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In the present number of this Journal the portrait appears of Dr. Edw. Schunck, F.R.S.

With regard to the Presentation to Dr. Schunck of the Society's Medal, attention may be directed to the July issue, page 621.

Changes of Address.

When notifying new addresses, members are requested to write them distinctly, and state whether they are temporary or permanent. Multiplication of addresses is also to be avoided as tending to create confusion. When sending subscriptions, the use of the form attached to the application helps in the verification of addresses, on which the safe delivery of the Journal depends.

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ANNUAL MEETING AND VISIT TO PARIS.

THE PARIS EXHIBITION.

J. LEWKOWITSCH.

The following notes merely describe the general impression gained by an all too brief inspection of those departments of the Paris Exhibition that interest the technical chemist. They must, therefore, be considered as not complete, but are intended to offer a general survey, to enable those who may visit the Exhibition, with the view of gaining information and instruction, to select for themselves its most salient features.

Naturally, the first visit will be to the section of chemistry and chemical arts, placed in the right wing of the main building in the Champ de Mars. It is admitted that the British Section is not representative of the chemical industry of this country. Important branches of the chemical arts, as, for instance, the principal electrochemical industries (*e.g.*, electrolysis of alkalis, manufacture of aluminium), the tar colour, and other industries are not represented.

The alkali, soap, candle, and perfume industries are, thanks to the leading firms, well to the fore. Indications of new processes are found in the chlorine compounds of the United Alkali Co., and in the bleaching powder and pure zinc (99·5 per cent.) manufactured by Brunner, Mond, & Co., according to Höpfner's process.

The industries of mineral colours and varnishes are well illustrated by several firms, who fully maintain the well-deserved reputation of British varnishes enjoy throughout the world. The exhibits are shown in a most instructive manner, and there is a rich collection of choice specimens of gums such as can rarely be seen together.

Fine chemicals—prominent amongst them, alkaloids—are being shown by the firms of Howards and Sons, London, Macfarlan and Co., Edinburgh, and T. and H. Smith and Co., Edinburgh.

Opposite the English is the German Section, which attracts attention by its artistic arrangement. The principle

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adopted by the German Committee is to illustrate, by means of a collection of the best preparations obtainable, the whole chemical industry of Germany. Makers' names do not appear on the labels describing the nature of the exhibits; nor can these names be ascertained from the catalogue (readily obtainable on application to the secretary in French and German) if the preparation happens to be manufactured by several firms. Thus the exhibits possess an extremely instructive and even educational character, and to anyone who studies them thoroughly they present, as it were, a vivid encyclopædia of chemical manufactures, each preparation speaking its own language, and recalling associations with known or new processes.

It is needless to say that the coal-tar colour industry is magnificently illustrated by the products made in Germany. The system of selecting the best preparations only for the Exhibition has brought together a collection of the finest and largest crystals of the various products, which are set out in a most attractive and artistic manner.

The exhibition of synthetic perfumes occupies one case in the centre, and no doubt it deserves this place, realising, as it does, some of the highest triumphs of organic chemistry.

In the centre of the section devoted to the alkali, acid, and salts industries, the Stassfurt industry is represented by a complete collection of the minerals found in the Stassfurt and neighbouring salt districts. They are placed on huge blocks of the native mineral, forming the basis for a central group of three goddesses in classic style—a welcome relief from the impressionist style in which much of the German literature and German structures appear to have been got up for this Exhibition. Blocks of aluminium and a huge mass of pure chromium illustrate the new thermo-industry (shown in experiments before the Society of Chemical Industry by the inventor himself. *See* this Journal, 1898, 543).

Photographic chemicals, pharmaceutical products, and the latest scientific medicaments fill several cases, in which also representatives of the new albumose and similar preparations (nutrol, &c.) may be seen.

Less striking are the exhibits of other industries, amongst which those involved in the manufacture of soap and candles are not represented, the toilet soapmakers having taken their products to the German perfumery department.

Following up the idea of having retrospective exhibits, the German Committee, under the auspices of the German Chemical Society, has brought together a complete collection of chemical manufactures discovered in Germany; labels bear the name of the inventor and the year of the discovery. The "*pièce de résistance*" is a collection of 63 elements which can hardly have been seen together before in any exhibition.

The fact that the French Section is chiefly housed in the upper floor makes it appear less important than it really is. On the lower floor there is a centennial exhibition of French chemical work which cannot fail to attract careful attention. The balance which Lavoisier used, the apparatus Gay-Lussac constructed, the porcelain retort in which Dumas distilled silver, are accompanied by a host of other historical apparatus and chemical preparations down to the most recent times—a worthy monument to labours of French chemists for the progress of both scientific and industrial chemistry.

The exhibition of chemistry and pharmacy on the upper floor is a truly magnificent one, and whilst in size it very greatly exceeds the German exhibition, it not only compares very favourably with the latter, but, in the opinion of the writer, greatly outshines it in many respects. Although the tar-colour industry may not be so complete as the German, the exhibits show that the French industry is well to the fore, and largely participates—to mention only one product—in the manufacture of artificial indigo. The soap, candle, sulphur, ultramarine, iodine, tartaric acid and gelatin industries, are magnificently represented by attractive specimens. The most striking exhibit in the whole section (amongst minor rarities, such as crystallised calcium, the radio-active substances of M. and Mdme. Curie, &c.) is the case of Chenal, Donilhet et Cie. We see here a very rich and beautiful collection of salts of the rare earths: cerium, praseodymium, and neodymium, lanthanum, thorium and samarium, not in small quantities, but in large crystals, in some cases in quantities of fully 10 lb. We further see the platino-cyanides of praseodymium, neodymium, thorium, and lanthanum, amongst a host of other splendidly crystallised salts of the rarer earths.

The exhibit of synthetic perfumes by De Laire, although somewhat smaller than the corresponding German exhibition, is a worthy companion to the latter.

De Laire's case, conjointly with the one occupied by Tanret—showing amongst other preparations, splendid crystals of the substances discovered by him—are but specimens of this department of the French pharmaceutical section, in which the chemist will find a very interesting collection of fine chemicals.

Of other countries, the Russian exhibition deserves full attention, especially the exhibits of the candle and allied industries by the two houses, Shukoff and Krestovnikoff Bros., both of whom explain in special pamphlets the nature of the scientific work that is carried on in their factories. Holland's most prominent case represents a collective exhibition of candles. Switzerland does not appear to have taken part in the exhibition of chemical products.

Metals, metallurgy, and the mining industry, have been housed in a special section of the left wing. The most striking exhibits in this very rich and instructive department are, perhaps, those of antimony (France), copper (United States), uranium (Austria), and amber (Germany). In the same section there is also shown machinery for mining and metallurgical operations. A converter for refining copper deserves attention. The German section is especially noteworthy for its machinery. Electro-metallurgy is also represented in this section. Aluminium, magnalium, carborundum, and Moissan's electric furnace (in the annexe) will readily attract the visitor.

Chemical apparatus for laboratories is well represented in the French and German chemical sections, and demand more than a passing glance. A complete chemical laboratory with elaborate fittings is shown in the Pavillon Ville de Paris, where a special section is devoted to Pasteur's work and discoveries.

The exhibition of physical apparatus is no less attractive, and will impress the observer by its wonderful completeness.

Chemical engineering does not appear to be so well represented as at the last Paris Exhibition. The French makers of machinery for the soap, candle, and perfumery trades are well represented, although to a much more modest extent than in 1889. In fact, the most prominent of these firms seems to lay chief stress on plant for making Chardonnet's artificial silk and weaving it together with natural silk. Of other machinery in the French section for chemical arts a large pasteuriser and a distilling apparatus for thick liquids are the most striking. In the German section prominence is given to the exhibits of apparatus of acid-resisting material. Acid towers—filled with Guttmann's perforated clay balls—large vessels and chemical machinery (mixing apparatus), all made of clay, and the new vessels of Platt and Pieperdink, built up of bricks and held together by an iron shell, as also the enamelled iron vessels of the Niederbronn firm, and to no small extent the wonderful exhibits of porcelain coils and other utensils by the Royal Porcelain Manufactory of Berlin, show in a very instructive manner to what an extent the chemical engineer has been able to supply and foster the special wants of a rapidly-growing industry. The exhibits of Doulton & Co., in the British section, although very interesting, do not equal in extent this small but very complete section of plant and apparatus for chemical industry.

Linde's apparatus for making liquid air, shown in the German section, will naturally be compared with Tripler's apparatus in the United States section. This leads to the study of ice machines in general, of which there are various systems illustrated in the exhibits of several countries, such as the systems of Fixary (France), and Lebrun (Belgium), both employing ammonia. It is noteworthy that the carbonic and sulphurous acid systems seem to find more favour on the continent than in this country.

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Apparatus for the gas industry, Coze's inclined retort, is shown chiefly in the French section of Chemical Arts.

The lighting industry, apart from electric lighting, brings acetylene installations very prominently to the fore in several pavilions along the Seine and in a large shed in the annexe at Vincennes.

Destructive distillation of wood is chiefly illustrated in collections of the products obtained; in the pavilion of forestry, however, drawings and photographs illustrate the installations required for this industry.

At the last Exhibition of 1889, the products of the petroleum industry were collected together in one large building. In the present Exhibition they are scattered through the buildings of the various countries where petroleum occurs. In order to obtain a somewhat complete idea one should visit the several stands of the Standard Oil Company in the United States sections, the Russian Pavilion near the Trocadéro (where Nobel Bros., and the Société Commerciale et Industrielle de Naphte Caspienne et de la Mer Noire exhibit a very instructive collection of models of apparatus and tank steamers), the Austro-Hungarian section (where Galician oils are shown) and the Roumanian Pavilion at Vincennes. The French refinery of Deutsch et Fils makes a very fine exhibit in the French Chemical section.

Apparatus for the production of sugar, from cane as well as from beet, is illustrated by a number of apparatus, chiefly vacuum vessels consisting of single and multiple effects, which do not seem to exhibit any novel feature. They are scattered throughout various departments and are chiefly to be seen in the section devoted to "Agriculture" and "Aliments." In the same section, to the left of the Salle des Fêtes, apparatus and machinery for brewing and for the distillation of wines and spirits are somewhat abundantly exhibited. The purification of spirits as carried out by the Russian Government is shown in an actual factory erected in a pavilion near the Eiffel tower.

Water purification and sanitation form a somewhat important object in the Exhibition. The Septic Tank system is prominently brought before the public by two working model installations.

The paper industry occupies a very prominent space in the Austrian and Norwegian sections. The French Viscose Company fills a case with its various products in the French Chemical section, where also celluloid and machinery for its manufacture are exhibited by Morane jun. The German section of the paper industry will also be found very interesting.

Machinery for the match industry appears to be confined to the Swedish and German sections, where very ingenious box making and packing machines are shown in operation.

One of the striking features of this exhibition is that transmission of power by means of belting and small steam motors seems to have taken a secondary place. Although the annexe of Vincennes is out of the way, it will well repay a visit, not only with the view of seeing a number of machine tools which have not found a place in the building in the Champ de Mars, but chiefly with a view to studying the various gas and petroleum motors which are destined to play an important part for very small industrial establishments, or for a kind of house industry that may come to the fore more prominently in the future. Special interest attaches to the Diesel motor, which is shown in various forms by French and German manufacturers, the principle being the generation of motive power by means of paraffin oil burned or exploded by compressed air. One maker of these engines guarantees a consumption of only 250 grms. of crude oil, costing 7 centimes, per horse power per hour.

A large space in the main building in the Champ de Mars is allotted to electricity, and it is this portion of the Exhibition which undoubtedly deserves the highest admiration. The enormous strides which electricity, as applied to practical purposes, has made during the last 11 years are shown in every form, from the largest dynamo to the very smallest electrical instruments, and are most ably represented. To what an enormous extent electricity is employed in the Exhibition may be gathered from the fact that the electric current is not only used exclusively for the lighting and decorative illumination of the place, but also for the driving of a very large number of machines in the smaller installations. According to an estimate, over 30,000 horse power has to be provided by the electric current. France was to generate about one half of this, whilst Germany was to provide about 7,500; the other countries, amongst which may be chiefly mentioned England, Switzerland, Belgium, and Austria, furnishing the remainder. The triphase current motors are very prominent, and it will certainly repay the time of every chemical engineer carefully to study the monster dynamos working in the Salle d'Electricité. The largest dynamo working in the Exhibition develops 3,000 horse power, at a pressure of 2,200 volts. It is coupled directly to the shaft of the steam engine, the magnet wheel of the alternating machine forming the fly wheel of the engine. The dynamo gives either single phase or three phase current, or both simultaneously. The largest dynamo in the world on the triphase principle is shown in the annexe of the German Exhibition by the Allgemeine Elektricitäts Gesellschaft, Berlin; it is stated to give 4,500 horse powers, and is one of nine motors working a continental light installation. As a steam engine large enough to drive this dynamo could not be erected in the Exhibition, it is running without a load, being driven by the small dynamo which would otherwise have acted as the exciter for the electro magnets. Too much space would be consumed in describing this most important section of the Exhibition in any detail, for here every country, including prominently this country, has done its best; but it will certainly be worth while for anyone who contemplates the erection of new works to consider the advisability of electric power, and in that case it will be of the highest interest to follow up the easy and elegant application of the electric current for the working of the various small and large machines shown in the several parts of the Exhibition.

Summing up one's impressions as regards the merits of the various countries in this peaceful competition, France seems to have concentrated her whole strength on the erection and the artistic design of the various buildings, which surpass anything ever seen before in the way of construction and arrangement. Of other countries Russia has made special efforts to prove in every department what progress industry has made in that country, and inferentially this shows how important it must be for manufacturers to cultivate the custom of a country, which is sure to play an important part in the coming century. Hungary also deserves to be specially mentioned. The palm, however, belongs to Germany, which has demonstrated in every section of the Exhibition, the enormous strides she has made in every branch of chemical industry, electricity, and engineering. Here we see the results of scientific training, which has slowly but irresistibly been working for the good of that country during the last half century, and it proves *ad nauseam* that chemical industry which springs from the teachings of the class-room and the instruction of the laboratory, is bound to triumph over the crude art and empiric inventiveness of the foreman.

Here is food for reflection, and it is bound to act as an incentive to everyone who has the progress of chemical industry in this country at heart. For the reward of such efforts cannot fail to come; indeed, it has come already. Even in the German section of machine tools we find a large number of exhibits marked "sold," with the number of repeat orders below—many of them for France. "C'est l'envahissement de l'Allemagne," as an engineering friend of the writer's said, whilst reluctantly but justly expressing his admiration of the success of his German competitors.

Errata.

In July number of this Journal, 1900, page 597, col. 1, lines 20 and 21 from top: *for* "Rockefellow" *read* "Rockefeller." Page 595, col. 1, line 22 from top: *for* "Elberfeldt" *read* "Elberfeld." Page 626, col. 1, line 29 from top: *for* "Thompson" *read* "Thomson."

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I.—PLANT, APPARATUS, AND MACHINERY.

PATENTS.

Distillation or Condensation [Crude Oils, &c.], and Apparatus therefor: Improved Method of ——. J. Fischer, Vienna. Eng. Pat. 13,225, June 26, 1899.

The elements of the condensing apparatus are hollow plates, which are arranged side by side, or one above another, so that the passages in the plates form zig-zag conduits for the vapours. The passages are preferably provided with baffle plates, and ribs or projections are formed on the exterior of the hollow plates, so that the cooling liquid can be circulated between them in a direction opposite to that of the vapours through the apparatus. Each chamber or compartment is provided with a trap, to retain the products condensed in it, and prevent them from passing out or mixing with the products condensed in the other elements. Two or more condensers may be connected in series, and one or more may be heated or cooled to a certain temperature, so that a product of a determined density can be obtained from each condenser. The products can be drawn off from the condensers in any suitable manner.—R. A.

Rotary Kilns: Impts. in ——. C. L. Carman, Chicago, U.S.A. Eng. Pat. 3812, Feb. 27, 1900.

The principal feature of this kiln consists in an arrangement by means of which the admission of cold air during the withdrawal of the calcined material is prevented. The kiln consists of a rotatable tube, preferably mounted on an inclined plane so as to cause the material to gradually descend from the inlet to the discharge outlets. Each of the discharge outlets opens into a pocket, which in turn opens into a second pocket, the outlets being provided with weighted swinging doors, and trolleys for opening and closing them. There is also a circular guide made in sections, separated, so as to furnish a discharging space between the sections, and adapted to open and close the gates automatically by the rotation of the kiln. By this device, the first pocket is closed before the second pocket is emptied, and thus the introduction of cold air is avoided. —H. H. B. S.

Kilns; Construction of ——. H. H. Lake, London. From C. Christensen, Kamfjord, Norway. Eng. Pat. 8150, May 2, 1900.

The heating chamber and hearth are in communication with the lower end of the downwardly extending chimney through flues of narrow section. Of these flues, those leading from the hearth towards the chimney communicate with air flues also leading into the chimney from the ash pit.—R. S.

Furnaces; Electric Smelting ——. H. Koller, Nuremburg, Germany. Eng. Pat. 8894, May 14, 1900.

A series of intermediate, disconnected electrodes, embedded in the mass treated, are mounted between two end electrodes at a suitable distance from the bottom of the furnace, with their longitudinal axes in the direction of the current lines, and their adjacent ends a suitable distance apart. In the interspaces below, is a series of disconnected electrodes the upper surfaces of which are recessed to form troughs to catch the molten mass. Means are provided for regulating the intensity and tension of the current independently of the stationary electrodes, and a carbon block suspended between their ends can be lowered between them as they become consumed. In a modification of the furnace there is a combination of superposed hopper-shaped electrodes arranged between the two current feed electrodes disposed one above the other, and insulated from each other, the lower smaller end of one hopper extending into the upper larger mouth of the hopper beneath.—G. H. R.

II.—FUEL, GAS, AND LIGHT.

Cannel and Shales; Notes on Carbonising ——, *for Gas-making Purposes.* S. Glover. J. Gas Lighting, **75**, [1931], 1286—1288.

When oil, cannel or shale is carbonised by itself, the volume of gas produced and its illuminating power both increase as the temperature of carbonisation rises, up to a certain temperature, above which the volume continues to increase, but the illuminating power decreases, though, for a time, not so rapidly as the volume increases. Consequently the gross illuminating value of the gas obtained continues to increase. At still higher temperatures, however, the illuminating power decreases more rapidly than the volume increases, and the gross illuminating value of the gas obtained begins to fall. In carbonising cannel or shale by itself, the most advantageous temperature is that which gives the maximum gross illuminating value of the gas. But when the cannel or shale is carbonised along with ordinary gas coal, the same temperature is not necessarily the most advantageous. Since the volume of gas obtained by carbonising the gas coal, is ample, the author is of opinion that the cannel or shale should be carbonised at that temperature which yields gas of the maximum illuminating power, or containing the maximum quantity of enriching hydrocarbons. He finds that this temperature is considerably lower than that by which the maximum gross illuminating value is obtained. In short, there is practical inconsistency in carbonising ordinary gas coal and cannel together.

Moreover, the products of the carbonisation of ordinary coal contain naphthalene and oils in amount equivalent to 10 to 14 lb. of naphthalene and 60 to 80 lb. of oils per 10,000 to 11,000 cubic feet of gas produced. The oils act as a powerful solvent on volatile illuminating hydrocarbons, and consequently absorb a large quantity of the latter from the gas produced from cannel or shale if it is mixed with coal gas prior to condensation. Therefore the author considers that cannel gas should be made apart from the coal gas, and added to the latter after condensation. The condensable products in the cannel gas will dissolve any naphthalene which remains in the coal gas. This method of separately carbonising cannel at a lower temperature than is used for the carbonisation of coal has been successfully employed at St. Helens for 2½ years.—J. A. B.

* Any of these specifications may be obtained by post by remitting 8*d.*—the price now fixed for all specifications, postage included—to C. N. Dalton, Esq., Comptroller of the Patent Office, Southampton Buildings, Chancery Lane, London, W.C.

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Peat; Utilisation of ——, *as Fuel, &c.* Oesterr. Zeits. für Berg- u. Hüttenw. 1900, **48**, 291. Chem. Zeit. Rep. 1900, **24**, 180.

ATTEMPTS to use peat as fuel and for gas-producing have failed on account of the difficulty of quickly and cheaply drying and compressing it. Peat usually contains about 75 per cent. of water. The difficulty of drying peat is removed by first destroying the fibre and then converting the material into a paste. The dried substance yields excellent charcoal. This process of preparing peat is worked on the large scale in Ontario. The peat comes into the market in hard cylinders, 8 × 5 cms.; when used as locomotive fuel it gives 93·25 per cent. of the heat produced by coal, but burns somewhat more rapidly. The cost of the treatment is about 2½ marks per (metric) ton.

—A. C. W.

Liquid Fuel in Metallurgical Furnaces in Russia; Use of ——. Eng. and Mining J. 1900, **69**, [25], 739.

THE methods of burning oil fuel may be divided into three main groups:—(1) Pan firing; (2) Drop firing; and (3) Forsunka, or spray firing. In pan firing the oil is burned in a number of rectangular cast-iron pans, mounted one above another in a hole in the furnace wall. In drop firing the oil is discharged in drops, or in a very fine stream, from a number of jets arranged in a row, or from a perforated gutter, at such a height that the descending oil becomes intimately mixed with air, and thereby burns thoroughly, rapidly producing a high temperature with less waste than in pan firing. The most widely used method of oil firing is that with the "forsunka" or atomiser (spray burner). The oil is reduced to the condition of spray either by steam or by compressed air. The burner consists of two concentric tubes, the inner one being usually the oil pipe, whilst the outer one is used to convey the steam or compressed air, which impinges on the oil issuing from the inner tube and converts it into spray, a very intimate mixture of the oil and air being effected in this manner. The "forsunka" system has the advantages that the length of the flame can be controlled, the supply of fuel regulated, and a wide range of temperature is attainable. The tubular form of burner, giving a conical flame, which was, at first, generally used for boilers, is now being replaced by a lenticular burner provided with two horizontal, longitudinal slits, the upper one discharging the oil, and the lower one delivering a current of steam. With this arrangement, a broad flat flame of any convenient length can be obtained. A similar form of forsunka is used for heating welding furnaces. The oil is delivered so as to flow down the inclined top surface of the burner, and on reaching the bottom of the slope, is caught up and sprayed by the compressed air discharged through a narrow underlying slit.

When it is required to heat uniformly a large chamber, the most suitable form is the tubular forsunka with spiral jet, wherein a whirling motion is imparted to the steam or compressed air, whilst the flame takes the shape of a cone. Tubular forsunkas are used in all kinds of smelting furnaces for the production of forged iron, also in puddling furnaces, open-hearth steel furnaces, and crucible steel furnaces. The smelting furnaces are constructed on the same lines as the Siemens regenerative furnaces for heating with coal-gas. The Martin (open-hearth) furnaces have four generator chambers, the two outer ones being heated alternately with the oil fuel, whilst the inner pair serve as air-heaters.

For the past few years the system of blowing the oil directly into the smelting furnace has been followed by favourable results. The furnace has an arched roof and two air-heating chambers. Five burners are provided, two at each end of the arch, and one in the centre. The latter works continuously, whilst the others are worked alternately in pairs. To prevent the burners being melted by the heat, they are surrounded by cooling jackets built in the arch.

—A. S.

Acetylene; Hydrogenisation of ——, *in presence of Copper.* P. Sabatier and J. B. Senderens. Comptes Rend. **130**, [23], 1559—1561.

WHEN acetylene and hydrogen are passed together over reduced copper, combination takes place (at 130° C. with copper reduced at a low temperature from the hydroxide; at 180° C. or above with that reduced from the oxide), the products varying with the proportions of the gases. With four volumes of hydrogen to one of acetylene the products contained about 5½ per cent. of olefines, 25 per cent. of ethane, and nearly 70 per cent. of unchanged hydrogen; with two volumes of hydrogen to one of acetylene, the proportion of olefines rose to 28·4 per cent., the amount of ethane was 12·9 per cent., and that of hydrogen 58·7 per cent.; with equal volumes of the gases, the product contained 2·0 per cent. of acetylene, 43 per cent. of olefines, 1·8 per cent. of ethane, and 53 per cent. of hydrogen, but with these proportions there was also a considerable formation of the solid hydrocarbon *cuprene* (this Journal, 1900, 230), formed by the direct action between copper and acetylene.—J. T. D.

Acetylene; Hydrogenation of ——, *in presence of Reduced Iron or Cobalt.* P. Sabatier and J. B. Senderens. Comptes Rend. **130**, [24], 1628—1630.

WHEN a mixture of acetylene and hydrogen is passed over reduced iron, action begins about 180° C., and a considerable amount of yellowish liquid products is formed. The issuing gas is chiefly hydrogen, with small amounts of unchanged acetylene, ethane, ethylene, and higher olefines. If the proportion of acetylene in the entering gas be increased considerably, the iron acts directly on it, breaking it up almost completely into carbon and hydrogen.

With cobalt instead of iron, the initial temperature of reaction is about the same, but the gaseous products contain about 27 per cent. of ethane and 70 per cent. of hydrogen, the rest being benzene vapour and unchanged acetylene. The liquid products seem to be almost entirely paraffins. With a large proportion of acetylene the same decomposition is effected by cobalt as by iron.

In regard to their action on acetylene or hydrogen, the four metals, nickel, cobalt, copper, and iron, are in descending order of activity, hydrogenation to ethane being easiest and most complete with nickel, while iron forms scarcely any ethane, its products being chiefly ethylene and its homologues.—J. T. D.

Acetylene, Action of ——, *on Cuprous Chloride dissolved in Potassium Chloride.* Chavastelon. Comptes Rend. **130**, [24], 1634—1636. See this Journal, 1898, 745.

ACETYLENE, acting on cuprous chloride in potassium chloride, gives sometimes a crystalline yellow precipitate, sometimes an amorphous violet precipitate, and (when the action of the gas is prolonged) colourless crystals. The author finds that the violet precipitate is the substance $C_2H_2Cu_2Cl_2$, Cu_2O, and that its formation is prevented by the presence of a sufficient quantity of hydrochloric acid—a quantity varying from 0·334 per cent. at 72° C to seven times that amount at 8° C. When acetylene is bubbled slowly through the saturated and sufficiently acidified solution of cuprous chloride in potassium chloride, the yellow crystals are first formed and are gradually transformed into the colourless crystals. The latter are formed at once if the acetylene be introduced with sufficient rapidity, and are in their turn converted into the yellow crystals if the acetylene be gradually expelled by a current of carbon dioxide.—J. T. D.

Mantles; Self-igniting Gas ——. Killing. Zap. imp. russk. techn. obschtsch. 1900, **34**, 837; through Chem. Zeit. Rep. 1900, 188.

ACCORDING to the author's process a fabric of platinum wire and cotton is sewn or woven into an incandescent mantle, impregnated with a thorium salt, and dried. A mixture of 2 parts of thorium nitrate with 5 parts of platinic chloride yields a very permanent sponge after "burning off," which is particularly effective in firing a stream of gas containing oxygen.—F. H. L.

Naphthalene, The Presence of ——, *in Coal Gas: its Detection and Extraction.* W. Irwin. J. Gas Lighting, **75**, [1931], 1282—1284.

NAPHTHALENE, when condensed from the state of vapour, forms white thin rhomboidal crystals, of which one cubic

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foot weighs only ¼ oz., according to Roscoe and Schorlemmer. One ton of coal yields on carbonisation as much as 13 lb. of naphthalene. Coal gas, as it leaves the retorts, apart from water and sulphur and ammoniacal constituents, may be regarded as consisting of: (1) gases, each of which is a permanent gas at the ordinary temperature; and (2) condensable constituents, which are bodies liquid or solid at the ordinary temperature. The condensable constituents, after the gas has left the retorts, mostly condense to form tar, but they also remain in the gas in considerable quantities, dependent on the proportional amounts in the original gas and their vapour tensions. The annexed table shows the amounts of condensable constituents produced by the carbonisation at high temperatures of one ton of Lancashire coal.

Names, with Formulæ and Boiling Points.	1. Total Weights.	2. Amount in Tar.	3. Amount in Gas.	4. Vapour Tension at 15° C.	5. Illuminating Power of the Gas due to the Presence of each Constituent (approximate).	6. Additional Gain to the Illuminating Power of the Gas if each of the Lighter Constituents was transferred from the Tar to the Gas.	7. Percentage of Gas saturated with each Product (approximate).	8. Solubility in 1,000 parts of Water.
	Lb.	Lb.	Lb.	Mm.	Candles.	Candles.	Per Cent.	
Benzene	18·80	0·8	18·00	61·00	8·60	0·40	10·1	1·45
Toluene	6·70	0·7	6·00	19·40	3·00	0·35	8·9	0·57
Three xylenes	1·40	1·0	0·40	6·30	0·20	0·60	1·6	0·12
Three cumenes	0·50	0·3	0·20	1·50	0·10	0·16	2·8	..
Higher methyl derivatives of benzene.	0·20	0·1	0 10	0·40(?)	0·05	..	5·7	..
Naphthalene	13·15	13·0	0·15	0·03	0·10	..	70·0	..
Phenol	1·00	1·0	..	..	..	..	..	50·00
Three cresols	0·80	0·8	..	..	..	..	..	20·00
Pyridine and lower methyl derivatives (117°—140° C.).	0·30	0·3	..	..	..	..	..	Very soluble.
Phenanthrene ($C_{14}H_{10}$, 340° C.)	1·00	1·0	..	..	..	..	..	..
Anthracene ($C_{14}H_{10}$, 360° C.)	0·30	0·3	..	..	..	..	..	..
High boiling oils	22·70	22·7	..	..	..	..	..	..
Pitch	93·00	93·0	..	..	..	..	..	..
Totals	159·85	135·0	24·85	..	12·05	1·51	99·1	..

Note.—The pyridine and phenol, though having comparatively low boiling points and vapour tensions, do not appear in the gas, as they are extracted along with the ammonia salts, they being very soluble in water. The values for illuminating power were determined by means of the ordinary No. 4 union-jet burner. With the Argand burner, the figures in column 5 would be something over half those given above, and those in column 6 would be considerably less than half.

It will be seen from the table that the primary aromatic bodies, benzene and naphthalene, are present in relatively large quantity, while the methyl derivatives of benzene are found in increasingly smaller proportion as the methyl groups in the molecule become more numerous. The author confirms the fact that high temperatures of carbonisation mean the production of benzene and naphthalene at the expense of the methyl derivatives, the vapour tensions of some of which lie near that of naphthalene. These derivatives would be deposited along with and dissolve naphthalene, but as the quantity of them in the gas has been decreased by the gradual rise in the temperatures of carbonisation, the concomitant increase in deposits of solid naphthalene is accounted for. Moreover, only a small proportion of the gas is saturated at ordinary temperatures with benzene and its lighter derivatives, and the remainder is for the most part saturated with naphthalene. When all the hydrocarbons named in the table are extracted from the gas, its illuminating power falls to about 1 candle in a No. 4 union-jet burner, or about 9 candles in the standard Argand. The transference to the gas of everything of illuminating value in the tar would not increase the illuminating power of the gas under ordinary conditions of testing (*i.e.*, with the standard Argand) by more than 0·6 candle; hence it is futile to attempt to raise appreciably the illuminating power of gas merely by changes in the method of condensation. The material solubility of benzene in water, as shown in the table, accounts for the loss of illuminating power when gas is passed through a wet meter until the water has become saturated.

The author has found that gas at 25° can contain 0·45 lb. of naphthalene per 10,000 cb. ft., but at 15° only 0·15 lb. Hence, to take an extreme case, 0·3 lb. of naphthalene would be precipitated if the gas were sent from a holder at 25° into mains at 15°. If, however, the gas is subjected to adequate condensation at the works, naphthalene deposits appear to be entirely dependent on the climatic variations, either diurnal or annual.

The condensable bodies can be extracted from coal gas by washing it with heavy tar oil or blast-furnace oil. The author estimated the naphthalene in Burnley coal gas by passing a large volume through benzene (or toluene), fractionating the latter, and crystallising out the naphthalene from the last residue by cooling. 10,000 cb. ft. of gas were found to contain 0·13 lb. of naphthalene. This method of estimation gives approximate, but sufficiently accurate, results for comparative purposes. Heavy tar oil absorbed naphthalene from gas until it contained 10 per cent. Hence from 13 to 40 galls. of the oil were required, according to the temperature, to extract the naphthalene from a million cubic feet of coal gas. The addition to the oil of 8 per cent. of benzene prevented the illuminating power of the gas being diminished by the treatment with the oil. The low-boiling hydrocarbons may be recovered for future use from the oil which has been used in the process. A washer about half the size of that used for ammonia extraction is a suitable apparatus for washing the gas with the oil. The process has been used at the Burnley gasworks, and the cost has been only a fraction of a penny per 10,000 cb. ft. of gas treated.—J. A. B.

Keneval Coking Process. Eng. and Mining J. 1900, **69**, [26], 764.

See under III., *page* 727.

Antiseptic [Petroleum Waste] for Impregnating Railway Sleepers and Wood for Building Purposes; Alkaline Waste Liquors of Petroleum Works, and their Use for Making an ——. K. W. Charitschkoff. Chem. Ind. 1900, **23**, [11], 197.

See under IX., *page* 747.

Ethylene and Benzene in Gaseous Mixtures; Separation and Estimation of ——. E. Harbeck and G. Lunge. Zeits. anal. Chem. 1900, **39**, [4], 239.

See under XXIII., *page* 779.

PATENTS.

Gas Producers. F. Radcliffe, Plumstead. Eng. Pat. 15,662, July 31, 1899.

THE air, or mixture of air and steam, for the production of the gas is to be admitted directly into the midst of the

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incandescent fuel, and not at the top or bottom, and the gas generated is drawn off through ports in the wall of the producer, between the top and bottom, so that it has to pass only through the hottest mass of fuel. The producer described has, centrally suspended within its fuel chamber, a water-jacketed pipe, provided at intervals with small tuyères, through which air, or air and steam, is blown into the midst of the fuel, and the wall of the chamber is provided at intervals round the lower end of the water-jacketed pipe with gas exit ports.—H. B.

Gas Producers. E. J. Duff and The United Alkali Co., Ltd., Liverpool. Eng. Pat. 18,581, Sept. 14, 1899.

This relates to the grates of gas producers, more particularly such as are described in Eng. Pat. 7467 of 1893, and is designed to prevent obstruction on the bars of the grate, through the caking of fine dust. The bars of the grate are connected in the form of grids, which are inclined to each other, forming a grate of inverted V-form. The upper edges of the grids lie against a bearing in which is a spindle, provided with a hammer or hammers, and outside the producer is a lever, connected with the spindle. By moving the lever the hammer is caused to strike the tops of the grids on one side or the other, thus breaking up and dislodging any caked material on them.—H. B.

Gas Producing Apparatus; Superheaters to be used in connection with ——. E. J. Duff and The United Alkali Co., Ltd., Liverpool. Eng. Pat. 18,582, Sept. 14, 1899.

The inventors describe a superheater for use in connection with gas-producing apparatus, the said superheater consisting of pipes connected alternately at top and bottom, and provided with dust boxes, and an inlet and outlet for the gases. The pipes referred to are encased in a chamber, provided with an inlet and outlet for air and steam, and with baffle plates, so that the air and steam pass through the chamber in contact with the pipes in a direction the reverse of that taken by the gases. The dust boxes form the connections at the bottom of the intermediate pipes.—H. B.

Coal Gas; Process and Apparatus for the Manufacture of ——. E. Besemfelder, Charlottenburg, Prussia. Eng. Pat. 13,830, July 4, 1899.

There is claimed a "process for the complete gasification of coal and other carbonaceous material," in which the red-hot coke, as it comes from the gas retorts, is utilised before it has had time to cool, for making water-gas, carburetted if desired; the heat with which the water-gas leaves the generators is used for gasifying the coal, by conducting the gas from the generators directly into the retorts, where it mingles with the coal-gas evolved; and the retorts are heated externally by the waste gases obtained from the water-gas generators during the preliminary heating-up stage. The plant described and claimed is designed for the continuous and almost automatic working of the process: it consists essentially of a number of revolving retorts, provided with mechanical feeding devices; a group of water-gas generators placed at a lower level near the discharge end of the retorts; and a coke distributing appliance situated over the centre of the group of generators.—H. B.

Gases; Filtering and Purifying Hydrocarbon ——, *and Filtering Bodies therefor.* J. H. Exley, Huddersfield. Eng. Pat. 15,239, July 25, 1899.

Clay, porcelain, or other suitable earth, is mixed with a finely divided combustible substance, such as sawdust, and after kneading into a suitable shape is burned in a kiln, so as to yield a porous earthenware body. This body is used as a filter for such gases as coal-gas, acetylene, &c., for the removal of benzene vapours, coal-tar, and other suspended solid or liquid impurities. The porous body may be saturated with sulphuric or other suitable acid, for the absorption of ammonia, moisture, &c.—H. B.

Gas for Illuminating and other Purposes; Process of and Apparatus for the Production of ——. F. Schwander, Durlach, Germany. Eng. Pat. 16,147, Aug. 8, 1899.

The patentee claims a method of producing a combustible gaseous mixture, consisting in passing ordinary moist air (*i.e.*, atmospheric air, which may be moistened, if too dry, by bringing it into contact with water) over calcium carbide and then carburetting the resultant mixture of air and acetylene by passing it over a volatile hydrocarbon.—H. B.

Producer Gases and Apparatus therefor; Treatment of ——. E. J. Duff and The United Alkali Co., Ltd., Liverpool. Eng. Pat. 18,580, Sept. 14. 1899.

This relates more particularly to apparatus for cooling producer gases after they have been freed from tar and ammonia. The cooler or "heat interchanger," down which the gases pass after leaving the ammonia scrubber, consists of a tower of alternately arranged, superposed, larger and smaller chambers, the larger of which contain numerous vertical tubes which open, through the dividing plates, into the smaller chambers. The hot gases pass down through these tubes and the smaller chambers, while a stream of water, entering at the bottom of the tower, flows upwards, surrounding the tubes in the larger chambers and passing from one to another of the latter chambers through central pipes arranged within the smaller chambers. The cool gases issue from the foot of the apparatus, and the heated water flows from the top of it to a tower where it meets an ascending stream of air, and gives rise to a mixture of hot air and water vapour, which is led to the producer. Water-lute arrangements for cutting out the apparatus when repairs are necessary, are described and claimed.—H. B.

Illuminating Gas; Improved ——. S. Koopman, London. Eng. Pat. 19,281, Sept. 26, 1899.

Mineral oils ("including all kinds of petroleum, from the lamp oil to the heaviest") are decomposed in heated cast-iron retorts, the gas being purified before use. The retort consists of three parallel, horizontal branches, two lying side by side and the third being superposed. All three are connected together at the back. The oil is dropped into the two lower branches and the third serves as a superheater.—H. B.

Combustible Gas from Refuse Sweepings, Waste Products, and the like, Free from Carbon Monoxide, with or without Simultaneous Production of Cyanogen Compounds; Process for the Production of ——. O. Imray, London. From G. Ottermann and Co., and V. Loos, Vienna. Eng. Pat. 6625, April 9, 1900.

In the process claimed, the refuse, &c., is heated in fireclay retorts to 700°—800° C., the gases generated being then led into contact with "heated neutral substances, such as paper ashes, in one or more other retorts, so as to become heated to the dissociation temperature, after which they are brought into contact with coke or other carbonaceous materials, for effecting their conversion." The gases may then be brought into contact with a heated mixture of alkali carbonates and carbon or carbon and iron, for the purpose of producing cyanogen compounds from the nitrogen contained in the gases.—H. B.

[*Water-*] *Gas; Apparatus for the Manufacture of* ——. H. Pettibone, New York. Eng. Pat. 7423, April 21, 1900.

This relates to water-gas producers in which the air-blast is applied alternately from above and from below. The producer is combined with two superheaters, one of which is connected with a pipe from the top of the generator, the other being similarly connected with the bottom of the generator. Gas-outlet pipes and air and steam supply pipes are connected with the discharge end of each superheater.—H. B.

Gases; Apparatus for the Fractional Scrubbing and Washing of ——. W. Young, Peebles; S. Glover, St. Helens; and T. Glover, West Bromwich. Eng. Pat. 17,620, Aug. 31, 1899.

To obviate certain defects in the apparatus as originally constructed, the caps are provided with wire stems passing

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downwards through the passages, and with eyes fixed centrally upon the top. By means of these eyes and suitable connecting wires, the caps are flexibly connected together in a single group or a plurality of groups, so that each may participate in the movement of the others. In the original type of apparatus, however, a sudden rush of gas was liable to blow some of the caps out of position, thus allowing the gas to escape without being properly treated. In order to prevent solid matter in mechanical suspension in the gas from depositing on the tops of the caps and thus load them so that they fall out of action, it is proposed to form the openings through the tubular extensions with a wider diameter at the bottom than at the top, whereby the velocity of the gas is increased to such an extent, that it impinges against the undersides of the caps with sufficient force to allow the suspended matter to deposit.—D. B.

Acetylene Gas Generators and Holders. J. B. Holmes, Minneapolis, U.S.A. Eng. Pat. 13,962, July 6, 1899.

CARBIDE is introduced on to a grate by the rotation of a conical hopper by hand, and is then sprayed with water intermittently, according to the movements of the gasholder which receives the gas evolved. The gas passes through a washing chamber, and safety escape pipes are provided at various points of the apparatus.—J. A. B.

Acetylene Gas Generator. M. Moses, Cologne. Eng. Pat. 16,194, Aug. 9, 1899.

ATTACHED to the crown of a gasholder is a chamber which contains a carbide holder, to which water gains access when the bell descends to a certain extent, provided a valve, actuated externally, is open. The amount of water in contact with the carbide is automatically controlled by the pressure of the gas in the chamber.—J. A. B.

Acetylene Gas Generator and Apparatus. L. Partl, Budapest. Eng. Pat. 16,235, Aug. 9, 1899.

CARBIDE is delivered into water from a receptacle, supported above the level of the water in a tank, through a valve operated through the gas pipe which conveys the gas generated into the gasholder, to the crown of which the pipe is attached. The bell of the gasholder floats in an annular tank, within which the generator is located.—J. A. B.

Acetylene; Apparatus for Generating ——. C. Schnitzler, Berlin. Eng. Pat. 17,396, Aug. 28, 1899.

A SPROCKET wheel, which is rotated by the movements of the bell of the gasholder, drives an endless chain, provided with pins which release flaps, which thereupon discharge carbide into water contained in a number of generators, in succession.—J. A. B.

Acetylene Gas Generating and Storing Apparatus. E. Björnrud, Christiania. Eng. Pat. 19,036, Sept. 21, 1899.

CARBIDE chambers, the bottoms of which are hinged flaps, are arranged above water in a generator, so that the flaps are opened in turn by mechanism actuated by the bell of the storage gasholder.—J. A. B.

Acetylene or other Gas; Apparatus for Generating ——, *Operating Automatically.* G. A. Hervieu, Nanterre, France. Eng. Pat. 2631, Feb. 9, 1900.

CARTRIDGES containing carbide are discharged in turn through guide ways into a generating tank, where they are opened by mechanism actuated by the gasholder. The spent cartridges are ejected by mechanism similarly actuated. —J. A. B.

Acetylene Gas; Apparatus for Generating ——. R. Morin, Quebec, Canada. Eng. Pat. 7539, April 24, 1900.

GENERATORS, containing carbide baskets, rest on a false bottom in a tank, and are fed with water through sprinklers operated by a gasholder bell, which floats in the tank, and operates also water supply services and a safety valve. —J. A. B.

Carburet of Calcium; Manufacture of ——. J. Bilbie, London, and J. A. Wanklyn, New Malden. Eng. Pat. 8311, April 20, 1899.

A FURNACE or crucible is constructed of an outer casing of iron with an inner lining of quicklime, and within it is placed a central pedestal or block of quicklime supporting a central vertical gas pipe formed also of quicklime, but protected in its upper part by an iron casing. The furnace is partly filled with a mixture of powdered quicklime and pulverised carbon, a layer of glowing coke is placed on the top, and a blast of oxygen is directed downwards upon the coke through the central tube.—R. S.

Calcium Carbide or Magnesium Carbide; Impts. in and Apparatus for or Connected with the Manufacture or Production of ——. C. J. Wollaston, London. Eng. Pat. 15,306, July 25, 1899.

THE constituents employed are heated in special furnaces first by an oxidising flame to heat up the furnace and charge, and afterwards by a non-oxidising flame to effect the actual conversion. To the ordinary ingredients employed may be added one or more of the following materials:—finely-powdered calcium sulphate, kieselguhr, and pulverised dolomite. The different gases employed—hydrogen, oxygen, water gas, and hydrocarbon gas—are contained in separate holders connected to the furnace by tubes having valves, and are forced by blowers through blow pipes into or on to the charge within the furnace. The furnace has a rising and falling bottom part which can be moved into and out of position by mounting it upon a carriage running upon rails. The front of the furnace, when in operation, is preferably closed by a slab operated by a lever. In one form the ingredients are placed in crucibles within the furnace.—R. S.

Carbide of Calcium, An Impt. in the Method of Preparing ——. C. H. Worsnop, Halifax, Yorks. Eng. Pat., 16,763, Aug. 18, 1899.

CALCIUM carbide is impregnated with a composition formed of the following ingredients: wax (preferably paraffin wax), cocoa butter, and sugar. The composition is called "acetyloid," and will only develop acetylene when under pressure.—R. S.

Calcium Carbide; Manufacture of ——. W. Rathenau, Berlin. Eng. Pat. 6038, March 31, 1900.

RAW materials containing iron or other metals or oxides are added to the mixture of lime and carbon in suitable proportions so as to yield simultaneously a high percentage of carbide of calcium together with a compound of silicon and iron containing 20 to 25 per cent. of silicon which is eminently suitable for industrial purposes; or, instead thereof, the following metals and metallic compounds may be employed:—copper, oxide of copper (brass, bronze, silicon bronze), manganese, its oxides or alloys, oxide of chromium &c.—J. H. C.

Catalytic Activity; Process for the Production of Substances of great ——. O. Efrém and J. Klandy, both of Vienna. Eng. Pat. 14,339, July 11, 1899.

THE substances which are produced are suitable for the automatic ignition of combustible gases or vapours mixed with air, or generally for producing increased velocity of reaction in mixtures of several bodies, as in the production of sulphuric anhydride, chlorine, formaldehyde, &c. The substances are formed by treating a refractory body (such as meerschaum, clay, or the like) with powerful acids (such as aqua regia, sulphuric acid, &c.) for the purpose of removing or preventing the formation of fusible or hygroscopic salts, washing the substance, mixing it with a platinum salt, and with an organic substance such as sugar (which serves for reducing and increasing the porosity), and with a volatile acid such as hydro-fluosilicic acid, or hydrofluoric acid which etches the particles, accelerates the reduction, and acts to harden and bind the mass. The mixture thus produced is finally moulded, dried, and freed by heating from all volatile constituents. To produce a body of only a small degree of firmness, but of great porosity, large

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quantities of volatile solid substances, such as ammonium or mercury salts, or organic acids are used instead of the volatile acid. To further increase the porosity, the latter substances may be added to the material prepared according to the first method.—R. S.

III.—DESTRUCTIVE DISTILLATION, TAR PRODUCTS, PETROLEUM.

Keneval Coking Process. Eng. and Mining J. 1900, **69**, [26], 764.

The Keneval coke ovens in use at Knoxville, Tennessee, U.S., have each a capacity of 20 tons, and have the following interior measurements:—Length, 21 ft. 6 ins.; height, 12 ft.; and width, 20 ins. The draught is regulated by doors below the grate bars, and a cover on the up-draught chimney, with which each oven is connected. In some recent experimental tests with slack (containing a little over 3 per cent. of sulphur) from the Brushy Mountain mines, the following yields were obtained per ton (2,000 lb.) of coal:—Coke, 1,500 lb.; ammoniacal liquor, 15 lb.; sulphur, 60 lb.; coal tar, 25 galls.; "some sulphurous acid," and 10,000 cub. ft. of gas. One third of the gas was used for consumption in the oven. The conversion into coke was fully completed in about 40 hours; and the resulting product had the composition:—Moisture, 0·08; sulphur, 0·81; fixed carbon, 92; ash, 5·77; and volatile matter, 1·34 per cent.—A. S.

Unsaturated Hydrocarbons; [Phenol from Benzene]; Action of Hydrogen Peroxide on ——. C. F. Cross, E. J. Bevan, and T. Heiberg. Ber. 1900, **33**, [13], 2015—2018.

When acetylene is passed into a vessel containing a dilute solution of hydrogen peroxide, in which a little ferrous sulphate is dissolved—the temperature being maintained at 50°—70° C.—the main product of the reaction is acetic acid. When using 50 c.c. of peroxide solution, and passing in acetylene until all the peroxide has disappeared, the quantity of acid formed varies from 0·24 to 2·28 grm. of $C_2H_4O_2$, as the strength of the peroxide solution rises from 0·50 to 11·54 per cent. The only other products separated are acetaldehyde and alcohol, both in very small proportions.

On heating 10 grms. (1 mol.) of benzene to 45° C. in a reflux apparatus with 500 c.c. of dilute hydrogen peroxide (2 mols.) solution and 1·5 grms. of crystallised ferrous sulphate, and after some hours, distilling off the unchanged benzene (2·3 grms.) remaining, the residue was found to contain 1·5 grms. of phenol, 3·5 grms. of pyrocatechol, a small quantity of hydroquinone, and 1·75 grms. of a brown, amorphous product. The last-named yields, with caustic potash at 200°, mainly pyrocatechol, and readily takes up 3 atoms of bromine with the formation of a crystalline derivative.—T. H. P.

Anthracene; Purification of ——. Actien. Ges. für Theer- u. Erdöl-Ind.; Chem. Zeit. **24**, [45], 491. Ger. Pat. 111,359, April 8, 1899.

In the following process crude anthracene is separated from phenanthrene by melting and partial crystallisation; carbazole is removed by treatment with caustic potash and any remaining phenanthrene is dissolved out with benzene.

The crude material is poured in the molten state into a well-isolated metallic vessel, capable of holding 2,000 kilos., and is there allowed to cool slowly. When about half has crystallised, an aperture in the base of the vessel is opened, and the molten portion run into another similar vessel, in which it is cooled and partially crystallised. The anthracene-content of this second crop of crystals is brought up to the same as that of the first crop, *viz.*, 45—50 per cent., by remelting, &c. The next stage consists in heating the purified material in a cast-iron vat, provided with stirring gear, and running into the stirred, molten mass at a temperature below 260° C., a slow stream of hot, 50 per cent. caustic potash solution in sufficient quantity to unite with all the carbazole present, the amount of which has been previously determined. The liquid separates into two layers, the lower one, consisting of the potassium derivative of carbazole, is run out through a tap, after which the upper one is allowed to flow into a vessel, where it is cooled until its temperature is just above the melting point of anthracene. It is then brought into another vessel provided with stirring gear and condenser, in which it is heated with its own weight of 90 per cent. benzene. The undissolved pale brown powder, after pressing, consists of approximately 90 per cent. anthracene.—E. H. T.

Petroleum; Roumanian ——. L. Edeleanu and G. A. Filiti. Bull. Soc. Chim. **23—24**, [10], 382—403.

The fractions yielded by an oil from Berka having exhibited a higher sp. gr. than that corresponding to hydrocarbons of the methane series, the authors endeavoured to eliminate the unsaturated compounds by the nitration method, and obtained the following products:—

Fraction 25°—50° C.:—None, fuming nitric acid having no action. Fractions from 50°—55° C. to 80°—85° C. furnished nitrobenzene in increasing quantities, the last fraction also yielding *m*-dinitrobenzene under more energetic treatment. The succeeding fractions up to 95°—100° C. also gave the same products, together with orthomononitrotoluene and dinitrotoluene (1.2.4), these latter being furthermore obtained from the fractions 100°—115° C. In addition, the fractions up to 130° C. gave trinitroxylene; and trinitromesitylene was isolated from the product of the fraction 170°—180° C. Similar results were obtained, in varying degree, from other Roumanian oils.

The distillates below 150° have generally a characteristic disagreeable odour, for the most part removable by sulphuric acid; the purest distillate of this class was obtained from Campeni-Parjol oil. The oils from Sarata-Tohani, Matita-Glodeni, Recea, and Lucacesti gave the smallest proportion (under 10 per cent.) of light distillates, over 20 per cent. being obtained from Predeal, Slobozia-Vrajitorea, Poiana-Verbilau, Apostolache, and Casin oil; the remainder yielded between 10 and 20 per cent. The heaviest burning oil was furnished by Sarata-Tohani, Pacureta-Matita, and Gura-Ocniti crude, the lightest by Campeni-Parjol, Casin, Poiana-Verbilau, and Plopeni oil The highest flashing point (56° C.) was exhibited by Campeni-Parjol burning oil; and the crude oil from this place also gave the highest percentage of burning oil, and of paraffin (29·20 per cent. of the heavy oil). Of the last-named product, the heavy fractions of Casin yielded 18·18—25·55 per cent.; Pradeal, 18·55 per cent.; Lucacesti, 15·36—17·42 per cent.; Recea, 17·14 per cent.; and Campena, 17·04 per cent. The paraffin in Predeal oil can be very easily extracted.

The most viscous fractions above 300° C. were those from Gura-Ocniti (6·26), Tintea (7·43), Bustenari (5·84), and Pacureti oil (5·92).—C. S.

Petroleum Mineral. Lidoff. Ber. russ. phys-chem. Ges., **31**, 780; Chem. Rev. Fett- u. Harz-Ind. **7**, [6], 117.

The author recently examined a very hard petroliferous rock, found at Baku at a depth of about 130 m., accompanied by petroliferous loam and sand, and consisting to a large extent of mussels. The colour is dark brown, the sp. gr. 1·195 (at 15° C.), the composition being as follows: Hydroscopic moisture and matters volatile below 100° C., 0·37 per cent.; organic matter, 7·24 (of which 5·2 is soluble in petroleum spirit); sand, 35·41; calcium oxide, 25·01; carbon dioxide, 20·13; sulphur trioxide, 0·81; iron and alumina, 8·78; chlorine, 0·045; phosphorus-pentoxide, 0·087 per cent. Qualitative reactions indicated a small proportion of alkalis; no iodine or nitrogen could be detected.—C. S.

Mineral Oil Industry; Utilising Waste Products of the ——. [Soap Making.] R. A. Wischin. Zeits. angew. Chem. 1900, [21], 507—511.

Reviewing the various methods proposed since 1879, the author is of opinion that the largest field open for the utilisation of the naphthene acids from petroleum refining is in the manufacture of soap. Even at the present time when

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only a small proportion of these acids can be included in soapmakers' formulæ, owing to the fact that they form soft soaps exclusively and are of disagreeable odour, the amount so consumed is about 35,000 poods per annum. If the acids could be modified in such a manner as to furnish solid compounds with alkalis, they would play a great part in the soapmaking industry.—C. S.

Creosote; Valuation of ——. A. D. Hall. Analyst, 1900, **25**, 148.

See under XXIII., *page* 779.

PATENTS.

Mineral Wax from Bituminous Lignite; Manufacture of ——. E. von Boyen, Hamburg. Eng. Pat. 5999, March 30, 1900.

The claim is for the manufacture of a wax-like substance consisting of an acid and an unsaturated hydrocarbon, from bituminous brown-coal. The coal is treated by steam or by suitable solvents such as benzine, solar oil, and the like to obtain bitumen and the latter is changed into mineral wax by single or repeated distillation with superheated steam in a partial vacuum.—D. B.

IV.—COLOURING MATTERS AND DYESTUFFS.

Insolation of Colours under Coloured Glasses. A. Scheurer. Rev. Gén. des Mat. Col. 1900, **4**, [6], 192—193.

Several experiments have been made in order to determine the action of different coloured solar rays on various colours, but no trustworthy results have been obtained. Investigators appear generally to have assumed that red, yellow, or green glasses, only allow rays of these particular colours to pass through. This, however, according to the author, is only true in the case of red glass. He has examined photospectrometrically red, orange, yellow, green, and blue glasses by diffused light, and represents, by means of a plate, the nature and quantity of the light transmitted and absorbed by each particular colour. With the exception of the red—and even this allows an important fraction of the orange to pass through—all the colours examined allowed rays of different refrangibility to pass. For example, the light passing through yellow glass gave a spectrum extending from B to E, *i.e.*, from red to green, and in addition an appreciable fraction of the light between the green and the indigo. He concludes that insolation under coloured glasses should only be undertaken after a photospectrometric examination of the filtering medium. Moreover, the intensity of the light is an important factor in the matter, and only after these points have been sufficiently cleared up will it be possible to place any reliance on investigations of this nature.—T. A. L.

Nitrosobenzene, Action of Soda-Lye on ——. E. Bamberger. Ber. **33**, [12], 1939—1957.

Soda-lye acts slowly in the cold and quickly when hot on nitrosobenzene, forming the following substances:—Azoxybenzene, nitrobenzene, aniline, *p*-nitrosophenol, *o*- and *p*-amidophenol, an acid $C_{12}H_{10}N_2O$ melting at 83° C., three acids $C_{12}H_{10}N_2O_2$ melting respectively at 76°, 156°·5, and 108°·5 C., hydrocyanic acid, and ammonia, together with other substances which have not been further investigated. Under all circumstances of temperature, azoxybenzene may be considered as the main product, and whilst at 100° C., considerable quantities of nitrobenzene and of the acids are formed, at ordinary temperatures, *p*-nitrosophenol is the chief by-product. The formation of tarry matters cannot be avoided, but is much lower at high than at low temperatures. The product melting at 83° C., and having the formula $C_{12}H_{10}N_2O$, is *o*-hydroxyazobenzene, giving on reduction aniline and *o*-amidophenol, and obtainable also from nitrobenzene and *o*-anisidine. The compound, $C_{12}H_{10}N_2O_2$, is *p*-hydroxyazoxybenzene, which melts at 156°·5 C., reduces to aniline and *p*-amidophenol, and can also be obtained by condensing phenylhydroxylamine with *p*-nitrosophenol. Of the other two acids, the one melting at 76° C. is most probably *o*-hydroxyazoxybenzene, whilst that melting at 108°·5 C. is designated iso-*o*-oxyazoxybenzene. Both these isomers on oxidation with potassium permanganate yield potassium diazobenzolate. It has also been observed that the isomeride of lower melting point is more readily soluble in soda-lye, and on losing oxygen yields *o*-hydroxyazobenzene, melting at 83° C. This product crystallises from ether in long orange-red silky needles, and dyes silk from an acetic acid bath about the same shade as *p*-hydroxyazobenzene. Under similar conditions *o*-hydroxyazoxybenzene only gives a very light yellow shade much paler than with *p*-hydroxyazoxybenzene, whilst the iso-derivative will not dye silk from an acetic acid bath.—T. A. L.

Nitroso-m-phenylene Diamine. E. Täuber and F. Walder. Ber. **33**, [13], 2116—2118.

The authors find that under certain conditions, *m*-phenylene diamine is converted by the action of nitrous acid into nitroso-*m*-phenylene diamine. The product is formed in the manufacture of Bismarck Brown, which always accompanies the production of the nitroso base, still a yield of 20 per cent. on the diamine taken is possible under suitable conditions. It is essential that the nitrite be added as quickly as possible, and too much acid entirely prevents the formation of the nitroso base. The best proportions of base, mineral acid and sodium nitrite, are 3:4:2 molecules. The following quantities are given for technical work. A solution of 324 grms. of distilled *m*-phenylene diamine base in 2·5 litres of water and 444 grms. of hydrochloric acid (33 per cent.) is cooled by mixing with 3 kilos. of ice. When cooled to 0° C. or below, a cold solution of 156 grms. of sodium nitrite in 600 c.c. of water is added at once with vigorous agitation and stirred for about five minutes. After some hours the mixture is warmed to 50° C., the Bismarck Brown precipitated with 800 grms. of salt, filtered off at 30° C. and washed with 1 litre of 10 per cent. brine. The filtrate is then covered with 3 litres of ether and 800 grms. of crystallised sodium carbonate are slowly added. The nitroso base, which is insoluble in ether, separates out, and after about 12 hours the crystals are filtered off, washed with ether, and crystallised from about 20 times their weight of boiling water. Nitroso-*m*-phenylene diamine forms shining red plates or needles belonging to the monoclinic system. It is insoluble in ether and benzene, readily soluble in hot water and alcohol. It melts at 210° C. and swells up. Determinations of the molecular weight of the base by the boiling point method point to the formula $C_6H_7N_3O$. On reduction it yields 1.2.4 triamidobenzene, it evolves ammonia on boiling with caustic soda lye, yielding a well crystallised substance, probably nitrosoamidophenol. The base does not give Liebermann's nitrosamine reaction, whilst on heating its salts with β-naphthol, a dyestuff is formed as with nitrosodimethylaniline.

—T. A. L.

Salol; Dyestuffs from ——. G. Cohn. J. prakt. Chem. 1900, **61**, [11, 12], 544—553.

On heating salol with the calculated proportions of chloracetic acid and caustic soda, no salolacetic acid is obtained, but a mixture of salicylic acid and phenoxyacetic acid.

When gradually added to ice-cold concentrated sulphuric acid, salol dissolves, and on pouring the solution on to ice, salicylic acid is precipitated and phenolsulphonic acid remains in the filtrate. If, however, salol be heated on the water-bath with three times its weight of sulphuric acid, the liquid solidifies after 1—2 hours to a mass of rhombic scales which consist of a mixture of sulphosalicylic and phenolsulphonic acids; on dissolving in water and adding common salt, the corresponding sodium salts are precipitated and can be readily separated owing to the slight solubility of sodium phenolsulphonate in water. Sodium sulphosalicylate forms an acid solution in water, and is not decomposed by concentrated hydrochloric acid; with ferric chloride it gives, even in very dilute solutions, a characteristic blood-red violet coloration, which is permanent in presence of much hydrochloric acid. On heating with dimethylaniline and phosphorus oxychloride, sodium sulphosalicylate yields a small quantity of a beautiful blue colouring matter, insoluble in water and acids, but readily soluble

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in alkali, by excess of which it is precipitated in blue flocks. The sodium salt also reacts easily with formaldehyde and hydrochloric acid giving an amorphous mass. Sodium sulphosalicylate readily condenses with phenols. Thus, on heating 10 parts of the salt with three parts of phenol and 13 parts of phosphorus oxychloride, and then treating the product with water, sulphosalicylphenol $C_6H_3(OH)(CO_2.C_6H_5)(SO_3.C_6H_5)$ [1 : 2 : 4] is obtained as a white powder insoluble in water, but crystallising from alcohol and hot acetic acid, m.p. 172°—173° C. On heating together 5 parts of sodium sulphosalicylate, 6 parts of β-naphthol, and 5 parts of phosphorus oxychloride for half an hour at 140°, sulphosalicylnaphthol—

$$C_6H_3(OH)(CO_2.C_{10}H_7)(SO_3.C_{10}H_7)$$

is obtained. Sulphosalicylguaiacol—

$$C_6H_3(OH)(CO_2.C_6H_4.OCH_3)(SO_3.C_6H_4.OCH_3)$$

is prepared similarly to the above.

When salol is heated with primary or secondary bases, the phenol is replaced in the molecule, by the amine. As the yields obtained are theoretical and the reaction soon over, this is a much improved method of obtaining salicylanilides. On heating 10 parts of salol with 12 parts of benzidine for 5—10 minutes at 230° C. and treating with soda to remove any unchanged benzidine, monosalicylbenzidine is obtained in almost quantitative yield. It combines with alkaline β-naphthol solution, forming a violet colouring matter, which with concentrated sulphuric acid gives a deep red solution with a reddish-violet surface colour, and the addition of water to this solution first changes the colour to blue and then gives a brown flocculent precipitate. Diazotised salicylbenzidine yields with sodium salicylate a brown colouring matter, which after salting out is only slightly soluble in water, and with concentrated sulphuric acid gives a reddish-yellow, or in thin layers, a rose colour; the corresponding compound formed with sodium naphthionate has no tinctorial power, and dissolves in sulphuric acid to a deep violet-brown colour. Disalicylbenzidine, formed by heating the base with excess of salol, resembles the mono derivative, and appears under suitable conditions also to react with nitrous acid.

When salol is heated with higher phenols, the latter replace the phenol in the molecule; the yields are mostly very good. The method is of technical value, since in the case of sensitive phenols, no decomposition or resinification takes place, as occurs when condensing agents, such as phosgene or phosphorus oxychloride, are employed. The author describes the application of the method to the preparation of salicyleugenol—

$$C_6H_3(C_3H_5)(OCH_3)(O.CO.C_6H_4OH)[1:3:4],$$

salicylguaiacol, salicyl-β-naphthol, salicylcarvacrol, salicyl-*p*-acetamidophenol (the "Salophen" of commerce), monosalicyl-*p*-amidophenol, $C_6H_4(OH)(CO.NH.C_6H_4OH)$, disalicyl-*p*-amidophenol,

$$OH.C_6H_4.CO.NH.C_6H_4.O.CO.C_6H_4OH,$$

monosalicylresorcinol, monosalicylhydroquinone, and disalicylhydroquinone.—T. H. P.

Acid Dyestuffs [*Produced by Means of Formaldehyde and Bisulphites*]; *New* ——. M. Prud'homme. Rev. Gén. des. Mat. Col. 1900, **4**, [43], 216—217.

A NUMBER of dyestuffs obtained by treating the leuco-bases of chromogens containing free amido-groups with formaldehyde and sodium bisulphite, are described.

From Magenta.—10 grms. of this dyestuff, dissolved in a litre of water, are acted upon with 150 grms. of dilute (1:10) sulphuric acid, 50 grms. of formaldehyde solution (40 per cent.), and 150 grms. of sodium bisulphite solution (34° B.). The whole is heated for an hour or is left at the ordinary temperature for 24—48 hours. The colour of the solution changes, as the reaction proceeds, to a violet. The dyestuff formed is decolorised by alkalis without being precipitated; it is partly precipitated by common salt. Primary amines form with it blue lakes which are decomposed by alkalis with regeneration of the original dyestuff. It has no affinity for tannin-mordanted cotton, but it dyes wool from an acid bath a violet colour. *Acid Magenta*, submitted to the same reaction, gives a similar, but redder, derivative.

p-Nitrodiamidotriphenylmethane, when treated in hydrochloric acid solution with the above reagents, gives the leuco-compound of an acid green dyestuff. By reducing the leuco-compound in the cold with zinc and hydrochloric acid and then filtering and boiling, a violet dyestuff is produced.

From Lauth's Violet.—Thionine is converted by the reaction into a sulphonated Methylene Blue dyestuff, which dyes wool and silk, and differs from the compound obtained by the direct sulphonation of Methylene Blue in being fast to light.

Safranine yields a compound which dyes wool a bright pink similar in shade to the colour obtained from a blue shade Rhodamine dyestuff. It is very fugitive to light.

From the Nitranilines. — These are transformed into yellow dyestuffs, that produced from *p*-nitraniline being the greenest in shade.

A defect of all these dyestuffs is their inability to withstand prolonged boiling with mineral acids, by the action of which they are decomposed with elimination of sulphur dioxide.

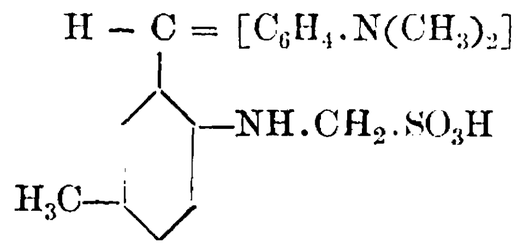
The reactions by which the dyestuffs are produced may be thus expressed:—

$$CH_2O + H_2SO_3 = CH_2(OH)SO_3H$$
$$R.NH_2 + CH_2(OH)SO_3H = R.NH.CH_2SO_3H + H_2O$$

By substituting sodium hyposulphite (hydrosulphite) for sodium bisulphite in the above reactions, compounds are obtained which closely resemble, but are not identical with, those described.—E. B.

Blue Dyestuff [*Triphenylmethane Series*], *New Acid* ——. M. Prud'homme. Rev. Gén. des Mat. Col. 1900, **4**, [43], 217.

TETRAMETHYLTRIAMIDODIPHENYLTOLYLMETHANE, prepared from *p*-toluidine and tetramethyldiamidobenzhydrol, when treated with formaldehyde and sodium bisulphite, gives the leuco compound—



This on oxidation with lead peroxide is converted into a greenish-blue dyestuff, not decolorised by alkalis, and dyeing wool and silk from an acid bath.

The new dyestuff contains a sulphonic acid group in the *o*-position relatively to the methane-carbon atom, but united to the benzene nucleus by means of an intermediate group $-CH_2.NH-$. Notwithstanding this it is similar in character to the dyestuffs in which the group is directly attached to the nucleus. The colour law discovered by Suais and Sandmeyer is thus further confirmed and extended. —E. B.

Leuco Methylene Blue. G. Cohn. Ber. **33**, [10], 1567—1568.

THIS product itself is very unstable, and hitherto only the acetyl derivative has been examined which was obtained by simultaneously acetylating and reducing the dyestuff. The method, however, cannot be applied with other acids, and in view of the fact that the substitution products of leuco Methylene Blue may have a therapeutic value, their synthesis has been effected in another way. It was observed that the zinc or tin chloride double salts of leuco Methylene Blue, are stable, and can be obtained in quantitative yield. On heating them with an acid anhydride or chloride in presence of a base, preferably pyridine, they are converted into new acid derivatives. For example, 9 grms. of the zinc chloride double salt of leuco Methylene Blue, 15 grms. of pyridine, and 5 grms. of benzoyl chloride are boiled together for one hour. The tarry precipitate obtained by pouring the melt into water becomes a yellowish-white

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granular powder when treated with caustic soda-lye. The substance is purified by dissolving it in hydrochloric acid, precipitating with ammonia, and recrystallising from alcohol. The benzoyl leuco Methylene Blue so obtained then melts at 187° C. The substance is strongly electric and gives the typical reaction with ferric chloride, turning at first green, then blue, and finally depositing the dyestuff in greenish-metallic needles. It forms a double chloride with ferric chloride, yields a picrate melting at 178° C., and decomposes in the organism into the dyestuff. In a similar manner *Anisylleucomethylene Blue* obtained from the zinc chloride double salt and anisylchloride forms colourless hard crystals melting at 107° C. The substance dissolves in sulphuric acid to a yellow solution becoming olive and then green on heating and pure blue on diluting. The author has also obtained *Propionylleucomethylene Blue* melting at 146° C., *Butyrylleucomethylene Blue* melting at 143° C., and *Valerylleucomethylene Blue* melting at 156° C. Analogous products have also been obtained from Ethylene Blue and from New Methylene Blue.—T. A. L.

Alizarin, Hystazarin, and Quinizarin; New Homologues of ——. St. v. Niementowski. Ber. **33**, [10], 1629—1636.

THE author has condensed pyrocatechol with α-methyl-*o*-phthalic anhydride, by heating equal quantities in presence of sulphuric acid to about 185° C., and obtains a mixture of methyl alizarin and methyl hystazarin. The melt is extracted with alcohol, and the residue from this extract is extracted with benzene, which dissolves the methylalizarin, the methylhystazarin remaining undissolved.

2-*Methyl-* (*heteronuclear*) *alizarin* forms orange-red needles, melting at 216° C. The dilute alcoholic solution on adding a drop of potash lye, shows the characteristic alizarin spectrum, and its dyeing properties, so far as they could be determined, appear to be similar to those of Alizarin. The diacetyl compound is readily soluble in hot alcohol, and forms light yellow needles melting at 176° C.

2-*Methylhystazarin* - 6.7 forms yellowish microscopic needles or nodules melting at about 320°—340° C. The yellowish alcoholic solution of the substance turns greenish-blue on adding potash lye. The spectrum of this solution is almost identical with that of hystazarin, although the solution of the latter is pale cornflower blue, whilst that of methylhystazarin has a distinctly greenish-blue shade. On distilling with zinc dust, the product yields 2-methyl-anthracene, melting at 202° C. Methylhystazarin gives a diacetyl compound, crystallising from alcohol in straw-yellow branching needles, melting at 208° C. In the above condensation, if the pyrocatechol be replaced by quinol (hydroquinone) the resulting product is—

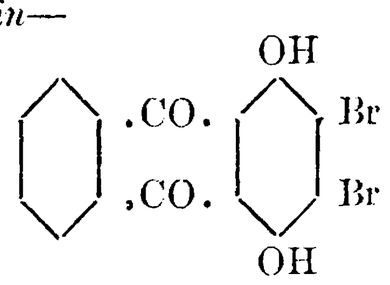
2-*Methylquinizarin*-5.8.—This crystallises from alcohol in orange plates or red needles. The sublimed product melts at 175° C. It dissolves to a pink solution in sulphuric acid, and gives a spectrum with two absorption bands much nearer the red than in Nietzki's methyl-quinizarin. Moreover, the latter dissolves with a yellowish-red colour, that of the author giving a cherry-red solution. Its diacetyl derivative crystallises from alcohol in long yellowish plates, melting at 204° C.—T. A. L.

Quinizarin; Bromination of ——. C. Liebermann and C. N. Riiber. Ber., **33**, [10] 1658—1664.

THE authors find that the hydrogens in quinizarin are not easily replaceable, and only at higher temperatures. On the other hand, quinizarin forms addition products with bromine, which contain more halogen, the lower the temperature. Thus at 0° C., quinizarin forms quinizarin hexabromide, whilst at 40° C. the product obtained is bromoquinizarindibromide, and at 100° C., and even up to 230° C., two hydrogen atoms only are substituted. In glacial acetic acid solution, even at 100° C., only one hydrogen is substituted.

Bromoquinizarin is obtained by cohobating quinizarin with 25 times its weight of glacial acetic acid, and three times its weight of bromine for 12 hours. It sublimes at about 300° C. *in vacuô*, forming red needles and plates soluble in caustic alkalis with a blue to bluish-violet colour.

Dibromoquinizarin—



is formed by heating quinizarin with six times its weight of dry bromine in a sealed glass tube for eight hours to 160° C. The product sublimes *in vacuô* at 350° C., forming red needles sparingly soluble in caustic potash to a blue solution. Neither of these products dyes mordants, but both, on fusing with potash, yield apparently the same dyestuff free from bromine. The product so obtained dyes mordants the shade of natural Purpurin, but less pure, and on oxidation with permanganate gives phthalic acid. It appears to be a mixture of Purpurin and possibly Oxy-purpurin.—T. A. L.

PATENTS.

Sulphonic Acids, and of Colouring Matters [Yellow, Red, Black] and other Products therefrom; Manufacture of New ——. I. Levinstein, F. Pollak, and Levinstein, Ltd., Manchester. Eng. Pat. 13,178, June 26, 1899.

WHEN 1.4′-naphthylamine sulphonic acid is treated at 0°—10° C. with nitric acid in presence of sulphuric acid, it is converted into 4.1.4′-nitronaphthylamine sulphonic acid, a dyestuff which gives greenish-yellow shades on wool from a neutral or acid bath. The new product is also capable of diazotisation, and after combination with the usual dyestuff components (amines, phenols, their amido, hydroxy, sulphonic, or carboxylic derivatives) yields yellow to black dyestuffs similar to those derived from *p*-nitraniline, but generally bluer in shade. Moreover, the new nitronaphthylamine sulphonic acid on reduction with iron and acetic acid, forms a naphthylene diamine sulphonic acid which serves as a photographic developer. A solution of 22·3 kilos. of 1.4′-naphthylamine sulphonic acid is dissolved in 150 kilos. of sulphuric acid (66° B.) and nitrated with a nitrosulphuric acid containing 6·3 kilos. of nitric acid at about 0°—10° C., and after some hours the melt is run into 500 litres of water, when the new acid separates in yellow flakes. The acid and its diazo compound are tolerably soluble in water. For the production of a dyestuff, the diazo compound from 2·68 kilos. of 4.1.4′-nitronaphthylamine sulphonic acid, 7 kilos. of sodium nitrite and the necessary quantity of hydrochloric acid, is combined in an alkaline solution with 32 kilos. of 1.1.3.3′-dihydroxynaphthalene disulphonic acid and stirred for several hours. The mixture is then heated to 80° C., and the dyestuff subsequently salted out and filtered off. It forms a greenish-black powder giving a bright red solution in acid, becoming violet-red on adding alkali, and dyes wool bluish-red from an acid bath. In order to reduce the nitro acid, it is suspended in water together with the equivalent quantity of an alkali, and the resulting solution is run into a reducing mixture of iron and acetic acid and heated for some hours. When the reduction is complete, the dissolved iron is precipitated with magnesia and the naphthylene diamine sulphonic acid is precipitated from the filtrate by adding hydrochloric acid.—T. A. L.

Colouring Matters [Black]; Manufacture and Production of ——. G. W. Johnson, London. From Kalle and Co., Biebrich-on-Rhine, Germany. Eng. Pat. 14,639, July 15, 1899.

THE amido-azo compounds derived from a *p*-amidodiphenylamine sulphonic or carboxylic acid and 1.3′- or 1.2′-naphthylamine sulphonic acid are diazotised and combined with β-naphthol or α-naphthylamine. The resulting black dyestuffs are suitable for printing or dyeing wool black shades, very fast to washing, and fast to alkali and acid. The products have a very high tinctorial value, and generally those with β-napthol or a phenol in the end position are more suitable for printing than those with α-naphthylamine or other amine. For example, 26·5 kilos. of *p*-amidodiphenylamine sulphonic acid are diazotised in water with 18 kilos. of hydrochloric acid and 7·0 kilos. of sodium nitrite, and to this solution is added a cold aqueous solution of 24·5

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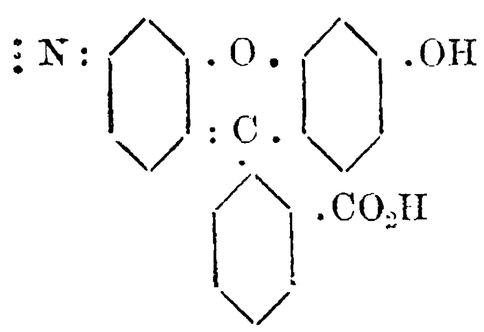
kilos. of sodium 1.3′-naphthylamine sulphonate and 3 kilos. of anhydrous sodium carbonate. After stirring for 12 hours, 12 kilos. of caustic soda lye (40° B.) and 7 kilos. of sodium nitrite are added, and the whole is acidified with 30 kilos. of hydrochloric acid and stirred until the diazotisation is complete. The diazo compound, which is soluble to a violet solution in water is then combined, in presence of an excess of sodium carbonate, with 14·5 kilos. of β-naphthol dissolved in water with just sufficient caustic soda. The dyestuff, which is sparingly soluble, is obtained by filtration, after heating to 80° C. It dyes wool a deep black.—T. A. L.

Dyestuffs Fast to Soap; Process for Transforming Rhodols and Rhodol Esters into ——. O. Imray, London. From The Farbwerke vormals Meister, Lucius und Brüning, Hoechst a/Main, Germany. Eng. Pat. 15,983, Aug. 4, 1899.

The rhodols of the type—



owing to their want of fastness to soap, are of no value as dyestuffs, and etherification of the carboxyl group does not remove this disadvantage. If, however, the hydroxyl group also be alkylated or benzylated, dyestuffs are obtained which are perfectly fast to soap on tannin-prepared cotton. A further difference between these dyestuffs and the carboxylic esters is that they are not precipitated in aqueous solution by sodium carbonate, and yield, on hydrolysis with alkalis, rhodols insoluble in alkalis, but soluble in acids. For instance, a mixture of 120 kilos. of diethylrhodol hydrochloride and 120 kilos. of soda ash are thoroughly incorporated and mixed with 190 kilos. of dimethylsulphate. The mass is stirred, and the temperature rises spontaneously to 85° C. After standing some time at the ordinary temperature, or heating for half an hour to 90° C., the melt is cooled, dissolved in dilute hydrochloric acid and salted out. The diethylrhodol-methylether-methylester forms a crystalline mass very readily soluble in water, and readily even in moderately concentrated brine. It dyes tannin-prepared cotton bright yellowish-red shades fast to soap. Sodium carbonate produces no precipitate, but when boiled therewith, or by adding soda lye, hydrolysis of the ester group takes place and diethylrhodolmethyl ether separates as an almost colourless powder insoluble in alkali, sparingly soluble in water, but readily soluble in acids. These solutions dye tannin-prepared cotton similar shades to the methyl ether methyl ester, the difference being in the fastness to soap, which is inferior although considerably greater than with the rhodol methyl ester.—T. A. L.

Dialkylrhodamines; Process for Alkylating ——. O. Imray, London. From The Farbwerke vormals Meister, Lucius und Brüning, Hoechst a/Main, Germany. Eng. Pat. 16,068, Aug. 5, 1899.

According to the present specification, the alkyl ester of alkyl sulphuric acid—for example, dimethylsulphate—acts on dialkylrhodamine bases similarly to alkylhaloids, *i.e.*, causes carboxylic alkylation or esterification. The following example illustrates the process. A mixture of 40 kilos. of diethylrhodamine base, 5 kilos. of dry sodium carbonate, and about 20 kilos. of dimethyl sulphate is thoroughly incorporated and allowed to stand 48 hours at the ordinary temperature. The melt, on becoming solid, is powdered and stirred into water containing some hydrochloric acid. After salting out, the hydrochloride is filtered off and dissolved in water, some sodium acetate is then added to remove small quantities of unaltered dialkylrhodamine base, and the dyestuff finally is precipitated by adding salt and hydrochloric acid. An alternative method is to heat together to 60° C. for several hours the same quantities of the reagents without any sodium carbonate, and then work up the melt as already described.—T. A. L.

Nitroso-Bases, Stable; Process for Rendering ——. O. Imray, London. From The Farbwerke vormals Meister, Lucius und Brüning, Hoechst a/Main, Germany. Eng. Pat. 16,153, Aug. 8, 1899.

Nitroso-bases can be kept as perfectly stable products in presence of a small quantity of sodium carbonate or other faintly alkaline salt. For example, the precipitated, pressed, and washed base from 310·8 kilos. of nitrosodimethylaniline hydrochloride is mixed with so much water that the whole amounts to 487·5 kilos. Subsequently 12·5 kilos. of soda ash are added, and the whole is stirred until a uniform mass is obtained. In place of alkaline carbonates or bicarbonates, sodium acetate or phosphate may be used.—T. A. L.

Dyestuffs [Blue-Black]; Manufacture of Cotton ——. O. Imray, London. From The Farbwerke vormals Meister, Lucius und Brüning, Hoechst a/Main, Germany. Eng. Pat. 16,295, Aug. 10, 1899.

The intermediate product produced in the manufacture of naphthazarin, described by Aguiar and Bayer (Ber. 4, 440), and in Ger. Pat. 76,922, can, according to the present specification, be separated from the mixture obtained in making naphthazarin by adding to it, suitably diluted, a solution of zinc chloride. The product is then obtained as a zinc compound, and when heated with alkali polysulphides, yields a dyestuff giving bluish-violet shades on cotton, which on subsequent treatment with metallic salts give strong fast black shades. The intermediate product is obtained by adding 200 kilos. of the mixture produced in making naphthazarin to 600 litres of ice water, filtering, and adding 50 litres of a zinc chloride solution (40° B.). The resulting precipitate is filtered off, washed with brine, and dried. It can be recrystallised from water or alcohol, but decomposes, depositing needles free from zinc. For the production of a dyestuff, 50 kilos. of the naphthazarin intermediate product zinc chloride compound, 50 kilos. of sulphur, and 250 kilos. of crystallised sodium sulphide are heated to 150° C. for several hours until no further increase in colour takes place. The product forms a dark violet powder soluble in water to a blue solution. It dyes cotton greyish-blue to bluish-violet, which on treatment with copper salts become dark blue-black. In place of the intermediate product either the corresponding leuco compound or the oxidation product or naphthazarin itself yield dyestuffs when heated with alkali polysulphides with or without the addition of zinc chloride.—T. A. L.

Black Dyestuff; Manufacture of a Sulphurised ——. O. Imray, London. From The Farbwerke vormals Meister, Lucius und Brüning, Hoechst a/Main, Germany. Eng. Pat. 18,105, Sept. 7, 1899.

This specification is supplementary to Eng. Pat. 24,538 of 1898 (this Journal, 1899, 1012), and according to it, black cotton dyestuffs are obtained by heating *p*-oxy-*m*-methyl-*p*-amidodiphenylamine *o*-sulphonic acid or *p*-oxy-*m*-methyl-*p*-nitrodiphenylamine-*o*-sulphonic acid with sulphur and alkaline sulphides. As an example of the formation of one of these condensation products and its subsequent conversion into a dyestuff, one molecular proportion each of sodium nitrochlorobenzene sulphonate, *p*-amidocresol, and sodium acetate, together with four litres of water, are heated in a closed vessel for six hours to 120° C. The nitro compound is precipitated in reddish-brown crystalline needles by adding salt to the melt, whilst in order to obtain the amido compound the solution is at once reduced with iron and acetic acid. When the reduction is complete, the iron is precipitated with sodium carbonate, and, after filtering, the amido compound separates in white needles on adding acid. One kilo. of the amido compound is added to a fused mixture of 1 kilo. of sulphur and 3 kilos. of sodium sulphide, heated for several hours to 180° C., and afterwards for 3—4 hours to 240° C. The melt on cooling forms a porous mass or black powder soluble to a violet-black solution, and giving deep black shades on cotton.—T. A. L.

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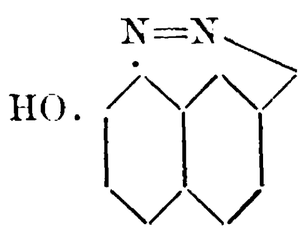
Colouring Matters [*Brown*]; *Manufacture of* ——. R. Holliday and Sons, Ltd., Jos. Turner, H. Dean, and Jas. Turner, Huddersfield. Eng. Pat. 16,135, Aug. 8, 1899.

CERTAIN aromatic substances containing the CH_3 group, together with nitro or amido groups, or both, and one or more sulphonic acid groups, when heated with sodium sulphide or caustic alkalis and sulphur, yield dyestuffs which give brown shades on vegetable fibres. For instance, 100 kilos. of *p*-nitrotoluene sulphonic acid are heated with 400 kilos. of crystallised sodium sulphide and 50 kilos. of sulphur. After all the water has been driven off, the temperature is raised to 300° C., and maintained thereat until no increase in depth of colour is observed. As another example, 100 kilos. of sulphobenzene-azo-*m*-tolylene diamine, 300 kilos. of caustic soda lye (40° B.), and 50 kilos. of sulphur, are heated for a few hours to 280° C. The resulting product dyes vegetable fibres brown.—T. A. L.

Diamidonaphthol, and Salts of the Same; Manufacture of a New ——. R. B. Ransford, Upper Norwood, Surrey. From L. Cassella and Co., Frankfort-on-Main, Germany. Eng. Pat. 16,149, Aug. 8, 1899.

WHEN 2.2′-amidonaphthol is combined with diazo compounds in an alkaline solution, the azo group enters ortho to the hydroxyl, and on reduction of the azo dyestuff produced, there results 1.2′.2-diamidonaphthol. The same compound can also be produced in a simple manner by reducing the substance obtained by the action of alkalis on the 2.2′-diazonaphthol, and having probably the formula—



The salts, more particularly the hydrochloride and sulphate of the new diamidonaphthol, give deep brown shades on wool from a boiling bath, more especially in presence of bichromates. The following is the method employed:—A solution of 15·9 kilos. of 2.2′-amidonaphthol in hydrochloric acid is precipitated in a finely-divided state by adding sodium carbonate, and the diazo solution from 9·3 kilos. of aniline is run in, in presence of an excess of sodium carbonate. The dyestuff is filtered off, stirred to a paste with water, and reduced at the boiling point with 20 kilos. of iron filings, about 100 kilos. of hydrochloric acid being gradually added, so as to maintain throughout an acid reaction. When the reduction is complete, the solution is filtered, and the sulphate of 1.2′.2-diamidonaphthol is precipitated by adding sodium sulphate. An alternative method is to diazotise 15·9 kilos. of amidonaphthol with 6·9 kilos. of nitrite, the solution subsequently being made alkaline with sodium carbonate. The azo compound, which separates as a dark precipitate, is, after filtering, gradually added to a tin-salt solution, the sulphate of the finished product being finally precipitated as before. The salt is somewhat sparingly soluble in water, and crystallises in thin, nearly colourless needles. The free base is also somewhat sparingly soluble in cold water, more easily in hot. It crystallises in shining leaflets, which melt with decomposition at 220° C.—T. A. L.

Anthraquinone Dyestuffs; Manufacture or Production of ——. H. E. Newton, London. From The Farbenfabriken vormals F. Bayer and Co., Elberfeld, Germany. Eng. Pat. 16,574, Aug. 15, 1899.

WHEN dinitro-anthraquinones are treated with sulphur sesquioxide (the mixture obtained from fuming sulphuric acid and sulphur), diamidodihydroxyanthraquinones are produced. The reaction proceeds somewhat differently if this process be applied to the dinitro-anthrarufin and dinitrochrysazin disulphonic acids of Eng. Pat. 12,011 of 1897 (this Journal, 1898, 572). In this case, only reduction of the nitro groups takes place, diamido-anthrarufin and diamidochrysazin disulphonic acids being produced. For example, 10 kilos. of dinitro-anthrarufin disulphonic acid, 200 kilos. of a fuming sulphuric acid containing 20 per cent. of SO_3, and 5 kilos. of flowers of sulphur, are heated with continual agitation at 50°—80° C., until no further nitro compound remains. The melt is then poured into ice-water, and, after filtering, the diamido dyestuff is salted out.—T. A. L.

Dyestuffs [*Yellow, Brown*] *of the Acridine Series, and of Intermediate Products for Use therein; Manufacture or Production of* ——. H. E. Newton, London. From The Farbenfabriken vormals F. Bayer and Co., Elberfeld, Germany. Eng. Pat. 16,718, Aug. 17, 1899.

THE acidyl derivatives of *m*-amidoalkyldiamido-diphenyl carbinols, described in Eng. Pat. 5711 of 1894 (this Journal, 1895, 265), are condensed with those amines or diamines of the benzene or naphthalene series which, when condensed with alkylated diamidodiphenyl carbinols, yield condensation products containing the methane carbon ortho to a free amido group. When these condensation products are heated with acids; they are converted into acridine derivatives, which, by the action of oxidising agents, yield the finished dyestuffs. For instance, 32·7 kilos. of acetyl-*m*-amido-tetramethyldiamidodiphenyl carbinol are dissolved in 20 kilos. of hydrochloric acid (36·5 per cent.), 300 litres of water, and 25 kilos. of acetic acid (5·0 per cent.), and mixed with 12·2 kilos. of well-powdered *m*-tolylene diamine. After standing a short time, the carbinol will have disappeared, and by adding an excess of caustic soda lye the new base is separated as a slightly coloured flocculent precipitate. It is filtered off, dissolved in 300 kilos. of 20 per cent. sulphuric acid, and cohobated in a lead-lined vessel for six hours. After partially neutralising with an alkali and allowing to cool, the melt is mixed with a solution of 30 kilos. of ferric chloride. The dyestuff is finally separated by adding salt and zinc chloride, and forms a brown resinous mass, which becomes solid on standing. It yields a brown powder soluble to a yellow solution in water, and dyes tannin-mordanted cotton and leather very bright yellow shades.
—T. A. L.

Naphthol Derivatives; A New Process for the Production of ——. H. E. Newton, London. From The Farbenfabriken vormals F. Bayer and Co., Elberfeld, Germany. Eng. Pat. 16,807, Aug. 18, 1899.

THE process described consists in converting α-naphthylamine derivatives into the corresponding α-naphthol derivatives by heating them with sulphurous acid or its salts, and subsequently treating these products with alkalis, acids, or the like. For instance, a current of gaseous sulphurous acid is passed slowly for 30 hours at about 95°—100° C. through 35 litres of water containing 10 kilos. of sodium 1.4-naphthylamine sulphonate. Hydrochloric acid is then added until the solution is acid to Congo paper. After filtering from any unchanged naphthylamine sulphonic acid, the filtrate is made alkaline with caustic soda lye and boiled until ammonia is no longer evolved. It is then acidified with hydrochloric acid, and boiled in order to remove sulphurous acid. The solution then contains 1.4-naphthol sulphonic acid, and may be employed for the production of dyestuffs; or the acid sodium salt may be separated in white leaflets by saturating it with sodium chloride. As another example of the production of a naphthol derivative, 26·5 kilos. of sodium 1.3′-naphthylamine sulphonate, 15 litres of water, and 75 kilos. of a sodium bisulphite solution (40° B.) are heated for about 15 hours in an enamelled vessel provided with an agitator to about 120°—150° C., until a test made acid shows little unchanged naphthylamine sulphonic acid. The melt is then worked up as above, and the solution containing 1.3′-naphthol sulphonic acid may be used directly for the production of dyestuffs.—T. A. L.

Anthraquinone Dyestuffs, The Manufacture or Production of ——. H. E. Newton, London. From The Farbenfabriken vormals. F. Bayer and Co., Elberfeld. Eng. Pat. 17,206, Aug. 24, 1899.

THIS specification is supplementary to Eng. Pat. 12,011 of 1897 (this Journal, 1898, 572), and relates to the production of monosulphonic acids of diamido-anthrarufin and diamido-

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chrysazin from the corresponding disulphonic acids by the action of suitable reducing agents. For example, 10 kilos. of anthrarufin disulphonic acid, 1,000 litres of water, and 30 kilos. of sodium sulphide (Na_2S) are heated on the water bath until no more disulphonic acid is present in the melt. The whole is then allowed to cool and the monosulphonic acid is salted out. If other reducing agents are employed, the reaction proceeds somewhat differently. With zinc dust and acetic acid a product is obtained which the patentees term "leuco compound I." This dissolves in water with a red, in concentrated sulphuric acid with a yellow colour, which is not much changed by boric acid. It dissolves in dilute caustic soda lye with a red colour, which by the action of the air is changed to blue, owing to the formation of diamido-anthrarufin monosulphonic acid. With stannous chloride and hydrochloric acid a "leuco compound II." is obtained which has similar properties.—T. A. L.

Black Colouring Matter directly Dyeing Cotton; Manufacture of a ——. C. D. Abel, London. From The Actiengesellschaft für Anilinfabrikation, Berlin. Eng. Pat. 19,617, Sept. 29, 1899.

The patentees heat together equimolecular proportions of dinitro-oxydiphenylamine and 1.3.4-dinitrophenol with sulphur and sodium sulphide, the following quantities being employed. A mixture of 20 kilos. of dinitro-oxydiphenylamine and 13·2 kilos. of dinitrophenol is added at 100° C. to a molten mixture of 170 kilos. of sodium sulphide, 60 kilos. of sulphur, and 15 litres of water. The temperature is then gradually raised to and kept at 145° C. for several hours. The mass is then either heated to 160°—170° C. until sufficiently dry to be powdered, or else it is dissolved in water and precipitated with salt; or it is precipitated by an acid, redissolved in sodium sulphide solution, and evaporated to dryness. The dyestuff obtained according to either of these methods is soluble in water to a deep blue-black solution, which gives heavy greenish-black shades on cotton from a bath containing salt.—T. A. L.

Black Colouring Matter directly Dyeing Cotton; Manufacture of a ——. C. D. Abel, London. From The Actiengesellschaft für Anilinfabrikation, Berlin. Eng. Pat. 19,618, Sept. 29, 1899.

This is supplementary to the preceding specification (see above). The dinitrophenol there employed is replaced by picric or picramic acid, the resulting dyestuff giving deep violet-black shades on cotton from a bath containing salt.
—T. A. L.

Blue-Green Dyestuffs of the Triphenylmethane Series; Impts. in the Manufacture of ——. R. J. Urquhart, Manchester. From The Chemische Fabriken vormals Weiler-ter-Meer, Uerdingen-on-the-Rhine, Germany. Eng. Pat. 23,593, Nov. 27, 1899.

The process relates to the production of triphenylmethane dyestuffs fast to alkalis, containing chlorine ortho to the methane carbon. They are obtained by condensing *o*-chlorobenzaldehyde or *o*-chlorobenzal chloride or their substitution products with secondary or tertiary amines, sulphonating, and oxidising the leucosulphonic acids so obtained, or else by condensing *o*-chlorobenzaldehyde or *o*-chlorobenzal chloride or their substitution products with sulphonic acids or sulphonic acid salts of secondary or tertiary amines, dissolving the leuco compounds in dilute sodium carbonate solution, and oxidising them. As an example of the method, 58 kilos. of ethylbenzylaniline sulphonic acid, 14 kilos. of *o*-chlorobenzaldehyde, and 45 litres of water are heated under a reflux condenser for 12 hours. The leucosulphonic acid is dissolved in dilute sodium carbonate solution, precipitated with hydrochloric acid, filter-pressed, and dried. In order to obtain a dyestuff, 25 kilos. of it are dissolved in 120 litres of water and 8·8 kilos. of sodium carbonate, and oxidised with 3·3 kilos. of lead peroxide (100 per cent.) and 7 kilos. of sulphuric acid. When the oxidation is complete, the excess of acid is neutralised with sodium carbonate, the lead sulphate is filtered off, and the dyestuff is salted out. It forms, when dry, a bluish-green powder readily soluble in water, giving clear bluish-green shades, more particularly by artificial light, on wool and silk. The shades are level, fast to light, washing, soap, and alkalis.
—T. A. L.

Black Colours. T. R. Shillito, London. From J. R. Geigy and Co., Basle, Switzerland. Eng. Pat. 6559, April 7, 1900.

When *p*-amidophenol or 5.1.2-amidocresol is heated with acetyl compounds and sulphur at 200°—280° C., with or without the addition of diluents, products result which dye unmordanted cotton blackish-olive shades, becoming deep black when treated with oxidising agents. For instance, 44 kilos. of *p*-amidophenol, 26 kilos. of acetanilide, and 40 kilos. of sulphur are heated together at 220°—250° C. in a vessel provided with an agitator. When the evolution of sulphuretted hydrogen has almost ceased, the mass is powdered, and dissolved by boiling in 500 litres of water and 50 kilos. of caustic soda lye (40° B.), precipitated with acids or sodium bicarbonate, and the dyestuff filter-pressed, dried and powdered. It dissolves to an olive-coloured solution in aqueous sodium sulphide, and gives blackish-olive shades on unmordanted cotton in presence of salt, which turn deep black on treatment with oxidising agents.
—T. A. L.

Leucogallocyaninesulphonic Acids, and of Gallocyaninesulphonic Acids therefrom; Manufacture of ——. J. Imray, London. From La Société L. Durand, Huguenin, and Co., Basle, Switzerland. Eng. Pat. 9776, May 28, 1900.

The leuco derivatives of the gallocyanins obtained according to Eng. Pat. 21,415 of 1898 (this Journal, 1899, 827) may be sulphonated by the usual processes if the operation is conducted at a low temperature. Concentrated sulphuric acid or fuming sulphuric acid may be employed, but better results are obtained by using chlorosulphuric acid (SO_3HCl). For example, 10 kilos. of leucocoréine 2 R (from nitrosodiethylaniline hydrochloride and gallamic acid) are stirred gradually into 60 kilos. of sulphuric acid (100 per cent.) and allowed to stand 4—6 days. The melt is then poured into 1,000 litres of ice water, and the precipitate after several hours is filtered off. As another example, 10 kilos. of leucoprune (prepared according to Eng. Pat. 21,415 of 1898 from methyl gallate and nitrosodimethylaniline hydrochloride) are gradually stirred at the ordinary temperature into 40 kilos. of chlorosulphuric acid. After one or two days, 2 kilos. of sulphuric acid (50 per cent.) are gradually added. The melt is then poured into 800 litres of ice water and 22 kilos. of caustic soda, and 100 kilos. of salt are subsequently added. The precipitate is then filtered off. The leucosulphonic acids so obtained are suspended in 500 litres of water and dissolved by adding 20 kilos. of caustic soda (25 per cent.). The solution is then agitated in the air until no further formation of colouring matter takes place. The excess of soda is neutralised by hydrochloric acid, and the dyestuff is precipitated by salt in the form of its sodium salt, which is filter-pressed and dried.
—T. A. L.

V.—TEXTILES: COTTON, WOOL, SILK, Etc.

Oxycelluloses; and the Molecular Weight of Cellulose. H. Nastukoff. Ber. **33**, [13], 2237.

A continuation of the author's investigations on the oxidation of cellulose (see this Journal, 1892, 771; and 1893, 516). The products described, were obtained by the action of hypochlorites and permanganates upon Swedish filter paper (Schleicher and Schüll).

A. *Oxidation by Hypochlorites.*—(1) The cellulose was digested 24 hours with 35 times its weight of a filtered solution of bleaching powder of 4° B.; afterwards being drained and exposed for 24 hours to the atmosphere. These treatments were then repeated. After washing, treatment with dilute acetic acid, and again washing, the product was treated with a 10 per cent. NaOH solution. The oxycellulose was precipitated from the filtered solution, the yield being 45 per cent. The residue, when purified, amounted to 30 per cent. of the original cellulose, with which it was identical in all essential properties.

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The oxycellulose, after purification and drying at 110°, was analysed.

(2) The reagents were as in (1), but the conditions varied by passing a stream of carbonic acid gas through the solution contained in a flask until Cl compounds ceased to be given off. The oxycellulose was purified as above and then analysed.

(3) The conditions were as in (2), but a much stronger hypochlorite solution, *viz.* 12° B., was employed. The yield of oxycellulose precipitated from solution in soda lye (10 per cent. NaOH) was 45 per cent. There was only a slight residue of unattacked cellulose.

B. *Oxidation by Permanganate* ($KMnO_4$). — (1) The cellulose (16 grms.), was treated with 1,100 c.c. of a 1 per cent. solution of $KMnO_4$ in successive portions. The MnO_2 was removed from time to time by digesting the product with a dilute sulphuric acid (10 per cent. H_2SO_4). The oxycellulose was purified as before. Yield, 40 per cent.

(2) The cellulose (16 grms.) was digested 14 days with 2,500 c.c. of 1 per cent. $KMnO_4$ solution and the oxycellulose then purified. It was found to be identical in all respects with the above.

(3) The cellulose (16 grms.) was heated on the water bath with 1,600 c.c. of 15 per cent. H_2SO_4, to which were added 18 grms. of $KMnO_4$. The yield and composition of the oxycellulose were identical with the above.

From the results obtained, it appears that on oxidation with hypochlorites 1 atom of O is added to 4—6 of the unit groups $C_6H_{10}O_5$; and the oxidation with permanganate, 2 atoms of O per 4—6 units of $C_6H_{10}O_5$. The molecular proportion of N in the phenylhydrazine residue combining, is fractional, representing 1 atom of O, *i.e.*, 1 CO group reacting per $4C_{36}H_{60}O_{31}$ and $6C_{24}H_{40}O_{21}$ respectively, assuming the reaction to be a hydrazone reaction.

Further investigations of the oxycellulose by treatment with (*a*) sodium amalgam, (*b*) bromine (water), and (*c*) dilute nitric acid at 110°, led to no positive results.

By treatment with alcoholic soda (NaOH) the products were resolved into a soluble and insoluble portion, the properties of the latter being those of a cellulose (hydrate).

Molecular Weight of Cellulose and Oxycellulose.—The author endeavours to arrive at numbers expressing these relations by converting the substances into acetates by Schützenberger's method, and observing the boiling points of their solution in nitrobenzene.—C. F. C.

Bleaching Textile Fabrics with Hydrogen Peroxide. V. Thomas. Rev. Gén. des Mat. Col. 1900, **4**, [41], 162—163.

THE following method has been found on the small scale to give good results in the bleaching of lace:—The textile materials to be bleached, after being moistened with water, are immersed for several minutes in a cold 10 per cent. solution of a permanganate. They are then rinsed and treated for about 10 minutes with a very dilute solution of hydrogen dioxide, which bleaches the materials and reduces the manganese peroxide deposited upon them by the permanganate to manganous oxide, a final treatment with a dilute solution of acid removing the latter.

The two operations of treating with hydrogen peroxide and with acid may be combined by the employment of an acidified solution of hydrogen peroxide; but this is not to be recommended, owing to the loss of oxygen which it entails.
—E. B.

PATENTS.

Rhea Fibre, Composition from ——, applicable for Electrical Insulation and other Purposes. W. J. Cordner, London. Eng. Pat. 13,846, July 4, 1899.

THE fibre is cleansed and degummed by any known method, soaked in a solution of sodium silicate (15° to 20° Baumé) and dried by heat; it is then placed in a bath of rosin or other heavy hydrocarbon oil at 275° F. until saturated, when it is removed, the excess of oil extracted, and the fibre suspended in a drying room at 250° F. until by the reaction of the sodium silicate the fibre becomes converted into "pure hydrocarbon cellulose"; a dry mixer is then used to break up the material, which is finally incorporated with oils, gums, resins, rubber, or gutta-percha according to the class of material desired. The inventor gives the following formulæ:—

Very High Quality, Hard.

	Lb.
Cellulose	8
Negro-head rubber	8
Whiting	16
Sulphur	8
Lime	1½
Lampblack	1½

Vulcanise six hours at 45 lb. pressure.

Very High Quality, Soft.

	Lb.
Cellulose	8
Negro-head rubber	8
Whiting	4
Sulphur	½

Vulcanise 40 minutes at 40 lb. pressure.
—J. W. H.

Mercerising, Dressing, Mordanting, Washing, Dyeing, and other Purposes; A Machine for Treating Hanks of Yarn for ——. B. Cohnen, Grevenbroich, Germany. Eng. Pat. 14,032, July 7, 1899.

A MACHINE for performing the above operations, which is characterised by the following points: the cylinders which receive the hanks and pass them periodically through the liquid are arranged radially round the central shaft of the machine, in such manner that when the hanks pass through the liquid, the axes of the central shaft, the driving cylinder, and the cylinder driven by the latter, are all in the same plane, or approximately in the same plane, for the purpose of giving the hanks a long and thorough impregnation.

The inner cylinders are the driving cylinders, and are driven by means of endless belts or chains.—C. M.

Ramie, Rhea, China Grass, and the like, Washing ——, in the Process of Preparing the same for Spinning, also applicable for Washing Yarn and other Fibrous Material. T. Burrows, Staines; and J. F. Woods, London. Eng. Pat. 16,049, Aug. 5, 1899.

A PROCESS in which fibre, immediately after the degumming process, is led on an apron to a bath containing immersed in it a large fluted roller with several smaller fluted rollers round the periphery. By this arrangement it will be seen that the bundles of fibre, passing between all the peripheral rollers and the central one are alternately squeezed and released, thus thoroughly washing all gummy material from it.—C. M.

Textile Fabrics or Materials for the Purpose of Filling or Weighting same, Treating of ——. W. Brothers, Prestwich, Lancashire. Eng. Pat. 16,647, Aug. 16, 1899.

A SOLUTION of calcium chloride is prepared of density 1·14 and also a saturated solution of sodium sulphate. Cloth is immersed in the former solution for a few seconds, and then after passing through squeeze rollers it is immersed in the sodium sulphate solution. The calcium sulphate is thus precipitated in the fabric, which is afterwards washed and dried. Other soluble sulphates may be used and the order of immersion reversed.—C. M.

VI.—DYEING, CALICO PRINTING, PAPER STAINING, AND BLEACHING.

Dyeing and the Function of the Fibre; The Chemical Phenomena of ——. M. Prud'homme. Rev. Gén. des Mat. Col. 1900, **4**, [6], 189—192.

To study the part played by acid and basic groups in fibres in the process of dyeing, the author attempts to construct an "artificial fibre," in the form of a liquid. He chooses a neutral solvent not miscible with water, such as benzene, chloroform, or amyl alcohol, and dissolves therein either an

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organic acid (benzoic or salicylic) or a weak base, preferably an imide (acetanilide or diphenylamine), or a mixture of acid and base, or a body containing both a basic and an acid group (phenylglycocoll or anthranilic acid).

Schützenberger has shown that albuminoids contain NH, and the author's experiments (Rev. Gén. des Mat. Col. **2**, 213, and **4**, 72; this Journal, 1898, 663), confirmed by those of V. Flick, point to the presence of the NH group and not NH_2 in wool.

Basic Dyestuffs.—Small quantities of the bases of Pararosaniline, Malachite Green, Hexamethyl Violet, Methylene Blue, Rhodamine, Safranine, Bismarck Brown, and the oxazines Sky Blue and Nile Blue are dissolved in weak (about 1 per cent.) caustic soda. Equal quantities of any one of these solutions are placed in two test tubes and treated one with amyl alcohol, the other with "salicylic reagent," *i.e.*, amyl alcohol containing 10 per cent. of salicylic acid, and both are rapidly shaken. The neutral alcohol assumes the colour of the base or if the latter is colourless, itself remains colourless while the "salicylic reagent" becomes coloured like a salt of the base. For example, Methylene Blue is violet in the one solvent and blue in the other, Rhodamine is yellow and red, Safranine is carmine and orange red, Nile Blue is orange and blue, Bismarck Brown is yellow and deep orange. When silk is dyed with any of these colouring matters it takes the same shade as the acidified alcohol, and the dyeing process may therefore be almost certainly attributed to a combination of the base of the dye with an acid group in the fibre. Salts of basic dyes are more or less soluble in neutral amyl alcohol, but Magenta, Methylene Blue, and Safranine dissolve much more readily in the acidified alcohol. The salicylic acid evidently acts on the free amido groups and this explains the fact that silk takes up a certain quantity of Magenta in the saline condition.

Sulphonated Acid Dyestuffs.—The author has used Acid Magenta, Acid Green and Violet, Patent Blue, Cyanol, the Ponceaus, the Croceïnes, Orange III., the Chromotropes, and Indigo Carmine. Amyl alcohol, whether neutral or acid, is but very slightly coloured when shaken with aqueous solutions of these dyes acidified with sulphuric acid. If, however, instead of salicylic acid, 10 per cent. of acetanilide be added to the alcohol, an intense coloration is obtained, differing in shade from that of the neutral or acid reagent. Thus Indigo Carmine is a very pale greenish blue in the neutral alcohol and a fine blue in the "acetanilide reagent." Patent Blue and Cyanol are green in acid aqueous solution owing to the formation of acid salts; these solutions give to amyl alcohol a pale blue colour (the free acid), but to the "acetanilide reagent," a deep blue (salt of the dyestuff). From the cherry-red acid solution of Orange III. (the acid salt) amyl alcohol takes up the yellow dyestuff acid, while the "acetanilide reagent" becomes orange. In this case the salt has nearly the same colour as the free acid; the latter is quite distinct from the cherry-red (poly-) acid salt formed in aqueous solution in presence of excess of sulphuric acid. Silk and wool in an acid dyebath behave like amyl alcohol containing acetanilide, and are similarly capable of decomposing certain compounds of the dyestuffs with acids. The author concludes that the fixation of the sulphonated dyes is due to basic groups in the fibres. He thinks it more likely that the NH group in the wool combines with the HSO_3 of the dyestuff than that NH in the latter combines with CO_2H in the wool, as supposed by Gillet, who assigns a quinonoid formula to the azo dyes and considers their affinity for wool to be due to the $-NH-N=$ group they contain (Rev. Gén. des Mat. Col. **3**, 160). Among other reasons against Gillet's view the author cites the experiments described above as showing that salicylic acid, though a stronger acid than can be supposed to exist in wool, is yet incapable of extracting the azo dyes from their acid solutions.

Phthaleïnes.—The orange-red precipitate obtained by acidifying an aqueous solution of an eosine dissolves in amyl alcohol (neutral or acid) with a yellow colour. The "acetanilide reagent" does not act on eosine solution, but if the alcohol contains both salicylic acid and acetanilide, or if it contains phenylglycocol, it extracts a red colour.

Mordant Dyestuffs (oxyketonic and carboxylic).—The fixation of these dyes on cotton mordanted with a metallic oxide, which must be at least diatomic, is due to the interaction between one or more free hydroxyls attached to the metal and the hydroxyl or carboxyl of the dyestuff with elimination of water. Animal and vegetable fibres act like a semipermeable membrane or an aggregate of osmotic cells capable of decomposing certain compounds, such as the acid salts. On account of their structure alone, fibres repel certain substances and attract others which they retain and protect. To a certain extent they are analogous to neutral solvents, although the final result of the dyeing cannot be considered a mere solution. Most dyestuffs are only effective by virtue of their acid or basic groups, and the function of the fibre is to bring the latter into intimate contact with those of its own parts which possess chemical properties.—T. A. L.

Dyeing; Theory of ——. E. Knecht. Rev. Gén. des Mat. Col. 1900, **4**, [6], 182.

The author finds that amyl alcohol, purified by contact with powdered caustic potash and distillation, no longer becomes coloured in contact with alkaline Rosaniline solution, unless the two are shaken together for some time in presence of air, when the alcohol gradually becomes rose-coloured. If, however, the purified alcohol be first acidified with a trace of heptylic or oleic acid, or with gaseous carbonic acid, it is quickly and strongly coloured by the Rosaniline. Sisley's results (see following abstract) were therefore probably due to traces of an organic acid in the amyl alcohol. Neither ethyl nor heptyl alcohol give the reaction.

—T. A. L.

Wool Dyeing; Theory of ——. *III.* C. Gillet. Rev. Gén. des Mat. Col. 1900, **4**, [6], 183—189.

Amyl alcohol redistilled, shaken with moist caustic soda, and finally distilled in a current of nitrogen is not coloured by alkaline rosaniline solution in the cold and only slowly on heating. Sisley's results (Rev. Gén. des Mat. Col. **4**, 113) must be attributed to traces of organic acids still remaining in the alcohol used by him, a weak solution of caustic soda being incapable of removing traces of valeric or other easily hydrolysable acid dissolved in amyl alcohol. It is known that in order to obtain a colourless solution of Rosaniline in ether, the latter must be distilled over sodium immediately before use, and other solvents behave similarly. Detailed results are given of a number of observations on the action of amyl alcohol on solutions of the azo dyestuffs (principally the sulphonated diamine colours), the triphenylmethane series, and several other typical dyestuffs. With regard to Magenta, it is found that if hydrochloric acid be added to the aqueous solution until it is yellow (triacid) and it is then shaken with amyl alcohol, the latter becomes blue (diacid). With insufficient acid, the colour is red, and the blue solution treated with water slowly changes to red. Similarly Methyl Violet colours amyl alcohol blue (diacid) or violet (monacid), according to the proportion of hydrochloric acid in the aqueous solution. Malachite Green, Victoria Blue, &c., show analogous changes of colour. The sulphonated oxy- and amido azo dyestuffs also form acid salts in aqueous solution with excess of hydrochloric or sulphuric acid, and these acid salts are also easily decomposed by water. This is illustrated by a detailed study of Congo Red, in the course of which Schimansky's work on the acid combinations of this dyestuff is shown to be erroneous (Mitt. des tech. Gew. Mus. 1900, 39). Congo Red solution on the addition of successive quantities of acid is precipitated with gradual changes of colour through violet to blue. These violet and blue precipitates, when washed, dissolve in ethyl alcohol with an orange-red colour. Similarly with Azo Blue, the violet coloration and blue precipitate dissolve with a red colour in amyl alcohol, and from this solution pure water again extracts a violet colour. These differences between the colours of aqueous and alcoholic solutions show that the dissolved substances are different. Under the influence of water and mineral acid, the neutral alcoholic solvent takes up the colour acid and then brings about an intramolecular union between the basic (NH) and acid (HSO_3) groups. When the free

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colour acid is soluble in water, the latter breaks up the intramolecular combination and redissolves the colour acid; this happens in the case of Azo Blue. Here the water plays the same part as in the hydrolysis of combinations of colour acids with mineral acids. The colour changes of Azo Blue are as follows: *a.* Sodium salt—Red; *b.* Free acid—Violet; *c.* Intramolecular salt—Red; *d.* Sulphate and hydrochloride of free acid—Blue.

In conclusion, the author expresses the opinion as one of the results of his own researches and those of Hantzsch (Ber. **33**, 752; this Journal, 1900, 432) that the hypothesis of the quinonic constitution of colouring matters put forward by Nietzki and Armstrong (Proc. Chem. Soc. 1893, 206) is as applicable to azo compounds as to others, and is therefore of general validity.—T. A. L.

Solid Solution Theory of Dyeing. M. Prud'homme. Rev Gén. des Mat. Col. 1900, **4**, [41], 156—158.

Sisley states that amyl alcohol is at once coloured red when agitated with a hot dilute solution of Magenta which has been decolorised by boiling with about 1 per cent. of caustic soda—a phenomenon considered analogous to the dyeing of silk by such a solution. The author finds that the colouring of the alcohol is due to the presence in it of an acid, probably valeric acid; for the alcohol which has first been washed with a 1 per cent. solution of caustic soda, remains colourless on being shaken with a colourless solution of Magenta base. As a further proof of this, it is observed that impure amyl alcohol, which has been coloured by Magenta, is decolorised very slowly when it is shaken with a fairly concentrated solution of caustic soda. The action of an acid, moreover, may be readily demonstrated; thus, Magenta base gives no coloration to benzene, chloroform, or turpentine; but if a small quantity of benzoic or salicylic acid be added to these solvents, or to pure amyl alcohol, they are coloured when shaken with an alkaline solution of Magenta base.

Again, a solution of Patent Blue, acidified with sulphuric acid, has a greenish-yellow colour, but it dyes silk, and colours amyl alcohol a greenish-blue. This is held to be a case of solution from which all possibility of salt-formation is excluded. The true interpretation of the change in colour is that the colour-acid has in solution a greenish-blue colour, but that it combines with sulphuric acid, forming an acid additive compound which has a greenish-yellow colour. The latter is decomposed by a large volume of water or by a relatively small volume of methyl or ethyl alcohol. It is also decomposed when its aqueous solution is shaken with amyl alcohol, the liberated colour-acid being extracted. The colour-acid of Orange III. and the sulphonic acids of amido-azo dyestuffs generally, no doubt, behave similarly, giving acid additive compounds which are decomposed in the same way. (For an instance, see this Journal, 1900, 340.)

Witt (this Journal, 1891, 42) has given coloured glass as an example of solid solution. This has once been in a condition of fusion, that is, an ordinary solution. The case of dyed textile fibres is different, however, as these have never passed through such an intermediate state.

The physical structure of the textile fibres, their insolubility, the extremely divided condition of the dyestuff (? in the dyed fibre), the various forces coming into operation in the dye-bath, as capillary attraction, osmotic pressure, surface tension, &c.—all these are not fully taken into account in the theory which supposes dyeing to be a case of solution. There are instances—for example, the dyeing of fibres so dissimilar as cotton and wool by Congo Red—in which chemical affinities can have no part.—E. B.

The Solution Theory of Dyeing, and the Coloured Bases derived from Triphenylmethane. P. Sisley. Rev. Gén. des Mat. Col. 1900, **4**, [6], 180—182.

Contrary to Prud'homme's surmise (see preceding abstract) the amyl alcohol used by the author was, as stated in his former article (Rev. Gén. des Mat. Col. 1900, 113), pure and neutral. He now gives further details of his method of procedure. The slight acidity of commercial amyl alcohol, due probably to a trace of valeric acid, may be very readily neutralised by decinormal caustic soda, using phenolphthaleïn as an indicator. It is nevertheless true, as Prud'homme states, that when Magenta is dissolved in the alcohol it is decolorised with great difficulty by somewhat strong soda; and this fact the author will explain in a future paper. The alcohol used in the author's experiments was purified by agitation with 5 per cent. caustic soda lye, washing with water, and decantation. It was then cohobated for two hours with quicklime and finally distilled, the fraction at 128°—131° C. being selected. Immediately before being used it was again shaken with weak caustic soda, decanted, and filtered to remove carbonic acid. Amyl alcohol so prepared, when shaken in the cold with the colourless alkaline rosaniline solution, does not become coloured, and this no doubt misled Prud'homme; but if heated it does, in accordance with the author's former statement, become more or less rose-coloured, the intensity of the colour depending on the alkalinity of the aqueous solution. When the latter amounts to $1\frac{1}{2}$ per cent. NaOH, the alcohol does not become coloured. This is just what happens with silk, which is hardly coloured in a cold dye-bath, whilst in the hot bath the dyeing is hindered by alkalis.

Hexamethyl-*p*-rosaniline being more sensitive to alkalis shows the same effects more neatly. To prepare the pure base, Crystal Violet in aqueous solution is precipitated cold with an excess of caustic soda. After 15 minutes the impure base, with the mother-liquor, is heated to boiling, cooled, filtered off, re-dissolved in boiling alcoholic soda, and filtered through animal charcoal. On cooling, the colourless base separates in small crystals, which are dried *in vacuo*. This base is quite insoluble in water. In suspension in boiling water it colours a skein of silk even in presence of 1 grm. of caustic soda per litre. A few crystals suspended in 5 c.c. of cold (previously boiled) distilled water with 0·5 c.c. of neutral amyl alcohol give no coloration, but on boiling, the alcohol becomes deep violet. Even with the addition of 2 c.c. of decinormal caustic soda, a violet colour is developed on boiling, and the water after cooling is still strongly alkaline to phenolphthaleïn. The coloration of the alcohol in these cases is certainly not attributable to acidity. It is consistent with Georgievics' views on the existence of two forms of base in the triphenylmethane class of colouring matters. The colourless form is only stable in presence of alkalis or in the anhydrous crystalline condition. Silk dyed in a hot solution of a colourless base induces the formation of the coloured base, which it is alone able to fix. Amyl alcohol behaves in the same way, and the analogy is striking. In the case of Patent Blue and Orange III., the free acids dissolve with the same colours as the salts, unless excess of sulphuric acid is present; and this, no doubt, as Prud'homme suggests, gives rise to an acid salt which is of a different colour. The author's point, however, is that from these acid solutions, silk and amyl alcohol both take up colour of the same shade as the neutral salt.—T. A. L.

Azo Dyestuffs on the Fibre Formation of ——. Ed. Justin Mueller. Rev. Gén. des Mat. Col. 1900, **4**, [6] 196—197.

The author alludes to the methods which he terms speculative for the direct production of azo dyestuffs on the fibre. One of these consists in padding the fibre with a mixture of an amine, a phenol, sodium nitrite, and sal-ammoniac, the colour being developed on steaming. A more recent method consists in dissolving the amine and phenol in glacial acetic acid, adding a small quantity of tartaric acid and some thickening, the mixture being used for printing. After drying, the goods are passed through a sodium nitrite bath. A modification consists in printing the fabric with a mixture of an amine, a phenol, and nitrite and subsequently passing it through acid, or else the mixture is printed on a material (silk) impregnated with acid. None of these methods have any practical value, the shades obtained being far from commensurate with the amounts of material employed. The same remark applies to a method of the author's, consisting in printing the fabric with a mixture of β-naphthol and Nitrazol C, together with a little sulphuric acid. After printing, the goods are passed through a chamber containing ammonia vapour when a colour is developed immediately. It is, however, stated to be wanting in stability.—T. A. L.

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Sulphur Dyestuffs; Note on ——. Chapius. J. Soc. Dyers and Colourists, **16**, [6], 124—125. (See this Journal, 1900, 439.)

THE author especially draws attention to the origin of the finely divided sulphur, when using sulphur dyestuffs, which during the process of dyeing generates sulphuric acid.

The various sources from which free sulphur may be derived are:—(i) Sulphur which accidentally accompanies the dyestuff as a result of defective preparation, *e g.*, irregularly conducted or incomplete reactions, excess of reagents, &c. It is impossible to eliminate this sulphur in dyeing, and this applies equally to that which arises from the decomposition of the calcium thiosulphate (see (ii)) in a dye bath which is badly prepared or managed.

(ii) Thiosulphates (chiefly sodium salts) which are contained in all sulphur dyestuffs, as a result of their mode of preparation. These thiosulphates are decomposed with the deposition of sulphur, by the acidity of the fixing bath, if the fixation is effected after insufficient washing. Further, if the dye-bath is not alkaline enough and hard water is used for dyeing, calcium thiosulphate is formed, which decomposes above 60° C. into calcium sulphite and sulphur.

In this case, however, the presence of sulphur can be avoided by liberal alkalinity of the dye-bath, and thorough washing of the cotton after dyeing and fixing.

The following experiments confirm the above conclusions:—

(*a*) Dye the cotton in the usual way with St. Denis Black (which contains no free sulphur) and sodium chloride, without the addition of sodium carbonate or sodium sulphide; wash thoroughly, fix with potassium bichromate and sulphuric acid, again wash well, and finally pass through a weak alkaline bath.

(*b*) Proceed as in (*a*), but omit the washing between dyeing and fixing.

(*c*) Dye, wash, and fix as in (*a*), but hydro-extract immediately after fixing, without previous washing.

(*d*) Proceed as in (*a*), but admix the dyestuff with 5 per cent. of sulphur.

(*e*) [i] Prepare the dye-bath with a water of 105° of hardness, and dye as in (*a*).

[ii] Use the dye-bath a second time, with the addition of more dyestuff and hard water, so as to make it up to the same strength as in [i].

The dye-baths (*e*) [i] and [ii] are slightly turbid, especially [ii], due to the precipitation of calcium salts, while a little dyestuff has been rendered insoluble. Hence, hard water must be corrected with alkaline salts, *e.g.*, sodium carbonate.

The six lots of cotton thus obtained were hydro-extracted and not dried.

A sample was detached from each, and the rest steamed for 12 hours at 103° C.

Taking the breaking strain of the original cotton as 100, the following results were obtained:—

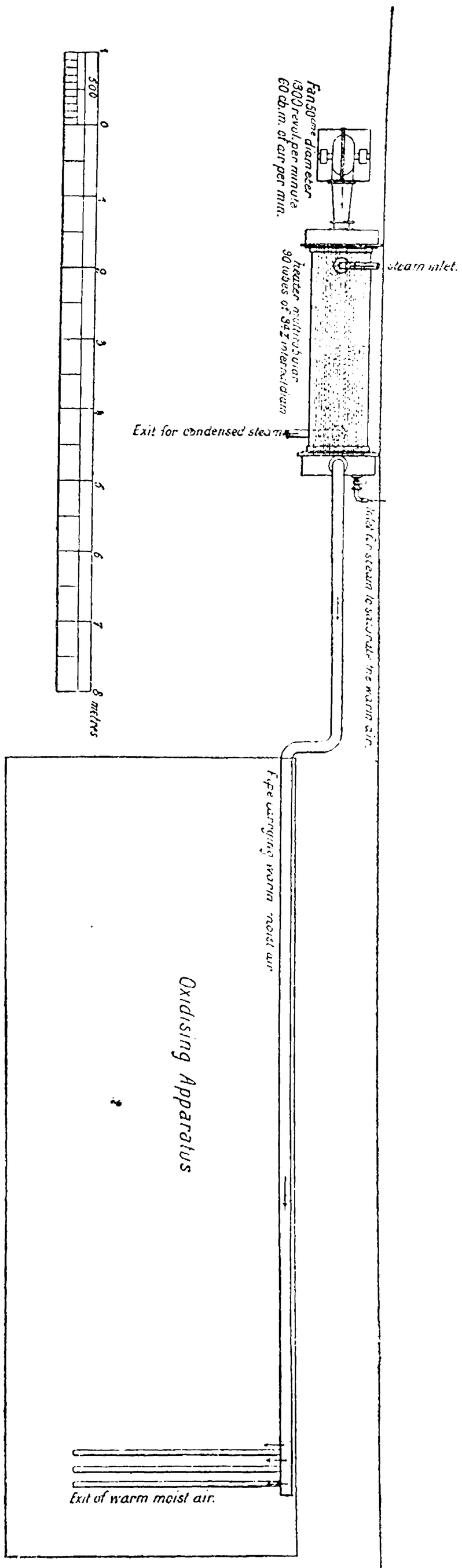
Cotton dyed as in (*a*), not steamed, but dried between filter-paper in the press.....	95
Cotton dyed as in (*a*), and steamed.....	91
„ „ (*b*) „	85
„ „ (*c*) „	40
„ „ (*d*) „	60
„ „ (*e*) [i] „	87
„ „ (*e*) [ii] „	80

—J. E. H.

Aniline Black. C. Brandt. Rev. Gén. des Mat. Col. 1900, **4**, [6], 193—195.

OF the three methods in general use for developing aniline black, one consists in suspending the goods in a warm, slightly moist atmosphere, a second in passing the material through a so-called oxidation chamber at a particular temperature and degree of humidity, whilst according to a third method the fabric is steamed for a minute or two in a Mather and Platt steaming chamber. There are certain drawbacks to all these methods. The first is tedious, in the second the fibre is liable to be tendered and moreover the whites are yellowed, whilst the third produces less perfect blacks, the shades having a brownish hue. The author, in place of steam makes use of warm moist air so that the effect is a kind of washing with hot air, which process also removes any noxious gases as they are produced. The apparatus employed is represented in the accompanying figures:

Fig. 1.



OXIDISING CHAMBER, FAN, AND MULTITUBULAR HEATER.

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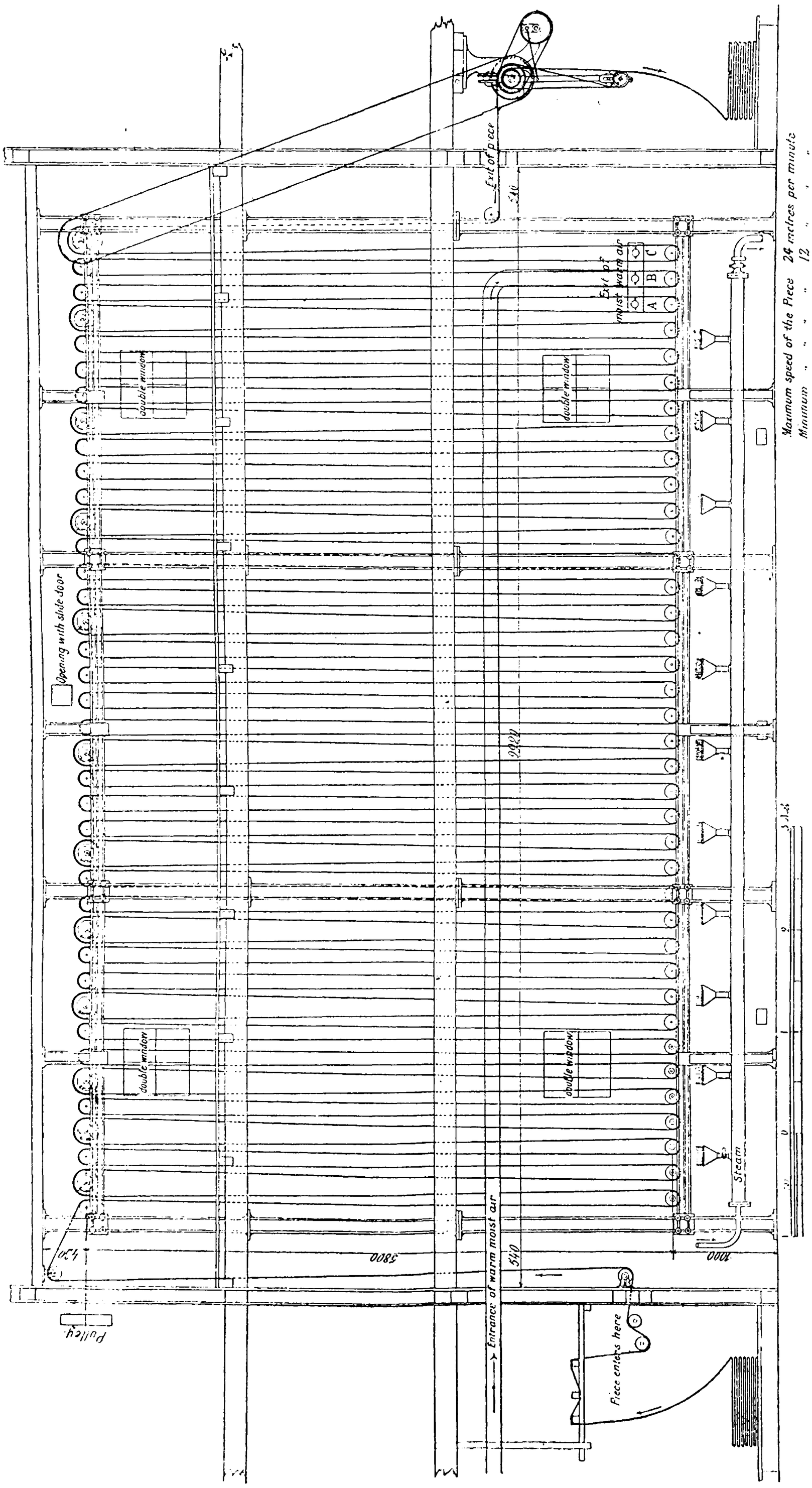
Fig. 2.



LONGITUDINAL SECTION OF OXIDISING CHAMBER.

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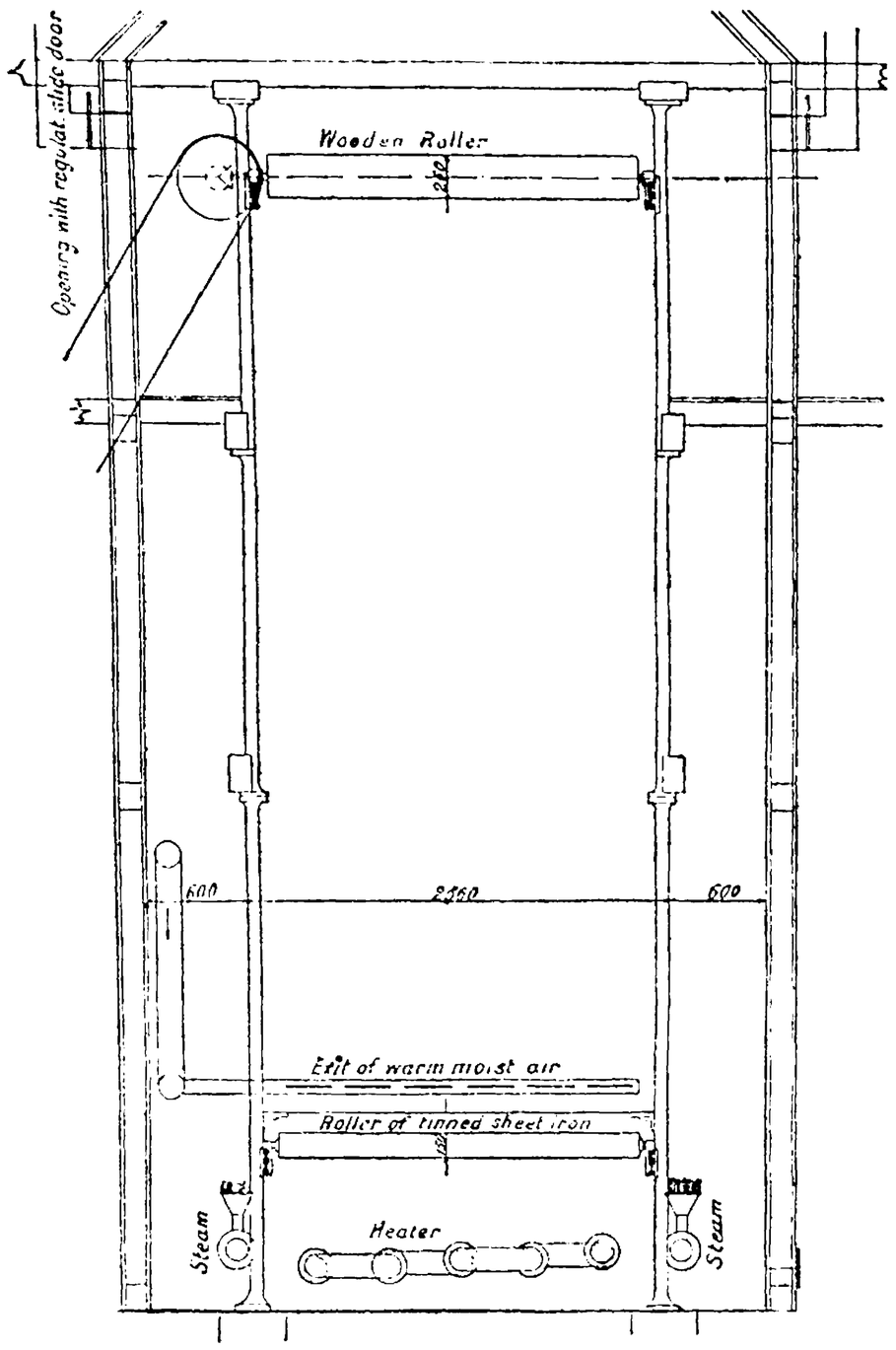
Fig. 3.



Transverse Section of Oxidising Chamber.

The goods are carried over rollers in a large chamber heated by steam jets provided with nozzles of fine wire gauze so as to provide the necessary moisture. Before leaving the chamber the goods pass between three nozzles pierced like a rose through which a strong current of air, heated to 60° C. and containing traces of moisture, impinges on the fibre. This air simultaneously removes noxious gases from the chamber. The air is supplied by a fan and then passes through a multitubular heater where it is heated and also takes up the necessary moisture by the introduction of a small jet of steam. The goods remain about 15 minutes in the oxidising chamber which is kept at 60° C., the moisture being also controlled by means of a wet and dry bulb thermometer, the difference between the two thermometers being at least 5° C. Generally one passage of the goods suffices, but if necessary they can undergo the treatment a second time; this depends upon the pattern.—T. A. L.

Aniline Blacks; Methods of Producing Ungreenable —— A. Scheurer. Bull. Soc. Ind. Mulhouse, 1900, 128—131.

Sealed Note No. 671, *deposited December* 12, 1891.—Aniline Black, produced by Jeannolle's process, is rendered fast to sulphurous acid when it is treated with dinitrosoresorcinol. The action takes place rapidly at a temperature of 80° C. It commences at 40° C. and may be completed at this temperature but it requires a longer time.

The Black contains iron. After treating it, however, with a hot solution of oxalic acid (10 grms. per litre), concentrated enough to remove iron oxide from tissues stained with that compound, the Black is still rendered fast by treatment with dinitrosoresorcinol, but a longer action and higher temperature are required to effect the change. It is probable that a trace of iron escapes the action of the acid in this case.

Sealed Note No. 568, *deposited January* 20, 1889.—Monnet in 1886 (Eng. Pat. 10,113 of 1897; this Journal, 1888, 501) patented the use of a mixture of aniline and *p*-phenylenediamine in the production of a fast Black.

Blacks of similar character are obtained by substituting for the *p*-phenylenediamine, benzidine, tolidine, α- and β-naphthylamine, and *p*-toluidine. They do not become green when submitted to the action of sulphurous acid, either because the amido compounds employed along with the aniline give Browns which are unaffected by sulphurous acid and which are sufficiently red to physically counteract the green colour of the compound into which the Aniline Black is transformed, or, because the colours produced from the mixed amido bases are essentially different from Aniline Black and as such are unchanged by the reagent.

Additional Note on the above.—Prud'homme, in 1890, suggested the employment of the xylidines and toluidines, especially that of *o*- and *p*-toluidine, along with aniline, for the purpose of producing fast Blacks. He also mentions the fact that α-naphthylamine had previously been tried with the same object.

Binder was apparently the first to observe that benzidine gives a Brown when acted upon as aniline is in the production of Aniline Black.

Sealed Note No. 739, *deposited Aug.* 11, 1893.—Cotton tissues which have been dyed Manganese Bronze, preferably by Witz's modification of Lauth's process, are immersed in a solution composed of 2 litres of water, 15 c.c. of aniline, 30 c.c. of hydrochloric acid, 5 grms. of potassium chlorate, and 25 grms. of copper chloride. The solution is thereupon heated during half an hour to 85°—90° C. An action takes place in two stages. The first stage is completed at 60°—65°, and results in the formation of a greenable Aniline Black which becomes ungreenable in the succeeding stage. For the second part of the reaction the presence of aniline in the bath is required. All kinds of Aniline Blacks, produced from mixtures containing copper sulphide, vanadium compounds, ferrocyanides, &c., are not indifferently rendered ungreenable by this treatment, unless they have previously been chromed and washed. The second action may be accomplished with a solution consisting of 1 litre of water, 3·12 grms. of copper chloride, 0·88 grm. of potassium chlorate, 0·7 grm. of hydrochloric acid, and 0·6 grm. of aniline (for 100 sq. cm. of tissue) or, more conveniently, in the case of tissues which have been chromed, washed, and dried, by padding in a solution of 1 litre of water, 10 grms. of aniline hydrochloride, 10 grms. of copper chloride, and 5 grms. of potassium chlorate, and then steaming for 2 minutes. The effect of the passage through the chroming bath is to form a chromate of Aniline Black, which is not decomposed by boiling water. This process has been employed on the industrial scale since 1892.

—E. B.

Observations on the Preceding Notes. H. Schmid. Bull. Soc. Ind. Mulhouse, 1900, 134—137.

After the discovery had been made that *p*-toluidine in admixture with aniline, gave a Black which retained its shade when treated with acids and reducing agents, other aromatic bases were tried in the same connection. It was thus found that α-naphthylamine and still better, *p*-phenylenediamine, were suitable for the purpose. Scheurer has added to the list tolidine and anisidine.

Scheurer has made the interesting observation that the Aniline Black produced by Jeannolle's process becomes fast to sulphurous acid, after it has been acted upon by dinitrosoresorcinol. The iron present in the Black appears to have an important function in the action, for the same Black when deprived of the greater part of the iron it contains, is acted upon with greater difficulty by the dinitrosoresorcinol.

The most effectual method of rendering Aniline Black ungreenable is to superoxidise the colour, as recommended by Jeanmaire. Scheurer has adopted this method with success in the production of a dyed Aniline Black.

The author has repeated Scheurer's experiments with Aniline Blacks of different origins and confirms the statement that they are all rendered ungreenable by treatment in the way he describes. The necessity for the presence of aniline in the oxidising solution may be explained by assuming that the copper chlorate which is formed becomes decomposed when heated in the steaming machine, that is, at a temperature exceeding 60° C., into copper chloride

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and chlorine compounds. These act upon the aniline and convert it into Aniline Black. At the same time hydrochloric acid is produced as is shown in the equation—

$$3C_6H_5NH_2.HCl + HClO_3 = C_{18}H_{15}N_3.HCl + 3H_2O + 3HCl.$$

The acid thus set free acts upon the Aniline Black chromate present on the fibre, liberating chromic acid which superoxidises the Black, being assisted in the action by the excess of chlorine evolved from the oxidising mixture. The final result is the production of a fully oxidised, intense black which remains unaffected in shade when treated with sulphurous acid.—E. B.

Aniline Black; Use of Tungstic Acid in Producing Colour Resists for ——. A. Scheurer. Bull. Soc. Ind. Mulhouse, 1900, 138—139.

The tissue is mordanted with tungstic acid, for instance, by padding with a solution of sodium tungstate, and passing into a solution of sulphuric acid and washing. It is then dried, padded in an Aniline Black mixture, dried, printed with a colour mixture containing a basic dyestuff and sodium acetate, again dried, steamed for two minutes, washed and dried. It may be chromed, if desired, after steaming. The black forms better on the tissue thus mordanted than it does on an ordinary unmordanted tissue. The basic colour lakes obtained, withstand a 30 minutes' soaping at 60° C., but are decomposed at 80° C. Some of them are faster to light than they are when fixed with tannic acid. Their fastness to soap may be increased by an after-treatment with tannic acid and tartar emetic.

Sodium tungstate (200 grms.) dissolved in gum tragacanth paste (1 litre), constitutes a white resist for Aniline Black. The white may be rendered more lustrous and opaque by passing the printed tissue, after steaming, through a solution of barium chloride. The compound thus formed may be coloured by means of pigments, such as Vermilion, Ultramarine Blue, and Chrome Green, giving a series of pale resist colours, along with which the usual albumin and tannic acid colour mixtures may be printed.

In a report upon the preceding paper, C. Schoen states that, Rousseau in 1869, first prepared barium tungstate as a substitute for white lead. The fixing of the basic dyestuffs upon the tissue prepared with tungstic acid, is completed by two minutes' steaming.—E. B.

Dianisidine Bronze. A. Scheurer. Bull. Soc. Ind. Mulhouse, 1900, 130.

A tissue dyed Manganese Bronze is treated with a solution of dianisidine sulphate. The manganese dioxide becomes replaced by a Dianisidine Bronze of a full, rich shade.

—E. B.

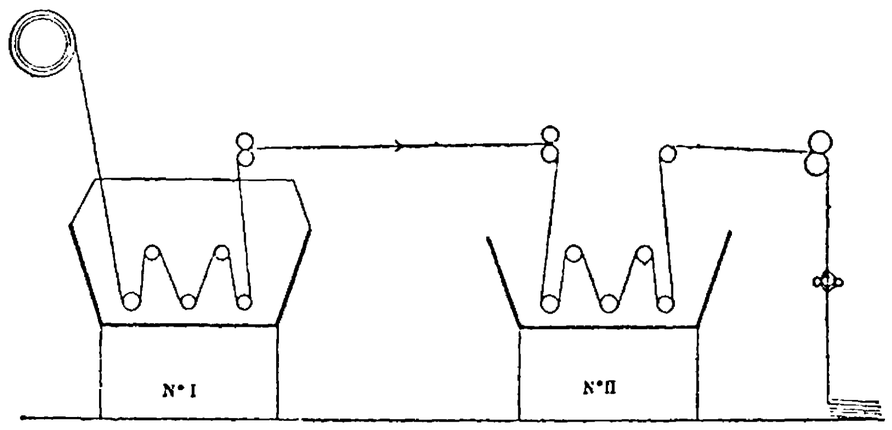
Printing Mixed Tissues [Cotton and Wool]. J. Pokorný. Bull. Soc. Ind. Mulhouse, 1900, 112—117.

Sealed note, No. 1057 *deposited Oct.* 5, 1898. — A description of the bleaching, preparing, and printing of a tissue (muslin de laine) composed of mercerised cotton warp and woollen weft yarns.

The tissue is singed by means of an ordinary singeing stove. 6 pieces, each 120 metres long, are taken at a time and washed for ½ hour in a spiral soaping machine at a temperature of 45° C. They are next treated for 1¾ hours in the same machine with a solution of 6 kilos. of soap and 600 grms. of sodium carbonate, and afterwards for ½ hour with a solution of 600 grms. of sodium carbonate, at the same temperature. After this they are washed, hydro-extracted, and opened out to full width. They are then ready for bleaching.

The operation of bleaching is carried out in a wooden vat furnished with a leaden steam-pipe. Into this 170 litres of water are put and heated to the boil. The steam is then shut off, 3 litres of sodium silicate solution at 39° B. and 48 litres of hydrogen peroxide solution (3 per cent.) are added, and the scoured pieces are introduced and worked about for 3—4 hours, while kept completely covered by the solution. The exact length of time necessary for the process varies according to the amount of colouring matter present in the cotton: thus, brown Egyptian cotton takes about 4 hours, American cotton about 2 hours to bleach. After being bleached, the tissue is well squeezed as it leaves the vat, to recover as much of the solution as possible for use again. It is then well washed, hydro-extracted, opened, wound on a roller, and prepared for printing.

The apparatus (see figure) employed in preparing with chlorine, consists of two dye-jigger machines. One of these (No. 1) contains 120 litres of water, 9 litres of hydrochloric acid at 4° B., and 11 litres of a solution of bleaching powder at 4° B. The density of this solution is 0·6°—0·7° B., and this is maintained during the operation. The tissue is immersed in the solution for 15 seconds, and is then passed into the second machine, in which it is washed before being thoroughly washed in an ordinary washing machine.



Apparatus for preparing Woollen Tissues with Chlorine.

The first jigger-machine is covered and connected with an exhaust fan for the removal of the chlorine which is evolved. It is supplied with acid and bleaching powder by means of two pipes, perforated at their extremities. One of these supplies a solution of 9 litres of hydrochloric acid at 4° B., diluted with water to 60 litres; the other a solution of 11 litres of bleaching powder solution at 4° B., similarly diluted. A gauge glass fixed on the outside of the machine enables a constant level of the bath to be maintained.

The tissue after being washed and squeezed, is next prepared with stannic oxide. To this end it is passed through a solution of sodium stannate at 2° B., allowed to remain wound on a roller for an hour, and then passed into a solution of sulphuric acid at 1½° B. After being washed, hydro-extracted and dried, it is ready for printing.

The colours chiefly printed, are the basic dyestuffs, commonly employed in calico printing and fixed with tannic acid, along with a few dyestuffs fixed upon a chromium mordant. The printed tissue is wrapped between folds of dry steaming-cloth and steamed for ½—1 hour in a cottage steamer. It is afterwards passed through a cold solution of tartar emetic and soaped in the cold.

Paranitraniline Red and similar insoluble azo colours are produced upon the mixed tissue in precisely the same way as upon cotton tissues, namely, upon a grounding of sodium β-naphtholate. There is no necessity to neutralise the soda by passing the prepared tissue through a solution of ammonium chloride, as has been recommended. The colours of this class are soaped at 30°—40° C.

The Aniline Black resist style (Prud'homme's) may be worked with very slight modifications.

The tissue is finished in the same manner as a pure woollen tissue, with the addition of a little hydrogen peroxide to the finishing mixture, for light-ground prints.

—E. B.

Leather; Dyeing, Staining, and Finishing of ——. M. C. Lamb. Leather Trades Rev. **33**, [747], 522. (See this Journal, 1900, 158.)

Bleaching. — The bleaching of chamois leather is best carried out by means of a solution made by dissolving 1 lb. of potassium permanganate in 10 galls. of water. The skins are immersed for about half an hour, with constant stirring, at a temperature of 40° C.; and when dyed brown throughout, they are washed in water and transferred to a solution made by dissolving 7 lb. of sodium bisulphite in 20 galls. of water, and adding 3 lb. of hydrochloric acid.

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The skins are kept in this solution until they are completely bleached, a little more acid being added if necessary; they are then removed and washed in water.

Other bleaching agents are sulphur dioxide gas and sodium hypochlorite solution ("Javelle water").

The sodium hypochlorite bleach is used successfully for bleaching "Persian" and Australian basils, the treatment with sodium hypochlorite being substituted for the alkaline bath used to "strip the tan" from these goods.

Hydrogen- and sodium peroxide, have never, so far as the author is aware, been successfully applied to leather as bleaching agents.

Dyeing.—After the preliminary operations previously described (this Journal, 1900, 158), the skins are ready to be dyed.

There are three distinct methods of dyeing in use in this country, namely the "tray," "drum," and "paddle" methods.

The "Tray" Method.—In this method of dyeing, the skins are paired together, flesh to flesh, and laid over a "horse" alongside the dye tray; the dye-bath is prepared in the tray and the skins placed therein, a pair at a time, as quickly as possible. The skins are kept in motion by transferring the pair of skins at the bottom of the tray to the top, this being repeated until each pair of skins have been moved from the bottom to the top three or four times, or until the skins have acquired the desired depth of shade. The temperature of the dye-bath is about 60° C. before the skins are entered, the cold skins on being placed in the bath lowering the temperature down to about 45° C. The advantages of this method are (1) that the skins can be seen during the dyeing operation; (2) that where one or two skins, owing to their closer and more compact grain, do not take the dye as quickly as the rest, these may be allowed to remain in the dye-bath after the other skins have been removed, until they have acquired the necessary depth of colour; (3) that the flesh sides of the skins are not to any great extent dyed, this meaning a saving in dyestuff. The disadvantages of the method are (1) that the dye-bath soon becomes cold without some special appliance for heating; and (2) that the labour involved in keeping the skins in motion is considerable.

The "Drum" Method.—In this method the dye-bath is made in the drum at a temperature of about 50°—60° C., the skins entered, and the drum rotated.

The advantages of this method of dyeing are (1) that the goods are kept in motion without labour; (2) that the dye-bath only cools down a few degrees during the dyeing; and (3) the mechanical action of the drum causes a better absorption of the dye, also the dyeing is more even than in the "tray" method. The disadvantages of the method are that the goods cannot be seen during the dyeing operation; the drumming action is apt to "grain the skins up," and the flesh side of the skin is dyed.

The "Paddle" Method.—In this case the dye-bath is made in the paddle, the paddle started, and the goods to be dyed entered. The advantages of this method over the "tray" method are that no labour is required to keep the skins in motion, and the dyeing is more even. The disadvantages are, that more dyestuff is used than is the case in either of the other two methods; the flesh side of the skin is dyed, and that, unless the paddle is closed in, the dye-bath soon cools down.

The dye-bath is made by pouring upon the requisite quantity of dyestuff, 200—300 times its weight of boiling water and stirring until dissolved. If the dye solution is not quite clear it should be filtered through a piece of canvas; should the water with which the dye-bath is to be made, contain lime salts, it should be rendered faintly acid with acetic acid.

The "acid" and basic dyes are those chiefly used in leather dyeing, the latter being least in favour owing to their partiality for accentuating defects caused by any part of the grain surface being damaged. The "acid" colours require double their weight of concentrated sulphuric acid adding to the dye-bath, whereas the basic dyestuffs require no such addition.

It is better to only add one-third of the concentrated dye solution to the dye-bath at first, adding the remaining two-thirds at periods of about ten minutes each.

The length of time required in dyeing depends upon the depth of shade required and upon the dyestuff, but about three-quarters of an hour is generally sufficient.

After dyeing, the skins should be well washed in tepid water; where "acid" dyes have been used, the dyed skins should be washed in running water for at least three hours in order to free them as much as possible from the excess of sulphuric acid. The author recommends the addition of a little salt to the water in which the skins are washed, in order to prevent the "bleeding out" of the dyestuff.

After washing, the leather is "set out," then lightly oiled over on the grain, and dried out; when dry the goods are ready for the finishing.—M. C. L.

Sumach; Detection and Estimation of certain Vegetable Adulterants of ——. G. Scarlata. Staz. Speriment. Agrar. Ital. 1900, **33**, [2], 168.

See under XXIII., *page* 779.

PATENTS.

Printing of Textile Fabrics. W. Rumney and Co., Ltd., and J. Young, Manchester. Eng. Pat. 15,867, Aug. 3, 1899.

Shaded or clouded effects on textile fabrics are produced in this invention by painting the design on the roller with suitable varnish and then etching the roller so that the design stands out in relief.

When the roller is placed in the printing machine and comes in contact with the cleaning doctor, the latter does not clean thoroughly the parts round the design, and so a shaded appearance is given to the printed fabric. The same effect can be produced by painting a die, etching the same, and raising a mill from this, and then proceeding in the usual way.—C. M.

Bleaching, Electrolytic ——, *of Baled Yarns.* A. A. Vogelsang, Dresden, Germany. Eng. Pat. 20,214, Oct. 9, 1899.

The yarn, in bundles or bales of several pounds' weight as delivered from the mills, and without being unpacked or made into smaller bundles or hanks, is packed vertically in a bleaching vat, the bales being adjoining or one above the other, so that the circulating fluid moves in the direction of the yarn threads, and large quantities of material can be economically and spotlessly bleached at one time.—G. H. R.

Detergent [and Dyeing] Compound; A New ——. C. H. Fitch, Jersey City, New Jersey, U.S.A. Eng. Pat. 8078, May 1, 1900.

Claim is made for the manufacture of a liquid which, by one application, shall simultaneously cleanse, deodorise, disinfect, and dye carpets and other fabrics. It consists of an aqueous solution of ammonium chloride and mercuric chloride, to which are added zinc chloride, ammonia solution, and aniline colours of the required shade. Suitable proportions of these various ingredients are given.

—C. A. M.

Sodium Dioxide; Manufacture of Hydrates of ——, *and their Application to Bleaching.* G. F. Jaubert, Paris. Eng. Pat. 9461, May 22, 1900. (Under Intern. Conv.)

Sodium dioxide is exposed in thin layers to the action of moist air within a closed chamber until it has absorbed about twice its own weight of water, to constitute a white hydrate of approximately the formula $Na_2O_2, 9H_2O$. To form a neutral bath for bleaching wool, 100 litres of water, 2,220 grms. of the hydrate, and 1,070 grms. of "commercial concentrated sulphuric acid" are taken. If the bath be acid it may be made slightly alkaline by ammonia. The cleansed wool is stirred in the bath, kept at 50° C. for several hours, and then well washed, when the bleaching is complete.—E. S.

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VII.—ACIDS, ALKALIS, AND SALTS.

Thirty-sixth Annual Report on Alkali, &c., Works, by the Chief Inspector. March 27, 1900.

In this, his fifth report, the Chief Inspector refers, with especial emphasis, to the intimate relation between physics and industrial chemistry, and quotes from Mr. Beilby's Presidential address on "The Relations of the Society of Chemical Industry to Chemical Engineering and to Industrial Research" (this Journal, 1899, 333—340), with particular reference to the statement coming under the second chief head, that "the systematic study of design and construction of chemical apparatus is nowhere carried out in this country." The Chief Inspector considers that the branch of science most needing to be taught is "*engineering*, modified by the special requirements of the subject of chemical manufactures to which it is to be applied"; and, in reference to the scheme for a National Physical Laboratory, in respect to which he was consulted by the authorities, he considers the point of first importance to be:—

"*To establish, collect, and codify trustworthy data on the transference of heat, by radiation, conduction, or convection, per unit difference of temperature through unit areas of various materials of unit thickness in unit time.*"

There is a net increase of two alkali and one other works since 1898, the total of alkali and other works being 1,055. Besides these, there are 127 registered works in Scotland, being an increase of one over the preceding year. There is a slight average improvement in the condensation of acid gases over the preceding year, as that also was an improvement on the year before. There have been four prosecutions, penalties being obtained. Sulphuric acid works have shown throughout the country a slightly higher escape of acids of sulphur and nitrogen than in recent years, which is attributed to pressure of increased demand. There has been a diminution in the "stepped beaker" rectifying processes, owing to nuisance arising from the escape of acid furnaces. The Lunge-Rohrmann plate towers, mentioned in the two preceding reports, are still being worked, but their introduction is as yet too limited to enable a "definite statement" to be made, though the inspector is of opinion that with a chamber space of 13 cubic feet per lb. of sulphur burned, steady results may be obtained. At one work, where overheat pans for concentrating sulphuric acid are used, freedom from the heavy white fume which is so objectionable has been attained by using an improved system of firing, which promises to be worthy of wider adoption. The fireplace is of the gas producer type, with primary air carefully regulated, and the secondary air, heated on regeneration principles, is introduced at such a point into the combustion chamber, that immediate contact of flame with heated acid is avoided. The Kessler rectifying process has been introduced into three registered works, the process "leaving little or nothing to be desired as regards the escape of noxious gases."

Nearly four pages of the report are devoted to a statement of the position in reference to the Badische catalytic process for the manufacture of sulphuric acid, Dr Lunge's opinions being quoted, giving full credit to the success of the process, but maintaining that "up to the point of chamber acid, or even Glover tower acid, the chamber process can still compete with the catalytic process, and for acids of such strength there would be no need whatever to incur the expense of introducing the catalytic system." The Badische process yields acids of "exceptional" purity, and especially free from arsenic. Also, it is stated that the plant for making acids of all strengths, from the anhydride down to weak acid, costs only two-thirds the capital outlay of a plant to yield a corresponding quantity of concentrated acid. Nevertheless, all things being taken into consideration, it would not seem that the proprietors of chamber plant in this country have need to be alarmed. It is curious, and worthy of note, that the process now brought to so successful an issue in Germany was first established in England in 1831, when Phillips took out a patent for a process based on the catalytic power of platinum. The various stages through which the invention passed are followed in the report, especially in pages 145–6. Squire and Messel's developments since 1875 have been fertile in this country, and both Nordhausen and anhydrous acids have been made in large quantities on the catalytic system at the works of Messrs. Chapman, Messel and Co., Silvertown, and it is stated that very shortly an entirely new and improved installation will be in operation.

There is no change to note in the manufacture of nitric acid. The Valentiner patent process, with a medium vacuum of from 6 to 9 ins. of mercury, has continued to work satisfactorily. Chlorine works have been kept busy through increased demand, and vigilance has been necessary to guard against local escapes. The safest and quickest means of getting rid of excess of chlorine has been found in dusting the finished chambers by means of the Minton sprinkler.

The year 1899, covered by the present report, stands out in sombre prominence in the history of the Leblanc industry, as marked by the terrific explosion of 150 tons of chlorate of potash, at Kurtz's works of the United Alkali Company on May 12th, involving also the destruction of 12 large vitriol chambers in a neighbouring works, from which the vitriol ran in a stream down a road over which a tram had recently passed. The gas-holder of a gas works, 100 yards distant, was rent at the top, and the escaping gas, ignited by burning débris, flamed to a height of 600 feet. The explosive wave acted on a barometer quarter of a mile off, sending the mercury to the top of the tube, and then depressing it to 22·60 inch. Thus windows were in some places blown inwards, and in other places outwards, as the pressure of the wave rose and fell. An entirely new vitriol plant has now been built on the site of the demolished chambers.

The following table shows the—

Amount of Sulphate of Ammonia produced in the United Kingdom.

—	1899.	1898.	1897.
Gas works	136,529	129,590	132,724
Iron works.....	17,963	17,935	17,779
Shale works.....	38,780	37,264	37,153
Producer gas, coke, and carbonising works.....	15,209	11,568	10,624
Total	208,481	196,357	198,280

The production of sulphate of ammonia from iron and shale works is mainly in Scotland, where an additional shale work has been registered, and where an additional iron work was in blast, though with decreased production of iron. There was, however, an increase in the coal consumed per ton of pig, to which the increased ammonia production must be attributed. This change in the relation of pig obtained, to coal consumed, is partly due to inferiority in the quality of the iron ore received from abroad, and partly to the difficulty the ironmasters experienced in obtaining hard splint coal, softer coals being in part substituted. The principal coalfield in Scotland is that in Lanarkshire, and it is estimated that this will be practically depleted in from 12 to 25 years. It appears, however, that extension of recovery plants to the few remaining unconverted blast furnaces is contemplated in 1900. The calorific value of the gases, although theoretically diminished by the withdrawal from them of tar, &c., is not so in practice, owing to removal at the same time of water vapour, dust, &c., by the recovery processes. Iron oxide exercises a destructive action on ammonia at so low a temperature as 140°—150° C., and the Chief Inspector points out that probably contact of the gases with red-hot brickwork may prove a factor of importance. Apparatus for the washing of coal has been much improved, and coal can now be washed to contain no more than 2 to 3 per cent. of mineral matter, and the washed-out mineral matter to contain no more than the same percentage of combustible. The effect of coal-washing on coke-oven recovery plants is considered, and so far as

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regards the yield of ammonia, is regarded as immaterial. A reduction of "the smoky pall that hangs over large tracts of country in the northern part of England" is regarded as a great desideratum, and in this connection a description is given of a special mould used for forming fine coal into cakes, which then burn under much more advantageous conditions. Another improvement, imported from America, consists in forcing the necessary air into the heating flues of the ovens, instead of draughting them by the chimney. Both fuel gas and hot-air supply are thus under slight pressure, which is found to promote the yield and quality of the residuals. Remarkable economies in fuel might be attained if central sources of supply of gas for gas engines were established. Such sources might, for instance, be established with recovery of by-products in the Midlands. A quotation is given from Mr. Beilby as follows: — "It is rather a striking thought that the five million h.p. which is at present developed by steam boilers, with a consumption of 50 million tons of coal, might be developed by Mond producers and gas engines with a consumption of only 10 million tons." Mr. Beilby is further quoted to show that if the 130 million tons of coal now burned in the raw state, in beehive ovens, were consumed in recovery ovens, there would be an *increased production* of 125,000 million cb. ft. of illuminating or fuel gas, 620,000 tons of tar, 9 million tons of hard coke, and 110,000 tons of sulphate of ammonia. Were such changes effected it would be necessary to utilise the tar as fuel, and the coke would need a new outlet. The making and introduction of the briquette on a large scale would solve this difficulty, and meet a public want greatly stimulated by the existing conditions of the coal trade.

A table is given of the constitution of ammoniacal liquors, those from Scotch sources being given in a second table, as in preceding years. The strengthening of the liquor by repeated passage down the scrubbers is considered of great importance, and from special experiments made, it appears important also as assisting the oxidation of sulphide to thiosulphate. More conclusive results are, however, hoped for in the next annual report. The methods employed in analysing the liquors is described. It has been found necessary to abandon the use of ammoniacal solutions of copper or zinc salts in estimating sulphide, and to adopt a method based on the insolubility of zinc sulphide in presence of dilute acetic acid. Even then, however, attempts to estimate thiosulphate in the filtrate from the zinc sulphide proved unsuccessful owing to the interference of organic matter. This difficulty was overcome by the use of hydrochloric acid in the place of acetic acid.

Mr. Green, of the Preston Gas Works, has devised a method of producing sulphate of ammonia which can be bagged very shortly after production as "a beautiful white crystalline salt." "The process is continuous, the waste gases heat the incoming liquor by passing through a tubular heater, and the hot liquor then passes to a divided flanged pipe, in which is a steam pipe connected with the steam boiler at both ends, one end returning the condensed water to the boiler. These pipes are of considerable length with a slight rise from the horizontal from the outlet, and at two points in the length of the divided flanged pipe the ammonia gas is drawn off to the saturator; the liquor with the fixed or combined ammonia is conducted to a small liming vessel of simple construction, provided with arms or agitators to prevent the lime from depositing. The saturators are copper vessels, into which mother-liquor is pumped and acid run in continuously. After some hours' working the saturator becomes heavily charged with salt, which is discharged from the bottom into a tip box standing over a well into which the mother-liquor drains." By means of three floating telescope siphons, measured quantities of ammonia liquor, lime liquor, and acid are supplied with nicety to the apparatus. The process is not patented.

Considerable difficulty is experienced in some ammonia works in disposing of the spent limed liquor. Mr. Diamond, of Pye Bridge Chemical Works, cools the spent ammoniacal liquor in settling tanks, whence the liquor is conducted into a plant for chemical treatment, and mechanically filtered. The cost is estimated at 3*s.* per ton of sulphate of ammonia, allowing for wages and a high price for coal.

An historic retrospect is given as to the value of residuals of the coal gas manufacture, beginning with 1850, or thereabouts. From a tabular statement furnished by the Sunderland Gas Company, it appears that the production of gas, with coal at 3*s.* per ton, was 20 million cb. ft. in 1849, against 927 million cb. ft. in 1899, with coals at 12*s.* The ammoniacal liquor at the earlier period was valued at 3*s.* per 1,000 gallons, against 10*s.* in the latter period. Tar was 2*d.* per gallon as sold to builders of wooden ships in 1849, and now $1\frac{1}{4}d.$ per gallon as sold to tar distillers. The proportion of cost of coals recovered through the residuals was 65 per cent. in 1849, against 70 per cent. in 1899. As the production of tar increased, the price fell, until the demand for benzol arose on the discovery of the aniline dyes, when the price rose to 3*d.* a gallon, and then again fell, until at one time $\frac{1}{2}d.$ per gallon could with difficulty be obtained. These investigations have led to other interesting discoveries, one of which is that, so early as 1817, the fundamental principle of the Claus process was anticipated by a patent by Mr. D. Wilson, of Dublin, for purifying coal gas by means of the chemical action of *ammoniacal gas*. The work done in late years on the introduction of Hill's process, and by such co-workers as Mr. R. Laming and Mr. G. Livesey is mentioned, and details are given of the practical working of the Claus process, and of Mr. Holgate's process, started in 1894. Mr. W. Young's imments of 1885 are based on appreciation of the fact, that at ordinary pressure only a small range of temperature exists between the dissociation point of carbonate and sulphate of ammonia, and the boiling point of water, and as the solvent power of hot water for ammonia is small, the process must be conducted with large vessels. If the process be conducted under considerable pressure, more caustic ammonia can be kept in solution by the water.

Extension is going on in the use of the Lennard continuous tar still, and two more plants are expected to start operations in 1900. A large work is in course of erection in the north of England, in which, after full consideration, the intermittent principle of distillation is to be adopted. In the early autumn an explosion occurred in a large tar and liquor well of the Corporation Gas Works, Burton-on-Trent, after the sulphate of ammonia plant had been in operation for a fortnight, and there had been no time for accumulation of fouled oxide. No explanation has been found. Such explosions are not, however, unknown, one investigated in 1892–93 having involved loss of life. A tabular statement of explosions in gas works, beginning in 1885 and numbering six in all, is given.

In chemical manure works special care is needed to guard against the escape of acid gases carrying fluorine compounds. Recently public demand has required greater drying than formerly of manures, thus putting greater strain on manufacturers to keep within the requirements of the inspector. The nitrate of soda imported into Europe in 1899 was 1,280,000 tons, and the Continent took from us 140,500 tons of sulphate of ammonia. The manure materials imported into this country in 1899 were: Guano, 27,000 tons; mineral phosphates, 420,000 tons, and nitrate of soda, 136,000 tons; all these being considerably in excess of the two immediately preceding years.

Prof. Lunge's report on the Dellwik-Fleischer water gas process is mentioned, as confirming earlier investigations as to the "extraordinary fuel efficiency" of this process as compared with others in which the "blow" before the introduction of steam to the incandescent coke is carbonic oxide. In the new process the "blow" is carbonic acid, and is shortened from ten minutes to two minutes, while the time of being on steam is lengthened from five to eight or ten minutes, the result being that from 80 to 82 per cent. of the fuel used is converted instead of 45 per cent. as previously. Thus, at a very low cost, a concentrated gaseous fuel of twice the calorific power of producer gas, smokeless, and of very high temperature, is obtained, "so that problems of high temperature chemistry, not otherwise approachable, become possible of trial."

Cement works are, in the Act of 1881, defined as being "works in which aluminous deposits are treated for the purpose of making cement," and only works using such "aluminous deposits" need to be registered under the Aet

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The chief inspector, after a review of the difficulties introduced, finds as equitable and reasonable "that only in cases where alumina was the predominating base (not the 'predominating partner,' for silica, which plays the part of an acid in combination with the other bases, always occupies this position in a typical aluminous deposit) should registration be required." Analyses of Gault clay and of Medway mud, as well as of "clays" from several parts of the Kingdom, and analyses of Portland cement, for which three additional works have been registered for the past year, are given. The cement industry has been active, a number of new kilns having been built. Six Schneider kilns, originated on the Continent, have been built. They are in pairs, and consist of tall cylindrical brick kilns, circular in section, terminating in an iron dome with a short iron shaft; the two kilns are connected at the top by a platform. The "slip" as rough briquettes, is charged into the top with fuel every hour or two, and the cement clinker is drawn from below, so that working is continuous. The volume of the gaseous discharge is small, and taking place at a height of some 60 feet, is readily dispersed.

The manufacture of arsenious acid from mundic has undergone extension, and some progress has been made in condensing the escaping SO_2 by introducing tiers of limestone into the final wash towers. Cattle are sometimes injured by drinking water from such towers, to which a small proportion of arsenious acid present gives a palatable sweet taste. Experiments are described and tabulated for trying whether such small proportions of arsenic can be cheaply removed. The conclusion is, that by means of copperas and lime successively, "a purified effluent can be obtained containing no more than 0·001 per cent. As_4O_6." Arsenites of iron are entirely soluble in solutions containing free sulphuric acid. With regard to protection of workmen from injury in arsenic works, a report may soon be looked for from the Home Office.

The present report contains 184 pages, of which 26 pages are devoted to Scotland.—E. S.

Chlorine; Potential required for the Discharge of ——. [*Electrolysis of Chloride Solutions.*] E. Müller. Zeits. für Elektrochem. 1900, **6**, [48], 573—578, and [49], 581—583.

The electromotive force required for the liberation of chlorine is usually taken to be 1·31 volt. From his experience the author is inclined to doubt the correctness of this value, and gives an account of unfinished researches which tend to confirm his view.—J. S.

Chlorides; Decomposition of Metallic ——, *in Aqueous Solutions by Animal Charcoal.* O. de Coninck. Comptes Rend. **130**, [24], 1627—1628.

On filtration through animal charcoal, *mercuric chloride*, though partially absorbed, is not decomposed; *cadmium chloride* and *aluminium chloride* are very slowly absorbed, and not at all decomposed; *stannic chloride*, like stannous chloride, is rapidly decomposed, with formation of an oxychloride, which is in the end completely absorbed by the charcoal. A dilute solution of *ferric chloride*, prepared a fortnight before the experiment, exposed to diffused daylight during that fortnight, and to strong sunlight for three hours, gave after one filtration a turbid filtrate in which ammonium sulphide gave an immediate precipitate; after two filtrations a slightly opalescent filtrate very slightly affected by ammonium sulphide; and after three filtrations a perfectly clear filtrate, unaffected by ammonium sulphide, but precipitated by silver nitrate. The author considers that the charcoal acts as a dialyser, and that the turbid filtrates are solutions of colloidal ferric hydroxide in hydrochloric acid, the colloidal hydroxide being gradually absorbed by the charcoal.—J. T. D.

Sodium Tungstate Solutions; Density, Refractive Power, and Strength of ——. B. Pawlewski. Ber. **33**, [8], 1223—1224.

Sodium tungstate crystallises with 2 molecules of water, according to the formula $WO_4Na_2.2H_2O$. The water, amounting to 10·91 per cent., is given up on drying the salt at 100° or keeping it for a few days in an exsiccator over sulphuric acid. The statement in certain textbooks that sodium tungstate is soluble in 4 parts of cold and 2 parts of boiling water, is inaccurate, as will be seen in the table which follows. The following is an abridgment of this table of determinations given by the author:—

Density or $D\frac{20°}{20°}$	$n\frac{20}{D}$	WO_4Na_2	$WO_4Na_2.2H_2O$.
		Per Cent.	Per Cent.
1·02016	1·33586	2·21	2·48
1·04292	1·33901	4·59	5·15
1·07449	1·34244	7·83	8·79
1·09687	1·34516	10·08	11·31
1·13036	1·34902	13·16	14·77
1·16896	1·35376	16·56	18·62
1·19938	1·35752	19·10	21·44
1·21720	1·35933	20·59	23·11
1·25083	1·36297	23·30	26·15
1·28143	1·36648	25·46	28·58
1·38826	1·37934	32·68	36·68
1·47193	1·38697	37·30	41·87
1·48595	1·38890	38·43	43·14

In this table the data in the columns under $D\frac{20}{20}$, $n\frac{20}{D}$, and WO_4Na_2, were directly determined, whilst those in the column under $WO_4Na_2.2H_2O$ were calculated.

The density at $\frac{20°}{4°}$ may be calculated by the formula—

$$D\frac{20}{4} = D\frac{20}{20} \times (0{\cdot}99827 - 0{\cdot}00120) + 0{\cdot}00120.$$

$WO_4Na_2.2H_2O = (p \times 330{\cdot}14) : 294$, where p = the percentage of WO_4Na_2 found.—H. B.

Acids in Organic Solvents; Rapidity of the Action of ——. M. Geiger. Chem. Centr. 1900, **1**, [20], 1061.

See under XXIV., *page* 786.

Potassium Chloride; Impossibility of the Direct Electrolytic Formation of ——. A. Brochet. Comptes Rend. **130**, [24], 1624.

See under XI. A., *page* 751.

Ozone; Quantitative Estimation of ——. O. Brunck. Ber. 1900, **33**, [11], 1832.

See under XXIII., *page* 776.

PATENTS.

Liquid Air; Improved System for the Safe Storage, Transport, and Use of ——. C. Joly and E. J. Richardson, both of London. Eng. Pat. 11,835, June 7, 1899.

This system comprises the use of cases or receptacles for the liquid air, which are provided with valve mechanisms for maintaining a pressure equal to or greater than the critical pressure required, and with a jacket of alcohol, brine, or other liquid of low freezing point. The jacketing liquid is adapted to be cooled by any vaporisation of the liquid air, so as to maintain a temperature equal to or less than the critical temperature required. External heat is excluded by suitable insulation. The liquid air may be employed for cooling, freezing, or preserving goods, which may be contained in a vessel immersed in, or surrounding, the air container, or it may be employed for driving machinery, arrangements being provided for regulating the vaporisation and expansion of the air.—R. A.

Catalytic Activity; Process for the Production of Substances of great ——. O. Efrém and J. Klaudy, both of Vienna. Eng. Pat. 14,339, July 11, 1899.

See under II., *page* 726.

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Hydrochloric Acid, Manufacture of ——. J. Wetter, London. From Harkort'sche Bergwerke und Chemische Fabriken zu Schwelm und Harkorten, Gotha, Germany. Eng. Pat. 18,049, Sept. 6, 1899.

GASEOUS hydrochloric acid is passed into solution of stannous chloride, or of other stannous salt, to free it from arsenic and other impurities. As the solution becomes saturated with the gas, the latter passes on in a pure state, and may be condensed. Or, the gas may be washed in towers by the stannous solution.—E. S.

Nitric Acid; A New or Improved Product obtained by the Utilisation of the Residues from the Manufacture of ——. P. Claes, Paris. Eng. Pat. 1072, Jan. 17, 1900.

AFTER distillation of nitric acid in the usual process for manufacturing that acid, sufficient sulphuric acid is added to the residue to bring the proportion of free acid up to about 75 per cent., calculated as acid of 60° B, which, when cool, gives a solid product capable of transport like a salt. The excess of sulphuric acid may be added in the process of distillation, or after discharge of the residuum.—E. S.

Potash, Soda, Chlorine, and their Derivatives; Process of Manufacturing ——, *by the Decomposition of Alkali Chlorides, and Apparatus therefor.* R. Haddan, London. From P. J. J. Roubertie, Bordeaux, France. Eng. Pat. 23,340, Nov. 22, 1899.

SOLID sodium chloride or potassium chloride is mixed with silver oxide or carbonate, and water is gradually added, with stirring, to obtain an alkali lye and silver chloride. The latter is separated, and treated with water and finely divided iron, to obtain ferrous chloride solution and metallic silver. The ferrous solution is dried and heated in a furnace to which is connected a chamber for condensation of any volatilised chloride, which chamber communicates by pipes with lime chambers for absorption of the chlorine evolved and formation of bleaching powder. The air supplied to the furnace is deprived of carbonic acid by passage through lime water. The iron oxide residue is reduced by carbon to obtain iron powder suitable for re-use. The silver, reduced from the chloride as described, is dissolved in nitric acid, and precipitated as oxide or carbonate by lime or other alkali earth, and the solution of the latter is dried and roasted to recover nitric acid and a residue of the alkali earth. Another process for treating the silver chloride precipitate consists in heating it with sulphuric acid, collecting the hydrochloric acid evolved, and decomposing the silver sulphate with ammonia or ammonium carbonate, to recover silver oxide or carbonate. "By this second process it is possible to prepare as desired either caustic alkalis or carbonated alkalis, according as the retrieving is done by ammonia or its carbonate."—E. S.

Sulphate of Ammonia Plant, Apparatus for Clarifying Spent Liquor from ——. W. Diamond, Pye Bridge, near Alfreton. Eng. Pat. 15,543, July 29, 1899.

THE spent liquor is conducted into a brick tank below the level of the sulphate of ammonia plant, whence it is pumped into a series of three settling tanks, each connected by outlet pipes to a main pipe, through which the cleared liquor passes into a tank fitted with an agitator. Alumino-ferric cake is dissolved in a small tank above the agitator tank, into which the solution is led. The mixed liquor and aluminous solution are then pumped into a filter press, from which the clear liquor runs away down a suitable trough. —E. S.

Brine; Apparatus for Evaporating. E. J. Duff and The United Alkali Company, Ltd., both of Liverpool. Eng. Pat. 17,689, Sept. 1, 1899.

THE evaporating apparatus is an upright, closed cylindrical vessel, with a funnel-shaped bottom through which the deposited salt passes into an elevator, to be carried to a suitable receptacle. In the upper part of the cylindrical vessel a "preheater" is arranged, containing a closely set series of horizontal tubes, expanded at the ends into tube plates, which form the inner sides of two small projecting chambers, into one of which the brine to be heated is passed. There is an outlet through the opposite small chamber, from which the brine is then led into the evaporating chamber below, the steam from which passes freely around the tubes, and issues, with condensed water, into a side vertical condensing pipe. A tray, curved upwards on one side, is fixed below the preheater, to catch water of condensation and direct its outflow. In the lower part of the cylinder, a series of vertical tubes is placed, and is surrounded by a belt into which hot gases, live steam, or the hot exhaust gases from gas engines, are led. In these tubes the brine circulates whilst being evaporated. Arrangements are also made for allowing the brine to clear by settling.—E. S.

Brine; Multiple Effect Evaporating Apparatus. E. J. Duff and The United Alkali Company, Ltd., both of Liverpool. Eng. Pat. 17,690, Sept. 1, 1899.

THE apparatus is of a similar type to that described in the preceding abstract, but a number of the apparatus are arranged in series, and, as stated in the first claim, "with the heating chamber of each succeeding evaporating chamber, at, or about, level with the top of the preceding evaporating chamber, and a pipe, or passage, passing directly, and horizontally" "from the top of each preceding evaporating chamber to the heating chamber of the succeeding evaporating chamber." The heating chamber in each cylinder is similar to that described in the preceding abstract, but there are no "preheaters"; each chamber is fed with brine by branches from a main pipe, and is discharged independently of the others. A long vertical pipe connected to the end and highest apparatus, carries off water of condensation from the system, and in doing so gives rise to a partial vacuum which assists the evaporation. —E. S.

Alkali Cyanides and Ferrocyanides, Method of Producing ——. J. Grossmann, Manchester. Eng. Pat. 24,011, Dec. 2, 1899.

AN alkali sulphide, or a mixture of an alkali with sulphur, is mixed with charcoal powder, and heated in a system of connected retorts to redness, when ammonia gas, pure or crude, but dried by dephlegmation, and free from oxidising bodies, is passed through the system. The effluent gases are condensed in the usual manner, and treated for the recovery of ammonia. When the reaction has proceeded sufficiently in the first retort, the latter is detached, discharged with exclusion of air, or in a non-oxidising gas, and is recharged and constitutes the last retort of the series, the rest being treated in rotation in like manner. The alkali cyanide formed is lixiviated from the mass obtained, and may be converted into ferrocyanide by treatment with suitable ferrous compounds in the usual way. Or ferrocyanide may be formed directly in the retorts by adding iron filings to the charge to be heated, either at the beginning or towards the end of the reaction.—E. S.

Nitrogen Compounds; Processes of and Apparatus for the Manufacture of ——, *from Atmospheric Nitrogen.* C. S. Bradley, New York, and C. B. Jacobs, East Orange, U.S.A. Eng. Pat. 7558, April 24, 1900.

AN intimate mixture of barium carbonate and soft coal is coked in a retort oven, and the resulting porous material is charged into an electric furnace of the rotary continuous type comprising, according to the sixth claim, "means for delivering current to the furnace, a movable receptacle adapted to contain carbide-producing materials and to present different portions of such materials successively to the action of the current, and gas-delivering means adapted to deliver gas to the receptacle at a definite part of the movement thereof." The material is first subjected to the intense heat of the current, so as to form barium carbide which fuses, but without destroying the porosity of the material; as the receptacle revolves, the material is brought whilst cooling, into that part of the apparatus to which nitrogen gas is admitted, when the gas is absorbed with formation of barium cyanide, from which other cyanides may be obtained by ordinary processes. It is necessary to the absorption of the gas that the latter should be brought into contact with the carbide when the latter is below the temperature of fusion.—E. S.

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Sodium Dioxide; Manufacture of Hydrates of ——, and their Application to Bleaching. G. F. Jaubert, Paris. Eng. Pat. 9461, May 22, 1900.

See under VI., *page* 741.

VIII.—GLASS, POTTERY, ENAMELS.

Silica; On the Dilatation of Fused ——. H. Le Chatelier. Bull. de la Soc. d'Encouragement, 1900, **5**, [6], 924.

In connection with researches upon dilatation at high temperatures, the author had occasion recently to study the behaviour of the different varieties of silica. Very anomalous results were obtained with the crystalline variety, and it was only with silica in the amorphous condition that a low and approximately regular dilatation was obtained. For the purpose of these experiments, the amorphous silica was prepared by heating quartzose sand with 2 per cent. of lime to a temperature of 1,650° C. (cf. Coupeau, this Journal, 1898, 1147); however, it could not with certainty be established that the crystalline condition of the silica had entirely disappeared, and the author has now repeated his experiments with electrically-fused silica placed at his disposal by M. Moissan. The results obtained with this material correspond to a mean coefficient of dilatation of 0·0000007. The author also made experiments with the view of producing, by the aid of lithia, a mixture combining sufficient fusibility with the low dilatation of fused silica. Only partial success was, however, obtained, and the author thinks that either the lithia was volatilised unequally, or that a recrystallisation of silica took place.—H. H. B. S.

Silica; Coefficient of Expansion of Fused ——. H. Le Chatelier. Comptes Rend. **130**, [25], 1703—1705.

Fused silica has a mean coefficient of expansion between 0° and 1,000° C. of 0·000,0007; it is thus much less expansible than any other common substance, and ought consequently to bear well sudden changes of temperature. Its fusion point is, however, far above that of platinum, and the author has endeavoured to find mixtures containing silica which, while melting at a lower temperature, should have an equally low coefficient of expansion. The mixture, $10SiO_2.Al_2O_3.2Li_2O$, which melts at 1,200° C., seems to have an expansibility little greater than that of pure silica, but the author does not yet place much reliance on the accuracy of his figures.—J. T. D.

Enamel for Iron Ware. Sprechsaal, **33**, [10], 306—307; [11], 337—340.

A cloudy grey appearance can be imparted to ware, coated with ground enamel, by dipping and working about in a thin white enamel and re-firing, the whole being afterwards glazed with transparent cover enamel. Spotty enamel is prepared by adding a solution of some metallic salt—cobalt- or nickel sulphate, &c.—to the enamel mass before use, and then dusting the moist layer of enamel with "ammonia-soda," the corresponding metallic oxide being precipitated and appearing in the form of spots after firing. Similar effects are obtainable by spraying the ware with a cover enamel of a different colour to that of the ground layer. Marbling is produced by sprinkling coloured enamel on the unfired cover enamel, and turning the ware round and round so as to cause the sprayed mixture to run into veins.

For re-touching defective places, an enamel of the following composition may be used: colourless gum dammar, 25 parts; copal, 25 parts; Venice turpentine, 20 parts; zinc white, 30 parts; stirred with sufficient alcohol to make a stiff paste. The yellowish tinge can be corrected with Berlin Blue. For blue enamel, the zinc white is replaced by cobalt blue; for brown, with manganese brown, and so on.

Decorative effects are produced by means of fusible pigment preparations, and bright gold, as well as by overlaid enamel. Printed, hand-painted, and transfer designs are also used.

A few typical recipes for ironware enamels are given below:—

Fritts.

—	Ground I.	Ground II.	White Ground.	White I.	White II.	White III.
Borax	32	41	25	26	18	15
Quartz sand	20	16	20	8	17	19
Felspar	28	30	38	32	44	39
Calc spar or chalk	9	..	..	..	..	7
Ammonia soda	6	6	8	9	6	..
Fluor spar	3	4	2	6	..	1
Saltpetre	2	3	1	3	2	6
Manganese dioxide	0·50	..	..	..	..	..
Cobalt oxide	0·18	0·15	..	..	..	..
Nickel oxide	..	0·10	0	..	..	..
Cryolite	..	..	6	5	13	12
Tin oxide	..	..	..	11	..	..
Magnesia	..	..	..	..	..	1

For use these fritts are ground (not too finely) with clay in the following proportions:—Ground I., 92 per cent.; clay, 8 per cent. Ground II., 95; clay, 5 per cent. White Ground, 95; clay, 5 per cent. White I., 86; clay, 6; tin oxide, 8 per cent. White II., 96; clay, 4 per cent. White III., 84; tin oxide, 10; clay, 6 per cent.

Coloured Enamels.

—	Blue.	Green.	Black.	Brown I.	Brown II.	Turquoise.	Yellow.	Violet.	Rose.	Grey.	Red.
Borax	32	30	35	27	25	28	16	32	25	33	A mixture of alum 30, and iron sulphate 70 per cent. is heated until the colour develops, and is then incorporated with white enamel mass.
Quartz sand	17	19·5	21	3	14	7	28	15	8	30	
Felspar	31	26	16	35	30	30	17	30	31	23	
Ammonia soda	5	8·5	10	9	8	11	11	3	9	9	
Fluor spar	8	6·5	6	3	5	5	..	8	5	3	
Saltpetre	3	1	5	2	1	2	3	..	2	2	
Cryolite	2	4	..	..	..	..	18	7	4	..	
Cobalt oxide	2	1	1	..	..	..	..	..	..	..	
Chromium oxide	..	3	..	..	..	..	..	..	..	..	
Copper oxide	..	0·5	1	..	..	5	..	..	..	..	
Manganese oxide	..	..	5	2	..	..	..	3	6	..	
Iron oxide	..	..	..	4	6	..	..	..	..	..	
White enamel chippings	..	..	..	15	11	..	..	..	..	..	
Tin oxide	..	..	..	..	..	12	4	..	10	..	
Naples Yellow	..	..	..	..	..	..	3	..	..	..	
Zinc oxide	..	..	..	..	..	..	..	2	..	..	
The mixture for use is prepared from—											
Above Fritt	97·25	97·5	97	96	90	94	95	97	97	94	
Clay	2·5	2·5	3	4	3	6	5	3	3	6	
Iron oxide	..	..	..	..	7	..	..	..	..	..	

—C. S.

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PATENTS.

Glazing or Enamelling Compounds for Pottery; Impts. in ——. J. Noad, East Ham, Essex, and T. H. L. Bake, London. Eng. Pat. 13,163, June 24, 1899.

A LEAD glaze for china and hardware, which is said to lessen the liability of the operatives to plumbism, is produced by fritting together lead, sulphur, and silica, or an alkaline silicate, the resulting mass being finely ground in water, washed, and dried.—H. H. B. S.

Glass and other Analogous Substances; Manufacture of ——, *and Apparatus therefor.* J. Lähne, Aix-la-Chapelle, Germany. Eng. Pat. 23,990, Dec. 1, 1899.

THIS is an apparatus for use in the refining of glass and consists of a bell suspended in a partitioned compartment after the manner of a bell-trap. The molten glass is caused to descend into the compartment through a channel, in which is placed a device for removing floating particles. The impurities are further separated by the forced passage of the liquid mass under the edge of the bell. The construction of the apparatus admits of the bell being moved upwards and downwards as well as being rotated and by these means the perfect mixing of the molten glass is effected. Arrangements are also made for the admission of oxygen, or of gases charged with oxygen under the bell.
—H. H. B. S.

IX.—BUILDING MATERIALS, CLAYS, MORTARS AND CEMENTS.

Clay; Fixation of —— in Suspension in Water by Porous Bodies. J. Thoulet. Comptes Rend. **130,** [24], 1639—1640.

DEEP sea calcareous ooze always contains a very notable proportion of clay, while fresh shells contain very little. The author concluded that the clay entered the ooze after its formation, and was not contained in the shells during the life of their inhabitants. To test this, blocks of pumice and of charcoal were filed to flat surfaces, weighed, thoroughly saturated with water, exposed for several days to water containing fine clay in suspension, thoroughly washed, dried, and weighed again. The pumice increased in weight by 5 per cent. The charcoal lost weight, but this was due to mechanical abrasion, for it contained 1·902 per cent. of ash, against 0·909 contained by the original charcoal, showing that it had absorbed 1 per cent. of the clay. The clay absorbed by these porous bodies (and by the shelly ooze of the sea bottom) is not chemically combined, for it is not there in constant proportion; nor is it mechanically mixed in the ordinary sense of the term, for water will not wash it out.—J. T. D.

Concrete; Lining Shafts with. Eng. and Mining J. 1900, **69,** [21], 616.

AT Ougrée, in Belgium, a method of lining shafts with concrete instead of with brickwork has been followed with satisfactory results. A description is given of the mode of working in the case of the lower 50 m. of an air-shaft 100 m. deep. The "sinking" was excavated to the full size without any lining to a depth of 3 or 4 m., and a series of four horizontal cross timbers was fixed near the bottom. Upon this ground-work was erected a cylindrical wooden frame 1 m. high, the outer surface of which, 3 m. in diameter, corresponded to the size of the finished shaft, and concrete was rammed into the annular space between the wooden frame and the side of the excavation. A new frame was then erected above the first, and so on until the bottom of the lining above was reached, the joint being made good by ramming in the last portion of the concrete horizontally. The cement used was made from blast-furnace slag. The concrete used had the following composition: Sandstone, 1,100; cement, 250; and broken blast-furnace slag, 650 parts; 2,000 kilos. of the concrete occupy about 1 cbm. It is stated that the resistance of such concrete to crushing is about 300 kilos. per sq. cm., whilst that of good bricks only averages 12 kilos., so that, with less thickness, a more resisting lining is obtained.
—A. S.

Impregnating Railway Sleepers and Wood for Building Purposes; Alkaline Waste Liquors of Petroleum Works, and their Use for Making an Antiseptic [Petroleum Waste Liquors] for ——. K. W. Charitschkoff. Chem. Ind. 1900, **23,** [11], 197.

IN a communication to the Russian Imperial Technical Society, the author makes a proposal for the utilisation of the waste soda liquors obtained in the refining of petroleum by sulphuric acid, for the manufacture of an antiseptic fluid for impregnating wood. The liquors contain a mixture of the sodium salts of the naphtha acids, and appear to be both the acids themselves and their salts (that of copper in particular) are possessed of strong antiseptic properties. In an eight-months' trial, wood impregnated with salts of the naphtha acids was found to be quite proof against such organisms as *polyporous sulfureus,* whereas unimpregnated wood was very quickly attacked. As a solvent for the copper salt, it is proposed to make use of a bye-product of the manufacture of naphtha, known in Grosny as "ligroin," and in Baku as "gasolin." The product is too inflammable to be sold for burning, and is not sufficiently volatile to be used as a substitute for benzine. In Baku it is considered as a waste product, and run into the sea. An aqueous solution of the freshly precipitated salt is agitated with the ligroin in which the salt dissolves, and the solution thus prepared is used as an impregnating fluid. A 2 per cent. solution is said to be the most suitable strength to employ. Two methods for the preparation of the copper salt have been patented, one of which consists in acting upon copper shavings with the acids under free access of air. The salts of zinc and aluminium may be used instead of the copper salt, but they are less antiseptic than the latter, although more so than the naphtha acids themselves.—H. H. B. S.

Creosote Constituents; Valuation of ——. A. D. Hall. Analyst, 1900, **25,** 148.
See under XXIII., *page* 779.

PATENTS.

Wood; Treatment of ——. H. C. Williams, London, E. Bagshawe, Dover, and W. H. Pendlebury, Dover. Eng. Pat. 13,423, June 28, 1899.

IF the wood is to be used for the manufacture of vessels for storing alimentary products, it is first treated with a hot solution of soda or potash to remove starchy matter, gums, &c., then with hot water, and afterwards gradually heated to a temperature of about 300° F., and immersed in, or coated with, hot liquid hydrocarbons. The treatment with soda or potash and afterwards with water is not, however, always needed, and in such case it suffices to merely heat the wood to 300° F. and immerse it in the hydrocarbons. For preserving piles, railway sleepers, &c., the wood is first heated and then impregnated with crude hydrocarbons, gums, oils, &c. For fireproofing, the wood is heated and then immersed in a firepoofing solution, such as silicate of potash, chloride of zinc, soluble phosphate of lime, &c., after which it is drained and dried. The wood may also be coloured by introducing colouring matters with the impregnating solutions.—H. H. B. S.

Artificial Stone; Improved Process for the Manufacture of ——. F. Gernaert and C. Libert, both of Brussels, Belgium. Eng. Pat. 15,640, July 31, 1899.

CRUSHED sand is either partly or entirely substituted for natural sand in the manufacture of artificial stone from sand, lime, &c., by the process of steaming. It is said that in this way the stones are rendered denser and less hygroscopic, and therefore proof against frost.—H. H. B. S.

Artificial Stone, Cement, Plaster, and the like; Improved Process for the Production of ——, *from Sand, Lime, and other Materials.* S. Zientarski, Warsaw, Russia. Eng. Pat. 16,501, Aug. 14, 1899.

THIS is a modification of the process for making artificial stone which depends upon the property possessed by

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powdered quicklime of combining with silica during slaking. In addition to the alum and gypsum, which is usually mixed with the lime and sand to retard the slaking so as to give time for the mixing to be completed, about 15 per cent. of unburnt powdered clay is added, the effect of which is said to be to convey water slowly and gradually to the lime. The mixture is brought to a plastic state with water, pressed into moulds and allowed to harden. If desired the alum and gypsum may be dissolved in the water used and added in the form of solution.—H. H. B. S.

Imitation Stone Plates, Slabs, or Tiles; A Process of Manufacture of ——. L. Hatschek, Vocklabruck, Austria. Eng. Pat. 6455, April 6, 1900.

The composition used is a mixture of some fibrous material —preferably asbestos—with cement, lime, or other binding material. The materials are mixed in the ordinary mixing machines used in paper works, and the composition is then treated in a paper- or cardboard-making machine. The plates or tiles so produced may be further shaped, if desired, by the use of presses.—H. H. B. S.

Cement; Manufacture of ——. W. P. Thompson, Liverpool and London. From the firm of Terranova Industrie (C. A. Kapperer and Schleuning), Munich, Germany. Eng. Pat. 17,853, Sept. 4, 1899.

With the object of producing a cement free from the dull grey colour of ordinary cement, materials are selected containing as little iron as possible. Kaolin, felspar, and lime or carbonate of lime form the mixture used, and the proportion of felspar is adjusted so as, on the one hand, to prevent too much alumina being present in the mixture, and, on the other hand, to sufficiently reduce the temperature of fusion. The claims also embrace the direct use of felspar in place of clay, and the use of clay free from iron in conjunction with silica and lime, either with or without the addition of such fluxes as alkalis, fluorspar, or felspar, as a foundation material for a cement.—H. H. B. S.

X.—METALLURGY.

Gold from Auriferous Pyrites; Extraction of ——, *by Amalgamation.* T. G. Davey. Proc. Inst. Min. and Metall., June 20, 1900; 7 pp.

Pyritic concentrates for roasting should contain a little silicious sand, and about 25 per cent. of grit that will just pass a sieve of 25 holes per lineal inch, in order to render it "spongy," and to facilitate oxidation. For relatively inaccessible places, and for small plants, the author recommends the use of the reverberatory furnace for roasting, and describes with drawings a three-stage stepped-hearth furnace, with a flattened arch roof, using flaming wood as fuel, and taking 12 to 15 cwt. of concentrates on each (9 ft. × 9 ft.) hearth, which has given good results in practice. After roasting sweet, the charge is drawn on to the cooling floor and moistened prior to amalgamation. From 20 to 30 lb. of lime may be added to the charge before roasting, especially when copper is present, to prevent sulphating. For amalgamation the author briefly describes Wheeler pans. He recommends that 20 lb. of lime, 1½ oz. of potassium bichromate, and 2 oz. of caustic soda should be mixed with each charge of half a ton of roasted pulp before placing in the pan. After mixing, the muller is lowered and grinding is carried on for from 4 to 6 hours, then the muller is raised and from 20 to 50 lb. of mercury is sprayed in, and amalgamation is proceeded with until a sample "panned off" shows the action to be complete. The bichromate is added to minimise the evolution of hydrogen on the surface of the mercury. This evolution of hydrogen, caused by sulphuric acid from decomposed sulphates, is found to hinder or to prevent amalgamation, and the addition of just sufficient bichromate to neutralise this action, has the effect of restoring to the mercury its amalgamating power. The use of too much bichromate, on the other hand, causes the mercury to "sicken." Cases are quoted in which the introduction of the correct proportion of potassium bichromate has rendered it possible to treat satisfactorily raw pyrites, blanketings, and roasted magnetings, respectively, that were otherwise unworkable. The magnetings were first mixed with pyritic concentrates to convert the iron into sulphide, and the sulphide was then roasted to oxide.—W. G. M.

Selenides of Iron. Fonzes-Diacon. Comptes Rend. **130**, [25], 1710—1712.

Ferrous Selenide, FeSe, is obtained by the action of selenium on iron at a red heat, or by reducing a higher selenide by hydrogen; it is not reduced further by hydrogen. *Ferric Selenide*, Fe_2Se_3, is obtained by the action of hydrogen selenide on ferric oxide at a red heat, while the same gas acting on ferric chloride, slowly transforms it into *Iron diselenide*, $FeSe_2$. The last substance is not attacked by hydrochloric acid; the others are slowly attacked by it, the ferrous compound more readily than the ferric. Fuming nitric acid converts them all into selenites. Chlorine readily displaces the selenium from them, while oxygen at a red heat converts them into ferric oxide and selenious anhydride.—J. T. D.

Ferro-Silicon. L'Ind. Electro-chim. 1900, **4**, 43; through Chem. Zeit. Rep. 1900, 188.

By heating any iron ore with silica in the electric furnace, an iron silicide containing from 1 to 2 parts of metal to 4 of silicon may be prepared. It is a white compound which casts well and takes a high polish. If the proportion of silicon is high, it is remarkably stable, resisting most chemical reagents. It is also a good conductor of electricity; so that it may possibly become serviceable instead of platinum for electrodes.—F. H. L.

Nickel Mining in New Caledonia. Eng. and Mining J. 1900, **69**, [25], 735.

There are six distinct areas in New Caledonia in which nickel mining is carried on. The ore consists of the hydrosilicate of nickel and magnesia, sometimes found absolutely pure, but more frequently associated with silicious gangue, red clay, or the fragments of decomposed serpentine. The average composition of the nickel ore, dried at 100° C., is:— SiO_2, 42·0; NiO, 10·0; MgO, 22·0; Fe_2O_3, 10·5; Al_2O_3, 2·5; CaO, 1·0; and H_2O, 12·0 per cent. All the workings are open quarries, the length and depth of which vary with the different deposits. The life of a quarry never exceeds a few years, after which new ground must be opened out. The veins vary from an inch to several feet, but mining operations, which consist mainly of pick and shovel work, assisted by an occasional shattering of the serpentine rock by powder, are, as a rule, slow and tedious.—A. S.

Copper Ores; Pyritic Smelting of ——. C. C. Longridge. Engineering, June 15, 1900, 775—776.

Thermal Relation between Sulphides and Carbonaceous Fuel.—In estimating the calorific value of iron pyrites in the pyritic furnace, the heat evolved by the oxidation of ferrous sulphide to ferrous oxide has alone to be taken into account, as the first equivalent of sulphur in the pyrites is sublimed or burnt at a comparatively low temperature and in the upper portion of the furnace. One pound of pyrites yields about 0·735 lb. of ferrous sulphide, which in burning to ferrous oxide will evolve about 2,284 thermal units. One pound of coke in burning to carbonic oxide evolves about 5,600 thermal units. Theoretically, therefore, 1 lb. of iron pyrites or 0·735 lb. of ferrous sulphide is equal, for fuel purposes, to 0·4 lb. of coke. It is probable that, under the most favourable conditions, this ratio is maintained in practice, for whilst on the one hand, when coke is burnt in the pyritic furnace, "about 44·82 per cent. of the total heat is lost in gases," and there is not the same local concentration of heat as is produced by the combustion of the iron and sulphur in the fusion zone under the action of the blast; on the other hand, owing to the rapid decrepitation of pyritic ore and its reduction into "fines," and to the caking of the mass under the influence of heat, the most favourable conditions for the complete utilisation of the pyrites as fuel are seldom maintained continuously.

Carbonaceous Fuel required in Pyritic Smelting.—Assuming the ratio, 1 lb. of pyrites = 0·4 lb. of coke, to be

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approximately correct, the fuel value of an ore may be estimated from its composition, the iron and sulphur needed for forming matte being of course taken into account. Theoretically, certain ores ought to smelt without the aid of extraneous fuel, but in practice, 2—3·5 per cent. of carbonaceous fuel is used even with the most suitable ores.

Ore Charges suitable for Pyritic Smelting.—If this 2—3·5 per cent. be deducted from 16·66 per cent., which is the average amount of carbonaceous fuel used in ordinary copper smelting, there is left 14·66—13·16 per cent. to be replaced by ferrous sulphide, or in other words, charges for pyritic smelting should contain an amount of pyrites equivalent to at least 26·4—23·9 per cent. of ferrous sulphide, exclusive of the iron and sulphur needed for matte.

Influence of Carbonaceous Fuel.—The author is of the opinion that the best method of employing carbonaceous fuel is the introduction of producer gas with the air blast, the heat being by this means concentrated at the proper spot. If coke be added to the furnace charge, it is necessary to increase the volume of the blast in order to maintain an oxidising atmosphere, and this increase of volume has the effect of reducing the temperature. Also, if the coke becomes kindled before it falls to the region of the tuyères, the ferrous sulphide, before reaching the smelting zone, may meet a temperature at which it will dissociate. In such a case, not only is the fuel value of the pyrites considerably diminished, but warmth is communicated to the upper portion of the charge, where heat is prejudicial.

Slag-forming Constituents. — The slag-forming constituents are chiefly silica and iron, of which the first-named must be present in sufficient quantity to slag off the iron, preferably in the form of a monosilicate slag, in which the oxygen of the silica is equal to that of the bases. In order to obtain lighter slags, earthy bases may be added to the charge. Such an addition is, in fact, a necessity when the charge does not contain enough iron to flux off the silica. The extent to which earthy bases may be used to compensate for a deficiency of iron is about 30 per cent. The amount of silica which a charge should contain depends upon the proportion of iron present, the degree of concentration required, and the nature of the slag to be made.

Ores Suitable for Pyritic Smelting.—The most suitable ores for pyritic smelting are iron pyrites and pyrrhotites, together with all sulphuretted copper ores; but all metallic sulphides and also sulpho-arsenides with non-metallic bases can be used. Peter has stated that zinc and lead sulphides are about as deleterious in pyritic as in ordinary smelting, but W. L. Austin considers that with careful fluxing and a proper combination of the different bases, no evil effects need be apprehended even if zinc be present to the extent of 14 per cent. Sulphate of barium or heavy spar presents no difficulties in the pyritic furnace. Ores in which the sulphide is disseminated in a stony gangue, are not in a suitable condition for pyritic smelting, which depends to a considerable extent upon the separation of the components of the charge into sulphide without gangue, or gangue without sulphide.—A. S.

Copper, Recovery of ——, *from Ores.* K. W. Charitschkow. Zap. imp. russk. techn. obschtsch. 1900, **34**, 895; through Chem. Zeit. Rep. 1900, 188.

The copper sands of the Permian formation generally contain from 2 to 3 per cent. of copper, the bulk of which exists as carbonate, only a small proportion being combined with sulphur and silica. These ores hitherto have not paid for smelting; but Stuckenberg has patented a process for extracting them with crude (wood) acetic acid. The solution is separated from sand and alumina, allowed to settle for a time, and then heated to 100° C. in order to decompose the copper acetate.—F. H. L.

Copper upon Iron; Influence of ——. W. Lipin. Chem. Zeit. Rep. 1900, **24**, 180.

The author has examined the influence of varying amounts of copper upon the physical properties of iron. He finds that the general opinion as to the injurious effect of copper is without foundation in fact. The tenacity of cast iron was increased by 4·9 per cent. of copper from 30 to 35 kilos. per sq. mm. Castings with a high proportion of copper, made in sand, were sound and regular in structure; grey cast iron cannot dissolve more than 5 per cent. of copper. In iron containing 0·1 per cent. of carbon, the tenacity increases with the copper content, but the extension becomes smaller; the malleability is diminished only by a considerable proportion of copper; complete red-shortness is attained with 3 per cent. Traces of copper make welding difficult, but not impossible; 2 per cent. makes it impossible. Steel of medium hardness becomes harder and more brittle with increase of copper. Steel containing 0·5 per cent. of carbon and 1 per cent. of copper is suitable for tools. Hard steel becomes harder and more brittle with an addition of copper; strong heating decreases the effect. It is generally stated that the least trace of copper makes puddling impossible. The author took a charcoal pig iron containing 3·26 per cent. of carbon, 0·23 Si, 0·20 Mn, 0·27 P, and 0·017 S, and added pig iron containing copper to bring the percentage of that metal up to 0·35—0·70; the operation of puddling proceeded normally; the bending, hammering, and welding tests were good, and the breaking weight was 37—41 kilos. per sq. mm.—A. C. W.

Silica upon Cast Iron; The Formation of ——. Ledebur. Chem. Zeit. Rep. 1900, **24**, 179—180.

The white mossy deposit of silica occasionally observed upon cast iron, is formed by oxidation of silicon sulphide, which is prevented from escaping in casting by the mould. The white smoke seen when blast furnaces are tapped is due to the combustion of this silicon sulphide.—A. C. W.

Zinc Blende; Influence of the Degree of Desulphurising on the Yield of Zinc from ——. E. Prost. Bull. Assoc. Belge des Chim. **14**, [3—4], 125—131.

In order to ascertain how far an incomplete desulphuration in roasting affects the percentage of zinc recoverable from zinc blende, the author investigated two different samples of ore, one rich in lead (10 per cent.) and containing 19 per cent. of sulphur, the other containing 15 per cent. of iron and 30 per cent. of sulphur. When completely roasted these samples contained 2·10 and 2·91 per cent. respectively of residual sulphur; whilst when drawn from the furnace eight hours before the completion of the roasting process, the sulphur content was 5·33 per cent. and 7·73 per cent. respectively.

On heating 125 kilos. of each of these samples with coal in a reducing furnace, under identical conditions, the residual percentages of the total zinc originally present were found to be as follows:—

	Per Cent.
In the imperfectly roasted plumbiferous blende..	7·38
„ completely „ „ „ ..	1·35
„ imperfectly „ ferruginous „ ..	6·70
„ completely „ „ „ ..	0·95

thus demonstrating the importance of complete roasting. In the case of ferruginous material, the smaller loss of zinc indicates the favourable influence of iron in displacing that metal from combination with sulphur. It was also found that the completely roasted ferruginous blende contained a larger proportion of soluble sulphates than the incompletely roasted sample, the reconstitution of sulphur trioxide and zinc sulphate at the expense of part of the residual sulphur being thus indicated at this stage.—C. S.

Smoke and Fume Produced by the Fire Treatment of Gold, Silver, Lead, and Copper Ores; Apparatus for Collecting Solids from ——. M. W. Iles. Eng. and Mining J. 1900, **69**, [22], 647.

The author describes the apparatus which he has found to give the most satisfactory results. In the diagram, B represents a No. 00 "Monogram" blower, connected by means of the pulley, *d*, with a water motor, from which the motive power is obtained. At *e* is shown the suction of the fan, whilst *f* is the discharge pipe. C is a box of

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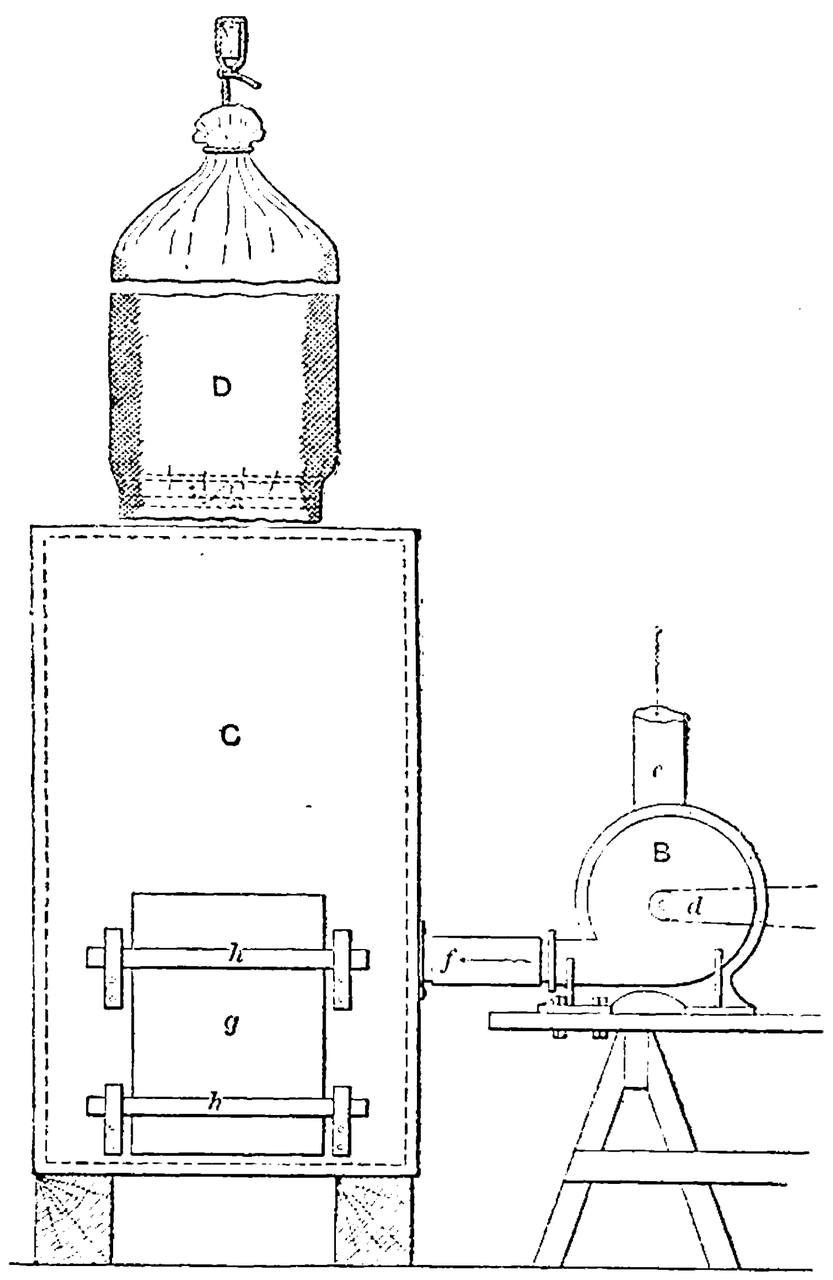
"heavy IX. bright tin," 3 ft. square and 5 ft. high; *g* is a door about 18 ins. wide and 2 ft. high, held in place by two bars of iron, *h*. There is a "thimble" for the reception of the pipe, *f*; the bottom of the "thimble" is 18 ins. above the floor of the box. In the centre of the top of the box is another "thimble," 18 ins. in diameter and 12 ins. long, ending with a "roll" projecting outwards around a $\frac{1}{4}$-in. rod. D is a bag having a circumference of 60 ins. and a length of about 20 ft.; it is made preferably of plain woven cotton cloth, every square inch of which contains 44—50 threads both in the weft and woof. If the fume to be filtered is very hot, say at a temperature above 250° F., the lower end of the bag, for a distance of 3 ft., should be made of flannel.

During the experiment, it is important that the pressure of the water working the motor be kept constant; also, if necessary, the bag should be shaken very lightly every one



or two hours, but not too often, otherwise some fume will be lost through the meshes of the cloth. On the other hand, the bag should not be allowed to get too tight, or the exhaust fan will not deliver the same quantity of fume for each revolution. The experiment should be continued for a period of 10 days or two weeks, but it may prove advantageous to make a rough, qualitative examination of the solids collected during the first 24 hours.

The author considers that all smoke and fume from industrial plants should be carefully tested quantitatively, in order to determine the losses of solids per year, and to ascertain whether these solids can be made a source of income.—A. S.

Copper in Chilled Slags; Rapid Determination of Small Amounts of ——. C. F. Shelby. Eng. and Mining J. 1900, **69**, [24], 708.

See under XXIII., *page* 776.

Liquid Fuel in Metallurgical Furnaces in Russia; Use of ——. Eng. and Mining J. 1900, **69**, [25], 739.

See under II., *page* 723.

PATENTS.

Metallic Body, Manufacture of New ——. L. M. O. Dessaigne, Paris. Eng. Pat. 15,062, July 21, 1899.

PLATES of copper- or aluminium-bronze, German silver, or steel, are heated in a furnace nearly to melting, then hammered into thin leaves, and after being scraped on one side are planished by passing through a rolling mill. A leaf of silver is then laid on the scraped side; the compound plate is again strongly heated, and then subjected to hydraulic pressure of 150—180 tons to the square inch. By a repetition of the same series of operations, a leaf of platinum may be applied to the silvered side of the compound plate. Sheets so prepared may be formed into vessels by spinning, stamping, or hammering.—J. H. C.

Coating (Plating) Small Metallic Articles with Nickel, Tin, Zinc, Gold, and similar Metals. A. Darley, Paris. (Under Internat. Convent.) Eng. Pat. 15,383, Jan. 27, 1899.

THE objects to be coated are placed in a tray of aluminium or magnesium, or otherwise brought in contact with one of those metals, and then plunged in an alkaline bath containing a salt of the metal to be deposited. Two kinds of baths are used: the first consists of a double chloride of ammonium and of the required metal, together with a large excess of an alkaline phosphate; the second is a double cyanide of potassium and the metal. In each case a little free alkali is added, and the bath is kept at or near to a boiling temperature.—J. H. C.

Tinned Scrap; Process for Removing Tin from ——. H. R. S. Coleman, Smethwick, and G. Cruickshank, Birmingham. Eng. Pat. 15,402, July 27, 1899.

THE scrap is plunged into a hot solution of caustic soda, potash, or other suitable alkali, and electrically connected with suitable cathodes. It is subsequently transferred to a bath of boiling water, and then to a vat of dilute sulphuric, hydrochloric, or nitric acid, with or without heat or electric current. By these means the tin is partly dissolved and partly precipitated.—J. H. C.

Lead; Apparatus for Desilverising or Refining ——. S. Tredinnick and A. Wetzstein, Butte, Montana, U.S.A. Eng. Pat. 7364, April 20, 1900.

THE lead is contained in a series of kettles, which are raised or lowered by means of hydraulic rams so as to facilitate the operations of desilverising or refining.—J. H. C.

Steel Castings. A. G. Lundin, Boston, U.S.A. Eng. Pat. 8080, May 1, 1900.

STEEL scrap is melted in a crucible or open-hearth furnace. When a temperature of about 4,000° F. is reached, to each 100 lb. of scrap from $1\frac{1}{2}$ to $2\frac{1}{2}$ lb. of ferrosilicon, containing about 12 per cent. of silicon, is added, and, when this is melted, from 2 to 8 oz. of ferromanganese (containing about 80 per cent. of manganese) and 3 lb. or less of aluminium. The proportions and composition of the ferrosilicon and ferromanganese may be varied within small limits. Castings made of this alloy can be welded.—J. H. C.

Steel Castings, Impts. in. A. G. Lundin, Boston, U.S.A. Eng. Pat. 8081, May 1, 1900.

THE steel scrap is melted and raised to a temperature of 4,000° F., additions of ferrosilicon and ferromanganese being made, as in the preceding specification, after having added from 1 to 4 lb. of metallic copper to each 100 lb. of scrap. This alloy is particularly adapted for the manufacture of heavy or large castings, such as crank-shafts, cross-heads, &c.—J. H. C.

Metallurgical Furnaces. A. Reynolds, Sheffield. Eng. Pat. 9562, May 24, 1900.

THE vessel or chamber containing the mineral or metal to be heated has its end walls supported by the furnace casing, whilst its side walls, which are unsupported and directly heated, are curved with convexity towards the interior, so

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that they are subject to compressive stress by the fluid pressure within. The furnace is provided at each side with air-regenerating chambers and reversing valves, and heated by producer or other gas or by solid fuel, the fire being urged by blast tuyères.—J. H. C.

Precious Metals; Process for Extracting ——, from their Ores. H. J. Phillips and others, London. Eng. Pat. 11,542, June 2, 1899.

THE pulverised ores are heated to about 210° C. in closed vessels, with sulphur mono- or dichloride, whereby the precious metals are converted into chlorides, which are then dissolved out in any suitable vessel by any suitable solvent, and subsequently separated into the metallic form by any suitable process.—J. H. C.

XI.—ELECTRO-CHEMISTRY AND ELECTRO-METALLURGY.

(*A.*)—ELECTRO-CHEMISTRY.

Alkali Chloride Solutions; The Evolution of Oxygen at the Anode during the Electrolysis of ——. F. Foerster and H. Sonneborn. Zeits. f. Elektrochem. 1900, **6**, [51], 597—604.

THE evolution of oxygen on bright platinum anodes during the electrolysis of neutral solutions of alkali chlorides has been the subject of many investigations. The authors have made some further researches on the subject, under suitable conditions, and now regard it as an established fact that the production of chlorate and the simultaneous evolution of oxygen during the electrolysis of neutral and not too dilute solutions of alkali chlorides (with or without diaphragm) is almost exclusively due to the electrolysis of the hypochlorite or hypochlorous acid which is at first produced.

—J. S.

Potassium Chlorate; Impossibility of the Direct Electrolytic Formation of ——. A. Brochet. Comptes Rend. **130**, [24], 1624—1627.

ALL authors are practically agreed that the chlorate formed during the electrolysis of *neutral* solutions of chlorides of the alkali metals is produced from hypochlorite by purely chemical reactions; but many hold that in the electrolysis of *alkaline* solutions, the chlorate is formed by primary electrolytic action. The author's experiments show that this is not the case; for while the electrolysis at 70° C. of solutions containing, in 125 c.c., 20 grms. of potassium chloride with 4 grms. or with 8 grms. of caustic potash, yielded considerable amounts of potassium chlorate (though at any one time little or no hypochlorite could be detected), the same solutions electrolysed after addition of 1 grm. of cobalt chloride yielded only hydrogen and oxygen, and at most mere traces of chlorate. Had the chlorate been formed directly, it would not have been affected by the cobalt hydroxide: as it was not formed under circumstances in which the hypochlorite could not exist, its formation in the other cases must have been due to the hypochlorite.

—J. T. D.

Alcohols; Electrolytic Oxidation of Fatty ——. K. Elbs and O. Brunner. Zeits. f. Elektrochem. 1900, **6**, [51], 604.

See under XXIV., *page* 786.

Chlorine; Potential required for the Discharge of ——. [*Electrolysis of Chloride Solutions.*] E. Müller. Zeits. f. Elektrochem. 1900, **6**, 573—581.

See under VII., *page* 744.

PATENTS.

Galvanic Cell, Primary. P. Offenbroich and H. Rockel, Coblence, Germany. Eng. Pat. 12,730, June 19, 1899.

IN this cell the electrodes are coated with a paste of carrageen moss, "*electrogeen*," or similar substances, and are arranged in an insulated vessel, preferably rectangular, partly filled with a cooling material such as gelatin. The "electrogeen" referred to, is a concentrated solution of carrageen moss and strong ammonium chloride. Connection between the individual electrodes is made within a layer of "a mineral tar known as goudron," which reaches to the rim of the containing vessel, but leaves the two terminals exposed, and this insulation also prevents evaporation.—G. H. R.

Ozone, Apparatus for Generating ——. W. Elworthy, Crouch End. Eng. Pat. 12,612, June 16, 1899.

THE apparatus consists of tubes of glass, or other dieletric, through which, but without touching them, pass metal rods. Metal wires, cords, or chains are coiled helically round the tubes so as to be out of contact with them, and are connected to one terminal of an electric current, while the metal rods are connected to the other. Means are provided for causing air or oxygen to pass first down the tubes so as to be subject to the ozonising action of the electric discharge between the rod and the inner surfaces of the tubes, and then up through the space between the outer surface of the glass tubes and the wire coiled round them, so as to be subjected to a second ozonising action.—G. H. R.

Chemical Compounds by Electrolysis with Alternating Currents, Method of Producing Complex ——. W. P. Thompson, London. From A. Sindingharsen, Fredriksvaern, Norway. Eng. Pat. 7198, April 18, 1900.

COMPLEX chemical compounds may be produced electrolytically by means of alternating currents, the impulses of which in one direction yield a greater work than those of the other direction, for example, by employing impulses of unequal duration or of unequal density, whereby compounds are obtained which are composed entirely or partly of both ions or their bye-products in proportions desired. For the production of hydrocarbon compounds, the electrodes may consist of porous platinum or carbon, and an electrolyte is employed which by electrolysis is decomposed into oxygen and hydrogen, or oxygen and hydroxyl (primary or secondary). During electrolysis it is supplied with carbonaceous compounds, organic or mineral, either dissolved or in emulsion, or finely-divided carbon in suspension may be added to it. For producing certain compounds the electrolyte is compressed in synchronism with the alternating current, and the electrodes may be exposed to the action of radiation (light, heat, &c.).

—G. H. R.

Two-liquid Primary Batteries, and Regenerating the same. [*Chromic Acid.*] J. Y. Johnson, London. From H. J. Dercum, Philadelphia, U.S.A. Eng. Pat. 8299, May 4, 1900.

THIS process of using and regenerating the liquids of a two-liquid primary battery consists in charging the cathode compartment with a mixture of a highly oxidised metallic compound as a depolariser, and an acid excitant capable of combining with the exhausted products of the depolariser, and charging the anode compartment with a mixture consisting of an acid excitant and a product of reduction of a depolarising agent, removing the two liquids from the battery after exhaustion, mixing them, and regenerating the mixture by first throwing out the zinc or other metal which formed the anode, and then bringing all, or part, of the liquid back to its original condition for use as a depolariser. A mixture consisting of chromic acid or a salt thereof and sulphuric acid may be used as a depolariser, and a mixture of chromium sulphate and sulphuric acid as the excitant.

—G. H. R.

Primary Two-liquid Batteries, and Regenerating the same. J. Y. Johnson, London. From H. J. Dercum, Philadelphia, U.S.A. Eng. Pat. 8300, May 4, 1900.

THIS process of using and regenerating a liquid in a two-liquid battery consists in mixing oxidised chromic acid and sulphuric acid, and using the solution as the depolariser until the chromic acid is reduced, and then using the solution as an excitant until the free sulphuric acid is exhausted, after which it is transferred to the cathode chamber of an electrolytic cell, and a current is passed through it which throws out the metal that formed the anode on to the cathode. All or part of the liquid is then transferred to

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the anode chamber of the regenerator, where a current is passed through it, which regenerates it and brings it back to its original oxidised state.—G. H. R.

Galvanic Battery. [*Zinc-Carbon.*] A. C. Martin, Neuilly, France. Eng. Pat. 8586, May 9, 1900.

THE zinc plates are varnished on one side, and provided with a granulated surface on the other, or active side. The granulated carbon electrode is placed between the zinc electrodes and perforated with holes so as to expose an increased depolarising surface. The exciting liquid in contact with the zinc plates consists of dilute hydrochloric acid to which is added a small amount of calcium chloride, or sodium chloride. The depolarising solution in contact with the positive electrode consists of nitric acid to which are added solid chlorate of potash and solid nitrate of soda which have been melted in their own water of crystallisation together with a small amount of an alkali permanganate.
—G. H. R.

Electrolysing Apparatus. [*Automatic Circulation.*] M. Haas, Aue, Germany. Eng. Pat. 9331, May 21, 1900.

THE electrolysing apparatus is mounted in a storage receptacle of the liquor, and consists of a number of compartments separated by double-poled electrodes provided with isolated plates, and electrodes for conducting the current into the apparatus. The bottom of the electrolyser has apertures or recesses communicating with the storage receptacle, its top edge meeting the level of the liquor, or projecting above, or underneath the same, so that the hydrogen gas developed by the current carries the liquor over the edge of the electrolyser into the storage receptacle, and from thence through the openings back into the first.
—G. H. R.

(*B.*)—ELECTRO-METALLURGY.

Alloys; Thermo-Electric Powers of ——. E. Steinmann. Comptes Rend. **131**, [1], 34.

THE author has found that the nickel steel which he supposed to contain 28 per cent. of nickel contained in reality 36·1 per cent. A sample of authenticated 28 per cent. nickel-steel gave a thermoelectromotive force of 385 microvolts (against lead) between 20° C. and 260° C., instead of − 2461 microvolts between 0° C. and 100° C., as reported for the former sample.—J. T. D.

XII.—FATS, OILS, AND SOAP.

Maize Oil. Rowland Williams. Analyst, **25**, (1900), 146—148. (See also this Journal, 1899, 346.)

EXPERIMENTS made by the author have led him to the conclusion that although maize oil does possess drying properties, which may be increased by suitable treatment, it is not at all likely to take the place of linseed and similar oils in the manufacture of paints and varnishes. In the following table results are given, obtained by examination of eight samples of commercial maize oil procured from most reliable sources :—

Results of Examination of Maize Oil.

Sample No.	Sp. Gr. at 15·5° C.	Saponification Value.	Free (Oleic) Acid.	Bromine Thermal Value.	Iodine Value.		Unsaponifiable Matter.
					Hübl (15 hours).	Wijs (15 mins.).	
		Per Cent.	Per Cent.	° C.			Per Cent.
1	0·9252	18·88	3·50	23·7	123·97	124·74	1·46
2	0·9268	19·07	3·02	24·4	127·27	127·48	..
3	0·9244	18·96	3·18	23·3	122·57	123·54	1·71
4	0·9256	18·62	3·64	23·4	127·36	128·02	..
5	0·9284	19·00	2·39	23·3	120·85	122·21	..
6	0·9246	18·79	1·52	23·3	125·56	126·62	..
7	0·9262	18·74	1·50	23·2	121·99	122·68	1·66
8	0·9248	18 81	2·27	23·5	123·98	125·05	..

—L. A.

Lubricants; New Method of Testing ——. J. Claudy. Petroleum Ind. and Techn. Rev. 1900, **2**, [68], 381.

THE author describes a new method of testing lubricants, taking into account not only the viscosity of the liquid but also its power of adhesion to surfaces. The apparatus used consisted of a metallic vessel provided with a "collaring" 44 mm. wide and 44 mm. high, through which a piston could be introduced into the vessel and force out of it exactly 100 c.c. of the lubricant. By comparing the time necessary for the outflow of 100 c.c. of the oil with that necessary for water under identical conditions, a factor was obtained, called by the author the capillary viscosity of the oil for a given thickness of layer. By using pistons of different sizes, four such thicknesses were obtained, namely, 0·03, 0·04, 0·05, and 0·075 mm. The pressure could be increased to two atmospheres and the temperature to 100° C. The author recommends the quotient $\frac{\text{Capillary Viscosity}}{\text{Engler's Viscosity}}$ as an adequate and true standard for measuring and comparing the adhesion of liquids to metallic surfaces. He proposes to call this standard the adhesion factor. The higher the adhesion factor the more "slippery" is the oil. Some of the results obtained by the author are given in the accompanying table.—A. S.

At 20° C. (Water = 1).	Capillary Viscosity at 0·03—0·075 mm.	Engler's Viscosity.	Adhesion Factor.
Spindle oil:			
Wagenmann	37·52— 42·48	5·80	6·47— 7·32
Florisdorf I.	53·89— 77·30	10·70	5·05— 7·22
Florisdorf II.	65·39— 86·02	9·00	7·26— 9·56
Olive oil	73·97— 83·82	10·50	7·04— 7·98
Glycerin	206·50—250·40	23·50	8·81—10·66
Vaseline	163·30—173·80	9·06	18·02—19·18
Paraffin	9·94— 13·81	1·30	7·65—10·62
Valvolin	317·00—418·00	10·00	31·70—41·90

Viscosimeter; The Lamansky-Nobel ——. R. Wischin. Chem. Rev. Fett- u. Harz-Ind. **7**, [4], 73—75.

IN the improved form of this viscosimeter shown in the drawings, a small boiler is provided to supply steam where the same is not otherwise available. The old valve under the jet is replaced by the rod S, which, when raised, is held in position by a small stud resting on the spring K. The jet *i* is of platinised brass, and can be unscrewed for cleaning the oil-cup. On releasing the four nuts at the under side of the apparatus the plate R with all its attachments and the lid, can be removed.

These arrangements, and the larger diameter of the oil-cup, will, it is considered, obviate the defects of the old form. The long thermometer has been replaced by a rod thermometer graduated above the top of the apparatus only. No filling mark is required, the cup being filled up to the top and the pressure maintained at a constant level (200 mm.) by means of the tube *m*. The water jacket is filled through the neck *n*, and the oil introduced through *o*. The oil

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should be warmed to 49°—50° C. The tip of the jet being raised above the bottom of the oil-cup prevents obstruction by deposited solid impurities. A closed coil placed near

Fig. 1.

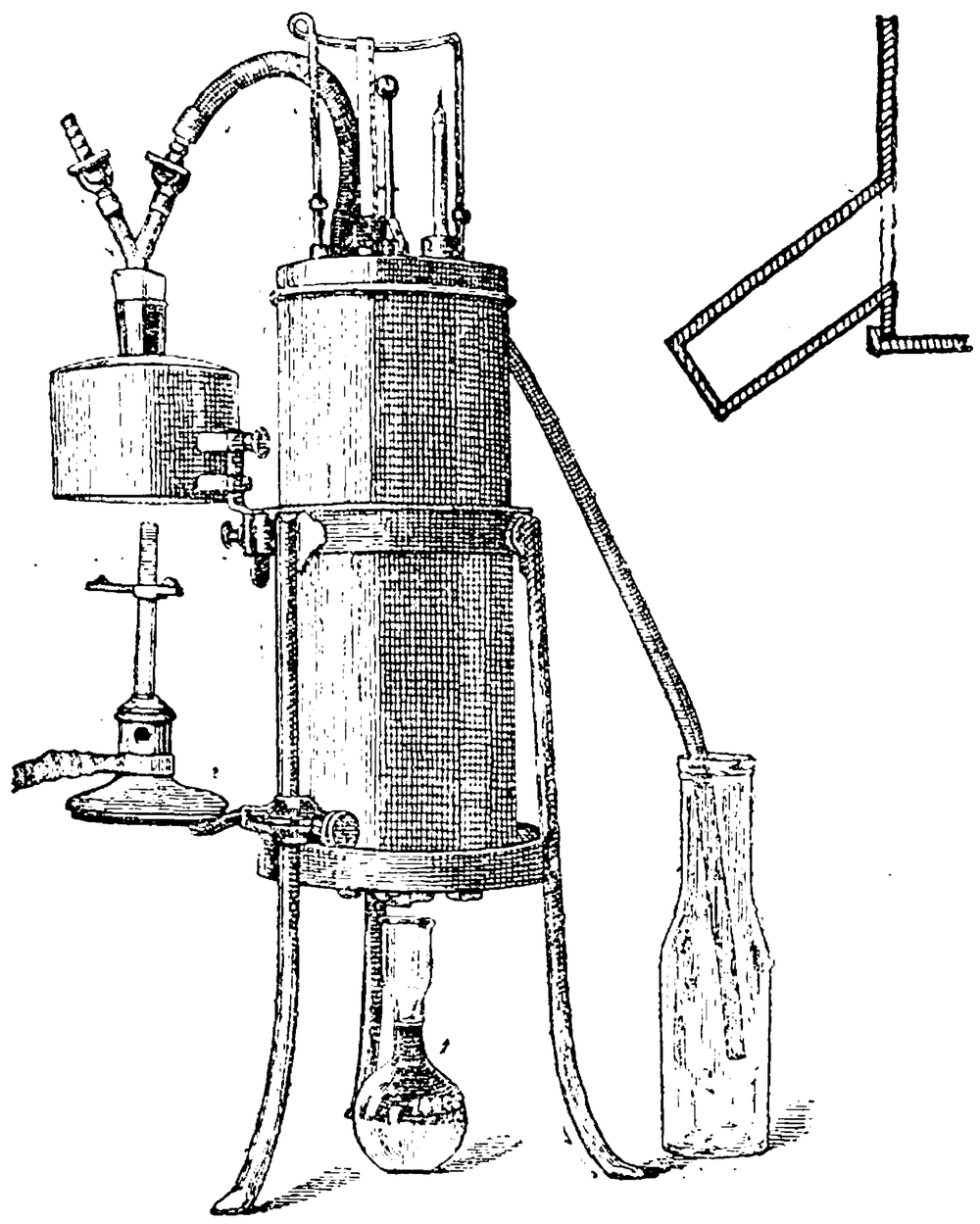
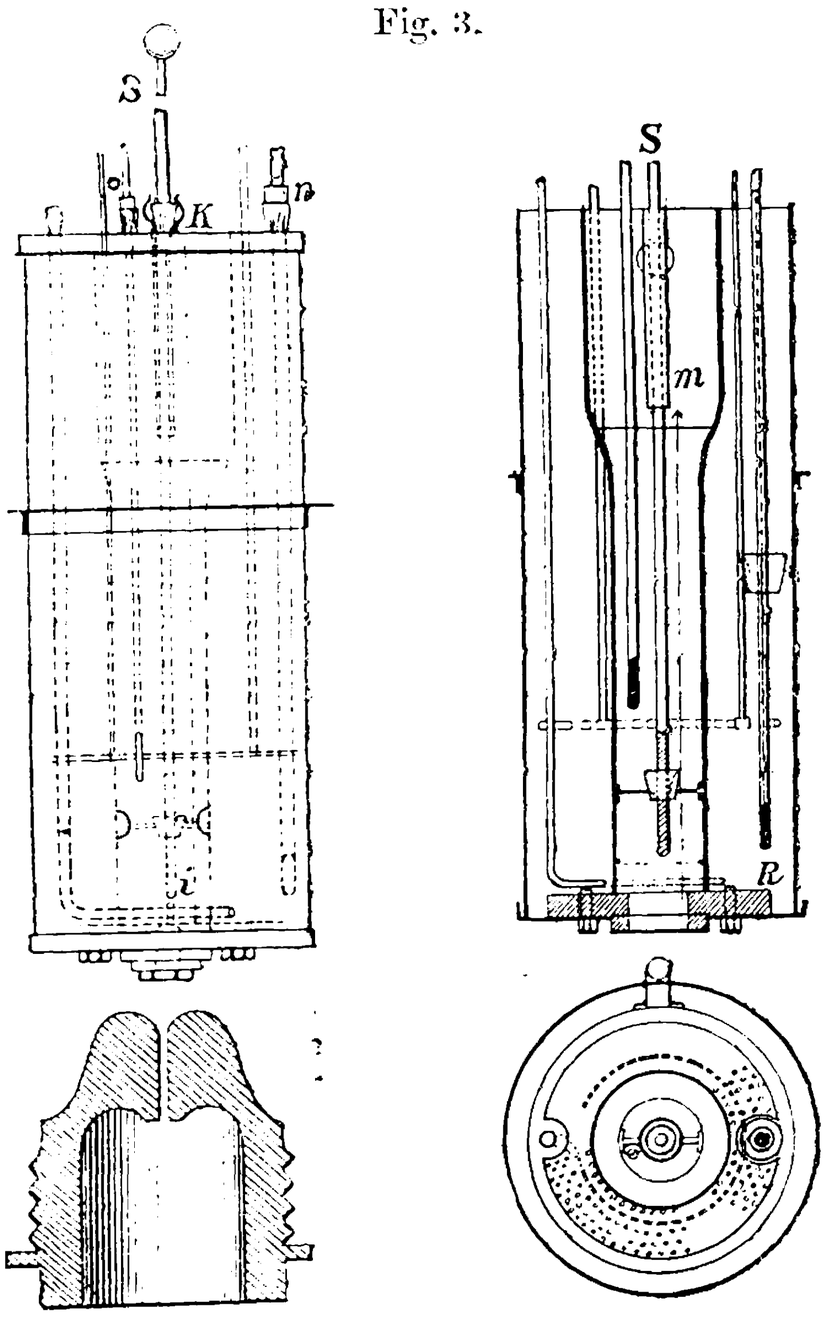


Fig. 2.

Fig. 3.



the bottom of the water jacket enables the contents of the latter—in such event heavy mineral oil—to be heated by a lamp flame when determinations have to be made at temperatures above 100° C.—C. S.

Olive Oil in Sardine Cans; Characteristics of ——. O. Klein. Zeits. angew. Chem. 1900, [23], 589.

See under XVIII. A., *page* 764.

Iodine Number of Fats; Simple and Rapid Method of Determining ——. J. Bellier. Chem. Centr. 1900, **1**, [21], 1109.

See under XXIII., *page* 779.

Mineral Oil Industry; Utilising Waste Products of the ——. R. A. Wischin. Zeits. angew. Chem. 1900, [21], 507.

See under III., *page* 727.

PATENTS.

Oil Filter, An Improved ——. L. White, Smethwick, Staffordshire. Eng. Pat. 13,379, June 28, 1899.

THE apparatus claimed consists of an outer chamber, enclosing three filtering vessels. The dirty oil is introduced into an upper receptacle, whence it passes through a siphon into an interior filtering chamber filled with unsized cotton waste or other suitable material loosely packed between two perforated discs. Heavier impurities are deposited in the exterior vessel, whilst the filtered oil falls into a second compartment. This is constructed in the form of an inverted hopper, the face of which slants towards the centre, where a second filtering chamber is provided. The oil leaving this passes into a third filtering chamber, consisting of a drum with an upper and lower wheel-shaped grid, connected by means of a central rod, the space between being packed with the filtering material.—C. A. M.

Soap; Improved Process for making Albuminous ——. W. Schuh, Nuremberg, Germany. Eng. Pat. 8582, May 9, 1900.

ACCORDING to this patent the excess of caustic alkali used in the saponification is neutralised with albumin, which is previously treated with formaldehyde to prevent the formation of tough gelatinous alkali albuminate. The whole contents of hens' eggs are used as the source of the albumin, and a process of cold saponification is employed.—C. A. M.

XIII.—PIGMENTS, PAINTS; RESINS, VARNISHES; INDIA-RUBBER, Etc.

(*A.*)—PIGMENTS, PAINTS.

PATENT.

Lamp Black; Manufacture of ——. H. S. Browne, London. From I. F. Sanders, Chicago, U.S.A. Eng. Pat. 9550, May 24, 1900.

THE process consists essentially in the generation of gases from bituminous or lignite coal; the purification of such gases by filtration; their burning at a temperature lower than that of complete combustion in a suitable chamber with the requisite amount of air, so as to produce lamp black. The apparatus comprises a gas generator and a purifier, from which the gas is led into a closed combustion chamber containing a cooling surface, composed of pipes grouped in a triangular form, against which the flame produced by the combustion of the gas is directed.—D. B.

(*B.*)—RESINS, VARNISHES.

PATENT.

Plastic Materials; Manufacture of —— [*for Insulators, &c.*]. F. G. Kleinsteuber, Berlin. Eng. Pat. 25,006, Dec. 16, 1899.

BY the use of a mixture made by adding a solution of 5 parts of Dammar resin in 10 parts of benzol and 5 parts of oil of turpentine, to another solution of 50 parts of Chinese wood-oil in 23 parts of benzol and 5 parts of oil of turpentine, stirring well, with moderate heating, and finally

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adding 2 parts of rosemary oil, the inventor claims to be able to bring into solution resins, soluble with difficulty, for the manufacture of plastic materials. This mixture is added to the solvent for the resin in the proportion of from 1 to 10 per cent. of the resin under treatment, and the mass allowed to stand for 24—48 hours; at the end of this time the slimy and mucilaginous residues are brought into solution. In the mixture, the Chinese wood-oil only is the essential ingredient.—J. W. H.

(*C.*)—INDIA-RUBBER, &c.

Balenite. Gummi-Zeit. 1900, **14**, [37], 593.

BALENITE is an intermediate product between soft rubber and ebonite. It is prepared by mixing 10 parts of india-rubber with 2 parts of shellac, calcined magnesia, sulphur, and antimony sulphide. It is used for the manufacture of surgical and technical articles.—C. O. W.

India-Rubber Milk; Two Reports on Samples of ——. A. Henriques. Gummi-Zeit. 1900, **14**, [37], 592.

THE first report deals with a number of samples of india-rubber milk from East Africa, most of which were in a bad state of preservation. These samples had been obtained in different districts from various species of Landolphia and Ficus. The india-rubber obtained from these samples contained from 15·7 to 78·2 per cent. of resin and from 82·7 to 20·1 per cent. of india-rubber. Some of the samples contained no india-rubber at all. The second report refers to a sample of milk from Togo. The milk had a specific gravity of 0·975, and was readily coagulated by inorganic acids in the cold, by organic acids on heating. From 100 c.c. of the milk were obtained 26·4 per cent. of a first-class Landolphia rubber, containing 14·5 per cent. of water. Nothing is known regarding the botanical origin of this milk.—C. O. W.

India-Rubber Goods; General Scheme for the Analysis of ——. O. Chéneau. Zeits. f. Unters. d. Nahrungs- u. Genussm. 1900, **3**, [5], 312.

See under XXIII., *page* 780.

XIV.—TANNING, LEATHER, GLUE, SIZE.

Chrome Tanning. W. Eitner. Der Gerber, **26**, [615], [617], and [619]. (See this Journal, 1900, 453.)

CHROME leather when acted upon by reagents behaves differently from all other kinds of tanned leather. Up to a certain extent it resists the influence of acids, and is not even swelled, whilst alkalis have even less effect. It cannot be effectively softened by water, either hot or cold, and therefore cannot be "soaked back"; consequently, since it is essential that the leather should be soft for the dressing process, it is necessary that it should be fat-liquored previous to drying.

As chrome leather cannot be converted into glue even with boiling water, it is specially adapted for the manufacture of hose which may be used for hot liquid. Chrome leather also resists dry heat better than any other kind of tanned goods, and is particularly adapted for technical purposes where a heat resisting substance is required, as, *e.g.*, for straps running at high speed. The chrome strap is specially suited for the running of dynamos.

Chrome Tanning Process.—If hide substance be permeated with chromic acid or a solution of bichromate, then dried in the light for some time, and then again soaked in water, the excess of chromate dissolves out. It will be noticed that the pelt after prolonged exposure to the light is thoroughly tanned, the tanning agent being the formate salt of chromic oxide. This can be proved by treating hide-powder with a chrome salt, and, after washing the hide-powder, distilling the same with dilute sulphuric acid; formic acid is then found in the distillate. This formation of formic acid explains the fact of Heinzerling's leather becoming rotten on drying.

Chromic acid and chromates have therefore no direct tanning power; on the other hand, both chromic acid salts and chromium salts when allowed to act upon hide substance, produce compounds which are tanning agents. But this action always takes place at the expense of hide substance, by the decomposition of which the formation of these tanning compounds is made possible. Besides chromic acid itself, the acid chrome salts also have the above action; also the bi- and trichromates; whereas the normal chrome salts, and also the monochromates, have no such power. It has been observed that when gelatin is acted upon by chromic acid, following the reduction of the chromic acid to insoluble chromic oxide, the remaining unoxidised gelatin mass and a compound of the same with chromium oxide are formed, this compound resisting the further action of chromic acid. If chromic acid or bichromates be used in excess, no complete oxidation and decomposition of the gelatin takes place, the process only continuing until the chrome-gelatin compound is formed, which then remains unaltered; the remaining excess of chromate can be washed out. The resulting product, after prolonged treatment with dilute ammonia to remove the acid formed by the oxidation of the gelatin, has, according to Eder, a constant composition of 77·50 per cent. of unaltered gelatin and 22·5 per cent. of chromic oxide. It is a green, brittle mass, and can be powdered. These insoluble chromic oxide gelatin compounds are formed directly when, instead of chromic acid or bichromates, a chromic oxide salt is used. The stronger the solution, the more rapidly is the gelatin rendered insoluble. The presence of free acid always retards the process.

The action of chromic oxide salts upon gelatin is very similar to the action of vegetable tanning materials.

The author explains the fact that chrome leather is insoluble in water and more resistant to external influences, such as alkalis and acids, by the fact that in chrome tanning, there is a more thorough and penetrating action in the hide substance and on the fibres than is possible with vegetable tanning, and that a more thorough combination takes place in the case of chrome tanning.

It has been frequently stated that chrome leather is produced by saturating the fibres of the hide with soluble chrome salts, and then, by reduction, producing an insoluble salt in and upon the fibres of the leather. This, in the opinion of the author, is scarcely correct, as when a skin is saturated with a pure chrome alum solution and then thoroughly washed with water, a chrome-tanned leather is produced; and in this case there has been no precipitation of chromic oxide, yet the chrome salt is chemically combined, and cannot be removed without decomposition of the leather. If a piece of chrome-tanned leather be treated with an alkali to precipitate the chromic oxide, the full reaction is never attained, and instead of leather a hard brittle mass is produced which has no commercial value. Chromic oxide is soluble in alkalis, and to a limited extent in glycerin, but in neither solution has it any tanning power. Therefore it is not the chromic oxide alone which tans, but the chromic acid salts, and therefore chrome tanning does not take place by the formation of an insoluble compound in the pores of the hide, but by the direct combination of the chrome salts with the hide substance in the finest state in the fibres. But at the same time, also, insoluble chrome salts are formed in the cavities of the hide and between the hide fibres.

Acid and so-called neutral chrome salts, like the corresponding alum and iron salts, possess the power of penetrating hide substance very rapidly, and at the same time producing a swelling effect. This rapid penetration of the hide is similar to the penetration and colouring produced in the vegetable tannage. Notwithstanding the rapid penetration of the hide substance, the tanning effect is less than that of the basic salts, and less of the chrome is fixed in the fibres. The alum salts are most easily washed out, and the iron salts the least easily, the chrome compounds appearing to lie between the two. By the two-bath process the same effect is produced, *viz.*, the penetration of the hide into its minutest part by the chromic acid. The latter is transformed into a chrome oxide salt, which, if the process be correctly carried out, should be of acid reaction, and is

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first transformed into the basic form by washing with alkaline water. The absorption of the chromic oxide salts depends to a certain extent on the concentration. The maximum quantity is absorbed when the pelt to be tanned is at once put into a concentrated solution, but if the pelt is first put into a weak solution, and this gradually strengthened, a much smaller quantity is taken up. When using the one-bath process the author is of the opinion that if the leather is to be fully tanned, as required for some sorts of chrome leather, then a basic salt must be used; on the other hand, neutral or even acid salts can be used, and even preferred, when the tannage is not required to be so full and heavy.—J. G. P.

Leather; Currying of Strap Butts or Belting ——. Leather Trades Rev. **33**, [747], 527.

THE most suitable leather for currying into belting leather is one tanned with valonia and extract, or valonia and myrobalans; the ordinary dressing leather tannage of bark and gambier makes a soft, pliable, and tough leather, but does not give the solidity and pliability that is required in a strap or belt butt.

The butts are first soaked in cold water for from four to five hours until thoroughly saturated; then they are split up the back and allowed to lie in pile for an hour or two, in order to get them into condition for skiving. The skiving is best done on the table, using a turned edged slicker which is well rounded at the corners.

After skiving, the goods are ready for "scouring" and "sumaching"; if the goods are to be scoured by hand, they must be well "stoned" and all bloom marks removed with the pumice stone; a good Burdon machine is advantageous if the butts are to be scoured by machine. The next operation is the "sumaching," which may be done in the vat, in which case the goods must be handled three or four times during the day, and left to drain overnight; a better method is to do the "sumaching" in the drum, drumming the goods for from 40 to 60 minutes in a warm sumach bath.

The butts now require slicking out on both flesh and grain in order to remove as much moisture as possible; they are then laid in a pile. It is advisable, during the operations which follow, to keep the goods as flat as possible.

The next step is the "stuffing," which is best done by hand. The butts are laid on the table, flesh side up, and a good coating of cod oil is well brushed into the leather; the goods are now turned over and stuffed on the grain side with a stiff dubbin made from beef tallow, cod, and mineral oil, taking care to apply the dubbin sparingly on the shoulders and bellies; the goods are now hung up in the drying loft. In two or three days the dubbin will begin to set on the butt. The goods are then taken down, brushed over on the flesh side with warm water, and a light coat of dubbin applied to the flesh side; they are then laid away in pile for a few hours and are ready for re-setting on the grain side. After re-setting, the goods are hung up to partially "dry off," then taken down and gone over with a damp cloth, and any remaining grease that may adhere to the flesh side is "pebbled off"; this latter operation also smooths down the flesh side. The goods are now turned over and "pebbled" on the grain side in order to remove any marks and scratches left by the stones.

After "pebbling," the goods are hung up to dry thoroughly, then rubbed over with a little tallow dubbin, to which has been added a small quantity of water, and finally left in pile until required for the finishing, which is done by using a slicker and a good stiff dry brush. If a bright finish is required, the goods may be given a coating of warm tallow.

—M. C. L.

Glue in Presence of Dextrin and Gum Arabic; Simple Method of Detecting ——. H. Bornträger. Chem. Centr. 1900, **1**, [21], 1109.

See under XXIII., *page* 777.

Sumach; Detection and Estimation of Certain Vegetable Adulterants of ——. G. Scarlata. Staz. Speriment. Agrar. Ital. 1900, **33**, [2], 168.

See under XXIII., *page* 779.

Leather; Dyeing, Staining, and Finishing of ——. M. C. Lamb. Leather Trades Rev. **33**, [747], 522.

See under VI., *page* 740.

PATENT.

Para-nucleoproteids; Process for Obtaining Clear Solutions from Impure ——. A. Spitteler, Prien, Bavaria. Eng. Pat. 17,657, Aug. 31, 1899.

DRIED coagulated paranucleoproteids are used as a substitute for horn, amber, &c. Former preparations were opaque; now transparent products can be obtained. The process claimed consists in treating the impure paranucleoproteid (casein), or its impure solution (milk) by a solution of caustic alkali of suitable strength (5 per cent.) in excess, and removing the insoluble matter. The clear solutions so made are also claimed.—A. C. W.

XV.—MANURES, Etc.

Denitrification in Soil; Cause and Importance of ——. W. Krüger and W. Schneidewind. Landw. Jahrb. 1899, **28**, 217.

LOOSENING the soil by application of dung and straw has no effect on the lowering of the yield, which is shown to be caused by denitrification.

Farmyard manure does not act injuriously by introducing denitrifying bacteria; sterilised manure gave precisely the same result. Its action is due to carbon compounds (pentosans and woody fibre) present in the manure, which serve as food for the denitrifying bacteria already present in the soil. Addition of pentosans produces the same effect as dung and straw, whilst straw which has been extracted with sulphuric acid and caustic potash does not promote denitrification to the same extent as pentosans. Glycerin, calcium citrate, lactate, and butyrate act more readily, but less permanently than less soluble compounds. Peat does not induce denitrification. The amount of moisture in soils is of importance, as regards denitrification, when it exceeds a certain limit; the temperature and the mechanical condition of the substances which feed the bacteria are also of importance.

The conclusion is drawn that denitrification is of practical importance, although its effect is not noticed, owing to the greater vigour of nitrification, and to the fact that farmyard manure supplies more soluble nitrogen than the denitrifying bacteria can destroy.—N. H. J. M.

Nitragin Question; Present Position of the ——. J. Stoklasa. Zeits. landw. Versuchswesen Oesterr. 1898, **1**, 78.

PURE cultivations of *Bacillus radicicola* promote the growth of leguminous plants, according to the nature of the soil. In absence of sufficient combined nitrogen, free atmospheric nitrogen is fixed. The infection of the roots takes place most readily when the soil is poor in nitrogen.

The author believes that fixation of nitrogen takes place in the leaves and not in the nodules. Inoculated lupins grown in sand produced numerous nodules on the roots; before the period of flowering, the plants were taken up, washed, and, after the nodules had been cut off, planted in sterilised sand free from nitrogen. The plants so treated produced as much dry matter as other plants from which the nodules had not been removed.

Fluorescence bacteria, obtained from soil, were found to possess the property of fixing free nitrogen.

From the results of recent experiments the conclusion is drawn that not only the *Leguminosæ* but other phanerogams have the property of fixing free nitrogen, and that fixation takes places in the leaves.—N. H. J. M.

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PATENT.

Blood Products for Fertilizing, Alimentary, and other Purposes; Manufacture of ——. A. J. Boult, London. From E. Richter, Dresden, Germany. Eng. Pat. 23,970, Dec. 1, 1899.

Blood is treated with a small quantity (about 1 per cent.) of a solution of sodium acid sulphate. On applying a moderate heat, a solid mass or cake is formed, which may be dried and pressed into shape, or ground to powder.

—W. P. S.

XVI.—SUGAR, STARCH, GUM, Etc.

Granulated Sugar; Direct Production from Low Syrups of ——. K. Cerny. Zeits. Zuckerind. Böhmen, 1900, **24**, [7], 391—403.

Although the production of granulated sugar has nothing in common with the separation process of Steffen, the whole operation here is a combination of the improved process for obtaining calcium tri-saccharate with the actual production of crystals.

The calcium saccharate is formed from the syrups run from the second or third massecuites with a quotient of 70 or 63 to 66. The lime is ground to the finest possible powder with millstones and sifted, and is used in a fresh, dry, non-hydrated condition. Of a weighed portion of syrup, two-thirds are diluted to 13° Bg. with cold water at first, afterwards with "white" lye; the remainder is made to 3° or 4° Bg.

Two vessels are required for the precipitant liquor of 13° Bg, and are known as the "black," the one for the more dilute precipitant (3°—4° Bg) being termed the "white." This arrangement varies however with circumstances. As soon as the precipitator is filled, the centrifugal pump is set in action and the exhauster drives in the lime in a cloud which constantly meets fresh layers of liquid. The reaction is complete in the black precipitators in 20 to 30 minutes; in the white one, in 10 to 15 minutes. The time required depends on the fineness of the lime dust and the temperature. The latter should not exceed 16° to 17° C.

A pure calcium saccharate is obtained with a quotient of 92 to 96, the lime required being 80 to 90 parts for 100 of sugar. The end of the reaction may be recognised by the fall of the alkalinity to the alkali strength of the original liquor, 0·7 to 0·9, after rising to 2·8. The saccharate easily and readily decomposes and should not be left long in agitation with the lye or some will dissolve. It is pressed, the "black" at $2\frac{1}{2}$ atmospheres, the "white" at $5\frac{1}{2}$, and washed.

Where the syrup from the second massecuite can be grained and crystallised in motion for five to seven days, yielding 20 per cent. of sugar, it will be found more advantageous financially, to do this, than to subject it to the separation process, but the saccharate from the syrup of the third massecuite will then be insufficient for saturating the juice, and milk of lime must be used in addition. The saccharate is made up to 20° to 25° Baumé for use in the first saturation.

In the waste lyes there is loss not only of sugar, but of potash and nitrogen. The sugar lost, amounts to from 0·11 to 0·17 per cent. on the beetroots.

There is, from working in and in, an accumulation of raffinose, but no inconvenience results when the amount does not exceed $2\frac{1}{2}$ per cent. Otherwise, a portion must be withdrawn and boiled separately.

To obtain sugar in the granulated form from beetroot-massecuite, whilst employing the Steffen process, is not easy, and involves a system essentially different from refinery processes. The separation of the spun syrups must be precise in accordance with quotient of purity.

The first massecuite is so far concentrated by evaporation as to contain about 6 per cent. of water and is then run off into the mixer: it is next centrifugalised. The first syrup run off is 27 to 28 per cent. of the massecuite, and has a quotient of about 82. After two or three minutes, water is run in with a Körting jet at a pressure of 8 atmospheres. This brings off about 7 per cent. of medium syrup of quotient 86. Finally, after three minutes more, steam is turned on, and the last syrup off—about 5 per cent.—results with a quotient of 92.

The latter is returned to the syrup for the first massecuite. The two former go into the second massecuite.

The second massecuite yields 45 to 50 per cent. of second sugar which is returned to the juice.

The final result is that after the sixth or seventh round, by which time the factory is in full work, from every 100 kilos. of original massecuite, there results a total of 165 to 175 kilos. of combined massecuites, from which 50 per cent., or 83 to 88 kilos. of grainy sugar, are obtained.

—L. J. de W.

Beetroot; Quantity of Dextrose and Levulose in the Leaves of ——. H. Pellet. Bull. de l'Assoc. des Chim. de Sucr. et de Dist. 1900, **17**, [11], 770—772. (This Journal, 1900, 455.)

From an examination of the blades and petioles of normal beetroots gathered at 5 p.m. on September 18, 1890, after a fine day, the proportions of saccharose, dextrose, and levulose found, are quite comparable under similar conditions, with those observed by Lindet.

From beetroots run to seed, gathered on the 16th of September under similar circumstances, results confirming those of Lindet were obtained.

The author checked his polarisations and cupric reducing power by adding known quantities of sugar and repeating the determinations. He also remarks that the results are not absolutely exact, since the reduction of copper by dextrose and levulose differs slightly from that by invert sugar. This difference was not taken into account.

—L. J. de W.

Beet-leaves; Oxalic Acid in ——. Wendeler. Deutsch. Zuckerind. 1900, **25**, 969.

Experiments lasting over a period of two years have shown that even very young beet-leaves contain a considerable amount of oxalic acid, the amount of which steadily decreases as the beet reaches maturity. The total nitrogen content also seems to vary directly with the amount of oxalic acid present, but the want of sufficient data precludes any definite conclusion.—E. H. T.

Beetroot Sugar Factory; Bacteriological Studies on the Normal Products of the ——. O. Laxa. Zeits. Zuckerind. Böhmen, 1900, **24**, [8], 423—435.

In the systematic bacteriological examination of the products of the sugar factory the true value and explanation of the results could only be attained by examining juice during the normal course of work, and taking into account the complicated conditions that obtain. The presence of micro-organisms in diffusion juice has hitherto been assumed without positive proof, and the evolution of gas and formation of invert sugar have been attributed sometimes to microbes and sometimes to the acidity of the beetroot juice. With the view of demonstrating the presence of micro-organisms in diffusion juice and isolating them, samples were taken from the measuring tanks in two factories last season. These were received in sterilised tubes, and within two hours were sown in glycerin-agar and beetroot-juice agar. Many of the organisms found, did not develop on the glycerin-agar. Cultivation was made in a thermostat at 37° C.

The plates showed innumerable colonies; even when 1 c.c. of juice had been diluted to 150 c.c. with sterilised water, their number was uncountable. The bacteria from the two factories were not the same, but spore-forming kinds predominated. In one factory colonies of a yeast were found, and a week later, lactic acid bacteria. The thermophile bacillus, *Clostridium gelatinosum*, was often found. These organisms are derived partly from the earth adhering to the roots and partly from the water used. With the exception of the thermophile varieties, the multiplication of the microbes ceases at a temperature of 60° to 70° C., so that destruction of sugar is not to be feared in ordinary diffusion when the juice is warm enough, but with any delay, and attendant fall of temperature, the spore-forming bacteria begin to grow and cause loss of sugar.

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At a further stage, the addition of 3 per cent. of lime before carbonating, and the high temperature, act destructively, and juice from the scum presses was found to be sterile when the temperature of the juice was not too low. Where this had happened, budding *Clostridium* was found to the number of 60 colonies per c.c. in the filtered juice of the third saturation. Apparently these had been introduced from the air during agitation with the juice.

When the filter presses are not tight, juice drops down and cools, and on such wet patches a white jelly-like mass may frequently be seen. Under the microscope this appears like a felt of matted threads, and gives an almost pure cultivation of *Clostridium*, this organism having crowded out its neighbours. When the jelly dries it gives a strong impulse to infection from the spores which are carried off by the air. Molasses also forms a suitable medium for the growth of the Clostridium jelly.

It is surprising that in his various samples the author never met with *Leuconostoc*, and he is of opinion that what has been supposed in some cases to be this form was really *Clostridium*, which forms volatile acids, and is able to bear a temperature of 90° C. for half an hour. Leuconostoc is killed at 88° C. in five minutes, and forms no butyric acid.

In the first vessel of the triple effect where the juice boils under pressure, this juice was found to be sterile, but in the second and third, *Clostridium* was found. This may have come from imperfect cleansing of the cocks, but a quantity of liquor was run through in each case before the sample was taken. Otherwise it must be attributed to spores which had survived the temperature of 72° C. in the third effect.

In the liquor thus formed, the organisms have to withstand not only a higher temperature but increased concentration. During the subsequent purification by mechanical filtration, the liquor comes into contact with the air. That from the first filter was found sterile, that from the second filter at 73° C. contained innumerable microbes, not only *Clostridium* but a spore-forming bacillus similar to *B. subtilis*. Subsequent boiling in the vacuum pan hinders the growth of the microbes, but does not kill the spores. From this point onwards a gradually increasing number of colonies was obtained.

As regards the connection between the presence and growth of microbes and the inversion of sugar, the increase of invert sugar in molasses and raw sugar is well known, but this phenomenon still awaits solution. Numerous bacteria have been shown to invert sugar, and it is probable that if such are present in large numbers and in development, the inversion of the sugar products is due to them.

The fact that "foaming" or "frothing" fermentation is diminished by the addition of antiseptics would point to fermentation as the cause rather than the decomposition of unstable organic compounds. There are thermogenic bacteria, which by their multiplication and development may give the impulse to more far reaching decompositions, whereby heat is developed by the oxidation of the compounds elaborated. This sufficiently accounts for the spontaneous combustion of cotton, hops, and hay.

—L. J. de W.

Sugar-Beet; Lime in ——. Briem. Centralbl. für die Zuckerind. 1900, [19—20], 358—378.

No analysis has yet shown the absence of lime in the different organs of the beet; the leaves always contain more than the root, which is significant, since the leaves mark the site of the elaboration of the sugar. Müller and Schneidewind found 1·59 to 12·20 per cent. of lime in the ash of the roots and 5·73 to 19·66 per cent. in the ash of the leaves. According to Loew the chlorophyll-bearing cells are richest in lime, and in the case of poverty in lime the green colour of the leaves is always deficient. In certain diseases of the beet a diminution of the lime goes hand in hand with a diminution of the chlorophyll granules, and "burning" of the beets can be cured by the application of a calcareous manure. The main function of the lime is to fix the oxalic acid in an insoluble form. Stoklasa showed that the sugar beet requires lime from the earliest stages of its growth until its death. The seeds proper are deficient in lime (3·83 per cent. on the ash), but the casing of the seeds contains an excess (23·0 per cent. of the ash), forming a valuable reserve. The calcium oxalate doubtless exercises a certain protective function for the young shoots against the attacks of moulds. Beet seedlings grown in media from which lime is absent are stunted and die in a few weeks. Various authors have shown that the lime plays a part in the transformation of carbohydrates, and the development of enzymes in the plant. Kohl considers that the presence of free oxalic acid is harmful to the plant, the starch and cellulose being attacked. The lime of the soil requires to be constantly renewed, since the application of other manures causes its removal in various soluble forms by the drainage waters.—J. F. B.

Sugar Works in Java; Result of the Mutual Control of some ——. H. C. Prinsen-Geerligs. Bull de l'Assoc. des Chim. de Sucr. et de Dist. 1900, **17**, [11], 757—769.

From the encouraging results obtained in Europe by the mutual control of sugar works, about 40 of the cane factories in Java were led to follow the example in 1899. Regular weekly reports were sent to the director of the sugar industry experimental station in West Java, who tabulated the calculated results twice a month and distributed them to the members. At the end of the crushing season, averages and totals are sent to the experimental station, and from these the principal figures which are entered in the tables given in the paper are calculated.

One column gives the degree of mixture of the water used for maceration with the juice of the begass. This figure may be described as the ratio between the sugar in the final pressed juice and that contained in the begass. It serves to show to what extent the water has penetrated the begass and mixed with the juice, or has merely wetted it superficially to no useful purpose.

As only one factory extracted the juice by diffusion, a comparison is scarcely fair, but anyway it does not appear to have been a great success. There is a loss of sugar in the begass of 4·94 per cent. on the saccharine content of the cane with a dilution of 28·6 per cent. On the other hand there was an extraction of 92·5 per cent. with a dilution of 10·4 per cent.

From a comparison of double and triple crushing, it appears that more cane is crushed and more juice extracted with three mills than with two, without any considerable difference in dilution.

The Ross cane slicer does not increase the capacity of either category and the extraction is lower. With unprepared cane the begass of the last mill shows by its torn and crushed state whether the mills are working well or not, but sliced cane gives a begass equally fine whether the extraction is satisfactory or otherwise, and its appearance is no criterion of its exhausted condition.

The woody fibre was determined in all cases. An average of all the factories gave 0·8496 as the ratio between the sugar in the juice from the first mill and that in the cane, so that the co-efficient of 0·85 is maintained.

It is remarkable that the sugar recovered differs very little with defecation or carbonating, returning syrups or not, and with or without crystallisation in movement. However, carbonating without returning the syrups shows a lower figure than other methods, but these factories only make white sugars for direct consumption, while the others make brown sugars.

Losses in filter-press cakes are very steady. There is less sugar in the cakes where carbonating is followed, but the cakes are heavier than with simple defecation. The loss is about 0·1 per cent. on the cane. No difference was observed between the filter presses of different makes nor between these and bag filters.

It will require several years of analogous results before it will be possible to give an exact idea of the work of the Java sugar factories.—L. J. de W.

Beetroot Juice and Diffusion Juice; Relation between ——. H. Pellet. Bull. de l'Assoc. des Chim. de Sucr. et de Dist. 1900, **17**, [11], 805—815.

The average purity of diffusion juice is in general higher than that of the juice obtained from fresh chips or beet-roots by pressing after cutting it up as finely as possible,

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or from the pulp obtained by ordinary rasping. The difference varies from 1° to 3°.

There are, however, some cases where diffusion juice is of lower degree of purity than the so-called juice of the beetroot, as there are more numerous cases in which the purity of diffusion juice is considerably higher.

These great variations are dependent, in the author's opinion, on the composition of the juice obtained on mincing, rasping, or pressing. In fact, from beetroots cut into 2, 3, or 4 parts, variable results were obtained from each part, according to the method used, while diffusion really represents the average juice enclosed in the cells when the extraction is carried out properly.

By dividing entire beetroots, no matter what number of roots are analysed, or method followed, it is absolutely impossible to certify that the results obtained on beetroot juice represent the average, and this is further confirmed by the direct determination of the sugar in the fresh slices.

An examination of the purity of beetroot juice has no interest because there is no means of preparing it in exactly the same manner and of certifying that the pressed juice is the average juice of the whole root. (The determination may, however, have a comparative value for any particular factory.) The juice remaining in the pulp cannot be said to be the same as that extracted. The only determination of interest is the purity of diffusion juice.

The purity of diffusion juice is moreover less subject to notable variations in proportion as a larger number of roots are worked up daily, ensuring a thorough mixture of various qualities of beetroots. Variations in the purity may be always explained by slackening of the work, stoppage or by discharge of the battery. When there is no apparent cause, errors in analysis or in sampling should be looked for, and the proportion of reducing bodies present, to account for the variation.

When the same beetroots feed two or three diffusion batteries, unless the work of each is quite irregular and different, the purity of the juice is almost always similar, especially where the beetroots are equally divided among the batteries, so as to have cossettes of the same richness within 0·01 per cent. at the same instant.—L. J. de W.

Centrifugalised Syrups; Preliminary Purification of ——. M. Stentzel. Zeits. Zuckerind. Böhmen, 1900, **24**, [8], 441—444.

The results are given of the author's method of treating spun syrups, that they may be compared with results usually obtained. The beetroot worked, however, was abnormally poor, and the water used was bad.

Content of beetroots (by alcoholic digestion) 14·22 per cent. sugar; massecuite obtained 14·92 at 89·3 per cent., making 13·32 of sugar, and leaving a total loss of 0·90 of sugar. The determinable loss was 0·72, leaving 0·18 indeterminate.

The massecuite gave 71·58 pure first product, 9·18 B sugar, and 7·44 of after product, equal respectively, on the beetroot, to 10·68, 1·31, 1·11 per cent., and 1·67 of molasses.

The composition of the various products was—

——	Sugar.	Water.	Ash.	Organic Non-Sugar.	Invert.	Nett.
First product :—						
Average	95·40	1·99	1·09	1·52	0	89·95
1st half-year ...	95·53	1·89	1·14	1·44	0	89·83
2nd half-year ..	95·27	2·09	1·03	1·61	0	90·12
B sugar, grainy ..	95·69	1·50	1·21	1·60	0	89·64
After products...	88·80	4·02	2·93	4·25	0	74·15

The molasses was 83 per cent. Brix (43°·7 B.), 47·6 per cent. sugar, and 57·3 quotient of purity.—L. J. de W.

Sugar; Crystallisation of ——, *in Presence of Raffinose, (Reducing Sugars and Salts).* Aulard. Bull. de l'Assoc. des Chim. de Sucr. et de Dist. 1900, **17**, [11], 815—827.

Ignoring non-sugar, the final composition of various products crystallised in the laboratory and analysed at 20° C. show a solubility of sugar in water of 1·87, 1·90, and 1·91, the theoretical solubility being 1·985.

On the other hand, the yield of 11 per cent. of sugar from massecuites that would be described as uncrystallisable shows that it is no longer possible to attribute to reducing sugars any melassigenic action. From the second table given in the paper it must be admitted that they perform the function of sugar.

Cane products of real purity 41·86, reducing sugars 35·57, ash 6·39, and organic matter 14·18 are susceptible of still crystallising diluted to 8·9 per cent. of water, as also products of 44·164 purity, 20·406 reducing sugars 10·115 ash, and 25·306 organic matter.

Their degree of crystallisation is in relation to their degree of viscosity compared with that of a solution of pure sugar.

In the present state of our knowledge of the subject, the author is of opinion that chemists occupied in the analysis of sugars should not take up a commercial position in establishing technical coefficients to be applied to the different bodies constituting raw sugars. Commerce will make of the analytical results what seems good to it, having regard to supply and demand.—L. J. de W.

Saccharine Products [Polarisation]; New Method of Clarification of ——. C. Koperski. Bull. Assoc. Chim. de Sucr. et de Dist. 1900, **17**, [12], 881—883; (see this Journal, 1899, 79).

This method has been employed by the author during the whole of the last campaign with very satisfactory results. It is well known that the low grade refinery products have a brown colour which can only be bleached with difficulty, necessitating the use of animal charcoal. The method in question effects the bleaching of these obstinate colouring matters by means of potassium permanganate and hydrochloric acid. For first-boiling massecuites, 1—4 c.c. of hydrochloric acid and 0·5 c.c. of permanganate solution are used per 26·048 grms., and for after products the quantity of acid may be increased up to 10 or 15 c.c., permanganate being added, 0·5 c.c. at a time, until the decolorisation has attained a pale yellow colour. This method is especially suitable for polarisation after inversion; after heating with acid the permanganate is added drop by drop to the required extent. Provided the decolorisation be not carried too far, the author has proved that no destruction of sugar takes place in the cold. It is advisable to keep the flask in cold water during the oxidation.—J. F. B.

d-Sorbose and l-Sorbose and their Configuration. Lobry de Bruyn and W. A. van Ekenstein. Zeits. Ver. deutsch. Zuckerind. 1900, 513.

See under XXIV., *page* 786.

d-Galactose and Milk Sugar; Down-Grade Products of ——. (*d-Lyxose and Galacto-Arabinose.*) O. Ruff and G. Ollendorff. Ber. 1900, **33**, [11], 1798.

See under XXIV., *page* 787.

Erythrulose; Hydrogenation of ——, *and the Preparations of a New Erythritol.* G. Bertrand. Comptes Rend. **130**, [22], 1472.

See under XXIV., *page* 787.

Sugar Solutions; Analysis of ——. G. Halphen. J. Pharm. Chim. 1900, **12**, [1], 12.

See under XXIII., *page* 780.

Beetroot Pulps; Analysis of ——. J. Weisberg. Bull. Assoc. des Chim. de Sucr. et de Dist. 1900, **17**, [12] 880.

See under XXIII., *page* 780.

Reducing Sugars; New Method for the Determination of ——, *by Aid of a Centrifugal Apparatus.* P. Chapelle. Chem. Centr. 1900, **1**, [16], 878, and [21], 1108.

See under XXIII., *page* 778.

Ze zbiorów Biblioteki Głównej Politechniki Łódzkiej

PATENTS.

Cane-Juice; Method of Defecating ——. R. A. Robertson, Glasgow. Eng. Pat. 2572, Feb. 9, 1900.

The claims provide for the defecation, continuously or intermittently, of cane-juice, by heating it with the necessary defecating agents, by direct contact with steam, to the highest temperature consistent with the preservation of the sugar in the juice, subsequently filtering or allowing to settle under pressure at about the same temperature as in defecation. The defecator is essentially a large cast-iron cylindrical vessel, provided with a mechanical agitator, with the necessary pipes and valves. The steam enters through a reducing valve, and comes in direct contact with the juice, and the resulting temperature under ordinary circumstances would be allowed to reach 240°—250° F. The defecated juice is fed directly into pressure-filters or settling tanks, and thence into the multiple effect evaporators without any considerable lowering of temperature. The super-heat in the juice is then capable of providing for the evaporation of about 90 per cent. of the dilution suffered from the condensation of the defecating steam. Provisions for the greatest economy of steam are described in the specification.—J. F. B.

Mannite or Substances resembling the same; Manufacture of ——. E. de Pass, London, from J. O'B. Gunn, San Francisco, U.S.A. Eng. Pat. 9438, May 22, 1900.

The process, in general terms, relates to the manufacture of the alcoholic hexites by the reduction of the monohexoses in aqueous solution by means of an electric current. The claims provide for the electrolytic reduction of glucose, an aqueous solution of which is placed in one compartment of a tank divided by porous partitions, whilst water is placed in the other compartment. The electrode in the water is connected to the positive pole and that in the glucose solution to the negative pole of an electric generator. The hexite is afterwards recovered from the solution by evaporation.—J. F. B.

XVII.—BREWING, WINES, SPIRITS, Etc.

Barley; The Proteolytic Enzyme of Germinated ——. W. Windisch and B. Schellhorn. Woch. für Brau. 1900, **23**, [24], 334—336.

The presence of a proteolytic enzyme in malt has been affirmed and denied several times by various investigators, the most recent conclusions by Laszczynski and Loé (this Journal, 1899, 697), being of a negative nature. The authors are not satisfied as to the finality of these results, and have studied the subject from the standpoint of Griessmeyer, who pointed out that the products of vegetable proteolysis are probably different from those formed by animal enzymes. The authors did not concern themselves with the formation of peptone, but applied a method used by Fermi in similar work. A 10 per cent. solution of gelatin was mixed with the substance under examination with the addition of an antiseptic such as thymol, and the mixture kept in the incubator at 20°—40° C., being cooled at certain intervals to 5° C. and examined for the first appearance of liquefaction at this temperature. The results showed that an enzyme capable of liquefying gelatin is certainly present in malt; it may be extracted by digestion with water, cold or at 31° C., or by very dilute acetic acid. It is destroyed by boiling, and is almost, if not quite, destroyed by mashing at 70° C. A coagulum separates from the liquefied gelatin which is not active, but if the filtered liquid be precipitated by alcohol, the precipitate contains the enzyme still in the active state. The presence of small quantities of acetic acid is favourable to the action of the enzyme, but the liquefaction is very much more rapid if the extract be made faintly alkaline; the enzyme is apparently of a trypsin nature.

In normal cases the enzyme is only present in ungerminated barley in the very faintest traces, but it occurs in larger quantities in badly harvested barley, and in samples rich in proteïn. During the steeping process no secretion of the enzyme is perceptible, but it begins to increase when germination commences, and goes on increasing until the seedling becomes green.

The period of germination at which the enzyme first makes its appearance in appreciable quantities varies with the quality of the barley. Experiments on samples valued for exhibition purposes, showed that the better the quality of the barley, the later was the appearance of the proteolytic enzyme in the course of germination. On following the malt from the malting floor to the kiln, the authors could only detect a slight destructive effect when the temperature of the kilning rose to 80° C.—J. F. B.

Malt; How Can its Yield be Increased without Damaging the Quality? W. Windisch. Woch. für Brau, 1900, **17**, [21], 297—300. (Compare this Journal, 1900, 679.)

The formation of enzymes in germinating barley is closely connected with the life-process, which itself depends on respiration; the activity of the enzymes, on the other hand, has nothing to do with the respiration. What is required is sufficient air supply to give a vigorous start to the germination and to produce sufficient enzymes with the minimum of respiration necessary. In practice with floor maltings the only way to restrict respiration is to pile the grain in thick layers, but the maltster dare not do this in the early stages because of the heating which would result during this period. Experiments should be made with the pneumatic malting drum, supplying air charged with carbonic acid in place of ordinary air, at certain stages of the germination, thus keeping respiration under control. The author experimented on these lines with a small quantity of barley in a bottle; the mixture of air and carbonic acid was used from the third day onwards, germination was conducted at 12·5° C. for seven days. The yield obtained was extremely high, 81 per cent., corresponding to a loss by respiration of only 3·2 per cent.; the malt was of first-class quality.

In 1898 Luff called attention to the fact that the yields in small laboratory maltings are always higher than are obtained on the large scale, attributing this fact to the germination being slower and cooler on the small scale. Luff's experiments showed that the yield of malt decreases with longer steeping, and this effect is apparently not accounted for by the presence of increased proportions of moisture, since the barley absorbs only a little more water by prolonging the steeping beyond 24 hours. Longer steeping did not improve the transformation of the grain, and to some extent it decreased the germinative power.

When attempts are made to obtain high yields on the large scale by the usual methods, the malts are always badly transformed.

The great cause of low yields is the aëration caused by turning the grain over to avoid heating; the author does not regard high temperature itself as a cause of low yield, and a low temperature obtained artificially by turning or sprinkling only makes matters worse by stimulating the combustion. The slower the germination the better the yield, and a naturally cool couch can only be obtained by early sprouting of the grain and spreading in thin layers Early germination is obtained either by short steeping (one day only) or by steeping with aëration or by the "dry malting" process, merely washing the barley. In these cases the balance of moisture required is supplied on the floor by watering cans, frequently and in small doses; comparatively little water is required. The grain sprouts on the first day; it is spread out in thin layers and receives water until the third day; the temperature does not tend to exceed 15° C. In this way the natural coolness of the heaps necessitates little, if any, turning over of the grain, it should simply be worked loose with the plough or shovel.

The yields so obtained on the large scale amounted to from 81·7 to 79·1 per cent.—J. F. B.

Yeasts of the Saaz Type; Employment of Bottom Fermentation ——, *in Brewery Practice.* F. Schönfeld, Woch. für Brau. 1900, **17**, [22], 313—315.

Low attenuating yeasts of the Saaz type are scarcely ever met with in brewery practice. Sweet, malty beers of the

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Munich type are always fermented by Frohberg yeast, which, though normally of high attenuative power, is restricted in its action by the conditions which exist.

At the low temperature employed, the yeast used for these beers clots together and falls to the bottom before the fermentation is complete, multiplication in these dark-malt worts is retarded and the cell walls become thickened and coated with a slimy deposit, hindering the diffusion of enzymes and sugar. The author points out that the low attenuation obtained in this manner is not final; the beers still contain sugar and carbohydrates fermentable under other conditions, such as increased temperature, by the culture yeast employed. They are therefore subject to secondary fermentations in cask or bottle by the residual traces of culture yeast, even in total absence of wild yeasts. The author has only encountered two cases in which Saaz yeast is employed in practice, and, even then, it was not used by itself, but in conjunction with Frohberg yeast. He has isolated the Saaz yeast from these mixtures, and gives the results of the fermentation experiments made in the course of their isolation, comparing them in dark worts with ordinary beer yeast.

The author found that the attenuations with the Saaz yeasts were only about 40 per cent. as compared with 80 per cent. by the ordinary yeast. The fermentations were complete in about one-half the time. The Saaz yeasts "broke" better than the ordinary, but the froth was not high or solid and soon broke down; the yield of yeast was low. The flavour of the beers from the Saaz yeast was not good, they were slightly tainted with a decomposed taste. This inferior flavour was disguised by blending the beers from the Saaz yeast with those from Frohberg yeast, and for this reason, the mixed yeasts as used in practice did not give bad results, especially as the breweries from which they came brewed strongly hopped worts of the Bohemian type with the addition of "Kräusen."

—J. F. B.

Beer Yeast; Utilisation of ——. Dormeyer. La Bière, **8**, [3], 36—38.

In conjunction with R. Ruckforth, the author has prepared a nutritive yeast extract by the following process: The yeast, after being freed from extraneous matters by washing, is heated to between 58° and 85° (according to the yeast employed) to coagulate the greater part of the protein and develop the meaty flavour of the product, which becomes more pronounced the longer the exposure to this temperature. The amount of water is kept up to the initial quantity, and the soluble, extractive matter, albumin, peptones and inorganic salts, are then separated from the yeast cellulose and coagulated albumin by filtration. The filtrate is concentrated to the consistence of meat extract, which it resembles in odour and flavour; it is, however, richer in proteïn and less expensive than the latter.

The residue may be treated by steam at a pressure of about four atmospheres, which reliquefies the albumin and furnishes a hydrolysed product of the same class as somatin, but free from any injurious secondary reaction. The residue may also be converted into cattle food by mixing it with an equal quantity of dried grains, the product being then partly dried and crushed, after which it can be easily and rapidly dried below 100° C.—C. S.

Yeast and Brewing Fermentations. O. Overbeck. J. Fed. Inst. Brewing, 1900, **6**, 265—273.

The author sums up the pure yeast question by stating that it is unreasonable to expect a pure yeast of only one species to effect a lively primary fermentation, satisfactory secondary fermentation, good multiplication, and good clear beer which will keep. Jörgensen has, however, found that a pure yeast will in course of time differentiate itself into a mixture of races of one species.

The so-called "heads" of a fermenting beer are described and remedies suggested when these behave abnormally.

The effect of temperature on the behaviour of a fermentation is discussed, also aëration, and the manner in which certain substances such as asparagin, maltose, &c., are absorbed. In this connection it is pointed out that a yeast containing a high percentage of nitrogen is sluggish; a large excess of sugar will lower this again, and improve the quality of the yeast.—J. L. B.

Yeast; Vitality of Dried ——. H. Will. Zeits. für d. ges. Brauw. **23**, [1], 11—12. (This Journal, 1898, 480.)

A re-examination of the charcoal preparations Nos. 9 and 10, which alone survived at the end of 13 years' storage, showed that the live yeast in No. 9 consisted solely of culture yeast, the few cells of wild yeast remaining at the end of the 12th year having perished in the interval. On the other hand, No. 10 consisted almost exclusively of wild yeasts, only one culture exhibiting traces of live culture yeast. In a few cases the presence of a species of yeast exhibiting a tendency to rapidly collect in large agglomerations was still noticeable (No. 9).

The presence of charcoal in the cultures appears to retard the development of the still-living cells—probably by absorbing oxygen—and it is therefore advisable to carefully remove the charcoal from preparations of this kind as soon as the dried yeast is re-steeped in wort. The author also recommends the use of cellulose as the principal ingredient in preparations for storing dried yeast, with charcoal as a relatively minor constituent. The cellulose preparations made up by himself behaved satisfactorily, and would probably have rivalled the charcoal preparations but for exposure to a higher temperature—resulting in the destruction of the yeast—during the seventh year of storage.

—C. S.

Saccharomyces anomalus; Notes on the Group ——. L. Steuber. Zeits. für d. ges. Brauw. **23**, [1], 3—10; [2], 17—25; [3], 33—36.

Four varieties of *Saccharomyces anomalus* were investigated, with the following results:—

Var. I. completely fermented 10 per cent. solutions of saccharose, dextrose, and levulose, but did not attack maltose.

Var. II. inverts and completely (though very slowly) ferments 10 per cent. solutions of saccharose; it also produces small quantities (0·45 per cent.) of alcohol in similar solutions of levulose, though no fermentation phenomena are exhibited. Neither dextrose, lactose, galactose, nor maltose is fermented, and only traces of alcohol are formed.

Var. III. is incapable of fermenting 10 per cent. solutions of saccharose, dextrose, lactose, galactose, or maltose, and produces merely traces of alcohol therein; in levulose solutions (10 per cent.) alone is as much as 0·4 per cent. of alcohol formed, and that only after about four weeks. In beer wort the acidity increases a little in the first month, but recedes by the end of six months, *i.e.*, the acids first produced are subsequently oxidised by the organism itself.

Var. IV. behaves very similarly to III., the production of alcohol attaining to 0·52 per cent. in 10 per cent. solutions of levulose only, while none of the other sugars yield more than traces.

Further experiments directed to the question of the capacity of the organism for producing a bad flavour in low-fermentation beer, yielded negative results in all four cases; and although they frequently occur in brewing—being often mistaken for mycoderma—their requirements in respect of air and heat preclude them from exercising any unfavourable influence under the conditions prevailing in low-temperature fermentation.—C. S.

Secondary Fermentation [Distillery], Temperature of —— G. Frede. Zeits. Spiritusind. 1900, **23**, [23], 212.

The author works highly concentrated mashes, allowing 72 hours fermentation. In cold weather he finds it best to allow a high temperature at the end of primary fermentation so as to provide against sluggishness during secondary fermentation. In cold weather he starts the mash at 24° C. and then regulates the temperature with the cooler so that primary fermentation takes places at 29° C.; he stops the cooler early so that the final temperature at the end of the primary fermentation is 32·5° C. But this temperature is too high during the warm weather, since the tendency of

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the vats to cool down during the later stages is not so great. If the temperature of 32·5° C. be continued during the warm weather, the yield of alcohol is 0·1—0·15 per cent. less than at 29° C.—J. F. B.

Beer Filters, and their Use in Brewing. Böhmische Bierbrauer; La Bière, **8**, [3], 38—39.

In filtering good young and matured beers the medium need not be so compact as in treating defective beer, a dense material and great care being needed when dealing with the latter. Beer should never be left in the filter over night, this being a frequent cause of the complaints of loss of flavour due to filtration. Similar results will ensue from an improper method of cleansing the filtering medium. This should never be steamed or treated with boiling water until it has been thoroughly washed with pure cold water. After a final rinsing with hot water, the mass may be stored for a short time in cold water, frequently changed; but, for prolonged storage, should be pressed and kept in a well-ventilated room. Irregular working may be due to the employment of the material in a too compact form, entailing high pressure, which causes the beer to run through heady; or the material may be choked by hop resins, &c., in which event steeping in hot dilute soda followed by a good scrubbing and rinsing in cold water will afford a remedy. Filters should be selected of larger size than is theoretically necessary for dealing with the quantity to be treated; otherwise unsatisfactory results will frequently be obtained. —C. S.

Pitch [Brewers']; Alteration in Composition and Properties of ——, during Prolonged Heating. Brand. Zeits. für d. ges. Brauw. **22**, [50], 687—693.

The following conclusions are drawn by the author from the results of his experiments.

Whatever form of apparatus be employed, the pitch used should be as inodorous as possible, of moderate melting point, and free from adjuncts capable of yielding malodorous products when superheated. Pitch freed from volatile constitutents is best, since it does not require prolonged heating before use, an increase of 5°—9° C. in the melting point being thus obviated. The application of heat should be controlled with the thermometer to avoid useless overheating, which renders the pitch brittle and causes a pitchy flavour in the beer. At first the temperature should be kept comparatively low, and only raised when the inevitable volatilisation of the resin oil renders this course necessary to produce the requisite fluidity.—C. S.

"Berlin White Beer"; Pure Culture Yeast and Lactic Acid Bacteria for ——. F. Schönfeld. Woch. für Brau. 1900, **17**, 338—340.

The first condition for the use of pure cultivated yeast is sterile wort. It has always been held that sterilised wort could not be employed in the manufacture of "white" beer, because the lactic acid bacteria would be killed. The author's experiments show that the wort obtained from a final mashing temperature of 75° C. is, for all practical purposes, sterile, provided closed clearing vats be used instead of open ones. In any case the specific constricted form of lactic bacteria, which is the only form of use in the preparation of beer of this type, is never present, so there can be no disadvantage in sterilising the wort. If pure yeast and pure lactic bacteria of the desired form were used, all the uncertainties which now accompany the manufacture of "white" beer would disappear, and a more stable beer, free from sarcina sickness, would be obtained. The beer would clarify more easily and give a better sediment. Lindner failed to get good results in his experiments, because he only paid attention to a pure yeast and not to a pure lactic acid culture as well. Until the organisms get thoroughly acclimatised to each other, the beer is liable to have a smoky flavour; but after a time the pure cultures give a product fully equal in flavour to the ordinary beer. Instead of ripening in bottle, the author prefers to conduct this process in closed iron vessels and not to add any water.—J. F. B.

Sugars; Simple Method for the Estimation of the Fermentability of various ——, by Fermentaion Organisms. P. Lindner. Woch. für Brau. 1900, **17**, [24], 336—338.

The following method is well adapted for the examination of minute quantities of the rare synthetical sugars or, more especially, for the classification of the various yeasts and fungi by a chemical physiological test. The fermentation vessel consists of a hollow microscope slide with a cover glass. A few drops of sterile yeast-water in which the yeast or fungus is distributed are placed in the hollow, and a small quantity of the powdered sugar is then added by means of a flattened platinum wire. The quantity of liquid must be accurately gauged so as to just fill the hollow without leaving any air bubbles, or allowing any overflow to wet the surface of the slide. The cover glass is made tight by sterilised vaseline. The slide is kept in the incubator at 25° C., and examined next morning. If the sugar is non-fermentable, the liquid is unaltered and the yeast has settled to the bottom. If there is slight fermentation, bubbles of gas appear underneath the cover glass, whilst if the fermentation is considerable, the vaseline ring will have been broken. Bubbles of gas may be tested by placing a drop of caustic alkali on the edge of the glass cover. It is not necessary, as a rule, to sterilise the sugar. The operation is most conveniently carried out by using one culture of yeast and several different sugars in each series, seldom *vice versâ*; the different glasses then control each other to a certain extent. The author remarks that the classification of organisms in this manner differs considerably from the morphological grouping.—J. F. B.

Extract in Sweet Wines; Determination of the ——. J. Wolff. Ann. Chim. anal. appl. **5**, 133. Chem. Centr. 1900, **1**, [21], 1109.

The author has frequently obtained doubtful results in the determination of the extract, other than sugar, in sweet wines. This is probably due to the fact that in wines containing a large proportion of sugar (20—25 grms. of sugar per 100 c.c. of wine), the error in its determination is great, and this error influences the amount of extract other than sugar, which is obtained by deducting the amount of sugar found, from that of the total extract. In order to overcome this difficulty, the author recommends that the wine, freed from alcohol, be fermented by beer yeast, and the fermented wine analysed in the usual manner. The analyses of seven wines according to this method are given in the original. Differences of as much as 2·17 grms. per 100 c.c. were obtained in the amount of extract other than sugar, in the wine before and after the fermentation.—A. S.

Mannitic Sickness in Wines; A Preventive of ——. P. Carles. Comptes Rend. **131**, [1], 77—80.

The production of mannite has been hitherto attributed to a too high temperature during fermentation, and efforts to prevent it have been always directed towards keeping the temperature down. Some years ago the author showed that mannite was also produced in the fermentation of over-ripe fruits, whatever the temperature; and that an addition of tartaric acid to the fermenting liquid prevented its formation. He has now found that an acidity of 10 grms. of tartaric acid per litre completely prevents the formation of mannite even at 38°—39° C., while the acidity of the resulting wine is less than when the unfermented must is less acid than the degree mentioned. As nearly the whole of the added tartaric acid is recovered in the marcs, the treatment is not expensive.—J. F. D.

Wines; Detection of "Vinoline" and Bordeaux Red in ——. A. Casali. Staz. Speriment. Agrar. Ital. 1900, **33**, [2], 183.

See under XXIII., *page* 777.

Mashing Potatoes in Distilleries; A Rapid Method for ——. G. Frede. Zeits. für Spiritusind. 1900, **23**, [22], 202.

The author relates his experiences in a distillery, where the supply of cooling liquor being limited, he had to

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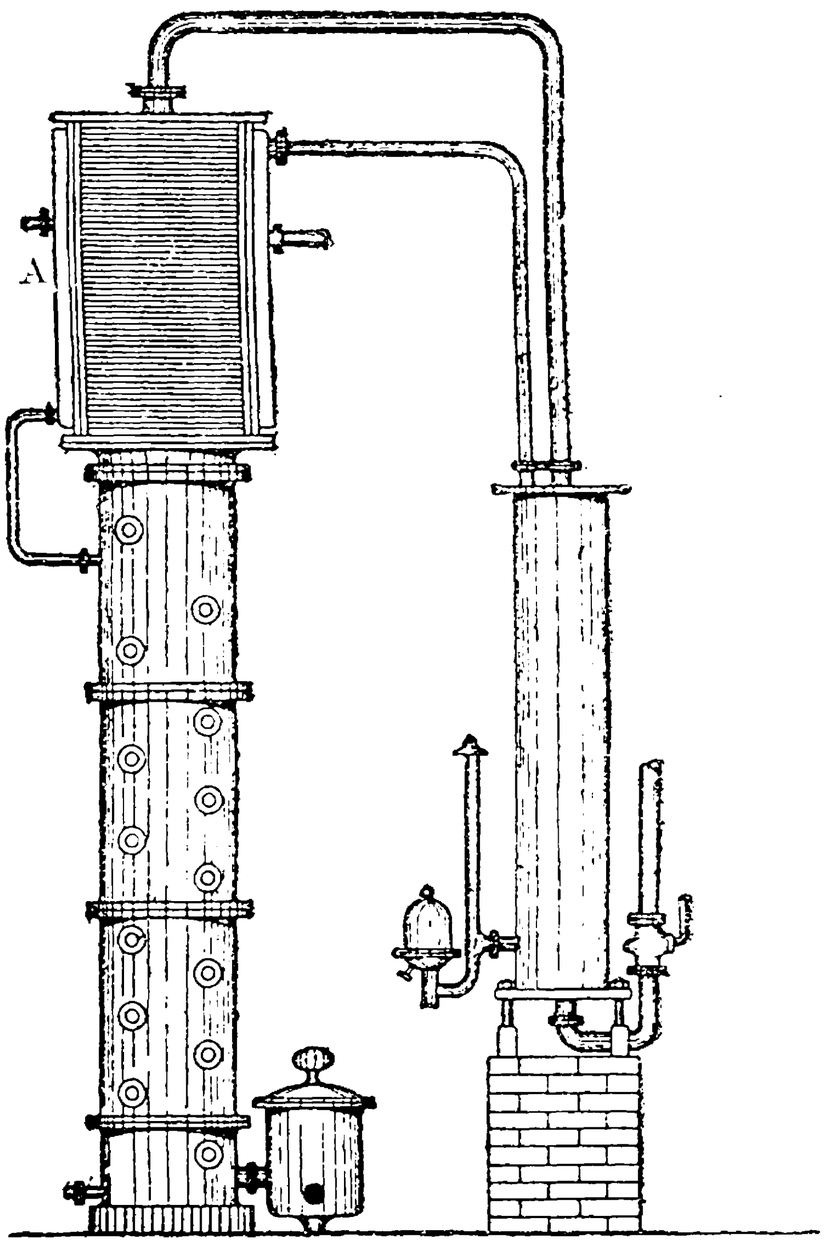
cast about for a means of accelerating the preliminary mashing operation, in which the cooked potatoes are saccharified with malt. The method worked out and since adhered to, is very simple, and consists in: (1) Steaming the potatoes very thoroughly; (2) blowing out and mashing rapidly, the necessary malt (2 per cent.) being added during the operation in three sections, at the beginning, half time, and towards the end, and efficient cooling being maintained all the time; (3) entirely discontinuing the use of the steam-exhauster attached to the mashing vessel. By these means good saccharification and satisfactory yield of alcohol were always obtained.—H. T. P.

Dephlegmator; A New ——. [*Wagner's.*] Zeits. Spiritusind. 1900, **23**, [28], 258.

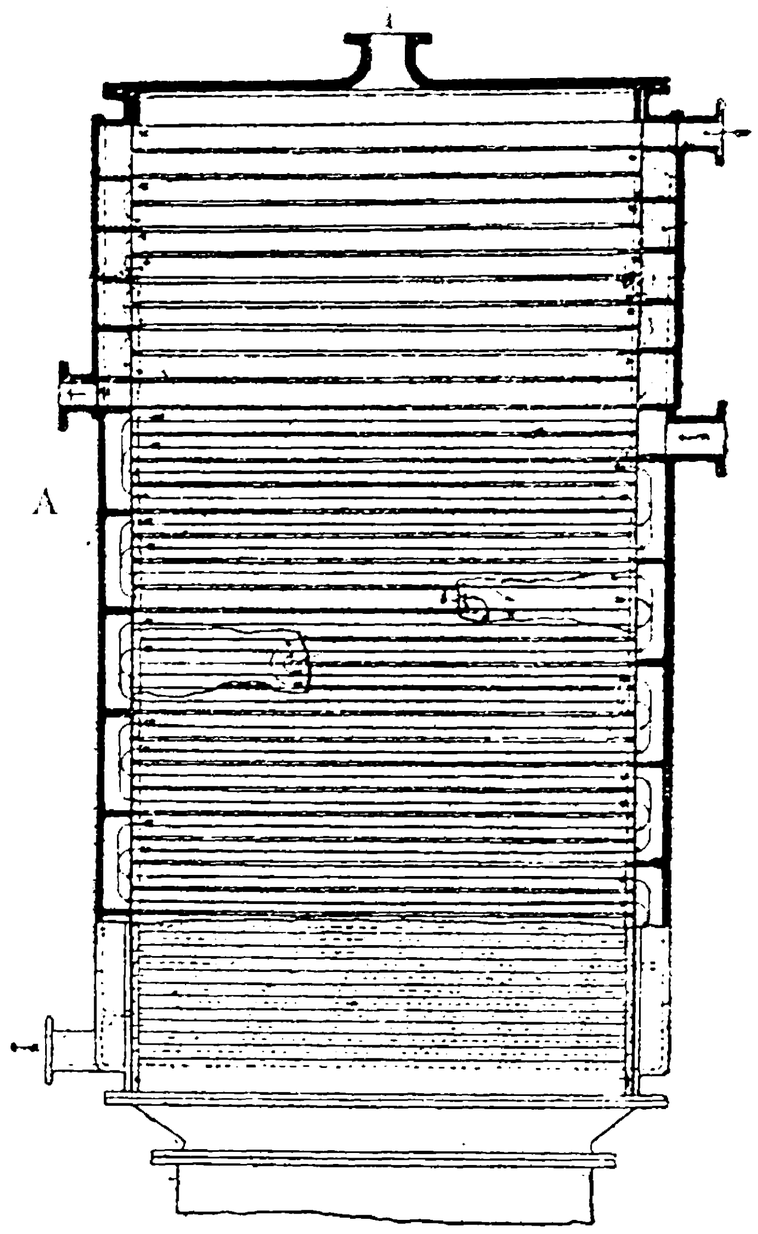
Attention has been devoted latterly to the designing of improved dephlegmators for continuous stills, capable of yielding a spirit of about 93 per cent. strength suitable for methylating, direct from the fermented "wash." An improved still of this nature was that of Ilges (described in this Journal, 1899, 848); the present dephlegmator is of a much simpler form than Ilges', and it can be erected and

Fig. 1.



cleaned out without expert workmen. It is manufactured by A. Wagner, of Cüstrin, and outwardly resembles a vertical beer-wort cooler, being of a rectangular form with little thickness. It consists of an outer casing, the two side walls of which are made of corrugated metal. Inside is a system (A) (Figs. 1 and 2) of horizontal tubes arranged vertically one over the other. The vapour ascends through the space between the tubes and the walls, and this space is divided longitudinally by a number of shelves or trays. The "wash" enters the system of tubes and is heated on its way to the still by the ascending vapours, the vapours are partially condensed and dephlegmated by the wash in the tubes, and the condensed portion of the vapours falls in spray over the trays. If desired, the corrugated walls may also be cooled by a stream of water, but experiments have shown that this has no effect on the strength of the spirit. With this apparatus spirit of 94 per cent. strength can be obtained, the pressure in the still is very low, and the vapours enter the dephlegmator at a temperature of 89° C., and leave it at 77·5° C.

Fig. 2.



—J. F. B.

Spirit in Tropical Countries; Employment of; Uncommon Raw Materials for the Manufacture of ——. E. Reuter. Zeits. Spiritusind. 1900, **23**, [28], 258—259.

Manioc root (*Manihot*) is used in East Africa and South America for the production of alcohol; it is also worked for cassava and starch in Brazil and Mexico. The roots require three or four months growth, and are 20—30 cm. in length. The dried root contains 65—70 per cent. of starch and 12 per cent. of moisture; it yields about 34·5 litres of absolute alcohol per 100 kilos. The fresh root contains 80—81 per cent. of moisture, and yields 18·6 litres of alcohol per 100 kilos. The material is steamed and the addition of 10 per cent. of barley in the form of green malt, suffices for saccharifying it. Complete attenuation is not obtained, the fermented wash generally showing 2° Bg. Manihot flourishes between 40° North and South latitudes. The spirit possesses a fine, worty flavour, even after rectification.

Kaffir Corn is a round grain, about half the size of a pea, and is light grey in colour. It requires intense heat for ripening, and is cultivated between 50° North and South latitudes. It contains 60—65 per cent. of starch and 9—10 per cent of moisture; the yield is 34·5 litres of absolute alcohol per 100 kilos. The spirit is pleasant and sweet in flavour, and milder than that obtained from other raw materials.

Rice is worked in Mozambique; it contains 64—65 per cent. of starch and 9·2 per cent. of moisture; the yield is 35—36 litres per 100 kilos. Rectified rice spirit has a sharp smell, and is harsher in flavour than potato spirit.

Dari is a grain resembling a light-grey lentil, cultivated in Algeria, and sometimes in the South of France. It contains 58—62 per cent. of starch and 9—11 per cent. of moisture; it flourishes between 40° North and South latitudes. The yield is 32—35 litres per 100 kilos., and the spirit has a pleasant sweet taste, and is very popular.

The *Sweet Potato* of Peru (Span. *Camote*) very closely resembles the *Badatadoce* of the Azores. It contains about 15 per cent. of starch and 3 per cent. of sugar, and yields 14—15 litres of alcohol per 100 kilos.

The "*Sapagos*" of Peru is a species of small pumpkin; it yields 7—8 litres of alcohol per 100 kilos.

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In the rainless countries on the west coast of South America all kinds of fruits and grains are used for the manufacture of alcohol; sugar-cane, barley, rye, and oats are cultivated for this purpose; the moisture is supplied by irrigation.

A yeast prepared with rye meal, kilned malt, and sweet mash answers well in the tropics. A water cooling plant is of great assistance. The yeast is preserved from one campaign to the next by kneading the liquid yeast with rye, maize, or Kaffir corn meal and drying in the sun; it can then be kept for several months in sealed vessels.

Malting presents few difficulties in the tropics; other grains besides barley are suitable. It is best to steep for as short a time as possible, using a little lime in the water. Floor malting is preferable to pneumatic malting, because thin layers are necessary.—J. F. B.

Potato Distilleries; Use of Hydrofluoric Acid in ——. Kahle. Alkohol, 1900, [7], 50, through Bull. Assoc. Chim. de Sucre et de Dist. 1900, **17**, [12], 951—952.

The author has used hydrofluoric acid in the fermentation of potato mashes, taking 0·5 c.c. of acid per 100 litres of yeast mash, and 0·25 c.c. per 100 litres of the principal mash. The results were extremely good, the density of the mash attenuating from 24—25° Bg down to 3—4° Bg. Hydrofluoric acid is also of great service for cleansing and disinfecting purposes, and its use has resulted in a complete suppression of moulds in the distillery. The employment of lactic acid may be entirely dispensed with, but it should be remarked that hydrofluoric acid only yields good results provided the malt be of good quality. With defective or badly transformed malt, a bad fermentation and low yield are obtained when hydrofluoric acid is employed.—J. F. B.

Air; Use of Compressed ——, in the Distillery. Goslich. Zeits. Spiritusind. 1900, **23**, [24], 222.

Compressed air may advantageously replace steam in many operations in the distillery; it is already in common use in the brewery. Compressed air may be employed for working the ejector in the mash tun, for discharging the potatoes after steaming from the Henze steamer, or for removing the spent wash by means of a montejus to the place where it is to be treated, operations in which the heat of steam is not merely wasted, but is even a disadvantage. A central collecting vat for spirit can readily be made to stand a pressure of 3 lb. per square inch, and with air at this pressure, the spirit can be filled into casks with the greatest ease. In the steeping process and for washing grain, compressed air is useful for aëration and mechanical agitation. It can also be used for supplying moisture to the germinating barley on the floor. The overflowing of the mash in the fermenting vat owing to frothing can be prevented by compressed air. Lastly, the application of compressed air for elevating and transporting grain may be mentioned.—J. F. B.

Saké; Investigations on ——. Y. Kozai. Centralbl. Bakteriol, 1900, **6**, 385.

Koji, the product of the first stage in the preparation of the Japanese beverage "saké," has been submitted to a biological and chemical examination. Among other ferments found in the koji granules, *aspergillus oryzæ* has been investigated and its action upon various sugars determined. It is capable of converting starch, dextrin, melitriose, saccharose and maltose, but not inulin or lactose, into glucose. If 2 per cent. of alcohol be present in the liquid, the action is weakened; if more than 28 per cent., it ceases altogether.

The saké-yeast is chiefly responsible for the fermentation; it ferments saccharose, maltose, *d*-mannose, *d*-fructose, glucose, and methyl glucoside readily; trehalose and *d*-galactose less easily, and lactose and rhamnose not at all. It will convert melitriose into melibiose and fructose, but is without action upon melibiose itself, so that it must be classified among the top fermentation yeasts. At a temperature of 60° C. it is killed within five minutes.

—E. H. T.

PATENTS.

Pressed Yeast; Purification of Molasses for the Manufacture of ——. E. Kafka, Olmütz, Austria. Eng. Pat. 15,451, July 27, 1899.

The process consists in treating the molasses with excess of alum at a temperature of 70° C. for the purpose of precipitating the albumin and other undesirable organic impurities. (See this Journal 1900, 261.)—J. F. B.

Beer-Wort; Apparatus for Rapidly Cooling ——. H. Krutmann, Recklinghausen, Germany. Eng. Pat. 9663, May 25, 1900.

The apparatus for cooling the wort without infection consists of a corrugated plate flowing space, having a water-cooling space below and an air-cooling space above the corrugated plate floor. This flowing space forms part of the wort conducting circuit between the boiling-pan and the collecting or settling-vat. The air space above the corrugated floor over which the wort flows is closed in and so constructed that a current of sterilised air may be passed over the wort. The cooling is completed in the collecting vat, which is closed and furnished with a worm and stirrer, sterilised air being passed over the surface of the liquid.—J. F. B.

Cooling Liquids [Distilled or Malted Liquids, &c.]; Apparatus for ——. W. R. Lake, London. From C. Strobel, Connecticut, U.S.A. Eng. Pat. 9909, May 29, 1900.

An inner cylinder, enclosed within an outer cylinder, is provided with end plates, which close the ends of the annular space between the two cylinders, and with longitudinal radial wings or partitions, which divide the said space into a series of longitudinal channels. These channels communicate through ports formed alternately at opposite ends of the partitions, inlet and outlet orifices being provided on opposite sides of one of the partitions, which is formed without a port. The liquid is circulated through the channels from the inlet to the outlet, and is exposed during its travel to cooling or chilling influences. Two end cups with packings are fitted over the ends of the cylinders, and are connected together by a screwed rod and nut.—R. A.

XVIII.—FOODS; SANITATION; WATER PURIFICATION, & DISINFECTANTS.

(*A.*)—FOODS.

Carnosine, a new Organic Base in Meat Extract. W. Gulewitsch and S. Amiradžibi. Ber. 1900, **33**, [12], 1902—1903.

The authors have isolated from Liebig's extract of meat a new base, to which they give the name of "carnosine." The diluted extract was first precipitated with phosphotungstic acid, and the precipitate decomposed with barium hydrate in the cold. The filtrate was neutralised and precipitated by silver nitrate, and the filtrate from this was precipitated with silver nitrate and baryta. The carnosine was obtained after decomposing this precipitate with hydrogen sulphide, and separated in the form of the nitrate, which crystallises in aggregates of needles. The nitrate in aqueous solution has $[\alpha]_D\ 20° = +\ 22°{\cdot}3$ ($c = 5{\cdot}67$ per cent.) and it melts with decomposition at 211° C. Analysis indicates the formula $C_9H_{14}N_4O_3$ for the free base; it is extremely soluble in water, crystallises in microscopic needles, and has a strongly alkaline reaction. Carnosine melts at 239° C. with decomposition; when boiled with copper carbonate it gives the copper compound, which is readily soluble in hot water and only slightly soluble in cold, and which crystallises in characteristic hexagonal microscopic plates, decomposing, without melting, at 220° C. In the properties of its silver compound and its acid double salt with silver nitrate, carnosine resembles arginine to some extent.—J. F. B.

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Saccharin in Foods; Detection of ——. J. de Brévans. Ann. Chim. anal. appl. **5**, 131. Chem. Centr. 1900, **1**, [21], 1105.

See under XXIII., *page* 777.

Beer Yeast; Utilisation of ——. Dormeyer. La Bière, **8**, [3], 36.

See under XVII., *page* 760.

Butter; Contributions to the Nature of the Acidity of ——. J. Hanus. Zeits. f. Unters. d. Nahrungs- und Genussm. 1900, **3**, [5], 324–328.

Repeatedly the question has been investigated whether the hydrolysis of the glycerides of the butter, to which its rancidity is due, affects primarily the glycerides of the lower acids, or whether it begins with the decomposition of the glycerides of the higher acids, or whether this hydrolytic decomposition affects all the glycerides simultaneously. Every one of these three possible cases has variously been stated to represent the actual nature of the change. A butter which possessed an acid number 5·1, iodine number 34·5, Reichert-Meissl number 28·3, saponification number 230·8, was for three months exposed to the light and atmosphere. It then had an acid number 75·2, iodine number 33·6, Reichert-Meissl number 28·8, saponification number 232·0. This rancid butter was titrated to neutrality with caustic soda, the salts of the free acids extracted with water, the aqueous solution evaporated to dryness, and the residue extracted with petroleum spirit. In the mixture of the salts of the free fatty acids, the proportion of volatile to non-volatile acids (*a*), of unsaturated to saturated acids (*b*), of volatile to unsaturated acids (*c*), and of volatile to saturated acids (*d*), was estimated with the following results :—

In fresh butter : $a = 1:16$; $b = 1:1\cdot6$; $c = 1:6$; $d = 1:9\cdot6$.
In rancid butter : $a = 1:32$; $b = 1:1\cdot5$; $c = 11:3$; $d = 1:20$.

It follows from these figures that the action causing rancidity affects the glycerides of the non-volatile higher fatty acid much easier and quicker than the glycerides of the volatile fatty acids. No difference exists between the rate of decomposition of the glycerides of the saturated as compared with those of the unsaturated acids.—C. O. W.

Olive Oil, in Sardine Cans, Characteristics of ——. O. Klein. Zeits. angew. Chem. 1900 [23], 559—560.

In order to determine to what extent the olive oil used to preserve sardines, becomes mixed with the oil from the fish, the author has made a number of parallel determinations, with the following results :—

	Oil from the fresh Sardines.	Olive oil used.	Oil from the Sardine Boxes.		
			Two months after Manufacture.	After one Year.	After two Years.
	Nov. 24, 1897.			Oct. 25, 1898.	Jan. 19, 1900.
Specific gravity at 15° C.	928·2	916·6	922·5	922·9	923·5
Refractive index at 25° C.	1·4852	1·4672	1·4712	1·4715	1·4725
Acids calculated as oleic acid	2 78 %	3·31 %	3·45 %	3·52 %	3·64 %
Volatile acids in 10 grms. of oil	23·0	21·4	18·4	15·8	11·9
Iodine value	148·1	78·90	99·02	109·05	126·2
Acetyl value	31·8	11·43	11·92	11·98	12·04

In each case the fat from the boxes was filtered and dried, and the constants determined in the usual manner, the acetyl value being determined by Lewkowitsch's method.

Manufacture of Preserved Sardines.—The author gives an outline of the method of preparing preserved sardines, in order to throw light on the influences to which the oil and fat of the fish are subjected. The sardines, after removal of their heads and entrails, are arranged in specially constructed wire baskets, which are immersed several times in running water and then packed in stages in a wagon. When filled, the wagon is run into a tunnel through which passes a current of hot dry air, which removes the excess of moisture from the fish. The wagon is next transferred to a steam bath, and the sardines, when cooked, are packed in boxes, which are then placed in a wire basket and immersed in hot oil. After some time the excess of oil is drained off, and the boxes soldered, and sterilised in a steam bath.

Conclusions from the Analyses.—In the author's opinion the rapid change which the olive oil shows in its composition must be entirely attributed to the processes of the manufacture, the steaming and heating in oil accelerating the osmotic passage of the sardine oil from its cells. He calculates that about 30 per cent. of the fish oil becomes mixed with the olive oil in the process of preparation. This diffusion continues throughout the first year and is not completed after two years. In order to prevent the preparations from acquiring too fishy a flavour, the manufacturers are in the habit of avoiding the use of very fat fish.

The author suggests that the results of an analysis may thus possibly be used to determine the age of a preparation.

—C. A. M.

PATENTS.

Wood; Treatment of ——. H. C. Williams, London, E. Bagshawe, Dover, and W. H. Pendlebury, Dover. Eng. Pat. 13,423, June 28, 1899.

See under IX., *page* 747.

Alimentary Product, New ——. B. J. B. Mills, London. From H. Bourne, Lyons, France. Eng. Pat. 15,643, July 31, 1899.

By treating anhydrosulphamido-benzoic acid with sodium carbonate at a high temperature, a product is obtained which the communicator calls anhydrosulphamidosodo-benzol. This, when dissolved by warming in a solution of glycerin and sugar, forms the food claimed. The solvent solution is composed of glycerin 1,000 grms., sugar of fecula 2,000 grms., water 1,000 grms., and solution of indigo-carmine, 100 drops. 4,000 grms. of this liquid are used to dissolve 1,000 grms. of the above product.

—W. P. S.

Artificial Human Milk; Apparatus and Method for the Preparation of ——. H. J. Blackler, Redhill, Surrey, and W. T. Burgess, Reigate, Surrey. Eng. Pat. 18,798, Sept. 18, 1899.

In making this preparation cows' milk is filled up to the zero mark, into a cylindrical vessel, holding, say, 1½ pints, and graduated into 12 divisions. The milk is allowed to stand until the cream has risen, and then a quantity of the milk under the cream is run off by a suitable opening or tap at the bottom of the vessel until the level of the milk remaining in the vessel has sunk to, say, the division marked 6. The quantity run off (*i.e.*, the removal of casein) must depend on certain circumstances such as the quality of the milk, but chiefly on the digestive powers of the children fed on the treated milk. A second graduated vessel is then filled up to the mark 6 (that is, the same division that the contents of the first vessel stand at) with milk sugar. This is added to the milk in the first vessel together with sufficient water, barley water, &c., to bring the volume up to the original bulk. In the second vessel there is a space below the zero line and the bottom of the vessel. The quantity of milk sugar contained by this space is the amount required to bring up the

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percentage of sugar to that of human milk. Each of the divisions above the zero line are of such capacity as to hold the quantity necessary to restore the amount of milk sugar removed by the drawing off of part of the milk to remove the superfluous casein.—W. P. S.

Albuminous and like Substances; Process for the Concentration of Solutions of ——. A. Gürber, Würzburg, Germany. Eng. Pat. 1517, Jan. 24, 1900.

THE process claimed is applicable for the concentration of solutions of albuminous substances which are coagulated by heat (such as blood serum, medical serum, anti-toxine albuminous substances, &c.). It is characterised by the alternate freezing and thawing of the solutions in a centrifugal machine, by which means the solid matter separated during the freezing is driven to the circumference of the machine and here forms a concentrated solution with a layer of water which remains unfrozen.—W. P. S.

Food for Animals; Manufacture of ——. A. Hlawitschka and G. Drucker, both of Vienna. Eng. Pat. 2527, Feb. 8, 1900.

BLOOD is first treated to prevent putrefaction and coagulation by the addition of a solution of common salt in alcohol or ammonia, or by a solution of ammonia alone. It is then mixed with fibrous materials such as brewers' residues, husks, bran, oil cakes, beet-roots, sugar cane, &c. If the fibrous material used be poor in sugar, a sugar solution may be added. The mixture is then gradually heated to 100° C. The sugar coats the particles of impregnated material with a glaze, and preserves the finished material. Calcium phosphate may be added to increase the nutritive value of the food.—W. P. S.

Fat Testing Instruments for Milk and Milk Products. W. T. Webster, London, and the Dairy Outfit Company, Limited, London. Eng. Pat. 17,150, Aug. 24, 1899.

See under XXIII., *page* 775.

(*B.*)—SANITATION; WATER PURIFICATION.

Polluted Rivers; The Self-Purification of ——. J. König. Zeits. f. Untersuch. Nahr. u. Genussmittel, 1900, **6**, 377–401.

THIS paper gives the results of a large number of experiments made with the object of more fully understanding the changes which the organic matters in polluted streams undergo during the processes of natural purification. The author has divided his work into three parts:—1. The direct oxidation of the organic matter. 2. The importance and signification of diffusion and evaporation. 3. The part played by water plants.

The experiments made under the first of these headings lead to the conclusion that direct oxidation of ammonia into nitric acid does not take place, except in the presence of nitrifying bacteria. The oxidation of sulphur compounds proceeds by the direct action of atmospheric air. It was also ascertained that the organic carbon compounds were oxidized much more slowly than the nitrogenous (ammonia) compounds.

The second series of experiments showed that a decrease of organic matter takes place after a flow of 7 kilometres. A loss of ammonia readily takes place especially under the action of light and air. The purification of rivers proceeds much more quickly in bright warm weather, especially in quickly flowing rivers, than in winter.

Finally, the author states that the higher water plants *Elodea canadensis Rich., Potamogeton crispus L., Myriophyllum proserpinacoides Gill., and Ceratophyllum demersum L.* take up the nitrogen they require from organic substances in the water (asparagin or albumose, but not from urea) The same is probably true for *Salvinia natans Willd.* and *Salvinia auriculata Aubl.*, and *Azolla Caroliniana Willd.* All these plants together with *Lemna minor L.* and *Lemna polyrhiza L.* assimilate carbon from organic carbon compounds, when the water is free from carbonic acid gas.
—W. P. S.

Organic Matter in Water, Action of Wood Charcoal upon. F. Malméjac. Journ. Pharm. Chim. 1900, **12**, [1], 5–8.

ORDINARY wood charcoal (20 grms. per l.), free from dust, does not remove organic matter from water in four hours, but after washing with boiling distilled water or heating to redness it considerably diminishes the content in organic matter; in the latter case 50 per cent. of the organic matter determinable by permanganate in alkaline solution is removed, and 33 per cent. of the organic matter determinable in acid solution. The purifying action of the charcoal reaches a limit in about five days. The amount of purification is not increased proportionately with the increase of the quantity of charcoal employed.—A. C. W.

PATENTS.

Sewage and other Foul Waters; Aërobic Bacterial Filters for the Purification of ——. W. M. Ducat, London. Eng. Pat. 10,386, May 17, 1899.

AËROBIC bacterial filter beds for purifying sewage are enclosed within double walls and a double roof, both placed at such a distance from the filter bed, and so constructed, as to prevent loss of heat from within the enclosed space and the consequent lowering of the temperature of the filter bed to that point (about 40° F.) below which the activity of the organisms upon which the efficiency of the bed depends, becomes lessened and their vitality suspended.—L. A.

Sewage by the Biological or Bacterial Method; Purification or Treatment of ——. C. J. Whittaker, Accrington, Lancashire. Eng. Pat. 15,765, Aug. 2, 1899.

SEWAGE is mixed or seeded with sludge, liquor or scum containing micro-organisms from a previous treatment, in order to facilitate the commencement of bacterial purification.—L. A.

Water; Process for Purifying ——, *by the Joint Action of Iron and Ozone.* Siemens Bros. and Co., Ltd., London. From Siemens and Halske, Berlin. Eng. Pat. 16,066, Aug. 5, 1899.

THE invention is carried out by mixing with the water to be purified, iron or iron compounds and passing ozone into the water. The proportion of ozone required depends upon the nature and quantity of the impurities in the water. Most iron compounds are suitable for the purpose; exceptions are organic compounds of iron other than those which humic acid makes with iron, poisonous iron compounds, and those which are too expensive.—L. A.

Combustible Gas from Refuse Sweepings, Waste Products, and the like, free from Carbon Monoxide, with or without Simultaneous Production of Cyanogen Compounds; Process for the Production of ——. O. Imray, London. From G. Ottermann and Co. and V. Loos, Vienna. Eng. Pat. 6625, April 9, 1900.

See under II., *page* 725.

(*C.*)—DISINFECTANTS.

Rays of Mineral Light-Absorbers as Remedies and Disinfectants. C. Roth. Zeits. für angew. Chem. 1900, **27**, 663—666.

"LIGHT BATHS" are frequently used as remedies in certain disorders, a common mode of application being to direct the rays of the sun, arc lamp, magnesium light, &c., from a parabolic mirror through a screen of blue glass upon the affected part. Only outer surfaces of the body can thus be irradiated, and in order to utilize such natural passages as the throat, bronchial, nasal and oral tubes for the treatment of parts inaccessible to direct illumination, the author proposes to use the phosphorescence rays from such light-absorbers as the sulphides of calcium, strontium, lime, &c. These are mixed with adhesive, neutral substances, such as collodion, and applied to objects suitable for the irradiation of external or internal surfaces. When in use these objects are re-exposed every 15 minutes or so to the sunlight for a few seconds, until recharged, and again applied to the

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disordered part. Bacteriological tests, in which different kinds of pathogenic micro-organisms were thus exposed to the phosphorescence rays of alkaline earth sulphides, are quoted and show that these rays destroyed the bacteria in a few hours. They may therefore be regarded as natural and cheap antiseptics, forming an important addition to the remedies of general hygiene.—H. B.

PATENTS.

Detergent Compound; A New ——. C. H. Fitch, Jersey City, New Jersey, U.S.A. Eng. Pat. 8078, May 1, 1900.

See under VI., *page* 741.

XIX.—PAPER, PASTEBOARD, Etc.

Woody Fibres [in Paper]; New Reagent for Detecting ——. Papier-Zeit. 1900, **25**, [51], 1877.

FRIEDLÄNDER has found that white paper containing woody fibre is coloured an intense green by fuming hydrobromic acid. The reaction is stated to be as delicate as that with phloroglucinol.—A. S.

Satin-white, Manufacture of. Papier-Zeit. 1900, **25**, [48], 1765.

INSTEAD of "Blanefixe," "Satin-white" is much used in Paper Works, and especially for fancy goods. The following three recipes are given for preparing a good, a medium, and a commoner variety of satin-white:—

(1) 100 kilos. of magnesium chloride are dissolved in from 200—300 litres of boiling water and passed through a calico-filter into a spacious tank. A hot solution of sodium carbonate is then run into the solution, which is kept agitated, until all the magnesium is precipitated. On the other hand 75 kilos. of sodium carbonate, dissolved in hot water, are used to precipitate 100 kilos. of aluminium sulphate. The aluminium hydrate is washed several times and then mixed with the magnesium carbonate, the mixture is filtered and well pressed.

(2) 100 kilos. of quicklime are well ground in a wet mill, and passed through a very fine sieve into the precipitating tank. A solution of 45 kilos. of sodium carbonate is added, care being taken that the solutions are sufficiently dilute. 100 kilos. of aluminium sulphate previously dissolved in hot water, are then run into the same tank. After agitation, the "white" is washed, filtered and pressed.

(3) For the commoner quality, 130—140 kilos. of lime are used in place of 100.—S. K.

PATENTS.

Paper Manufacture; Treatment of Fibrous Materials for ——. A. Masson and R. Scott, Wandsworth. Eng. Pat. 5367, March 21, 1900.

THE combination of "a cylindrical beater, a vertical cylindrical mixing chest, an attached circulator and an upraised duct connecting the circulator outlet with the beater inlet," is claimed. The beater is situated at the top of the tower-like mixing chest and the circulator raises the stuff from the bottom, through the duct back into the beater. The stuff as it overflows from the beater falls on a coned deflecting plate, which causes it to be evenly distributed in its descent around the inner periphery of the tower.

—J. F. B.

XX.—FINE CHEMICALS, ALKALOIDS, ESSENCES, AND EXTRACTS.

Lithium Peroxide. de Forcrand. Comptes Rend. **130**, [22], 1465—1468.

HYDROGEN peroxide was mixed with a 5 or 6 per cent. solution of lithium hydroxide, and then an equal volume of absolute alcohol added. On standing, hard, brilliant, colourless crystals were deposited, of formula—

$$Li_2O_2.H_2O_2.3H_2O.$$

These, in a vacuum over phosphorus pentoxide, gradually lose water and hydrogen peroxide, and leave practically anhydrous lithium peroxide, Li_2O_2. Calorimetric measurements show that its formation from Li_2O is attended with but slight evolution of heat. In this respect it seems to present analogy with the peroxides of the alkaline earth metals, rather than with peroxide of sodium.—J. T. D.

Cerite Earths; Contributions to the Knowledge of the——. O. N. Witt and W. Theel. Ber. **33**, [8], 1315—1324.

SCHEELE has described a process (this Journal, 1899, 392) for separating La, Pr and Nd, based upon the progressive crystallisation of the double ammonium nitrates in presence of cerium. The authors confirm the reliability of this method. Each of the products has to be subsequently purified from cerium, and the authors have devised a process to effect this. It depends upon the fact that if ammonium persulphate is added to a neutral solution of a cerous salt, the latter is oxidised to the ceric state; the cerium is then precipitated partially as a cream-coloured, insoluble, basic sulphate, with simultaneous liberation of free acid. The other cerite earths are unaffected. The free acid prevents the complete precipitation of the cerium, but if it is neutralised as formed, the cerium is precipitated completely as the basic ceric sulphate. The liquid must not be rendered alkaline lest the other cerite earths should be precipitated. To indicate the neutral point, blue litmus papers and Congo-red papers should be used, neutral double ammonium nitrates showing a slight acid reaction with litmus, but having no effect upon Congo-red, which is only turned blue by free mineral acids. Dilute ammonia or alkaline carbonates must not be used in neutralising, or the cerium finally obtained will be contaminated with La and Di. Nor is sodium acetate permissible. Cautious neutralization by means of $CaCO_3$ is best, the precipitated Ce being then free from La and Di, while the $CaSO_4$ accompanying it is easily separated afterwards. The cerium precipitate is readily filtered off, can be washed thoroughly, and on drying is easily removed from the filter paper. It dissolves in moderately dilute nitric acid to an orange-red liquid from which cerous ammonium nitrate may be obtained by first cautiously removing the SO_3 by means of $BaCl_2$, then reducing the ceric salt by adding hydrogen peroxide, and evaporating to crystallisation after neutralisation with ammonia.

The process is as follows:—The mixture of earths to be separated, of unknown composition, is converted into the ammonium double nitrates, and as much ammonium persulphate is added as would be required theoretically if the whole consisted of pure cerous ammonium nitrate. 112 grms. of double nitrates require 23 grms. of persulphate. These quantities are dissolved in 1 litre of hot water and boiled. After a few minutes the clear liquid becomes turbid through separation of the basic ceric sulphate, and when a marked turbidity has appeared, finely powdered $CaCO_3$ is added in small portions till neutrality is restored. Free acid continues to be liberated and is similarly neutralised till after about half an hour's boiling, a point is reached where further boiling develops no further acidity. The precipitate is then allowed to settle, washed by decantation, collected on a filter, washed free from other earths and dried, when it may be converted into cerous ammonium nitrate as described above. The filtrate should be quite free from cerium.—H. B.

Ceric Sulphates. W. Muthmann and L. Stützel. Ber. **33**, [11], 1763—1765.

Two ceric sulphates exist, the one yellow in colour and of simple constitution, and the other red, and of complicated structure. By dissolving pure cerium hydroxide in concentrated sulphuric acid, evaporating the deep brownish red solution and recrystallising from water, the yellow sulphate was always obtained in the first crystals, the reddish brown sulphate then, though not always, coming down in large crystals. By carefully separating and analysing the two

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salts, the formula of the yellow sulphate was found to be $Ce(SO_4)_2$, $4H_2O$, and that of the red salt $Ce_2(SO_4)_3$, $2Ce(SO_4)_2$, $2H_2O$. In the latter, the metal thus exists in both the trivalent and tetravalent forms in equal amounts. The yellow salt dissolves in water to a clear yellow solution; but the red salt is at once decomposed by water into basic insoluble compounds, although $Ce_2(SO_4)_3$ and $Ce(SO_4)_2$ are separately both soluble in water.—H. B.

Alkali Iodides; Action of Oxidising Agents on ——. E. Péchard. Comptes Rend. **130**, [25], 1705—1708.

That the ordinary explanation of the liberation of iodine from potassium iodide by oxidising agents, given in the equation $2KI + H_2O + O = 2KOH + I_2$, is not the true one, is demonstrated by the following facts:—(1) Sodium periodate acts as an oxidiser on alkali iodides, this reaction being expressed by the equation—$3NaIO_4 + 2NaI + 3H_2O = NaIO_3 + 2Na_2H_3IO_6 + 2I$, for the amounts of (*a*) free iodine, (*b*) additional iodine liberated by acidification, (*c*) iodine as di-sodium periodate (by titration with potassium permanganate after removal of free iodine) are in the proportions 1 : 11 : 1 which this equation requires. The alkaline reaction of the liquid is due to the disodium periodate; and if the solution be preserved from atmospheric carbon dioxide, it gradually becomes neutral, through the reaction $2Na_2H_3IO_6 + 2I = 3NaIO_3 + NaI + 3H_2O$. (2) If ozone be allowed to act on potassium iodide, the proportions of iodine (*a*), (*b*), (*c*) above, are the same as in the reaction of potassium periodate upon the iodide, whence we may assume that the ozone converts the iodide directly into periodate, which then reacts on the excess of iodide. (3) When faintly acid, hydrogen peroxide acts on potassium iodide, iodine is liberated, the liquid becomes alkaline, and there is slight evolution of oxygen; but on standing for a day, preserved from atmospheric carbon dioxide, the liquid again becomes neutral, and the depth of the iodine tint diminishes. Here we have again direct oxidation of iodide to periodate, reaction of this on the iodide, and further reaction of the iodine on the potassium periodate formed, as above. The evolved oxygen comes from direct decomposition of the hydrogen peroxide in presence of the dipotassium periodate.—J. T. D.

Mercuric and Mercurous Iodides; Direct Production in the Wet Way of Crystallised ——. F. Bodroux. Comptes Rend. **130**, [24], 1622—1624.

By adding to an aqueous solution of mercuric acetate or mercurous nitrate, ethyl or methyl iodide (the latter preferably), shaking, and then allowing to stand in the cold, there are slowly formed crystals of mercuric or mercurous iodide. The former are bright red transparent plates, some more than 1 c.m. long; the latter are bright yellow needles, resembling lead iodide in colour.—J. T. D.

Hydrazine from Hyponitrous Acid. v. Brackel. Ber. **33**, [13], 2115—2126.

In the course of some experiments on the reaction between sulphurous acid and hyponitrous acid, the author finds that the latter product, on treatment with sodium bisulphite and reduction with zinc dust and acetic acid yields hydrazine. Potassium hydroxylamine disulphonate (from sodium nitrite and sodium bisulphite and precipitation with potassium chloride) is treated in the cold with concentrated caustic soda lye. When no further evolution of nitrous acid takes place, the mass is dissolved in a litre of water, treated with yellow mercuric oxide, and after filtering and diluting, the addition of silver nitrate precipitates silver hyponitrite. This is decomposed with the equivalent amount of hydrochloric acid and treated at a low temperature in acid solution with sodium bisulphite. The product reduces Fehling's solution in the cold, and after concentration *in vacuo* gives on reduction with zinc dust and acetic acid and removal of the zinc, a solution which still reduces Fehling's solution in the cold. On shaking with benzaldehyde, a yellow precipitate of benzalazine is obtained which after crystallisation from alcohol forms thin needles melting at 93° C. and having the formula $(C_6H_5CH)_2N_2$.
—T. A. L.

Ethylidene Choride; Action of ——, *on the Cresols and on Resorcinol.* R. Fosse and J. Ettlinger. Bull. Soc. Chim. 1900, **23—24**, [12], 517—519.

On heating together in a sealed tube, orthocresol (2 mols.), potash solution (2 mols.) and ethylidene chloride (1 mol.), a little alcohol being also added, the ethylidene acetal of orthocresol (ethenedioxyorthodicresyl),

$$CH_3.CH(O.C_6H_4.CH_3)_2,$$

is obtained, as a slightly amber-coloured oil which, on cooling, forms a white mass melting at about 12° C. It smells like creosote and distils at 180°—185° C. under 27 mm., and at 173°—175° C. under 16 mm. pressure. It is insoluble in water or aqueous alkalis, but dissolves in alcohol, ether or benzene.

The corresponding isomeric compound obtained from paracresol, ethylidene acetal of paracresol, is an oily liquid boiling at 200°—204° C. under 27 mm. pressure; it has a faint amber colour and an odour also like creosote. It does not dissolve in water or aqueous alkalis, but is soluble in alcohol, ether or benzene.

With resorcinol, the action of ethylidene chloride is different, the resulting compound being identical with that obtained by Causse by heating resorcinol and aldehyde together in presence of a small quantity of sulphuric acid, to which he gave the constitution $CH_3.CH(O.C_6H_4.OH)_2$.
—T. H. P.

Iron Citrate and Iron Tartrate; Distinction between ——. G. Griggi. Chem. Zeit. Rep. 1900, **24**, 178.

To the solution of several scales of the iron compound in 5 c.c. of water, 5 c.c. of a solution of sodium salicylate of 0·5 per cent. strength are added. The citrate immediately gives a garnet red coloration, whereas with the tartrate there is at first scarcely any change of colour, but later on a similar garnet red coloration appears.—A. C. W.

Alkaloids of Bocconia Cordata. P. Murrill and J. O. Schlotterbeck. Pharm. J., July 14, 1900, [1568], 34—35.

This plant, investigated under the name *Macleya Cordata* by Eijkmann and by Hopfgartner (see this Journal, 1898, [8], 751), contains alkaloids in the leaf, fruit-coat and especially the rhizome. They may be extracted by acidified alcohol or water, but most successfully by moistening the drug with ammonia, drying in a current of air and percolating with hot chloroform. Protopine (Macleyine) and β-homochelidonine were obtained as before; also chelerythrine and traces of sanguinarine. The chloroform extract was evaporated and the residue treated with warm dilute acetic acid, giving a deep red solution, the colour being due partly to sanguinarine and partly to a colouring matter not yet investigated. From this solution, when acidified with sulphuric acid and shaken with chloroform, sulphates separated. These were filtered off, dissolved in water, made alkaline with ammonia and extracted with ether, from which, on slow evaporation, protopine was obtained as warty aggregates, and β-homochelidonine as large transparent prisms, easily separable by hand, or extraction of the latter by alcohol. The mother liquors were mixed and allowed to evaporate in excess of alcohol, to completely remove protopine, and the residue dissolved in glacial acetic acid and poured into 2 vols. of water, a resinous colouring matter being at the same time separated. The red filtrate was made alkaline with ammonia and extracted with ether, from which, on evaporation, chelerythrine crystallised as slightly pink aggregates and a further portion of β-homochelidonine.

Protopine, which forms about two-thirds of the alkaloidal contents, yields monoclinic prisms from alcohol-chloroform, is insoluble in ether, though very soluble when freshly precipitated, and melts at 208° C. (corr.). Analyses supported the formula, $C_{20}H_{19}NO_5$.

β-Homochelidonine, $C_{21}H_{21}NO_5$, forming one-third of the total alkaloids, is soluble in chloroform, ether, and acetic-ether, and melts at 158·5° C.

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Chelerythrine, $C_{20}H_{15}NO_4$, occurring in very small quantity, dissolves freely in chloroform, sparingly in other solvents, and crystallises with 1 mol. of alcohol. The fluorescence of its solutions disappears with increased purity of the substance.

Sanguinarine was only recognised by the blood-red colour of its salts.—R. L. J.

Strychnine; The Action of Iodoform and Chloroform upon ——. P. F. Trowbridge. Arch. Pharm. 1899, **237**, 622—625; through Zeits. f. Untersuch. Nahr. u. Genussmittel, 1900, **6**, 419.

The author describes compounds of strychnine with iodoform and chloroform, the compound with the latter being formed by heating a solution of strychnine in chloroform to 120°—150° C. It has also been observed by E. Schmidt that when an alkaline solution of an alkaloid is shaken out with chloroform, the residue obtained after completely distilling off the chloroform still contains more or less chloride and also chloroform.

—W. P. S.

The Aloïns. E. Léger. Comptes Rend. **131**, [1], 55—58.

Klunge's reaction (cherry-red coloration with cupric sulphate, sodium chloride, and alcohol) is produced not by barbaloïn, as Klunge states, but by isobarbaloïn. By the use of this reaction barbaloïn can be readily freed from isobarbaloïn, two or three fractional crystallisations from methyl alcohol yielding a product which no longer gives the reaction. Pure barbaloïn so obtained is paler in colour than the impure substance, and is coloured by nitric acid only when heated, whilst the triacetyl derivative melts at 164°·8 C. instead of at 152° C., and the tribromo derivative is readily crystallisable.

The *capaloïn*, from Cape aloes, prepared and described by Treumann, and by Tschirsch, is identical with the pure barbaloïn just described.—J. T. D.

Amyl Alcohol; Coloration of ——, *by Rosaniline.* M. Prud'homme. Rev. Gén. des Mat. Col. 1900, **4**, [43], 209—210.

A slightly alkaline solution of Magenta imparts at the ordinary temperature a red colour to amyl alcohol containing valeric acid; it gives a pink colour to the same alcohol in which sodium valerate is present, on heating the mixture.

It appears to be impossible to obtain amyl alcohol free from valeric acid or its sodium salt.—E. B.

Turpentine; Spurious ——. G. Fabris. Annali del Laboratorio Chimico Centrale delle Gabelle, 1900, **4**, 143—150.

Composition and Characteristics.—For some time past substitutes for turpentine have been met with in commerce. They are mixtures of rosin oil with colophony and oil of turpentine, their colour and consistency depending on the relative proportion of these constituents. In general, such products are very thick and have a mingled odour of colophony and rosin oil. Six commercial samples examined by the author were all completely soluble in 95 per cent. alcohol, and on distillation yielded volatile compounds (turpentine oil) below 250° C. On analysis they gave the following results:—Amount distilling below 250° C., 6·5 to 13 per cent.; acid value, 105 to 113·8; saponification value, 113·6 to 119·2; difference between saponification and acid values, 5·3 to 9·2.

From these figures the author calculated approximately the composition of the samples from the data that the rosin oil used boiled above 300° C., and had no perceptible acidity; that oil of turpentine boils at 151° to 170° C. and is not acid, when pure; and that colophony commonly has an acid value of 161 to 170. They were calculated to have the following composition:—turpentine oil (substance volatile below 250° C.), 6·0 to 13 per cent.; colophony (from acid value), 65·2 to 67·9 per cent.; and rosin oil (by difference), 19·1 to 28·8 per cent.

Differences between True and Spurious Turpentine.—Apart from the distinct differenee in appearance and odour, natural turpentine (French or American) contains more than 15 per cent. of constituents volatile below 200° C., whilst the highest amount met with by the author in artificial turpentine was 13 per cent. in one sample, the others yielding only 6 or 7 per cent. The artificial products also contain rosin oil which is readily recognisable.

Venetian Turpentine.—Larch or Venetian turpentine might possibly be confused with the spurious preparations, but it invariably contains more than 15 per cent. of oil of turpentine. According to Dieterich the acid value of Venetian turpentine varies from 65 to 75 and the saponification value from 110 to 125. In three commercial samples the author found 20 to 25 per cent. of oil of turpentine, and acid values of 99·1, 90·2, and 96·8. The difference between the acid and saponification values is thus much smaller than in the artificial products.

Detection of Rosin Oil.—Five grms. of the turpentine are dissolved in 20 c.c. of 95 per cent. alcohol, a few drops of phenolphthaleïn added, and a 10 per cent. solution of potassium hydroxide introduced until the liquid is alkaline. In the case of artificial turpentine the liquid becomes turbid, and on standing, oily drops of rosin oil separate; whereas Venetian turpentine tested in the same way gives a perfectly clear solution.—C. A. M.

Bornylene: A New Terpene. G. Wagner and W. Brykner. Ber. 1900, **33**, [13], 2121—2125.

On heating bornyl iodide on the water-bath with alcoholic potash, it is converted into camphene and another compound with a higher melting and lower boiling point. To accelerate the reaction, potassium phenolate was used in place of potash, but under these conditions, camphene alone is obtained; if, however, concentrated alcoholic potash be employed and the mixture be heated for four hours in an autoclave at 170°, the change is greatly accelerated. To separate the camphene from the new compound, the mixture is heated in sealed tubes with sulphuric and acetic acids, by which means the camphene is converted into isobornyl acetate whilst the other remains unchanged and can be isolated by fractional distillation and pressing between linen. As thus prepared, the new terpene—for which the name "bornylene" is proposed—is a solid substance melting at 97·5—98° and boiling at 149—150° under 750 mm. pressure. It is extremely volatile and sublimes on the glass walls of the containing vessel in transparent sparkling crystals, while small quantities placed on a watch-glass disappear almost instantaneously. When oxidised in benzene with 1 per cent. potassium permanganate solution at the ordinary temperature, bornylene gives rise to active camphoric acid. The constitution assigned by the authors to the new compound is—

$$CH : (CH:CH)(C(CH_3)_2)(CH_2.CH_2) : C.CH_3.$$

—T. H. P.

Balsam of Peru; The Test for ——. A. Dlusski. Chem. Zeit. Rep. 1900, **24**, 178.

In applying the test for balsam of Peru with sulphuric acid as given in the Russian Pharmacopœia, the substances must be well mixed and allowed to react for at least 10 mins., otherwise the reaction may not be obtained even with the genuine substance.—A. C. W.

Rose Oil; Discovery of an Aromatic Alcohol in German ——. H. von Soden and W. Rojahn. Ber. 1900, **33**, [11], 1720—1724.

Roses are grown on a large scale at Schladebach, near Merseburg, and distilled for their essential oil. In the distillation considerable quantities of water come over; this is again distilled, and furnishes a further quantity of oil, together with a strongly scented "rose water." In the retort remains water with a faint odour of roses. From this residue, by extraction with ether, about 0·025 per cent. of an oil of peculiar odour was obtained; this contained small quantities of free acids and phenols, it consisted chiefly of β-phenylethyl alcohol. About 80 per cent. of this alcohol was obtained by shaking with caustic soda solution of 5 per cent. strength and extracting the clear filtered solution with ether. The oil extracted from the

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"rose water" contained about 35 per cent. of the alcohol; the rose oil, from which the stearoptene had been removed by freezing, contained about 1 per cent.

Radziszewski obtained phenylethyl alcohol by reducing phenylacetaldehyde with sodium amalgam in dilute alcoholic solution (Ber. **9**, 372). The authors obtained a yield of 16 per cent. of phenylethyl acetate by reducing with zinc dust on the water bath in acetic acid solution, distilling in steam, and extracting the distillate neutralised by sodium bicarbonate. Pure phenylethyl alcohol boils at 219° C., its specific gravity at 15° C. is 1·0235 (Radziszewski found 212° C. and 1·0337 at 21° C.). The principal product of the oxidation of the alcohol by chromic acid mixture is the phenylethyl ester of phenylacetic acid.

On account of the solubility of phenylethyl alcohol in water, the preparations of roses obtained by *enfleurage*, or by extraction with a volatile solvent, should contain larger quantities of the alcohol than the rose oil examined here.

—A. C. W.

Rhodinol and Citronellol. L. Bouveault. Bull. Soc. Chim. 1900, **23**, [11], 458—463.

CITRONELLOL, $C_{10}H_{20}O$, is the primary alcohol corresponding to the unsaturated aldehyde citronellal, it boils at 117°—118° C. under 17 mm. pressure, its density at 17·5° C. is 0·8565, $\alpha_D = 4° 20'$.

The name rhodinol was first given to a mixture of alcohols isolated by Eckart Barbier, and Bouveault, Monnet and Barbier. The presence of geraniol, $C_{10}H_{18}O$, in the mixture was recognised later by Barbier and Bouveault, who then gave the name of rhodinol to the other alcohol, $C_{10}H_{20}O$, contained in the mixture, no ambiguity resulting, since Eckart's rhodinol is not a chemical individual. (See this Journal 1896, 292, 564; 1898, 267, 371.) Tiemann and Schmidt state that rhodinol is *l*-citronellol (*loc. cit.*). The physical properties of citronellol and rhodinol are almost identical, both yield acetone and β-methyladipic acid on oxidation; for rhodinol α_D varies from −2° to −4°, pointing to partial racemation. The corresponding aldehydes differ, however, in chemical behaviour, rhodinal is spontaneously transformed into menthone (Comptes Rend. **122**, 737), and rhodinal-oxime is immediately changed by acetic anhydride to menthone oxime. Citronellal does not change spontaneously and acetic anhydride transforms its oxime merely into the nitrile; in contact with sodium acetate and acetic anhydride it yields the unsaturated cyclic alcohol isopulegol (Tiemann and Schmidt, this Journal, 1897, 257). The work of Harries and Roeder on pulegone and isopulegone (this Journal, 1900, 176) confirms the formula of Barbier and Leser for citronellol—

$$CH_2 : C(CH_3).CH_2.CH_2.CH_2.CH(CH_3).CH_2CH_2OH.$$

The transformation of rhodinal into menthone (see following abstract) supports Barbier and Bouveault's formula for rhodinol—

$$(CH_3)_2.C : CH.CH_2.CH_2.CH(CH_3).CH_2.CH_2OH,$$

which has been wrongly assigned to citronellol by Tiemann and Schmidt (*loc. cit.*).—A. C. W.

Rhodinal into Menthone; Transformation of ——. L. Bouveault. Bull. Soc. Chim. 1900. **23**, [11], 463—466.

RHODINAL was found by Barbier and Bouveault (Comptes Rend. **122**, 737) to change spontaneously into menthone. From the product they isolated semicarbazones melting at 115°—116° C. (rhodinal) and at 186° C. (menthone). Tiemann and Schmidt repeated the experiments (this Journal, 1897, 257), and obtained semicarbazones which they regarded as derived from citronellal and isopulegone, without giving analyses. The latter, melting at 186° C., the author finds by analysis to be derived from menthone, and for the ketone $\alpha_D = -10°$.

The rotatory power of rhodinol from pelargonium oil is less than that of rhodinol from rose oils; the former is partially racemised, thus explaining the production on oxidation of a β-methyladipic acid of high melting point (95° C.), which is a mixture of the racemic and levo-rotatory acids.—A. C. W.

Otto of Rose; Examination of ——. H. Garnett. Chem. and Druggist, 1900, **56**, [1063], 961.

THE chief adulterant of otto of rose is the oil of palma rosa or "Turkish geranium," the chemical composition of which closely resembles that of the liquid portion of the otto itself. This adulterant, if present in considerable amount, can be recognised by reason of its somewhat rank smell, but as much as 5 per cent. can escape detection in this manner. The difference in odour can be more easily observed if the suspected otto be dissolved in a little alcohol, and the solution diffused in a large quantity of warm water, the odour being compared with that of a sample of pure otto treated in a similar manner.

Specific Gravity.—The author determines this, by means of a Sprengel tube, at a temperature of 30° C. (water at 15·5° C. = unity). He considers that the limits allowed by the B.P., 0·856 to 0·860, are too high. An examination of the finest Bulgarian ottos during a number of seasons showed that the sp. gr. varied between 0·8525 and 0·8575; samples with higher densities were almost invariably adulterated. It is apparent therefore that the statement by Parry in his "Chemistry of Essential Oils" that .... 0·855 to 0·865 may be taken as including most good commercial otto" must be received with some caution, as these limits would exclude some of the finest otto and admit much that was doubtful.

Optical Rotation.—With samples that respond satisfactorily to the other tests, the optical rotation usually lies between −2° 15′ and −3° 15′ at 27°—30° C. The author has never met with a sample having a dextro-rotation, and states that the limits given by Parry, +1° to −4°, cannot be considered suitable for Bulgarian ottos.

Freezing Point.—It is almost impossible to obtain figures agreeing closely with those given by Bulgarian merchants, as varying and uncertain results are obtained by the method used by the latter. The author recommends allowing the melted otto to cool gradually in a jacketed tube (similar to a Beckmann freezing point apparatus), using a thermometer graduated to 0·2° or 0·1° C. and stirring constantly with a platinum-wire stirrer. The water-bath should be at a temperature not more than 3°—4° C. lower than the freezing point of the otto. The small air bubbles carried down by the stirrer will rise so long as the otto is fluid, but immediately permanent crystallisation begins, the bubbles remain suspended, and can be seen even before the transparent crystals are visible. It is stated that by this method, different determinations should not vary by more than 0·1°. The limits 19·5° to 22° C. cover all the purest ottos of Bulgarian origin; Parry's figures, 17°—23° C., appear to allow too much scope for adulteration. The author has observed that the freezing point of the same otto varies from time to time according to the amount of water dissolved in the oil. A quantity of otto of rose which had been allowed to stand in an open beaker at a temperature of 30°—35° C. for 24 hours had its freezing point considerably depressed. An otto which before this treatment had a freezing point of 21·4° C. (corr.) was examined after "dehydration"; the specific gravity and optical rotation were scarcely altered, but the freezing point was lowered to 20·5° C. An addition of 1 part by weight of palma rosa oil to nine parts of otto of rose lowered the freezing point of the latter from 21·5° to 20·5° C. The author has never been able to detect with certainty the presence of ethyl alcohol in pure otto of rose, and he considers that the method of preparation of the otto—the latter being drawn off from the surface of a very large volume of water—ensures the almost complete washing out of any ethyl alcohol originally present.

Alcoholic Constituents and Stearoptene.—The determination of the percentage of alcoholic constituents is not much value, as palma rosa oil and the liquid portion of the otto consist largely of the same alcohols. A method for the quantitative separation and determination of the alcohols, geraniol and citronellol, is required, as it is probable that there is a much larger proportion of the latter in the liquid portion of otto of rose than in palma rosa oil. The process of Flattau and Labbé, which is based upon the differing solubilities of the alcoholic phthalates in petroleum spirit, is not considered satisfactory by Schimmel and Co.

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In the determination of stearoptene, it is essential that each test be made under exactly similar conditions.

Percentage of Ester.—The amount of ester in pure ottos varies from 3 to 3·5 per cent.; in palma rosa oil it averages about 10 per cent.—A. S.

Jasmine Flowers; Essential Oil of ——. IV. A Hesse. Ber. 1900, **33**, [10], 1585—1591. (See also this Journal, 1899, 296, 396, 513, 1153.)

The majority of the jasmine pomades of the seasons 1898 and 1899 show great uniformity in properties. In Southern France jasmine flowers are treated by another process in addition to "enfleurage." By extraction with a volatile solvent "essences concrètes" are obtained, these contain vegetable wax, paraffins, &c., together with the perfumes. A sample of "jasmin pur" obtained by extraction from fresh flowers was examined, its purity was guaranteed. It was a pale brown fairly mobile liquid, with an agreeable odour differing from that of jasmine pomade, the specific gravity at 15° C. was 0·914, the saponification value corresponded to about 25 per cent. of benzyl acetate and the neutral product of the saponification smelt strongly of jasmone. By steam distillation about 25 per cent. of volatile oil was obtained; this had a specific gravity of 0·940 at 15° C., was almost optically inactive, and contained 41 per cent. of benzyl acetate. The oil dissolves in alcohol and ether, without fluorescence; it contains no indole.

In order to obtain 1 kilo. of essential oil from "jasmin pur," 5,600 kilos. of flowers are required, whilst by enfleurage 1,000 kilos. produce more than 1 kilo. of essential oil. Thus in the enfleurage process, lasting 24 hours, the flowers give six times the yield of oil obtained by extraction. Passy (Comptes Rend. **124**, 783), was led to conclude that certain blossoms, *e.g.*, rose and orange, contain large quantities of essential oil ready formed, whilst others, such as jasmine and tuberose, contain small quantities of perfume, but are continually producing and volatilising it afresh. This would explain the different yields obtained from jasmine by enfleurage, where the blossoms are kept alive in contact with moist fat for some time, and by extraction with solvents or by distillation, which kill the blossoms at once.

The volatile oils obtained by the two processes differ considerably, particularly in specific gravity and percentage of esters. The absence of fluorescence in the extracted essential oil indicates the absence of methyl anthranilate, probably the small quantity of this ester previously found in jasmine pomade was due to the orange blossoms with which the enfleurage fat was prepared (to hide the odour of the fat), for the pomades used in the previous investigations the amount of orange blossom was one thirtieth of the jasmine flowers employed. The absence of indole in the extracted essential oil indicates that this substance is formed after the flowers are plucked, the relatively large quantity of indole previously found could not also be derived from the orange blossoms.

The absence of indole and the far smaller yield of essential oil in the extracts are the causes of the preference given to jasmine pomades. The alcoholic extracts of the pomades are chiefly used in perfumery to impart roundness and freshness, indole (most carefully purified) giving to dull-smelling mixtures a fresh natural odour.—A. C. W.

Jasmine; Analytical Researches on some Essences of ——. Jeancard and Satie. Bull. Soc. Chim. 1900, **23—24**, [12], 555—556.

The authors point out that analyses of jasmine essences prepared from the pomade (see Verley, this Journal, 1899, 296, and Hesse and Müller, 1899, 396) are misleading, owing to the presence in the pomade of about 0·05 grm. of benzoïn and 0·25 grm. of essence of orange flowers for every 3 grms. of the jasmine essence. Analytical results are given by the authors in the foregoing table.

——	I.	II.	III.	IV.
Specific gravity at 17·5° C.....	0·9099	0·9201	0·9246	0·8900
Rotatory power (l = 20 mm.)...	+0° 30′	+0° 32′	..	..
„ „ (l = 100 mm.)..	..	..	+1° 40′	+3° 50′
Saponification number.....	103·6	126·0	155	77
Percentage of ethereal salts calculated as linalyl acetate.	36·26	44·10	54·39	26·95
Percentage of ethereal salts calculated as benzyl acetate.	27·70	33·75	41·65	20·62

Analyses I. and II. are of specimens of the essence obtained by subjecting to *enfleurage*, vaseline containing neither benzoïn nor orange-flower essence, the essence afterwards being extracted in the ordinary way; column III. refers to an essence obtained by direct distillation of the flower, and IV. to an essence prepared from jasmine flowers after being subjected to *enfleurage*.—T. H. P.

Lavender; Variations in the Proportion of Ethereal Salt in Essence of ——. Jeancard and Satie. Bull. Soc. Chim. 1900, **23—24**, [12], 549—554.

The altitude at which lavender plants are grown seems to have no influence either on the proportion of ethereal salts in the essence, or on its specific gravity or rotatory power. No regular difference has been observed between the essence obtained from the leaves and stems of the plant and that prepared from the flowers, although as regards odour, the latter is much the superior. During the distillation of the essence in a current of steam, the proportion of esters in the distillate increases regularly from the beginning to the end of the operation; thus in an essence containing 39·20 per cent. of ethereal salt, the first portions distilled were found to contain 22·50 per cent. and the last portions 46·70 per cent. of ester, the mean for the whole distillate being 35·53. A loss of ethereal salt thus occurs on distillation, owing to partial saponification taking place. When essence of lavender is boiled in a reflux apparatus with 20 times its weight of distilled water, the rate of saponification is at first 2 per cent. per hour, this number gradually diminishing until a condition of equilibrium is attained. The addition of increasing proportions of sodium carbonate to the water with which the essence is boiled brings about a corresponding increase in the amount of saponification effected. The author concludes that it is important, in the distillation of lavender essence, to carry on the process as quickly as possible and to make sure of its completion, and further the use of waters which leave little residue at 110° is to be preferred.—T. H. P.

Oil of Lime [Citrus] Flowers. E. J. Parry. Chem. and Druggist, 1900, **56**, [1064], 993.

The author has examined a small quantity of the essential oil distilled from the flowers of *Citrus Limetta*. The oil was of a pale yellow colour, and had an odour similar to that of Neroli oil, but not so powerful. Its specific gravity was 0·870, and its optical rotation $\alpha_D = +21° 30'$. The presence in the oil of methyl anthranilate and linalol was detected.—A. S.

Oil of Lemon, Extraction of, and Trade in ——. G. Fabris. Annali del Laboratorio Chimico Centrale delle Gabelle, 1900, **4**, 42—47.

Manual Extraction.—Oil of lemon is, for the most part, extracted by hand, and machinery has not been adopted to any extent. There are a few large factories, numerous small ones, and innumerable families of peasants who squeeze the lemons grown in their own gardens. The large factories also deal in the oil; the small factories for the most part sell to the large dealers; whilst the peasants also sell their produce from day to day to the large merchants.

The method of extracting the oil by hand is the same in the large and small factories. The lemons are cut into three longitudinal slices in such a way that hardly any pulp remains adherent to the peel. The pulp is pressed and the juice sold without further treatment (*agro*) than concentration (*agro cotto*); to the calcium citrate manufacturers, who export either the concentrated juice, or the crude citrate, principally to England, for the manufacture of citric acid. The peasants only produce the crude *agro*, which they take daily to the factories with the oil.

The operation of cutting the lemons begins at about 10 in the morning, and continues throughout the day. The cut peel is collected in large baskets and left for several

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hours so as to obtain a better yield of oil, and in the course of the night the extraction is commenced. This is carried out in cool and well-closed buildings in the following manner:—Each workman holds in his left hand a medium-sized sponge of the best quality, which has previously been thoroughly washed; and attached to the fingers of the same hand he also carries small pieces of sponge to prevent any loss of oil. With the right hand he squeezes the pieces of peel with their external side held to the sponge. The pressure ruptures the oil-cells and the discharged oil is absorbed by the sponge, which when filled is expressed into a vessel beneath. To insure that the oil has been completely removed a foreman squeezes the refuse peel from time to time against a flame, and if oil is still present, small flames are produced by its ignition. When the peel has been thoroughly pressed, no flames are observed. The rinds are then put through a press to express any little juice contained in the pulp adherent to the peel, and the residue of pressed peel, as also the pressed pulp, used for feeding cattle. The oil thus obtained is mixed with a certain proportion of aqueous acid liquid from the adherent pulp, and when the receptacle is filled with liquid from the sponges it is put on one side for some time. The essential oil rises to the surface and is decanted, whilst the turbid lower layer is transferred to large vessels where it is left until the oil it contains is recovered by distillation. The decanted oil is slightly turbid, but can be sufficiently cleared by filtration through paper, as is done in many factories.

Extraction by Machinery.—This is based on the same principle as the manual extraction. The lemons are cut in two and the pulp removed by a cutting spoon. The peel is mechanically squeezed and the expressed oil collected in suitably arranged sponges, which are removed when filled. The residual peel is put into salt water, and sent to the candied-peel manufacturers, whilst the other by-products are utilised as in the extraction by hand. With the machinery the extraction is a little more rapid, but not much more so, than by hand, and a workman is required for each machine. It appears, too, that the oil extracted by machinery has not so fine an aroma, as that produced by hand.

The oil, by whichever process obtained, is stored in cylindrical copper vessels lined with tin. These are known as "*Ramiere*" and have the same form as the vessels of smaller size in which the oil is exported.

Yield of Oil from Lemons.—The amount of oil extracted from the peel varies with the season. The maximum yield is in November, December, and January, when 1,000 lemons produce from 1 to 2 Italian pounds of oil (1 It. pound = 317 grms.); subsequently the yield is much less. The immature fruit gives a larger quantity of oil than the ripe lemons, and the quality and aroma of the former are superior. There is also some difference between the chemical and physical constants of the two. The quality of the lemons has an influence on the value of the oil. Those known as "*Bastardoni*," which are unripe windfalls, give but little oil, and that of a very inferior quality. Such factors as the position of the gardens and kind of season have also obviously an influence on the oil.

The Trade in Lemon Oil.—This is in the hands of the peasants, merchants, and large and small manufacturers, the principal market being at Messina. The unit of weight generally adopted is the *pound of* 317 *grms.* The merchants, who procure their oil from the small makers, usually test the consignment with the polarimeter. As the polarimetric reading of oil does not vary greatly for one season or locality, the merchants, who know the origin of the oil and kind of season, regard this test as sufficient when taken in conjunction with organoleptic tests; and in the author's opinion it is difficult for any adulteration to escape the detection of the buyer on the spot.

The variation in commercial oils is attributed to those made in winter from good lemons being kept distinct from those made at other seasons from inferior fruit. Of late there have been many fraudulent practices, such as mixing fresh oil with old or distilled oil; and the fact that a mixture of oil of lemon 80 per cent., oil of orange 15 per cent., and turpentine 5 per cent. is sold under a special mark points to the general use of such mixtures, which may readily be used for purposes of adulteration.

The oil exported, especially when sent to England and America, is often accompanied by a certificate of analysis showing the percentage of citral. There are also in commerce terpeneless oils (Schimmel and Co.), prepared by distilling off under reduced pressure the greater part of the more volatile constituents (terpenes) and distilling the residue, which consists principally of citral, in a current of steam (*cf.* Idris, this Journal, 1898, 869, and 1900, 372). Reference is also made to the *Concentrated Essence, Soluble Essence,* and *Terpeneless Oil of Lemon* of H. Haensel.

—C. A. M.

Oil of Bitter Orange ——. G. Fabris. Annali del Laboratorio Chimico Centrale delle Gabelle, 1900, **4**, 139—140.

Extraction.—Oil of bitter orange, also known as *Essence d'orange-bigarade,* is extracted from the peel of the bitter orange (*Citrus bigaradia Risso*). It has only a limited use, and, according to the author, is not easily obtained pure in commerce.

Characteristics.—It is a yellow liquid with a bitter aromatic taste, and an odour of orange rather more delicate than that of the sweet oil. Its rotatory power varies within far wider limits than the sweet oil (+92° to 98°), but it does not differ much from the latter in its other properties. Two pure samples examined by the author gave:—Specific gravity at, 15° C., 0·853 and 0·852; and rotation at 20° C., 92° 40′, and 92° 0′.

Adulteration.—On account of the greater variation in the rotatory power this oil can be more easily adulterated than oil of sweet orange. But the author considers that the rotation taken in conjunction with a fractional distillation, should detect without much difficulty the more common and gross adulterations.—C. A. M.

Oil of Mandarin. G. Fabris. Annali del Laboratorio Chimico Centrale delle Gabelle, 1900, **4**, 140—141.

Extraction.—This oil is rarely obtained pure in commerce owing to its production being limited and its price high It is obtained from the peel by hand in the same manner as the oil of orange or lemon.

Characteristics.—It is a golden yellow liquid with a slight bluish fluorescence, which becomes more pronounced on diluting the oil with alcohol. Its specific gravity varies from 0·854 to 0·858 at 15° C., and its rotatory power at 20° C. from +65° to +75°. It begins to boil at 175° C., and distils over almost completely at 179° C. The fraction distilling between 175° and 177° C. has a rotation of 76° to 77°. It consists for the most part of limonene, and also contains small quantities of aldehydes (citral and citronellal). As regards its adulteration the author makes the same observations as in the case of oil of bitter orange (*cf.* preceding abstract).—C. A. M.

Oil of Sweet Orange. G. Fabris. Annali del Laboratorio Chimico Centrale delle Gabelle, 1900, **4**, 136—139.

Extraction.—This oil, commonly known as *Essenza di portogallo,* is manufactured principally in Calabria (Province of Reggio), and also in the Provinces of Messina, Catania, and Siracusa in Sicily. It is extracted by hand in the same manner as oil of lemon.

Characteristics.—It has a more or less pronounced yellow colour, and an aromatic, not bitter, taste. It consists in the main (about 90 per cent.) of limonene. It also contains citral, and, possibly, another aldehyde not yet identified. It does not contain pinene.

The most characteristic properties of the oil are its specific gravity, rotatory power, and boiling point, which, according to different authors, vary within the following limits:—Specific gravity at 15° C., 0·848—0·852; rotation at 20° C., +96°—98°; boiling point, 175°—180° C. The distillate is colourless, and has a density slightly lower and a rotation slightly higher than that of the original oil.

Detection of Foreign Substances.—Owing to the fact that oil of orange is much more constant in its properties than oil of lemon or oil of bergamot, adulteration is more easily detected. Oil of turpentine and oil of lemon, which are

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the principal adulterants, raise the specific gravity and lower the rotation. In doubtful cases a fractional distillation is useful, it being noted that in the case of a pure oil the first distillate has a slightly higher rotatory power than the original oil, whereas, in the case of mixtures, the rotatory power of the distillate is lower than that of the mixture (*cf.* this Journal, 1899, 1160).—C. A. M.

Oil of Bergamot. G. Fabris. Annali del Laboratorio Chimico Centrale delle Gabelle, 1900, **4**, 123—136.

Expression of the Oil.—This is done almost exclusively in the Province of Reggio Calabria, near the coast, and chiefly by machinery. The machines are primitive, consisting essentially of two wooden discs, the lower of which has its surface and edge raised, whilst the upper is provided with channels for carrying off the oil. In using them, six bergamots of nearly equal size are placed between the plates, and the upper one lowered so as to touch the fruit. They are then made to revolve slowly and by the slight pressure and movement the surface of the fruit is gently scraped and the kernel broken, and the oil and aqueous liquid expressed flow into a receptacle below. The pulp of the fruit is utilised in the production of juice (*agro*) as in the case of lemons. The oil rising to the surface in the collecting vessel is decanted and filtered through special woollen bags, whilst the oil left in the aqueous layer is recovered by distillation. The yield of oil varies with the season, locality, and maturity of the fruit; but, in the mean, 1,500 bergamots are required to produce 1 kilo. of oil. The best and most valuable oil is that obtained from the ripe fruit in January. The oil obtained by pressing has a more or less pronounced yellowish-green colour, whilst distilled oil is light yellow, and has a special odour due to the heat.

Nero of Bergamot.—This is the name given to the oil expressed from unripe or damaged fruit which has fallen from the trees. It has a brownish-green colour, and an odour which is not very fragrant.

Composition of Bergamot Oil.—The principal constituents of bergamot oil are terpenes (among which have been identified limonene and bergaptene) and linalyl acetate. The specific gravity of the pure oil varies from 0·882 to 0·886 at 15° C. according to Schimmel & Co. (this Journal 1896, 925), but according to Campolo (*Staz. Sper. Agrar. Ital.* 1895, **28**, 433), it should be 0·887. The rotatory power in a 100-mm. tube at 15 to 20° C. varies from + 8 to 20°. When distilled by Soldaini and Bertè's method (this Journal 1899, 943, 1160) it boils at 74° to 120° C. under a pressure of 20 to 30 mm., and the rotatory power of the successive fractions diminishes from right to left. The residue, about 7 per cent., is a semi-solid mass.

The amount of linalyl acetate is variable. Schimmel & Co. give 34 to 43 per cent. with a mean of 38 per cent.; Helbing and Passmore (this Journal, 1895, 993), 42·4 per cent.; and Campolo (*loc. cit.*) 37·57 to 39·87. It is usually accepted that a good oil should contain about 39 per cent. (*cf.* Bornträger, this Journal 1896, 223). The amount of esters varies with the kind of season, locality, and ripeness of the fruit. Thus, the oil from green bergamots was found to contain 31 per cent., that from half-ripe fruit 33·2 per cent., and that from over-ripe fruit 37·7 per cent. (Schimmel & Co.'s Report, April 1896) (*cf.* Charabot, this Journal, 1900, 69). Nero of bergamot and distilled oil are much poorer in esters than good expressed oil, the first containing only 23 to 25 per cent., and the second 12 per cent. at the maximum.

Seven specimens of good oil examined by the author gave the following results:—Specific gravity at 15° C., 0·8860—0·8870; rotation at 20° C., + 11° 35′ to + 15°; linalyl acetate, per cent., 34·10 to 41·00; residue on evaporation, 4·0 to 5·55 per cent., containing 1·05 to 2·05 per cent. of linalyl acetate. All were soluble in 90 per cent. alcohol. A sample of distilled oil gave:—Specific gravity at 15° C., 0·8700; rotation at 20° C., 30° 15′; linalyl acetate, 10·15 per cent.; residue on evaporation, 1·45 per cent.; linalyl acetate in residue, 0·50 per cent. And a sample of Nero of bergamot:—Specific gravity at 15° C., 0·8885; rotation at 20° C., + 9° 30′; linalyl acetate, 25·50 per cent.; residue on evaporation, 2·70 per cent.; and linalyl acetate in residue, 1·75 per cent.

Detection of Adulteration of Bergamot Oil.—The substances added to bergamot oil are very numerous, and include fatty oils, resins, Canada and Gurjun balsams, turpentine, oils of lemon, orange, and cedar wood, and the distillation products of bergamot oil itself.

Fatty Oils, Resins, and Balsams increase the specific gravity and residue on evaporation. Resins, especially colophony, increase the proportion of esters and the acidity of the oil, normal bergamot oil being only very slightly acid. The residue of a pure oil on evaporation should not exceed 6 per cent. Fixed oils and resins will be shown by the saponification value of the residue, and the former, with the exception of castor oil, by the solubility-in-alcohol test.

Turpentine Oil.—The author shows by the figures obtained with an experimental mixture, that 15 per cent. of turpentine can be added to bergamot oil without causing the constants to deviate to any extent from their normal limits. Soldaini and Bertè's method of fractional distillation affords a valuable criterion, but even with it a notable quantity of dextro-rotatory turpentine may escape detection.

Oil of Lemon and Oil of Orange increase the rotatory power and diminish the specific gravity, quantity of esters, and residue left on evaporation. Indications of such an addition will be afforded by Soldaini and Bertè's method of fractional distillation. Pure bergamot oil, unlike orange and lemon oil, gives no coloration with Schiff's reagent (absence of aldehydes). Moreover, on testing 2 to 3 c.c. of pure oil of bergamot in 10 to 15 c.c. of absolute alcohol with a small quantity of metaphenylenediamine hydrochloride, the liquid does not change colour, or only becomes slightly yellow; if, however, oil of lemon be present, a deep yellow or brown colour is produced. A comparative test should be made with bergamot oil of known purity.

Distillation Products of Bergamot Oil.—These lower the specific gravity, the percentage of esters, and the residue on evaporation. In the author's opinion, however, they can be added in considerable quantity without materially changing the characteristic properties of a pure oil.—C. A. M.

Oil of Cade, Investigation of ——. Cathelineau and Hausser. Bull. Soc. Chim. 1900, **23—24**, [12], 557—559.

The authors have separated from oil of cade (this Journal 1898, 868 and 1899, 604) a series of products which have been divided into substances soluble and insoluble in soda. Further, the portion soluble in soda has been separated into six parts, the fourth of which, a resinous substance, is here described. When freshly prepared it is a dark brown slightly malleable mass, but after several months' exposure to the air it becomes brittle and can be readily pulverised. By dissolving in soda, adding ether and gradually neutralising with hydrochloric acid, and repeating the process with the flocculent precipitate thus obtained, it is separated into two parts, the one a semi-liquid which has an agreeable odour, and is soluble in ether, and the other a well defined crystalline substance insoluble in ether. This latter is a weak acid of the composition $C_{12}H_{11}O_3$, and combines with bases to form salts, from which it is re-precipitated by acetic acid in the form of very light, small, brown flocks which appear absolutely amorphous under the microscope, and are readily soluble in sodium carbonate solution. In the flocculent form, the acid is very soluble in chloroform, less so in alcohol, and insoluble in ether; it is soluble in concentrated acetic acid, from which it is re-precipitated by the addition of water. It is quite insoluble in cold water, but on prolonged boiling it dissolves to a slight extent; the solution thus obtained is coagulated by hydrochloric acid either in the cold or more quickly on heating, and also by many salt solutions. On shaking the flocculent acid with ether, a certain quantity of the latter is absorbed and energetically retained, but on heating the product under water, gradual liberation of the ether takes place, accompanied by a series of crackling sounds resembling detonations

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of nitrogen iodide; after the whole of the ether has been removed the acid remains in the form of small crystals.
—T. H. P.

Scammony; White Resin of ——, *Solubility in Ether.* P. Guigues. Jour. Pharm. Chim., 6th series, **11**, 529—535.

HAVING obtained conflicting results with the ether solubility test on the same sample of white scammony root-resin, the author has found the cause to be mainly due to the varying quality of the ether employed. The solubility of scammony resin (convolvulin) in ether is apparently much influenced by the presence of alcohol, or of water, in the ether employed, as is shown in the following tabulated statement of the results obtained.

Ether employed.				Percentage of Insoluble Resin.
Mark.	Sp. Gr.	Percentage of Alcohol, 98 per Cent.	Percentage of Water.	
A	0·7700	33·0	0·0	Not exceeding 0·2
B 1	0·7440	16·0	1·6	
B 2	0·7360	16·0	0·0	
C 1	0·7355	15·5	0·0	
C 2	0.7355	15·5	0·0	
D 1	0·7288	4·0	1·0	0·6
D 2	0·7240	4·0	0·0	0·4
E 1	0·7232	0·0	0·6	14·1
E 2	0·7200	0·0	0·0	4·0
F 1	0·7230	0·0	0·6	23·8
F 2	0·7200	0·0	0·0	2·6
G	0·7210	1·0	0·0	0·1
H	0·7190	0·0	0·0	4·4

In the absence of alcohol, as in the samples of ether marked E 1 and F 1, the presence of a trace of water lessens the solvent action of the ether in a very marked degree. The resin employed throughout the experiments contained 5·34 per cent. of moisture. When perfectly dry resin is employed, the solubility is considerably increased in all cases, and the amount of resin insoluble in various ethers lies between 8·8 and 12·4 per cent. Not only does the quality of the ether affect the results, but the quantity of the solvent employed also has an influence on the solubility. Thus with an ether which completely dissolves the resin when added to it in limited quantity, a precipitate of insoluble resin is obtained on further adding excess of the solvent.—J. O. B.

Vegeto-alkaloids; Estimation of —— *; by Determination of the Quantity of Acid required to form Normal Salts.* C. Kippenberger. Zeits. anal. Chem. 1900, **39**, [4], 201.

See under XXIII., *page* 781.

Antipyrin and Tolypyrin; Distinguishing Amido-antipyrin and Pyramidon from ——. P. Hoffmann. Zeits. f. Untersuch. Nahr.- u. Genussm. 1900, **6**, 419.

See under XXIII., *page* 778.

Iron; Determination of ——, *in Liq. ferri Albuminati.* O. Linde. Apoth. Zeit. 1900, **15**, 423.

See under XXIII., *page* 780.

Alcohols; Electrolytic Oxidation of Fatty ——. K. Elbs and O. Brunner. Zeits. f. Elektrochem. 1900, **6**, [51], 604.

See under XXIV., *page* 786.

Urëids and Purine Derivatives; Quantitative Reaction of ——. A. Jolles. Ber. 1900, **33**, [13], 2119.

See under XXIII., *page* 781.

Oil of Lemon; Composition and Analysis of ——. G. Fabris. Ann. del Lab. Chim. Centr. delle Gabelle, 1900, **4**, 53.

See under XXIII., *page* 784.

Morphine in Opium; New Method for Estimating —— H. M. Gordin and A. B. Prescott. Arch. der Pharm. **237**, 380.

See under XXIII., *page* 784.

PATENTS.

Permanent Emulsions soluble in Water of Aromatic Hydrocarbons and Ethereal and Pharmaceutical Products; Process for the Preparation of ——. F. Boleg, Esslingen a/N., Germany. Eng. Pat. 12,348, June 13, 1899.

"PROCESS for preparing permanent emulsions soluble in water of aromatic hydrocarbons and ethereal oils . . . . by means of a preliminary treatment thereof with caustic soda lye and compressed air . . . . by the addition of a soluble mixture of mineral and resin oil, together with the further application of compressed air at varying temperatures, and subsequent treatment of the compounds in a distilling apparatus under slight pressure . . . ." In a modification of this process drugs are intimately mixed with "mineral and resin oil soluble in water," by means of compressed air at determined temperatures.—A. C. W.

Lactic Acid, Manufacture of ——. La Société Anonyme des Manufactures de Produits Chimiques du Nord and E. Boullanger, Lille, France. Eng. Pat. 13,439, June 28, 1899. Date claimed under International Convention, Jan. 28, 1899.

LACTIC acid is at present made by fermenting whey with old cheese, or a saccharine wort prepared with commercial glucose or with grain saccharified by malt diastase, or a mixture of the two, is sown with a pure lactic ferment.

The patentees have found on certain plants lactic and saccharifying mucedines, which can energetically convert starch into sugar, and also sugar into lactic acid. The name lactomyces has been given to the mucedine especially studied, it belongs to the mucors. The lactomyces of *Rumex acetosella* is obtained by placing fragments of the leaves in the following medium:—yeast water obtained by boiling beer yeast with water 100 grms, glucose 10 grms. After development at 28° C., the mucedines are separated by ordinary methods. In order to obtain the culture required for sowing a vat, 20 grms. of rice are allowed to swell with 5 c.c. of water in a 500 c.c. flask for 4—5 hours, the rice is then shaken to cover the inside of the flask. The flask is sterilised at 120° C., 5 c.c. of sterilised beer wort are sown with a fragment of a previous culture, this culture is then introduced into the flask, which is subsequently kept at 28° C. for 3—4 days.

The wort is prepared by heating grain, potatoes, starch, &c., the thickening of the starch on cooling is prevented by the addition of a small quantity of malt or acid. The wort contains on the average 15 kilos. of maize per hectolitre of water. Chalk is added in the proportion of 100 kilos. to 180 kilos. of total glucose. The wort, after sterilisation, is distributed aseptically into closed sterilised vats provided with agitators, and with means for sowing with the lactomyces culture and for maintaining the temperature at 35° C. A vat containing 200—500 hectolitres is sown with a 500 c.c. flask of wort containing a pure culture. When the lactomyces is sufficiently propagated and the formation of sugar is in process, the conversion into lactic acid may be facilitated by adding a very small quantity of pure lactic ferment. When the operation is ended, the heated wort is run off into vats in which the calcium lactate crystallises, it is then decomposed by sulphuric acid.—A. C. W.

Iodol [Tetra-iodopyrrol] and Albumin, Manufacture and Production of a New Compound of ——. G. W. Johnson, London. From Kalle & Co., Biebrich-on-Rhine, Germany. Eng. Pat. 16,353, Aug. 11, 1899.

THE manufacture of a compound of tetra-iodopyrrol (iodol) and albumin, by mixing solutions of albuminous bodies with

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alkaline solutions of iodol and neutralising by hydrochloric acid, is claimed, as also the products of the operation as new articles of manufacture.—A. C. W.

Perfumery; Impts. in [addition of Formaldehyde]. A. Zimmermann, London. Eng. Pat. 17,840. Sept. 4, 1899.

The claim is for the addition of formaldehyde, either in dissolved or gaseous form, to combinations of aromatic products with alcoholic liquids.—A. C. W.

Anthranilic Acid; Manufacture of ——. B. Willcox. London. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Eng. Pat. 18,319. September 11, 1899.

The patentee claims the processes for the manufacture of anthranilic acid which consist in heating *o*-nitrotoluene with alkalis or alkaline earths (in aqueous solution under pressure or in alcoholic solution), or in treating with alkali and reducing the intermediate product (azoxybenzoic acid) by suitable reducing agents.—A. C. W.

Orthotoluenesulphonic Chloride and Saccharin therefrom; Manufacture of ——. O. Imray, London. From the Basle Chemical Works, Basle, Switzerland. Eng. Pat. 4,525. March 9, 1900.

The patentee claims the improvement in the manufacture of *o*-toluenesulphonic chloride which consists in treating the sulphinic acid or one of its salts with chlorine, also the improvement in the oxidation of *o*-toluenesulphamide into saccharin which consists in partly neutralising with a mineral acid the alkali liberated from the permanganate.—A. C. W.

Oxyphenyltartronic Acids; Manufacture and Production of ——. G. W. Johnson, London. From C. F. Boehringer and Soehne, Waldhof, Mannheim, Germany. Eng. Pat. 8825, May 12, 1900.

The process for the manufacture of oxyphenyltartronic acids, which consists in treating the condensation products of phenols with alloxan by alkalis, is claimed (see this Journal 1900, 373, 557). The oxyphenyltartronic acids of the general formula $R.C(OH).(CO_2H)_2$, where R denotes a phenol radical, are claimed as new articles of manufacture. —A. C. W.

XXI.—PHOTOGRAPHY.

Ferric Chloride; New Use for ——, *in Photography*. H. Spörl. Allgem. Phot. Zeit. 1900, **7**, 123.

It is well known that the photographic silver image is bleached by ferric chloride, and that it can be readily and completely re-developed without much previous washing. It is now proposed to use it for bleaching over-exposed prints and over-developed negatives before fixing, the bleached portions being then restored with a diluted developer. The chloride is used in the form of liquor ferri oxychlorati (German Pharmacopœia), diluted with ten times its bulk of water. Should a more rapid action be required, a little hydrochloric acid can be added.—E. H. T.

Toning Bath; A Sulphocyanide ——. Brit. J. Phot. 1900, **47**, [2094], 392.

Lainer points out in Phot. Corr. that most toning baths contain too much sulphocyanide; instead of 24 parts of the salt to 1,000, he uses only 2·5; this bath generally gives brown tones, but the purple tones usually desired may be obtained by adding lead nitrate. The following solutions are prepared :—

——	—	Water.
	Grms.	C.c.
A. Ammonium sulphocyanide.....	100	1,000
B. Potassio-chloride of gold.....	1	100
C. Lead nitrate.....	200	1,000

For use take :—Water, 1,000 c.c.; solution A, 25 c.c.; solution B, 50 c.c.; and solution C, 30—50 c.c.—J. W. H.

Gelatin Negatives; Fading of ——. P. C. Duchochois. Brit. J. Phot. 1900, **47**, [2094], 391.

Fading is usually caused by the manner of fixation and subsequent washing; the danger of it is always present when sodium thiosulphate is the fixing agent, and the author considers that for certain purposes, such as astronomical photography, that salt should be discarded for some other fixing agent. Potassium cyanide would serve were the film hardened in an alum bath before fixation, and the solution made up with the addition of alcohol to prevent the swelling action on the film of the potassium carbonate, usually present in the commercial salt; the solvent action of potassium cyanide on the silver deposit is, according to the author, slight and unimportant. Ammonium thiocyanate, also, as suggested by Meynier in 1863, may be used, treating the negative with a 5 per cent. alum bath both before and after fixation. A convenient bath is the following:—Ammonium thiocyanate, 10 parts; alum, 5 parts; and water, 100 parts.—J. W. H.

Intensifier; A New ——. Brit. J. Phot. 1900, **47**, [2094], 392.

Mangin suggests in Phot. Chron. the following intensifier :—

A.	Old hydroquinone developer	50 parts.
	Ten per cent. solution of citric acid..	10 parts.
B.	Potassium ferricyanide.....	1 part.
	Water	50 parts.

Add B to A and use, after filtration.—J. W. H.

Platinum Paper; Preparation of ——. W. S. Davenport. Brit. J. Phot. **47**, [2093], 376.

Ferric salts of organic acids are reduced by the action of light, and the ferrous salts produced may be made to react with other substances to form insoluble coloured products; this is the basis of several photographic processes. In the platinum process, ferric oxalate is the salt used, an alkaline oxalate being also necessary to dissolve the ferrous salt formed, so that the reaction with the platinum salt may occur. The paper may be either coated with the iron solution and printed and developed with a mixture of the platinum salt and potassium oxalate, or, coated with a mixture of iron and platinum salts and developed with potassium oxalate, or coated with all three salts and used as a printing out paper. The method usually adopted is the second of the above. Ordinary Rives smooth 19 kilo. normal platinum paper or the fine grain pyramidinkorn paper made by Schaeffelen, Heilbrunn, give excellent results; the paper chosen is first coated evenly with a solution of 2 grms. of gelatin in 250 c.c. of water, adding $\frac{1}{2}$ to 1 grm. of alum; with very porous paper this operation should be repeated. The sensitising solution consists of a mixture of 10 parts of an "iron" solution to 1 part of a "platinum" solution. The "iron" solution consists of ferric oxalate 25 grms., oxalic acid 2 grms., lead oxalate 1 grm., mixed and filtered in artificial light; the oxalic acid prevents rusty brown tones, and according to von Hübl, lead oxalate facilitates the reduction of the platinum. For the platinum solution 1 grm. each of chloroplatinite of potassium and chloroplatinite of sodium are dissolved separately in 6 c.c. of water; for soft prints the "platinum" solution may consist entirely of the potassium chloroplatinite mixture and for brilliant effects the sodium salt may replace it. A mixture of the two gives the best results, taking care to add the salts separately to the iron solution. The paper is coated with a brush and allowed to dry spontaneously for half an hour and then completely dried by artificial heat; if the paper dry too slowly, the tone of the prints suffer, while too rapid drying will cause the picture to leave the paper on development; an effect which may be also possibly caused by a too heavy sizing. A more dilute sensitising solution should be used with rough papers, adding from 3 to 6 c.c. of water to every 5 c.c. of sensitising solution. Excessive dilution gives a paper which easily solarises and gives heavy shadows without detail.

The developer consists of 1 part of potassium chloroplatinite solution and 10 parts of a solution consisting of—

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potassium oxalate 100 grms., potassium phosphate 50 grms., water 1,000 c.c., or of—potassium oxalate 160 grms., potassium phosphate 8 grms., potassium sulphate 1 grm., water 480 c.c.

A soft camel-hair brush should be used to apply the developer, and the prints washed in several changes of a 2 per cent. solution of hydrochloric acid and finally in running water.—J. W. H.

XXII.—EXPLOSIVES, MATCHES, Etc.

PATENT.

Guncotton, Manufacture of ——, and Apparatus therefor. A. Hollings, Lancaster. Eng. Pat. 13,278, June 27, 1899.

THE cotton fibre is formed into a band and passed by means of hollow glass rollers in a zig-zag fashion through the nitrating acids contained in a covered tank; on leaving the tank other rollers squeeze out the excess of acids, and finally, toothed rollers, one of which at least has a longitudinal motion, separate the fibres ready for washing. A diaphragm is provided at the entrance of the band of cotton, so that the disengaged air cannot mix with the rest of the acids and cause fumes. The pressing rollers are made of discs of glass held together on a common spindle by means of nuts.

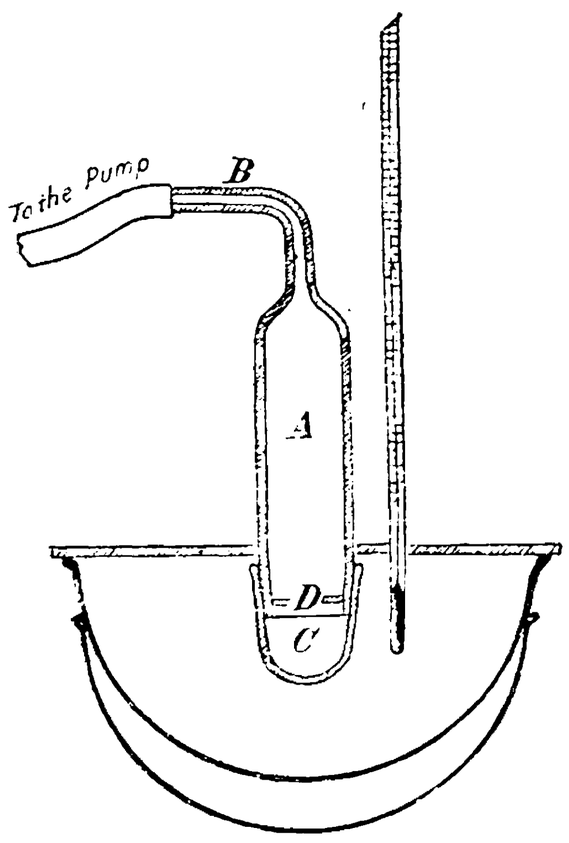
The tank is quite full, the underside of the cover being in contact with the nitrating acids.—J. W. H.

XXIII.—ANALYTICAL CHEMISTRY.

APPARATUS, ETC.

Sublimation Apparatus, A New ——. C. N. Riiber. Ber. 1900, **33**, [10], 1655—1657.

A SIMPLE and inexpensive apparatus for laboratory sublimations is described. The apparatus is heated in a Lothar Meyer's air-bath, or with equal success in an iron dish covered by asbestos board, and supported in a second iron dish so that there is an intermediate air space (see figure). The apparatus consists of a vertical glass cylinder A, connected by B with a filter pump, and closed below by a glass cup, C, which is ground on. The joint should not be quite tight, the entrance of a little hot air facilitating the sublimation. The material is placed in C, and a piece of asbestos board is fitted loosely in the lower part of the cylinder, the pump is put in operation and the temperature of the bath gradually raised until crystals are deposited on the cold part of the cylinder.



The apparatus may be used to sublime indigo, mono- and dibromoquinizarin, &c., to separate substances of different volatility and for estimations of water, alcohol, benzene, &c. of crystallisation.—A. C. W.

Calorimetric Bomb, Rapidity of Combustion in the ——. H. Thiele. Zeits. f. angew. Chem. 1900, [25], 607.

THE author has made some experiments by placing a resistance pyrometer in the calorimetric bomb during the combustion of several kinds of fuel in excess of oxygen, and has traced the rise and fall of the temperature by this means. He concludes that the combustion cannot be described as "explosive" or "instantaneous," but under normal conditions it is so quick that the results are not influenced by the time taken for combustion.—W. M.

PATENTS.

Fat-testing Instruments for Milk and Milk Products. W. T. Webster, London, and The Dairy Outfit Company, Ltd., London. Eng. Pat. 17,150, Aug. 24, 1899.

THE instrument claimed is a glass tube closed at one end and having marks to indicate the quantities of chemicals and milk to be placed therein. After these have been placed in the tube, the open end of the same is closed with an india-rubber stopper, and the tube and its contents whirled in the usual way. Should the column of separated fat extend beyond a measured and marked distance on the tube, the milk contains more than a previously-determined standard quantity of fat.—W. P. S.

Centrifugal Apparatus for Butyrometers, and other Fat-testing Instruments. W. T. Webster, London, and The Dairy Outfit Company, Ltd., London. Eng. Pat. 17,625, Aug. 31, 1899.

THIS is a "hand" centrifugal machine, worked in the same manner as an American drill. The revolving sleeves are attached to the lower part of the spindle.—W. P. S.

INORGANIC CHEMISTRY.—QUALITATIVE.

Barium, Strontium, and Calcium; Detection of ——; and the Action of Ammonium Chloride on Strontium Chromate. E. Dumesnil. Ann. Chim. Phys. 1900, **20**, 125; Zeits. Ver. Deut. Zuckerind. 1900, 531—537.

THE author proposes the following scheme for the qualitative separation of barium, strontium, and calcium from mixtures:—

The mixed carbonates are precipitated in the ordinary manner by means of ammonia and ammonium carbonate; the precipitate is dissolved in a minimum quantity of 10 per cent. hydrochloric acid, and the solution is evaporated to dryness to expel the acid, the residue being then dissolved in water. A small portion of the solution is tested with a saturated solution of strontium chromate; if a precipitate is formed, the presence of barium is indicated. If no precipitate occur, a saturated solution of calcium chromate is added to another small portion and the mixture is warmed; the formation of a precipitate indicates strontium. If barium be found, the remainder of the neutral solution is precipitated with potassium chromate, boiled and filtered. The precipitate is treated with boiling ammonium chloride solution, with which the vessel, in which the precipitation was made, has also been previously extracted, and boiled for a few moments. After filtration from the undissolved barium chromate, sodium carbonate is added to the clear solution; it is then filtered and the precipitate is washed with water and then treated on the filter with 10 per cent. acetic acid. Part of this solution is neutralised with ammonia, a solution of calcium chromate is added, and if a precipitate is formed, after heating if necessary, the presence of strontium is proved. Another portion of the acetic acid solution is heated with strontium oxalate in acetic acid solution, and the calcium, if present, is thus precipitated as oxalate. The author has investigated the solvent action of ammonium chloride solution on strontium chromate, which he believes to be due to the formation of a double salt. He has obtained crystals corresponding to the composition $4CrO_3.4NH_3.NH_3HCl$ from the liquors.—J. F. B.

Sodium in presence of Potassium; Detection of ——. N. Schoorl. Nederl. Tijdschr. Pharm. **12**, 116. Chem. Centr. 1900, **1**, [22], 1140.

THE micro-chemical detection of sodium by means of uranyl acetate fails in presence of a considerable amount of potassium salts. This difficulty, however, can be overcome by evaporating several times with perchloric acid, and then extracting the residue with alcohol. Potassium perchlorate remains undissolved, and sodium can now be satisfactorily detected in the filtrate by means of uranyl acetate.—A. S.

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INORGANIC CHEMISTRY.—QUANTITATIVE.

Acidimetric Determinations; Necessary Precautions in certain ——. L. Magnier de la Source. Ann. Chim. anal. appl. **5**, 121—125. Chem Centr. 1900, **1**, [21], 1103.

With phenolphthalein as indicator, it is not a matter of indifference whether the solution be titrated hot or cold. Freshly boiled distilled water, in presence of phenolphthalein, acquires a rose colour on the addition of a drop of $\frac{1}{49}$ normal baryta water; on heating nearly to boiling the colour disappears, but reappears on cooling; this change may be repeated at will. With sulphuric acid the same result is obtained whether a stronger solution be titrated or an aliquot part of the solution after considerable dilution be taken; with potassium bitartrate, however, different results are obtained. Using 2—3 grms. of bitartrate, the author found 0·33 per cent. too little; with 0·2—0·3 grm., 1 per cent., and with 0·02—0·03 grm., 2·8 per cent. too little. The author explains this by the assumption that sulphuric acid in any dilution becomes uniformly saturated, whilst with the bitartrate, the last portions are still not saturated when the coloration appears.—A. S.

Phosphoric Acid; Estimation of ——, by Titration with Ammonium Phospho-molybdate. P. Nyssens. Bull. Assoc. Belge des Chim. **14**, [3, 4], 132—139.

The method proposed by Warsage (Bull. Assoc. Belge des Chim. **13**, 343), furnishes a precipitate difficult to wash either with water or a saturated solution of phospho-molybdate; but this can be remedied by somewhat retarding precipitation by using 2 c.c. of Petermann's citrate reagent and 50 c.c. (instead of 100 c.c.) of Sonnenschein's reagent, the agitation being continued for 30 minutes. The resulting stellar crystals may be washed with water.

Examination of the precipitate shows that the strength of caustic potash prescribed by Pemberton is too high by about 0·008, and should be replaced by one prepared by diluting 323·95 c.c. of normal caustic potash to 1 litre (eliminating all traces of CO_2), the sulphuric acid solution being prepared by diluting 323·95 c.c. of the normal acid to 1 litre.

The presence of a large quantity of citric acid entails an addition of potassium permanganate to eliminate nearly the whole of the acid, after which the conversion of metal into ortho-phosphate is effected by heating for 10 minutes, and the operations are completed in the ordinary manner.

—C. S.

Ozone; Quantitative Estimation of ——. O. Brunck. Ber. 1900, **33**, [11], 1832—1842.

The most practicable method of estimating ozone consists in titrating by means of thiosulphate the iodine liberated by it from a solution of potassiumiodide; the absorbing solution of potassium iodide is sometimes used neutral and sometimes acid. But in spite of the apparent simplicity of the process, many investigators have failed to obtain good results. In testing this method of estimation, the author obtained practically constant quantities of ozone by ozonising a certain volume of oxygen under exactly identical conditions, and compared one set of experiments with another in terms of "active oxygen." He found that when a neutral solution of potassium iodide was used as an absorbent, the results were only 50 to 60 per cent. of the numbers obtained when an acid solution was employed. The action of ozone on neutral potassium iodide is somewhat complicated. In the first place, free iodine and caustic potash are produced, which partly re-combine forming iodide and iodate, and partly undergo further oxidation by the ozone, giving rise to iodic anhydride on the one hand, and potassium peroxide on the other. The hydrogen peroxide liberated on acidification reacts according to the equation—

$$H_2O_2 + 2HI = 2H_2O + I_2.$$

This reaction, which is only completed after several hours in dilute solutions, brings about a continual restoration of the blue colour, after the titration is apparently finished. But the main cause of the low results, obtained when a neutral solution of potassium iodide is employed, is the direct reaction of the potassium peroxide with the iodine, according to the equation—

$$I_2 + K_2O_2 = 2KI + O_2.$$

The potassium peroxide is partially hydrolysed in solution and the hydrogen peroxide may then combine with the ozone according to the equation—

$$O_3 + H_2O_2 = H_2O + 2O_2,$$

also lowering the results; at the dilutions used, however, this latter reaction is not very energetic.

The author concludes that the absorption of the ozone in acid solutions of potassium iodide gives correct results, the only error being due to decomposition of the iodide solution by the oxygen and light, which may readily be controlled by a blank. Sulphuric or acetic acid may be used, but it is always advisable only to employ the calculated quantity of acid.

In testing the output of large ozonisers, it is best to pass the whole current of gas through the absorbent for a certain time, or, if this be too much, a side current may be withdrawn continuously from the main current. The concentration of the absorbing solution should be one-fifth normal, containing 33·1 grms. of KI per litre; an aliquot part should be withdrawn after the reaction, and the iodine titrated with centi-normal thiosulphate. Nitrous oxides may be washed out by sulphuric acid.—J. F. B.

Copper in Chilled Slags; Rapid Determination of Small Amounts of. C. F. Shelby. Eng. and Mining J. 1900, **69**, [24], 708.

Five grms. of the powdered slag are moistened in a No. 3 casserole with 2 or 3 c.c. of water, and 10 c.c. of strong hydrochloric acid and 1 c.c. of nitric acid added, with agitation. The casserole is heated till the gelatinised silica is completely dehydrated, then allowed to cool sufficiently, and 10—15 c.c. of strong hydrochloric acid added. The liquid is boiled, then diluted, and the residue washed several times by decantation and finally on the filter with hot water. The filtrate is treated with a sufficient quantity of a saturated solution of sodium thiosulphate to reduce the iron to the ferrous state, and then a strip of sheet zinc (about 1 by 2 in. and rolled up to prevent its subsequent rising to the surface) placed in the solution. The nascent hydrogen and sulphur combine to form hydrogen suphide, and the copper is completely precipitated as sulphide in about 30 seconds. When the whole of the zinc has dissolved, the copper sulphide is filtered off, washed, the paper and precipitate heated with 25 c.c. of dilute nitric acid (containing 5 c.c. of strong acid) until all the copper has dissolved, and then the solution prepared for the determination of the copper either by the cyanide method or the potassium iodide and thiosulphate method. The chief advantages of the method are rapidity, ease of manipulation, and the complete separation of the copper from the preponderating amounts of silica and iron present. It is essential that the silica be completely dehydrated, and that only enough thiosulphate be added to render the solution colourless.—A. S.

Zinc; Notes on the Ferrocyanide Titration of ——. E. H. Miller and E. J. Hall. School of Mines Quarterly, Univers. Columbia, 1900, **21**, [3], 267—272.

The influence of various substances likely to be present when zinc is estimated by titration with potassium ferrocyanide and uranium acetate used as indicator, was investigated by addition of such substances in successively increased quantity to constant known amounts of zinc solution and titrating with ferrocyanide of a definite strength, uniform conditions of temperature and total volume being carefully maintained.

The following conclusions were drawn from the observed results:—

1. Salts, such as calcium chloride and sodium citrate, and acids, notably hydrochloric, disturb the end reaction by their solvent effect on uranium ferrocyanide.

2. Zinc ferrocyanide diminishes this effect in the case of hydrochloric acid; the correction established from blank tests is therefore slightly too great.

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3. Ammonium chloride, not exceeding 17 parts, does not affect the accuracy of the method, but has some unknown action on zinc ferrocyanide.

4. Aluminium sulphate, in considerable quantity, renders the results unreliable.

5. Twelve parts of concentrated hydrochloric acid, sp. gr. 1·2, suffice to prevent interference by lead.

6. Antimony gives high results, whilst small quantities of bismuth have no influence.—R. L. J.

Vanadium; Colorimetric Estimation of ——. L. Maillard. Bull. Soc. Chim. 1900, **23—24**, [12], 559—563.

THIS process, which is especially useful in determining the small quantities of vanadium employed in physiological or toxicological researches, is based on the oxidation of vanadic acid by an ethereal solution of hydrogen peroxide, the pervanadic acid formed producing a magnificent red colour. A solution of vanadic acid containing 1 or 0·1 gr. per 100 c.c. is used as a standard, and the ethereal solution of hydrogen peroxide is prepared by mixing equal volumes of ether and of commercial 10-volume hydrogen peroxide solution. Into a very tall and very narrow graduated cylinder of 25 c.c. capacity, are poured 10 c.c. of the neutral vanadate solution to be estimated, and then from 1 to 5 c.c. of pure hydrochloric acid and 3 to 10 c.c. of the ethereal hydrogen peroxide. The cylinder is then closed and well shaken, when the aqueous liquid becomes more or less intensely reddened while the supernatant ether remains colourless; water is then added so as to bring the volume of the aqueous part of the liquid up to 15 c.c. A similar operation having been carried out with the standard vanadate solution, the two coloured liquids are placed in the two tubes of a colorimeter, and the depths arranged until the tints are of the same intensity; when this is the case, the proportions of vanadium in the two solutions are in the inverse ratio of the heights of the liquid columns. The author finds that excess of hydrogen peroxide or of hydrochloric acid does not affect the determination, but care must be taken that sufficient is added to complete the reaction; for 10 c.c. of a 0·1 per cent. solution of sodium metavanadate, 2 c.c. of ethereal hydrogen peroxide and 0·5 c.c. of acid are enough, whilst for 10 c.c. of a 1 per cent. solution of the metavanadate, 10 c.c. of the peroxide and 4 c.c. of acid are required. The red liquid can be diluted to any extent without altering the total quantity of the colouring matter, so that the accuracy of the estimation is only limited by the sensibility of the eye to red rays. Further, the coloration persists for hours and even for days if sufficient ether be present, and is besides uninfluenced by the presence of potassium chloride, ammonium chloride, potassium sulphate, potassium nitrate, disodium phosphate, or calcium chloride to the extent of 50 times the sodium metavanadate. By the use of a red glass of suitable depth and carefully standardised, the use of the standard solution is obviated and the process hastened. The most suitable depth of colour is that given by a depth of about 15 m.m. of a 0·1 per cent. sodium metavanadate solution.—T. H. P.

ORGANIC CHEMISTRY.—QUALITATIVE.

Caro's Reagent [*Compound of Sulphuric Acid and Hydrogen peroxide*]. E. Bamberger. Ber. **33**, [12], 1959—1961.

THE author observed that neutral Caro's solution, when treated with silver nitrate, froths up on gentle warming, giving off gas containing ozone. The same phenomenon is observed at the ordinary temperature with various catalytic agents such as manganese dioxide, silver oxide, lead peroxide, or platinum black. Hence Caro's solution gives off ozone under conditions in which hydrogen peroxide evolves hydrogen. When Caro's solution is treated with a copper salt and then with soda lye, a heavy deep brownish-black precipitate separates out, presumably a copper superoxide. The reagent would thus appear to be suitable for the production of the higher metallic oxides.

The author has also investigated the action of potassium percarbonate on concentrated sulphuric acid in the cold. After adding ice and neutralising with potassium carbonate, a solution is obtained which readily oxidises aniline to nitrosobenzene. Since potassium percarbonate is decomposed by dilute sulphuric acid, forming hydrogen peroxide, and this latter, according to Baeyer and Villiger (Ber. **33**, 124; this Journal, 1900, 278), yields Caro's reagent with concentrated sulphuric acid, it is probable that the solutions obtained by means of percarbonate or persulphate are identical. The solution obtained from percarbonate oxidises benzaldehyde and acetaldehyde to the corresponding hydroxamic acids, and yields the above-mentioned copper peroxide. The solution only gave a very slight smell of ozone on treatment with catalytic agents, and sometimes none at all, possibly due to the fact that the solution from 5 grms. of 70 per cent. potassium percarbonate and 30 grms. of sulphuric acid only contained 0·19 grm. of active oxygen.—T. A. L.

Glue, in Presence of Dextrin and Gum Arabic; Simple Method of Detecting. H. Bornträger. Oesterr. Chem. Zeit., **3**, 188. Chem. Centr. 1900, **1**, [21], 1109.

THE material is warmed with 50 per cent. hydrofluoric acid. With animal glue an intense odour of butyric acid is immediately produced, whilst, on evaporation of the solution on the water bath, a white mass, soluble in water, is obtained, which gives the known alkaloidal reactions with phosphotungstic acid, Nessler's reagent, &c.—A. S.

Wines; Detection of "Vinoline" and Bordeaux Red in ——. A. Casali. Staz. Speriment. Agrar. Ital. 1900, **33**, [2], 183—189.

AT the present time the artificial coloration of Italian wines is, it is stated, a very general practice, those from the central provinces being chiefly coloured with "Vinoline" and those from the south with Bordeaux Red.

Detection of "Vinoline" Salts.—The name "Vinoline" is not applied to a single colouring matter, but usually denotes a mixture of different coal-tar reds. In Italian wines the author has found it to consist, to a large extent, of salts of Rosaniline, such as the hydrochloride, acetate, nitrate, and (more rarely) the sulphate. To detect it 100 c.c. of the wine are rendered strongly alkaline with ammonium hydroxide, and after the addition of a few drops of a solution of sodium hydroxide, shaken for some time with 30 c.c. of chloroform. In the presence of "Vinoline" the solution of the colouring matter in chloroform becomes red on acidification, and on spontaneous evaporation leaves a scarlet residue.

Detection of free "Vinoline."—Vinoline not in the form of salts, which does not behave like the dyes mentioned above, can be extracted from the wine by means of hot amyl alcohol. Wool dyed in the extract, dried and digested with dilute hydrochloric acid, gives a violet-red solution—a property which distinguishes it from wool dyed with Bordeaux red.

Detection of Bordeaux Red.—Wines coloured with Bordeaux Red (azo-naphthyl-naphthol sulphonic acid) differ from those coloured with "Vinoline" in becoming turbid on the addition of hydrochloric acid. In testing for it 50 to 100 c.c. of the suspected wine are treated with 10 to 20 c.c. of a 10 per cent. solution of barium chloride, and sufficient potassium bisulphate solution to precipitate the barium introduced. When the precipitate has subsided the supernatant liquid is decanted, and after the addition of 3 to 6 c.c. of hydrochloric acid, and sufficient water to restore it to its original volume, it is boiled for 5 to 10 minutes with a little fat-free wool. In the presence of Bordeaux red the wool is dyed a bright red colour, which does not change on adding ammonium hydroxide. In some wines the colour appears to be carried down by the precipitate, and the wool when boiled with the sediment and washed assumes on treatment with alkali a green tint, which changes to red on washing with water.—C. A. M.

Saccharin in Foods; Detection of ——. J. de Brévans. Ann. Chim. anal. appl. **5**, 131—133. Chem. Centr. 1900, **1**, [21], 1105.

WHEN using Truchon's method (this Journal, 1900, 380), certain substances give the salicylic acid reaction, even when saccharin is not present. With liquorice juice, such disturbing reactions are caused by certain "tannin substances" soluble in alcohol and petroleum spirit. Many

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wines and beers behave in a similar manner. In order to render the method applicable in these cases, the liquid to be examined is treated with an excess of a concentrated solution of ferric chloride (10—15 c.c. of a solution of 30° B.), and then is made neutral or slightly alkaline with calcium carbonate. The filtrate is generally colourless or faintly yellow, and is examined by the original method (*loc. cit.*). None of the saccharin is carried down by the iron precipitate.—A. S.

Salicylic Acid, Detection of ——, in presence of Citric Acid. A. Conrady. Apoth. Zeit. 1900, **15**, 412.

THE ferric chloride test for salicylic acid does not succeed in presence of citric or tartaric acids, probably owing to the formation of a double salt in which the iron is present in the ferrous state. If, however, a drop of nitric acid, or a little hydrogen peroxide, be added, the ferric salt is formed, and the colouration appears at once. Langkopf's suggestion of shaking out with petroleum spirit is, therefore, unnecessary.—E. H. T.

Antipyrin and Tolypyrin; Distinguishing Amido-antipyrin and Pyramidon from ——. P. Hoffmann. Arch. Internat. de Pharmakodyn. et Therap. 1899, 171, through Zeits. f. Untersuch. Nahr. u. Genussmittel, 1900, 6, 419—420.

ANTIPYRIN and its derivatives give similar reactions with the general alkaloid reagents, but may be distinguished from amido-antipyrin and pyramidon by certain other reactions.

Ferric chloride colours antipyrin and tolypyrin red-brown (1:2000), amido-antipyrin violet (1:20000), and pyramidon blue by reflected light and violet by transmitted light. Silver nitrate gives no reaction with antipyrin or tolypyrin, but amido-antipyrin becomes reddish, then red-violet; pyramidon is first coloured blue, then violet, and finally silver separates out. Antipyrin gives a bright green coloration with nitrous acid; warmed with nitric acid it becomes deep red. Tolypyrin with nitrous acid becomes green; with warm nitric acid cherry red. Amido-antipyrin and nitrous acid yield a fugitive red coloration, whilst pyramidon with this reagent turns blue, inclining to violet. Nitric acid gives no red colouration with pyramidon. Wagner's reagent, with both antipyrin and tolypyrin, gives a brown-red precipitate (1:2000), which disappears on heating; with amido-antipyrin a yellowish brown turbidity appears (1:2000), which dissolves on heating to a red-violet solution, and with pyramidon a violet coloration is obtained. If the solution of the latter is concentrated the colour is deep blue by reflected light and violet by transmitted light; excess of the reagent produces a turbidity or precipitate which dissolves on warming. Bromine water gives a white precipitate with solutions of antipyrin and tolypyrin; with amido-antipyrin a yellowish-white precipitate (1:2000). When the solution of amido-antipyrin is concentrated (1:100), the precipitate is brilliant violet red, giving a spectrum like reduced hæmoglobin; ammonia destroys the colour, which is restored by the addition of sulphuric acid. An excess of bromine also destroys the colour. Concentrated solutions of pyramidon with bromine water give a black or grey coloration. A 2 per cent. solution of blood mixed with four times its volume of a solution of hydrogen peroxide gives with antipyrin and tolypyrin a brown colour, due to the formation of meta-hæmoglobin. Amido-antipyrin with hydrogen peroxide forms a faint red colour, which, on the addition of blood becomes dark red, with a tendency to turn blue. Pyramidon in very dilute solutions yields a violet coloration with the above solution of blood and hydrogen peroxide. Amido-antipyrin and pyramidon can, therefore, also be distinguished from one another. A mixture of hydrogen peroxide and pyramidon furthermore serves as a reagent for hæmoglobin.—W. P. S.

ORGANIC CHEMISTRY.—QUANTITATIVE.

Acidimetry (*Organic Acids*). A. Astruc. Comptes Rend. **130**, [23], 1563—1564.

Isethionic acid is monobasic to phenolphthaleïn, litmus, orcinol, rosolic acid, and Poirrier's Blue, and sensibly so to methyl orange.

Sulphanilic acid is also monobasic to all the indicators mentioned; it thus shows a much stronger acidity towards methyl orange than do the aminobenzoic acids, from which we may conclude that the group SO_3H imparts a much stronger acidity to the molecule than CO_2H does.

Meconic acid is dibasic towards most indicators, including methyl orange. With the very sensitive Poirrier's Blue, however, it acts as a tribasic acid. It thus possesses a double strongly acid function, and a single weakly acid or phenolic function.

Mellitic acid, carefully purified from the ammonium salt which often contaminates the commercial article, is hexabasic to most of the indicators, but tribasic towards methyl orange; Berthelot's conclusion from calorimetric results, that three of the six acidic functions of mellitic acid differ from the rest, is thus confirmed.—J. T. D.

Reducing Sugars; New Method for the Determination of ——, by the Aid of a Centrifugal Apparatus. P. Chapelle. Ann. Chim. anal. appl. **5**, 86—88, 140—145; Chem. Centr. 1900, **1**, [16], 878, [21], 1108. (See this Journal, 1900, 383.)

IN applying the method to liquids such as milk, gastric juice, wine, and urine, these are clarified by adding a sufficient quantity of lead acetate, and without filtering, a corresponding amount of sodium sulphate. The mixture is then made up to a definite volume, agitated, and filtered. In the presence of several reducing sugars, the total quantity of cuprous oxide separated is not equal to the sum of the amounts which would be reduced by each individual sugar. The quantity of cuprous oxide due to each individual sugar is ascertained by the aid of a factor $\frac{Cu_2O}{sugar}$, designated k, and depending upon the nature of the sugar, and the amount of cuprous oxide separated. The values of k for quantities of cuprous oxide from 20 to 250 mgrms., and for glucose, invert sugar, inverted cane sugar and milk sugar, are given in a table. The author has effected the determination of two of these sugars in presence of one another, but has not succeeded in determining glucose, cane sugar, and milk sugar when all three are present together.

The determination of sugar by means of mercury solutions may be readily carried out with the aid of a centrifugal apparatus, but the drying must be performed carefully, as mercury is volatile to a considerable extent at 150° C. The author uses a solution containing 22·7 grms. of mercuric iodide, 40 grms. of potassium iodide, and 100 grms. of pure potash per litre. 25 c.c. of this solution are treated with the necessary quantity of sugar, and the volume of the liquid made up to 37·5 c.c. The mixture is heated rapidly to boiling in the calcium chloride bath, allowed to boil for two minutes, then immediately centrifugalised, and the reduced mercury washed by decantation and dried. The following equations are given:—

For invert sugar ..... $y = 0{\cdot}0085\,x^2 + 3{\cdot}75\,x + 4{\cdot}3$.
For glucose..... $y = 0{\cdot}005\,x^2 + 2{\cdot}8x + 8$,

where x = the amount of reducing sugar, and y the quantity of mercury reduced.—A. S.

Alkalimetry and Acidimetry in Volumetric Analysis. A. Astruc. Comptes Rend. **130**, [24], 1636—1639.

THE author draws attention to certain points in regard to indicators in the titration of organic bases and acids. Certain "intermediate indicators," such as litmus and rosolic acid, will with one class of substances (monamines, phenylhydrazine, most organic acids) behave like phenolphthaleïn, with another class (fatty diamines and hydrazine) like methyl orange.

Alkalimetric experiments agree with thermochemical data in marking the alteration in basic character of amines as the hydrogen is displaced by hydrocarbon radicles of the fatty or aromatic series, or by electronegative radicles, such as Cl, Br, NO_2. Diamines, though containing two NH_2 groups, yet appear to have but one strongly basic, and one weakly basic function; the same is true of hydrazine, and its basicity, like that of amines, is diminished in strength by the substitution of aromatic radicles for hydrogen.

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In the titration of acids, thermo-chemistry and alkalimetric indications again go side by side. In the case of acids of low heat of formation, the point of saturation is not very exactly marked, in, for example, titrations in which methyl orange is used as an indicator. With more strongly marked acids, such as these containing a strongly electro-negative group (Cl, NO_2, OH), titration with methyl orange is more sharp and exact.

In all cases the indicator should be chosen for the substance; the alkalimetric or acidimetric phenomena depend both on the functions of the substance itself, and on the indicator.—J. T. D.

Ethylene and Benzene in Gaseous Mixtures; Separation and Estimation of——. E. Harbeck and G. Lunge. Zeits. anal. Chem. 1900, **39**, [4], 239—241.

The method is based upon the conversion of ethylene to ethane, when a mixture of ethylene and benzene with excess of hydrogen is led over platinum black at 100° C., the benzene remaining unaltered. After the absorption of oxygen and acetylene the amount of benzene and ethylene is determined by absorption with fuming sulphuric acid. A second portion of the gas freed from oxygen and acetylene is led over platinum black and then treated with fuming sulphuric acid; the volume absorbed corresponds to the benzene, the difference between this volume and the former absorption gives the ethylene.

This process cannot be used if carbon monoxide be present, as finely divided platinum and palladium form stable compounds with carbon monoxide which deprive the metals of their contact action; these compounds are suddenly decomposed at 250° C. Hydrogen does not displace the carbon monoxide. A direct method for estimating benzene is also given. The gas is passed through a mixture of equal parts by weight of strong sulphuric acid and fuming nitric acid contained in a glass tube with 15 bulbs. The benzene is converted into dinitrobenzene, which is insoluble in water and soluble in ether, whilst ethylene forms water-soluble compounds not extracted by ether. When the operation is finished, the acid is neutralised by caustic soda, and after cooling with ice, and the separated nitro-compound is washed and weighed. An aliquot portion of the filtrate and washings is shaken with ether, and the dinitrobenzene extracted, is weighed, after removing the solvent. This method gives good results, and was used by the authors to check the results of the first process.—A. C. W.

Creosote; Valuation of——. A. D. Hall. Analyst, 1900, **25**, 148—153.

Experiments were made to ascertain the relative preservative powers of the various constituents of creosote. Lengths of good hemp-string of known breaking stress were soaked in various extracts from creosote and other pure materials at water-bath temperature, the string was then partly buried for two months in garden soil, dug up, and its strength re-determined. The results obtained gave a low value to the phenoloid constituents, and not much more to the naphthalene; but the less volatile fractions of the creosote, the basic constituents, and bone oil which is rich in similar bases, all preserved the string fairly well.

Small deal rods, 8 inches long × $\frac{3}{8}$ inch square, were also soaked in the various oils for $1\frac{1}{2}$ hours at 90° C., then buried to about three-quarters of their lengths in garden soil, taken up after 10 months, washed, slowly dried, and the transverse breaking stresses measured. The results showed that the creosote itself, and especially the less volatile fractions, had considerable preservative power, as had also the bone oil; the phenoloid and basic constituents had a real but smaller preservative power, but pure cresol had little or none. The general results seem to indicate that the preservative action of coal-tar creosote lies in its power of filling the cells of the wood with a fixed moisture-resisting material rather than in any chemical antiseptic action; but it seems desirable, in the commercial examination of creosote, to estimate the pyridine "tar bases," and to rate them as of equal preservative value to the "tar acids."—L. A.

Sumach; Detection and Estimation of Certain Vegetable Adulterants of——. G. Scarlata. Staz. Speriment. Agrar. Ital. 1900, **33**, [2], 168—171.

According to the author, sumach, which should consist of the dried and powdered leaves of *Rhus cariaria*, is very frequently adulterated with the leaves of other plants containing tannin, and notably with those of the *Tamarix africana* and of the lentiscus (*Pistacia lentiscus*).

Of the methods proposed for the detection of these adulterants a microscopical examination of the powder, as recommended by Brizi, requires long experience, and is hence practically unused; whilst that of Spica (Gazzetta 1897, 354) does not, in the author's opinion, solve the problem.

The method described by the author is based upon the fact that when finely-powdered sumach is sprinkled upon glycerin (sp. gr. 1·26) which is then brought to the boiling point, and left for an hour, the sumach subsides completely, whilst the supernatant glycerin assumes a greenish-yellow tint.

If, however, the test be tried with finely-powdered lentiscus leaves, the powder remains on the surface of the glycerin, to which it imparts a wine-red colour; whilst in the case of tamarix leaves, the powder remains in suspension and only falls after 24 hours. Here, too, the glycerin is coloured wine-red.

Quantitative Determination of Lentiscus.—In his experiments the author prepared a mixture of sumach and lentiscus containing 20 per cent. of the latter. Five grms. of this mixture, previously passed through a fine-meshed sieve, were introduced into a large test tube containing 110 c.c. of glycerin (sp. gr. 1·26). The liquid was heated to the boiling point, without shaking, and boiled for a few moments, until there was a complete emulsion. It was then left for 24 hours, after which the supernatant glycerin was removed by means of a pipette. The powder on the surface, simultaneously removed, was collected on a weighed filter, washed with water until free from glycerin, dried in the water oven and weighed. The results thus obtained varied from 0·65 to 0·70 grm. The loss through solubility of the powder in the glycerin was found, as the mean result of several determinations on 1 grm. of pure *lentiscus*, to amount to 30 per cent.; and on adding this loss to the amount actually found in the test experiments, the results agreed well with the quantity taken.

Detection of Tamarix Leaves.—It was not found possible to quantitatively determine *tamarix* leaves in sumach by this method, but they could be identified in the following manner:—Five grms. of the sifted sample were introduced into the tube of glycerin, which was then boiled, as described above, and allowed to stand for two hours. If the supernatant glycerin was then clear and of a greenish-yellow colour the sumach was regarded as pure. If, however, after 24 hours part of the powder remained on the surface, whilst the glycerin was clear and of a wine-red colour, the presence of *lentiscus* leaves was, in the author's experience, certain. But when *tamarix* leaves were the adulterant, part of the powder remained suspended in the glycerin after two hours, and the liquid had the same wine-red colour as in the case of *lentiscus*. After 24 hours the suspended powder completely subsided.—C. A. M.

Iodine Number of Fats; Simple and Rapid Method of Determining the——. J. Bellier. Ann. Chim. anal. appl. **5**, 128—131. Chem Centr. 1900, **1**, [21], 1109.

As iodine is not sufficiently soluble in glacial acetic acid, the author partly replaced it by bromine, which acts just as efficiently. 50 grms. of iodine and 32 grms. (10 c.c.) of bromine, or 33·5 grms. of iodine, and 42·2 grms. (13·5 c.c.) of bromine are dissolved in 950 c.c. of glacial acetic acid, the solution is saturated with corrosive sublimate (about 95 grms.) and allowed to stand for one to two days. It is standardised by titrating 5 c.c. with N/10 thiosulphate, and the strength is adjusted by the addition of glacial acetic acid, so that 5 c.c. require 39·4 c.c. of the thiosulphate. 1 c.c. of such a solution is equivalent to 0·1 grm. of iodine.

The results obtained correspond well with those obtained by Hübl's method, but with a slight inclination to be too high.—A. S.

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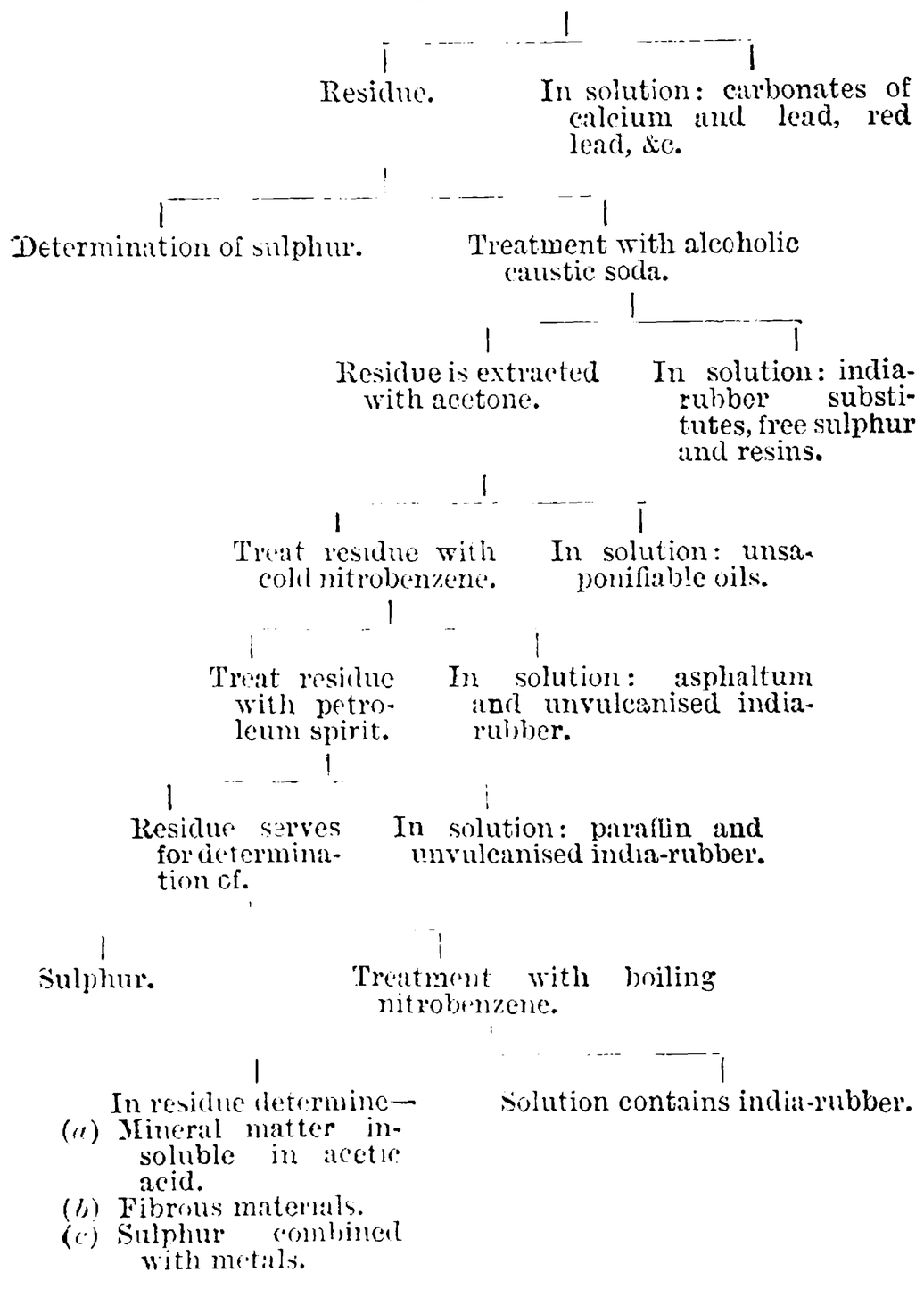
India-rubber Goods; General Scheme for the Analysis of ——. O. Chéneau. Zeits. f. Unters. d. Nahrungs- u. Genussm. 1900, **3**, [5], 312—318.

An exhaustive analysis, besides ascertaining the uniformity of the goods, requires the determination of the following data:—

I.—Uniformity. Specific gravity. Ash.
II.—Solubility in alcohol. Resins.
III.—Total sulphur and mineral matters.
IV.—Treatment with dilute acetic acid containing some sugar, according to the following scheme:—



The determination of the sp. gr. is carried out by well-known methods. The extraction with alcohol separates from the india-rubber, pitch, resinous bodies, and part of the asphaltum present. In the author's opinion, every sample yielding more than 2 per cent. of alcoholic extract may be considered to contain foreign admixtures, and to be of inferior quality. The determination of the sulphur is carried out by Henriques' method, or, according to the author, by combustion in Mahler's bomb. Treatment with dilute acetic acid and sugar dissolves farina, lime, chalk, white lead, read lead, zinc oxide, and alkalis. The rubber so treated, after boiling and washing with water until neutral, retains traces only of these substances. If sulphuretted hydrogen be evolved during this treatment, the amount of sulphur in the treated rubber is determined; the loss of sulphur is due either to the presence of ultramarine, or other sulphides acted upon by acetic acid. The treatment with alcoholic caustic soda is carried out in the well-known manner, and the sample so treated subsequently extracted with acetone for the determination of the unsaponifiable oils and asphaltum. The sample extracted with acetone is subsequently treated with cold nitrobenzene for the extraction of asphaltum, as described by Henriques, and by extracting the india-rubber remaining from this treatment with petroleum spirit, or chloroform, paraffin wax, and unvulcanised india-rubber are extracted. In an aliquot part of the india-rubber so extracted, a determination of the sulphur is made, the difference between which and the sulphur found after treatment with acetic acid represents sulphur present in the form of free sulphur, india-rubber substitute, and asphaltum. A further aliquot part of the above residual india-rubber is treated with a mixture of 3 c.c. of chloroform, and 50 c.c. of nitrobenzene according to Weber's method. Hard rubbers and heavily compounded rubbers are liable to cause difficulties in this process. The insoluble residue remaining in this process, may contain French chalk, china clay, ochre, barytes, antimony sulphide, vermilion, lead sulphide, lead sulphate, graphite, ground leather, cork, or vegetable fibres. A sulphur determination in this residue, by comparison with the sulphur determination made after extraction with petroleum spirit, indicates the amount of sulphur of vulcanisation present.—C. O. W.

Beetroot Pulps; Analysis of ——. J. Weisberg. Bull. Assoc. Chim. de Suer. et de Dist. 1900, **17**, [12], 880—881.

In a former number (this Journal, 1900, 566), Verbièse described a method for the extraction of the sugar from exhausted pulps by means of a Soxhlet apparatus. The dilute inverting acid (tartaric or sulphuric) is boiled in the flask, and the water-vapour condenses and extracts the sugar from the pulp in the Soxhlet apparatus.

It is stated that in this way the pulp does not come in contact with the acid, and hydrolysis of the marc is avoided. The present author raises an objection to this method, remarking that the hot water dissolves pectic and pentosan matters from the pulp, and the copper reducing value is increased by subsequent hydrolysis of the same in the flask. Weisberg recommends an extraction of the pulp with alcohol of 96—97 per cent. strength, whereby the solution of the non-sugars is avoided; the inversion of the sugar can then be effected after the evaporation of the alcohol.—J. F. B.

Sugar Solutions; Analysis of ——. G. Halphen. J. Pharm. Chim. 1900, **12**, [1], 12—14.

The proportions of saccharose, glucose, and invert sugar contained in a mixture can be calculated from determinations of the cupric reducing power, and of the rotations before and after inversion. It is, however, necessary to eliminate previously other substances reducing Fehling's solution, or acting upon polarised light. Raczkowski's process for removing tartaric acid and dextrin gives a coloured solution in which the polarimetric observations cannot be made with accuracy. The author proposes the following process, in which potassium carbonate is replaced by calcium carbonate:—A quantity of the sugar mixture, containing about 30 grms. of total sugars, is placed in a 300-c.c. flask; water is added, and calcium carbonate in excess. After 10 minutes, neutral lead acetate is added so long as a precipitate forms, and then 3—4 c.c. of the same reagent in excess. The volume is made up, the flask shaken, allowed to rest, and the clear liquid decanted on to a large folded filter. Portions of the liquid are used for the estimation of the reducing sugars and of the rotatory power, a third portion is inverted, and a fourth (50 c.c.) is evaporated on the water-bath to 5 c.c. It is then heated with constant stirring over a small flame, the dry portions being continually re-dissolved, it is allowed to cool to 40° C., and about 0·5 c.c. of pure hydrochloric acid added. The liquid is then precipitated by alcohol, allowed to stand 1—2 hours, the clear liquid decanted off, the residue washed with alcohol, dissolved in water, and examined in the polariscope. The examination can be made with accuracy.—A. C. W.

Iron; Determination of ——, *in Liquor ferri Albuminati.* O. Linde. Apoth. Zeit. 1900, **15**, 423.

The following directions are given for the estimation of iron in Liquor ferri Albuminati (German Pharmacopœia):—

Twenty grms. of the iron solution are heated with 20 c.c. of water and 30 c.c. of dilute sulphuric acid (1 : 5) in a 100-c.c. flask on a water-bath until the brown precipitate has become nearly white. After cooling, the liquid is made up to 100 c.c. and well shaken. 20 c.c. of the filtered liquid are then carefully oxidised with potassium permanganate solution, and after the disappearance of the colour, which can be accelerated by adding a few drops of

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alcohol, 2·5—3 grms. potassium iodide are added and the whole allowed to stand in a well-stoppered flask for one hour. Finally the separated iodine is titrated with N/10 sodium thiosulphate solution.—E. H. T.

Ureïds and Purine-Derivatives; Quantitative Reaction of ——. A. Jolles. Ber. 1900, **33**, [13], 2119—2121.

When purine derivatives are oxidised, methylamine, urea and ammonia are formed in varying proportions. The methylamine is estimated by precipitating it with phosphotungstic acid and determining the nitrogen-content of the precipitate, whilst by treating the solution with bromine water, the remainder of the nitrogen, corresponding to the ammonia and urea, is set free. The urea alone is estimated by precipitating it as oxalate, the nitrogen in which is then determined by Kjeldahl's method. The oxidation products of caffeine, hydroxycaffeine, theophylline, heteroxanthine, xanthine, and uric acid have been examined, and it is found that with these four-nitrogen-atom compounds, as many nitrogen atoms are found in the phosphotungstic acid precipitate as there are methyl groups in the molecule. Thus in the case of xanthine or uric acid, no nitrogenous precipitate is formed with phosphotungstic acid, whilst with caffeine three-fourths of the nitrogen is found in the precipitate. With trimethyl-derivatives, the amount of urea formed is not influenced by varying, within wide limits, the strength of the sulphuric acid employed in the oxidation; for dimethyl- and monomethyl-compounds, however, an increase in the concentration of the acid causes decomposition of the urea or methyl-urea, the proportion of ammonia produced also changing.

—T. H. P.

Vegeto-Alkaloids; Estimation of ——, *by determination of the Quantity of Acid required to form Normal Salts.* C. Kippenberger. Zeits. anal. Chem. 1900, **39**, [4], 201—229. (See also this Journal 1898, 1076; 1899, 526, 869; 1900, 78.)

In previous researches with regard to an acidimetric method for the estimation of alkaloids, the quantity of acid theoretically required has been generally disregarded, and a process has been said to give accurate results because those results were merely concordant, an indicator being given the preference simply on account of its sharp end reaction. This gives rise to considerable errors in forensic and pharmaceutical work, in which small quantities of alkaloids are available and very dilute (N/100) acid and alkali solutions are used.

In the following experiments, N/50 sulphuric acid and N/50 caustic soda were used, and the indicator solutions were standardised by means of the standard acid or alkali as required. The following indicators, which all gave a sharp reaction with the N/50 acid and alkali, were used in solutions of the usual strength:—Iodo-eosin, methyl orange, ethyl orange, azolithmin, uranine (sodium fluoresceïn), hæmatoxylin, phenolphthaleïn, cochineal, lacmoid, alkannin, and Congo red. The iodo-eosine was added in ethereal solution to the aqueous liquid; after each addition of standard solution the liquid was well shaken.

The alkaloids were dissolved in excess of standard acid, 50 c.c. of the solution were added to the standardised aqueous solution of the indicator, and the excess of acid measured by adding the standard caustic soda solution. In the case of methyl and ethyl orange, caustic soda was first added in slight excess and the excess titrated by acid. The results are contained in the table; the volumes of N/50 caustic soda required to neutralise the excess of acid are first given, and then the volume of N/50 sulphuric acid which has been neutralised by the alkaloid contained in the 50 c.c. of solution employed.

Low Acid Values.—The alkaloid sulphate is partially dissociated in aqueous solution, and thus in titrating with alkali, a portion of the acid belonging to the alkaloid salt is neutralised by the alkali, whilst the free base remains dissolved in the colloidal state or, if a very weak base or one which readily crystallises, separates in solid form. If the alkaloid salt be so dissociated, the base may not unite with the indicator, because the dissociation of the compound indicator-alkaloid is more or less complete. This is especially the case if the indicator be a weak acid and the alkaloid a weak base; good results may, however, be obtained with a feebly acid indicator if the alkaloid be strongly basic, as the compound of colouring matter and alkaloid may then form after neutralisation of the excess of acid. Thus phenolphthaleïn gives good results with sparteïne and fair results with coniine, but cannot be used with the other alkaloids, which are not sufficiently basic.

With a weak base the quantity of indicator used, especially if it is a strong acid, has considerable influence on the results, thus narcotine with Congo Red as indicator appeared to have combined with 5·6 and 8·4 c.c. of N/50 acid in two distinct experiments.

In certain cases, alkaloids, which in general appear to be strong bases, do not unite with the indicator, thus quinine forms no compound with phenolphthaleïn.

High Acid Values are obtained in particular with methyl and ethyl orange and Congo Red used in the titration of quinine and sparteïne. To neutralise 0·1 grm. of quinine 13·2 c.c. of N/50 sulphuric acid are required, but a solution of that quantity of the alkaloid containing 27·5 c.c. of acid gives the *alkaline* reaction with Congo Red, and a very considerable further excess of acid is required to give the blue acid reaction. Similar results, but not so pronounced, are obtained with methyl and ethyl orange. In the case of sparteïne, iodoeosine and methyl and ethyl orange, Congo Red and lacmoid behave in the same manner, also methyl orange and azolithmin with papaverine, methyl orange and lacmoid with aconitine, strychnine and brucine. This anomalous behaviour is not due to the strongly acid character of the indicators, which are present in small quantity as compared with the sulphuric acid. If methyl orange and Congo Red be replaced by the bases dimethylamido-azobenzene and tetrazodiphenylnaphthylamine, similar results are still obtained. The author shows that compounds of the indicator and alkaloid are formed in the solution, which are only decomposed by a considerable excess of acid.

Concordant and accurate results are obtained when the alkaloid salt is little dissociated in aqueous solution, and when the alkaloid-indicator compound is also little dissociated, which is the case if the alkaloid is strongly basic and the indicator of feeble or medium acid strength, or the alkaloid is a base of medium strength approximately equal to the strength of the acid indicator. The indicator must also not have a stronger affinity for the base than the acid used for the titration.

In the following table the indicators are given which may be used for the several alkaloids; the indicators which are the most suitable are printed in italics, whilst those which give less good, but still useful results, are placed in brackets; (*a*) indicates that the end reaction is somewhat indefinite; (*b*) that the indicator is discoloured; (*c*) that the change of colour can be well seen immediately, but does not remain.

Atropine.—Iodo-eosin, (methyl orange (*a*)), azolithmin, hæmatoxylin, *lacmoid*, cochineal, *uranin*.

Morphine.—(Iodo-eosin), *cochineal*, *lacmoid*.

Aconitine.—Iodo-eosin, *azolithmin*, hæmatoxylin, cochineal.

Veratrine.—Iodo-eosin, hæmatoxylin, cochineal, *lacmoid*.

Thebaïne.—*Iodo-eosin*, uranine, (hæmatoxylin), *cochineal*, lacmoid (*a*).

Codeine.—*Iodo-eosin*, (azolithmin), uranin, hæmatoxylin, cochineal, *lacmoid*.

Emetine.—*Iodo-eosin*, (azolithmin (*b*)), (uranine (*a*)), (hæmatoxylin (*a*)), *cochineal*, (lacmoid (*b*)).

Cocaine.—*Lacmoid*, uranine, cochineal, hæmatoxylin.

Strychnine.—Iodo-eosin, *azolithmin*, (uranine), hæmatoxylin, cochineal, (lacmoid).

Brucine.—Iodo-eosin, azolithmin, (uranine), hæmatoxylin, *cochineal*, lacmoid.

Nicotine.—(Iodo-eosin), uranine (*a*), (cochineal), lacmoid.

Coniine.—*Iodo-eosin*, (methyl orange), uranine, (azolithmin (*c*)), hæmatoxylin (*c*), (alkannin), *cochineal*, *lacmoid*, Congo red.

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Alkaloid Solution.		Indicators.											Theory.
		Iodo-Eosin.	Methyl-Orange.	Ethyl-Orange.	Azo-Lithmin.	Uranine.	Hæmatoxylin.	Phenol-phthalein.	Cochineal.	Lacmoid.	Alkannin.	Congo Red.	
Strychnine $C_{21}H_{22}N_2O_2$ 2·0 grms. + 100 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	C.c. 9·4—9·6 9·9	C.c. 9·1–9·2 9·1—9·5	C.c. 8·9—9·2	C.c. 10·2—10·6 10·2—10·7	C.c. 10·05—10·1 9·85 10·0	C.c. 10·0 10·1—10·2	C.c. 21·15	C.c. 10·1	C.c. 9·7	C.c. 15·1 20·95	C.c. Useless	C.c. 10·5
	$\frac{1}{50}$N.H_2SO_4	15·4—15·6 15·1	15·8—15·9 15·5—15·9	15·8—16·1	14·4—14·8 14·3—14·8	14·9 15·15 15·0	15·0 14·8—14·9	3·85	14·9	15·3	9·9 4·05	„	14·5
Brucine $C_{23}H_{26}N_2O_4 + 4H_2O$ 2·0 grms. + 100 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	13·15—13·13	11·55 11·1	12·3—12·5 12·1	14·3 14·2—14·8	13·75 13·55—14·4	14·1 13·8—14·1	22·4	13·65 13·50	13·2	About 21	Useless	14·3
	$\frac{1}{50}$N.H_2SO_4	11·7—11·85	13·45 13·9	12·5—12·7 12·9	10·7 10·2—10·8	11·25 10·6—11·45	10·9 10·9—11·2	2·6	11·35 11·5	11·8	About 4	„	10·7
Atropine $C_{17}H_{23}NO_3$ 2·0 grms. + 120 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	12·35 12·45	..	12·4—12·6 11·4—12·1	12·7 12·4—12·7	12·5 12·9	12·7 12·65—12·8	14·0	12·6	12 3 12·55	14·0	10·9—11·5 —11·75	12·7
	$\frac{1}{50}$N.H_2SO_4	17·75 17·65	..	17·4—17·6 17·9—18·6	17·3 17·3—17·6	17·5 17·1	17·8 17·35—17·7	16·0	17·4	17·7 17·45	16·0	18·25—19·1	17·3
Morphine $C_{17}H_{19}NO_3 + H_2O$ 2·0 grms. + 120 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c	$\frac{1}{50}$N.NaOH	12·9 12·6	12·45 11·8	12·15	14·4 13·85—14·0 13·55	..	14·4 14·05	28·1 27·4	15·35	13·2—13·35 13·35	About 28·3	11·7	13·5
	$\frac{1}{50}$N.H_2SO_4	17·1 17·4	17·55 18·2	17·85	15·6 15·9—16·1 16·45	..	15·6 15·95	1·9 2·8	16·65	16·65—16·8 16·65	About 1·7	18·3	16·5
Aconitine *pur. cryst. From Aconit Napellus.* 2·0 grms. + 100 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	17·1 17·3	14·95	14·3	17·0—17·1 17·1	16·9 16·8—17·1 16·8	17·4	21·2—22·5	17·25	16·85 16·2—16·25	About 19·5	Useless	$C_{34}H_{43}NO_{12}$ (Wright and Luff) : 17·3 c.c. $\frac{1}{5}$N.NaOH. $C_{33}H_{47}NO_{12}$ (Jürgens) : 17·3 c.c. $C_{33}H_{45}NO_{12}$ (Dunstan) : 17·3 c.c. $C_{24}H_{47}NO_{11}$ (Freund) : 17·15–17·2 and 7·85 c.c. $\frac{1}{50}$N.H_2SO_4.
	$\frac{1}{50}$N.H_2SO_4	7·9 7·7	10·05	10·7	7·9—8·0 7·9	16·85—17·25 8·1 7·9—8·2 8·2 7·75—8·15	7·6	2·5—3·8	7·75	8·15 8·75—8·8	About 5·45	„	
Veratrine Commercial powder, 2·0 grms. + 100 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	17·0 17·0	16·2 16·1	15·85	17·3 –17·35 17·2 –17·4	17·4 17·15—17·3	17·2	18·0 17·9—18·4	17·2	16·95 16·95	18·75 18·65	13·0—16·0	For Cevadine, $C_{32}H_{49}NO_9$ 16·6 8·4 7·8 c.c. is taken here as the mean.
	$\frac{1}{50}$N.H_2SO_4	8·0 8·0	8·8 8·9	9·15	7·65— 7·7 7·6 — 7·8	7·6 7·7 — 7·85	7·8	7·0 6·6— 7·1	7·8	8·05 8·05	6·25—6·35	9·0—12·0	
Thebaïne $C_{19}H_{21}NO_3$ 2·0 grms. + 120 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	13·85 13·9	13·1	12·55	14·55 14·1	14·0 13·8—14·1	14·8—15·0 14·15 14·15	25·1—26·5	13·8	13·85 13·7	18·9	10·4—17·1	13·9
	$\frac{1}{50}$N.H_2SO_4	16·15 16·1	16·9	17·45	15·45 15·9	16·0 15·9—16·2	15·0—15·2 16·85 16·85	3·5—4·9	16·2	16·15 16·3	11·1	12·9—19·6	16·1
Codeïne $C_{18}H_{21}NO_3 + H_2O$ 2·0 grms. + 120 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	14·1 14·2	13·25	13·4	14·5 14·45	14·6—15·0 14·0—14·5	14·75 14·2—14·6	26·15 26·4	14·4 14·35	14·1 14·35	About 26·9	13·25 12·2—13·2	14·2
	$\frac{1}{50}$N.H_2SO_4	15·9 15·8	16·75	16·6	15·5 15·55	15·0–15·4 15·5—16·0	15·25 15·4—15·8	3·85 3·6	15·6 15·65	15·9 15·65	About 3·1	16·75 16·8—17·8	15·8
Emetine. 2·0 grms. + 103 c.c. $\frac{1}{10}$N.H_2SO_4 in 1,000 c.c.	$\frac{1}{50}$N.NaOH	6·8—7·0 6·6	5·1	5·55	6·6—7·25 6·5—7·3	6·9	7·85 6·95	29·1	6·6 6·7	6·45 5·9—6·35	15·3—16·1 15·1 –17·5	Useless	$C_{15}H_{22}NO_2$ (Glenard) : 20·15. $C_{15}H_{21}NO_2$ (Cownley & Paul) : 20·24. $C_{20}H_{40}N_2O_5$ (Kunz-Krause) : 9·84. $C_{28}H_{40}N_2O_5$ (Wurtz) : 10·3. $C_{60}H_{44}N_2O_{16}$ (Lefort) : 5·08. $C_{10}H_{30}N_2O_{10}$: 13·23. $C_{20}H_{30}N_2O_5$ (Reich) : 7·17. $\frac{1}{50}$N.H_2SO_4.
	$\frac{1}{50}$N.H_2SO_4	18·75—18·95 19·15	20·65	20·2	18·5—19·15 18·45—19·25	18·85	17·9 18·8	..	19·15 19·05	19·3 19·4—19·85	9·65–10·15 8·25—10·65	..	

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Alkaloid Solution.		Indicators.										Theory.
		Iodo-Eosine.	Methyl-Orange.	Ethyl-Orange.	Azo-lithmin.	Uranin.	Hæma-toxylin.	Phenol-phthalein.	Cochineal.	Lacmoid.	Alkannin.	Congo Red.	
		c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.
Cocaine $C_{17}H_{21}NO_4$ 2·0 grms. + 100 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	9·65	7·95	..	8·55–9·1	8·45	8·9	15·3	8·55	8·5	15·8	6·75–6·85	8·5
		9·05	7·7		8·35–9·2		9·0		8·75	8·35			16·5
	$\frac{1}{10}$N. H_2SO_4	15·85	17·05	..	15·1–16·45	16·55	16·1	9·7	16·45	16·5	9·2	18·15–18·25	
		15·95	17·3		15·8–16·65		16·0		16·25	16·65			
Nicotine $C_{10}H_{14}N_2$ 2·7166 grms. + 280 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	16·8	8·6–9·2	10·2	18·3–19·3	15·6–16·6	18·2	48·2–49·8	16·35	16·0–16·2	51·15	Useless	15·9
		16·9			18·9		18·25		16·8	16·4–16·8			
	$\frac{1}{10}$N. H_2SO_4	40·7	48·3–48·9	47·3	38·2–39·2	40·9–41·9	39·3	7·7–9·3	41·15	41·3–41·5	6·35	Useless	41·6
		40·6			38·6		39·25		40·7	40·7–41·1			
Coniine $C_8H_{17}N$ 2·0540 grms. + 200 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	10·3	9·75	9·45	10·2–10·8	10·15	10·35–10·65	10·8–11·0	10·3	10·1–10·3	11·0	10·05	9·6
		10·2			10·25–10·6	10·3		10·8–10·9	10·4	10·25	10·65	9·65–10·05	
	$\frac{1}{10}$N. H_2SO_4	39·7	40·25	40·55	39·2–39·8	39·95	39·35–39·65	39·0–39·2	39·7	39·7–39·9	39·5	39·95	40·4
		39·8			39·4–39·85	39·7		39·1–39·2	39·6	39·75	39·35	39·95–40·35	
Sparteïne. $C_{15}H_{26}N_2$ 2·0726 grms. + 150 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	9·3–15·4	Useless.		15·0–15·65	14·75–17·9	15·2	15·7–15·8	11·6 –15·8	7·1–11·2	15·9	Useless.	15·4
		7·1–13·3			15·0–15·35	15·8	15·5	15·6	13·95–15·5		15·55		22·1
	$\frac{1}{10}$N. H_2SO_4	22·1–28·2	Useless.		21·85–22·5	19·6–22·75	22·3	21·7–21·8	21·7 –25·9	26·3–30·4	21·6	,,	
		26·2–30·4			22·1–22·5	21·7	22·0	21 9	22·0 –23·55		21·65		
Quinine. $C_{20}H_{24}N_2O_2 + 3H_2O$ 2·0 grms. + 110 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	11·2–11·6	1·0	1·9	13·95	13·9	14·1–14·4	28·5–29·2	12·4–16·3	+ Ether	20·55	,,	14·3
					14·05	13·5–14·0	14·0–14·3			13·3–14·1	19 3–20·3		
	$\frac{1}{10}$N. H_2SO_4	15·9–16·3	26·5	25·6	13·55	13·6	13·1–13·4	..	11·2–15·1	13·4–14·2	6·95	,,	13·2
					13·45	13·5–14·0	13·2–13·5				7·2–8·2		
Pelletierine. (Punicine.) $C_8H_{15}NO$ 2·0732 grms. + 200 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	27·5	25·7	25·2	29·35	27·8	28·5–29·7	36·5–37·6	28·0	27·65	Useless.		12·2
		27·5–27·8			28·7	27·9–28·2	29·6–29·85		28·25	28·0			37·8
	$\frac{1}{10}$N. H_2SO_4	22·5	24·3	24·8	20·65	22·2	20·3–21·5	12·4–13·5	22·0	22 35	..	..	22·0–22·5
		22·2–22·5			21·3	22·1–21·8	20·15–20·4		21·75	22·0			should be taken as the correct value here.
Papaverine $C_{20}H_{21}NO_4$ 2·0 grms. + 100 c.c. $\frac{1}{10}$ N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	12·55	8·53	8·9	18·6	18·5	22·55	25·65	11·4	9·95	25·4	Useless	10·3
		11·35		8·2	18·8					10·05			
	$\frac{1}{10}$N. $2H_2SO_4$	12 45	16·45	16·1	16·4	6·5	2·45	..	13·6	15·05	..	..	14·7
		13·65		16·8	16·2					14·95	..		
Narcotine $C_{22}H_{23}NO_7$ 2·0 grms. + 100 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	19·95–21·35	11·95	12·05	Useless	14·15	24·6	27·25	About	13·05	Useless	9·35	12·9
		16·0 –17·7	12·2	11·95		14·9			17·0	12·7–13·0		6·55	
	$\frac{1}{10}$N. H_2SO_4	3·65– 5·05	13·05	12·95	..	10·85	0·4	..	About	11·95	..	5·65	12·1
		7·3 – 9·0	12·8	13·05		10·1			8·0	12 0–12·3		8·45	
Narceine $C_{23}H_{29}NO_9 + 2H_2O$ 2·0 grms. + 100 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	25·95	..	23·1	26·5–27·2	24·1–25·1	27·1	28·1	26·4	26·6	29·5	16·9	15·0
												16·1–17·8	
	$\frac{1}{10}$N. H_2SO_4	..	..	1·9	..	..	..	..	..	..	..	8·1	10·0
												7·2–8·9	
Caffeine $C_8H_{10}N_4O_2 + H_2O$ 2·0 grms. + 150 c.c. $\frac{1}{10}$N. H_2SO_4 in 1,000 c.c.	$\frac{1}{10}$N. NaOH	37·15	36·3	36·3–36·7	37·7	36·9	37·8	37·9–38·2	37·6	37·35–37 8	37·7	34·4	13·9
		37·25				37·0							
	$\frac{1}{10}$N. H_2SO_4	0·35	1·2	0·8–1·2	..	0·6	..	..	..	..	..	3·1	23 6
		0·25				0 5							

Sparteïne.—Azolithmin, (uranine), *hæmatoxylin*, phenolphthaleïn, alkannin.

Quinine.—*Azolithmin*, uranine, *hæmatoxylin* (*c*), lacmoid (ether must be added).

Pelletierine (*Punicine*).—(Iodo-eosin), uranine, *cochineal*, (lacmoid (*b*)), (azolithmin (*b*)).

Papaverine.—*Lacmoid.*

Narcotine.—(Methyl orange), *lacmoid.*

Narceïne and Caffeïne.—None of the indicators are suitable.—A. C. W.

Morphine in Opium; New Method for the Estimation of ——. H. M. Gordin and A. B. Prescott. Arch. der Pharm. **237**, 380.

THE total alkaloids present in opium are set free by ammonia. After a sufficient maceration, the liquid is evaporated, and the narcotine, codeine, thebaine, papaverine, &c., are removed by means of benzene. The morphine, which is insoluble in benzene, is extracted by a mixture of chloroform and ether. The extract is evaporated, the residue dissolved in a solution of N/20 acid, and the excess of acid titrated by N/20 potash solution. The method can be checked by a titration with iodine on the product of the above estimation. It is sufficient to treat with lime, then acidify, and run in a standard solution of iodine; one molecule of morphine fixes three atoms of iodine, giving the compound $C_{17}H_{19}NO_3HI.I_3$. The excess of iodine can be estimated with sodium thiosulphate. The two methods give identical results.

—A. S.

Oil of Lemon; Composition and Analysis of ——. G. Fabris. Annali del Laboratorio Chimico Centrale delle Gabelle 1900, **4**, 53—121.

Composition of Oil of Lemon.—The author summarises the conclusions arrived at by different chemists on the composition of lemon oil (*cf.* this Journal, 1894, 417; 1895, 594; 1897, 556; 1898, 869, 1069).

Rotatory Power of Adulterants of Lemon Oil.—The substances most generally employed to adulterate oil of lemon are turpentine with oil of orange to raise the rotatory power of the mixture to that of the normal oil. The author gives the following table of the rotation of different samples in a 100 m.m. tube at 20° C.:—

	Rotation (α_D =).
Oil of turpentine, French	−20°
„ „ common	−5° 30′
„ „ American	+4° 30′
„ lemon, distilled	+52° 15′
Lemon terpenes, distilled in laboratory from pure oil	+60° 40′
Terpenes of Messina lemons	+55° 50′
Limonine (Schimmel and Co.)	+102° 4′
Oil of orange	+97° 10′
Oil of lemon, pure	+60° 42′

From a long series of experiments with mixtures of these substances, the author has arrived at the conclusion that there is no method in existence capable of detecting every extraneous addition to oil of lemon; although in his opinion the best means of detecting the most common and probable adulteration is the method of fractional distillation as described by Schimmel & Co. (Report, Oct.—Nov. 1896, *cf.* this Journal 1896, 925), and that of Soldaini and Berté (this Journal 1897, 266; 1899, 1160). He considers that, whilst these methods only give vague indications as to the nature and amount of foreign substances added to the oil, and cannot detect oil of turpentine in small proportion or lemon terpenes, if not added in large excess, yet that they are capable of detecting 5 per cent. of oil of turpentine (or less of laevorotatory turpentine), and the presence or absence of oil of orange can be inferred from the rotation of the distillation residue.

Other analytical tests, such as the determination of different physical and chemical constants, and various colour reactions are, in his experience, less sensitive, though they should not be omitted. Of the colour tests, the following are especially recommended:—

The Guaiacum Test.—In this test (Hager, *Seif. Oel u. Fette*, 1898, 179) a pinch of powdered guaiacum resin is placed in a test tube into which are then introduced 5 or 6 c.c. of alcohol, and 0·5 c.c. of the oil of lemon; or better, 0·2 grm. of guaiacum resin is dissolved in 100 c.c. of alcohol (about 95 per cent.), and 6 to 8 c c. of a solution containing 0·5 c.c. of the oil added. On boiling the contents of the tube for a moment, the liquid assumes a brown tint which soon changes to violet in the case of pure lemon oil. With oil of turpentine a pronounced violet is observed. When left for 15 minutes, and then diluted with 10 c.c. of alcohol, the liquid containing oil of lemon becomes faint brown; with turpentine it assumes an intense blue colour; and with a mixture a faint but distinct blue tint. A comparative test should be made with an oil of lemon of known purity. The author states that old or badly kept lemon oil tends to give a blue colour, and that French turpentine oil reacts much more rapidly than American turpentine. Oil of orange does not give any coloration with guaiacum resin.

Potassium Iodide Test (*Marpmann*).—On dropping turpentine on to a crystal of potassium iodide a black coloration is obtained after some time, whilst lemon oil gives a yellow colour, and mixtures a brown shade. According to the author a mixture containing less than 5 per cent. of turpentine oil does not differ materially, in the colour produced, from pure oil of lemon.

Amyl Nitrite Test.—Two c.c. of the oil are treated with 6 to 8 c.c. of 96 per cent. alcohol, and after the introduction of 10 or 12 drops of ethyl or amyl nitrite and two or three drops of hydrochloric acid (sp. gr. 1·17) the liquid is boiled for an instant and then left to cool. With lemon oil a yellow or orange colour is obtained; with turpentine a rose to blood-red colour; and with mixtures a rose coloration varying in shade with the proportion of turpentine. The author found that a mixture containing 2 per cent. of French turpentine oil gave a marked rose colour, but that in the case of American turpentine the test was not sensitive for less than 5 per cent.

Soldaini and Berté's Tests for Orange Oil.—These consist in testing the oil with potassium bisulphite, and with brominated chloroform. (This Journal 1899, 1160.)

Difference between the Rotations of the Oil and Distillate.—Whichever method of distillation is used, the author considers it essential to make two distillations with the corresponding polarimetric readings. In interpreting the results of the fractional distillation he refers to his table of results obtained with known samples, in which he shows that, in the case of these pure oils at least, the maximum difference between the rotation of the oil and distillate is about −4°·30′ by Schimmel's method, and the minimum difference in the Soldaini-Berté method from + 0° 1′.—C. A. M.

XXIV.—SCIENTIFIC & TECHNICAL NOTES.

Electrolytic Dissociation. Hans Jahn. Zeit. physik. Chem. 1900, **33**, 545.

THE law of mass action, although applicable to weak acids and bases, does not hold good for strongly dissociated electrolytes. The author shows that it is not the law of mass action which is here invalidated, but the assumption involved in the calculation of the degree of dissociation, *viz.*, that with sufficiently dilute solutions the speed of migration of the ions is independent of the concentration. It is found that an acceleration of the ions takes place as the concentration of the ions increases, so that the dissociation appears to be greater than it really is. If this be taken into consideration, the above-mentioned law is found to hold good for all dilute solutions up to N/30 strength.—E. H. T.

Ions; Mechanical Device for Illustrating the Migration and Deposition of ——. E. Müller. Zeits. f. Elektrochem. 1900, **6**, [50], 589—591.

THE author gives full details and measurements for the construction of a model, intended to be used on lecture tables, to illustrate the velocity of migration of the ions,

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their deposition at the electrodes, and the change in concentration in the anode and cathode compartments. As described, the model can be adjusted to show the ratio of the velocity of migration of the ions H : Cl = 5 : 1 or H : Cl = 1 : 1.—J. S.

Nitric Acid, Formation of —— during Combustions. Berthelot. Comptes Rend. **130,** [22], 1430—1436.

During the combustion of sulphur under the same three sets of conditions as those under which carbon was burned (this Journal, 1900, 697), nitrogen is also oxidised; the amount oxidised formed during the combustion of a given mass of sulphur being, in oxygen at 25 atmospheres, one-eleventh of; in oxygen at one atmosphere, half of; and in air equal to the amount oxidised during the combustion of an equal mass of carbon. The variations in the amount with variations of pressure are thus not nearly so great, though they are in the same direction, as those in the case of carbon. The author is disposed to regard them as an electrical phenomenon, connected with the varying electrical resistance of the media concerned; the more so as there is always some sulphur trioxide formed during the combustion of sulphur, and we know that sulphur dioxide and oxygen do not directly combine save under electrical influence.

During the combustion, under the same conditions, of iron and of zinc, no oxidation of nitrogen occurred. This affords confirmation of the view that we have to do with electrical effects, for both the metals and the products of combustion (fine powders in an atmosphere saturated with moisture) are good conductors, while sulphur and carbon, as well as the gases produced by their combustion, are bad conductors or insulators.—J. T. D.

Nitric Acid; Formation of —— during the Combustion of Hydrogen. Berthelot. Comptes Rend. **130,** [25], 1362—1377. (See preceding abstract.)

The author has determined the amounts of nitrogen oxidised during the combustion of hydrogen with oxygen containing varying proportions of nitrogen, both when exploded at constant volume and when burnt at constant pressure.

Constant pressure.—When the mixed gases (hydrogen and oxygen containing 7 per cent. of nitrogen) are burnt at a jet a very small amount of nitric acid is formed. When a jet of hydrogen burns in an atmosphere of the nitrogenous oxygen, very notable amounts of nitric acid are formed, though much less (one-twelfth to one-third) than during the explosion of the mixed gases at constant volume. When the jet of hydrogen is burnt in air, at most mere traces of nitric acid are formed.

Constant volume.—The quantitative results here are much more regular and trustworthy than in the other case: for the long series of data the original paper must be consulted. When the two gases are mixed in equivalent proportions or when the hydrogen is in excess, no nitric acid is formed. When the oxygen is in excess (equal volumes) considerable quantities are produced, increasing with the pressure (0·23 grm. per grm. of hydrogen burnt at two atmospheres, 0·45 grm. at 20 atmospheres). These amounts are enormously greater than those formed during the combustion of carbon or of sulphur. It is to be noted that the temperature of explosion is practically independent of the pressure of the gases, and thus does not influence the amounts of nitric acid formed at different pressures. With a variable excess of oxygen, the amount of nitric acid formed increases slowly with the proportion of oxygen (though the temperature of reaction falls); but this increase soon ceases, and the amount diminishes till, with the gases in the proportion of 1 volume to 5, there is no formation of nitric acid. With any given proportion of hydrogen to oxygen, there is the same tendency to increase of nitric acid with increase of pressure that was noted above. When the proportion of nitrogen increases, the amount of nitric acid formed also increases; but a maximum amount is soon reached here too, as in the case of oxygen. The influence of the increased mass of oxygen or of nitrogen is neutralised or overcome by the influence of the lower temperature and consequent lower electric conductivity. The highest noted formation of nitric acid (1·07 grm. per grm. of hydrogen burnt) was observed in the explosion of a mixture of hydrogen, 1 volume; oxygen, 1·7; nitrogen, 1·3 at a total initial pressure of 16 atmospheres.—J. T. D.

Thionyl Fluoride; Preparation, Properties, and Analysis of ——. H. Moissan and P. Lebeau. Comptes. Rend. **130,** [22], 1436—1442.

Thionyl fluoride is formed by the action on thionyl chloride of fluorine itself and of various metallic fluorides, but the best mode of preparation is to act on thionyl chloride with arsenic trifluoride: the calculated amounts of the materials are introduced into tubes, which are then cooled and sealed, and afterwards raised to 100° C. for half an hour. They are then cooled to — 80° C., opened, and allowed gradually to rise in temperature, the gas evolved being collected over mercury, and purified if necessary by a second cooling and distillation. Thionyl fluoride is a colorless gas of formula SOF_2, without action on glass in the cold, but sharply decomposed with formation of silicon fluoride and sulphur dioxide when heated to 400° C. in glass vessels. Sodium near its melting-point decomposes and completely absorbs thionyl fluoride. Water decomposes it only slowly, producing sulphurous and hydrofluoric acids. Ammonia in small quantity forms an orange solid, which on further addition of ammonia becomes quite white; the two substances correspond respectively with an absorption of $5NH_3$ and $7NH_3$ for $2SOF_2$.—J. T. D.

Sulphurous Acid; Action of Iodides and of Hydriodic Acid on ——. A. Berg. Bull. Soc. Chim. 1900, **23—24,** [12], 499—501.

On exposing mixtures of sulphurous acid with varying quantities of potassium iodide in sealed tubes to the action of sunlight, the author finds that sulphur is gradually deposited and the solution becomes decolorised. This action, which is quicker as the proportion of sulphurous acid to the iodide is made greater, takes place according to the equation: $3SO_2 + 2H_2O = S + 2H_2SO_4$. Light is not a necessary factor in the reaction but has an accelerating effect, the blue and violet rays being the most active in this respect.—T. H. P.

Uranium; Radiation of ——. H. Becquerel. Comptes Rend. **130,** [24], 1583—1585.

Radio-active bodies emit two kinds of radiation: one, cathode rays, deviated by a magnetic or electric field; the other, rays of unknown nature, not so deviated, but possessing in various degrees the power of penetrating substances opaque to ordinary light. Radium emits both kinds of rays; polonium only the second kind; actinium only the first. The author's experiments show that uranium emits rays of the first kind, similar, in regard to the amount of deviation they undergo in a given magnetic field, to those of radium; but the intensity of the radiation is so feeble as to render experiments very difficult.

The author has examined a suggestion made by Debierne and by von Lengyel, that the radiation of uranium is due to impurity. By adding to a solution of uranic chloride some barium chloride, and precipitating the barium by sulphuric acid, a radio-active barium sulphate was obtained which when the amount of barium was small and that of uranium salt large, exhibited even greater activity than the original uranium salt; but, however often this precipitation was repeated, the uranium salt still retained much (about two-thirds) of its original activity. Moreover, two specimens of uranium nitrate given to the author by Lecoq de Boisbaudran, which were the first and last fractions of a long series of fractional crystallisations, were identical in their activity. Hence though commercial uranium compounds may contain an active impurity, they are themselves active.—J. T. D.

Luminescence Spectra; Observations on ——. W Muthmann and E. Baur. Ber. **33,** [11], 1748—1763.

The authors have studied the luminescence spectra afforded by certain of the rare earths and their salts when these are subjected to the influence of cathode rays in a

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highly exhausted tube and the phosphorescent light emitted is decomposed by a prism, according to Crookes' method. Lanthana, yttria, and several specimens of yttrium sulphate and end-fractions from monazite and thoria extractions were examined, the lines observed being shown in diagrammatic form and discussed in detail. On the whole, the observations agree with those of Crookes, Bettendorf, and others.

Lanthanum oxide emits a very bright luminescence of fine grass-green colour; in a vacuum corresponding with the maximum luminosity the region which is most intensely bombarded by the rays has a fiery-red appearance. The author's spectroscopic measurements differ from those of Bettendorf, probably owing to differences in standardising the apparatus.

Yttrium oxide has a lemon-yellow luminescence, but the sulphate glows more brightly and affords a better characterised spectrum. Of four specimens of sulphate, obtained in different ways, two exhibited a lemon-yellow phosphorescence, one a brilliant white, and one a pale rose colour. Fractionation experiments with these, in conjunction with spectroscopic tests, showed that the lines of the spectra formed two groups; one of four lines, found to be due to gadolinium, and one of seven, due to yttrium itself. In three of the specimens gadolinium was thus revealed, and that element was likewise found in the end-fractions of the monazite and thoria fractionations.

Though the luminescence spectrum is apt to show puzzling variations, its value as a qualitative test for the colourless rare earths is great. No spectrum of this kind is exhibited by those readily distinguished earths which give a discontinuous spectrum when heated to a white heat, or give absorption spectra when in solution. The presence of impurities may either increase, weaken, or altogether suppress the luminescence. Thus the presence of CaO or $CaSO_4$ increases the luminosity of Yt preparations ten or twenty-fold and develops lines, not due to these impurities themselves, which are not perceptible with pure preparations.—H. B.

Alcohols; Electrolytic Oxidation of Fatty ——. K. Elbs and O. Brunner. Zeits. f. Elektrochem. 1900, **6**, [51], 604—609.

After referring to the electrolytic oxidation of ethyl alcohol (Dony-Hénault, this Journal, 1900, 542), the authors describe the analytical methods which they have adopted, and then give an account of the electrolytic oxidation of several other fatty alcohols.

Oxidation of Methyl Alcohol.—The products of oxidation are:—formic aldehyde, formic acid, carbon monoxide, and carbon dioxide.

1. Formic aldehyde is the principal product obtained when a bright platinum anode is employed during the electrolysis of an aqueous solution containing 160 grms. of methyl alcohol and 49 grms. of sulphuric acid per litre, the current-density being 3·75 amp. per 100 sq. cm. At a temperature of 30° the current yield of formic aldehyde exceeds 80 per cent. Doubling the concentration of the sulphuric acid in the anode-electrolyte has no influence on the yield. An increase of temperature from 15° ro 30° favours the formation of the aldehyde at the expense of the formic acid and carbon monoxide. Doubling the concentration of the methyl alcohol lowers the yield of formic aldehyde, on account of the formation of methylal.

If a platinised platinum anode be used, the yield of formic aldehyde is reduced to about one-half, carbon dioxide being formed. Formic aldehyde nevertheless remains the chief product of oxidation. A lead peroxide anode acts in the same way, only to a greater extent, the principal product of oxidation being carbon dioxide.

2. The formation of formic acid is unimportant since it amounts, at most, to one-twentieth of the formic aldehyde. Its formation is easiest when a polished platinum anode is used, and it decreases in the same ratio as the formic aldehyde when a platinised or lead peroxide anode is employed.

3. Carbon monoxide is only formed when a bright platinum anode is used and then only as a by-product.

4. With a bright platinum anode, scarcely any carbon dioxide is formed, whereas with a platinised anode the amount formed is considerable and with a lead peroxide anode it is the chief product of electrolysis. Changes in the concentration or in the temperature do not affect this result.

Oxidation of Ethyl Alcohol.—The products of oxidation in this case are aldehyde, acetic acid, carbon dioxide, and scarcely any carbon monoxide. Ethyl alcohol behaves in a different manner to methyl alcohol under similar conditions inasmuch as acetic acid is the principal product when a bright platinum anode is used, the amount of aldehyde being only about one-twentieth of that of the acid. The yield of acid is about 80 per cent. of the current used, whilst in the case of methyl alcohol 80 per cent. of the current was utilised for the formation of aldehyde.

Oxidation of n-Propyl Alcohol.—No matter whether bright or platinised platinum or lead peroxide anodes are used, propionic acid is the chief product of electrolysis; the current yield being about 90 per cent.

Oxidation of Iso-amylalcohol. The results in this case are not exactly comparable with the others since a solution of the alcohol of the same concentration could not be obtained.

Iso-valerianic acid is, however, the principal product formed on oxidation, the current yield being about 80 per cent.

Oxidation of Iso-propylalcohol.—The secondary propyl alcohol is more easily oxidised than the former primary alcohols. Very varying results were obtained, the highest current yield of acetone being 70 per cent.

When an alkaline solution is employed instead of a sulphuric acid solution of the alcohols, condensation products of the aldehydes are obtained.—J. S.

Acids in Organic Solvents; Rapidity of the Action of ——. M. Geiger. Gaz. chim. Ital, **30**, [1], 225—233. Chem. Centr. 1900, **1**, [20], 1061.

The monobasic acids, hydrochloric acid, and nitric acid, examined by the author, behaved, in methyl alcoholic solution like weak acids. Equi-molecular solutions of the two acids in methyl alcohol attacked carbonates with the same rapidity; this is in accordance with the results of Carrara, who found that the molecular conductivities of the two acids in methyl alcohol were almost identical. Sulphuric acid in methyl alcoholic solution had no action on carbonates, nor had formic acid, acetic acid, and chloracetic acid. According to these results, the degree of dissociation of the acids in the solvent plays a great part with regard to the reactive power. On metals, as zinc and magnesium, the acids in the most different solvents appear to act, in general, very energetically.—A. S.

d-Sorbose and l-Sorbose and their Configuration. Lobry de Bruyn and W. A. van Ekenstein. Rec. trav. chim. des Pays Bas, 1899, **21**, 718; Zeits. Ver. deutsch. Zuckerind. 1900, 513—520.

The authors confirm the conclusion of Bertrand that sorbose is a ketose which yields on reduction the two hexites, sorbite and idite. They have further studied ψ-tagatose, a ketose which is obtained, together with *d*-tagatose, by the action of dilute alkalis on galactose, and have now identified this sugar as *l*-sorbose. It is difficult to separate the last 10—15 per cent. of *d*-tagatose from *l*-sorbose by crystallisation, but by dissolving 1 part of ψ tagatose and 2 parts of aniline in 5 parts of absolute methyl alcohol, crystals of ψ-tagatose separate in the pure state and the *d*-tagatose can be crystallised by evaporation of the mother-liquors; its combination with aniline is resolved by the evaporation.

d- and *l*-Sorbose are identical in all their characteristics, with the exception of the sign of the optical rotation of their solutions. The authors formulate the configuration of *d*-sorbose as—

$$CH_2OH.OHCH.HCOH.OHCH.CO.CH_2OH$$

and that of *l*-sorbose (ψ-tagatose) as—

$$CH_2OH.HCOH.OHCH.HCOH.CO.CH_2OH.$$

—J. F. B.

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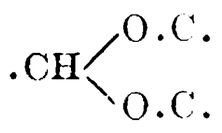
d-Galactose and Milk Sugar; Down-Grade Products of ——. (*d-Lyxose and Galacto-Arabinose.*) O. Ruff and G. Ollendorff. Ber. 1900, **33**, [11], 1798—1810.

By the oxidation of the calcium salt of *d*-galactonic acid with hydrogen peroxide in presence of iron salts, the authors have obtained the pentose, *d*-lyxose, characterised by its osazone (identical with xylosazone) and the formation of *d*-arabite and of lyxonic acid lactone. Full details of the crystallographic properties of lyxose are given in the paper; the authors find $[\alpha]_D = -13{\cdot}9°$.

They have also prepared lactobionic acid by the action of bromine on milk sugar, and have oxidised its calcium salt in a similar manner. They obtained in this way a C_{11} sugar which they term galactoarabinose; they were not able to prepare the sugar in a crystalline state. Galactoarabinose reduces Fehling's solution, and is split up on hydrolysis into galactose and arabinose.

The formation of this sugar from lactobionic acid shows that the free aldehydic group in the milk sugar molecule is contained in the glucose residue. Two types of anhydride linkage of galactose with glucose to form milk sugar have been discussed by Fischer, namely the acetal type—



and the galactoside type, :CH.O.C, analogous to the methyl glucosides.

In order to decide between these two types, the authors prepared galactosidogluconic acid (Fischer and Beensch), and compared its behaviour with hydrogen peroxide with that of lactobionic acid. The two acids behaved very differently, galactosidogluconic acid was only oxidised on heating, and no C_{11} sugar was formed, the principal products being galactose and arabinose. From this difference between the synthetical galactosidogluconic acid and the lactobionic acid from milk sugar, the authors conclude that the anhydride linkage in milk sugar is not of the galactoside type. The fact that galactoarabinose still contains a free aldehydic group indicates that the glucose residue of milk sugar must contain at least two intact secondary alcohol groups next to the aldehydic group, *i.e.*, the sequence CHOH.CHOH.CHO. Hence the number of possible constitutional formulæ of the acetal type of condensation is reduced to three.—J. F. B.

Erythrulose; Hydrogenation of ——, *and the Preparations of a new Erythritol.* G. Bertrand. Comptes Rend. **130**, [22], 1472—1475.

By the action on erythrulose (this Journal, 1900, 677) of sodium amalgam in the cold, in the presence of sufficient weak sulphuric acid to prevent the liquid from becoming alkaline, a liquid is formed from which, after precipitating the sodium sulphate by alcohol and concentrating the clear solution, quadratic crystals of ordinary erythrite are obtained. On treating the mother liquors with sulphuric acid and benzaldehyde, crystals separate out, which when washed and decomposed by steam, yield ultimately a syrup, setting to a mass of silky crystals (rhombohedrons) of an erythrite agreeing in all respects with the lævo-rotatory erythrite prepared by Maquenne from xylose, save that their rotation is opposite in sign and equal in amount.—J. T. D.

Tobacco; Chemistry of ——. R. Kissling. Chem. Zeit. **24**, [45], 488—489.

The most important discoveries in 1898–99 were in connection with the culture of the tobacco plant. The new fertiliser "martellin" (potassium silicate) has proved a great success. As powder, it can be strewn upon the ground; in the form of a syrup and mixed with three times its amount of water, it can either be applied to the soil or used for watering the plants. Among the good effects produced by it are, early and uniform ripening, increased capacity for withstanding disease, better colour of the dried tobacco, much improved burning, and more elastic nature of the leaf.

Behrens in his studies on the tobacco plant has established the fact that the softness and ductility of the leaf are in a large measure dependent upon the amount of water it contains.

The calica, mosaic, or spot disease of the leaf, according to Beyerinck and Wood, is caused by an enzyme, and is intimately connected with the nutritive processes. Sturgis recommends the use of ammoniacal copper carbonate solution as an antidote for germ diseases, in preference to the Bordeaux mixture, as it is more easily washed in by rain. Loew has sought to prove that the fermentation of green tobacco is conditioned by the presence of two oxidising enzymes, and that these are of chief importance in the development of colour and aroma; these views, however, are contested by Behrens.

A patent has recently been taken out by Landfried for pipe-cartridges made of molybdenum salts, which absorb nicotine but not other basic constituents which cause aroma.

An advance is also to be chronicled in analytical work. Sinnhold has investigated 31 kinds of cigars, and found the nicotine-content to vary between 0·97 and 2·96 per cent. For cigarette and pipe tobaccos the figures are 0·52—0·80 and 0·85—2·90 per cent. respectively. A method of estimating citric and malic acids through the barium salts has been devised by Kissling, who found these acids to be present to the extent of 0·96—3·72 and 3·78—10·40 per cent. respectively. As a test for nicotine, Schindelmeiser has proposed the use of formaldehyde (or strong formic acid) and nitric acid, which cause a rose-red coloration. An investigation of tobacco smoke by Thoms has shown the presence of nicotine and pyridine in the proportion of 6:1, of carbon monoxide (20 c.c. of which were obtained from 1 kilo. of tobacco), and of an unknown, very poisonous ethereal oil.

Finally, from the evidence adduced at present, it seems that the toxicological action of tobacco smoke is to be ascribed to nicotine and not to carbon monoxide.—E. H. T.

ERRATUM.

This Journal, 1900, 697, col. 1, line 5 from top: the omitted page is "682."

New Books.

SEWAGE, AND THE BACTERIAL PURIFICATION OF SEWAGE. By SAMUEL RIDEAL, D.Sc. Robt. Ingram, Pleydell House, Pleydell Street, Fleet Street, London, 1900. Price 14*s*.

LARGE 8vo volume, containing 267 pages of subject-matter, illustrated with 47 wood engravings and 4 plates; with 13 figures, representing microscopic preparations; preface, table of contents, and alphabetical index. The following are the leading themes treated in the course of the volume:—I. Characters of Sewage, and Primary Methods of Disposal. II. Chemical Analysis of Sewage and Effluents. III. Chemical Analysis. IV. Bacteria occurring in Sewage. V. Chemical Changes produced by Bacteria. VI. Irrigation and Sewage Farms. VII. Subsidence and Chemical Precipitation. VIII. Sterilization. IX., X., and XI. Bacterial Purification. XII. Agricultural Value of Bacterial Effluents. Distribution and Distributors. Trade Effluents.

PURE AIR, OZONE, AND WATER: A PRACTICAL TREATISE OF THEIR UTILISATION AND VALUE IN OIL, GREASE, SOAP, PAINT, GLUE, AND OTHER INDUSTRIES. By W. B. COWELL. Scott, Greenwood, and Co., 19, Ludgate Hill, London, E.C. 1900. Price 5*s*.

SMALL 8vo volume, containing 82 pages of subject-matter, illustrated with 12 wood engravings. It contains also preface, table of contents, and an alphabetical index. The leading subjects of the several chapters are as follows:—I. Atmospheric Air. II. Compressed Air. III. Liquid Air. IV. Purification of Water. V. Fleshings and Bones. VI. Ozonised Air in the Bleaching and Deodorising of Fats, Glues, &c. Appendix, with general information and tables.

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FLESH FOODS, WITH METHODS FOR THEIR CHEMICAL, MICROSCOPICAL, AND BACTERIOLOGICAL EXAMINATION. A Practical Handbook for Medical Men, Analysts, Inspectors, and others. By C. A. MITCHELL, B.A. Chas. Griffin and Co., Ltd., Exeter Street, Strand. 1900. Price 10*s.* 6*d.*

THIS work, dedicated by the author to Mr. Otto Hehner, is an 8vo volume with coloured plate as frontispiece, representing Eber's Colour Scale for sulphuretted hydrogen estimations; preface; table of contents; list of illustrations, 58 in number; subject-matter, filling 322 pages, and the alphabetical index. The general scheme of the work may be gathered from the following outline of the contents:—I. Structure and Chemical Composition of Muscular Fibre. II. Structure and Composition of Connective Tissue and Blood. III. Flesh of different Animals. IV. Examination of Flesh. V. Methods of examining Animal Fat. VI. Preservation of Flesh, and the Composition and Examination of Preserved Flesh Products. VII. Composition and Analysis of Sausages. VIII. Proteids of Flesh. IX. Meat Extracts and Flesh Peptones. X. Cooking of Flesh. XI. Poisonous Flesh. XII. Animal Parasites of Flesh. XIII. Bacteriological Examination of Flesh. XIV. Extraction and Separation of Ptomaïnes.

TRAITÉ DE CHIMIE ANALYTIQUE QUALITATIVE, SUIVI DE TABLES SYSTÉMATIQUES POUR L'ANALYSE MINÉRALE. Par LOUIS DUPARC, Professeur ord. de Minéralogie et de Pétrographie à l'Université de Genève, &c., et EMILE DEGRANGE et ALFRED MONNIER. Henry Kündig, 11, Corraterie, Genève. 1900. Price 5*s.* Félix Alcan, 108, Bd. St. Germain. Sampson Low, Marston, and Co., Ltd., St. Dunstan's House, Fetter Lane, Fleet Street, London.

LARGE 8vo volume, containing preface, introduction, 165 pages of subject-matter, and twenty-one tables. There are interleaved in the text numerous blank pages for the entry of notes, &c. I. Reagents used in Analysis: By the Wet Methods: By Dry Methods. Colouring Matters used in Analysis. Spectrum Analysis. II. Reactions of Bases. Reactions of Acids. III. Systematic Tables for Mineral Analysis.

L'INDUSTRIE CHIMIQUE EN ALLEMAGNE: ORGANISATION ÉCONOMIQUE, SCIENTIFIQUE ET COMMERCIALE. J. AUGUSTE TRILLAT, Expert Chim. au Tribunal civil de la Seine. Librairie, J. B. Baillière et Fils, 19, rue Hautefeuille, près du Boulevard Saint-Germain. 1900. Price Fr. 5.

THIS work is an *exposé* of the condition of the chemical industries of Germany. It forms a small 8vo volume containing preface, introduction, and 480 pages of subject-matter. The table of contents is placed at the end, and is followed by the alphabetical index.

The subject is treated according to the following general scheme:—I. GENERAL ECONOMIC SITUATION OF GERMANY. II. THE CHEMICAL INDUSTRIES. (i.) Historical. (ii.) Coal and Metallurgy. (iii.) Acids, Alkalis, and Salts. (iv.) Pharmaceutical Chemicals and Drugs. (v.) Organic and Mineral Colours, Lakes, &c. (vi.) Various Industries. (vii.) Electrochemical and Electrometallurgical Industries. III. ECONOMIC ORGANISATION. IV. SCIENTIFIC ORGANISATION. (i.) Universities and Schools. (ii.) Applied Chemistry in Germany. (iii.) Schools of Chemistry and of Technology in Germany. V. COMMERCIAL ORGANISATION. (i.) Chambers of Commerce and Industry. Various Associations, &c. (ii.) Laboratories Journals. Patents, Treaties of Commerce, &c.

SPECTRALANALYTISCHER NACHWEIS KÜNSTLICHER ORGANISCHER FARBSTOFFE. Zum Gebrauche bei wissenschaftlichen und gewerblichen Untersuchungen. Bearbeitet von J. FORMÁNEK, Ing. Chem. k. k. Inspektor an d. staatlichen Untersuchungs-Anstalt für Lebensmittel in Prag. Julius Springer, 3, Monbijouplatz, Berlin, N. 1900. Price M. 10.

8vo volume containing preface, list of abbreviations, and table of contents. The subject-matter occupies 187 pages, 3 pages are filled with tables, and an alphabetical index of dyestuffs, occupies 6 pages. The remainder of the work is filled with 58 tables representing the spectroscopic characteristics of the colouring matters. Pages 43 to 187 are filled with tabulated schemes for identifying the various dyestuffs. The following abstract of contents represents the general classification adopted throughout the work:—

I. INTRODUCTION.—(*a.*) General Remarks. (*b.*) Optical Properties of Dyestuff Solutions. (*c.*) Theory of Absorption Spectra. (*d.*) Influence of Solvents, Reagents, and Temperature. (*e.*) Relation between Absorption and Colour. (*f.*) General Arrangement of the Absorption Spectra. (*g.*) Principles of the Spectroscopic Method.

II. The Spectroscope, &c. III. Solvents and Reagents. IV. Investigation of Combined Dyestuffs. V. Arrangement, &c., of Groups of Dyestuffs. VI. Tables. VII. List of Dyestuffs. VIII. Tables. Arrangement of Groups of Dyestuffs. Absorption Spectra of the Dyestuffs.

Trade Report.

LEGISLATION; TARIFF CHANGES AND CUSTOMS REGULATIONS.

CARBOLIC ACID.

London Gazette, July 31, 1900.

Whereas by "The Pharmacy Act, 1868," section two, it is enacted that the Council of the Pharmaceutical Society of Great Britain may, from time to time, by resolution, declare that any article in such resolution named ought to be deemed a poison within the meaning of that Act; and thereupon the said Society shall submit the same for the approval of the Privy Council, and that, if such approval shall be given, then such resolution and approval shall be advertised in the London Gazette, and on the expiration of one month from such advertisement the article named in such resolution shall be deemed to be a poison within the meaning of that Act.

And whereas the Council of the Pharmaceutical Society of Great Britain did, on the 4th day of July 1900, resolve and declare by virtue and in exercise of the powers vested in the Council of the Pharmaceutical Society of Great Britain, that liquid preparations of carbolic acid and its homologues containing more than 3 per cent. of those substances, except any preparation prepared for use as sheepwash or for any other purpose in connection with agriculture or horticulture, and contained in a closed vessel, distinctly labelled with the word "Poisonous," the name and address of the seller, and a notice of the agricultural or horticulturai purpose for which the preparation has been prepared, ought to be deemed poisons within the meaning of the Pharmacy Act, 1868, and ought to be deemed poisons in the second part of the Schedule A. of the said Pharmacy Act, 1868.

And whereas the said Society have submitted the said resolution for the approval of the Privy Council, and the Lords of the Privy Council are of opinion that the said resolution should be approved.

Now, therefore, their Lordships are hereby pleased to signify their approval of the said resolution.

A. W. FITZROY.

SODIUM PEROXIDE; CARRIAGE OF ——.

Official Notice XXIII., $\frac{\text{M. 11,046}}{1900.}$

The Board of Trade are advised that although peroxide of sodium by itself is not an explosive, yet when it comes into contact with any combustible substance it becomes a highly dangerous material, and therefore to ensure safe carriage of this substance on board ship, it is necessary that it should be packed in iron or steel drums sufficiently strong to stand rough usage without allowing any of their contents to escape, and not too large for ready handling. The drums should not be stowed in a space containing combustible material.

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Wood Pulp from Canada; Export of ——.

U.S. Cons. Report, July 1900.

Consul-General Turner writes from Ottawa, April 25, 1900:—

In response to Department instruction of April 7, I have to report that there has been no legislation prohibiting the export of pulp wood in the Provinces of Nova Scotia, British Columbia, or Quebec.

Tariff Modifications in British Honduras.

Bd. of Trade J., Aug. 9, 1900.

Coming into force on the 23rd June last and remaining in force until 31st January 1901:—

1. The general rate of duty *ad valorem* has been increased from 10 to 10½ per cent.

2. The following articles, which were formerly exempted from import duty, are now to be subject to the general rate of duty *ad valorem:—cement and lime; pitch and tar; salt, other than table salt; asbestos paint.*

Customs Tariff in British Guiana.

See Bd. of Trade J., Aug. 9, 1900, *page* 300.

Customs Decisions in Victoria.

See Bd. of Trade J., Aug. 9, 1900, *page* 318.

Customs Decisions in United States.

Bd. of Trade J., Aug. 9 *and* 23, 1900.

Type ashes.—So-called type ashes containing 56·35 per cent. of lead, 0·53 per cent. of copper, and a trace of zinc are dutiable at 2⅛ cents. per pound, as lead dross, under paragraph 182 of the Tariff.

Lysol.—Lysol is dutiable at the rate of 20 per cent. *ad valorem* under paragraph 15 of the Tariff as a non-medicinal coal tar preparation (not a colour or dye) not specially provided for, and not as a chemical compound or a medicinal preparation.

Glycerin; American Customs and ——.

22,258; *U.S. Treasury Department, June* 1, 1900.

The U.S.A. Treasury Department has prepared a series of regulations for the allowance of the duty paid on imported glycerin used in the manufacture of nitro-glycerin, dynamite, and other explosives, as follows:—

"On the exportation of dynamite and other explosives in the production of which all the glycerin used was imported, a drawback will be allowed, equal in amount to the duties paid on the glycerin so used, less the legal deduction of 1 per cent.

"The quantity of such glycerin shall be determined by allowing 46·2 lb. of the same for each 100 lb. of nitro-glycerin contained in the exported articles. When the glycerin used in the manufacture of dynamite, or other explosives, was refined in the United States for imported crude glycerin, the quantity of crude glycerin so used shall be determined by adding to the allowance of 46·2 lb. of glycerin for each 100 lb. of nitro-glycerin contained in the exported article 22 per cent. of such allowance.

"The drawback entry must show the number and size of cartridges and other packages contained in each shipping case, the trade names or marks by which the several forms and grades of the explosives are designated, the quantity of each kind or grade, and the percentage of nitro-glycerin contained in each grade, respectively. The weights of the several kinds of uniform packages shown by the drawback entry shall be tested by a United States weigher when ordered by the collector.

"Samples may be taken or sworn samples furnished, as ordered by the collector, to be submitted to the appraiser for his report relative to the requisite conditions noted.

"Before the liquidation of any such drawback entry, there must be filed with the collector at the port of exportation a sworn formula or statement by the proprietor and foreman of the factory where the explosives are made, showing the percentage of nitro-glycerin used in the manufacture of the several brands or grades of explosives made in such factory for exportation, and no drawback shall be allowed on any excess over the quantity taken in the manufacturer's formula so filed, without special instructions from the department."

Alcohol; Duty-free ——, in Germany.

Chem. and Druggist, Aug. 18, 1900.

The new regulations for the use of duty-free alcohol have just been published, and come into force on October 1. The details, which are very exhaustive, enact that alcohol for technical purposes, for the preparation of vinegar, for cleaning, heating, cooking, or lighting, or for scientific and medical purposes, may be used duty free, subject to the special denaturing conditions. The denaturing may either be complete, rendering the alcohol quite unfit for drinking, or partial, in which case further measures would have to be taken to prevent it being put to fraudulent uses. In the first case, 25 litres of a mixture of 4 parts of wood-spirit and 1 of pyridine are added to every 100 litres of alcohol. In the second case a list is given of the different means to be employed, according to the use to which the alcohol is to be put. For the preparation of celluloid and pegamoid 1 kilo. of camphor or 2 litres of turpentine oil or 0·5 litre benzol is to be used with every 100 litres of alcohol. In like manner for the preparation of agaricin, podophyllin, and other resins, the acetates of lead, photographic plates and papers, chloral hydrate, collodium pancreatin, alkaloids, salicylic acid and its salts, santonin, tannin, and colours obtained from coal-tar, 10 litres of ether or 1 litre of benzol must be added; failing these 0·5 litre of turpentine oil or 0·025 litre of ol. animale fœtid. The use of perfumes or other preparations to cover the smell or the taste of the denaturing materials is not allowed, and in places where such alcohol is sold there must be a printed notice to that effect, also stating that it is not allowed to be sold with less than 80 parts by weight of alcohol. A supervision of the stock will take place once a year. Duty-free and undenatured alcohol may be sold to pharmacists and manufacturers of medicines, to hospitals, laboratories, and gunpowder factories. Apothekers may use such alcohol for the preparation of special medicaments given in a list, ext. nuc. vom., spt. camphorat., tr. digital., tr. iodi, tr. opii, tr. nuc. vom., &c.—in all about eighty articles. A certain quantity is allowed yearly, and to obtain more the vendor must prove by his laboratory journal that the quantity he has been supplied with does not suffice for the extent of his business. Alcohol may be exported from Germany without having to pay Excise duty if in the form of essences, fluid extracts, tinctures, or perfumes. All these sold in Germany must pay Excise duty. This export regulation enables the German manufacturer to compete with foreign producers in their own country.

Saccharin into Greece; Prohibition of Importation of ——.

Bd. of Trade J., Aug. 2, 1900.

The Board of Trade have received information, through the Foreign Office, to the effect that a Greek Royal Decree has been issued prohibiting, from the 17th ult., the importation of saccharin into Greece on the ground that it is injurious to health. Apothecaries are, however, permitted to introduce annually, for pharmaceutical purposes and under certain conditions, small quantities not exceeding 100 drams in each case (= about 11 oz.).

Russia: Increase of Import Duties.

Complete Statement in Bd. of Trade J., Aug. 16, 1900.

1.—*Increase of Fifty Per Cent.*

Beer and cider; caoutchouc and gutta-percha, and other gums in general.

2.—*Increase of Thirty Per Cent.*

Paraffin; vaseline; wax.

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3.—*Increase of Twenty Per Cent.*

Animal fats, candles; porcelain ware (except majolica), liquid products of petroleum, &c., oil and spirit of turpentine.

4.—*Increase of Ten Per Cent.*

Bone glue; small hides, tanned, &c. (former duty, 16 rs. 50 cop. per poud); large hides, tanned, &c. (former duty, 9 rs. per poud); drainage and water pipes of clay (former duty, 9 cop. per poud); china ware, white or of one colour dyed in the paste (former duty, 1 r. 50 cop. per pond); white or half white glass and glass ware not specially tariffed, pressed or moulded (former duty, 3 rs. per poud); glass ware not specially tariffed of a single colour or double coloured glass, dull, opaque white, fluted, &c. (former duty, uncut 9 rs. per poud, cut 15 rs. per poud); glassware of all kinds, painted, enamelled, gilt, &c. (former duty, 15 rs. per poud); sheet glass, neither moulded nor polished; plate-glass and mirrors.

Caoutchouc, crude, and articles thereof, not specially tariffed; various chemical products, including sal ammoniac, carbonate of ammonia, soda and potash, chloride of lime, acids, &c.; castor oil, cocoa nut and palm oil, volatile and sweet scented oils; soap, varnishes, tanning extracts; indigo; various colours; cardboard and pasteboard; sized and unsized paper of all kinds; wall-paper.

5.—*Other Rates.*

The under-mentioned are dutiable at the increased rates stated:—Firebricks and roofing tiles, unglazed, 7 cop. per poud; paper pulp, 35 cop. per poud; cellulose, 60 cop. per poud; cardboard of wood pulp, not unmanufactured, 50 cop. per poud.

Rags of all kinds, except woollen rags, formerly free of duty, are now to pay 3 rs. 50 cop. per poud, unless destined for the manufacture of paper.

Caoutchouc; Export Duties on ——, in Peru.

Bd. of Trade J., Aug. 2, 1900.

The Board of Trade have received, through the Foreign Office, a translation of a decree, issued by the Peruvian Government on the 23rd May last, relative to the duties leviable upon caoutchouc exported from Peru. In the grants of rubber plantations conceded by the Minister of Public Works, it is stipulated that, over and above the rent of 2 sols. per quintal of rubber extracted, a corresponding export duty shall be paid if the said rubber be exported. It has therefore been decided—

1. To recover in the maritime Custom Houses of the Republic—

(*a*) The rents already overdue, and those that may become due for rubber plantations, at the rate of 2 sols. per quintal of rubber exported.

(*b*) An export duty of 5 cents per kilogramme of caoutchouc and of 1 cent per quintal of fine rubber exported, or that may be exported, on the contracts signed by the Minister of Public Works for the working of rubber plantations.

2. That the Custom Houses shall exact that the name of the place from which the rubber proceeds or is gathered, as also the contract to which it belongs, shall be declared in the permit of exportation; and that, in case the rubber proceeds from Bolivia, the necessary documentary proof must be presented.

Export Duties in Columbia.

Bd. of Trade J., Aug. 16, 1900.

A decree of June 11th repeals the decree of April 24th and providing for the levy of export duties as follows:—

	Per Quintal.
Rubber	5 pesos (2*s.*)
Cow hides	3·20 „ (1*s.* 3*d.*)
Goat skins	4·50 „ (1*s.* 10*d.*)
Gold and silver	2 per cent.

Matches; Importation of ——, into Venezuela.

Bd. of Trade J., Aug. 23, 1900.

The importation of all kinds of matches, which has hitherto been prohibited, may be allowed through the Custom Houses of the Republic on payment of a duty of 250 bolivares and 12½ per cent. thereon per kilogramme.

Tariff Modifications in Argentine Republic.

Bd. of Trade J., Aug. 16, 1900.

Tariff No.	Article.	Valuation.	New Duty. Rate of Duty *ad val.*
		Pesos. Cts.	Per cent.
2300	Mineral pitch.....	10 kilos..... 0 08	10
2328	Sulphate of copper..	Kilo..... 0 14	10
2344	"Quillay" bark.....	100 kilos. (gross wt.) 2 50	5
2736	Medicinal liquors in general	Dozen botts. 6 00	25
	"Scagliola" (sulphate of lime)	Declared value.....	5
3110	(Sulphur in general) —Suppressed, sulphur being already provided for under the Tariff Nos. 2283 and 2284.		

EXTRACTS FROM DIPLOMATIC AND CONSULAR REPORTS; GENERAL TRADE NOTES, &c.

II.—FUEL, Etc.

Coal; Price of ——.

The average prices of coal at pit's mouth in various countries, according to the *Statist*, is as follows:—

	Per Ton. *s.*	*d.*
United Kingdom	6	4½
United States	4	5
France	9	0
Germany	7	4½
Belgium	8	9½

These are averages on the basis of the production of 1898. Prices are higher now. The average price of exports of coal from the United Kingdom last official year came to 10·72 shillings per ton against 8·98 in 1897.

Peat; Use of—. [Moss Litter.]

Foreign Off. Ann. Ser. No. 2490, *July* 1900.

An English syndicate is engaged in erecting a large moss litter factory a few miles from Halmstad, Sweden, where the syndicate has acquired an extensive peat bog suitable for this industry. The moss litter produced is chiefly intended for export, and the starting of the enterprise is looked forward to with much interest as being of great importance to the locality.

Peat as Fuel.

Commercial and Industrial Gazette (official), St. Petersburg, 15—28 *June,* 1900.

"The great importance of peat as fuel, especially at the present moment, when all kinds of fuel, wood, coal, and naphtha, are incessantly running up in price, has often been referred to in these pages. Peat bogs abound in Russia, with supplies for an indefinite period, but a successful working of these bogs would depend upon being able to produce the peat ready for use at low prices.

"The peat briquettes hitherto prepared have contained too much moisture, giving an extremely poor heat-capacity. The Ministry of Ways has lately organised a whole series of investigations and experiments with regard to manu-

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facture of peat briquettes, and, it is said, these endeavours have been crowned with success. Without at present entering into details it may be said that it has been decided to erect special works for the purpose, while prices of peat fuel with greater heat-producing power will probably be low enough to correspond to a cubic sajen of firewood at 10—11 roubles, the price of firewood at St. Petersburg at present being 16—17 roubles the cubic sajen (1 sajen = 7 feet). The railway administration has formed a special department to consider the subject.

III.—PETROLEUM, Etc.

Petroleum: Algeria.

Foreign Office Annual Series, No. 2472, July 1900.
Amer. Cons. Report, July 1900.

Three companies have applied for concessions for working petroleum mines at Aïn Teft (department of Oran), in the Tiliovanet district in the commune of Hillil.

"M. Henry Neuberger, intrusted by the governor-general with a geological exploration in Algeria, has just furnished information as to the first part of his expedition into the department of Oran. According to his report, the West Algerian petroleum-bearing basin offers 14 districts rich in oil, extending north-west to south-east for a length, in the southern district, apparently exceeding 124 miles. If the report of the discovery is reliable, the nature of these soils is in all respects similar to that of the rich beds of Baku and Galicia, which promises a prosperous future for petroleum exploitation in Algeria. On the other coast, petroliferous levels reappear in the department of Constantine. Applications for concessions to work these beds have already been made by 10 or more financial companies."

Petroleum: Roumania.

Foreign Office Annual Series, No. 2468, July 1900.

Petroleum has made great progress of late. The mode of transport is very primitive and is detrimental to the industry. If the price of the transport becomes reasonable, there can be no reason why Roumania should not compete with the United States and Russia. The prime necessity is that ports on the Black Sea and the Danube should be connected by pipe lines with the petroleum centres.

Statistics for 1898.

	Quantity.
	Tons.
Refined	93,382
Residue	21,290
Exported	19,511
Total production	134,180

Oil Pipe-Line in Russia.

U.S. Cons. Rep., July 1900.

The first section of the largest oil pipe-line in the world for the transportation of refined oil has just been completed, and its operations were started on the 7th of April 1900.

The pipe-line was constructed by the engineers of the Trans-Caucasian Russian State Railway. The pipe runs parallel to the railway track, which is 560 miles long. It is intended to run it the whole length of the Trans-Caucasian Railway, from Baku to Batum, the first section, just completed, being 145 miles.

The pipe is wrought iron, lap-welded, having an internal diameter of 8 inches, and was made in Russia from native materials.

The first section has three pumping stations, each station having two pumping engines, one for continuous working and the second for reserve. There are six compound high-duty pumping engines with condensers and compensating cylinders, each engine having steam cylinders 21 and 42 inches in diameter, plungers of 8½ inches, all having an uniform stroke of 24 inches. Each engine works against a pressure in the delivery pipe of 650 pounds to the square inch, the steam pressure being 150 pounds to the square inch. Against this heavy pressure of 650 pounds per square inch, each engine will be required to deliver 416,275,200 gallons per year, this being the quantity of oil which will be pumped through this pipe.

IV.—DYESTUFFS, Etc.

The Alizarin Combine.

Chem. Trade J., Aug. 11, 1900.

It has been arranged that two of the continental makers, Messrs. Neuhaus and Messrs. Gauhe, are to cease manufacturing so that the world's requirements for the moment will be left in the hands of the Badische Anilin und Soda Fabrik, Messrs. F. Bayer and Co., Messrs. Meister, Lucius, and Brüning, and the British Alizarin Co. This combination has raised the price of anthracene by 30 per cent. As, however, the latter is cheap enough some idle alizarin works will be restarted at once.

The ultimate effect upon the anthracene market cannot be easily foreshadowed, but there is so much anthracene, especially B quality, at the moment absolutely a waste product, with which the market could be promptly deluged that we fear any substantial rise in price must not be looked for in the immediate future.

Alizarin, Aniline, Coal-tar Products; Production in Germany.

Foreign Office Annual Series, No. 2484, July 1900.

Year.	Quantity in Tons. Alizarin.	Aniline Oil Alkaloids.	Analine, and other Coal Tar Products.
	Tons.	Tons.	Tons.
1883	4,008	663	3,819
1884	4,291	686	4,822
1885	4,284	1,713	4,646
1886	4,529	1,699	5,702
1887	5,985	2,137	6,544
1888	6,732	2,528	6,906
1889	7,793	2,998	6,975
1890	7,906	3,830	7,280
1891	8,169	4,403	8,680
1892	7,677	4,660	10,725
1893	8,036	4,096	11,560
1894	7,735	6,318	12,368
1895	8,928	7,135	15,789
1896	8,526	7,708	16,233
1897	8,641	9,178	17,639
1898	9,321	12,360	19,712
1899	9,586	12,275	22,704

VI.—DYEING, Etc.

Arsenic in German Textiles.

U.S. Cons. Rep., July 1900.

According to a report from Consul Hughes, of Coburg, dated April 5, 1900, a contention has arisen between German exporters and the Swedish Government, the latter asserting that there are traces of arsenic in textile materials exported from Germany, such as carpets, wall papers, furniture covers, toys, &c. The German manufacturers claim that this is not so. In one way, says Mr. Hughes, this will be a strictly chemical fight, as the Swedish Officials will say that their examinations were properly made, and the Germans will insist that if arsenic was found it was due to the use by the Swedish chemists of impure chemicals in making the tests.

Fuller's Earth in the U.S.

According to the *Chicago Chronicle*, there was recently discovered near the Ocklockonnee River, 14 miles west of the city of Tallahassee, Florida, a vein of very pure fuller's earth.

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VII.—ACIDS, ALKALIS, AND SALTS.

Trade of Gothenburg, Sweden.

Foreign Office Annual Series, No. 2490, *July* 1900.

The manufacture of *bleaching powder* by an electrical process, recently commenced in this country, does not seem to affect the import of this article, which, as hitherto, is obtained from the United Kingdom in increasing quantities.

Alkali, extensively used by the glassworks, wood-pulp and paper-mills, as well as by the textile industry, is chiefly supplied by the United Kingdom.

Glauber salts, an important and increasing article of import to this country, finds its most prominent consumers among the glass and wood-pulp manufacturers.

Salt; Production of ——, in British India.

Bd. of Trade J., Aug. 2, 1900.

According to a return received at the Board of Trade from the India Office, the total quantity of salt produced in India, in 1899, was 25 millions of maunds.* This quantity was supplemented by 11,379,520 maunds of imported salt, the total quantity produced and imported amounting to 36,379,795 maunds, over 68 per cent. of the whole being produced in India. Importation is practically limited to salt brought to Bengal and Burma from England, Germany, other countries in Europe, Aden, Muscat, Jeddah, and a few other places. Only a quite insignificant quantity is imported elsewhere than in Bengal and Burma, but there is also a trifling trans-Himalayan import. The localities where salt is manufactured, and the output in each of the last three years, are shown in the following table:—

——	1897.	1898.	1899.
	Maunds.	Maunds.	Maunds.
Burma—Coast, and some brine wells in Upper Burma.	620,060	496,352	559,320
Bengal—Orissa chiefly ...	162,351	..	..
Northern India—			
Sambhar	2,382,888	5,813,333	2,134,545
Panjab mines and Kohat.	1,927,375	2,946,863	2,969,680
Rajputana sources other than Sambhar.	854,098	776,113	1,414,521
Mandi, Sultanpur, Gwalior, and the saltpetre refineries.	307,161	270,669	260,720
	5,471,522	9,806,978	6,779,466
Sind—Moach (near Karachi), Saran and Dilyar deposits.	280,115	333,397	312,448
Bombay—Coast and Runn of Kutch.	10,768,345	9,352,639	10,019,664
Madras—East coast.....	6,579,120	6,856,537	7,329,377
Total	23,881,513	26,845,903	25,009,275

* Maund = 82⅔ lb. avoirdupois.

Salt; Statistics of all —— Exported and Coasted in the United Kingdom.

Chem. Trade J., July 28, 1900, 61.

The total for June was 86,513 tons, showing an enormous depression of nearly 28,000 tons. Runcorn and Manchester Ship Canal alone have fallen off 13,000 tons, Liverpool 2,600, Middlesbrough district 8,000, and Fleetwood 4,000. The depression is mainly attributable to the unaccountable reduction of 20,000 tons in coastwise trade, Scotland alone showing a falling off of 13,000. So far this year the British salt trade is 103,000 tons behind 1899.

Salt: Gothenburg.

Foreign Office Annual Series, No. 2490, *July* 1900.

The total import of salt slightly exceeded the usual quantity, but there was a decline in the demand for Liverpool and Middlesborough salt, owing to the failure of the herring fishing on this coast.

Borax in Chili.

Foreign Office Annual Series, No. 248, *July* 1900.

The valuable borax fields of Chilcaya, which are situated in the neighbourhood of Arica in the north of Chile, labour under the disadvantage of being about 114 miles from the coast. They are worked by foreigners and among them is one British company. The opening up of this rich district depends upon the possibility of being able to convey the products cheaply to the coast.

Large quantities of machinery have arrived at Tocopilla for the purpose of opening up borax works in the neighbourhood. It is expected that the certainty of a return freight will attract the muleteers to the Chilcaya district. This is a most important matter as the opening up of that rich district depends on cheap transit.

There is a probability of the Maricunga borax deposits in the neighbourhood of Caldera being opened up with the aid of British capital.

Borax in the Argentine Republic.

Foreign Office Annual Series, No. 2480, *July* 1900.

In the province of Jujuy there is a group of mines, 16 in number, of borax, situated about 90 miles from the railway line at the town of Jujuy, though a branch is projected nearer to the mines. Recently the official assayer of the mint in Buenos Ayres made an analysis of a sample of borate of lime taken from these mines with the following result:—

	Per Cent.
Boric acid.....	40·651
Oxide of calcium	13·547
„ sodium	6·082
Chloride of sodium	4·97
Water (hygroscopic and combined).....	33·90
Insoluble sand	0·85
	100·00

This sample showed a higher percentage of boracic acid than one from the province of Salta. From a report on the borax mines, furnished by Mr. C. H. Hoskold of the Mining Department here, is extracted the following:—

"It appears that the borate deposits present themselves at the surface over a portion of the mines, and in other portions the deposit is covered with a slight depth of ordinary soil. The cost of transport and production from the mines to Buenos Ayres is estimated at 5*l.* 4*s.* 2*d.* per ton, in sacks; the cost from Buenos Ayres to a port in the United Kingdom might be from 20*s.* to 22*s.* per ton, more or less; the value in the United Kingdom could be determined only after assay."

Sulphur in Gothenburg.

Foreign Office Annual Series, No. 2490, *July* 1900.

Sulphur, both chemical and raw, largely used in the manufacture of wood-pulp, is imported from the United Kingdom and Sicily, the greater quantity consisting of raw sulphur from Girgenti.

Sulphur in Chili.

Foreign Office Annual Series, No. 2481, *July* 1900.

The sulphur mines round Arica are doing fair business, but they are hampered by the lack of railways and transit is expensive; 1979 tons of sulphur were exported from this port. From Taltal the shipments amounted to 7 tons. From the extensive deposits of native sulphur, about 110 miles N.E. of this port, several small shipments of 90 per cent. purity have been made to Iquique. Sulphur is also found near Pisagua.

IX.—CEMENTS, Etc.

British Cement in United States.

Bd. of Trade J., July 19, 1900.

A despatch, dated 25th June last, has been received at the Foreign Office from the British Commercial Agent at Washington, in which it is stated that only a comparatively

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small quantity of British cement goes to Chicago, though a considerable quantity reaches that city from other European countries. According to some, this is owing to the good show of cement that Germany and Belgium made at the World's Fair. They increased their trade then, and have continued to do so since. Others, again, say that it is because British manufacturers do not push their brands as much as the other two countries named. Few travellers selling cement arrive in Chicago, and while both the Belgian and German makers advertise frequently in the trade and other newspapers, British manufacturers do it but seldom.

Though a considerable quantity of cement is being manufactured in the United States the demand is greater than the supply. If British makers cannot compete with their European competitors in price, there ought to be an opening in the States for British capital to be invested in the manufacture of high-class cement.

Cement: German Exports.

Engineering, July 27, 1900.

Exports of German cement have increased very rapidly lately. During 1894 the exports of this article from Germany amounted to 362,000 tons, and in 1899 to 528,700 tons. The United States is the largest buyer of German cement, with imports of 150,000 tons; next comes Australasia, with about 33,000 tons; and China with 25,000 tons. The exports to China show considerable increase, whilst those to Japan have almost closed. Brazil, Chili, and the Cape are also good customers. In Europe the largest receivers were Great Britain, Norway, and Portugal.

Cement Trade in Various Countries.

The *Moniteur Officiel du Commerce* communicates the following:—With reference to the production of cement, natural as well as artificial, the year 1899 has been an exceptional one. The demand caused by the public works, in France as well as elsewhere, has contributed to stimulate the production, which was scarcely able to meet requirements. From this results an almost complete absence of stock, and the prospects of 1900 appear to be favourable if the lack of fuel, which affects all industries, does not limit the production. As to Germany, the prices for 1899 ruled higher than those in 1898, and stocks are exhausted; but the growing demand has caused competition, and several new works have been established. The quotations are:—

	Marks per barrel, f.o.b.
For first-class brands.....	6·50 to 6·75
„ good „	6·25 to 6·50

During the ten months ending November the exportations have reached 505,318 barrels, as against 464,742 in the corresponding period of 1898. Whilst English exportation lost 10,000 barrels in the United States, Germany gained 30,000, as compared with 1898. The concessions obtained by Germany in China open a new market to its manufacturers, and the exportation thither in 1899 exceeded 25,000 barrels, as against 10,000 in 1898. For Belgium the results of the year 1899 were very good, both as regards production and prices obtained. The Belgian natural cement has been the object of an increasing demand, and the good brands have at present an acknowledged market in London. The demand for South America is extensive, and European brands meet a ready market there.

Cement: Imports into Chili.

Foreign Office Annual Series, No. 2481, *July* 1900.

The importation of cement assumes considerable proportions. The figures for 1899 are not yet available, but it may be said that there was a decrease in value of 2,220*l.* The total value of cement imported was 48,494*l.*, as against 50,715*l.* in 1898, when the total imports reached 16,637 tons. Germany was by far the largest sender of cement, her share being 9,972 tons, Great Britain only sending 4,428 tons. The superior quality of the British article seems fairly demonstrated.

Cement: Imports into Rio de Janeiro.

Foreign Office Annual Series, No. 2475, *July* 1900.

The leading position now held by Belgian, French, and German cement in the Rio market is explained by the fact that few, if any, British houses now send for cement as a speculation, whilst as regards quality, there is but little to choose. For certain classes of work the Belgian and other cements are preferable to English, being quick-setting, and therefore peculiarly suitable for repairs to drains and sewers, where expeditious work is necessary. A trial made lately of some Norwegian cement shipped from Germany gave excellent results for concrete-making. With the exception of the first-class Boulogne cement, the French qualities do not compare favourably with that from other sources. The costs vary very little, but most of the foreign firms allow long credits, and so make business easier for buyers, which is a matter of considerable importance, especially to master-builders, who have to await the conclusion of their works to receive payment.

X.—METALLURGY.

Platinum in the Urals.

Bd. of Trade J., July 26, 1900.

The price of platinum, according to the *Revue des Mines de l'Oural*, is about 14,000 roubles per poud (2*l.* 16*s.* 3½*d.* per oz.), and towards the end of the summer this price will probably have appreciably increased.

It is believed, according to the same authority, that platinum will reach the price of gold, and even exceed it, for whilst the consumption of the metal increases, the production of the platinum regions in the Urals is diminishing.

Quicksilver.

Engineering, July 27, 1900.

Messrs. Wm. Sargant and Co. furnish some figures in their annual metal circular, showing the quantity obtained from the principal sources, and they are useful in appraising the situation, especially with the aid of the Board of Trade monthly returns. The production of Spain, Italy, Austria, and California in 1899 was 94,935 bottles, a total exceeded in six previous years since 1890, the exception being 1897 with 91,906 bottles, 1896 with 89,070 bottles, and 1892 with 94,640 bottles. The appended table gives details:—

——	1899.	1898.	1894.	1890.
	Bottles.	Bottles.	Bottles.	Bottles.
Imports of Spanish into London.	45,729	46,367	42,414	50,202
Imports of Italian*	6,206	5,650	8,700	12,470
Austrian production	15,000	15,000	15,000	14,000
Californian „	28,000	28,000	30,183	22,926
Total of principal sources.	94,935	95,017	96,297	99,598
Exports from United Kingdom.*	33,101	32,288	41,046	56,702
	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
Highest price of Spanish.	9 12 6	7 15 0	6 15 0	10 7 6
Lowest price of Spanish.	7 15 0	7 0 0	5 10 0	8 17 6

* Calculated November to November.

The price of quicksilver this year has been steady in the neighbourhood of 9*l.* 12*s.*, or nearly up to last year's highest; and it is to be observed, as showing how quicksilver has sympathised with the generally high range of values, that only in 1890 (among recent years) have present prices been surpassed, 7*l.* representing the annual average for the intervening years. There has been no striking decline in supplies in the past decade, but the trouble is that there has been no expansion to meet the growing demand, more particularly in connection with gold-mining. If we go further back we get a better notion of the decrease. The production of the cinnabar mines of California, the only large mines on the American continent, with one

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insignificant exception, the Texas mine, has decreased from 79,936 bottles in 1888 to 28,100 bottles last year. The Almaden in Spain and the Idria in Austria, both of which have been worked and have produced for nearly 2,000 years, and the mines of Aurbach and Co., in Russia, are the only other producers of note in the world, though there are being worked a few scattered mines of minor importance in Spain, Italy, Siberia, and elsewhere. The total Spanish output last year is estimated by the *Revista Minera* at 39,339 bottles, apportioned thus: Almaden mines, 37,378 bottles; El Porvenir Asturias, 1,475 bottles; La Union Miere, 300 bottles; La Soterrana Asturias, 61 bottles; various mines in Granada, 125 bottles. The Almaden mines raised 20,322 tons of ore, and smelted 15,194 tons. If these figures of output are to be accepted as accurate, a considerable quantity was taken out of stock for export to the United Kingdom. About 8,700 bottles are obtained in the Mikitowka mines in Russia, but they do not come to the English market, which is supplied almost solely from Spain and Italy, the last, however, being of relatively little account. The Italian mines are in the neighbourhood of of Monte Amiato, which now produce 200 tons or so in a year, against 274 tons in 1893. The greater part of the Californian quicksilver goes to Mexico, to be used in mining operations there. A certain proportion is consumed by mines in some of the Western States, and the rest finds markets in various places all over the country. Apart from its use for gold and silver mining, to aid in the extraction of these metals, the chief demand for mercury is as a drug. Its chlorides—corrosive sublimate and calomel, also the red oxide—are well known. From the cinnabar, which is its most abundant ore, vermilion is prepared.

With regard to our colonies, and specially to Australia, the richest deposits have been discovered near Yugilbar, New South Wales, in the Clarence River district, where considerable developments have been made, and six distinct shafts put down on three parallel lodes. Several tons of the ore from these lodes have been brought to Sydney, and have averaged from 3 to 5 per cent. of mercury, and it has been ascertained that the "spent" ore contains gold and silver. The area of the ground examined by the Government geologist is about 120 acres; but it is believed that, with the progress of prospecting operations, other lodes, more or less rich, will be found.

Minerals in Guatemala.

Foreign Office Annual Series, No. 2481, *July* 1900.

Zinc, copper, lead, and *silver* predominate in these regions, being generally found in argentiferous blendes and galenas, and sometimes both metals in conjunction with carbonates of copper. The proportion of lead varies from 20 to 25 per cent. in the galenas, and the blends contain from 15 to 40 per cent. of zinc.

The proportion of silver varies from 200 grms. to 7 kilos., and may be calculated on an average of from 2 to 3 kilos.

Large deposits of *plumbago* exist both north and south of Huehuetenango of a good class and ready for commerce.

In searching the old mining archives of the old colonial days we find that between the years 1627 and 1820, 1,322 mines of *gold, silver, lead, copper, tin, iron,* and one of *quicksilver* were discovered, opened, and worked, and were a source of great revenue both to Church and State. But this branch of industry was chiefly under the auspices of religious orders, and no encouragement was given to outside parties, and when their power waned mining was neglected, and then owing to the decades of civil revolutions that followed, this industry was entirely paralysed.

Graphite in Bavaria.

Foreign Office Annual Series, No. 2489, *Aug.* 1900.

Graphite is one of the most valuable minerals found in Bavaria, representing almost a monopoly for the country, as the only formidable competitor in the supply of natural graphite is the island of *Ceylon.*

The production of graphite in *Ceylon* has, however, in the last six years decreased from 30,000 tons to from 12,000 to 15,000 tons annually, causing a great rise in prices, as the deficit could not be made good from other sources. The price of *Ceylon* graphite ranges from 50*l.* to 75*l.* per ton.

In Bavaria the graphite deposits are found near Passau, and are inferior to the *Ceylon* graphite, as while the latter is nearly pure, the former has about 60 to 75 per cent. earthy substances mixed with it. The Passau graphite, however, can be purified by a very simple and inexpensive process, and a substance produced that is quite equal to the *Ceylon* graphite.

Unfortunately, owing to local conditions, this process is little used, as the deposits are spread over a number of small proprietors, who work on a small scale in the cheapest manner possible; the result is that there is a regrettable waste of the raw material, and it is alleged that nearly 90 per cent. of the mineral is absolutely thrown away owing to this unscientific and short-sighted system of working, which must lead to the premature exhaustion of the deposits.

In 1898 there were 49 graphite works in Bavaria, employing only 216 men, which produced 4,593 tons of graphite, worth 19,583*l.*

Gold Production in the United States.

Bd. of Trade J., Aug. 9, 1900.

The following tables showing the production of gold for the past four years has been received at the Board of Trade from the American Bureau of Statistics. The additions to the world's supply of gold during the past four years has been as follows:—

Year.		Gold Production in United States.	Total Gold Production in the World.
		Dollars.	Dollars.
1896		53,088,000	202,251,000
1897		57,363,000	238,812,000
1898		64,463,000	287,428,000
1899		72,500,000	315,000,000
Total	$	247,414,000	1,043,491,000
	£	51,540,000	217,394,000

Manganese Ore in Russia.

Comm. Intelligence, Aug. 1900.

An English company have just acquired important manganese ore deposits in the Shorapanski district in the Caucasus, and intend building a branch line to connect the estate with the Transcaucasian Railway. Manganese ore is comparatively rare, so that a few years ago the Russian Government put on it a heavy export duty, and thus nearly killed its export to England.

Manganese Ore in Rio de Janeiro.

Foreign Office Annual Series, No. 2475, *July* 1900.

The prospect for *manganese ore* mining appear encouraging, and a Belgian company—La Société des Mines de Manganèse de Ouro Preto, capital 3,000,000 fr., was formed during the year for exploiting this industry. It is said that the lands acquired by them contain deposits of iron and topaz as well as of manganese.

It appears that the descriptions found in greatest abundance are *manganite* and *pyrolusite*, which, on account of their purity, are regarded as minerals of excellent quality.

Only deposits in the neighbourhood of the railway are worked at present, the principal workings being situated at Queluz and Miguel Burnier, at 462 and 496 kilom. respectively from Rio. The mineral is worked in open cuttings, and the cost of extraction is said to be about 15 milreis (say 10*s.*) per ton.

Very fair deposits are said to occur at Gandarella, and I append the analyses of two specimens taken from that district; the first shows the highest, and the second the lowest, proportion of metallic manganese found in six specimens submitted to test:—

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Analyses of Manganese Ore found at Gandarella (Minas Geraes).

	Analysis.	
	I.	II.
	Per Cent.	Per Cent.
Metallic manganese	58·36	49·35
Loss by fire	1·09	1·75
Insoluble deposit	1·14	0·45
Bioxide of manganese	92·31	78·93
Phosphorus	Traces	Traces
Sulphur	,,	,,
Magnesia	,,	,,
Lime	0·29	1·41
Sesquioxide of iron and alumina	6·50	18·14

Manganese Ore in Chili.

Foreign Office Annual Series, No. 2481, *July* 1900.

There was the substantial improvement of 20,079,087 kilos. in the export of manganese, the total shipments amounting to 40,930,738 kilos., valued at 92,177*l.*

From Carrizal Bajo there were shipped during last year 20,700 tons of manganese ore, and the whole of this export went to steel works at Philadelphia in the United States.

Iron Production in Japan.

U.S. Cons. Reps., July 1900.

Under date of March 9, 1900, Consul Lyon, of Hiogo, transmits a clipping from the Kobé Chronicle, showing a nearly steady increase in the production of iron in Japan during the 10 years ended December 31, 1897, the gain during that period having been 83 per cent. The article reads :

The *Osaka Asahi* observes that the production of iron in Japan, though as yet very small, continues to increase a little every year. The output during the past 11 years is as follows :—

	Lb.
1887	33,335,784
1888	39,724,530
1889	43,786,185
1890	45,878,500
1891	37,799,927
1892	41,197,128
1893	37,132,819
1894	42,431,416
1895	56,324,319
1896	59,765,303
1897	61,114,480

Since 1897, several new iron mines have been opened, and the production has increased in proportion. On the other hand, the importation of iron also continues to increase, though it is true that last year a heavy falling off was observed, more especially in bar and rod iron, rails, iron nails, and steel, to say nothing of machinery and locomotive engines. The quantity and value of iron and steel imported last year, compared with the preceding year, is as under :—

Year.	Quantity.	Value.
	Lb.	Dols.
1898	585,387,511	6,475,290
1899	307,438,661	5,641,847

The falling off in the importation of iron and steel last year was not due to increased production of the metals in Japan, but is to be accounted for by the depression in the manufacturing industry.

Iron, German Production and Consumption of ——.

U.S. Cons. Reps., July 1900.

The German Iron and Coal Association has recently published a statement of the consumption of pig iron in Germany during the last year, the estimate having been made by adding to the finished goods (iron in bars, steel, coarse iron and steel ware, and iron machines) 33⅓ per cent. for the waste in the blast furnace.

According to this statement, the production, importation, exportation, and consumption are :—

Description.	1899.	1898.	1897.
	Tons.	Tons.	Tons.
Blast furnace production	6,681,466	7,512,766	8,142,017
Importation :			
Raw and cast iron	462.122	407,889	675,793
Finished goods, plus 33⅓ per cent. addition for waste.	229,116	264,141	343,725
Production and importation.	7,572,704	7,984,796	9,161,535
Exportation :			
Raw and cast iron	128,987	272,470	235,194
Finished goods, plus 33⅓ per cent. addition for waste.	1,908,335	2,053,377	1,992,311
Total exportation	2,037,322	2,325,847	2,227,505
Home consumption	5,535,382	5,658 949	6,934,030

Consequently the production of pig iron has increased by 829,251 tons, or 11·2 per cent., after a gain of 431,300 tons, or 6·3 per cent., in 1898.

The importation has increased by 347,488 tons, or 57·7 per cent. The exportation has at the same time diminished by 98,342 tons, or 4·2 per cent. ; so that the consumption in Germany, which has been increasing continually since 1893, has risen to 6,934,030 tons in 1899, an increase of 22·5 per cent.

XII.—OILS, Etc.

Gothenburg, Sweden, Trade of ——.

Foreign Office Annual Series, No. 2490, *July* 1900.

The import of *lubricating oils* in 1899 amounted to 6,105 tons, which is more than twice as large as that of 1890, when only 2,980 tons were imported. This great increase is caused by the industrial progress of the last 10 years, during which a constantly increasing number of machines were started. The mineral oils predominate on account of their cheapness.

XIII. C.—INDIA-RUBBER, Etc.

Rubber : British Central African Protectorate.

Foreign Office Annual Series, No. 2497, *Aug.* 1900.

The value of rubber exported has risen from a little over 10,000*l.* to 13,000*l.* (In addition to this, a considerable amount of rubber has passed through the Protectorate "in transit.")

Rubber at Bahia.

Foreign Office Annual Series, No. 2470, *July* 1900.

The export of india-rubber continues to augment yearly, the value of this article exported in 1898 being 34,557*l.* against 19,223*l.* in 1897.

The best rubber from Pará is the so-called *seringueira.* Owing, however, to the unhealthiness of the districts in which it grows, it would be advisable for planters of rubber trees to turn their attention to the culture of the mangabeira and maniçoba varieties, exported from Bahia. Mangabeira grows almost in any soil in this State, and flourishes in quantities in sandy districts, where absolutely nothing else can be produced.

In certain zones of the interior, fertile in good rich red soil, the tree yields more than four times the quantity of milk than when growing on sandy lands. This tree, besides the rubber milk, yields a most delicious fruit called Mangaba. Were it not for the difficulty in planting, this variety, which requires from eight to 10 years before yielding, would be the rubber tree of the future.

Considering all circumstances, the maniçoba tree shows many advantages over the others. It is easily planted, either from seeds or saplings, grows in six or eight months in any kind of soil to a height of 6 feet, and will begin

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yielding a considerable quantity of milk in about three years, far more in proportion than any other rubber tree in existence. One planter has recently planted over 100,000 maniçoba rubber trees, and intends increasing his plantations to 1,000,000 trees, with the full conviction that this industry, in a few years, will show extraordinary results.

Rubber in the State of Amazonas.

Miscel. Series, No. 530, *June* 1900.

Since about the year 1770 the use of the latex of certain plants for waterproofing cloth has been well known. It has now come into very general use and of late years the enormous consumption of this article in the manufacture of bicycle tyres has created a demand which exceeds the supply. The price of about 2*s.* 6*d.* per lb. in 1889 has increased to 4*s.* 6*d.* per lb. in 1899. The total world's supply is about 120,000,000 to 130,000,000 lbs., valued at about 15,000,000*l.*

Table showing the Total World's Approximate Supply and Consumption of Rubber.

Producing Countries :—	Tons.
Amazon District (Brazil, Peru, Bolivia)	25,000
Rest of South America	3,500
Central America and Mexico	2,500
Java, Borneo and Eastern Archipelago	1,000
East and West Africa	24,000
Madagascar and Mauritius	1,000
India, Burmah and Ceylon	500
Total	57,500

Consumption :—	Tons.
United States and Canada	21,000
United Kingdom	21,000
Rest of Europe	15,500
Total	57,500

Trees.—In Brazil several kinds of lactiferous plants yielding "caoutchouc" or "rubber" exist, the Maniçoba (*Manihot glaziovii*), the Mangabeira (*Hancornia speciosa*), the most important being the Seringueira (*Hevea Braziliensis*). The seeds do not as a rule keep fertile for more than two months after being collected: this may account for the difficulty experienced in rearing the plant in Africa, Ceylon, and other parts.

For practical purposes three distinct varieties of the "seringueria," or rubber tree, may be considered. They are known locally as the seringueiras "casca vermelha" (red bark), "barriguda" (bellied), and "casca preta" (black bark). The first of these grows in the higher parts of the forest, which are rarely flooded. The latex which it yields is scanty, thick, and will not run. It is, therefore, of little value. The second grows in those parts which are most constantly flooded. It yields a large quantity of thin watery latex, which is of little value. The third variety, which yields the latex from which the rubber of commerce is manufactured, grows in those parts where a certain amount of drainage exists.

Three distinct qualities of rubber are manufactured, named "*Fine*," "*Entrefine*," and "*Sernamby*." "*Fine*" rubber has been well smoked, and is free from putrefaction. "*Entrefine*" rubber has been either burnt whilst being smoked or has been insufficiently smoked, and has therefore putrified. "*Sernamby*" is the "negro head" of commerce, and consists of scraps, mixed with dirt and other impurities.

A very important factor from the merchant's point of view is the loss of weight that is constantly taking place in raw rubber. This loss is very variable, and a consignee has to place the greatest faith in the consignor that the invoiced weight of rubber has really been shipped. The cause being the evaporation of the water contained, it varies according to the quality.

Centrifugalising has been tried to separate the caoutchouc from the watery part, but has not proved successful as regards the milk of the *hevea*.

Another method is to coagulate the latex by means of corrosive sublimate or acetic acid.

Analysis of the Milk of the Hevea Braziliensis (Seeligman).

	Per Cent.
Caoutchouc	32·0
Nitrogenous matter	2·3
Salts	9·7
Resinous matter	Traces
Water	55 to 56

The shipment of rubber, the commercial system on which it is sold, and the exploring and working of rubber estates are described at some length. Also opportunities for British enterprise, companies, and individuals.

Owing to the recuperative power of the tree, it is improbable that the available supply of rubber from the Amazon valley will be exhausted in the near future. Also the enormous area, over 1,000,000 sq. miles, over which the estates extend, renders it unlikely that any sudden increase or decrease of the annual production will occur.

Yearly Exports of Rubber Direct from Manáos to Europe and America.

Crop Year.	Quantity.		
	To Europe.	To United States.	Total.
	Tons.	Tons.	Tons.
1895–96	3,058	2,860	5,918
1896–97	4,043	2,634	6,677
1897–98	4,103	2,723	6,826
1898–99	4,670	2,372	7,042

Yearly Exports of Rubber Direct from Pará to Europe and America.

Crop Year.	Quantity.		
	To Europe.	To United States.	Total.
	Tons.	Tons.	Tons.
1895–96	7,108	7,944	15,052
1896–97	7,214	7,719	14,938
1897–98	8,699	7,931	16,630
1898–99	10,026	7,263	17,289

Caucho.—Caucho is a vegetable product similar to rubber in many of its qualities, but inferior to it in usefulness. The tree from which it is obtained is a variety of the "Castilloa." Owing to the fact that the lactiferous system is not connected throughout the tree, it is not possible to obtain all the milk by tapping only a small area of the bark, as in the case with the *hevea*.—J. L. B.

Gutta-Percha, The Future Supply of ——.

Engineering, June 8, 1900, 750.

In this article, in which the increasing rise in the price of gutta-percha is discussed, it is pointed out that whereas the various trees yielding the india-rubber of commerce are found in nearly all the tropical parts of the globe, the area of the distribution of the gutta-percha tree is much more circumscribed, the trees, of which there are several species, being found only in Borneo, Sumatra, and the Malay Archipelago generally. Attempts to acclimatise the gutta-percha tree in other parts of the globe have met with no particular success.

There is practically no supervision over the collectors of gutta-percha, and consequently careless and destructive methods of collection are employed, whilst the yield of milk is frequently increased by mixing the better class with the commoner and, in some cases, worthless sorts. The milk is not coagulated in the forest, but by the buyer; and it is not until this process is complete that it can be ascertained whether the gutta is of good or low quality.

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Although as regards chemical composition, pure gutta-percha is very closely allied to india-rubber, a considerable difference exists between the properties of the two substances, and in the majority of purposes to which they are put they cannot replace one another. The short-length deep-sea rubber-covered cables that have recently been made in America by the seamless process are giving every satisfaction, but Europeon experts are of the opinion that it is impossible to put on the seamless rubber insulation without destroying the best properties of the rubber, and rendering it liable to early decay. In any case, it appears likely that gutta-percha is the better material for long distances and great depths.

In conclusion it is stated that if the future supply of gutta-percha is to be assured in sufficient quantity for the needs of the consumers of that article, every effort should be made to prevent the wasteful cutting down of the trees by the collectors.—A. S.

XV.—MANURES, Etc.

Fertilisers: Trade of Gothenburg, Sweden.

Foreign Office Annual Series, No. 2490, *July* 1900.

Fertilisers have commanded high prices throughout the year. The duty recently imposed on superphosphate has tended to increase the cost; the agriculturist must consequently pay a higher price for this indispensable commodity. As a consequence of the advanced prices, a marked decrease was noticeable in the consumption of fertilisers, superphosphate particularly being subject to the decline, and appears to have been to some extent supplanted by Thomas phosphate.

Phosphates in Algeria.

Foreign Office Annual Series, No. 2472, *July* 1900.

The phosphate mines of the department of Constantine in 1898 showed an increase of 41,359 tons over the preceding year.

The following table gives the export figures since 1893 —the year when the phosphate industry commenced :—

	Tons.
1893	5,118
1894	47,957
1895	113,044
1896	143,098
1897	220,617
1898	249,721

During the first nine months of 1899, 209,256 tons have been exported, as against 191,798 tons for the corresponding period of 1898.

In 1895 a duty of 50 c. was imposed on every ton of phosphate extracted from the mines for use outside Algeria. The yield from this duty has been as follows :—

	Francs.
1895	9,631
1896	71,549
1897	110,308
1898	126,430
1899 (first 10 months)	103,187

206,374 tons of phosphate, therefore, were shipped from Algeria during the first 10 months of 1899.

Further researches have been made in the districts of Morsott and Tocqueville. The results in the latter case have been favourable, in the former disappointing. There seems also a prospect of successful phosphate mining in the country south of Guelma.

Fertilisers on the Hawaiian Islands.

Foreign Office Annual Series, No. 2492, *July* 1900.

There is a very large consumption of fertilisers on the sugar plantations, and though the output of the local factories has materially increased, it has been wholly insufficient to meet the demand. Last year from Chile alone, irrespective of imports from America and European countries, nitrates to the value of 44,500*l.* were imported, and the importations are likely to increase.

Guano Trade of Chili.

Foreign Office Annual Series, No. 2481, *July* 1900.

The former activity in the export of guano from the deposits of Punta Pichalo seems to have taken a fresh lease of life, for during the month of December 1899 no less than 45,210 sacks of guano, equal to 4,166 tons, were shipped to the south. Owing to a lawsuit these guano fields have been lying practically unused.

In 1898 a concession was granted by the Chilian Government to a Santiago firm to work the guano deposits at Punta Pichalo near Pisagua, the conditions being that the guano should only be used for home consumption, and that the price should not exceed 21 dol. 90 c. per ton at Valparaiso, and 22 dol. 90 c. at Talcahuano.

The deposits have proved to be of much greater importance than was anticipated and are now estimated to contain over 500,000 tons of guano. The amount shipped to the south of Chile during 1899 was 13,856 tons.

The total shipments of guano from all ports of the Republic in 1898 were 487,767 kilos., whereas last year they amounted to 23,482,000 kilos., which gives an increase of no less than 22,994,233 kilos.

Nitrate Exports of Chile in 1899.

Foreign Office Annual Series, No. 2481, *July* 1900.

The total amount of nitrate exported from Chile during 1899 was 30,360,239 Spanish quintals, or 1,294,227,396 kilos. (say, 1,273,846 tons), valued at 96,650,282 dols. (7,248,771*l.*), an increase of 86,490,927 kilos. as compared with 1898.

It is anticipated that during 1900 the exportation will reach 33,000,000 quintals.

The output of nitrate during 1899 was 39,360,239 quintals, and it is estimated that the consumption of nitrate all over the world totalled 30,712,192 quintals; in other words the production was very nearly limited to meet the demands of consumers.

The following figures are interesting as comparing the amount of nitrate taken by the principal nations in 1895 and 1899 :—

Shipped to	Quantity.	
	1895.	1899.
	Quintals.	Quintals.
United Kingdom or Continent	9,968,248	7,578,560
United Kingdom direct	668,128	1,741,712
Germany	9,030,060	8,337,732
Holland	1,236,814	1,415,759
Belgium	539,924	2,165,019
France	213,822	478,357
United States	2,769,529	3,253,551
Africa	82,468*	259,605

* First exported in 1896.

Other nations take nitrate, but in smaller quantities.

In 1895 Chile used internally 28,000 quintals, and in 1899 the local consumption had only increased to 43,000 quintals, whereas Honolulu (Sandwich Islands) used, in 1895, 13,000 quintals, and in 1899 had increased her consumption up to 148,000 quintals. (1 quintal = 101·61 lb.)

XVI.—SUGAR, Etc.

Sugar Production in Roumania.

Foreign Office Annual Series, No. 2486, *July* 1900.

During last year the sugar production of Roumania amounted to 5,476 tons, as follows :—

District:	Tons.
Sascont	2,645
Marasesti	2,081
Kitila	750
Total	5,476

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Sugar and Alcohol Export, Zambesi River.

Foreign Office Annual Series, No. 2495, *Aug.* 1900.

The exports reached, in 1899, 1,630 tons of sugar and 150,000 gallons of alcohol.

Sugar Production on the Hawaiian Islands.

Foreign Office Annual Series, No. 2492, *July* 1900.

The production of sugar, the main industry in these islands, has nearly doubled in the last five years. In 1894–95 it was 153,149 tons; in 1898–99 it was 282,807 tons.

The quantity produced in each of the islands during 1898-99 and 1897–98 was as follows:—

Islands.	Quantity.	
	1898-99.	1897-98.
	Tons.	Tons.
Hawaii	117,239	91,606
Maui	54,389	45,033
Oahu	45,820	34,181
Kauai	65,359	58,594
Total	282,807	229,414

The falling-off of the crops of 1897–98 (less by about 22,000 tons than in the preceding year) was wholly due to the drought which prevailed throughout the year. The crop of 1898–99, although giving the largest yield per acre on record in these islands, also showed the effect of the drought of the previous year.

The number of plantations on the islands is 51. The largest plantations are the Ewa Plantation Company in Oahu, production last year 23,334 tons; the Hawaiian Commercial and Sugar Company, and Pioneer Mill Company, Maui, production of 16,621 and 10,589 tons respectively; the Hawaiian Agricultural Company, and the Honokaa Sugar Company, Hawaii, production 12,157 and 9,111 tons respectively; and the Lihue Plantation Company, Kauai, production 14,350 and 13,333 tons respectively.

Sugar Trade of Gothenburg, Sweden.

Foreign Office Annual Series, No. 2490, *July* 1900.

As was expected, the shortness of the beetroot crop in 1898 necessitated the import of a considerable quantity of raw sugar, which was exclusively obtained from Germany.

The import of syrup, an important commodity, chiefly takes place from the United States and the United Kingdom, the latter country supplying the superior qualities.

Sugar; Table showing Increase in the Use of —— per Capita.

U.S. Cons. Reps., July 1900.

Country.	1870—1875.	1885.	1897.
	Lb.	Lb.	Lb.
Great Britain	48·8	71·8	85·7
America	35·9	54·0	62·3
France	17·1	23·5	26·6
Germany	14·7	17·1	28·6
Austria	..	..	19·6
Russia	..	..	10·8

Maple-Sugar Industry in Quebec.

U.S. Cons. Reps., July 1900.

The season varies in length from ten days to three weeks, and occurs between the 10th of March and the 20th of April. It is a period of exceptional activity, and every available member of the family is pressed into service, district schools being closed. Sugar "bushes" contain from 400 to 5,000 trees. Five thousand are rare, 2,000 not uncommon, but the average "bush" contains from 1,000 to 1,500 trees, which yield from 1 to 4 lb. of sugar per tree during the season. Two and one-half pounds are considered an average yield, 3 lb. good, and 4 lb. per tree exceptional. Almost every farmer in Eastern Quebec is a sugar manufacturer to the extent of from 500 to 15,000 lb. a year, or from one-fourth of a ton to $7\frac{1}{2}$ tons.

There are no available data from which to make anything like an accurate estimate of the maple-sugar production of Canada; but from the facts already set forth, it will be seen at once to be of considerable importance. It is, of course, well known that a great portion of the maple sap is never reduced to sugar, but is finished as syrup; yet the yield is always estimated in pounds of sugar, a gallon of syrup being equivalent to 7 lb. of sugar.

By a system of cross-sections in the evaporating pan, with apertures alternating at either end, the sap is forced slowly along a zig-zag course down the whole length of the pan from the receiving compartment, where it is thoroughly strained, to the finishing compartment, whence it is drawn off through a faucet. When the sap boils too furiously a few drops of milk will subdue it.

XIX.—PAPER, PASTEBOARD, Etc.

Wood Pulp in Norway.

Foreign Office Annual Series, No. 2471, *July* 1900.

The year opened with great promise for the wood pulp industry, which was not realised. This industry laboured under more than one kind of difficulty. The demand, owing to American competition in the British market, turned out to be less than the production during the earlier part of the year and a fall of prices ensued. The drought of the summer also acted unfavourably, as pulp-mills depend on water-power for driving their turbines; and lastly, financial troubles did not help to improve the situation in some cases. Some large mills had to close or restrict their operations; but it is satisfactory to find, that Vice-Consul Franklin expresses the opinion, that all engaged in the paper and pulp industries in his district, are in a healthy financial condition, and especially those engaged in the manufacture of pulp.

The quantity of wood-pulp exported in 1898–99 is given in the following table, which includes some Swedish pulp:—

Year.	Quantity.	
	Dry.	Wet.
	Tons.	Tons.
1899	20,420	284,072
1898	23,221	251,661

Of which from Christiania:—

Year.	Quantity.	
	Dry.	Wet.
	Tons.	Tons.
1899	8,761	34,140
1898	9,459	39,365

The United Kingdom has been the largest consumer of this production; in 1898 to the extent of 173,000 tons of both kinds, notwithstanding the competition above referred to. The other countries, to which considerable quantities are exported, are France, Belgium, Denmark, Holland, and Spain; but taken as a whole, profits were not satisfactory.

As is the case with the mechanical, so also the chemical pulp manufacture is of great importance to the export trade of Christiania, which has much capital invested in both. There were 75,731 tons dry, and 6,689 tons wet cellulose exported from Norway in 1899 compared with 72,321 tons and 6,919 tons respectively in 1898. Of these quantities 17,814 tons dry and 3,948 tons wet were shipped from Christiania, against 14,992 tons of the former and 4,927 tons of the latter sort in 1898. The United Kingdom took,

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as usual, the greater part of the quantity exported; the rest going to France, Holland, and other countries. The high cost of the raw material, American competition, and the drought, which made its consequences felt in the autumn, combined to render profits unsatisfactory.

It is, however, an undeniable fact that although there is no actual scarcity in the supply of the white wood logs required for the manufacture of pulp, the production of such logs is not over-abundant by any means, so the prices thereof will, in the face of the great demand, no doubt keep at a high figure.

Wood Pulp in Gothenburg, Sweden.

Foreign Office Annual Series, No. 2490, *July* 1900.

Chemical wood pulp, both sulphite and sulphate, found a good market during 1899 in spite of the gloomy forebodings that the increased number of factories would detrimentally affect prices and sales. Singular to say, the important increase in the output could hardly keep up with the constant growing demand.

Although the prospects at the commencement of the year gave reason to hope that the *mechanical wood pulp* would not come down again to the low prices which prevailed during 1898, still, the market, in consequence of importation from Canada and speculation, was very depressed during the early part of the season, particularly for moist, ground pulp, which in the course of the summer was sold at unremunerative prices, but since the increased demand for paper by the newspaper press began to be felt, the market assumed a very different aspect, and during the last months of the year the prices advanced about 50 per cent.

Esparto at Oran (Algeria).

Foreign Office Annual Series, No. 2472, *July* 1900.

The excess of esparto grass of 1898 has been fully maintained, although prices are no higher, and this notwithstanding the general rise in prices on all manufacturing commodities. In fact, wood-pulp, which is esparto's greatest competitor, has advanced very considerably. This is explained by the fact that coals and chemicals which are so largely required for the manufacture of paper from esparto, have augmented in price so greatly as to fully counterbalance any rise which might have profited esparto but for that reason.

The total quantity exported from this province to the United Kingdom is as follows:—

	Quantity in Tons.
Shipped from port of Oran	58,256
„ „ „ Arzeü	18,465
Total	76,721

Of this 53,609 tons went to Scottish and 23,112 tons to English ports. Small lots have been occasionally shipped to Belgium, Spain, and Portugal. To Belgium esparto is exported for paper manufacturing, and to Spain for basket-making; to Portugal for rope-making for the fishing industry, for which its lightness and softness render it particularly apt.

XX.—FINE CHEMICALS, Etc.

Quinine.

U.S. Cons. Reps., July 1900.

The total sales at the first auction in Batavia, held on Feb. 28, 1900, amounted to 3,753·66 kilos. (8,275 lb.), Edition II. average 23·24 florins (9·34 dols.) per kilo.; 192 kilos. (423 lb.), Edition III., average 28·01 florins (11·26 dols.) per kilo.

The Camphor Monopoly.

Chem. and Druggist, June 30, 1900, 1130.

Japanese newspapers state that Messrs. Samuel Samuel and Co., having complied with all the requirements in connection with the camphor monopoly, recently took over 700,000 catties of camphor, representing the stock held by the authorities last year, and are commencing to export it. The conditions originally imposed as to the nature of the bonds to be lodged as security has been relaxed. Bonds of the new Formosa Bank were originally designated, but this provision has been changed so as to read that any financially-recognised securities will suffice. The change is of much importance.

Iodine.

Foreign Office Annual Series, No. 2481, *July* 1900.

The amount of iodine exported from the port of Tocopilla, Chili, in 1899 paid in export duties 69,040 dols. 98 c. From Pisagua 1,230 quintals were exported.

Copaiva Balsam in the State of Amazonas.

Miscellaneous Series, No. 530, *June* 1900.

Copaiva balsam is an oil obtained from the *Copaifera multijuga*. It is used for medicinal purposes. The tree, which grows in the drier parts of the forest, comes from the Madeira and its affluents. The oil is extracted by boring a hole in the trunk of the tree, two feet from the ground, and collecting it in a funnel connected with a suitable vessel. After being tapped for some time the tree becomes exhausted. If the hole be stopped the tree recovers, and will again yield oil.—J. L. B.

BOARD OF TRADE RETURNS.

Summary of Imports.

Articles.	Month ending 31st July	
	1899.	1900.
	£	£
Metals	2,470,926	2,815,408
Chemicals and dyestuffs	438,029	374,455
Oils	852,169	877,557
Raw materials for non-textile industries.		
Total value of all imports	39,935,372	40,264,167

Summary of Exports.

Articles.	Month ending 31st July	
	1899.	1900.
	£	£
Metals (other than machinery)	3,583,948	3,562,531
Chemicals and medicines	635,987	652,604
Miscellaneous articles	2,900,622	3,025,840
Total value of all exports	23,195,958	24,550,557

Imports of Oils for Month ending 31st July.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Cocoa-nut ..... Cwt.	13,721	29,756	15,756	33,155
Olive ..... Tuns	1,392	575	45,863	24,690
Palm ..... Cwt.	76,731	93,574	83,293	107,197
Petroleum ..... Gall.	23,334,592	17,389,492	427,087	371,414
Seed ..... Tons	2,955	2,585	56,897	66,133
Train, &c. ..... Tuns	2,901	2,777	49,248	49,826
Turpentine ..... Cwt.	63,099	88,980	92,642	140,918
Other articles Value £	..	..	81,383	84,224
Total value	..	..	852,169	877,557

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Imports of Metals for Month ending 31st July.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Copper :—				
Ore ..... Tons	14,900	7,735	94,520	99,528
Regulus ..... „	6,211	6,775	194,518	300,086
Unwrought ..... „	4,990	6,784	377,105	493,909
Iron :—				
Pig and puddled „	12,315	10,801	47,712	53,545
Ore ..... „	631,417	558,631	482,212	512,781
Bolt, bar, &c. ... „	7,334	6,738	59,098	56,463
Steel, unwrought.. „	6,417	11,716	33,979	82,932
Lead, pig and sheet „	19,253	12,743	269,762	218,803
Pyrites ..... „	67,504	64,952	113,845	107,682
Quicksilver ..... Lb.	438,075	15,000	48,863	1,900
Silver ore..... Value £	..	..	129,398	50,872
Tin ..... Cwt.	43,373	36,459	262,598	386,620
Zinc..... Tons	4,406	6,347	111,691	130,369
Other articles ...Value £	..	..	245,625	319,918
Total value.....	..	..	2,470,926	2,815,408

Imports of Chemicals and Dyestuffs for Month ending 31st July.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Alkali..... Cwt.	27,496	35,234	14,448	17,465
Bark (Tanners', &c.) „	33,156	21,043	14,536	8,418
Borax ..... „	6,059	22,559	2,957	11,975
Brimstone ..... „	35,786	34,171	8,546	8,319
Chemicals..... Value £	..	..	111,712	121,577
Cutch and gambier Tons	3,013	906	48,189	15,773
Dyes :—				
Alizarin.....Value £	..	..	21,656	12,163
Anilin and other „	..	..	39,865	43,348
Indigo ..... Cwt.	1,073	336	14,969	5,889
Nitrate of potash.. „	14,032	13,551	11,705	11,854
Valonia ..... Tons	2,982	854	35,602	9,234
Other articles ...Value £	..	..	113,844	108,410
Total value.....	..	..	438,629	374,455

Imports of Manufactured Articles for Month ending 31st July.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Cement..... Tons	..	9,439	..	18,806
China and earthenware. Cwt.	..	27,054	..	74,662
Glass :—				
Sheet ..... „	80,887	91,069	44,087	51,836
Plate ..... „	25,395	9,499	29,684	12,817
Flint ..... „	..	45,181	..	79,527
Bottles ..... Gross	109,148	146,925	44,571	58,218
Other..... Cwt.	82,800	28,354	150,941	50,980
Glue, size, and gelatin. „	..	16,024	..	37,659
Leather, unmanufactured. „	104,169	109,634	671,358	677,729
Paints and pigments. Value £	450,798	560,401	324,129	117,318
Paper, pasteboard Cwt.	..	..	..	385,281
Scientific instruments. Value £	..	..	..	58,000
Soap and soap powder. Cwt.	..	18,656	..	21,123
Zinc manufactures. „	33,071	37,146	49,283	48,206
Total of manufactured articles..	..	..	7,394,381	7,214,452

Imports of Raw Material for Non-Textile Industries for Month ending 31st July.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Bark, Peruvian .. Cwt.	7,262	1,897	15,922	4,744
Bristles..... Lb.	545,724	408,973	80,567	47,858
Caoutchouc ..... Cwt.	28,743	42,642	348,476	502,948
Gum :—				
Arabic ..... „	5,121	7,757	11,325	14,981
Lac, &c. ..... „	9,433	9,730	32,398	30,188
Gutta-percha .... „	6,874	11,261	82,760	152,893
Hides, raw :—				
Dry..... „	47,386	74,316	125,676	196,610
Wet ..... „	48,461	46,896	100,936	110,091
Ivory ..... „	1,597	861	59,052	34,412
Manure :—				
Guano ..... Tons	1,367	260	10,575	2,335
Bones..... „	3,303	3,173	16,453	13,595
Nitrate of soda... „	7,994	7,752	59,388	62,608
Phosphate of lime „	33,841	35,955	56,631	62,443
Paraffin..... Cwt.	61,070	43,865	56,449	65,752
Linen rags ..... Tons	1,845	1,365	15,240	13,388
Esparto ..... „	11,406	11,177	45,857	44,124
Pulp of wood..... „	47,404	46,877	203,161	218,618
Resin..... Cwt.	131,804	104,745	31,885	28,627
Tallow and stearin „	184,836	203,654	210,969	261,353
Wood :—				
Hewn..... Loads	285,612	370,035	591,707	720,540
Sawn ..... „	1,032,559	1,056,307	2,531,807	2,877,532
Staves ..... „	12,599	18,400	51,845	72,698
Mahogany ..... Tons	2,273	4,068	21,851	40,119
Other articles....Value £	..	..	1,091,200	620,467
Total value	..	..	5,852,130	6,738,051

Besides the above, drugs to the value of 111,322*l.* were imported, as against 82,118*l.* in July 1899.

Exports of Metals (other than Machinery) for Month ending 31st July.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Brass..... Cwt.	11,791	9,004	55,114	47,074
Copper :—				
Unwrought.... „	38,889	23,499	154,253	92,400
Wrought ..... „	15,403	15,817	67,527	72,386
Mixed metal... „	7,345	12,209	25,178	41,759
Hardware ..... Value £	..	..	123,125	113,247
Implements..... „	..	..	123,552	119,049
Iron and steel ... Tons	370,014	267,143	2,631,313	2,558,116
Lead..... „	3,553	2,638	54,820	49,744
Plated wares... Value £	..	..	32,545	38,294
Telegraph wires.. „	..	..	97,635	205,306
Tin ..... Cwt.	9,840	7,370	60,625	52,171
Zinc..... „	7,211	11,685	9,874	12,138
Other articles...Value £	..	..	99,142	102,729
Total value	..	..	3,583,948	3,562,531

Exports of Drugs and Chemicals for Month ending 31st July.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Alkali ..... Cwt.	269,989	267,185	75,293	85,625
Bleaching materials „	81,380	79,094	19,968	23,982
Copper sulphate .. Tons	486	488	11,660	11,686
Chemical manures „	35,939	36,500	174,991	173,618
Medicines..... Value £	..	..	89,705	104,997
Other articles... „	..	..	264,370	252,696
Total value	..	..	635,987	652,604

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EXPORTS OF MISCELLANEOUS ARTICLES FOR MONTH ENDING 31ST JULY.

Articles.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
			£	£
Gunpowder.... Lb.	527,300	965,300	12,268	18,892
Military stores.. Value £	..	..	155,169	245,801
Candles..... Lb.	2,201,000	1,844,100	32,546	32,932
Caoutchouc..... Value £	..	..	113,133	116,268
Cement..... Tons	37,074	39,256	70,993	74,151
Products of coal. Value £	..	..	108,344	110,227
Earthenware ... „	..	..	164,134	135,697
Stoneware ..... „	..	..	13,318	16,387
Glass:—				
Plate ..... Sq. Ft.	123,563	181,207	7,458	12,319
Flint ..... Cwt.	7,272	8,459	16,646	19,371
Bottles ..... „	56,201	68,702	26,405	34,755
Other kinds ... „	16,090	19,677	15,208	20,131
Leather:—				
Unwrought .... „	12,428	10,636	110,116	112,209
Wrought.....Value £	..	..	33,692	33,049
Seed oil ..... Tons	2,614	3,521	54,430	101,447
Floorcloth.....Sq. Yds.	2,169,500	2,034,600	96,707	103,306
Painters' materials Val. £	..	..	154,348	176,206
Paper..... Cwt.	74,270	91,725	114,074	137,632
Rags..... Tons	5,575	5,061	27,713	34,260
Soap ..... Cwt.	85,987	65,302	83,374	76,421
Total value	..	..	2,900,622	3,025,840

Monthly Patent List.

* The dates given are the dates of the Official Journals in which acceptances of the Complete Specifications are advertised. Complete Specifications thus advertised as accepted are open to inspection at the Patent Office immediately, and to opposition within two months of the said dates.

I.—PLANT, APPARATUS, AND MACHINERY.

APPLICATIONS.

12,789. W. G. Atkins. Improvements in the construction and arrangement of filtering apparatus. July 16.

12,892. N. Stjernström. A process of manufacture of double-walled bodies with channels for the circulation of fluids and gases. Complete Specification. July 17.

12,905. E. Claude. Improvements in and in apparatus for the manufacture of liquid air. July 17.

12,906. R. H. Wilkinson. Improvements in apparatus for mixing or cooling and stirring liquid semi-liquid or pulverulent material. July 17.

13,042. L. Allen. Improvements in apparatus for expanding and compressing gases and vapours for use in refrigeration and for other purposes. July 19.

13,050. B. Talbot. Improvements in open hearth melting or other furnaces. Complete Specification. July 19.

13,225. C. A. Kämpfner. Improvements in apparatus for agitating, circulating, or otherwise acting on liquids and the like. July 23.

13,348. W. F. E. Casse. Improvements in apparatus for heating liquids. Complete Specification. July 24.

13,404. A. J. Boult.—From A. Molet, Argentine Republic. Improvements in or relating to apparatus for mixing gases. July 25.

13,562. P. Bonvillain. Improvements in or relating to oil and other filter presses. Complete Specification. July 27.

13,568. F. Honigmann. An improved method of compressing gas or air and arrangement of apparatus therefor. Complete Specification. July 27.

13,650. H. H. Lake.—From C. H. Fish, United States. Improvements relating to apparatus for drying continuous webs of fabric paper and other materials. July 30.

13,749. S. G. Mabouleix. Improvements in apparatus for heating and cooling fluids, and for sterilising or pasteurising liquids. Complete Specification. Aug. 31.

13,780. E. Paul. Improvements relating to heaters, condensers, evaporators, and the like. Aug. 1.

14,013. J. Prentice and A. W. Prentice. Improvements in the working of automatic refrigerating apparatus. Aug. 4.

14,026. J. Keith. Improvements in gas or air compressors or pumps. Aug. 4.

14,136. E. E. Murphy. Improvements in and relating to carbonating apparatus. Complete Specification. Aug. 7.

14,207. G. Desjacques. Improvements relating to carburetters. Filed Aug. 8. Date applied for Feb. 12, 1900, being date of application in France.

14,364. K. Enzinger. Improvements in filter presses and in the material for use in connection with the same. Aug. 10.

COMPLETE SPECIFICATIONS ACCEPTED.*

1899.

12,515. G. Selle. Manufacture of selective colour light filters for photo-optical purposes. July 25.

14,643. G. G. M. Hardingham.—From A. Musciacco, Italy. Means applicable for use in proportioning and mixing finely-divided or powdered substances. July 25.

18,052. W. Clark.—From the firm of C. H. Boehringer and Sohn, Germany. Manufacture of mordants and alizarine dyeing processes. Aug. 15.

18,964. G. A. Herdman. Process for the production of materials for preventing the radiation or transmission of heat. Aug. 15.

19,684. C. T. Hennig. Calcining, roasting, or drying furnace. Aug. 9.

19,856. W. Clark.—From C. F. Courtney, New South Wales. Magnetic separators. Aug. 9.

20,202. J. Laidlaw and J. W. Macfarlane. Centrifugal machines. Aug. 1.

21,142. H. J. B. Thiroux. Siphon apparatus for decanting liquids. Jan. 31.

1900.

12,212. S. Watkins.—From The Thompson and Norris Company, United States. Non-conducting coverings for pipes, tubes, and the like. Aug. 15.

12,251. W. Jandus. Filters. Aug. 15.

12,252. W. Jandus. Filters and fittings for the same. Aug. 15.

II.—FUEL, GAS, AND LIGHT.

APPLICATIONS.

12,786. H. Borchardt. Improvements in means for lighting gas. Complete Specification. July 16.

12,920. J. Wilkinson. Improvements in or relating to means or apparatus employed in the manufacture of gas. July 18.

12,993. E. W. Sprott. Improvements in acetylene generators. July 18.

12,994. F. Thuman. Improvements in apparatus for treating liquor obtained from the washing, scrubbing, or cooling appliances of carburetted water gas and other plant, so as to separate the tar from the water. July 18.

13,194. W. P. Thompson.—From A. Giraud, France. Improvements relating to the production of acetylene gas. July 21.

13,204. H. Gerdes. Improvements relating to pressure regulating apparatus for gas generators. July 21.

13,205. H. Gerdes. Improvements relating to gas generators. July 21.

13,234. H. Cussac, père, and H. Cussac, fils. Improved apparatus for generating acetylene gas. July 23.

Ze zbiorów Biblioteki Głównej Politechniki Łódzkiej

13,239. E. Fajole. Acetylene gas generator. July 23.

13,259. H. Hill. An improvement in the manufacture of mantles for incandescent lighting. July 23.

13,289. C. Guy. Improvements in or relating to apparatus for the production of acetylene gas. July 23.

13,386. H. Sutcliffe. Improvements in apparatus for generating, washing, cooling, and storing acetylene and other similarly prepared gases. July 25.

13,545. J. Hudler. Improvements in or connected with incandescent gas burners. Complete Specification. July 27.

13,558. A. J. Boult. — From Chemische-Technische Industrie-Gesellschaft, Ltd., Germany. Self-igniting incandescent burner. July 27.

13,647. A. S. Bower. Improvements in apparatus for bringing into and regulating the contact of calcium or other metallic carbides with water for the production of acetylene or other gases. July 30.

13,706. F. C. von Heydebrand. Artificial fuel. Complete Specification. July 31.

13,707. J. Faucheur. Combustible briquette. July 31.

13,809. T. Ingham. Improvements in the manufacture of fuel briquettes, artificial stone, and other blocks made from granular material bound together. Aug. 1.

13,814. J. Y. Johnson.—From The Deutsche Continental Gas Gesellschaft and J. Buel, Germany. Improvements in the manufacture of gas and coke. Aug. 1.

13,996. P. N. L. Girardville. Improved apparatus for production of acetylene gas. Complete Specification. Filed Aug. 3. Date applied for Jan. 4, 1900, being date of application in France.

14,034. C. Meissner. Improvements in or relating to apparatus for the production of acetylene gas. Complete Specification. Aug. 4.

14,045. F. Fritz. Improvements in the production of compressed fuel from turf. Complete Specification. Aug. 4.

14,066. G. de Diest. Improvements in acetylene generators. Aug. 4.

14,121. G. C. Marks.—From The General Electric Company, United States. Improvement in methods of and means for producing light. Complete Specification. Aug. 7.

14,138. C. Hennings. Improved apparatus for the production of acetylene gas. Aug. 7.

14,160. E. F. Smith. A new or improved acetylene gas generator. Complete Specification. Aug. 7.

14,360. C. Lespinasse. Improvements in apparatus for the production of acetylene gas. Aug. 10.

14,426. J. P. Johnston. Improvements in apparatus for use in the manufacture of gas. Complete Specification. Aug. 11.

Complete Specifications Accepted.

1899.

8923. J. Bilbie and J. A. Wanklyn. Manufacture of oxygen. Aug. 9.

9273. G. Daupenspeck. Refractory incandescent mantles and hoods. Aug. 9.

15,403. H. Schild. Process for coking mineral coal and lignite. July 25.

16,265. W. H. Dargue. Generation of acetylene gas. Aug. 15.

16,287. D. J. van Praag and F. W. Harker. Acetylene generators. Aug. 15.

17,243. G. Kellaway. Acetylene gas generator. Aug. 9.

18,556. British Pure Acetylene Gas Sydicate, Ltd., and C. E. Talbot. Apparatus for generating acetylene gas. Aug. 9.

18,590. H. R. Chubb and G. Bone. Apparatus for the generation, condensation, and storage of acetylene and other gases. July 25.

18,800. R. Nordmann. Process for the production of incandescence bodies. July 25.

19,032. Siemens Brothers and Co., Ltd.—From Siemens and Halske Actien Gesellschaft, Germany. Process and apparatus for purifying gases from dust. July 25.

19,275. S. C. Sörensen. Apparatus for generating acetylene gas. Aug. 15.

20,048. H. J. Rogers. Apparatus for the manufacture of acetylene gas. Aug. 15.

20,097. F. P. Vallet-Rogez. Process and composition for facilitating the combustion of fuel. Aug. 15.

20,641. W. Mackean. Incandescence gas burners. Aug. 15.

1900.

10,574. R. Wünsche. Apparatus for generating gasoline gas. Aug. 1.

10,589. F. W. C. Schniewind. Treatment and utilisation of gases. Aug. 1.

10,993. R. Haddan.—From The Adams and Westlake Company, United States. Gas generators. Aug. 9.

10,994. R. Haddan.—From The Adams and Westlake Company, United States. Acetylene gas generators. Aug. 15.

11,044. A. J. Boult.—From E. Menzel and O. Wolff, Germany. Manufacture of fuel blocks or briquettes. July 25.

11,369. G. Delin. Burners for incandescent gas lighting. Aug. 15.

11,385. J. W. Bray. Acetylene gas burners. Aug. 1.

11,614. O. Jacobs. Acetylene gas apparatus. Aug. 1.

III.—DESTRUCTIVE DISTILLATION, TAR PRODUCTS, Etc.

Complete Specification Accepted.

1899.

18,825. G. W. Johnson.—From H. Spurrier, Canada. Retorts and the like for use in destructive distillation or analogous operations. Aug. 15.

IV.—COLOURING MATTERS and DYES.

Applications.

12,804. O. Imray.—From The Farbwerke vormals Meister, Lucius und Brüning, Germany. Manufacture of black azo dyestuffs for cotton. July 16.

12,819. J. Y. Johnson.—From The Badische Anilin und Soda Fabrik, Germany. The manufacture and production of azo-colouring matters and material for use therein. July 16.

12,871. O. Imray.—From The Firm Basle Chemical Works, Switzerland. Manufacture of aromatic sulphinic acids. Complete Specification. July 17.

12,872. O. Imray.—From The Firm Basle Chemical Works, Switzerland Manufacture of sulphazide derivatives. Complete Specification. July 17.

12,899. H. E. Newton.—From The Farbenfabriken vormals F. Bayer and Co., Germany. Improvements in the manufacture or production of azo-colouring matters and of intermediate products for use therein. July 17.

13,206. H. H. Lake.—From Schoellkopf, Hartford, and Hanna Co., United States. Improvements relating to the manufacture of colouring matters. Complete Specification. July 21.

13,207. H. H. Lake.—From Schoellkopf, Hartford, and Hanna Co., United States. Improvements relating to the manufacture of colouring matters. Complete Specification. July 21.

13,277. R. B. Ransford.—From L. Cassella and Co., Germany. The production of substituted azo-colouring matters. July 23.

13,542. G. W. Johnson.—From C. F. Boehringer und Soehne, Germany. Improvements in the production of amines from the corresponding azo compounds. Complete Specification. July 27.

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13,543. G. W. Johnson.—From C. F. Boehringer and Soehne, Germany. Improvements in the reduction of nitro compounds to the corresponding amines. Complete Specification. July 27.

13,664. J. Y. Johnson.—From the Badische Anilin und Soda Fabrik, Germany. The manufacture and production of new intermediate products of new azo-colouring matters their use in dyeing and treatment on the fibre. July 30.

14,220. R. B. Ransford.—From L. Cassella and Co., Germany. The production of dyestuffs. Aug. 8.

COMPLETE SPECIFICATIONS ACCEPTED.

1899.

16,641. J. C. Mewburn.—From The Chemische Fabrik von Heyden, Germany. Manufacture of indigo and substituted indigoes and intermediate products. Aug. 1.

17,118. H. E. Newton.—From The Farbenfabriken vormals F. Bayer and Co., Germany. Manufacture or production of chemical compounds of the aromatic series. Aug. 1.

18,658. A. G. Green, A. Meyenberg, and The Clayton Aniline Co., Limited. Manufacture and production of colouring matters containing sulphur. Aug. 1.

18,872. H. E. Newton.—From The Farbenfabriken vormals F. Bayer and Co., Germany. Manufacture or production of azo-colouring matters. July 25.

18,954. O. Imray.—From The Farbwerke vormals Meister, Lucius und Brüning, Germany. Manufacture of cotton dyestuffs. July 25.

18,977. B. Willcox.—From The Badische Anilin und Soda Fabrik, Germany. Manufacture and production of new black substantive azo dyes. July 25.

19,531. H. E. Newton.—From The Farbenfabriken vormals F. Bayer and Co., Germany. Manufacture or production of new anthraquinone dyestuffs. Aug. 1.

19,534. H. H. Lake.—From Farbwerke Mulheim, formerly A. Leonhardt and Co., Germany. Manufacture of colouring matters. Aug. 1.

20,232. J. Y. Johnson.—From The Badische Anilin und Soda Fabrik, Germany. Manufacture and production of dyestuffs containing sulphur which dye cotton direct, and material for use therefor. Aug. 9.

20,413. O. Imray.—From The Farbwerke vormals Meister, Lucius und Brüning, Germany. Manufacture of dinitro-diamido anthraflavic acid. Aug. 1.

20,485. O. Imray.—From The Farbwerke vormals Meister, Lucius und Brüning, Germany. Manufacture of dyestuffs from the intermediate product in the manufacture of napthazarine. Aug. 15.

20,848. J. Y. Johnson.—From The Badische Anilin und Soda Fabrik, Germany. Manufacture and production of new brown colouring matter. Aug. 15.

20,942. J. Y. Johnson.—From The Badische Anilin und Soda Fabrik, Germany. Manufacture and production of new colouring matters and of a product for use therein. Aug. 15.

21,155. C. D. Abel.—From The Actiengesellschaft für Anilinfabrikation, Germany. Manufacture of green-blue colouring matters. Aug. 15.

21,330. O. Imray.—From The Farbwerke vormals Meister, Lucius und Brüning, Germany. Manufacture of paraoxy-para-amido-diphenylamine. Aug. 9.

21,496. O. Imray.—From The Farbwerke vormals Meister, Lucius und Brüning, Germany. Manufacture of blue dyestuffs for cotton. Aug. 1.

22,202. C. Mensching, I. Levinstein, and Levinstein, Ltd. Manufacture or production of poly-azo dyestuffs. Aug. 9.

23,420. F. Ullmann and F. Kehrmann. Manufacture of azonium dyestuffs. Aug. 15.

24,980. I. Levinstein and Levinstein, Ltd. Manufacture or production of azo-colouring matters. Aug. 9.

1900.

11,491. J. Imray.—From La Société L. Durand, Huguenin et Cie., Switzerland. Manufacture of new colouring matters derived from oxyzines. Aug. 1.

V.—TEXTILES: COTTON, WOOL, SILK, ETC.

APPLICATIONS.

13,360. H. R. Riches and The Wool, Hide, and Skin Syndicate, Ltd. Improved process for cleaning and scouring wools, furs, hairs, skins, and textile fabrics. July 24.

13,768. A. J. Boult.—From H. Sonneville, J. Sonneville, and E. Landrain, France. Improvements in or relating to apparatus for extracting impurities and foreign bodies from fibrous material. Complete Specification. July 31.

14,050. A. N. Briggs and W. Priestley. Improvements in desulphurizing wool and other objects smelling of sulphur dioxide. Aug. 4.

COMPLETE SPECIFICATIONS ACCEPTED.

1899.

14,525. J. Chaubert. New process for the preparation of cellulose for the production of threads and films. July 25.

20,011. F. C. Gärtner. Mercerising machines. Aug. 15.

20,827. E. Lodge and J. Frost. Process for improving the appearance of textile fabrics. Aug. 9.

1900.

2699. H. Sefton-Jones.—From J. Dolder, Germany. Mercerising, washing, and drying yarn, and apparatus therefor. Aug. 9.

12,327. J. Dolder. Machine for the mercerisation of yarns in the hank. Aug. 15.

VI.—DYEING, CALICO PRINTING, PAPER STAINING, AND BLEACHING.

APPLICATIONS.

12,976. R. F. Schüle. Improvements in dyeing yarns, and apparatus therefor. Complete Specification. July 18.

13,027. W. Ruttenau and Co. An improved machine for and method of dipping and dyeing skins, fabrics, cotton, wool, or other substance. July 19.

13,034. H. E. Newton.—From The Farbenfabriken vormals F. Bayer and Co., Germany. Improvements in the process of dyeing with dye-stuffs containing sulphur. July 19.

14,174. C. L. Jackson. Improvements in kiers for bleaching or otherwise treating textile and other materials. Aug. 8.

14,229. J. Y. Johnson.—From The Badische Anilin und Soda Fabrik, Germany. Improvements in the production of discharge effects on indigo-dyed silk and woollen goods. Aug. 8.

14,312. F. L. Bartelt. *See* Class XII.

COMPLETE SPECIFICATIONS ACCEPTED.

1899.

14,849. W. G. Heys.—From L. Campsque, Holland. Method of dyeing and similarly treating textile materials and fabrics in all stages of preparation and manufacture. Aug. 1.

16,731. W. Mather. Process and apparatus for continuous bleaching of fabrics in open condition. Aug. 15.

16,908. F. A. Boyes and J. Miles. Means for conducting or guiding fabrics when under treatment in bleaching and like processes. July 25.

17,360. J. Longthorpe and W. Dargue. Machines for washing, scouring, mordanting, and cleansing hanks and other forms of fibrous substances. July 25.

18,052. W. Clark.—From the firm C. H. Boehringer, Sohn, Germany. *See* Class II.

Ze zbiorów Biblioteki Głównej Politechniki Łódzkiej

1900.

9037. O. Lauckner.—From A. Vogelsang, Germany. Apparatus for dyeing textile fibres and the like. Aug. 1.

VII.—ACIDS, ALKALIS, AND SALTS.

Applications.

12,796. G. B. Ellis.—From La Société Chimique des Usines du Rhône, anciennement Gilliard P. Monnet et Cartier, France. Improvements in and connected with the production of binoxide of manganese. July 16.

13,183. J. J. Vivas. A new or improved compound termed "Witsium" on the bases of salicylates of bismuth and cerium. July 21.

13,263. A. Gutensohn and H. H. Price. *See* Class X.

13,493. J. Hargreaves. Improvements in treating and obtaining metallic chlorides and oxides. July 27.

13,531. V. Alder. An improved process for the production of alkali cyanides. Complete Specification. July 27.

13,815. G. J. Atkins. Improvements in the manufacture of chlorine. Aug. 1.

14,021. A. Shearer. Improvements in the manufacture of alkaline chromates and bichromates. Aug. 4.

14,124. B. J. B. Mills.—From The International Chemical Company, United States. Improvements in silicides and process for their manufacture. Complete Specification. Aug. 7.

14,226. J. Marlow. Improvements in or connected with apparatus for the manufacture of chloride of lime or bleaching powder. Aug. 8.

Complete Specifications Accepted.

1899.

18,565. E. Beringer. Manufacture of hydrogen cyanide. July 25.

18,897. G. Glock. Process of manufacturing nitric acid. Aug. 15.

19,120. P. Imhoff, J. Raschen and The United Alkali Company, Limited. Manufacture of chlorates. Aug. 1.

1900.

1543. G. N. Vis. Process for the purification of brine. July 25.

10,295. H. Froehling, J. S. Fleming, and J. G. Whitlock. Process of obtaining sulphur from ores. July 25.

10,678. H. Howard. Commercial production of pure carbonic dioxide. Aug. 1.

VIII.—GLASS, POTTERY, AND ENAMELS.

Applications.

12,915. J. W. Sheppard. Improvements relating to the manufacture of glass. Complete Specification. July 17.

12,916. J. W. Sheppard. A new or improved device for casting wire glass. Complete Specification. July 17.

12,917. J. W. Sheppard. A new or improved device for casting sheet glass. Complete Specification. July 17.

12,923. R. Walker. Improvements in the manufacture of decorative slabs, tiles, and the like. July 18.

13,153. P. Lubitz. Device for transporting glass bottles in glass works. July 20.

13,818. W. Drake and B. W. Kemp. Improvements in and in apparatus for the manufacture of glass bottles and the like. Aug. 1.

14,286. G. Ott. Improved method of and apparatus for fusing porcelain and the like. Aug. 9.

14,392. E. Wright. Improvements in machinery or apparatus for dipping, decorating, glazing, or enamelling metallic wooden paper or pottery tiles and other articles. Aug. 11.

Complete Specifications Accepted.

1899.

19,881. A. J. Davies. Roughened or grip surface of glass. Aug. 15.

1900.

10,039. G. Appiani. Enamel containing no tin for ceramic ware. Aug. 9.

IX.—BUILDING MATERIALS, CLAYS, MORTARS, AND CEMENTS.

Applications.

12,803. H. Schmidt. Improvements in kilns for burning cement, limes, and the like. July 16.

13,169. J. Ward. Improvements in the manufacture of broken stone paving material. July 21.

13,467. T. M. Thom and A. C. Oakes. Improvements in the manufacture of artificial stone. July 26.

13,491. G. E. Gussow. A process of manufacture of artificial stone building blocks. Complete Specification. July 26.

13,718. E. M. Fox. Improvements relating to the manufacture of nonflammable wood. July 31.

13,809. T. Ingham. *See* Class II.

13,896. A. H. Crozier. Improvements in or relating to the manufacture of artificial stone blocks, bricks, and the like. Filed Aug. 2. Date applied for May 28, 1900, being date of application in France.

14,278. H. Passon. A new and improved process for producing first class cement. Aug. 9.

14,282. E. Kleine. A new and improved process for producing artificial asphalt. Aug. 9.

Complete Specifications Accepted.

1899.

14,612. W. Owen. Manufacture of artificial stone. July 25.

19,358. C. J. R. Le Mesurier. Street and other paving made of moss litter or peat, or both. Aug. 15.

1900.

7925. A. Ducloux. Process and apparatus for converting compressible earths into resistant earths for the foundations of structures. Aug. 1.

9989.—R. Haddan.—From Huelsberg and Co., Germany. Method of rendering wood, paper, and such like material fireproof. July 25.

10,297. A. Bevier. Process of preserving wood. Aug. 1.

11,347. J. F. A. C. Seumenicht. Cement kilns and drying chambers. Aug. 9.

X.—METALLURGY, MINING, ETC.

Applications.

12,823. F. L. Saniter, J. L. Smith, R. Bedford, and The South Durham Steel and Iron Company, Ltd. Improvements in open-hearth steel furnaces. July 17.

13,189. M. Heilmann. Improvements in blast furnaces. July 21.

13,260. O. Imray. — From J. S. Hay, United States. Improvements in the manufacture of tool steel and of tools therefrom. July 23.

13,263. A. Gutensohn and H. H. Price. New or improved process of eleminating the sulphur from sulphide ores. July 23.

13,299. J. L. Smith, R. Bedford, jun., and The South Durham Steel and Iron Company, Ltd. A new or improved open-hearth steel process. July 24.

13,396. G. Jones, D. Rosser, R. Rosser, and M. Thomas. Improvements in or relating to tinning apparatus. July 25.

13,433. Sir A. Wilson, Bart. Improvements in hardening armour plates projectiles and the like. July 26.

13,436. W. Burgan. Improvements in the construction of receptacles for holding molten lead for various purposes. July 26.

13,470. H. H. Lake.—From Königl Württemb. Hüttenverwaltung Wasseralfingen, Germany. Improvements relating to moulding and casting metals. Complete Specification. July 26.

Ze zbiorów Biblioteki Głównej Politechniki Łódzkiej

13,644. H. Lange. Improvements relating to the soldering of aluminium. Complete Specification. Filed July 30. Date applied for Jan. 27, 1900, being date of application in Denmark.

13,653. A. G. Greenway. Improvements in the process for purifying or removing impurities from iron or steel while in a molten state, and apparatus therefor. July 30.

13,769. S. Cowper-Coles. Improvements in the recovery of rare metals from their ores. Aug. 1.

13,782. J. Jonas. Improved process for toughening brass, nickel, and alloys of same. Aug. 1.

13,894. G. J. Snelus. Improvements relating to the refining of iron. Aug. 2.

13,910. J. C. Butterfield. Treatment of complex ores consisting of sulphides of zinc, lead, silver, and copper, &c. Aug. 3.

13,936. J. E. Tenison-Woods and C. T. Fox. The manufacture of difficultly fusible alloys by the application of hydrogen in furnaces. Aug. 3

13,952. H. H. Lake.—From Société Fonderia Milanese D'Acciaio, Italy. Improvements relating to the manufacture of steel. Aug. 3.

14,042. H. F. Kirkpatrick-Picard. Improvements in or relating to the treatment of zinc-bearing ores. Aug. 4.

14,110. C. Tattersall and R. Hutchinson. An improved composition or liquid for hardening steel or iron. Aug. 7.

14,291. E. L. Graham. Improved process for the disintegration, separation, and concentration of metals from their ores. Aug. 9.

14,293. A. Sanders and F. Floud. An improved process for the extraction of the rare metal from rich ores without the use of lead. Aug. 10.

Complete Specifications Accepted.

1899.

16,514. G. Palis and H. Rügge. Production of copper alloys. Aug. 15.

17,860. E. Mies and A. H. Mies. Process for obtaining permanent deposits of metals on aluminium. Aug. 9.

18,128. J. H. Lee. Treatment of ores. July 25.

18,659. B. Scheid. Manufacture or preparation of metallic silicon. Aug. 1.

19,169. E. Petersson. Treatment of sulphurous ores containing arsenic, antimony, or tellurium. Aug. 9.

23,911. C. J. Head and R. C. Wild. Method for the treatment of telluride ores. Aug. 15.

1900.

5506. O. Imray. — From A. Monell, United States. Manufacture of open hearth steel. July 25.

8066. A. J. Rossi, J. MacNaughton, and W. D. Edmonds. Process of producing alloys of iron and titanium. Aug. 1.

9373. F. Hardert. Cupolas. Aug. 1.

10,480. A. Holtgen and W. E. Hampton. Apparatus for the manufacture of zinc or other metallic shavings. Aug. 1.

10,610. H. Rolle. Permanent mould for making castings. Aug. 9.

11,806. A. J. Boult.—From J. G. Hendrickson and G. H. Clamer, United States. Alloy for antifriction bearings, and the like. Aug. 9.

12,006. E. Kerr. Metallurgical furnaces. Aug. 9.

XI.—ELECTRO-CHEMISTRY and ELECTRO-METALLURGY.

Applications.

12,950. P. Garuti and R. Pompili. Improvements in voltameters for the electrolysis of the water system, Garuti. Complete Specification. July 18.

12,977. P. E. Francken. Improved electric battery. July 18.

13,095. R. MacRae and H. C. MacRae. Storage battery electrode. Complete Specification. July 20.

13,195. G. H. Smith. Improvements in electrolytic apparatus for the production of caustic soda. July 21.

13,448. A. T. Wedelin. Electricity used in tanning. July 26.

13,656. R. W. James —From J. J. Heilmann, France. Improvements in and relating to the electrodes of accumulators, and the manufacture thereof. July 30.

13,816. W. O. Rooper. Improvements in or connected with storage batteries. Complete Specification. Aug. 1.

13,951. J. Weiss. Improvements relating to electric muffles or furnaces. Aug. 3.

14,104. O. Lauckner.—From A. Vogelsang, Germany. Improvements in electrodes for use in electro-chemical processes. Complete Specification. Aug. 7.

14,212. A. J. Boult.—From The Union Carbide Company, United States. Improvements in or relating to electric furnaces. Complete Specification. Aug. 8.

Complete Specifications Accepted.

1899.

13,274. A. Schanschieff. Manufacture of accumulators. Aug. 1.

15,017. H. Weymersch. Electric accumulators or secondary batteries. July 25.

15,207. P. Neumann. Process for depositing and changing metals. July 25.

16,293. P. J. Davies. Manufacture of leaden plates for secondary batteries or accumulators, and in moulds and tools to be employed in such manufacture. Aug. 15.

16,824. E. Grauer. Apparatus for electro-chemical and electrothermic melting operations, especially for the production of calcium carbide. Aug. 9.

19,112. C. F. P. Stendebach and H. M. F. Reitz. Filling mass or active material for the production of solid accumulator plates. Aug. 1.

21,562. H. Leitner. Separator for plates of secondary batteries. Aug. 1.

1900.

11,006. H. H. Lake.—From A. Reuterdahl, United States. Secondary electric batteries. July 25.

12,537. P. F. Ribbe. Accumulator plates. Aug. 15.

XII.—FATS, OILS, and SOAP.

Applications.

13,151. J. G. H. Beckmann. A new or improved process for purifying waste oil. Complete Specification. July 20.

13,201. F. Linde. Improvements in the method of preparing rape-seed oil and other sweet oils. July 21.

13,774. E. S. Wilson and G. H. Wise. Improved method of purifying oil. Aug. 1.

13,991. J. W. Mackenzie.—From Die Direction der Gesellschaft der Rigaer Esengiesserei und Maschinenfabrik vormals Felser and Co. Improvements in pressing plates for hydraulic oil presses. Complete Specification. Aug. 3.

14,181. J. Carstairs. An improved method of and apparatus for extracting fatty and oleaginous matter from various substances. Aug. 8.

14,192. G. Bamberg. Improvements in detergents and their manufacture. Aug. 8.

14,312. F. L. Bartelt. Improved compounds for washing and bleaching vegetable fibres and textile materials for softening and purifying water without the addition of soap or saponifyable matter. Aug. 10.

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COMPLETE SPECIFICATIONS ACCEPTED.

1899.

15,163. J. E. Bedford, C. S. Bedford, and F. Reddaway. *See* Class XIII.

15,994. T. Macalpine. Refining of oils. Aug. 9.

XIII.—PAINTS, PIGMENTS, VARNISHES, RESINS, INDIA-RUBBER, ETC.

APPLICATIONS.

12,790. C. Michaud. A new or improved composition for polishing, cleaning, and preserving patent, Russian, and brown, and the like leather boots and shoes. July 16.

13,218. S. Cowper-Coles. Improvements in the manufacture of white lead. July 23.

13,320. G. Fry. Improvements in the production of substances to be used in the manufacture of varnishes for dyeing and for other uses. July 24.

14,114. A. Klee. An improved emulsion for removing paints and varnishes and process for the production of same. Complete Specification. Aug. 7.

COMPLETE SPECIFICATIONS ACCEPTED.

1899.

15,163. J. E. Bedford, C. S. Bedford, and F. Reddaway. Preparation of an india-rubber substitute from linseed oil. August 1.

17,244. G. von Reinolts. Preparation or compound to be used as a substitute for white lead in the preparation of paints. Aug. 1.

1900.

10,039. G. Appiani. *See* Class VIII.

XIV.—TANNING LEATHER, GLUE, AND SIZE.

APPLICATIONS.

12,910. J. C. Fell. From T. P. Milligan, United States. Improvements in compositions for making sizing to be used in the manufacture of paper and for other purposes. Complete Specification. July 17.

13,361. H. R. Riches and The Wool, Hide, and Skin Syndicate, Ltd. Improved process for treating and preserving hides, skins, furs, and the like. July 24.

COMPLETE SPECIFICATIONS ACCEPTED.

1899.

11,314. A. E. Vidal. Tanning of hides and skins. Aug. 9.

15,652. H. H. Lake.—From Gerberei-Gesellschaft mit beschränkter Haftung, Germany. Process of continuous tanning. July 25.

XV.—AGRICULTURE AND MANURES.

APPLICATION.

12,895. C. Roth. Improvements relating to artificial manures. July 17.

XVI.—SUGARS, STARCHES, AND GUMS, ETC.

APPLICATIONS.

12,989. J. S. Stewart-Wallace.—From W. B. Cowell, Belgium. Improvements in and relating to the manufacture of starch. July 18.

13,659. H. Wulkan and H. Straetz. Improvements in the process of obtaining dry starch or starch syrup or sugar and albumen from maize, wheat, rice, and other fruits. July 30.

13,906. H. Wilhelm. A method of producing an easily digestible peptonised preparation of albumen. Aug. 2.

14,081. P. Macgregor. Improvements in centrifugal sugar-drying machines. Aug. 7.

14,224. R. Ostrejko. Improvements in and in the manufacture of charcoal having great discolourising powder. Complete Specification. Aug. 8.

14,428. W. H. Uhland. Improvements in or connected with the manufacture of starch. Aug. 11.

COMPLETE SPECIFICATIONS ACCEPTED.

1899.

17,558. W. A. Morris. Purified gum in scales or flakes. Aug. 9.

1900.

6388. F. Breyer. Process for purifying saccharine juices. July 25.

9040. L. Sarason. Process for the treatment of gluten and substances containing gluten. July 25.

XVII.—BREWING, WINES, SPIRITS, ETC.

APPLICATIONS.

12,949. J. W. Bennett. Bennett's anti-bacteria system and appliances for the use of brewers of ale, beer, and porter or stout during the processes of cooling fermentation and racking. July 18.

13,133. C. W. Ramsay. Improvement in or relating to the distillation and purification of alcoholic liquids. July 20.

13,343. E. Wagner. An improved process and apparatus for pasteurising beer. Complete Specification. July 24.

13,908. L. C. Reese. Improvements in condensing and rectifying apparatus. Aug. 2.

14,214. T. Storer and R. McAlley. An improvement in the treatment of the distillery refuse called "potale" or "burntale." Aug. 8.

XVIII.—FOODS, SANITATION, ETC., AND DISINFECTANTS.

APPLICATIONS.

A.—Foods.

12,807. H. J. Haddan.—From E. Passburg, Germany. A new or improved method of treating milk for the purpose of solidifying and preserving same. July 16.

13,175. L. Aubry. An improved manufacture of a food extract from yeast dregs, settlings, or like waste materials from breweries, distilleries, and wines. July 26.

13,826. J. St. Patrick Macardle. Improvements in the treatment of milk. Aug. 1.

14,266. M. Ekenberg. Improvements in the method of preserving fish. Complete Specification. Aug. 9.

B.—Sanitation.

12,859. H. H. Lake.—From Jewell Export Filter Company, United States. Improvements relating to the purification of water. Complete Specification. July 17.

12,860. H. H. Lake.—From Jewell Export Filter Company, United States. Improvements relating to the coagulation of the suspended matter in liquids. Complete Specification. July 17.

12,861. H. H. Lake.—From Jewell Export Filter Company, United States. Improvements relating to the purification of water and other liquids. Complete Specification. July 17.

12,862. H. H. Lake.—From Jewell Export Filter Company, United States. Improvements relating to the production of reagents designed for purifying water. Complete Specification. July 17.

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12,863. H. H. Lake.—From Jewell Export Filter Company, United States. Improvements in and relating to apparatus for use in the production of reagents, and for the purification of water thereby. Complete Specification. July 17.

14,417. A. Harris. Improvements in apparatus for softening or purifying water. Aug. 11.

Complete Specifications Accepted.

A.—Foods.

1899.

15,524. A Dubuisson. Process and apparatus for sterilising natural and artificial butter. Aug. 9.

15,955. J. Sleeman and S. White. Production of alcoholic liquors, flour, or meal, and malted or readily digested foods. July 25.

18,111. S. Gironcoli. Process of preserving meat and fish. Aug. 1.

18,426. L. L. Carpentier. Process for the preservation of butter. Aug. 1.

1900.

10,061. L. Lysen. Process for preserving alimentary products by carbonic acid. Aug. 9.

11,948. S. Bergheim. Treating tea to render the tannin therein insoluble. Aug. 9.

B.—Sanitation.

1899.

15,755. A. E. Bréchot. Apparatus for the destruction of solid sewage and other matters. Aug. 9.

17,027. H. P. A. Gaillet. Apparatus for purifying and sterilising drinkable waters. Aug. 9.

1900.

11,110. A. J. Boult.—From C. H. Koyl, United States. Process for the purification of water. July 25.

11,111. A. J. Boult.—From C. H. Koyl, United States. Apparatus for purifying water. Aug. 9.

11,112. A. J. Boult.—From C. H. Koyl, United States. Apparatus for softening and purifying water. July 25.

XIX.—PAPER, PASTEBOARD, Etc.

Applications.

12,910. J. C. Fell.—From T. P. Milligan, United States. *See* Class XIV.

13,123. W. Friese-Greene and P. E. Knell. Improvements in the manufacture of paper. July 20.

13,131. J. N. Goldsmith and The British Xylonite Company, Ltd. Improvements relating to the manufacture of celluloid. July 20.

13,255. A. B. Knopf, *née* Fuchshuber. Improvements relating to the treatment of material for use in the manufacture of paper. July 23.

13,469. A. Wohl. Improvements relating to the production of cellulose. July 26.

14,035. L. K. Böhm. Improvements in or relating to the manufacture of paper from straw. Complete Specification. Aug. 4.

Complete Specifications Accepted.

1899.

14,138. W. Friese-Greene. Manufacture of paper for inkless printing. Aug. 9.

20,279. J. Chaubet. Composition for the manufacture of celluloid. Aug. 15.

20,630. M. Fremery and J. Urban. Drying of cellulose products. July 25.

1900.

9956. The United Enterprises, Ltd., and R. Stocker. Methods of and means for manufacturing manifold carbon paper. July 25.

XX.—FINE CHEMICALS, ALKALOIDS, ESSENCES, and EXTRACTS.

Applications.

12,871. O. Imray. — From The Firm Basle Chemical Works, Switzerland. *See* Class IV.

13,193. G. B. Ellis.—From Société Chimique des Usines du Rhône, anciennement Gilliard P. Monnet et Cartier, France. Production of amido-carboxylic acids. July 21.

13,468. H. H. Lake.—From the firm of Fabrik Chemischer Praeparate von Dr. Richard Sthamer, Germany. Improvements in and relating to the production of saponin. July 26.

14,213. C. D. Abel. — From Actiengesellschaft für Anilinfabrikation, Germany. Manufacture of organic bromo-compounds. Aug. 8.

14,413. A. G. Bloxam.—From Chemische Fabrik Rhenania, Germany. Manufacture of an aseptic preparation from the pancreas. Complete Specification. Aug. 11.

14,414. A. G. Bloxam.—From Chemische Fabrik Rhenania, Germany. Manufacture from the pancreas of a preparation capable of resisting stomach juices. Complete Specification. Aug. 11.

XXI.—PHOTOGRAPHY.

Applications.

13,317. S. E. Page.—From The Grenier Art Company, United States. Improvements in coloured photographs and the process of making them. Complete Specification. July 24.

14,068. E. R. Brickell. An improvement in the development of photographic films. Aug. 4.

Complete Specifications Accepted.

1899.

12,515. G. Selle. *See* Class I.

12,516. G. Selle. Sensitising and relative sensitive adjustment of photographic plates or the like, for use in colour photography and to the measurement of time exposure of said plates. July 25.

12,517. G. Selle. Formation of films for use in colour photography. July 25.

13,666. G. Selle. Method of and means for producing images in complimentary colours suitable also for use in taking, projecting, inspecting, testing, or combining three-colour photographs, prints, or the like. Aug. 9.

17,375. F. J. Farrell and E. Bentz. Production of photographs on silk. Aug. 1.

19,843. L. A. Garchey. Colour photography. Aug. 1.

XXII.—EXPLOSIVES, MATCHES, Etc.

Applications.

12,654. A. Reichwald.—From the firm of F. Krupp, Germany. Improvements in or connected with percussion fuses for projectiles. July 17.

12,991. H. Huntingdon. Improvements in or connected with matches. July 18.

13,754. W. B. Challen. Improvements relating to gun-cotton moulding presses. July 31.

Complete Specifications Accepted.

1899.

15,850. S. A. Rosenthal. Matches, and the processes for the manufacture thereof. Aug. 1.

16,595. C. H. Curtis and G. G. André. Explosives. July 25.

19,544. V. von Neumann. Detonators for railway signalling. Aug. 1.

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19,695. Sir W. G. Armstrong, Whitworth, and Co., Ltd., and G. Stuart. Time fuses. Aug. 9.

23,405. J. Landin and A. Jernander. Igniting composition for matches. Aug. 15.

1900.

11,904. J. A. E. Criswell. Match-making machines. Aug. 1.

11,095. J. A. E. Criswell. Machines for making matches. Aug. 15.

11,567. J. B. Bernado. Manufacture of explosives. Aug. 9.

11,604. W. L. Wise.—From The Skodawerke Actiengesell-schaft, Austria. Primers for ordnance. Aug. 1

11,605. W. L. Wise.—From The Skodawerke Actiengesellschaft, Austria. Primers for ordnance. Aug. 1.

XXIII.—ANALYTICAL CHEMISTRY.

COMPLETE SPECIFICATION ACCEPTED.

1899.

16,185. The Dairy Outfit Company, Ltd., and W. T. Webster. Apparatus for testing milk and other substances. July 25.

PATENTS UNCLASSIFIABLE.

COMPLETE SPECIFICATIONS ACCEPTED.

1900.

9611. T. Lomas. Treating bones and the like materials.

11,647. L. Spiegel. Process of manufacturing yohimbine. Aug. 15.

Printed and Published by EYRE and SPOTTISWOODE, East Harding Street, London, E.C., for the Society of Chemical Industry.—P 896.

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