THE JOURNAL OF THE TEXTILE INSTITUTE

ABSTRACTS

LIST OF ABSTRACTORS

The Abstracts in this section of the "Journal" are supplied by the following Organisations, and the source indicated by the initials hereunder shown.

British Cotton Industry Research Association	C.
British Launderers Research Association	La.
Bureau of Hygiene and Tropical Diseases...	T.
Imperial Bureau of Animal Genetics.	W.
Imperial Bureau of Plant Genetics	C. or L.
Linen Industry Research Association	L.
Water Pollution Research Board	W.
Wool Industries Research Association	W.

The original publications may be borrowed from or through the Institute library, Any member wishing to borrow a journal should send to the Institute a copy of the reference which follows the author's name in each abstract, for example :—

"*J. Soc. Dyers & Colourists*, 1942, 56, 1921."

Members are requested to refund postage on the journals borrowed.

The letters B.P., U.S.P., D.R.P., in the references signify British, United States, and German patent specifications respectively. These are not obtainable through the Textile Institute.

In some instances a second reference is given in parentheses as " (through *Chem. Abs.*, 1942, 34, 269) ", which means that the abstract has been taken from another abstracting Journal and the original publication is not obtainable at the Textile Institute.

1—FIBRES AND THEIR PRODUCTION

(B)—Animal

Silkworm Eggs: Stimulation with Acid. L. Jaeger. *Kisérletügyi Kozlemények* 1939, 42, 109-114 (through *Chem. Zentr.*, 1940, i, 2096, and *Chem. Abstr.*, 1941, 35, 7040^5).

In Asia three or more crops of silkworms can be obtained each year but in Hungary only one, under normal conditions. By treating the eggs with hydrochloric acid under certain conditions it is possible to produce three generations in one year and the cocoons spun by the worms are of the normal quality. C.

Pulp: Purification. V. F. Maksimov. *Mitt. Kirov. forsttechn. Akad. (U.S.S.R.)*, 1940, No. 59, 28-40 (through *Chem. Abstr*, 1941, 35, 7187^2).

The author compares the results of the "cold purification" of pulp (use of concentrated alkali in the cold) with those obtained by the usual hot scour. The cold method leads to higher values for α-cellulose and is recommended for the production of nitrocellulose of high viscosity and of high grades of cuprammonium and acetate rayons. Washing with a graded series of alkali solutions (diffusion washing) gives a better product (higher α-cellulose, higher viscosity, greater swelling, less pentosan) than ordinary washing. The use of hot water in the final washing has a detrimental effect. C.

"Aralac" Casein Fibre. Aralac Inc. *Rayon Textile Monthly*, 1941, 22, 652-654.

Research carried out by the American National Dairy Products Corporation has resulted in the production of a textile fibre, "Aralac," from the casein of skim milk. The present production capacity of the manufacturing division is about 5,000,000 lb. a year—the recoverable casein content of about 160,000,000 lb. of skim milk. Supplies and uses of casein in the United States are discussed. Domestic production is supplemented by imports from Argentina. "Aralac" is being used in the manufacture of fur and wool felts, and in textile mills is being blended with other fibres. It is more expensive than rayon and cotton but less costly than wool and fur. "Aralac" supplies drape and substance which previously could only be obtained through the use of wool and fur in some fabrics. Blended with rayon, it produces fabrics of unusual beauty. C.

Hypericin: The Photodynamic Pigment from St. John's-wort; Cause of Disease in Domestic Animals. N. Pace and G. Mackinney. *J. Amer. Chem. Soc.*, 1941, **63**, 2570-2574.

The chemical nature is discussed of hypericin, the photodynamic pigment of St. John's-wort, the ingestion of which causes illness in certain domestic animals on exposure to sunlight. It is tentatively suggested that hypericin is a partially reduced polyhydroxy derivative of helianthrone. W.

Australia: Sheep and Wool Industry. W. S. Kelly. *Wool Rec.*, 1941, **60**, 667, 670.

A short review is given of the development of the sheep and wool industry in Australia, and price stability and other post-war problems discussed. W.

International Sheep Breeds. *California Wool Grower*, 1941, **17**, No. 43, 14-27.

Photographs and short descriptions are given of a further 63 breeds. (See also this *J.*, 1940, A 1 and A 650.) W.

(C)—VEGETABLE

American Cotton: Variety Tests. H. E. Dunlavy, I. M. Parrott and F. W. Self. *Oklahoma Sta. Circ.* 93, 1941, 24 pp. (through *Exp. Sta. Rec.*, 1941, **85**, 474).

The 14 high-yielding cottons among the 55 varieties and strains tested at the U.S. Dry Land Field Station in 1940 represented the Acala 5, Deltapine, Stoneville, Lone Star Triumph, Rowden and Hi-Bred families or lines. These 14 varieties averaged 160 and 106 lb. more seed cotton and seed per acre, respectively, and returned \$4·68 more per acre for lint than did the other 41 varieties. The 55 varieties produced an average of 516 lb. of seed per acre estimated to contain about the same amount of protein as 22 bu. of corn or 14 bu. of wheat. The 14 varieties averaged slightly over $\frac{15}{16}$ in. ranging from $\frac{13}{16}$ to 1 in. in staple length, while the other 41 varieties averaged slightly over $\frac{31}{32}$ in. and 15 of the 41 stapled longer than 1 in. The average cost of picking and ginning a bale for the 55 varieties was \$13·55 and for pulling and ginning \$14·14. Data on these and other agronomic characters and factors are tabulated and discussed in the original circular. C.

Black Cotton Soil: Effect of Firing. A. Sreenivasan and R. K. Aurangabadkar. *Soil Science*, 1940, **50**, 449-462 (through *Brit. Chem. Physiol. Abstr.*, 1941, B III, 226).

Light firing of black cotton soil gave rise to improved physical structure, aggregation of colloids, loss of organic matter, slight diminution in exchange capacity and exchangeable Ca and Mg, and increase in soluble salts and exchangeable Na and K. C.

Cotton: Cultivation in Nyasaland. *Ann. Rept. Dept. Agric., Nyasaland*, 1940, 7-8.

The following references to cotton cultivation are abstracted. (pp. 7-8) The number of growers in the whole Protectorate in 1940 showed an increase of 17 per cent. over 1939. The increase occurred mainly in the Lower River and Shire areas. In the Northern Province there was a decline of 11 per cent. in the number of growers and production in this Province was some 220 tons less than in 1939. Yields at the Domira Bay station of the Empire Cotton Growing Corporation were exceptionally high, the mean being 973 lb. seed cotton per acre. The season was admirable for growth and development in the Southern Province but bollworm attack was heavy and the early markets were disappointing. Trust Land and Private Estate seed cotton production with a total of 3,520 tons, of which private estates produced 506 tons, shows an increase of approximately 23 per cent. on the previous year's figure. European production of seed cotton amounted to 11½ tons. (p. 15) Extracts are given from the 1939/40 Progress Report of the Nkwale Empire Cotton Growing Corporation Experiment Station. Conditions were favourable and the crop the largest so far recorded by the station. The mean yield was approximately 350 lb. lint per acre, actually 973 lb. seed cotton per acre of which some 95 per cent. was clean and white. One 5-acre field, which had been under cultivation for 11 years including two rest periods, and had had no manuring, was planted with a bulk Z.14 and gave the high yield of 470 lb. lint per acre. A small bulk strain trial with ten sub-strains each of "920," C.28, and some of the crosses was planted. Yields were high, ranging from 310 to 530 lb. lint per acre. The U.4 x Cambodia x U.4 cross was again found to be the highest yielder. The Nyasaland Upland strain S.G.27 yielded less seed cotton and, owing to its low ginning percentage, much less lint than any of nine U.4 strains which were tested. Tests with two U.4 lots and two crosses showed that acid treated seed gave about 8 per cent. more yield than untreated seed and there was no differential response among the strains. No significant differences in final yield were observed in an experiment designed to study the effects of seed rate and time of thinning. Cultivation experiments showed an increase in yield in ridged plots compared with those planted on the flat. Dug plots were just better than plots with no pre-cultivation. (pp. 16-17) Routine records of bollworm and stainer populations were obtained from a number of fields on the Domira Bay station and also from native gardens in the main vegetational types of the Lake Shore area. The initial bollworm infestation was remarkably light. The main stainer immigration, composed almost entirely of *D. intermedius*, coincided with the start of boll opening in late April. Crop development studies showed that 57 per cent. of the crop was derived from buds produced in the last fortnight of February; 95 per cent. from the six weeks ending the 23rd March. The first 43 per cent. of the buds formed produced 90 per cent. of the crop. Of the four main types of crop loss, that of shedding due to unknown causes ranked highest in point of numbers, 66 per cent. of the fruiting points being lost by shedding of this type. Bollworm accounts for a loss of 19 per cent. of the total number of fruiting points, but the loss is largely made up of buds and bolls shed, and as this shedding may be selective, it is possible that it does not represent a true loss of crop. Considering the damaged non-shedding boll population, bollworm only accounted for a loss of 10 per cent. Bacterial disease (direct attack) and immaturity each accounted for 3½ per cent., and stainer accounted for 38 per cent. Observations on the red bollworm diapause and on depth of pupation are recorded. From May onwards a large proportion of the pupae go into diapause and do not emerge as moths until the following December to March or later. Direct sampling of cotton fields confirms that pupae are in the surface layer of soil: about 2,000 per acre were found in diapause in November. (p. 17) Records were made of red bollworm egg laying and larval populations, stainer populations, flower and boll production, and crop loss causes in native gardens in the Lower River region. Analysis of the causes of crop loss shows that of the total number of bolls which survive to a size where they are susceptible of examination, 46 per cent. were a complete loss due to bollworm, 28 per cent. due to stainer and 2 per cent. due to other causes including direct bacterial lesions. Only 24 per cent. contributed to the crop. In addition, analysis of aborted material (i.e. bolls which shed or which are attacked so early in life that they never develop) showed that 76 per cent. of this loss was due to bollworm. The critical factors determining the amount of bollworm damage are: (1) the size of the moth flight from diapausing pupae, (2) the amount of breeding up in very early plantings which may reinforce the latter part of the diapause flight to later plantings, and (3) the extent to which moth activity from June onwards is reduced, initially by the lengthening pupal periods in the cool weather and subsequently by the increasing proportion of pupae going into diapause. The size of the stainer infestation is controlled by (1) the size of the initial immigration to the crop in May, (2) the extent to which these immigrants are capable of building up an F1 on early fruiting plants, and the extent to which cool season breeding is inhibited. C.

Cotton: Effect of Environment on Fibre Maturity. A. N. Gulati. *Indian J. Agric. Sci.*, 1941, 11, 566-579.

An account is given of a study of the effect of environment, as provided by agronomical factors, on fibre maturity of cotton. Results obtained with P-A/289F and Mollisoni cottons grown at Sriganganagar (Bikaner) lead to the following tentative conclusions:—(1) Out of two sowing dates, May suited P-A/289F, whilst June helped Mollisoni to attain its highest fibre maturity. (2) Preparatory cultivation did not prove beneficial to either of the two cottons in respect of fibre maturity. Its absence, however, helped Mollisoni when it was sown in June. (3) Heavy irrigation comprising 11 waterings as compared to moderate irrigation of 6 waterings was helpful in raising the fibre maturity of both the cottons. (4) The application of Nicifos to P-A/289F was evidently better than no-manure when the cotton was sown in May, whilst cake and no-manure suited Mollisoni better than Nicifos. (5) Six-inch spacing as compared with 12-inch spacing improved the fibre maturity of Mollisoni. The following conclusions are drawn from results obtained with samples of Cambodia cotton grown in two Rajputana States—Bundi and Ajmere:—(1) Locality has a significant effect upon maturity percentage, Ajmere yielding higher percentages of mature fibres as compared with Bundi. (2) The earlier-sown samples gave higher percentages of maturity in both the localities. Bad effects of late sowing could be remedied by heavy irrigation. (2) Adequate irrigation yielded higher fibre maturity than scanty irrigation. (4) The application of sheep dung at the rate of 32 mds. per acre plus ammonium sulphate at the rate of 50 lb. per acre as basal dressing had a depressing effect upon fibre maturity as compared with no basal dressing. (5) Top dressing with (*a*) sheep dung alone and (2) sheep dung plus ammonium sulphate had a beneficial effect upon maturity percentage, (*b*) giving better results than (*a*). C.

Cotton Bolls: Attack by Alternaria Species. Y. Nisikado, K. Kimura and Y. Miyawaki. *Ann. phytopath. Soc. Japan*, 1940, 10, 214-230 (through *Rev. Appl. Mycol.*, 1941, 20, 461-462).

Two species of *Alternaria*, *A. macrospora* and *A.* (?) *gossypii*, were recently found attacking cotton fibres in nearly mature bolls in western Japan, the former also affecting the foliage. The inoculation of cotton bolls of varying degrees of maturity and of commercial cottons resulted in discoloration or blackening of the fibres. The minimum, optimum, and maximum temperatures and *p*H's for the mycelial growth of both species were 5°, 27°-30°, and 36° C., and 2, 5 and 10, respectively. C.

Cotton Seed: Disinfection; Effects on Stands and Yields. L. E. Miles. *Mississippi Farm Res.* [*Mississippi Sta.*], 1941, 4, No. 5, p. 2 (through *Exp. Sta. Rec.*, 1941, 85, 493).

Tests in Mississippi over a 12-year period are reported to have shown that cottonseed treatment with certain disinfectants prior to planting will prevent losses due to poor stands and will yield high returns in profit for the small amount invested. Ethyl mercury chloride and ethyl mercury phosphate (Ceresan and New Improved Ceresan, respectively) gave best results among the dusts tested. C.

Cotton Jassids: Control. K. B. Lal. *Indian Farming*, 1941, 2, 465-468.

A popular account is given of the life-history of cotton jassids (*Empoasca* species), the damage they cause by sucking the sap of cotton plants, and work done in India on control measures, including the use of poison dusts and sprays, appropriate manuring of the plant, and breeding resistant strains of cotton. C.

Acala Cotton Plant: Fertilizer Experiments on Irrigated Soils. D. A. Hinkle and G. Staten. *New Mexico Sta. Bul.*, 280, 1941, 15 pp. (through *Exp. Sta. Rec.*, 1941, 85, 756-757).

Fertilizer tests with Acala cotton grown continuously on an irrigated clay adobe soil, 1929-40, are reported. Applications of 135 lb. of triple superphosphate or 150 lb. of ammonium sulphate per acre per annum did not materially affect yield, staple length, lint percentage, boll size, or maturity of cotton grown on this heavy soil. In combination, they increased yields slightly but not profitably. Annual applications of manure resulted in an average increase of 143 lb. of lint cotton per acre over unfertilized plots, a significant and paying response. None of the fertilizer treatments used reduced the percentage of wilted plants, which were most numerous on the lighter-textured soil areas of the field. Fertilizers used alone or in combination did not materially affect the total nitrogen, organic matter, or reaction of the surface or sub-surface soil. Those containing phosphorus increased the available phosphorus content of the soil but did not affect the reaction. In a second test on a lighter type of soil, 1937-40, a small response was obtained from either ammonium sulphate or superphosphate and a very good one from " 16-20-0 Ammo-Phos ". Annual applications of manure resulted in the greatest response even when manure supplied about the same amount of plant food as the commercial fertilizer, and also produced a much greater percentage increase in yield on poor light soil than on heavy soil. Comparisons of different kinds of sulphur on very heavy plastic soil failed to show an increase in cotton yield compared with unsulphured plots. *C.*

Cotton Plant: Effect of Soil *p*H. W. R. Paden. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 93-4 (through *Chem. Abstr.*, 1941, **35**, 7618^{3}).

Cotton on sandy loam at *p*H 5·5 or 5·0 made very slow growth as seedlings and was highly susceptible to cold and insect injury by comparison with the vigorous growth and earlier maturity on plots at *p*H 6·0 or 6·5. The relative yields of seed cotton at *p*H 5·0, 5·5, 6·0 and 6·5 were 100, 112, 118 and 122, respectively. C.

Cotton Plant: Fertilizing with Gypsum. E. D. Matthews. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 95 (through *Chem. Abstr.*, 1941, **35**, 7622^{7}).

Ordinary superphosphate proved superior to triple superphosphate as a fertilizer for cotton so long as little sulphate was also supplied. Gypsum increased the yield when used as source of sulphate with triple superphosphate but when there was plenty of ammonium sulphate at hand the use of gypsum caused the yield to decline. C.

Cotton Plant: Response to Minor Elements. Anna L. Sommer. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 94 (through *Chem. Abstr.*, 1941, **35**, 7622^{8}).

When grown in greenhouse pot cultures on 16 soils of Alabama cotton responded equally to both Mg and " minor " elements. C.

Cotton Plant: Response to Potash. N. J. Volk. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 55-56 (through *Chem. Abstr.*, 1941, **35**, 7618^{9}).

Data from supposedly uniform experimental plots are used to demonstrate the difficulty of correlating the replaceable K content of the soil with yield responses when cotton is the crop. C.

Cotton Roots: Growth in Culture Solutions. C. Wilson. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 209 (through *Chem. Abstr.*, 1941, **35**, 7465^{2}).

Sucrose is the best source of carbohydrate for the growth of excised cotton roots, and glucose is next best. Fructose and brown sugar inhibit growth. A good culture solution for the growth of 1-2 cm. root tips at 25-30° C. in the dark, sub-cultures being made at weekly intervals, consists of $Ca(NO_3)_2$ 190, $CaH_4(PO_4)_2$ 58·5, KCl 48, $MgSO_4$ 78, $Fe_2(SO_4)_3$ 0·9, vitamin B_1 0·1, nicotinic acid 0·5 mg., and sucrose 20 gm., made up to 1 litre with redistilled water. C.

Cotton Seedlings: Effect of Boron. J. R. Piland. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 95 (through *Chem. Abstr.*, 1941, **35**, 7617^{3}).

The boron content of N. Carolina soils is discussed. Cotton seedlings were injured if planted immediately after the addition of more than 1 p.p.m. of boron to the soil but if planted after soybeans were not injured in a soil containing 0·96-1·44 p.p.m. C.

Cotton Plant: Wilt Resistance and Phosphorus Supply. (1) A. L. Smith. (2) D. C. Neal. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 199, 198-9 (through *Chem. Abstr.*, 1941, **35**, 7618^{6}).

(1) In N. Carolina, S. Carolina and Georgia the average incidence of cotton wilt appears to be slightly greater if the P content of the fertilizer is increased from 6 to 12 per cent. in mixtures containing N 6 per cent. and K_2O 6 per cent.,

applied at the rate of 600 lb. per acre. In the Central Southern States there was no evidence of this effect. (2) The above effect of doubling the P content of the fertilizer was not observed in Louisiana. C.

Cotton Root-rot Disease: Control. R. B. Mitchell, D. R. Hooton and F. E. Clark. *J. Agric. Res.*, 1941, **63**, 535-547.

Hunt clay (Texas) to which no organic material was added permitted growth and persistence of *Phymatotrichum omnivorum* mycelium over the soil and root surfaces in open containers inoculated with segments of recently infected cotton roots, when maintained under favourable moisture and temperature conditions. Soil containing added organic matter, but otherwise similarly inoculated and maintained, either completely inhibited the growth of *P. omnivorum* or permitted initial growth which was followed by disintegration of mycelium. Under field conditions, cotton roots injured during the late summer or early autumn showed pronounced increases in micro-populations associated with root surfaces; such increases were proportionately greater than those caused in soil by organic amendments and found inimical to the growth of the parasite. The majority of *Phymatotrichum omnivorum* sclerotia buried in organic-amended soil were quickly destroyed; in contrast, the great majority of sclerotia buried in soil without organic residues persisted. Removal of the competitive effects of other microbes by soil sterilization, and subsequent reinoculation with *Phymatotrichum omnivorum,* permitted good growth of fungus mycelium. During the early stages of incubation viable sclerotia disappeared more rapidly from amended soils than killed sclerotia. A greater elimination of heat-killed sclerotia from organic-amended soil than from unamended check soil was observed. Following field application of organic materials, together with early October plowing, increased microbial activity, reduction of the incidence of dead cotton in the succeeding crop, and greater difficulty of sclerotia recovery from the amended levels in field soil were observed. C.

Cotton Root-rot Disease: Control on Houston Black Clay. R. B. Mitchell, J. E. Adams and C. Thom. *J. Agric. Res.*, 1941, **63**, 527-534.

Curves for temperature, moisture, and microbial numbers were established for selected plots of Houston soil as a background for studies in cotton root-rot control. The plots were used for comparing the effects of continuous cotton cultivation and of turning under sorghum and cowpeas on the incidence of root-rot. In a period between early December and February the temperature remained below those required for active microbial multiplication, yet without freezing. Temperatures ranged above 70° F. from March to November, and from 80° to 90° from June to October. Bacteria and actinomycetes were much more active and abundant than has been reported for northern soils. Maxima for total colony counts in soils receiving the sorghum- and cowpea-residue amendments reached 200 to 400 millions; actinomycetes at times reached 50 and 90 millions to the gram. The corresponding figures for the continuous-cotton soil were considerably lower. The observed responses to added organic nutrients should encourage a search for organic media and agronomic practices capable of yielding a controlled microflora. C.

Cottonseed: Effect of Sterilisation on Germination. C. H. Rogers. *Proc. Assoc. Southern Agric. Workers,* 1941, **42**, 193-4 (through *Chem. Abstr.*, 1941, **35**, 7627[2]).

A series of experiments are reported in which nine organic Hg compounds, delinting with sulphuric acid, three combinations of delinting and dusting with Hg compounds, and yellow and red Cu oxides were compared for their effects on germination and the yield of cotton. The copper oxides gave poor results but the other treatments improved germination by 5-45 per cent. and reduced seedling infection by 3-20 times. De-linting was particularly useful. The incidence of angular leaf spot disease, over a 4-year period, was reduced from 41 to 7 per cent. by dusting with Ceresan or by de-linting with acid. C.

Cottonseed Disinfectants: Efficiency Tests. D. C. Neal. *Proc. Assoc. Southern Agric. Workers,* 1941, **42**, 197 (through *Chem. Abstr.*, 1941, **35**, 7634[1]).

Results of tests on proprietary organic mercury compounds, ethyl mercuriborate, cyanamide and copper-mercury dust are reported. C.

Cotton Stem Blight: Occurrence in China. L. Ling and J. Y. Yang. *Phytopathology*, 1941, **31**, 664-671 (through *Rev. Appl. Mycol.*, 1941, **20**, 573-574).

A stem blight, locally known as "dry scar," of cotton is stated to be widespread and responsible for heavy losses, especially among varieties of Asiatic cotton *(Gossypium arboreum)* in Szechwan Province, China. The pathogen, which is believed to be a strain of *Alternaria macrospora*, produces on the stems, twigs and leaf petioles of mature plants dark brown, roughly circular spots, gradually turning dark grey and assuming an elliptical or oval shape, the centres at the same time becoming deeply sunken and forming cankers. Diseased tissues usually split longitudinally or crack into fragments, and finally the infected stem or twig breaks off at the canker, causing the death of part or all of the plant. From the upper part of the petiole, the lesion may extend upwards into the midrib and veins near the leaf base. The pathogen was isolated in pure culture on potato dextrose agar, on which it throve at a temperature of 16°-36° C., with an optimum at 28°. Growth took place over a wide range of hydrogen-ion concentrations with maxima at *p*H 4·2 and 7·6. The fungus is characterised by brown, septate, usually simple conidiophores, 21 to 124 by 4 to 10μ, and brown, obelavate conidia, 40 to 288 by 8 to 29μ, including the beak (from 15 to 216μ long), and provided with 3 to 13 transverse and 3 to 5 longitudinal septa. *A. tenius* was also isolated from diseased leaves only. In inoculation experiments, American cotton *(G. hirsutum)* proved equally susceptible with *G. arboreum* to stem blight in the early stages of growth, but gradually acquired some degree of resistance. Wounding increased the incidence of artificial infection on the stems from 70 to 100 per cent. On inoculated bolls the initial minute, greyish-brown spots frequently turn purplish and coalesce, while in a very humid atmosphere conidia develop in sufficient numbers to impart a black cast to the centre of the lesion. In the field the disease is most prevalent in July, just before flowering, serious outbreaks being promoted by successive periods of rainfall and high humidity, in combination with fairly high temperatures. *A. macrospora* was experimentally shown to overwinter on dead, infected stalks in the field, whilst the possibility of seed transmission is indicated by its frequent development from surface-sterilized cotton seeds cultured on agar plates. C.

Wilt-infected Cotton Plants: Response to Nutrients. G. M. Armstrong and W. B. Albert. *Proc. Assoc. Southern Agric. Workers*, 1941, **42**, 198 (through *Chem. Abstr.*, 1941, **35**, 7618^4).

Wilt-infected cotton developed worse and died sooner in culture solutions containing a low potash supply. Healthy plants absorbed more KNO_3, ammonia N, and Ca than wilt-infected plants; there was indeed some evidence that dying plants gave up K to the solution. The rate of growth of the plants was not affected by variations in Mg content of the solutions but symptoms of Mg deficiency were observed in the foliage when the Mg supply was low. C.

Boll-weevil: Control by Spraying or Dusting. K. P. Ewing. *J. Econ. Entomol.*, 1941, **34**, 498-500 (through *Chem. Abstr.*, 1941, **35**, 7628^5).

For a light infestation by the boll-weevil, spraying with Pb arsenate was more effective, in terms of cotton yield, than dusting with Ca arsenate but when the infestation was heavy dusting with Ca arsenate gave better results than spraying with either Ca or Pb arsenate. C.

Cotton Aphids: Effect of Calcium Arsenate Dusting. E. W. Dunnam and J. C. Clark. *J. Econ. Entomol.*, 1941, **34**, 587-8 (through *Chem. Abstr.*, 1941, **35**, 7627^4).

It is common experience that the use of Ca arsenate dust against cotton insect pests is accompanied by an increase in infestation by aphids. It appears that in some way the *p*H of the leaf cell sap is increased and that it would be worth while to spray the plant with a substance to buffer the arsenate against increase of alkalinity. The *p*H of several sprays is recorded. Best results were obtained with Zn arsenate (*p*H 6·4). C.

Cotton Aphids and Boll-weevil: Control. R. L. McGarr. *J. Econ. Entomol.*, 1941, **34**, 500-1, 580-2 (through *Chem. Abstr.*, 1941, **35**, 7628^6 and 7627^8).

(1) Mixtures of cryolite and sulphur were ineffective against boll-weevil and

cryolite itself was only half as effective as Ca arsenate. The use of both insecticides was accompanied by an increase in aphids. (2) The addition of derris to Ca arsenate (alone or mixed with sulphur) controls the cotton aphid without impairing the control of the boll-weevil. Nicotine and tobacco dust were less effective in checking aphids. C.

Cotton Plant Insecticides: Efficiency Tests. R. W. Moreland, E. E. Joy and K. P. Ewing. *J. Econ. Entomol.*, 1941, **34**, 508-511 (through *Chem. Abstr.*, 1941, **35**, 7628^9).

Several insecticides (basic Cu and Pb arsenates, cryolite) were tested against a Ca arsenate (5·4 per cent. soluble As_2O_5, 41·4 per cent. total As_2O_5, mean particle diameter 1μ) in cage tests with the boll-weevil, boll-worm and leaf-worm. Basic Cu arsenate and mixtures of it with sulphur and with lime were rather more effective than the Ca arsenate. C.

Cotton Plant Insecticides: Efficiency Tests. J. C. Gaines. (1) *J. Econ. Entomol.*, 1941, **34**, 505-7; (2) *Ibid.*, 1941, **34**, 512-5; (3) *Ibid.*, 1941, **34**, 515-8 (through *Chem. Abstr.*, 1941, **35**, 7628^3, 7626^8, and 7629^2).

(1) A special Ca arsenate with 19 per cent. of soluble As_2O_5 and mean particle diameter of 3·5μ, a commercial Ca arsenate with 7·3-7·7 per cent. of soluble As_2O_5, and a mixture of cryolite (73·2 per cent.) and sulphur were tested as dusts against the boll weevil, the tarnished plant bug and the rapid plant bug. The arsenates were equally effective and superior to the cryolite mixture but more aphids emerged when the special arsenate was used. (2) In a factorial experiment in the field it was found that sulphur applied early in the season reduced cotton flea hopper infestation but did not affect the yield. The stomach poisons (Ca and Pb arsenates, cryolite) significantly reduced boll-worm injury, boll weevil infestation and plant bug populations but aphid population and cotton yields were increased. Mixtures of cryolite and sulphur (85 : 15) and lead arsenate and clay (90 : 10) were superior to Ca arsenate against bollworm but less effective against plant bugs. Arsenical compounds were more effective than cryolite against weevils. On the basis of yields, all the stomach poisons were equally effective. (3) Lead arsenate and a mixture of sulphur with native cryolite proved more effective against bollworm than did Ca arsenate or a mixture of sulphur and artificial cryolite. C.

Cotton Plant Insecticides: Efficiency Tests. R. C. Gaines. (1) *J. Econ. Entomol.*, 1941, **34**, 495-7; (2) *Ibid.*, 1941, **34**, 501-4 (through *Chem. Abstr.*, 1941, **35**, 7628^7 and 7627^9).

(1) Three Ca arsenates containing respectively 0·42, 11·4 and 16·5 per cent. of soluble As_2O_5 were equally effective against the boll-weevil but more cotton aphids emerged when the dusts with high contents of soluble As_2O_5 were used. (2) In a factorial field experiment nicotine dust was shown to be an effective addition to Ca arsenate to check cotton aphids. C.

Pink Boll-worm: Control. A. J. Chapman and W. L. Lowry. *J. Econ. Entomol.*, 1941, **34**, 490-2 (through *Chem. Abstr.*, 1941, **35**, 7629^4).

Work on insecticides for control of the pink boll-worm is reviewed. Cryolite appears to have given the best and most consistent results. An emulsion of light petroleum and nicotine sulphate is effective when used as a spray to check the eggs. C.

Indian Cotton: Secret Bidding System of Buying. P. L. Tandon and F. Haq. *Indian Farming*, 1941, **2**, 518-519.

The cover system of bargaining which is used in many of the cotton markets of India is explained and its distribution, advantages and disadvantages are discussed. In this method the cultivator, on arriving at the market, arranges for the sale of his produce through his *arhatiya* or commission agent who takes the buyers to the cultivator's cart to examine the produce. As each buyer is ready to bid, the *arhatiya*, holding the right hand of the former, covers it with a piece of thick cloth, and bidding follows by means of the manipulation of fingers. Depending on the basic price per unit weight, each finger represents a definite value. The *arhatiya*, finally communicates the highest offer to the seller. In the event of non-acceptance by the latter the process may be repeated until a better offer satisfies the seller. In some markets, however, a single-bid system is in vogue and offers, once made, are final. In order to safeguard the interest of the seller it is imperative that the highest bid should be openly declared in the presence of prospective buyers. C.

Tennessee Cotton Warehouses: Functions. C. E. Allred and B. D. Raskopf. *Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog.* 127, 1941, 43 pp. (through *Exp. Sta. Rec.*, 1941, **85**, 684).

The location, capacity and functions of warehouses; storage and compression charges; distribution, trend and length of storage; reasons why farmers store or do not store cotton; and some factors affecting volume of cotton storage are discussed. C.

(D)—ARTIFICIAL

Argentine Cellulose Resources. C. R. Marenco. *Boletin Mensual, Junta Nacional del Algodon, Buenos Aires*, 1941, No. 71, 161-214.

The nature, properties, sources and purification of cellulose are discussed and its industrial application briefly reviewed. Argentine production of cotton and cotton linters is discussed, production and export figures are given, the possibility of using cotton stubble (leaves and stems) as a source of cellulose is examined, and tables are given showing the composition and uses of the various parts of the cotton plant. A survey is then made of other sources of cellulose available in the Argentine Republic, including wood, linen, sugar cane bagasse, cereal straws and other vegetable materials, and the quantities produced, the possibilities of their industrial utilisation and of reduction in imports of cellulose products, and suggestions for future development of the cellulose industry in the Republic are discussed. C.

Viscose Rayon Factory Atmosphere: Toxic Limits. Alice Hamilton. *U.S. Dept. Labour Bull. No.* 34, 1940, 79 pages (through *Chem. Abstr.*, 1941, 35, 7181^5).

Particulars are given of a study in nine large and four smaller factories distributed over ten States of the risk of poisoning by carbon disulphide and sulphuretted hydrogen. The maximum permissible concentration of these substances is discussed with the help of data summarised from various sources; 53 references are cited. C.

PATENTS

Cellulose Butyrate Filaments and Films: Production. R. W. Moncrieff, E. W. Wheatley and H. Bates (British Celanese Ltd.). B.P.541,075 of 7/5/1940: 12/11/1941.

A process for the production of artificial filaments, threads, yarns, bristles, foils, films and like shaped materials, comprises shaping a fused composition comprising a higher fatty acid ester of cellulose and a volatile aromatic hydrocarbon or halogenated aromatic hydrocarbon which is a solvent for the ester at ordinary temperatures, and setting the shaped materials by cooling. For example, cellulose butyrate, particularly cellulose butyrate having a butyryl value of about 2 to 2·8 radicals per $C_6H_{10}O_5$ molecule, is mixed with about 1½ parts by weight of benzene to give a solid composition which melts at about 30° C., and is extruded at a temperature of 40 to 80° C. to give good filamentary products. Shaping may take place under gravity or under pressure applied by means of an inert fluid. Setting may be effected by cooling in a liquid, gaseous or vaporous medium. After setting, residual solvent may be removed by washing the shaped materials with a liquor which is a solvent for the aromatic solvent. The shaped materials may be esterified with halides of polycarboxylic acids in order to increase their stability to ironing and other hot treatments. C.

Viscose: Spinning. Courtaulds Ltd. (London) and J. Wharton. B.P.541,099 of 11/5/1940: 12/11/1941.

A process for the production of threads comprises extruding viscose into an aqueous solution of sulphuric acid and at least one metallic salt in the presence of a non-ionogenic water-soluble surface-active compound obtainable by the action of an alkylene oxide on a monohydroxy compound containing at least 8 carbon atoms in a chain. Suitable non-ionogenic compounds are obtained by condensing ethylene oxide with a higher aliphatic acid or alcohol such as lauryl, oleyl or cetyl alcohol. The products may be added to the viscose before extrusion or to the coagulating bath. Such additions result in a substantial reduction in the proportion of blocked or partially blocked jet orifices. The face of the jet through which the viscose is extruded is preferably highly polished. C.

Viscose: De-aeration. Aktiebolaget Separator (Stockholm). B.P.541,115 of 10/5/1940: 13/11/1941. (Conv. 13/5/1939.)

Viscose is conditioned for supply to a spinning machine by centrifuging it to remove air or gas bubbles and then transferring it to the spinning machine under conditions excluding the occlusion of air or gas. A suitable form of centrifuge is described, which has an outlet connected with a fixed pipe line by a mechanical packing device preventing the entry of air. The viscose may be discharged by means of a paring or skimming device. The centrifuge may be provided with a displacement body arranged below the paring chamber and advantageously rotating with the bowl, which body prevents the formation of an air cushion in the chamber under the paring disc. When working with centrifuges having a central chamber which is not completely filled with liquid it is advantageous to operate under a vacuum. C.

Rayon Centrifugal Spinning Pot Chamber. N. V. Onderzoekingsinstituut " Research " (Arnhem, Holland). B.P.541,161 of 28/8/1940: 14/11/1941. (Conv. 4/12/1939.)

The spinning funnel makes a sliding fit in an annular plate that rests freely on and covers the top of the spinning pot chamber. The plate may be a thin flat sheet of synthetic resin and the upper and lower edges of the opening in the plate may be chamfered so that the surface of the funnel makes substantially linear contact with the plate. The spinning pot chamber may be separated from the driving apparatus by means of a water seal and the lid of the chamber may also be water sealed. The stem of the spinning funnel may be provided with a rubber or like ring the outside diameter of which is larger than the diameter of the central opening in the plate so that when the funnel is raised the plate is lifted from the top of the spinning pot chamber with it. C.

Filaments and Films: Production. H. Dreyfus (London). B.P.541,238 of 17/4/1940: 19/11/1941.

Artificial textile materials and the like are produced by extruding fluid material comprising a synthetic thermoplastic polymeric fibre-forming substance into an inert gas or vapour, cooling the extruded material in the medium to a temperature at which air has substantially no damaging effect on the material, and thereafter introducing the material into air and completing the setting thereof. Suitable apparatus comprises a chamber having arrangements for the introduction of an inert gas or vapour into its upper end, the introduction of air into its lower part, and the removal of a mixture of the inert medium and air from the boundary of the two zones. The inert medium may be steam, an inert gas, or the vapour of a liquid of relatively low boiling point such as ethyl ether, dioxane or carbon tetrachloride. C.

Vinyl Resin Threads: Treatment to Increase Strength. Carbide and Carbon Chemicals Corporation (New York). B.P.541,261 of 23/7/1940: 19/11/1941. (Conv. 25/10/1939.)

A method for increasing the tensile strength of filaments, yarns or threads made from vinyl resins, obtainable by the conjoint polymerisation of a vinyl halide and a vinyl ester of an aliphatic acid and having an average macromolecular weight of at least 15,000, comprises passing the filaments, yarns or threads continuously through a liquid or a vapour which will not attack or dissolve the vinyl resin, the liquid or vapour being heated to a temperature of at least 100° C. and stretching the filaments as they pass through the liquid or vapour while the filaments are surface-wetted with a non-solvent for the vinyl resins. Threads or filaments may, for example, be stretched up to about 600 per cent. while passing through wet steam heated to 100°-130° C. Stretching may also be carried out in heated diethylene glycol or similar liquids. C.

Rayon Reel and Carrier. Feldmuehle A.-G. vormals Loeb, Schoenfeld & Co. Rorschach, Switzerland). B.P.541,284 of 30/8/1940: 20/11/1941. (Conv. 29/7/1939.)

A reel or spool and carrier for winding freshly spun rayon into thread packages to be after-treated and including a spool carrier having longitudinal radially extensible thread supporting members, and an outer flanged spool interchangeably pushed on the carrier and having longitudinal slots for the members to shift in radially by the action of an axially shiftable core member into their outermost positions beyond the spool barrel is characterised in that the spool flanges are provided with outwardly diverging inner faces, and the rear flange at least has apertures extending through it in continuity with the slots accommodating the supporting members having circumferentially broadened heads adapted to pass through the apertures when the members are in radially retracted positions, whereas in their outermost positions the supporting members are clamped between inwardly facing terminal walls of the apertures and the core member. C.

Cellulose Derivative Staple Fibre: Crinkling. P. F. C. Sowter (British Celanese Ltd.). B.P.541,568 of 1/6/1940:2/12/1941.

Staple fibre having a basis of an organic derivative of cellulose is subjected to the action of trichlorethylene, dichlorethylene or carbon tetrachloride and a lower aliphatic alcohol, while the fibres are substantially free to contract. If desired water or other diluents or swelling agents may also be present in the treatment media. Staple fibres are preferably treated as a loose mass and may then be agitated during treatment. Fibres in the form of slivers or roving may be passed through a bath of the treatment medium or sprayed with the medium while they are supported on a travelling band. Preferably, conditions are such that any shrinkage of the fibres does not exceed about 10 per cent. C.

Organic Polymer Filaments and Films: Production. H. Dreyfus, R. W. Moncrieff and C. W. Sammons (British Celanese Ltd.). B.P.541,592 of 31/5/1940:3/12/1941.

A process for the production of filaments, films, foils and other shaped and/or moulded articles uses a solution of an organic polymer in formic acid which is solid at ordinary temperatures. A solution consisting of approximately 72 per cent. of a polymer formed by condensing hexamethylene diamine with adipic acid and 28 per cent. of formic acid may be employed and this solution may be formed by evaporation of formic acid from a solution which is liquid at ordinary temperatures. In the production of artificial filaments extrusion may take place under pressure of any appropriate inert liquid, vapour or gas. The extruded materials may be received in an inert atmosphere or may be received, preferably after a short passage through a hot gaseous medium, in a liquid setting medium which may be water, an aqueous solution or an organic medium. After setting, the materials may be drawn down to a substantial extent, preferably in the presence of water, steam or other hydroxyl-containing compound. Formic acid may be removed from the products by appropriate washing treatments. C.

Polymethylene Oxide Cellulose Ester Solutions. British Celanese Ltd. (London). B.P.541,660 of 3/6/1940:5/12/1941. (Conv. 10/6/1939.)

Cellulose ester solutions for the production of filaments, foils and other shaped products are obtained by the use of a solvent medium that comprises a cyclic polymethylene oxide, preferably in conjunction with another solvent for the cellulose ester. Solutions of cellulose acetate in a mixture of tetramethylene oxide and acetone containing from 10-50 per cent. and preferably 25-50 per cent. of the tetramethylene oxide are especially advantageous in that they have a lower viscosity than solutions of the same concentration in either acetone or tetramethylene oxide alone. The water content of the spinning solution can be reduced to as little as 3 per cent. when the solvent mixture is employed and the strength of the filaments thereby increased. C.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—PREPARATORY PROCESSES

Textile Lubrication: Olein Substitutes. M. Kehren. *Fette u. Seifen*, 1940, 47, 265-269 (through *Chem. Abs.*, 1941, 35, 6462).

A description of German attempts to replace olein in the manufacture of army cloth and felt. Mineral oils formed felt of dense surface but loose core. Synthetic lower fatty acids had a very disagreeable odour, required a higher temperature for saponification, were poor lubricants during weaving and caused frequent breakages. Highly unsaturated acids were unsatisfactory because of resinification and neutral oils because of difficulty in washing out. Good results were obtained by esterification of lower fatty acids with methyl or ethyl alcohols; these ester oils could be used in presence of olein and acted as extenders. Compounds containing mineral oil in presence of emulsifiers and olein were effective in forming dense felts. W.

(B)—SPINNING AND DOUBLING

Cops: Building. S. Jackson. *Textile Weekly,* 1941, **28**, 735.

Practical hints are given on the building of good cops for weaving, with special reference to difficulties caused by the demand for longer, harder and thicker cops. C.

Mule Motions: Setting to Prevent Snarls and Weak Yarn. E. Taylor. *Textile Manufacturer,* 1941, **67**, 411 and 405.

Faulty setting of the various motions on mules results in snarls or overstrained yarn. Causes and remedies are described. C.

Spinning Frames: Breaking-in New Rings. "*The Traveler*" (through *Canadian Text. J.*, 1941, **58**, No. 23, 34).

A compound consisting of ¼ lb. flowers of sulphur thoroughly mixed with every 2 lb. of lubricating grease produces a high polish which prolongs the life of rings and assures better results in spinning. W.

(D)—YARNS AND CORDS

Worsted Yarns: Marking to Prevent Mixed Lots. D. Anthony. *Canadian Text. J.*, 1941, **58**, No. 23, 32, 34.

Colour codes using coloured bobbins and chalk marks are suggested to prevent mixing of worsted yarns. W.

PATENT

Bouclé Yarn. E. & L. Bry, Inc. (New York). B.P.541,694 of 5/6/1940: 8/12/1941. (Conv. 6/12/1939.)

A bouclé novelty yarn comprises two decorative threads in contrasting colours twisted about one another. Each thread is looped upon itself at spaced intervals in the twist, the decorative loops extending outwardly from the twist, and the loops are burst so that the fibres in the loops are so spaced that the burst volume of the thread of the loop is substantially larger than the volume of the same unburst thread in the twist. The yarn is obtained by the twisting together of two mohair threads over a core, after which the twist is firmly bound with a binder thread. The yarn, when washed, scoured and dried, shrinks, the different shrinking characteristics of the core and binder threads and the decorative threads being such as to produce a crêpe effect in the twist, the decorative threads of the yarn being relatively bulky and predominating with respect to the core and binder threads. A two-thread core of cotton, silk, rayon or worsted is used and over it is formed a twist of two separate threads of mohair. The mohair threads are twisted about one another, and at spaced intervals are suitably looped to form the adjacent curls. The bouclé yarn is firmly bound with a suitable binder thread which may be of cotton, worsted, silk or rayon. C.

3—CONVERSION OF YARNS INTO FABRICS

(B)—SIZING

Sizing Problems: Discussion. Textile Operating Executives of Georgia. *Cotton (U.S.)*, 1941, **105**, No. 10, 103-106.

The following subjects are discussed: (1) *Changing from 2- to 3-cylinder tape-frames;* data about speeds, stretch and roller weighting are given by representatives of several large mills. (2) *Automatic moisture control;* increased output and uniformity are reported by users of the "Moist-o-graph" device. (3) *Beam brakes and bearings;* experiences with rope brakes and ball bearings are described. (4) *Length variations of beamed warps;* the common experience that the back beam runs out first is discussed and length variations from beam to beam are reported. C.

Rayon Hosiery Yarn: Lubrication. United States Testing Co. *Rayon Textile Monthly,* 1941, **22**, 669-670, and *Silk and Rayon,* 1942, **16**, 34.

The sizing of rayon yarns for hosiery is briefly discussed and methods of lubricating rayon yarns before winding are outlined. It is pointed out that the best method of oiling the yarn in skein form consists in spraying the skeins, followed by wrapping overnight. Uniform results can be obtained by applying 4 to 6 per cent. of oil in this manner. For the knitting of high twist yarns, substantially more than 10 per cent. of oil is necessary, but the application of more than 10 per cent. by the throwster is not recommended since additional oil slowly drains off from the cones and the normal moisture regain of the yarn is reduced on standing. To produce a better stitch, to reduce press-offs, and to protect the machine from excessive wear, it is advisable for the knitter to lubricate the yarn, particularly highly twisted rayon, further during knitting. One of the most successful methods is to run the yarn over a very slowly revolving roller placed approximately in the position of the normal water trough, this roller being essentially similar to the roller used on coning machines. A more simple method is to run the yarn over the floating rod normally used in the water trough but under a wick, the wick simply being dropped over the rod. As it is now necessary to use various substitutes instead of olive oil, the effects of these products on the properties of the yarns should first be tested. Properties required of a good lubricant are briefly described. C.

(C)—WEAVING

Automatic Loom Battery: Setting. *Silk and Rayon,* 1941, **15**, 716, 718.

Directions are given for setting the pirn battery and transfer hammer on the usual automatic loom for silk and rayon weaving. C.

Loom Setting Devices: Application. (1) J. J. Vincent. (2) I. H. Thomas. *Textile Weekly,* 1941, **28**, 740, 764.

(1) Brief descriptions are given of devices developed at the Shirley Institute, namely (*a*) a speedometer and (*b*) an accelerometer for insertion in a shuttle to measure shuttle velocity and the forces exerted in picking and checking, (*c*) scales for determining the nominal movement of the picker, and (*d*) a template for setting the picker spindle, the box front and the box strip on the loom in standard positions. (2) Some examples are given of the kind of help afforded by the above devices in practical loom overlooking. A discussion of the two lectures is reported. C.

Weaving Problems: Discussion. Textile Operating Executives of Georgia. *Cotton (U.S.),* 1941, **105**, No. 10, 106-109.

The following subjects are discussed: (1) *Pirns on the floor with automatic looms;* ways and means to reduce this trouble are discussed and contributory causes are mentioned, including the size of the pirn and loom settings. (2) *Humidity;* several men reported that they aimed at securing warp regains in the weaving shed of 8½ to 10½ per cent., the values of R.H. being 80 to 95 per cent., but one large mill is satisfied with 7 per cent. regain and 75 per cent. R.H. (3) *Staggered cams;* some men reported that they failed to get good cover with staggered cams when weaving more than 100 ends per inch, but reductions of 56 per cent. in warp stops per loom-hour are reported when weaving a cloth with 67 ends and 46 picks. (4) *Broken weft;* various causes are listed. (5) *Training tacklers and weavers;* the practice in several large mills is reported, including the use of moving pictures about safety. C.

Loom Beating-up Motion: Regulation. J. H. Strong. *Indian Text. J.,* 1941, **52**, 20-21.

The author discusses the beating-up operation and problems connected with this motion, and various causes and methods of preventing the flying out of shuttles. C.

Tappet-driven Weft Fork. J. W. Hutchinson. *Silk and Rayon,* 1941, **15**, 762 and 765.

A rayon loom weft fork which is driven by tappet action on the low shaft is described in detail and shown in diagrams and its action is explained. C.

Warp-stop Dropper Support. E. Oddie. *Textile Manufacturer,* 1941, **67**, 402.

In order to eliminate the common practice of breaking or bending warp-stop droppers when certain ends are lacking a pin is provided to take the place of a warp end to support the dropper. This will ensure a full number of drop wires throughout the life of the beam and obviate the necessity of replacing bent or lost drop wires when twisting-in or drawing-in a new beam. If an end runs out in the body of the warp a thread is transferred from the side of the warp and the empty dropper is supported by a pin. Any extra droppers are either broken off or supported by a pin. C.

Weaving Experiments: Design. V. R. Main and L. H. C. Tippett. *J. Textile Inst.*, 1941, **32**, T209-T220.

Experiments have been conducted to measure the effects on warp breaks in weaving of conditions of the yarn preparation and loom settings, and attention has been paid in designing the experimental lay-out to reducing errors as far as possible and to measuring them, so that the statistical significance of the results could be tested. Most of the experiments have involved measuring differences in breakage rates between warps which are interchanged between looms to give a Latin square design. A typical experiment is described and analysed in detail to show the various sources of error and introduce the variances that measure their effects, and the results of similar analyses for many experiments are summarised. It is shown that the errors due to differences between looms, and the various healds and reeds associated with them, in their tendency to cause warp breaks can be eliminated by a suitable design. The remaining errors are random in that they cannot be associated with any controllable factors. Their expected variance is proportional to the mean warp breakage rate for all warps in the experiment, and is substantially greater than the value (calculated from the Poisson distribution) that would result if all the conditions were under perfect experimental control. An empirical formula is given for calculating this variance in terms of the mean warp breakage rate, the length of each " piece " of cloth and the number of pieces per warp. The general question of the design of weaving experiments is discussed in the light of these results. The conclusion is reached that a randomised block design to eliminate loom and associated variations is better than the Latin square design, and that for some kinds of experiments a " split-plot " design can be adopted with advantage. The error variance is a composite quantity made up of the effects of variations within pieces to which are added the effects of variations between pieces, and because of this there is an optimum piece-length which gives maximum precision for minimum cost. This length is worked out to be of the order of 60 yards. The use of a transformation of the breakage rate results to make the error variance independent of the mean is discussed and shown to be not advisable. Finally, it is shown how interactions between various factors affect the generality of the results of an experiment, and how account should be taken of this in deciding the scale of replication. The main conclusion is that all experiments should be replicated as many times as possible, and that ideally the replicate should be sized on different occasions, with different deliveries of yarn and different values of all other " subsidiary " factors that vary in the field to which the results will be applied. Practical considerations, however, limit the application of this ideal principle. C.

Weaving Shed: Efficiency. T. G. Chaudhari. *Textile Digest*, 1941, **1**, 99-114.

The author discusses the influence of men, materials, machines, climatic conditions, shed construction, lay-out of machines, weavers' surroundings, methods of labour control, etc., on weaving shed efficiency, and indicates the requirements for high efficiency. C.

Weft Stitching Defect: Causes and Prevention. *Silk J. Rayon World*, 1941, **18**, No. 210, 12-13.

The defect known as " weft stitching " is usually caused by the shuttle deviating from its correct course so as to pass over or under one or more of the warp threads forming the upper or lower lines of the warp shed. The defect is difficult to mend and bad cases of stitching will result in the " stringing " of the piece. If the stitches are cut from the face of the fabric a thin place becomes visible and the appearance of the design is considerably modified. The chief causes of the defect are faulty picking, faulty shedding, worn or defective shuttles, reed defects, faulty yarn, and incorrectly entered warps. Methods of detecting and correcting such faults are described. C.

(D)—KNITTING

Crêpe de Chine and Ray de Chine Hosiery. B. L. Hathorne and R. W. Seem. *Amer. Dyes. Rept.*, 1941, **27**, 586-588.

Crêpe de Chine hosiery is made from high twist, one-way twist crêpe yarn. Differences between this type of yarn and grenadine and compensene yarns are explained. In contrast to the Crêpe de Chine yarns used in weaving, the hosiery yarns are so processed that they will not kink during knitting but knit better than many of the conventional twists. They do not crêpe excessively during boil-off or dyeing but instead remain tightly twisted and produce a fabric more sheer, more dull, and more snag resistant than fabrics made from conventional yarns. Boiling off is slower on account of the high twist. If Crêpe de Chine stockings are not properly handled they develop a twist or bulge in the ankle. Methods of preventing ankle twist are outlined. Ray de Chine is rayon processed in a manner similar to Crêpe de Chine. Ray de Chine yarns are not only more sheer, more snag resistant, and produce hose that wear longer than ordinary rayon, but in addition the Ray de Chine treatment has, to all intents and purposes, overcome the bagginess defect of previous rayon hosiery. This is attributed to a reduction of plastic flow and an increase in elasticity and resiliency produced by the treatment. Ray de Chine hosiery does not present any particular problems in dyeing but in finishing the hard and firm handle of the highly twisted yarn must be taken into account. Ray de Chine twists at present used are 35 turns for 100 denier, 40 turns for 75 denier and 45 and 50 turns for 50 denier. Above these twists there is a tendency for the yarn to crêpe during boil-off, thus disturbing the wale line structure of the hose, producing an uneven result. Further improvements in methods of processing will probably enable higher twists to be utilized. C.

Nylon Hosiery: Knitting. V. A. Schiffer. *Rayon Textile Monthly*, 1941, **22**, 668-669.

The effects of twisting rayon yarn to the point of minimum diameter are outlined and suitable twists for rayon yarns for welts of nylon stockings are indicated. A direct change from rayon to nylon in the knitting operation gives unsatisfactory results as the nylon saws through the rayon loops. This difficulty may be avoided by the use of a single course of a cotton yarn between the rayon and the nylon or by using one end each of rayon and nylon for the four or six courses immediately preceding the change to nylon alone. The teaseed oil recommended for the lubrication of nylon cannot be used with nylon-rayon combinations; a non-oxidising, non-resinifying sulphonated mineral oil is required for this purpose. C.

(G)—FABRICS

Nylon: Supply and Use. E. I. Du Pont de Nemours & Co. Inc. *Rayon Textile Monthly*, 1941, **22**, 650-652.

Nylon is supplied in the form of textile fibre or yarn, as " monofils " for brush bristles, racquet strings, etc., and in the form of a solution for insulating wire and a moulding powder for plastic products. Nylon yarn is used mainly for hosiery. Demand has increased greatly since the American embargo on silk, and nylon stockings with cotton and rayon tops and feet are being produced though many mills intend to continue the production of all-nylon hosiery. Other uses of nylon have recently developed in the production of sewing thread, fishing lines, underwear and foundation garments, shoe, handbag, and umbrella fabrics, bolting cloth, screen printing cloth, parachute fabrics and shroud lines, and various other products. The supply of nylon is at present inadequate and an expansion program is being speeded up. A new plant at Martinsville started production in November, 1941, and should be operating at full scale by the summer of 1942. This should double the amount of nylon yarn available to the textile industries. C.

Vinyon: Properties and Uses. K. Heymann. *Amer. Dyes. Rept.*, 1941, **30**, 575 and 578.

The production and properties, particularly dyeing properties, of Vinyon are briefly discussed, and applications of Vinyon in the production of filter cloths, stiffened materials, felts, chemically resistant clothing, wearing apparel, cordage, sail cloth, nets, etc., are reviewed. C.

PATENTS

Picker Checking Device. F. Blömer (Almelo, The Netherlands). B.P.541,207 of 12/2/1940: 18/11/1941. (Conv. 11/2/1939.)

A device for checking the arriving picker, consisting in a blade spring mounted on the slay or other suitable part of the loom near the picker spindle in the direction substantially corresponding with the direction of movement of the picker, is characterised in that the blade spring at its rear end is fixed on a rigid arm of such a form that the front or receiving end of the blade spring may rest against it. The blade spring at its front or receiving end inclines to the picker path and merges in a slightly bent portion where it is fixed in position on the rigid arm. In the path of the picker head a rubber cushioner is mounted on the rigid arm near the rear end of the blade spring. C.

Raised Stitch Knitted Fabric. A. O. Hanisch and E. Fleer (Fond du Lac, Wisconsin, U.S.A.). B.P.541,287 of 11/11/1940: 20/11/1941. (Conv. 14/11/1939.)

A stitch construction intermediate between the ends of a wale of a knitted body yarn fabric having wale-wise wrap yarns, comprises in a course thereof a free loop of wrap yarn extending outwardly through an otherwise free loop of body yarn to ornament the fabric and to prevent the body yarn from ravelling. This stitch construction may be incorporated in a knitted fabric or hosiery in one or more selected wales in one or more selected courses to make a selected design on the fabric. The method of knitting the fabric comprises feeding a body yarn to the needles and feeding individual wrap yarns to selected needles for a course of the fabric, knitting the course thus containing plated stitches of wrap yarn or body yarn on the selected needles, dropping selected ones of the plated stitches from their needles, and feeding and knitting subsequent course of fabric on the needles. C.

Embossed Fabrics: Knitting. Hemphill Co. (Pawtucket, Rhode Island, U.S.A.). B.P.541,374 of 23/5/1940: 25/11/1941. (Conv. 25/5/1939.)

Ornamental effects are produced in weft knitted fabrics by a method of knitting which includes the step of wrapping an elastic yarn at selected stitches of a fabric. The elastic yarn may be wrapped at wales and courses of the fabric in such manner that it is not included in any course in adjacent wales. Stitches within the fabric in which elastic yarn is wrapped may be varied according to a predetermined pattern, for instance, the wrapping may be around a relatively narrow group of needles or around much wider groups. Preferably the elastic yarn is wrapped under tension so that when wrapped in spaced wales it will draw those wales together to create an embossed appearance. Elastic yarn may be wrapped at spaced wales and a non-elastic yarn wrapped at a wale or wales intermediate the spaced wales. If desired, the two wrapping yarns may be of different colours. Wrapping may also be used to render fabric elastic. For example, the tops of stockings may be wrapped at such frequent intervals as to present a highly ribbed appearance and at the same time to serve as a garter. C.

Straight-bar Knitting Machine. G. Blackburn & Sons, Ltd. (Nottingham), and H. W. and E. Start. B.P.541,408 of 23/4/1940: 26/11/1941.

In a straight-bar knitting machine of the kind used for knitting tabs to a part of a garment, such as heel tabs which are knitted to a blank comprising the leg and foot portion of a stocking and which is provided with two groups of needles and with knocking-over bits which are carried by a bar disposed in front of the needle bar, a guard is secured on the knocking-over bar and extends rearwardly and downwardly between the two groups of needles to hold that part of the blank which is disposed on the front of the needles clear of the latter. This arrangement prevents the work extending in front of the needles during the formation of the first course catching on the needle beards when it is withdrawn on to the rear side of the needles. C.

Straight-bar Knitting Machine. G. Blackburn & Sons, Ltd. (Nottingham) and H. W. and E. Start. B.P.541,410 of 24/4/1940: 26/11/1941.

In a straight-bar knitting machine for knitting heel tabs to a stocking blank which is provided with two groups of needles and associated knitting elements, the thread carriers are stopped at the inner sides of the heel tabs when narrowing takes place and a specially shaped sinker is provided at the inner side of each group to ensure that the yarn passes between the sinkers at this point, and as a result damage to the work by the sinkers is obviated and normal sized loops are produced on each selvedge of the heel tabs. C.

Winding Machine Feed Control Device. F. H. Clayton and Brocklehurst-Whiston Amalgamated Ltd. (Macclesfield). B.P.541,417 of 25/5/1940: 26/11/1941.

A winding machine of the type in which the winding spindle is driven at a constant angular speed and the supply package is rotated on a spindle, by virtue of the tension applied to the thread being wound on the spindle, is provided with an element (such as a contact arm) pivoted in fixed bearings and movable in response to change in diameter of the supply package, an element (such as a pulley) carried on a lever pivoted in fixed bearings and movable in response to change in the tension on the thread feeding to the winding spindle, and a braking device operatively connected to both of the elements and effective automatically to vary the angular speed of, the supply package in accordance with the combined operative effect of the movement of one of the elements imposed upon the movement of the other elements. One embodiment of this invention comprises an arm pivoted on fixed bearings and bearing against the supply package, a lever pivoted on fixed bearings and having at its free end a pulley over which the thread leaving the supply package passes, a brake band acting upon the spindle of the supply package and a rockable support connected at its ends respectively to one end of the brake band and to the said pivoted lever, the other end of the brake band being operatively connected to the pivoted arm. C.

Circular Knitting Machine. J. C. H. Hurd, H. H. Holmes and Wildt & Co. Ltd. (Leicester). B.P.541,420 of 4/6/1940:26/11/1941.

A circular independent needle knitting machine of the double axially-opposed needle cylinder type including double-ended needles operable by means of sliders is characterised by the provision of at least one additional needle bed with needles whereof the operative portions extend towards the same location as the operative ends of the double-ended needles. Means are provided for operating and feeding yarn or yarns to the double-ended needles and the additional set or sets of needles conjointly or/and independently to produce a single tubular knitted web or a plurality of independently knitted webs or sections of fabric, according to requirements. In the preferred manner of carrying the invention into practice provision is made for automatically effecting lateral or shogging movements between needles in another bed or in the other beds, in order to produce shogged effects or/and to enable shogged needles to participate with others in the production of different rib combinations, or/and welts. The different sets of needles may contain the same or different numbers of needles. C.

4—CHEMICAL AND FINISHING PROCESSES

(A)—Preparatory Processes

Textile Assistants: Properties and Uses. *Amer. Dyes. Rept.*, 1941, 30, 560-565.

An alphabetical list of wetting, filling, lubricating, softening, crease-proofing, waterproofing, bleaching, cleansing and other finishing agents, sizing preparations, synthetic gums and waxes, penetrants and other textile assistants placed on the market since October, 1940, showing the names of the manufacturers and the properties and uses of the products. C.

(G)—Bleaching

Bleach Liquors: Preparation. R. P. Whitney. *Paper Trade J.*, 1941, 113, *TAPPI*, 273-274.

The author discusses the design and operation of equipment for the production of chlorine water and calcium hypochlorite solutions, and the strength and stability of the solutions obtained. C.

Peroxide Bleaching Processes: Recent Developments. H. G. Smolens. *Amer. Dyes. Rept.*, 1941, **30**, 579-580.

In a report of activity during the past two years the author discusses briefly steep bleaching and continuous bleaching ranges, and improved processes for the bleaching of cotton knit goods and package yarn. C.

(I)—Dyeing

Rayon Locknit Fabric: Dyeing and Finishing. *Silk J. Rayon World*, 1941, **18**, July, 23-27; August, 23-24; September, 26-27.

Practical hints are given under the headings (1) scouring and bleaching, (2) methods for dyeing viscose, cuprammonium and acetate fabrics, and (3) drying and finishing operations. C.

Sulphur Dyes: Application. G. Dierkes. *Klepzig's Textil Z.*, 1941, **44**, 610-612 (through *Chem. Abstr.*, 1941, **35**, 6796^{7}).

After treatments with sodium sulphide solution improve the fastness to rubbing and washing of deep sulphur dyeings. Vessels with copper, brass or bronze parts should not be used. Most sulphur dyeings lack fastness to chlorine; the Indocarbon blacks are fast. C.

Vat Dyes: Application by Slop Padding. W. Pflumm. *Klepzig's Textil Z.*, 1941, **44**, 399 (through *Chem. Abstr.*, 1941, **35**, 6797^{4}).

Difficulties in dyeing piece goods with vat colours are discussed. The application of the unreduced dye as a suspension is recommended and an example is given in detail. C.

Celanese: Dyeing and Printing. G. H. Ellis. *J. Soc. Dyers and Col.*, 1941, **57**, 353-358.

A survey of recent developments in dyes for, and in the dyeing and printing of Celanese and mixtures of Celanese and other fibres. C.

Diamine Blue 3R Thermo-labile Constituent: Chromatographic Separation. R. Haller. *Textilberichte*, 1941, **22**, 81-85 (through *Chem. Abstr.*, 1941, **35**, 7197^{4}).

Diamine Blue 3R can be separated by adsorption into a highly dispersed stable red phase and a less stable micellar blue phase. The latter is partly converted into the red form when the aqueous solution is heated. Similar behaviour appears to be shown by vat dyes that are not fast to ironing. Fastness depends on alterations in the degree of dispersion and hydration of the deposited dye. C.

Dyes: Properties and Uses. *Amer. Dyes. Rept.*, 1941, **30**, 551-559.

An alphabetical list is given of dyes which have been placed on the market since October, 1940. The properties and uses of the products and the names of the manufacturers are indicated. C.

Long-chain Azo Dyes: Preparation and Properties. F. W. Hoyt and H. Gilman. *Proc. Iowa Acad. Sci.*, 1940, **47**, 262 (through *Chem. Abstr.*, 1941, **35**, 7197^{2}).

Three *p*-alkoxyanilines, $RO \cdot C_6H_4NH_2$, where R is $n\text{-}C_{12}H_{25}$, $n\text{-}C_{14}H_{29}$ and $n\text{-}C_{16}H_{33}$, and two *p*-alkylsulphamylanilines, $NHR \cdot SO_2 \cdot C_6H_4NH_2$, where R is $n\text{-}C_{12}H_{25}$ and $n\text{-}C_{18}H_{37}$, have been diazotised and coupled with β-naphthol. The melting points of the red dyes are recorded. C.

Vat Dyes: Application by Pigment Padding Process. W. E. Hopkins. *J. Soc. Dyers & Col.*, 1941, **57**, 358-362.

The advantages and disadvantages of the pigment padding process compared with other well-known methods of dyeing piece goods, yarn and loose materials are pointed out, and the preparation of piece goods, loose cotton, viscose rayon and cotton yarns for the padding process is described. The selection of padding oils and dyes is discussed and suitable products are named. Available types of padding mangle are briefly described, precautions necessary in the padding operation are outlined, and the method of calculating the strength of the padding liquor required to produce a desired shade is explained. Procedures for the pigment dyeing of loose cotton and viscose rayon "Fibro" in open vessels, the pigment padding of cotton, linen and viscose rayon in the hank or open beck, and the dyeing of cops, cheeses, beams, hanks and warps, and loose goods in open and closed circulating machines are discussed. C.

Dyeing and Finishing Plant and Laboratory Equipment. *Amer. Dyes. Rept.*, 1941, 30, 566-568.

Brief descriptions are given of equipment developed since October, 1940, including the Duplex Take-Over dyeing machine attachment, new dye boxes and kettles, a cloth tenter dryer, a de-twisting machine, rubber expanders, the "National" Accelerated Fading Unit Type XV, and the Solu-bridge device for checking rinsing operations. C.

Aniline Black Dyeings: Fastness to Perspiration. A. A. Maksimov. *Khlopchatobumazhnaya Prom.*, 1939, 9, No. 6, 47-48 (through *Chem. Zentr.*, 1940; i, 1108 and *Chem. Abstr.*, 1941, 35, 7197^{8}).

Lack of fastness of aniline black dyeings to perspiration is due to the formation of oxidation products during drying. A dyeing procedure is given (in the original) by which the defect is avoided. C.

(J)—PRINTING

Vat Dye Prints: Production. H. Hoyle. *J. Soc. Dyers & Col.*, 1941, 57, 332-335.

A practical account is given of modern methods of printing with vat dyes, including the preparation of the pastes, the types of ageing machine in use, and printing on various types of textile fibre. C.

Discharge Printing Pastes: Rendering Visible on Coloured Grounds. Society of Chemical Industry in Basle. *Ciba Review*, 1941, 4, 1427 (through *Chem. Abstr.*, 1941, 35, 7198^{9}).

The problem of rendering a discharge paste visible on a coloured ground so as to be able to check doctor streaks and similar defects, especially with alkaline discharges for whites, is discussed and the following method is suggested. A cotton strip is padded with Brilliant Yellow No. 10 (5 gm. per l.) and sewn between the pieces to be printed; the print shows up red through the action of the alkali on the yellow dye. Neutral discharge pastes can be rendered alkaline for the purpose by adding ammonia (¾ pint per 10 gallons) just before printing; the ammonia volatilises on drying and does not affect the white discharge effect. C.

High-speed Printing Machine. P. J. Wood. *Amer. Dyes. Rept.*, 1941, 30, 576-578.

Recent developments in the high-speed printing machine, including changes in the back-rigging to provide for continuous feeding of goods and grey cloth, where used, together with a device for feeding these two cloths at controlled uniform tension and a mechanism for correctly aligning them, provision for accurate guiding of the blanket, the elimination of wool and linen lapping by covering the cylinder with rubber, the elimination of pressure levers and provision of motor driving for the traverse, and the provision of anti-friction bearings, positive lubrication of bearings, and a high-speed folder and other improvements, are briefly described. Photographs and diagrams are given. Printing speeds range from 180 to 230 yards per minute. C.

"Verdol" Paper: Production. N. A. Liskovich and N. D. Pankovets. *Bumazhnaya Prom.*, 1939, 17, No. 9, 67-69 (through *Chem. Zentr.*, 1940, i, 1776, and *Chem. Abstr.*, 1941, 35, 7188^{3}).

Verdol paper is used for applying designs to silk and linen fabrics and should maintain its form constant under the influence of humidity. The raw material consists of cellulose 70 per cent., wood paste 10 per cent., and a bleached cotton paste 20 per cent. It is sized with a mixture of rosin 1·1 to 1·2, aluminium sulphate 2·3, potato starch 2·5 and water glass, *d* 1·35, 2·5 per cent., the figures referring to the weight of dry fibre. China clay is used as a filler and aniline yellow or orange for colouring. The ash content of the paper should be about 10 per cent. C.

Rayon Fabrics: Printing. R. W. Jacoby. *Amer. Dyes. Rept.*, 1941, 30, 607-609.

Vivid effects similar to those of silk prints can be produced on rayon fabrics by printing with suitable direct and acid dyes in combination with urea, using six times as much urea as dye with a minimum of 20 per cent. in the print paste as applied at the machine. Sodium alginate is an excellent thickener for this type of printing as it gives a good colour yield and bright prints, and is readily removed by a light washing leaving the goods very soft for finishing. Ranges of colours are available for both long steaming and short ageing processes. The urea printing method can also be applied in conversion printing in which mixtures of dischargeable and non-dischargeable dyes are used. The range of non-dischargeable dyes is very limited but it has been found possible to produce the non-dischargeable shade with vat dyes which are added as pigments. Examples are discussed. C.

Shaded Effect Screen Prints: Production. R. Künzl. *Textilberichte,* 1941, **22,** 211-212 (through *Chem. Abstr.,* 1941, **35,** 7198^7).

Shaded effects are obtained by using Anthrasol colours with about 2 per cent. of a wetting agent in the paste, and developing or over-printing without drying. C.

Vat Dye Prints: Effect of Drying. R. Künzl. *Textilberichte,* 1941, **22,** 212-213 (through *Chem. Abstr.,* 1941, **35,** 7198^6)

Greatest colour strength in Anthrasol or Indigosol prints is obtained by drying slowly at relatively low temperatures. A sample dried in 5 minutes in an air stream at 65° C. had only 80 per cent. of the colour strength of a similar print dried in 3 hours in still air at 21° C. C.

(K)—FINISHING

Crease-proofing Processes: Review. E. W. F. Schwarz and P. Wengraf. *Amer. Dyes. Rept.,* 1941, **30,** 610-614, 618-619.

Crease-proofing processes are reviewed, and suggested explanations of the crease-proof effect, factors influencing this effect, and various theoretical and practical considerations are discussed. C.

Wool-rayon Mixtures: Felting. *Dyer,* 1941, **86,** 355.

Felting in washing is promoted by the use of rayon staple fibre in woven and knitted goods. This may be due to the smoothness of the rayon, which, by acting as a lubricant, assists the travel of the wool fibres. Another possible explanation is that, in washing, the smooth rayon fibres assist the breakdown or loosening of the wool yarn, with consequent felting owing to protrusion of the fibre ends. Felting would therefore be obviated by the use of roughened rayon fibres. W.

Non-felting Wool: Manufacture and Uses. H. Phillips. *Wool Rec.,* 1941, **60,** 726, 729.

After differentiating between felting shrinkage and relaxation shrinkage, a short account is given of methods of producing non-felting wool. The effect of various methods on the handle, strength and dyeing properties is discussed, and possible uses for yarns spun from non-felting wool are suggested. W.

(L)—PROOFING

Acidols and Naphthenate Soaps: Composition. V. Parkhomenko. *Masloboino-Zhirovaya Prom.,* 1940, **16,** No. 5-6, pp. 30-32 (through *Chem. Abstr.,* 1941, **35,** 7169^2).

Naphthenate soaps are classified as *grade I* (from kerosene fraction, not more than 10 per cent. unsaponifiable), *grade II* (from kerosene and solar oil fractions, not more than 15 per cent. unsaponifiable), and *substitute* (from heavier fractions, not more than 25 per cent. unsaponifiable, nearly black, and used as a disinfectant). Acidols (soluble naphthenate soaps) should contain not more than 12 per cent. of unsaponifiable oil and 0·5 per cent. of inorganic salts, and should be made from naphthenic acids with acid numbers not lower than 200. The acid numbers of naphthenic acids range from 360 (light gasoline fractions from some oils) to 130 (lubricant fractions). C.

Copper and Aluminium Naphthenates: Application in Rot Proofing. Maurice D. Curwen Ltd. *Chemistry and Industry,* 1941, p. 725.

The solubility in water of Cu naphthenate can be lowered with advantage by the addition of Al naphthenate. Naphthenates may be applied in alcoholic solution and a mixture of the Al and Cu salts in white spirit + alcohol is recommended for the rot-proofing of yacht rope and trawl twine. C.

Tent Materials: Waterproofing and Testing. L. Stein. *Amer. Dyes. Rept.*, 1941, **30**, 621-627, 639.

A procedure for waterproofing a thin closely woven tent cloth of plied Egyptian yarn is outlined. Observations of the behaviour of this cloth in use under a heavy snow cover are discussed and a case of water dropping from the cloth is shown to be due, not to faulty waterproofing, but to condensation of vapour inside the tent. A shower test for such fabrics which is claimed to approximate severe outdoor conditions is described. The cloth is fastened on a square frame with a side length of about 1m. somewhat loose and declining in such a way that water can run down to a drain below the cloth. A shower device with the opening about 90 cm. above the cloth is connected to a tap. In most tests the water running normally strikes the cloth in a circle of about 950 sq. cm. in an average amount of 10 l. per min. The results of tests on the tent cloth made with this device are described, and the influence of the relative humidity of the air is discussed. Tests on a double cloth pasted together by a rubber layer are also discussed and the danger of damage to tent cloths by mildew when packed up in a wet condition with a ground sheet is pointed out. Details are given of the construction and method of proofing a heavy cotton cloth of sailcloth weave which is used as a rain-cover for horses. Shower tests on this cloth are reported. It was found that the water-repellency could be restored after hard wear by acid rinsing and drying at about 70° C. Cuprammonium waterproofing treatments are discussed and the use of cloths treated in this way for various tent parts is mentioned. Tests on cotton cloths of plain, sailcloth and twill weaves by various methods depending on measurement of the water pressure that the cloth can resist are described. Tests were made of untreated, dyed, and impregnated cloths and of materials woven from dyed yarns. It is pointed out that for tents, truck covers, wagon covers, awnings, and similar purposes, plain and sailcloth weaves are the most suitable, whilst twill is better for clothing. The use of the trough method of testing and results obtained on cloth resting on iron, wood covered with filter paper, and plain wood are discussed. C.

Electrical Insulation Cotton: Production. C. Seyd. *Textilberichte*, 1941, **22**, 208-9 (through *Chem. Abstr.*, 1941, **35**, 7203^3).

The electrical conductivity of cotton is ascribed largely to the potassium carbonate naturally present. This can be removed by washing with soft water. If hard water is used, several rinsings are necessary. C.

PATENTS.

Thiourea Dioxide: Application in Discharge Printing of Cellulose Derivatives. British Celanese Ltd. (London). B.P.541,047 of 8/5/1940: 11/11/1941. (Conv. 10/5/1939.)

Pattern effects are produced on textile materials, particularly materials consisting of or containing cellulose acetate or other cellulose ester or ether, by locally discharging a ground colour thereon with a thiourea dioxide. This may be employed alone or mixed with other discharging agents, and is conveniently applied as a preparation which has been thickened with, e.g. gum tragacanth or arabic. Swelling agents for the cellulose derivative and acid or alkaline substances may also be added. Coloured discharge effects may be produced by adding to the pastes dyes which are resistant to the action of the thiourea dioxide. C.

Insecticidal and Fungicidal Compositions. A. D. Ainley, W. H. Davies and Imperial Chemical Industries Ltd. (London). B.P.541,048 of 8/5/1940: 11/11/1941.

Insecticidal and fungicidal compositions comprise as active ingredient a formaldehyde-ammonium aryldithiocarbamate interaction product, and at least one other ingredient, which is either (*a*) an inert pulverulent diluent, or (*b*) an insect bait material, or (*c*) an aqueous diluent in which the formaldehyde-ammonium aryldithiocarbamate product is dispersed or suspended. The specified interaction products are obtained by treating in aqueous medium, one or more mole. of formaldehyde with 1 mole. of an ammonium aryldithiocarbamate, which may have been prepared in the aqueous medium before the addition of the formaldehyde, and which is of the general formula $RNH.CS.S.NH_4$, where R stands for phenyl, nitrophenyl, chlorophenyl, methoxyphenyl, tolyl, or naphthyl. C.

Green Dyeings: Production. Society of Chemical Industry in Basle. B.P. 541,082 of 9/5/1940: 12/11/1941. (Conv. 12/5/1939.)

Green dyeings which are fast to light can be obtained with the aid of blue and yellow direct dyes by using as the yellow element a dye containing as a constituent at least once a copper complex of a product of the coupling of a diazotised ortho-aminocarboxylic acid with a compound containing an enolisable keto group. Excellent results are obtained on cotton and regenerated cellulose rayons. The fastness of the dyeings to water can be improved by treatment with salts of basic compounds of high molecular weight. C.

Indigoid Dyes: Production. Society of Chemical Industry in Basle. B.P.541,097 of 10/5/1940: 12/11/1941. (Conv. 13/5/1939 and 8/4/1940.)

Indigoid dyes are prepared by condensing a 6-chloro- or 6-bromo-7-methylisatin with a 2:1-naphthioindoxyl to produce a compound of the indirubin type. The products have excellent fastness to light, chlorine and washing. They are suitable for dyeing and especially for printing cellulosic fibres, and may be used in the form of their leuco sulphuric ester salts which can be prepared from the dyes in the usual manner. They may also be used for dyeing and printing wool and silk. C.

Thermoplastic Resin Coated Fabrics: Production. Johnson & Johnson (Gt. Britain) Ltd. (Slough). B.P.541,108 of 11/4/1940: 13/11/1941. (Conv. 25/4/1939.)

A coating for application to a textile fabric by hot-rolling consists of a sheet or film of thermoplastic material, e.g. cellulose acetate, and an active solvent plasticiser, e.g. methyl phthalyl ethyl glycollate, adapted to produce a solid solution with the cellulose ester, the plasticiser being used in an amount greater than the cellulose ester and being compounded therewith in the absence of a volatile solvent. Inert fillers and pigments may also be added. The coating may be applied by means of a calender, the film or sheet being formed by rolls running at differential speeds and being applied to the fabric by rolls running at even speeds. Alternatively, the film may be preformed by an extrusion process and applied to the fabric base. Coated fabrics may be embossed. They may be used as a waterproof backing for adhesive tape. C.

Organic Gelling Compound: Extraction from Vegetable Matter. Celec Corporation Ltd. (London) and A. Baker. B.P.541,128 of 12/7/1940: 13/11/1941.

A process for extracting a gelling compound from vegetable matter comprises the steps of extracting sugar, glucosides, and other soluble matter by soaking the material, suitably broken or macerated when required, removing the soaked material from the liquor, boiling it in a solution of a substance which hydrolyses to form an alkaline solution, and collecting the resulting liquor. Soaking is preferably carried out for about 2 hours in water at 120° F., and extraction by boiling the material for about half an hour in a 0·75 to 1 per cent. solution of sodium carbonate. For each 100 g. of soaked vegetable material a solution consisting of 7 g. of washing soda and 2,000 c.c. of water may be used. C.

Green Sulphur Dyes: Production. N. H. Haddock and Imperial Chemical Industries Ltd. (London). B.P.541,146 of 13/5/1940: 14/11/1941.

Sulphur dyes are made by reacting a diazotised tetra-amino-, tri-amino- or diamino-phthalocyanine of the benzene series with an alkyl xanthate or an alkali metal thiocyanate, hydrolysing the resulting phthalocyanine xanthate ester or thiocyanophthalocyanine and oxidising the mercaptophthalocyanine thus obtained. In this way there are obtained dyes which, when applied to cellulosic material from sodium sulphide according to the usual practice with sulphur dyes, produce green dyeings of excellent fastness to washing, chemick and light. The dyeings are dischargeable to good whites by steaming after treatment with dimethyl-(sulphobenzyl)-phenylammonium chloride, sodium hydroxide and sodium formaldehyde-sulphoxylate. The phthalocyanine xanthate esters or thiocyanophthalocyanines can themselves be applied to cellulosic material from sodium sulphide solution and the sulphur dyes produced on the fibre. C.

Fabric Measuring Apparatus. J. Monforts (München Gladbach, Germany). B.P.541,170 of 4/4/1938: 17/11/1941.

A method for determining the length of webs of material which are laid in superimposed layers by means of a laying blade or the like, is characterised in that from the operation of laying the web, actuation is obtained by means enabling separate measurements to be made of a standard length of each layer and of the length or thickness of folds or doubled portions connecting the standard lengths of adjacent layers, the two measurements being aggregated continuously by a counting mechanism or the like. From the operation of laying the web, actuation may be obtained by means enabling measurement to be made of a standard length for each layer, this measurement being automatically adjusted according to the thickness of the folds or doubled portions connecting layers and the measurement being indicated continuously by a counting mechanism or the like. Suitable apparatus comprises an arrangement for determining the length resulting from the movement of the laying blade and one or more arrangements for determining the length, or the thickness, of the material at the folds or doubled portions, all of these arrangements being connected to the counting mechanism or the like. If desired, stops or obstructions co-operating with the laying device may, during the adjustment of the latter for the length of layer, be adjusted exactly to the size of the layer and serve for measuring the folds, the counting mechanism being additionally advanced by the movement of such stops or obstructions. Or if desired, stops may be automatically moved to positions suitable for the correct size of layer taking into account also the thickness of material and the length in the fold, these stops being set within the path of movement of the laying blade to limit the travel of the latter, the laying blade being yieldingly mounted in its head. C.

Glazed Fabrics: Production. Tootal Broadhurst Lee Co. Ltd. (Manchester), H. Corteen, R. P. Foulds and F. C. Wood. B.P.541,213 of 10/5/1940: 18/11/1941.

A glazed or polished fabric has a thin layer or layers of a rubbery artificial polymerised material and over this a thin layer or layers of a thermo-hardening synthetic resin produced from a far-condensed condensation product of the urea-formaldehyde type in which a plasticiser is incorporated with the resin but excluding a urea-formaldehyde resin modified by an alkyd resin. Following the application of the urea-formaldehyde condensation product it is necessary to heat the fabric in order to harden the coating. Calendering is not generally necessary. The rubber-like material preferably consists of a polymerised acrylic ester which may be thickened by the addition of ammonium salts of oleic or lactic acids. It is possible to apply the polymerised rubber-like material as a preformed film with heat and pressure. Alternatively, the fabric may be pretreated, e.g. with a filler to prevent penetration by the rubber-like material. Fabrics may be treated which have been previously printed or dyed or treated with urea-formaldehyde condensation products to make them crease-resisting. The fabric may be treated on one side or on both sides. C.

Polyglycol Ester Resins: Application in Printing. Calco Chemical Co. Inc. (Bound Brook, New Jersey, U.S.A.). B.P.541,326 of 8/8/1939: 24/11/1941. (Conv. 8/9/1938.)

In the printing and dyeing of textiles, paper and other products there is used as the colour vehicle an aqueous solution or dispersion of a resin which is an ester of polyglycols and unsaturated polycarboxylic acids, the resin being reactive with oxygen in curing or drying and soluble in water without the addition of alkali, ammonia or organic base. This method produces sharp prints with all the clarity and colour economy of lacquer prints, but does not unduly stiffen the goods. Soluble dyes and also insoluble pigments can be applied by this method to a wide variety of materials including cotton, rayon, silk, wool and spun glass products. Prints are resistant to stiffening processes employing cellulose acetate solutions. Materials which have been crease-proofed can be dyed and printed. Prints on elastic woven material do not crack when the material is stretched. The prints are fast to washing. C.

Tetrakisazo Dyes: Production. E. I. Du Pont de Nemours & Co. (Wilmington, U.S.A.). B.P.541,362 of 29/3/1940:24/11/1941. (Conv. 29/3/1939.)

Tetrakisazo dyes are produced by diazotising 1:3- or 1:4-diaminobenzene which may carry in the 2- and 5-positions alkyl or alkoxy groups, one of the amino groups being blocked, coupling with 1-aminonaphthalene which may carry in the 2-position an alkoxy group and/or in either the 6- or 7-position one sulphonic acid group, diazotising the monoazo compound and coupling with 1-aminonaphthalene which may be substituted as aforesaid, diazotising the diazo compound and coupling with an α- or β-naphthol mono-, di- or trisulphonic acid, unblocking the blocked amino group, diazotising and coupling with *m*-dihydroxybenzene. Dyeings produced with these dyes are fast to washing, particularly after treatment with formaldehyde. Fastness to light is increased by after-treatment with metal salts. C.

Vat Dye Levelling Agent. W. R. E. Hopkins, S. T. McQueen, C. S. Woolvin and Imperial Chemical Industries Ltd. (London). B.P.541,376 of 23/5/1940:25/11/1941.

Aqueous alkaline hydrosulphite solutions of vat dyes are prepared by incorporating in the solution a small proportion, not in excess of 0·2 per cent. of the weight of the solution, of a condensation product obtained from hexamethylenetetramine and an alkyl halide containing not more than four carbon atoms, e.g. the product obtained by interacting ethyl chloride with hexamethylenetetramine in water under pressure at about 120° C., effecting hydrolysis and condensation at the same or a higher temperature and then heating in the presence of sodium hydroxide. One part in 2,000-10,000 parts of water is sufficient to produce marked levelling action in most cases. The condensation product is conveniently added in the form of an aqueous solution before, during or after vatting, preferably to the diluted vat. The vat may be used for dyeing cellulosic textile materials. C.

Moisture-proofing Coating Composition. British Cellophane Ltd. (Bridgwater). B.P.541,559 of 30/5/1940:2/12/1941. (Conv. 1/6/1939.)

A moisture-proofing coating composition for sheet wrapping material comprises essentially a film-forming agent, a moisture-proofing agent and a resinous polyhydric alcohol ester of "Isopropyl" acid. The film-forming agent preferably consists predominantly of nitrocellulose. The moisture-proofing agent may be a wax or wax-like material preferably paraffin wax of high melting point. A plasticiser, blending agents, oils, dyes, pigments, etc., may be added, if desired. The term "Isopropyl" acid is used to define a synthetic terpinene-maleic anhydride polybasic acid resin complex consisting essentially of 3-isopropyl-6-methyl-3:6-endoethylene-delta-4-tetrahydrophthalic anhydride. The coating produced with this composition is flexible and transparent, has good surface properties, and may be united with itself by heat and pressure to form on cooling a joint displaying greater tenacity and permanence than any previously produced. C.

Coloured Resists under Azoic Colours: Production. United Turkey Red Co. Ltd. (Alexandria, Scotland) and W. Taussig. B.P.541,571 of 6/6/1940: 2/12/1941.

In a process for the production of fast coloured resists under azoic dyeings derived from the 2:3-hydroxynaphthoic acid arylides, the colouring matter for the coloured resist is a pigment, the binding agent for the pigment is a synthetic resin, cellulose ether or cellulose acetate or chlorinated rubber, and the resisting agent incorporated in the printing paste is an organic acid dissolved in an organic solvent or an ester of an organic acid which is hydrolysed on drying. C.

Cloth Cutting Device. J. S. Taylor (Manchester). B.P.541,607 of 7/9/1940: 3/12/1941.

Apparatus for cutting cloth comprises a block having grooves in the sides and tapered to a front vertical edge in which a blade is mounted, the back face of the block being adapted to rock slightly in a horizontal plane against a stop. The apparatus is inserted in a cut in the cloth at the desired place, the warp threads at the side of the opening are housed in the grooves, and the apparatus floats in the cloth and the blade cuts the weft as the cloth is wound up behind a stop bar against which the apparatus is pressed by the travel of the cloth. The grooves in the sides of the block are cut so as to leave sufficient material between them to insert the blade and to leave a slight thickness of the material of the block at each side of the blade, whereby the warp threads in the grooves are held clear of the blade. C.

Azo Dye Chromium Compounds: Production. Society of Chemical Industry in Basle. B.P.541,692 of 5/6/1940:8/12/1941. (Conv. 6/6/1939 and 6/5/1940.)

Chromium complex compounds of *o*-hydroxyazo dyes containing sulphonic acid groups are produced by causing an agent yielding Cr to act in an alkaline medium in the presence of a salt of an aliphatic hydroxycarboxylic acid on an azo dye of the general formula $HOR_1 \cdot N:N \cdot R_2OH$, wherein R_1 stands for a benzene monosulphonic acid residue and R_2OH stands for the radical of α-naphthol containing at least one halogen atom and wherein both the hydroxy groups are in ortho-position to the azo group. The invention is particularly advantageous for the conversion into chromium complex compounds of the group of dyes which are obtained by combining 3:6-dihalogen-1-hydroxy-2-diazobenzene-monosulphonic acids with 5:8-dihalogen-1-hydroxynaphthalenes. The chroming may be conducted by treating the azo dye with an alkaline chromium tartrate solution. Dyes having a high degree of fastness to fulling and potting are obtained. They may be applied to animal fibres such as wool and silk. C.

Wool and Silk: Rendering Water-repellent. J. G. Evans and C. E. Salkeld (to I.C.I. Ltd.). U.S.P.2,250,930 of 29/7/1941 (through *Chem. Abs.*, 1941, 35, 7214).

The material is impregnated with stearamidomethylenepyridinium chloride or other aliphatic acylaminomethylenepyridinium halide in which the aliphatic acyl radical contains >12 carbon atoms, and is then heated (to 105-120°) in the absence of moisture till decomposition of the pyridinium compound with liberation of the free base occurs. W.

Gas-absorbing Fabrics. Drägerwerk H. and B. Dräger. G.P.697,613 of 19/9/1940 (through *Chem. Abs.*, 1941, 35, 6813).

The fabric is made from mixed fire-resistant and cellulose fibres, or woven from fire-resistant fibres alone and then saturated with a concentrated carbohydrate solution. In either case the cellulose or the carbohydrate is transformed into activated carbon in the usual way. W.

Curly Hair: Straightening. F. Keil. G.P.697,634 of 19/9/1940 (through *Chem. Abs.*, 1941, 35, 6396).

The hair is treated with keratin-softening substances (e.g. aqueous solutions of alkaline sulphides, hydrosulphides, polysulphides, sulphites and sulphur compounds which when acted upon by acids yield sulphuric and/or sulphurous acid; to these are added preparations to keep the hair in position, e.g. sulphonated oils, oil emulsions, alcoholic solutions of drugs and albuminous compounds; bleaching agents, dyes, thickeners and wetting agents may also be added) and then with keratin-hardening substances which effect oxidation or reduction (e.g. hydrogen peroxide, permanganates or formaldehyde). W.

Textiles: Impregnating with Insect-repelling Mixture. P. Nestler. G.P. 699,278 of 31/10/1940 (through *Chem. Abs.*, 1941, 35, 7216).

The mixture consists of a 5 per cent. aqueous emulsion of 10 parts Ceylon citronellal, patchouli oil, oil of *Ocimum viride* or *Blumea lacera*, 3 parts of knee-pine oil, 1 part of wintergreen oil and 10 parts of guaiac wood oil or colophony. The mixtures does not stain the fabric and has no disagreeable odour. W.

5—ANALYSIS, TESTING, GRADING AND DEFECTS

(A)—Fibres

Cotton: Effect of Pressure Boil with Alcohol. T. Kleinert. *Cellulosechemie*, 1940, 18, 114 (through *Chem. Abstr.*, 1941, 35, 6439[7]).

Unbleached cotton (5 gm.) was sealed in an evacuated tube with water, pure alcohol, or a range of mixtures, and heated for 4 hours at 180° C. In water, there was a considerable loss of α-cellulose, and the product was pale yellow and had a copper number of 0·98. In pure alcohol, the product was white and had a copper number of 0·53. The protective effect of alcohol was displayed in the mixed solvents. C.

Fibres: Testing. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, 387 pages.

The following "standards" are revised: D.123, Standard definitions of Terms relating to textile materials; D.276, Tentative methods for Identification of fibres in textiles; D.540, Tentative methods of testing Rayon staple; D.584, Tentative method of test for Hard scoured wool in wool in the grease. C.

Silk: Action of Boiling Alkali. B. H. Nicolet and L. A. Shinn. *J. Biol. Chem.,* 1941, **140**, 685-686.

When silk is boiled for an hour with 0·1N alkali about one-third of the serine and threonine disappears and there is a corresponding rise in "amide" ammonia. To account for the sensitivity of serine in peptide linkage it is suggested that a seryl-peptide in silk loses water to become a dehydro-alanyl-peptide which would necessarily lose ammonia on hydrolysis. Some evidence of the formation of the double bond is given by the fact that S-benzylcysteyl residues are produced when silk is treated with benzylmercaptan and alkali. The bearing of the work on the denaturation of proteins is pointed out. C.

Silk Sericin: Fixation. M. Oku. *J. Agric. Chem. Soc. Japan,* 1941, **17**, 336-340 (through *Brit. Chem. Physiol. Abstr.,* 1941, B II, 338).

The formula $F = 100(A-B)/A$ is proposed for denoting the degree of fixation (F) of raw silk, where A is total loss in weight after scouring and B is the solubility of the sample. C.

Silk Sericin: Fixation. T. Nakahama and I. Sakaguchi. *J. Agric. Chem. Soc. Japan,* 1941, **17**, 370-376 (through *Brit. Chem. Physiol. Abstr.,* 1941, B II, 338).

Adsorption of formaldehyde by sericin and its separate A- and B-constituents follows Freundlich's isotherm. With less than 3 per cent. of formaldehyde B adsorbs more than A but with more than 4 per cent. A adsorbs more than B. C.

Wool Tops: Fineness Test. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, pp. 235-241.

"Standard specifications and methods of test for Fineness of wool tops" (No. D.472) prescribes apparatus and procedure for measuring the fineness of wool from widths, by means of the microscope and a wedge ruler, or from cross-sections, by means of a wedge measure and a bi-diameter scale, and tabulates the range of fineness and minimum number of tests for the commercial grades from 80's down to 36's. C.

American Cotton: Quality Statistics, 1939-40. *U.S. Dept. Agr., Agr. Market. Serv.,* 1940, 71 pp. (through *Exp. Sta. Rec.,* 1941, **85**, 684).

A report on grade, staple length and tenderability of cotton for 1939-40. Figures are included on the grade and staple length of the supply (carry-over plus crop) and the disappearance of Upland cotton. C.

New Mexican Cotton: Quality in 1936-1939. F. Lowenstein and J. C. Overpeck. *New Mexico Sta. Bul.,* 274, 1941, 26 pp. (through *Exp. Sta. Rec.,* 1941, **85**, 684).

Data for each year and the entire period are included for the State and each of two principal cotton-producing areas as to staple and grade by crop years and specific periods and as to the production and distribution of pure seed. The percentages for the State and the United States for the period were cotton classed as strict middling or above 62·1 and 20·7 and as 1 in. or longer 90·9 and 43. A large percentage of the cotton in the State classed as $1\frac{1}{16}$ in. and longer was middling or better. Most of the $1\frac{1}{8}$ in. and longer cotton was ginned before December 1. C.

Cotton and Rayon Fibres: Plasticity. O. Eisenhut and W. Grether. *Textilberichte,* 1941, **22**, 122-124 (through *Chem. Abstr.,* 1941, **35**, 7199[4]).

Load/extension curves of cotton and various rayons were obtained by alternately applying increasing loads and relaxing to zero load, the relative amounts of plastic and elastic extension being thus revealed. The work required to break a single fibre is constant whether the load is intermittent or continuous. Ordinary rayons are very plastic by comparison with cotton. High extensibility is of doubtful value if associated with high plastic deformation. C.

Wool Structure: Role of Cystine. J. B. Speakman. *Text. Manufacturer,* 1941, **67**, 381.

The formation of stable bis-thioether cross-linkages in wool by (*a*) reducing the cystine S-S links to cystine SH groups, and (*b*) linking the SH groups by treatment with suitable dihalides, and thus improving the resistance to alkalis, discussed by Patterson *et al.* (this *J.*, 1941, A 570), has been known for some time (B.P.453,701, this *J.*, 1936, A 626). Contrary to Harris's statement, cross-linkages of the type -S-X-S- (X = metal) formed by treating the reduced fibres with metallic salts, are not necessarily ionised, especially when the metal possesses marked co-ordinating power. They have been employed to prevent the unlevel dyeing of wool damaged by light and alkalis. W.

Wool: Testing Yield. H. J. Wollner. *Text. World,* 1941, **91**, No. 9, 86-87.

The U.S. Treasury Dept., Bureau of Customs has established a laboratory in the port of Boston for testing samples of all imported dutifiable wools. The tentatively-adopted definition of clean wool is that portion of the wool or hair which consists exclusively of wool or hair free of all vegetable and other foreign material and containing 12 per cent. by weight of moisture and 1½ per cent. by weight of material removable from the wool or hair by extractions with alcohol, and having an ash content not exceeding ½ of 1 per cent. by weight. Sampling is done by means of an electrically-motored core-boring tool which withdraws ¼ lb. wool from the bale. The number of cores taken and the depth of penetration depend on the statistical and other characteristics of the merchandise. The samples are sent in special containers to the testing laboratory, where they are weighed, degreased with trichloroethylene, opened and mixed, scoured and dried. The wool is then placed in a large glass-bottomed container having the same refractive index as wool and a special mixture of fluids poured over the sample which becomes transparent. The vegetable matter is photographed as a transparency which is compared with standard photographic slides. The dried and scoured wool is also tested for its content of ash and extractive material by standard procedures and an additional correction applied. The final figure represents the per cent. of the original sample which conforms to the definition of clean wool. A mathematical study indicates that the quantities of short fibres created in the bale by the core-boring tool are too small to interfere with subsequent manufacturing operations. W.

(B)—YARNS

Continuous Filament and Staple Rayon Yarn: Commercial Weight Test. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, pp. 191-193; 210-213.

(1) A " Tentative method of test for Commercial weight of continuous filament rayon yarn " (No. D.258) prescribes the apparatus and conditions for scouring the yarn and determining the oven-dry weight (105-110° C.). The " commercial weight " is then obtained by adding 11 per cent. for the regain, if cuprammonium, viscose or nitro-rayon, or 6·5 per cent. for acetate rayon. (2) A " Tentative method of test for Commercial weight of spun rayon yarns and threads " (No. D.507) follows the same lines, with appropriate modifications in the regain allowance for yarns spun from mixed types of rayon. C.

Jute Yarn: Testing. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, pp. 179-182.

" Standard methods of testing and tolerances for Single jute yarn " (No. D.541) define the count [weight in lb. of 14,400 yards (one spyndle)], twist direction, standard condition, and tolerances and prescribe sampling and tests for count, breaking load, and matter extractable by ethylene dichloride or carbon tetrachloride. C.

Textile Materials: Sampling and Number of Tests. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, pp. 278-288.

A statement is given of " Proposed recommended practice for calculating the number of tests to be specified in determining the average quality of a textile material." Nomograms are provided that connect (1) mean value, (2) standard deviation, (3) precision of mean (per cent. error), (4) coefficient of variation (per cent.), and number of observations to secure probability factors of 90, 95 and 99 per cent. An example from the breaking load of tyre cords is worked out. C.

Yarns: Specification and Testing. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, 387 pages.

The following "standards" are revised: D.123, Standard definitions of Terms relating to textile materials; D.76, Standard specifications for Textile testing machines; D.506, Standard method of test for Fastness of coloured textiles to light; D.582, Tentative method of test for Resistance of textile fabrics and yarns to insect pests; D.375, Standard specifications and methods of test for Asbestos roving for electrical purposes; D.180, Standard general methods of testing and tolerances for Cotton yarns. C.

Cotton Yarn: Shrinkage. G. S. Kasbekar. *Indian Text. J.,* 1941, **52,** 18-19.

The effects of solutions of acids, alkalis and salts on the dimensions, appearance, and dyeing and other properties of cotton fibres, yarns and fabrics, and the use of such reagents in mercerising and finishing processes are briefly discussed. Results obtained in a systematic study of the shrinkage of bleached cotton yarn in zinc chloride, calcium thiocyanate, and sulphuric and phosphoric acid solutions are described. Tables are given showing maximum percentage shrinkage and time for maximum shrinkage in solutions of various concentrations at 25° C. In each case as the concentration of the solution increases the shrinkage of the yarn increases, reaches a maximum and then begins to decrease. The importance of the time factor in industrial applications is pointed out. C.

(C)—FABRICS

Clothing: Thermal Properties; Heat Exchange Units. A. P. Gagge, A. C. Burton and H. C. Bazett. *Science,* 1941, **94,** 428-430.

The optimal average skin temperature for comfort, which appears to be 92° F., may be maintained in spite of exposure to cold if clothing is properly chosen. Temperature regulation can be attained under less favourable conditions by adjustment of the skin circulation and evaporation of water. If thermal equilibrium is to be attained without the necessity of these physiological adjustments, the three factors concerned for a balance at an assumed optimal skin temperature are the rate of heat production of the body (dependent on the degree of muscular activity), the insulating value of the clothing, and the temperature of the environment. The use of practical units for thermal activity and for insulation would provide a uniform system to describe comfortable conditions in relation to the heat exchange of man with his environment. A proposed thermal activity unit, the "met," is defined as 50 cals. per hour per sq. m. of the surface area of the individual (or 18·5 B.T.U. per hour per sq. ft.). This is approximately the metabolism of a subject resting in a sitting position under conditions of thermal comfort. The unit for thermal insulation of clothing is logically the amount of insulation necessary to maintain in comfort such a sitting-resting subject in a normally ventilated room (air movement 20 ft. per min. or 10 cm. per sec.) at a temperature of 70° F. and a relative humidity less than 50 per cent. The unit is called a "clo" and is defined as $0 \cdot 18 \times {}^\circ\mathrm{C} \div$ cals per hour per sq. m. or $0 \cdot 88 \times {}^\circ\mathrm{F} \div$ B.T.U. per hour per sq. ft. In general, the relation between the insulation of the clothing, I_{Cl}, that of the ambient air, I_{A}, the heat production, M, the evaporated loss, E, and the temperature of the air, T_{A}, for optimal comfort expressed in met and clo units is

$$I_{\mathrm{Cl}} + I_{\mathrm{A}} = \frac{33^\circ - T_{\mathrm{A}}}{9{\cdot}0\,(M-E)}, \text{ for } {}^\circ\text{C. or } \frac{92^\circ - T_{\mathrm{A}}}{16{\cdot}2\,(M-E)} \text{ for } {}^\circ\text{F.}$$

These equations hold only for muscular activity when no external work is accomplished. Values of I_{A} under various conditions are given. Predicted values of optimal temperatures for comfort with exercise in normal clothing, and ideal amounts of clothing, in clos, necessary for comfort for various degrees of rest and exercise are also given. The advantages of the use of the proposed units are discussed. C.

Cotton Corduroy Fabrics: Specification. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textiles,* 1941, p. 141.

Particulars are given of " Tentative specifications for Medium-weight cotton corduroy fabrics " (No. D.625). Two cloths for boy's wear are specified, one of V-shaped pile and the other of W-shaped pile. Figures for number of ribs, ends and picks, weight, breaking load, shrinkage, finishing material content and fastness to light are tabulated. C.

Fabrics: Specification and Testing. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, 387 pages.

The following " standards " are revised: D.123, Standard definitions of terms relating to textile materials; D.76, Standard specifications for Textile testing machines; D.506, Standard method of test for Fastness of coloured textiles to light; D.582, Tentative method of test for Resistance of textile fabrics and yarns to insect pests; D.315, Standard specifications and methods of test for Asbestos tape for electrical purposes; D.435, Standard method of test for Fastness of dyed or printed cotton textiles to laundering or domestic washing; D.504, Tentative specifications for Bleached cotton broadcloth; D.354, Standard methods of testing and tolerances for Tubular sleeving and braids; D.579, Tentative methods of testing and tolerances for Woven glass fabrics; D.580, Ditto for Woven glass tapes; D.374, Tentative methods of test for Thickness of solid electrical insulation. C.

Fire-proofed Fabrics: Specification and Testing. American Society for Testing Materials. *A.S.T.M. Standards on Textile Materials,* 1941, pp. 47-48.

Particulars are given of " Tentative specifications for Fire-retardant properties of treated textile fabrics (No. D.626). A 12-inch length of fabric, 2 inches wide, is suspended vertically ¾ inch above a 1½-in. luminous gas flame from a burner with ⅜ in. tube. The flame is applied for 12 seconds and the time that the strip continues in flame after removing the burner is noted. For a " fire-retardant " material, this time shall not exceed 2 seconds. Hooks are then inserted at the charred end, ¼ in. from the edges and ¼ in. from the end, and one hook is loaded with a weight equal to about one-tenth of the breaking load of the unburned fabric. The strip is slowly lifted by the other hook and the length of the tear is measured. Ten specimens are tested, five warp-way and five weft-way; the average tear shall not exceed 3½ inches and no single tear shall be more than 4½ inches. C.

Mixed Fibre Fabrics: Analysis. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, pp. 26-34.

Details are given of new " Tentative methods of Quantitative analysis of textiles " (No. D.629) covering moisture regain, total sizing and finishing materials, content of acetate rayon (extraction with acetone), silk content (extraction with Ca thiocyanate, *d* 1·20, at 70° C.), content of regenerated cellulose rayon (extraction with Ca thiocyanate, *d* 1·35, at 70° C.), wool content (by carbonization), and cotton, by difference. Directions are also given for a microscopic analysis. C.

Rank Correlation: Application in Textile Testing. E. R. Schwarz and K. R. Fox. *Textile Research,* 1941, 11, 482-489.

In many textile problems qualities are assessed by the award of points in a ranking system—as, for example, in colour fastness scales. The authors discuss the statistical handling of such non-dimensional data and explain, with illustrations, the Kendall rank correlation and coefficient of concordance. The analysis is applied to data obtained in five methods for determining the fineness of cotton and shows that the rankings provided by these data are statistically alike. Six instrumental methods for assessing the handle of cloth are also shown to give the same ranking. C.

Planoflex Pliability-measuring Device. E. C. Dreby. *J. Res. Natl. Bur. Stnds.,* 1941, 27, 469-477.

The Planoflex, a simple device for measuring the pliability of woven fabrics, measures the extent to which the fabric can be distorted in its own plane without producing wrinkles on its surface. The device consists essentially of a metal base plate supported by a wooden frame, to which is fastened a movable clamp, a fixed clamp, and a hinged shelf. The movable clamp is constrained by two connecting strips to move in an arc of 6-in. radius in such a way that it remains parallel to the fixed clamp. A weight clamp, supported by the hinged shelf, is used to put the test specimen under a 2-lb. tension when it is mounted. A specimen 3 in. wide and 10 in. long is used. The movable clamp is moved slowly, first to the left and then to the right, to the angles at which longitudinal wrinkles first appear on the surface of the specimen, and the angles, in degrees, are read on a scale below a pointer on the clamp. The sum of the readings on the left and right gives the total angle through which the fabric can be distorted. Results of measurements on a series of cotton percales show an 88 per cent. correlation with their tactual pliability ratings. Comparison of the Planoflex with the Schiefer Flexometer and the Peirce Hanging-Heart Loop methods for evaluating pliability showed it to be as good as or better than these methods with respect to the extent of the correlation between measured values and tactual pliability ratings, sensitivity to small differences in pliability, and ease of operation. The Planoflex may be used for testing all woven fabrics except those that are heavily starched. C.

Cellulose Acetate Sheet Material: Mechanical Properties. W. N. Findley. *British Plastics*, 1941, **13**, 205-210.

Tests were made on specimens cut from transparent sheet, 0·3 in. thick, of medium-viscosity cellulose acetate of the acetone-soluble type, plasticized with about 26 per cent. of phthalate and aromatic phosphate ester plasticizers. The tests included short-time extensometer tension tests, long-time constant load (time-to-fracture) tension tests, and vibratory bending fatigue tests of notched and unnotched specimens. A wide range of speeds of testing was used in the short-time tension tests. A critical speed of testing in tension was found above which the stresses were substantially unaffected by changes in speed of testing. The constant-load tension tests show that the fracture stress and the ductility decreased as the time to fracture increased. The effect of the moulded surface, the shape of specimen, and notches on the endurance limit in fatigue is shown, and the effect of air velocity and stress upon the temperature of the specimen during repeated stressing in fatigue is indicated. The endurance limit was affected markedly both by the shape of the specimen and by a V-notch. C.

Crease-resistant Fabric: Testing. W. Fischer. *Textilberichte*, 1941, **22**, 217-218 (through *Chem. Abstr.*, 1941, **35**, 7202^8).

The cloth is conditioned at standard temperature and humidity. A specimen 10 × 15 cm. is creased around four pieces of cardboard, 3 × 10 cm., and pressed on a metal plate under a load of 8 kilogm. for one hour. It is then hung from a frame against a background of graph paper and the length is marked off at appropriate intervals. Details are given (in the original) and correlations with the results of standard crease-angle tests are worked out. C.

Fabrics: Thickness, Compressibility and Flexibility. V. I. Tepnin. *Legkaya Prom.*, 1939, **18**, No. 8, 47-51 (through *Chem. Zentr.*, 1940, i, 1124-5, and *Chem. Abstr.*, 1941, **35**, 7202^1).

Thickness and compressibility are determined under loads of 5 gm. and 250 gm. per sq. cm., respectively; the load is applied for 5 minutes and 3 minutes are allowed for recovery before measuring thickness after compression. The "Compressometer" of Radovitzki is used. Flexibility is determined by the bending of a strip according to Peirce's method (B.C.I.R.A.). C.

Rayon Fabrics: Shrinkage Determinations. *Rayon Textile Monthly*, 1941, **22**, 683-684.

Details are given of a procedure for the determination of the stability to dimensional changes of rayon fabrics in laundering or wet cleaning. The samples are washed in a solution containing 0·5 per cent. of neutral soap in soft water at 100° ± 2° F. and are pressed in the tension presser. C.

Sugar Filter Cloth: Evaluation. J. F. Bogtstra. *Arch. Siukerind. Nederland en Ned.-Indie,* 1941, **2**, 178-181 (through *Chem. Abstr.,* 1941, **35**, 7225[7]).

The original paper gives the results of laboratory tests and factory observations on six brands of cotton filter cloth. The heaviest cloth was generally the best. A loose weave is undesirable, especially if the yarn is weak. The quality improves with the staple length of the cotton. C.

Waterproofed Khaki Cloth: Testing. W. R. Lang. *Textile J. Australia,* 1941, **16**, 138-143, 177-179 (through *Chem. Abstr.,* 1941, **35**, 7202[4]).

An analysis of the official hydrostatic pressure test has been made to find the influence of surface tension, water, density, size of pores, yarn diameter and angle of contact between water and yarn. The value of the test is limited by a variable factor—the increasing pore size due to the stretch of the yarns as the test proceeds. The " degree of proofing ", as distinct from the proofing effect of the weave, cannot therefore be determined simply by this test. The wide range of the proportions of Pb or Ca acetate and Al sulphate used, and the wide range of suitable concentrations, suggest that the final proofing material is a complex of Al compounds. The effects of after-treatments, hot pressing and wetting are discussed. C.

Papermaking Felts: Bacterial Degradation. J. W. Appling, O. A. Smith and D. Fronmuller. *Tech. Assoc. Papers,* 1941, **24**, 160-164; *Paper Trade Journal,* 1941, **113**, No. 7, 30-34 (through *Chem. Abs.,* 1941, **35**, 6787).

Species of bacteria isolated from damaged felts during the past 18 years include members of the Micrococcaceae, Bacteriaceae and Antinomycetaceae. The most active wool-decomposing species are *Alcalgienses bookeri, A. faecalis, Pseudomonas aeruginosa, P. fluorescens, Proteus vulgaris, Bacillus megatherium, B. agri.* (var.), *B. aurantius* (var.), *B. mycoides, B. mesentericus* and *B. subtilis.* A critical analysis and evaluation of the steps necessary for measuring the amount of bacterial degradation in temperatures of reduction in tensile strength were made to standardise the technique used. By the application of this technique (described in detail) it is intended to study fundamental questions related to the life of papermaking felts and possibly to develop bacteria-resistant felts. W.

(D)—OTHER MATERIALS

Insect Proofing Compounds: Testing. American Society for Testing Materials, Committee D13. *A.S.T.M. Standards on Textile Materials,* 1941, pp. 51-54.

Details are given of " Tentative methods of test for Evaluating compounds designed to increase resistance of fabrics and yarns to insect pests " (No. D.627). The compound is applied to a pure, undyed, scoured wool cloth (supplied by the American Association of Textile Chemists and Colorists) and the test pieces are exposed to attack by the larvae of the black carpet beetle for 28 days at 77-83° F. and 30-70 per cent. R.H. Damage is assessed by visual examination and by the weight of excrement, and the proportion of surviving larvae is noted. If no damage is noted in 28 days, the dead larvae are replaced and the exposure continued for a second period of 28 days, and so on until damage is observed, all the larvae being renewed every 12 weeks. The test is also applied after the proofed cloth has been (*a*) washed, (*b*) dry-cleaned, (*c*) hot pressed, (*d*) saturated with " sea water ", (*e*) wetted with acid and alkaline " perspiration ", (*f*) exposed to light, and (*g*) abraded, under prescribed conditions. C.

7—LAUNDERING AND DRY CLEANING

(A)—CLEANING

Practical Raincoat Cleaning, Tinting, One-Bath Machine Proofing. *Laundry Record,* 1941, 395, and 1942, 53.

Classification is stressed and the differences in processing of the various classifications discussed. Methods of tinting and re-proofing are also considered. La.

Charts and Tables. *Laundry Age,* 1941, 68.

Tabulated data are given for washing machines, average weights of laundry items, properties of fabrics, properties of detergents, washing processes and finishing machinery. Water treatment information is also tabulated. Under power plant are included data on fuel, boiler efficiency water pressures, tank capacities, pipe capacity, belts and pulleys, operating costs, etc. La.

Check Raincoats Before Cleaning, Restore Colour to Washed-out Coats. W. Brown. *Power Laundry,* 1941, 503, 555.

Raincoats of cotton or union cannot be adequately cleansed by dry-cleaning. They should be subsequently brushed with a soap—S.F.A. mixture or a spirit soap. Washing in a rotary machine is deprecated because of the dangers of uneven penetration and of the shrinkage of woollen linings. The washed coats should be re-tinted by immersion in a dye bath for just sufficient time to even up the colour. Finally the coats should be re-proofed by treatment with aluminium acetate or a paraffin wax emulsion. Aluminium acetate can be prepared by mixing a solution of sugar of lead with a solution of alum and allowing several hours for the sediment formed to settle. The clear liquid is ready for re-proofing. La.

PATENT

Fibrous Material: Removal of Rust Spots. L. C. Schilling. Dutch P. 50,110 of 15/4/1941 (through *Chem. Abs.,* 1941, 35, 7215).

Spots are removed by a solution of phosphoric acid or phosphates in anhydrous glycol or glycerol to which organic acids or salts may be added. Examples are given. W.

8—BUILDING AND ENGINEERING

(A)—CONSTRUCTION AND MAINTENANCE OF BUILDINGS AND PLANT

Chlorinated Rubber Protective Paints. A. R. Olsen. *Paper Trade J.,* 1941, 113, *TAPPI,* 255-256.

The advantages of " Parlon " paint as a protective coating for pulp and paper plant are stressed. The base is a chlorinated rubber (66-68 per cent. Cl) and the chemistry of this chlorination is discussed. C.

Cotton and Cement Roofing: Application. *Concrete,* 1941, 49, No. 1, p. 30, and *Concrete Building,* 1941, 16, No. 8, 128, 130 (through *Building Sci. Abs.,* 1941, 14, 91).

Brief reference is made to a roof covering consisting essentially of a thin layer of cement mortar reinforced with a cotton fabric, which is made on the site and laid wet. The covering must be kept sufficiently moist during hardening; it is flexible and can be laid over old wooden shingles or across ridges without flashing or ridge rolls. C.

Automatic Level Controllers. M. F. Behar. *Instruments,* 1941, 14, 326-380.

A survey is made of devices and systems for automatically controlling levels of liquids and bulk materials. C.

Chromate Corrosion Inhibitors: Efficiency. M. Darrin. *Ind. Eng. Chem., Anal. Edn.,* 1941, 13, 755-759.

Tests have been made of the effectiveness of chromate inhibitors in preventing the corrosion in water of iron, galvanized iron, tinned iron, copper, brass and aluminium, both alone and in contact with each other. The method used was based on simple visual observations and weighted scoring of characteristic corrosion criteria. The results show that sodium chromate is effective in retarding or completely inhibiting the corrosion of many bimetallic systems in water. Sodium chromate and bichromate are effective in retarding corrosion in most monometallic systems. Sodium bichromate also reduces corrosion in many bimetallic systems, but is not so generally effective as sodium chromate. Corrosion of aluminium and copper, aluminium and brass, and zinc and copper combinations is difficult to inhibit. With these combinations, sodium chromate is helpful but not completely inhibitive. The relative retardation of corrosion by sodium chromate is essentially the same in hot water as in cold. Neutralising the alkalinity of sodium chromate to *p*H 7·0 does not result in any impressive differences. If anything sodium chromate is more effective at its natural alkalinity of about *p*H 8·5. Although the rate of corrosion of most systems is greatly accelerated by aeration, there is no important difference between aerated and closed systems when sodium chromate is present. Increasing the concentration of sodium chromate slightly improves the protection; under most conditions concentrations of 200 to 500 p.p.m. provide good protection. No harm results from excess sodium chromate. Concentrations below 100 p.p.m. protect aluminium and zinc, but may cause stimulation of corrosion with iron systems. Sodium chromate retains its inhibitive properties until lost from the system, either mechanically or by chemical reduction. For many practical purposes its depletion may be judged by loss of colour. C.

Rubber-base Insulating Plastics: Properties and Uses. H. A. Daynes. *Trans. Inst. Rubber Ind.*, 1941, 17, 151-160.

A general account is given of the nature, properties and uses of ebonites, unvulcanised thermoplastics based on rubber and gutta percha or balata, and various derivatives and modifications of rubber. C.

(C)—STEAM RAISING AND POWER SUPPLY

Indian Cotton Mill: Power Costs. P. V. S. Iyengar. *Textile Digest*, 1940, 1, 115-119, 167-171.

The author analyses costs of production in Indian and Japanese mills, on the basis of data culled from various sources. Power and fuel account for about 5 per cent., varying from 3·5 per cent. for spinning only, to 6·9 per cent. for a mill engaged in spinning, weaving, bleaching, dyeing and finishing. Some actual data of power costs in Indian mills are tabulated. C.

Steam Supply in Industrial Heating Plants. W. Goldstern. *Industrial Heating Engineer*, 1942, 4, 8.

A method of calculating the steam flow in pipes connecting a boiler with various units of a heating installation is given, graphs showing resistance factor and pipe diameter being included: An example is worked out in detail. La.

Some Notes on Electrode Boiler Plants. *Industrial Heating Engineer*, 1942, 4, 14.

The use of electrode boilers in this country has considerably increased during the last few years, and this article gives a brief description of a number of different installations. La.

Steam Power in Industry. C. S. Darling. *Steam Engineer*, 1941, 11, 68; 1942, 11, 90.

The question of bought or generated power is briefly discussed and the importance of maintaining industrial generating plant at maximum efficiency is emphasised. Back-pressure and pass-out turbines are described, with diagrams, and the various characteristics are considered. The pass-out type is considered in greater detail by referring to several installations, including an American rayon mill. La.

Some Observations on the Design of Safety and Relief Valve Seatings. G. H. Pearson. *Steam Engineer*, 1941, 11, 65; 1942, 11, 95.

Safety and relief valve seatings are likely to have a shorter life than stop-valve seatings as a result of the wire drawing caused by the passage of high velocity air, water or steam. Satisfactory methods of grinding clack and seat are described and merits or demerits of winged clacks are given. A special design of valve is shown and it is suggested that the more easily renewed part (usually the seat) should be of a softer metal than the other part. With accurately lapped surfaces the clamping pressure for fluid tightness need be only 1¼ times the pressure of the fluid being controlled. Sizes of seating faces are obtained from a consideration of the allowable pressure drop as given in B.S.S. No. 759, and finally the importance of correct grinding is emphasised. La.

Notes on Fuel Economy. S. N. Duguid. *Steam Engineer*, 1942, 11, 98.

Some elementary notes, but none the less important, on the problem of fuel economy. La.

Steam Storage Capacity. W. Goldstern. *Steam Engineer*, 1942, 11, 100.

Fuel Saving Chart III (third series) has been devised to assist in calculating the steam storage capacity of a vessel filled with hot water under steam pressure.

It is necessary to know the maximum and minimum steam pressures in lb. per sq. in. and the water content, at maximum pressure, in gal. La.

(D)—POWER TRANSMISSION

Ball and Roller Bearing Economy. R. Allen. *Mech. World,* 1941, **110**, 355.

In order to make the best use of the supply of ball and roller bearings action can be taken in three stages, namely, (*a*) design, (*b*) maintenance, (*c*) repair. Under (*a*) the chief advice is consult the manufacturer; under (*b*) correct lubrication and cleaning are most important. Under (*c*) various aspects of repair are considered, including building up of shafts or bearing surfaces; examination of bearing slackness, etc., and a rough guide to procedure is given in tabular form. La.

White Metal Stuffing Box Rings. H. Warburton. *Mechanical World,* 1941, **110**, 173.

Illustrated description of white metal stuffing box rings for general and special purposes. La.

Zinc Oxide Lubricants. A. Duckham. *Mech. World,* 1941, **110**, 358.

The incorporation of zinc oxide in oils and greases avoids corrosion due to acidity and improves the bearing surfaces, possibly as the result of electrolytic action. La.

(F)—LIGHTING

Colour and Light Sources. N. Macbeth. *Amer. Dyes. Rept.,* 1941, **30**, 615-618.

A brief survey is made of the structure of the eye and the operation of the visual mechanism. The characteristics of modern light sources, particularly daylight lamps and fluorescent lamps, are outlined and their use in colour matching is discussed. The advantages of artificial skylights and of two variant colour matching lamps are described. The value of the recording spectrophotometer for the evaluation of colours is pointed out. C.

(G)—HEATING, VENTILATION AND HUMIDIFICATION

Water Vapour: Condensation from Air. M. Hirsch. *Industrial Chemist,* 1941, **17**, 291-293.

The condensation of water vapour on a cooling surface and condensation produced by adiabatic mixture of a stream of air at one temperature with a stream of air at a higher temperature and with a higher moisture content are studied, and the influence of the presence of nuclei and the effects of turbulent air flow are explained. Supersaturation of air is discussed in relation to refrigeration and air conditioning. Methods of preventing supersaturation are outlined. C.

Some Elementary Notes on Air Conditioning. D. F. Davis. *Industrial Heating Engineer,* 1942, **4**, 16.

An elementary consideration of the processes involved in air conditioning plant, the processes being considered separately. Filtering is by fabric, cotton-wool, oiled glass silk fibres, metal filters, but an air washer is probably the best proposition. The latter has to control the humidity as well as cleanse the air, which finally passes through a heater battery. Many more data are required before the best conditions for different buildings can be stated definitely. La.

(H)—WATER PURIFICATION

Carbonic Acid Content of Water. (1) A. Forshaw. (2) U. R. Evans. (3) A. Parker. *Chemistry and Industry,* 1941, 835 and 867.

(1) The writer raises the question whether hard water requires for stability more than the amount of carbon dioxide equivalent to Ca bicarbonate. (2) and (3). The question is answered by reference to tables published by Tillmans and Heublein (1912) of the excess that is required at different concentrations of Ca bicarbonate. If the water contains less than the necessary amount of carbon dioxide, carbonate tends to be deposited; if it contains more, the water is " aggressive ", i.e. capable of attacking iron or limestone. Zeolite softening treatment may have the effect of transferring some of the carbonic acid into the aggressive region. C.

Lignin: Use for Removal of Iron from Water. G. H. Nelson and S. I. Aronovsky. *Paper Trade J.*, 1941, **113**, *TAPPI*, 239-245.

The use of crude lignin powder for the removal of iron from water has been studied and promising results have been obtained. The percentage removal of the iron varied from 85-97 per cent. as the concentration of lignin varied from 16 to 500 p.p.m. It seems likely that by increasing the dosage of the crude lignin, as high an efficiency can be obtained as with purified lignin, and at lower cost. Colour produced in the water by the lignin treatment may be eliminated by the use of alum followed by filtration. The use of lignin-impregnated filters for iron removal gave encouraging results. A bed of lignin-impregnated corncob pulp 5½ inches deep removed from 65 to 90 per cent. of the iron and with 7½ inches the removal was about 97 per cent. This type of filter tends to clog fairly rapidly and needs frequent back-washing. A lignin-impregnated sand filter functioned more efficiently, removing from 95 to 99 per cent. of the iron and yielding an effluent with low colour. No clogging difficulties were experienced with the sand filter. Crude lignin powder or sand filters impregnated with crude lignin were found to be very effective in removing iron. C.

Water: Purification with Bentonite. H. L. Olin and H. F. Freeman. *Paper Trade J.*, 1941, **113**, *TAPPI*, 246-250.

Under properly controlled conditions the " swelling " or alkali bentonites when dispersed as negatively-charged particles in waters containing electrolytes, coagulate readily to form flocs that serve to remove suspended impurities. This coagulative effect, which is slight in the presence of monovalent cations, is fairly rapid and complete in hard waters containing Ca or Mg, and can be accelerated by the addition of Al or Fe'''. In the bentonite-alum split dosage method the clay dispersion acts to remove the gross material by adsorption, whilst the alum ionizes immediately to produce trivalent cations and neutralizes and coagulates the negatively-charged colloidal silt that remains as residual turbidity after the main purge. An account is given of experiments with bentonite alone; bentonite with lime softening in split treatments; bentonite and alum, both straight and split; and bentonite and alum with lime softening. C.

Synthetic Resin Base Exchange Compounds. D. Brownlie. *Steam Engineer*, 1942, **11**, 87.

A short review of the present position regarding synthetic resin base exchange compounds. La.

(I)—WASTE DISPOSAL

Sulphur Dye Wastes: Treatment. R. Porges, R. K. Horton and H. B. Gotass. *Sewage Works J.*, 1941, **13**, 308-317 (through *Chem. Abstr.*, 1941, **35**, 6796^9).

On a pilot plant scale, coagulation with acid and alum was unsatisfactory because of foaming and evolution of sulphuretted hydrogen. Treatment with ferric chloride and sulphate and lime-copperas was satisfactory. Rapid mixing with little flocculation gave best results. The sludge settled poorly but filtered well and the deposit could easily be removed from the beds. C.

Greases: Determination in Sewage, Sludge and Industrial Wastes. R. Pomeroy and C. M. Wakeman. *Ind. Eng. Chem., Anal. Edn.*, 1941, **13**, 795-801.

The usual methods for determining grease in sewage, sludges and many other fluid materials essentially involve acidifying the sample, evaporating to dryness, extracting thoroughly with a suitable solvent and evaporating the solvent. Causes of errors in these methods are discussed and a wet method in which extraction is effected without preliminary drying is recommended. The sample is acidified and shaken thoroughly with successive quantities of solvent until removal of grease is complete, and the solvent is evaporated by heating just sufficiently to ensure complete removal. Details of procedure are given and results are discussed and compared with results obtained by the usual methods. Results of the wet method are much less influenced by variations of technique and of solvent and more accurately represent the true content of grease than is the case in dry method. The preferred solvent is a petroleum fraction approximating the hexanes in properties, pure isohexane or *n*-hexane. C.

9—PURE SCIENCE

Dyes: Sensitisation and Photo-voltaic Effect. B. S. V. R. Rao. *Current Science,* 1941, **10**, 198-199, 200 (through *Brit. Chem. Physiol. Abstr.,* 1941, A I, 363, 379).

(1) With erythrosin, chrysoidin, methylene blue, methyl green and malachite green the spectral regions for maximum sensitisation and maximum photo-potential correspond closely, and lie at slightly higher wave-lengths than the absorption maximum. The photo-voltaic and sensitisation effects are probably secondary phenomena arising from the impact of dye molecules, activated by light absorption, with the electrode or sensitised emulsion. Sensitisation and desensitisation are probably the same phenomenon, the sensitiser acting on one or both of two opposed processes. (2) Photo-potentials (E_p) for methylene blue, methyl green and malachite green illuminated with filtered and unfiltered light from a mercury arc have been measured by means of a vacuum-tube voltmeter. The maximum E_p occurs at a slightly higher wave-length than the absorption maximum in each case. C.

N-H-N Bond: Occurrence. L. Hunter and J. A. Marriott. *J. Chem. Soc.,* 1941, 777-786.

The molecular weights of amidines and related substances have been measured in naphthalene solution over a range of concentration, and evidence has been adduced of molecular association through N-H-N bonds in those compounds possessing an unsubstituted imino-group. From the large factors of association exhibited by the glyoxalines and benziminazoles, it seems that the N-H-N bond is neither so weak nor so rare as has been supposed. The strength of the bond is evidently enhanced in tautomeric compounds, and the virtual tautomerism of the types studied is explained as a resonance phenomenon. C.

Physical Photometer. R. P. Teele. *J. Res. Natl. Bur. Stnds.,* 1941, **27**, 217-228.

A physical photometer is described that comprises a thermopile, a potentiometer, and a filter which has at each wave length a transmission proportional to the ICI (International Commission on Illumination) luminosity factor for that wave length. The method of use is explained and necessary precautions are indicated. It is claimed that this photometer gives results which are consistent with the ICI luminosity factors and which are more accurate than those obtained by visual observers when the photometric fields are not colour-matched. Results of measurements of spectrally selective filters and of rotating sectored discs, and tests of the stability of the photometer are given. Applications to the measurement of lamps are briefly discussed. It is pointed out that the luminous transmission of a spectrally selective filter can be determined with the physical photometer in a much shorter space of time than that required to obtain the spectrophotometric data and perform the necessary calculations. The two methods are comparable in accuracy. C.

Alloys for Instruments: Composition and Properties. O. F. Hudson. *J. Sci. Instruments,* 1941, **18**, 211-216.

A general account is given of the composition, properties and uses of alloys of (1) aluminium, (2) magnesium, (3) low coefficient of expansion, (4) high magnetic permeability, and alloys for (5) springs, (6) electrical resistances, and (7) permanent magnets. C.

High-speed Action: Analysis. E. M. Watson. *Gen. Elec. Rev.,* 1941, **44**, 549-557.

Methods of studying phenomena that are too fast for unaided visual observation are classified into (1) direct visual observation, (2) still camera methods and (3) motion-picture camera methods. Shutter or stroboscopic methods may be employed in each case. The shutter method, in which exposure time is determined by a shutter, is used where subjects radiate light of themselves or reflect utility light not used to determine exposure time. Determination of exposure time by stroboscopic flash is used where other light does not materially interfere with stroboscopic light. Equipment used in the various methods is discussed. C.

Oscillating Systems: Natural Frequencies; Determination by Admittance Method. W. J. Duncan. *Phil Mag.*, 1941, [vii], **32**, 401-409.

Carter's admittance method of obtaining natural frequencies is explained, the term admittance being borrowed from alternating current theory and standing for a flexibility measured under the conditions of a steady simple harmonic forced oscillation of the same frequency and phase at all parts of the system considered. It is shown that this method can be used to find the natural frequencies of a system composed of two parts whenever the force system in the connection between the parts depends on a single parameter, for then a unique admittance is definable. When the force system between the parts depends on more than one parameter the simple form of the method fails because a unique admittance no longer exists. It is shown, however, that the method is capable of extension to such cases, but is then considerably more complicated. Examples of the admittances of various elastic and massive bodies, examples of the use of admittances, and a list of some types of system which can be treated by the simple form of the method are given. C.

Compact Experiments with Three or Four Restrictions: Design and Analysis. P. V. K. Iyer and S. Sen. *Indian J. Agric. Sci.*, 1940, **10**, 854-859.

Details are given of the design and a method of statistical analysis of compact experiments with three and four restrictions. C.

Observational Data: Test for Randomness. L. C. Young. *Ann. Math. Statistics*, 1941, **12**, 293-300.

A criterion is given for testing whether a given sequence of observations departs significantly from a random order. The moments of the appropriate sampling distribution are worked out, and significance tables are given for sequences of 8 to 25 observations. C.

Simultaneous Linear Equations: Solution; Mathematically Significant Figures. L. B. Tuckerman. *Ann. Math. Statistics*, 1941, **12**, 307-316.

Errors in determining a number of unknowns from a set of simultaneous linear equations containing values obtained from experimental observations may arise from errors in the observed values. It is shown that the effects of the latter errors cannot be calculated generally. Computational errors may also arise because a limited number of figures is retained in intermediate computations. It is shown how upper limits to these errors may be calculated. C.

Household Insect Pests: Occurrence and Control in India. M. Singh. *Indian Fmg.*, 1941, **2**, 238-241.

An account of the control measures efficacious in India against the cockroach, silverfish and cricket. The latter feed on wool and rayon fabrics and on starch substances. W.

Electron Energy-levels in Biochemistry. S. Baxter and A. B. D. Cassie. *Nature*, 1941, **148**, 408-409.

Results are reported for the electric conductivity of wool. Above 6-8 per cent. moisture content the conductivity shows no polarisation, obeys Ohm's law, and has large positive temperature coefficient. The latter is 3 times that of water and is independent of moisture content, ionic impurities and the nature of the electrodes. When the water is replaced by methyl alcohol, the conductivity phenomena remain unchanged, except that the temperature coefficient is slightly lowered. These facts are difficult to reconcile with ionic conductivity, and it is suggested that the wool-water or methyl alcohol system is an electronic semi-conductor. W.

Pasture Proteins: Amino Acid Compositions. J. W. H. Lugg. *Australia: J. Council Sci. Ind. Res.*, 1941, **14**, 209-214.

A review of the literature indicates that the amino acid compositions of the whole leaf proteins of the angiosperms (to which sub-division the pasture species belong) are almost unaffected by manurial treatment, climate, and age of the leaves, and that the variations in composition between the various angiosperms are small. The analyses reveal no nutritive deficiencies. A table (compiled from various sources) shows the amino acid content of the leaf proteins of pasture plants. W.

Chinese Oak Silkworm: Metabolism. F. S. Treiman. *Biochem. J.* (Ukraine), 1940, **16**, 595-629 (through *Chem. Abstr.*, 1941, **35**, 7039^4).

The influence of the quality of the food (early and late oak leaves) is shown by determinations of the water, fat, glycogen and N contents of caterpillars of the Chinese oak silkworm (*Antheraea pernyi*) Guér. Mén. The respiratory quotient was 0·58 with early oak leaves against 0·53 for late oak leaves. C.

Silkworm Body Fluid: Reducing Power. Z. Kuwana. *Japanese J. Zool.*, 1937, **7**, 273-303; 1940, **9**, 127-137; *Proc. Impl. Acad.* (Tokyo), 1940, **16**, 564-568 (through *Chem. Abstr.*, 1939, **33**, 2227^5; 1941, **35**, 7037^8; 1941, **35**, 2221^5).

(1) The reducing power of the body fluid of the silkworm for ferricyanide was measured at various growth stages. On exposure of the fluid to air the reducing power decreases spontaneously, but this effect is inhibited by heating. The total reducing power in the quiescent state without feeding near the end of each larval stage and in the pupating stage just before ecdysis reaches about 200 mg./dl. (calculated as glucose) but in other periods it is roughly constant at about 100 mg./dl. (2) The reducing power was measured with indicator dyes of various redox potentials. The anaerobic redox potential was about *r*H9. If exposed to air the fluid also reduced dyes of *r*H>9. The uptake of oxygen by the fluid was nearly three times as much in the quiescent periods as in the feeding periods, and also rose to a high value in the pupating period just before ecdysis. (3) The intensity of melanosis, the concentration of a phenolic substance, and the ferricyanide reducing powder of the body fluid run parallel at various stages in the growth of the silkworm. On exposure to air, the reducing power and phenolic content decrease as melanosis proceeds. C.

Skin: Permeability. H. A. Abramson and M. H. Gorin. *Cold Spring Harbor Symposia on Quantitative Biology*, 1940, **8**, 272-279.

The three main channels of transport in the skin are (1) the ducts and coils of the sweat glands, (2) the hair follicles and sebaceous glands, and (3) the skin itself, i.e. the keratin matrix which links (1) and (2). Little is known of the permeability of the cornified layer, the keratin matrix. Probably only small molecules can readily pass through it and it is questionable whether water molecules permeate the keratin matrix itself. The sweat glands transport water-soluble substances and the sebaceous glands and the glands of the hair follicles secrete or transfer oily materials. Allergens, such as ragweed and timothy pollen, can be readily transported into the skin by electrophoresis and histamine can remain in the skin for days. Electrophoretic patterns of pores have been obtained by applying dyes to the skin. After applying methylene blue and rubbing and washing the stained area, blue dots were observed on the sites of the orifices of the ducts of the sweat glands. Little or no methylene blue was observed at the bases of the hair follicles. Patterns have been obtained with both positively- and negatively-charged dyes with the skin negatively charged. It is suggested that under normal conditions the sweat glands of the skin and their ducts are incompletely filled with liquid. When an electric current is applied across the skin, the electro-osmotic forces tend to displace the air in the pores with liquid. The pores will then contain an unbroken column of liquid, a liquid bridge in contact with the liquid on the outside of the skin and with the underlying gels and fluids. All the phenomena of electrokinetics should be displayed in these pores. The absorption of endocrine substances in the intact skin, from ointments or lipoid solvents as vehicles, is discussed. A list is given of the principal specific skin irritants encountered in industry and the patch test for determining the permeability of the skin to these materials is briefly discussed. It is pointed out that the material must not only wet the skin but channels must be formed in the skin to permit the diffusion of substances either through the sebaceous glands or through the sweat glands. The material is then transported through aqueous or lipid-liquid bridges which permit diffusion to occur in zones of the skin which would not be available unless there were a free diffusion path. Absorption of vitamins through the skin is briefly discussed. C.

Soybean Amylase: Activity. Nellie M. Taylor, V. D. Martin and R. M. Hixon. *Rept. Agric. Research,* 1938, Pt. II.; *Iowa Corn Research Inst., 3rd Annl. Rept.,* pp. 66-67 (through *Chem. Abstr.,* 1941, **35**, 6479[2]).

The temperature at which starch paste is prepared for amylase activity tests influences the rate of hydrolysis. Maximum rates with soybean amylase were observed when the pastes were prepared at the following temperatures: potato starch 70°, tapioca 80°, corn and wheat starches 90°, and rice starch 80° or higher. When the pastes were cooked at higher temperatures the rates were lower but at the end of 24 hours the same limits of maltose were reached. C.

Cellulose: Acid Character. E. Heymann and Gertrude Rabinov. *J. Phys. Chem.,* 1941, **45**, 1152-1166, 1167-1176.

(1) The equilibria between purified cotton wool and a number of salts were investigated at various concentrations. The results show that cation-free cellulose liberates acid from salt solutions, the amount increasing with decreasing strength of the acid radical. The cation of the salt is, however, not without influence. Samples of cellulose of varying origin and treatment were investigated. The bulk of the evidence of this and other investigations suggests that the acidity is due to groups other than hydroxyl, and probably to stray carboxyl groups. Oxidation increases the acid value considerably, whereas treatment with boiling alkali decreases it. The alkali and calcium " salts " formed on interaction of salts or bases with the carboxyl groups of the cellulose are not readily hydrolysed, even by prolonged washing with distilled water. Similar results were obtained with cellulose prepared from raw cotton by treatment with boiling caustic alkali in the absence of air; a very low acid value is obtained by prolonged treatment. (2) An unsuccessful attempt was made to prove the existence of an " atmosphere " of hydrogen ions around cellulose fibres by demonstrating a catalytic action on the inversion of sugar. A solution of " soluble cellulosic acid " was obtained by digestion of cation-free cellulose with hot water. Potentiometric titration showed this acid to be somewhat stronger than acetic acid. Attempts were made to calculate an apparent dissociation constant of the carboxyl groups of cellulose by application of (*a*) the formal mass action law, (*b*) the relation valid for the distribution equilibria of a base between two acids, and (*c*) the Donnan equilibrium principle. The limitations and uncertainties of such calculations are discussed; the last method is, in principle, the most satisfactory one. C.

Cellulose: Catalytic Oxidation at the Surface. Deodata Krüger and F. Oberlies. *Ber. deut. chem. Ges.,* 1941, **74B**, 663-670 (through *Chem. Abstr.,* 1941, **35**, 6244[1]).

The authors report that when bleached and soured cellulose fibres (spruce, beech, cotton, filter paper, hemp, etc.) are exposed to the vapour of dimethylaniline for a few days they assume a blue colour due to the production, by oxidation, of crystal violet (absorption maximum at 587·5 mμ). Monomethylaniline gives a red dye with absorption maximum at 563 mμ. Mixtures of mono- and di-methylaniline do not give mixtures of the above dyes but another red-violet dye, with absorption maximum at 568 mμ. The amount of crystal violet formed in four weeks was 2 mg. per gm. of beech cellulose and 0·55 mg. per gm. of cotton. The reaction is not ascribed to any lignin content but to catalytic oxidation initiated by carboxyl groups in the cellulose. This is discussed at length. C.

Cellulose: Structure. Th. Lieser. *Ber. deut. chem. Soc.,* 1941, **74B**, 708-714 (through *Chem. Abstr.,* 1941, **35**, 6245[8])

The author considers that known facts about the reactions of cellulose demand the micellar hypothesis for their interpretation. Cellulose solutions in cuprammonium, and viscose solutions, contain the original crystallites rather than isolated macromolecules. The supermolecular, submicroscopic structure of cellulose is just as significant for the reactions as the molecular structure. C.

Wood Cellulose: Isolation by Chloroacetic Acid. F. Schütz. *Cellulosechemie,* 1940, **18**, 76-83 (through *Chem. Abstr.,* 1941, **35**, 6448[8])

Experiments are reported on the cooking of wood and rye straw with chloroacetic acid (1 part of wood to 4-20 parts of 80-85 per cent. acid). The pure acid at 120° C. caused much decomposition and mixtures with glacial acetic acid were unsatisfactory. Spruce after 4-5 hours at 116° C. in the 85 per cent. acid gave a 40·6 per cent. yield of pulp containing 97·5 per cent. of α-cellulose. The di- and tri-chloroacetic acids, some hydroxy-acids and aromatic sulphonic acids gave similar results but chlorosulphonic acid decomposed wood at 0-20° C. into water-soluble material containing sulphonic acids and simple sugars. C.

Corn Starch: Fractionation. C. G. Caldwell and R. M. Hixon. *J. Amer. Chem. Soc.*, 1941, **63**, 2876-2880.

An account is given of a study of the fractionation and ageing of starch pastes and a comparison of waxy and ordinary corn starch. The ratio of soluble to insoluble components separated from ordinary corn starch pastes by electrodialysis or by freezing depends upon the extent of peptization. Retrogradation or ageing of starch pastes is a crystallization process as evidenced by the definite X-ray patterns. The Sallinger procedure measures the rate at which such crystallization takes places. A comparison of the physical properties of the limit dextrins obtained from waxy and ordinary corn starch by digestion with β-amylase emphasizes a close similarity rather than a chemical difference between them. The quantity of dimethyl glucose obtained by hydrolysis of methylated corn starch (0·93 per cent.) does not differ greatly from the quantity obtained by hydrolysis of the methylated limit dextrin (0·67 per cent.). If branching exists in the original starch, such linkages are hydrolysed by the β-amylase. C.

Corn Syrup Dextrins: Isolation. R. M. Hixon. *Rept. Agric. Research*, 1940, Part II; *Iowa Corn Research Inst., 5th Annl. Rept.*, p. 65 (through *Chem. Abstr.*, 1941, **35**, 6479[1]).

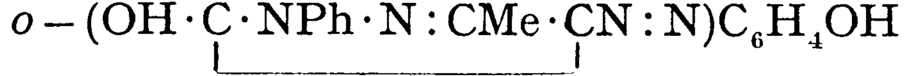
The solubility of glucose and maltose was determined in various aqueous mixtures of Me and Et alcohols in order to find the best medium for separating the sugars from dextrin. Corn syrup contains much of the sugars; the dextrin can be precipitated by means of 80-85 per cent. methyl alcohol at 40° C. C.

Proteins: Structure and Properties. H. Neurath. *Cold Spring Harbor Symposia on Quantitative Biology*, 1940, **8**, 80-93.

The structure and fundamental chemical and physical properties of proteins, and methods used for their investigation, are reviewed. C

Optically Active Chrome Lakes: Production. P. Pfeiffer and S. Saure. *Ber. deut. chem. Ges.*, 1941, **74B**, 935-941 (through *Chem. Abstr.*, 1941, **35**, 6936[6]).

The chrome lakes, $C_{26}H_{16}O_8N_4CrNa$ and $C_{34}H_{24}O_6N_8CrNa$, derived from the azo dyes $[2:5(OH)(NO_2)C_6H_3 \cdot C_6H_3N:CH]C_6H_4OH$ and



$$o-(OH \cdot \underline{C \cdot NPh \cdot N:CMe \cdot C}N:N)C_6H_4OH$$

have been resolved into optically active forms by fractional crystallisation of their free acids with the optically active forms of α-methylbenzylamine. The physical properties are recorded. C.

Optically-active Azo Dyes: Adsorption. A. Korolev and I. Bilik. *C. r. Acad. Sci. U.R.S.S.*, 1940, **29**, 586-588 (throngh *Chem. Abstr.*, 1941, **35**, 6795[5]).

Optically isomeric azo dyes were obtained by the following scheme: 2-acetamidotoluene→3-nitro-2-iodotoluene→6:6′-dinitro-2:2′-dimethyldiphenyl →6-amino-6′-nitro-2:2′-dimethyldiphenyl (*A*), followed by resolution of *A* by means of *d*-tartaric acid and coupling of the diazotised optical antipodes with the azo component of bis-(5-hydroxy-7-sulpho-2-naphthyl)-carbamide (*B*). The dyes showed no difference in rate of adsorption by silk, wool or vegetable fibre. They suffered mutarotation in solution and electrolytes affected the rate of mutarotation until a constant value of rotation was reached which persisted even when the dye was coagulated, separated and again dissolved. Other active dyes were prepared by coupling the diazonium salt of *A* with H- and J-acids, and by coupling diazotised *d*-aminomandelic acid with *B*. C.

Soap Solutions: Adsorption Isotherms. A. E. Alexander. *Nature*, 1941, **148**, 752.

The author discusses the validity of the Gibbs adsorption isotherm as applied to solutions of " paraffin chain salts " (soaps and the like) and recent attempts to explain the fact that these solutions often show a minimum in the surface tension/concentration curve at a surface tension of 30-35 dynes (i.e. much below the value for water) are considered. The views advanced by Powney and Addison (1937) involving the influence of micelle formation, are supported by the fact that the Gibbs equation holds for lauryl sulphonic acid salts when micelles are absent (see McBain and Wood, 1940). C.

Three-dimensional Polymers: Gelation and Molecular Size Distribution. P. J. Flory. *J. Amer. Chem. Soc.*, 1941, **63**, 3083-3090, 3091-3095, and 3096-3100.

(1) A diagrammatic scheme is presented for representing the structure of a three-dimensional polymer in a way which facilitates statistical analysis. The general condition for the formation of infinitely large molecules is expressed by $\alpha > 1/(f-1)$, where f is the functionality of the branch units and α is the probability of chain branching as opposed to chain termination. Methods are presented for calculating α from the number of branching units, the ratio of the two types of reactants (e.g. OH and COOH), and the extent of reaction. The analysis shows clearly that the number-average molecular weight need not be very large when the statistical conditions for incipient formation of infinitely large three-dimensional networks are fulfilled. Many smaller molecules are interspersed with the giant networks. Experimentally observed gel points in three-dimensional condensation polymerisations are compared with theoretical critical points for the formation of infinite networks. The discrepancies are no larger than may be attributed to the formation of some intramolecular linkages, which are not accounted for in the theoretical treatment. These results provide additional support for the hypothesis that gelation is the result of the formation of infinitely large molecules. The theory presented should be applicable also to certain inorganic gels. (2) The distribution of molecular species of various complexities in three-dimensional polymers in which the chain branching units are trifunctional is investigated by statistical methods. It is assumed that the polymer is formed through random linking together of bi- and tri-functional units. The results are somewhat in error because of the further assumption inherent in the method employed, that no intra-molecular reactions occur in molecular species of finite size. In a condensation polymerization of a large number of bifunctional units and a small number of trifunctional units, the average chain length increases as the reaction progresses. Although increasing quantities of complex species are formed as the reaction proceeds, simple single chains (containing no branch units) are always in abundance. Even at the critical point for the formation of infinite networks, i.e. at the gel point, one-fourth of the polymer by weight is composed of single chain species. At the gel point the number average molecular weight $\overline{M}_n$ is merely 1·5 times what it would have been if the trifunctional units had been replaced stoichiometrically with bifunctional units. The weight-average molecular weight, $\overline{M}_w$ rise rapidly as the gel point is approached. In contrast with $\overline{M}_n, \overline{M}_w$ reaches infinity at the critical point $\alpha = \frac{1}{2}$, although no infinite networks are present until α exceeds $\frac{1}{2}$ (α equals the probability of a branch at the end of a given chain). Since the viscosities of polymers depend on their weight-average molecular weights an explanation is provided for the observed increase in viscosity without limit as the gel point is approached. The simultaneous presence of sol (soluble polymer) and gel (insoluble polymer) after gelation, is shown by the statistical treatment to be the direct consequence of random distribution of branch units in the polymer. It is in no way dependent upon different chemical properties of the ingredients from which the sol and gel fractions are formed. Infinite networks (gel) make their appearance suddenly when α exceeds $\frac{1}{2}$. For greater values of α the weight fraction of sol is given by $(1-\alpha)^2/\alpha^2$. The weight fraction of gel can be calculated by difference. Highly-branched species are preferentially converted to gel as the reaction continues beyond the gel point. Consequently, the average complexity in the sol fraction decreases as the polymerization proceeds beyond gelation. (3) The distribution of species in three-dimensional polymers composed of randomly cross-linked chains of uniform length (tetrafunctionally-branched polymers) is studied. The results parallel those of the preceding paper for trifunctionally-branched polymers. Gelation occurs when the cross-link index γ (equal to the number of structional units which are cross-linked per chain) is equal to unity, and the number average molecular weight is twice that of the chains. The effect of non-uniformity in the lengths of the chains is discussed. When the chains are randomly distributed in length, $\gamma = \frac{1}{2}$ at the gel point. C.

Emulsions: Factors Determining Type. J. H. Hildebrand. *J. Phys. Chem.*, 1941, **45**, 1303-1305.

Factors influencing emulsion type are discussed and it is suggested that no single theory of emulsion type is sufficient to explain the effects observed. The direction of film curvature for minimum energy has probably been overemphasized at the expense of the more mechanical forces operating during the emulsification process. Films stabilized by monomolecular layers of soap are considered and it is shown that the rupture of a film separating two droplets can be resisted by a larger rise in interfacial tension at the threatened point if the reserve emulsifying agent is dissolved in the liquid forming the film, i.e. the external phase, owing to the lower rate of adsorption in that case. C.

Bound Water: Structure. K. C. Blanchard. *Cold Spring Harbor Symposia on Quantitative Biology*, 1940, **8**, 1-8.

Concepts of the structure of water are reviewed and the problem of bound water is studied. Methods for the determination of " bound " water are critically discussed. No method so far devised can yield precise information about the existence of bound water even in the presence of lyophilic substances. The various methods appear to be only means of indicating the presence of substances that interfere with the establishment of the ice-water equilibrium and thus enhance the under-cooling tendency of water. C.

Gelatin: Solvation. E. Heymann. *J. Phys. Chem.*, 1941, **45**, 1143-1151.

The hydration of gelatin has been determined from the minimum amount of water present in the gelatin which causes the volume contraction on swelling in water to be reduced to zero. It is thus defined as that part of the water in the gel which has a higher density than " free " water. The results of various methods for the determination of hydration are discussed. The discrepancies cannot be explained on the basis of the varying activity of the water in the systems concerned. The volume-change during the sol-gel transformation of gelatin in an alcohol-water mixture has been measured. A decrease in the volume is observed as in purely aqueous solutions. The complete isotherm of the apparent adsorption on gelatin in alcohol-water mixtures has been investigated at 0° and at 22° C. The results show that the solvation layer contains some alcohol besides water, the ratio of alcohol to water increasing with increasing temperature. C.

Powders: Particle Size Analysis. E. G. Richardson. *Nature*, 1941, **148**, 714-716.

A broad discussion is presented of the problem of particle size analysis and its importance in (1) the baking industry, (2) soil science, (3) painting, (4) spinning acetate rayon delustred with titania, and (5) the study of sand drifts and lake beds. C.

Cellulose Acetate Solutions: Viscosity and Concentration. M. Takei and H. Erbring. *Kolloid Z.*, 1941, **95**, 207-211 (through *Chem. Abstr.*, 1941, **35**, 6858^1).

The viscosities of solutions of cellulose acetate in dichloroacetic acid, aniline, acetic anhydride, ethyl lactate, methyl glycol acetate, and acetone have been used to compare the viscosity/concentration equations of (1) Arrhenius, Bredee and de Booys, and (2) Phillippoff and Hess. A slight modification of the latter equation fitted the experimental data. C.

Chlorophyll: Reversible Bleaching by Light. R. Livingston. *J. Phys. Chem.*, 1941, **45**, 1312-1320.

Investigations of the bleaching of methanol and acetone solutions of chlorophyll by light are described. Solutions free from air are reversibly bleached by light; the quantum yield of the bleaching is approximately 5×10^{-4}, and the regeneration of the bleached chlorophyll follows a second-order law, the smallest observed rate constant being 7×10^5 li. per mole per sec. Allylthiourea and similar easily oxidizable reducing agents have, at moderately low concentrations, little or no effect on the bleaching. These results are compared with the general theory of dye photochemistry recently suggested by Franck and Livingston. C.

Dyes in Rigid Media: Phosphorescent State. G. N. Lewis, D. Lipkin and T. T. Magel. *J. Amer. Chem. Soc.*, 1941, **63**, 3005-3018.

The peculiar state which is responsible for phosphorescence when a dye is illuminated in a homogeneous, rigid solvent is studied theoretically and experimentally. Most of the experiments were made with fluorescein in boric acid glass. Here, as in many similar phosphors, there are two emission bands (α and β) associated with two different processes by which the phosphorescent state may return to the normal state. These two processes are both uni-molecular. The rate of the β-process has been studied down to 20° K. Two possible interpretations are offered as to the nature of the phosphorescent state and of the β-process. The α-process obeys the Arrhenius equation and the heat of activation is 8 ± 1 k.cal., which agrees with the spectroscopic value of 9 k.cal. found for the difference in energy of the fluorescent and phosphorescent states. A full energy diagram of the several states is given. With intense illumination the phosphorescence approaches a maximum and a new absorption spectrum appears which belongs to the phosphorescent state. By slight extrapolation it has been possible to obtain the pure spectrum of that state. The results of experiments indicate that excitation by light does not cause appreciable turning of the dye molecule in its rigid environment. This accounts for the results of observations on the polarization of the phosphorescent light, and leads to a new kind of dichroism. From quantitative measurements of this dichroism it is possible to calculate the degree of orientation of the molecules in the phosphorescent and normal states. C.

Methylcellulose: Degradation by Ultra-violet Radiation. E. Steurer and H. W. Mertens. *Ber. deut. chem., Ges.*, 1941, **74**B, 790-798 (through *Chem. Abstr.*, 1941, **35**, 6573^7).

The discovery that methylcellulose suffers degradation of the type that can be followed by viscosity measurements when exposed to ultra-violet radiation in dioxane suggests a new method for studying the kinetics of degradation, provided that the effect is entirely due to the radiation. Dioxane, however, very readily forms a peroxide with atmospheric oxygen and the exposures have therefore been repeated, particular measures being taken to exclude oxygen. The degradation is a true photolysis, with photo-oxidation superimposed if oxygen has access. The reaction in the absence of oxygen has been applied to a test of the influence of poly-dispersion on viscosity. Iso-viscous solutions of different degrees of poly-dispersion were illuminated under comparable conditions and it was found that the initial degradation velocity was the greater the more highly poly-dispersed the preparation. The differences disappeared as the degradation proceeded. C.

Carcinogenic Hydrocarbons: Luminescence Analysis. A. V. Blagodatova. *Lab. Prakt.* (U.S.S.R.), 1941, **16**, No. 3, 1-2 (through *Chem. Abstr.*, 1941, **35**, 6276^2).

A method of photographing the fluorescence spectra of carcinogenic hydrocarbons is described and the principal bands displayed by 3:4-benzopyrene, 1:2:5:6-dibenzanthracene and methylcholanthrene in benzene, sunflower seed oil, dog blood serum and bile are reported. With a two-hour exposure characteristic bands were still displayed by benzopyrene at a dilution of 0·0001 mg. per mg. of benzene. C.

Phenol Blue: Absorption. L. G. S. Brooker and R. H. Sprague. *J. Amer. Chem. Soc.*, 1941, **63**, 3214-3215.

The un-ionized dye, phenol blue, gives solutions which vary in colour from reddish-violet in cyclohexane to deep blue in water. Values of λ_{max} are given for solutions in four solvents and it is pointed out that the absorption is shifted to progressively longer wave-lengths as the dielectric constant of the solvent is increased. An explanation of this effect is obtained from a consideration of two resonance configurations and the stabilizing effect of the dipole orientation of the solvent molecules, and a comparison of phenol blue with related ionized dyes. C.

Colour: Measurement. J. W. Perry. *Nature*, 1941, **148**, 691-692.

It is pointed out that the quantity defined by the resolutions of the Commission Internationale de l'Eclairage ($\chi_{C.I.E.}$) refers strictly to (*a*) a normal observer, and (*b*) normal observing conditions, including particularly (*c*) a field of direct observation of 2°. Many practical problems, however, demand a larger field size than that provided for by the C.I.E. system and attention is called to the need for a new colour quantity (χ_N) of a higher degree of precision rather than accuracy. C.

Plastics: Temperature Dependence of Young's Modulus and Internal Friction. J. S. Rinehart. *J. Appl. Physics*, 1941, **12**, 811-816.

The Young's modulus and specific energy loss of Lucite (an acrylate plastic) and Karolith (a white casein plastic) were measured at different frequencies in the neighbourhood of 50 kc/sec. as a function of temperature. The temperature range for Lucite was from −55° C. to 65° C., and for Karolith, 25° C. to 110° C. It was found that the reciprocal of Young's modulus/temperature curves showed positive curvatures at higher temperatures for both materials. At room temperature the Young's moduli of Lucite and Karolith were $4 \cdot 72$ and $6 \cdot 14 \times 10^{10}$ dynes/cm.^{2}, respectively. The specific loss was found to vary with frequency for both materials and varied in a linear fashion for Lucite at room temperature. Absorbed water seemed to have a pronounced effect on the Young's modulus of Karolith. The dependence of equivalent viscosity on temperature and frequency was also studied. C.

Calculating Machines: Principles. E. W. Crew. *Engineer*, 1941, **172**, 438-441.

A broad review is given of the development and principles of calculating machines from Napier's rods (1660) and the basic wheel mechanisms constructed by Pascal (1642) to the differential analyser. C.

Amylases: Starch Dextrinizing and Liquefying Activities. C. M. Hollenbeck and M. J. Blish. *Cereal Chemistry*, 1941, **18**, 754-771.

An account is given of a study of the dextrinizing and liquefying functions of amylases from three different sources (malted wheat, *Aspergillus oryzae*, and a bacterial preparation). Malt dextrinizing power was measured by a Wohlgemuth iodine method, α-dextrinizing activity by the method of Sandstedt, Kneen and Blish, and liquefying power by the viscometric procedure of Jozsa and Gore. The distinctive features of each of these methods are discussed. When extracts of the three enzyme preparations were adjusted to an equal basis in terms of α-dextrinizing power their liquefying activities also were found to be substantially the same. The two types of activity appear to be equally affected by heat and by changes in *p*H. Calcium ions seem to protect both functions equally against heat inactivation. This consistent parallelism of behaviour justifies the conclusion that both the liquefaction and the α-dextrinization of starch paste by amylases are attributable to the action of one enzyme, α-amylase. Amylases from different sources may show certain differences in properties. Thus the amylase of bacterial origin shows a higher optimum *p*H range and a greater resistance to heat than do the amylases of malted wheat and of *Aspergillus oryzae*. C.

Phenolic Germicides: Effect of Wetting Agents and Reaction. E. J. Ordal, J. L. Wilson and A. F. Borg. *J. Bacteriology*, 1941, **42**, 117-126 (through *Chem. Abstr.*, 1941, **35**, 7450^6).

The addition of wetting agents to buffered solutions of phenolic compounds enhances their germicidal power, the effect depending on the nature and concentration of the wetting agent (Na laurate, oleate and laurylsulphonate were used). The activity of phenol + buffer + wetting agent at a given *p*H is greater than that of phenol + buffer or wetting agent + buffer. The activity of the triple mixture decreases with rise of *p*H from 9 to 11 whereas the activity of buffer + wetting agent increases. A phenol is more toxic than the phenolate and is stimulated to a greater extent by the addition of a wetting agent. C.

Wheat and Wheat Products: Composition. R. G. Booth, R. H. Carter, C. R. Jones and T. Moran. *Chemistry and Industry*, 1941, **60**, 903-908.

Tables are given showing the proportions of the various parts of the pericarp and seed proper of the grain of wheat, the moisture, oil, protein, ash, fibre and carbohydrate contents of white flour, bran and germ, the compositions of the various constituents of wheat grain and of the whole wheat grain, the effects of manuring upon yield and nitrogen content of English wheat, and the inorganic constituents of wheat and flour. The data are discussed. Nutritional aspects are considered and the separations effected by milling, products of roller milling other than white flour, commercial wheatmeals, and the introduction of National Wheatmeal are discussed. C.

Starch: Determination by Malt Diastase Method. R. T. Balch and J. K. Phillips. *Ind. Eng. Chem., Anal. Edn.*, 1941, **13**, 815-818.

An account is given of a study of the effects of various pretreatments on the results of determinations of starch in sweet potatoes by the malt diastase method of the American Association of Official Agricultural Chemists. Possible explanations of the observed effects are discussed and evidence is advanced in support of the view that a considerable error in starch value arises with the malt diastase method when the usual procedure is followed and that pretreatment with calcium or barium hydroxide solution prevents, to a very large extent, the action of malt diastase on certain non-starchy constituents usually determined as starch. For accurate determination of starch in sweet potatoes such pretreatment is essential. C.

Amino Acid Carboxyl Groups: Gasometric Determination. D. D. Van Slyke, R. T. Dillon, D. A. MacFadyen and P. Hamilton. *J. Biol. Chem.*, 1941, **141**, 627-669.

An analytical method for free amino acids is described in which CO_2 from their carboxyl groups is evolved in a few minutes by reaction with ninhydrin, and is measured in the Van Slyke-Neill manometric apparatus. The same apparatus and technique serve for micro- and macro-analyses. The precision and rapidity of the method are such that it affords a convenient criterion of the analytical purity of isolated amino acids. Each of the known amino acids yielded by protein hydrolysis evolves, at properly chosen *p*H, 1 mole of CO_2, except aspartic acid and cystine which evolve 2. Glutamic acid, unlike aspartic, evolves CO_2 from only one carboxyl group. The reaction is specific for free amino acids, because it requires the presence, in the free unconjugated state, of both the carboxyl group, and of the NH_2 or (in proline and hydroxyproline) the NH (CH_2) group. Peptides as a class yield no CO_2, or only traces, in the analysis. An exception among peptides is glutathione, in which glutamic acid is so linked that the $-CH(NH_2).COOH$ group is free. Chloramine-T as a decarboxylating reagent gives results similar to those of ninhydrin, but less sharply quantitative. When combined with the nitrous acid method for amino nitrogen, the ninhydrin carboxyl method serves to estimate certain amino acids in mixtures with others. In mixtures of the diamino acids, the excess of NH_2 over COOH serves to measure the lysine plus hydroxylysine. In mixtures of aspartic acid with glutamic acid, alanine, etc., the excess of determinable COOH over the NH_2 or total nitrogen serves as a measure of the aspartic acid. In protein digests carboxyl determinations indicate the amounts of free amino acids formed. Crystalline trypsin has thus been shown to digest casein to peptides without liberation of free amino acids. C.

Free Amino Acids: Determination. D. D. van Slyke, D. A. MacFadyen and P. Hamilton. *J. Biol. Chem.*, 1941, **141**, 671-680.

A titration method is described for determining free amino acids by titration of the CO_2 evolved from their carboxyl groups during reaction with ninhydrin. The only special apparatus required consists of two 25 c.c. Erlenmeyer flasks connected by a U-tube. The reaction occurs in one flask; the CO_2 then passes *in vacuo* during 2 to 3 minutes into standard barium hydroxide in the other flask, where the excess hydroxide is titrated. The same apparatus serves for macro- and micro-analyses. For amounts of carboxyl carbon above 0·4 mg. the mean variability of results is of the order of ±0·3 per cent. of the amounts measured. Micro-analyses with samples down to 0·04 mg. of carboxyl carbon can be made with a mean error under 1 per cent. C.

Hydroxylysine: Determination in Proteins. D. D. van Slyke, Alma Hiller and D. A. MacFadyen. *J. Biol. Chem.*, 1941, **141**, 681-705.

Hydroxylysine in protein hydrolysates has been determined by precipitating it with the other diamino acids as phosphotungstate, and determining the ammonia evolved from the $\cdot CH(OH)\cdot CH(NH)_2$ group of the hydroxylysine when the diamino acids are treated with alkaline periodate. Under the conditions employed for the periodate-ammonia reaction with hydroxylysine, the other amino acids with the $\cdot CH(NH)_2\cdot CH(OH)$ group, viz., serine, threonine and β-hydroxyglutamic acid, also give quantitative yields of ammonia; no amino acid without this group has been found to yield ammonia. In the analysis of protein hydrolysates for hydroxylysine, the other ammonia-yielding amino acids are completely separated from the hydroxylysine by recrystallisation of the diamino acid phosphotungstates. In a series of 16 proteins analysed for hydroxylysine only six were found in which hydroxylysine contained over 0·1 per cent. of the total nitrogen, and in only gelatin and collagen did the amount approach 1 per cent. of the total protein nitrogen. C.

o-Phthalaldehyde Glycine Reagent: Preparation. W. M. Sandstrom and H. A. Lillevik. *Ind. Eng. Chem., Anal. Edn.,* 1941, **13**, 781.

Details are given of a method of preparing from *o*-xylene a solution of *o*-phthalaldehyde for use as a glycine reagent. A mixture of acetic anhydride, *o*-xylene and concentrated sulphuric acid is caused to react with a solution of chromium trioxide in a mixture of acetic anhydride and glacial acetic acid in an ice bath for a period of 4 or 5 hours. The mixture is then poured into a beaker containing cracked ice and left in an ice box over night. A yellow oily scum collects on the surface. The whole is extracted several times with ether, and the combined ether extracts are washed with water to remove the last traces of chromous compounds and dried over anhydrous sodium sulphate. The ether is removed and the residue, consisting of acetic acid plus phthalaldehyde tetra-acetate, is treated with 10 per cent. sulphuric acid and steam-distilled as long as the distillate gives a blue colour on adding a drop of ammonium hydroxide and acidifying with acetic acid. The glycine reagent obtained in this way should be stored in a dark bottle. It should be brought to a *p*H of 7·4 to 7·8 immediately before use. C.

Trichloroethylene: Determination. D. F. Kelly, Margaret O'Connor and J. Reilly. *Analyst,* 1941, **66**, 489-490.

Details are given of a method of analysis in which trichloroethylene is quantitatively hydrolysed by heating with caustic potash (25 per cent. w./v.) in a sealed Carius tube for 1 hour at 150° C., and the K chloride formed is determined by the Volhard method. The ratio by weight of K hydroxide to trichloroethylene should be 2 or 3 to 1, i.e. 8 to 12 ml. of the hydroxide solution to 1 gm. of trichloroethylene present. C.

Woburn Iodine Number Test: Application. J. D. von Mikusch and C. Frazier. *Ind. Eng. Chem., Anal. Edn.,* 1941, **13**, 782-789.

The iodine reagents now in use react incompletely with substances containing conjugated double bonds. Hanus solution, when used in large excess, measures the total unsaturation of dehydrated castor oil, but this procedure is unsuitable for other conjugated oils and fatty acids. By employing iodine bromide solutions of up to twice the concentration used in the Hanus method, a simple procedure is evolved for both conjugated and non-conjugated substances. Details of this procedure and of the method of preparing the Woburn iodine solution (0·32N iodine bromide solution in glacial acetic acid) are given, and results obtained with various unsaturated products are discussed. Fatty acids with conjugated double bonds, made by an isomerisation process from natural fatty acids, give low iodine values with the standard methods. With the proposed method, their iodine values are identical with those of the non-conjugated fatty acids from which they were made. With dehydrated castor oil, constant values result over a wide range of excess of reagent. With tung oil, a reproducible value of about 225 is obtained if temperature, excess and time of contact are kept within certain limits. The effect of changes in working conditions on the value for the total unsaturation of tung oil somewhat resembles the effect of similar changes in determination of the Wijs iodine value of this oil. Theoretical values are obtained with β-eleostearic acid, 9:11-linoleic acid, and blends of the latter with non-conjugated fatty acids, if proper conditions are used. Values for oiticica oil and for non-conjugated oils and acids are listed. C.

Cellulose Phthalates: Preparation and Properties. F. I. Korchemkin. *Mitt. Kirov. forsttech. Akad. (U.S.S.R.),* 1940, No. 59, 18-27 (through *Chem. Abstr.,* 1941, **35**, 7183[4]).

More particulars are given of work on the phthalation of cellulose and the properties of the esters and their copper salts. C.

Hydrocellulose Aldehyde Groups: Determination. A. R. Martin, L. Smith, R. L. Whistler and M. Harris. *J. Res. Natl. Bur. Stnds.*, 1941, **27**, 449-457, and *Amer. Dyes. Rept.*, 1941, **30**, 621-630, 638-639.

The aldehyde content of hydrocellulose may be readily determined by titration with iodine in alkaline solution. Investigation of the rate of oxidation of hydrocellulose by iodine at 0° C. and *p*H 10·6 showed that there is an initial rapid reaction in the first hour accompanied by a side reaction. The latter reaction continues after the rapid reaction has ceased and consumes iodine slowly at a constant rate. Purified cotton cellulose also shows an initial reaction with iodine and after 1 hour a side reaction of the same rate as the hydrocellulose. By applying a correction for the amount of iodine consumed in the side reactions, it is possible to estimate the iodine utilized in the oxidation of aldehyde groups. Since iodine utilized in this way should convert aldehyde to carboxyl groups, an independent check on the value obtained with iodine is readily obtained by estimation of the carboxyl groups thus formed by titration with silver *o*-nitrophenolate. On applying this check it is found that the iodine consumed in the first stage by cotton cellulose is not oxidising aldehyde groups. The extent of hydrolytic degradation as determined by the iodine method compares well with similar measurements by the viscosity method. C.

Lignin: Chlorination. E. V. White, J. N. Swartz, Q. P. Peniston, H. Schwartz, J. L. McCarthy and H. Hibbert. *Paper Trade J.*, 1941, **113**, *TAPPI*, 299-309.

Literature relating to the equilibrium and self-decomposition of aqueous solutions of chlorine is reviewed, and experimental data are presented indicating that the self-decomposition process can be treated as a second-order internal oxidation reaction. Treatment of isolated lignin with chlorine in aqueous solution results in about equivalent chlorination and demethoxylation and to a degree which increases with increase in the amount of chlorine added and also with the acidity of the reaction mixture. Literature is cited indicating that most, if not all, methoxyl groupings in lignin are probably attached to guaiacyl nuclei, and that the halogenation of such a nucleus should occur in either the 6- or the 5-position depending on whether the para-hydroxyl groupings of the nuclei are free. The experimental results are interpreted as indicating that guaiacyl nuclei in lignin are chlorinated in either the 5- or the 6-positions, that the presence of such chlorine atoms induces instability in the methoxyl groupings, and that the methoxyl groupings then cleave with formation of quinone or diketo structures which can further cleave to yield acidic groupings in the lignin. In additional experiments it is shown that the rate of chlorine consumption by lignosulphonic acid can be treated satisfactorily by assuming that the whole process involves two major reactions, an initial rapid one and a slow time-determining second order one. It is suggested that the slow reaction is essentially an oxidation type. The rapid initial reaction is shown to be one of chlorination and demethoxylation. Experiments are described, the results of which indicate that during aqueous acidic chlorination of unbleached pulp, little lignin is removed, although it is made potentially soluble in alkaline solution presumably as a result of formation of carboxyl groupings arising at points in the lignin from which methoxyl was cleaved. The removal of chlorinated lignin from pulp is shown to be largely a physical process in which such factors as temperature and time of treatment control the degree of solution of the lignin in the alkaline medium. C.

Sulphite Pulp Lignin Residues: Composition. L. L. Larson. *Paper Trade J*, 1941, **113**, *TAPPI*, 263-269.

Two spruce pulps were prepared and chlorinated with different percentages of chlorine and material, chlorine and sulphur balances were made in order to ascertain the distribution of chlorine and sulphur in the resulting products. The lignins were isolated from the pulps and from the liquors at various stages by different methods, and their chemical nature was studied. Sodium hydroxide extractions were also made at different temperatures to determine their effect on the chlorinated lignins. The results are discussed, and it is pointed out that the residual lignin in sulphite pulps is present as a sulphonated lignin (solid ligno-sulphonic acid) with an average sulphur content of 4·75 per cent. for

Klason and Willstätter lignin and 4·13 per cent. for methanol lignin. On chlorination of a normal sulphite pulp, lignin appears to be the only product removed; however, for a rawer pulp, a considerable amount of carbohydrate material is removed, and the greater the percentage of chlorine used the greater the quantity of carbohydrate material dissolved from the pulp. When chlorinated pulps are extracted with caustic alkali, lignin is again the chief product removed, but some carbohydrate material is dissolved. From 87 to 92 per cent. of the chlorine added in chlorination can be recovered in the chlorination waste liquor; from 56 to 66 per cent. of the total is found as hydrochloric acid. A part of the chlorine remaining in a chlorinated pulp is held loosely and is removed during the process of drying. The effects of the use of different proportions of chlorine and the effects of hot and of cold alkali extractions on bleachability are discussed. It is shown that chlorine is split from chlorinated lignins on treatment with caustic alkali and that chlorination of pulps splits methoxyl groups from the lignin. C.

Starch Acetates: Preparation. J. Seiberlich. *Rayon Textile Monthly,* 1941, **22**, 605-606, 686-687.

The preparation of starch acetates by the action of (1) acetic anhydride, (2) acetic anhydride in presence of sulphuric acid, (3) acetic anhydride in presence of catalysts, (4) glacial acetic acid, and (5) glacial acetic acid in presence of catalysts is discussed and results obtained by various investigators are reviewed. Two main classes of starch acetates are obtained: (1) starch acetates soluble in water (4-15 per cent. acetyl content), and (2) starch acetates soluble in organic solvents (40-44 per cent. acetyl content). The water soluble starch acetates may be used for sizing and stiffening paper and textiles. The starch acetates soluble in organic solvents compare favourably with cellulose acetates, have transparent film-forming properties and are suitable for the production of coatings and films. C.

Gums: Precipitation with Papain. G. E. Ewe. *J. Amer. Pharm. Assoc.,* 1941, **30**, 19; *Quart. J. Pharm.,* 1941, **14**, 288 (through *Analyst,* 1941, **66**, 501).

An acid solution of papain gives a precipitate with mucilages of Irish moss, Karaya gum, quince seeds and sodium alginate, but not with those of acacia and tragacanth or with gelatin. The precipitates differ in appearance. The amount of flocculation from Irish moss mucilage is reduced by the presence of certain salts, notably potassium tartrate. The precipitation does not appear to be due to enzymic action. C.

Fats and Oils: Molecular Distillation. N. D. Embree. *Chemical Reviews,* 1941, **29**, 317-332.

Apparatus for molecular distillation is briefly described and the amount of separation to be expected is discussed. Step-wise or analytical distillation methods are explained and results obtained in distillations of animal and vegetable oils are reviewed. The available data for vegetable oils show that molecular distillation will remove the free fatty acids and unsaponifiable constituents with considerable efficiency. The present types of molecular stills will be of little value for the separation of the triglycerides of vegetable oils. Brief mention is made of results obtained in the molecular distillation of heat-bodied oils. The bibliography has 50 entries. C.

Fats and Oils: Rancidity. H. S. Olcott and H. A. Mattill. *Chemical Reviews,* 1941, **29**, 257-268.

A review of the results of investigations of the effects of various inhibitols, phospholipids, carotenoids, gossypol, sesamol, chlorophyll, water and miscellaneous natural constituents of fats and oils on their stability. The bibliography has 80 entries. C.

Fatty Acids and Glycerides: Low-temperature Crystallization. J. B. Brown. *Chemical Reviews,* 1941, **29**, 333-354.

A review of work on the application of low-temperature crystallization to the isolation and determination of fatty acids, the isolation of naturally occurring glycerides by the fractional crystallization of fats, and the separation of fats into crude fractions, preliminary to further chemical study. Special attention is given to recent applications to fatty acid chemistry, and approximate calculated solubilities of fatty acids at low temperatures are tabulated. The bibliography has 118 entries. C.

Glycerides: Composition and Structural Characteristics. H. E. Longenecker. *Chemical Reviews*, 1941, **29**, 201-224.

A review of available knowledge of the composition of the component fatty acids of fats of aquatic origin, fats of land animals and vegetable fats, and of the structure of the glycerides of natural fats. The bibliography has 273 entries. C.

Glycerides: Synthesis. B. F. Daubert and C. G. King. *Chemical Reviews*, 1941, **29**, 269-285.

An account is given of early work on mixed triglycerides, the development of reliable methods of synthesis, the preparation of monoglycerides of the β-type and of unsymmetrical diglycerides, and recent physicochimical studies of isomeric glycerides. The bibliography has 101 entries. C.

Triglyceride Fats: Polymorphic Phases. R. H. Ferguson and E. S. Lutton. *Chemical Reviews*, 1941, **29**, 355-384.

A survey is made of the present state of knowledge concerning the polymorphic forms or phases of triglyceride fats, the subject being treated under the following main headings: the meaning of the melting points of fats, the development of the concept of polymorphic forms in fats, the polymorphic forms of simple triglycerides, the phases of mixed triglycerides, and multicomponent systems of triglycerides. The bibliography has 51 entries. C.

Rubber Derivatives: Preparation, Properties and Uses. F. A. Jones. *Trans. Inst. Rubber Ind.*, 1941, **17**, 133-138.

The preparation, properties and uses of derivatives obtained by the reaction of rubber with fluorine, hydrofluoric acid, benzyl chloride, boron fluoride and formaldehyde, aromatic amines, peracetic acid, thiocyanogen, thioglycollic acid, and maleic anhydride, and of rubber hypochlorites and azo dyes from rubber are briefly described. Patent numbers and literature references are given. C.

Fatty Acid, Alcohol and Ester Surface Films: Properties. W. D. Harkins. *Chemical Reviews*, 1941, **29**, 385-417.

The Rayleigh, Langmuir and Harkins theories of the spreading of oil on water are discussed and the spreading of benzene, carbon disulphide and a paraffin oil of very high molecular weight are considered. The transformation of a duplex film into a monolayer and a lens, phase relations of monolayers, the nature of the films formed by esters and methyl ketones, and condensed liquid films of acids, alcohols and esters are studied. Tables are given showing the compressibilities of certain acid, alcohol and ester monolayers in different states, the thermodynamics of spreading and extension of films are explained, and energy magnitudes associated with the spreading or extension of monolayers are discussed. C.

Gelatin: Moisture Relations. W. G. Eversole and F. Fordemwalt. *Proc. Iowa Acad. Sci.*, 1940, **47**, 189 (through *Chem. Abstr.*, 1941, **35**, 7264^7).

The sorption of moisture by untreated isoelectric gelatin, and gelatin treated with thallous thiocyanate and with thallous sulphate has been studied by means of a quartz spring balance at 25° C. over the range of 0 to 100 per cent. R.H. Equilibrium was much more quickly reached after pumping the air from the system. C.

Cellulose Acetate and Polyvinyl Acetate Solutions: Stratification. Z. A. Rogovin and L. A. Tsaplina. *Colloid J. (U.S.S.R.)*, 1940, **6**, 449-457 (through *Chem. Abstr.*, 1941, **35**, 7183^1).

Layer formation due to coacervation on mixing solutions of cellulose acetate and polyvinyl acetate is displayed at concentrations above certain minimum values that depend upon the chain length of the cellulose acetate. With equal amounts of the two components the phenomenon occurs at a minimum concentration of 5 per cent. when $\eta_{sp.}$ for the cellulose acetate is 0·35 (in 0·25 per cent. acetone solution) and at 3 per cent. when $\eta_{sp.}$ is 0·55. The layer was formed more quickly and intensively when more polyvinyl acetate was added.

The longer the cellulose acetate chains or the higher the degree of polymerisation of the polyvinyl acetate, the smaller is the amount of the latter required to cause stratification. The effect was observed in acetone and other solvents; the top layer contained mostly polyvinyl acetate and the bottom layer mostly cellulose acetate. In acetic acid solution separation occurred at 20° C. but not at 70° C. C.

Vinyl Acetate Polymers: Fractionation and Size Distribution. R. A. Blease and R. F. Tuckett. *Trans. Faraday Soc.*, 1941, **37**, 571-580.

Commercial polyvinyl acetates of three different average chain lengths have been fractionated from acetone solution by precipitation with a mixture of methyl alcohol and water. The fractionation data are in fair agreement with Schulz's theory of the solubility of high molecular weight substances. From the size distribution data obtained in this way combined with the Melville-Gee theory of the kinetics of polymerisation, the conclusion is drawn that the growing chains are most probably terminated by mutual collision, in agreement with the purely kinetic data. C.

Ball and Bucket Viscometer. Dobbie McInnes Ltd. *Engineering*, 1942, **153**, 6-7, 10.

A detailed description is given of the Dobbie-McInnes ball and bucket viscometer with mechanical clock and thermostatically controlled heater. The body of the instrument consists of a cylindrical block of metal of good conductivity in which are bored three holes, viz., the ball and bucket chamber, a thermometer pocket, and a heating element and thermostat chamber. The ball is screwed on the end of a tube and maintained in a fixed position. The bucket containing the liquid to be tested is supported on a table which at the beginning of the experiment is adjusted so that the ball is completely submerged and in contact with the bottom of the bucket. When the table is lowered the bucket falls at a rate determined by the viscosity of the liquid which passes into an upper section of enlarged bore through the narrow annular space between the bucket and the ball. The clock is started by hand when the table is lowered and is stopped automatically by the movement of the bucket when the latter falls clear of the ball. The time is recorded in seconds and is then multiplied by a constant engraved on the ball to give the viscosity in centipoises. The heating elements are of the electric coil type and the liquid is heated by conduction through the ball and tube and the bucket and table. Advantages of this instrument are pointed out. C.

U-Tube Viscometer with Side Filling Bulb. W. C. G. Wheeler. *J. Soc. Chem. Ind.*, 1941, **60**, 300.

The necessity for introducing an exact volume of liquid and other disadvantages of the standard U-tube viscometer are pointed out and a diagram is given of an improved form having a side bulb in the lower part of the arm not containing the capillary. The instrument is filled by pouring the liquid down the side of the tube to avoid air bubbles. It is then tilted to enable the liquid to be drawn above the upper graduation mark, where it is held. Precautions to be observed are that the liquid is overflowing when it passes the first graduation mark, and that the side bulb is not full when flow ceases. Careful comparisons with a standard U-tube on mineral oils of different viscosities have shown that the calibration of the instrument does not vary with time of flow or temperature. C.

Cellulose Solutions: Viscosity and Molecular Weight. *Silk J. Rayon World*, 1941, **18**, No. 210, 18-19.

By a combination of the equations of Kraemer and Lansing and Farrow and Neale an equation showing the relation between the logarithm of the viscosity and the degree of polymerisation of cellulose in cuprammonium solution is obtained. Curves for 0·5 per cent., 1·0 per cent. and 2·0 per cent. solutions are given. A fluidity/degree of polymerisation curve is also given for a 0·5 per cent. solution and it is pointed out that fluidity is a poor index of degree of polymerisation as the relation between the two quantities is far from linear. C.

Soft Materials: Dissipation Coefficient; Psycho-physical Significance. G. W. S. Blair and F. M. V. Coppen. *Nature,* 1942, **149**, 22-23.

In order to establish the psycho-physical significance of the dissipation coefficient (k) of soft materials, pairs of cylinders were given to groups of ten subjects who, squeezing the cylinders under controlled conditions, were asked to decide which was the firmer of each pair. A standard bitumen was compared with a series of rubbers of varying shear moduli. A series of fluid bitumens was compared with an unvulcanized rubber and a synthetic rubber-clay-vaseline mixture. The results are discussed and it is shown that, from subjective comparisons of the firmness of a material with that of a true fluid, it is possible to derive the dissipation coefficient, although no conscious judgment of this property is given by the subjects. This is a strong point in favour of the use of the Nutting type of equation, especially where subjective judgments are of industrial importance. C.

Starch Degradation Products: Viscosity. E. Komm and U. Martin. *Vorratspflege u. Lebensmittelforschung,* 1939, **2**, 635-661 (through *Chem. Zentr.,* 1940, i. 1117, and *Chem. Abstr.,* 1941, **35**, 7227[8]).

The structure viscosity of potato starch products (Hoppler viscometer) and its variation with time are employed in the characterisation of farina for dextrin manufacture. Properties of dextrins obtained by roasting under different conditions are recorded in the original paper. C.

Photographic Exposure: Computation. *J. Optical Soc. America,* 1941, **31**, 651-678.

The maximum and minimum brightness of 126 exterior scenes of a wide variety of types has been measured. From the data it is found that the average brightness scale (ratio of maximum to minimum brightness) is 160. Photographs of each of these scenes have been made under precisely controlled exposure and processing conditions. A camera-lens assembly in which a relatively small amount of non-image-forming light (flare light) was incident on the negative material was used in making these negatives. From measurements made on these negatives and from sensitometric characteristics of the negative materials used it is found that the average value of image illumination scale is 68 and the average value of the flare factor is 2·4. For the average type of small portable hand camera used by amateurs, the average value of the flare factor is approximately 4·0 and the average value of the image illumination scale is 40. Exterior scenes can be classified by inspection into a relatively few groups which are quite homogeneous with respect to brightness characteristics, especially with respect to minimum brightness. This classification is based on a consideration of general illumination conditions, directional viewing aspect, spatial distribution of scene elements, and local illumination conditions within the scene. A formula for the computation of correct exposure time based upon the minimum brightness of the scene has been derived. Exposure times computed by this formula agree well with those found by long experience to give satisfactory results. Three possible methods for the setting up of useful series of calculator numbers are discussed. Measurements made with a photographic exposure meter of the integrating type on each of the scenes studied show that the ratio of the integrated brightness value thus obtained to the minimum or to the maximum brightness value varies enormously from scene to scene. For the particular integrating exposure meter used the average ratio of the integrated value to the minimum brightness was found to be 44. This permits the determination of a meter constant by means of which the statistically correct exposure can be predicted by using the exposure time formula. C.

Fatty Acids: Ultra-violet Absorption Spectra. G. O. Burr and E. S. Miller. *Chemical Reviews,* 1941, **29**, 419-438.

The ultra-violet absorption spectra of fatty acids are discussed and absorption curves for various fatty acids, fatty acid esters, oils, etc., are given. Examples of the application of spectroscopic methods for the determination of various acids in oils, and in studies of structure and of chemical reactions and changes during processing of products such as butter and oils are briefly described. C.

Linseed Oil: Ultra-violet Absorption Spectra. J. H. Mitchell, Jr., and H. R. Kraybill. *Ind. Eng. Chem., Anal. Edn.*, 1941, **13**, 765-768.

The ultra-violet absorption curves for two series of linseed oils, one heat-bodied at 585° F. and the other blown at 220° F., are presented and discussed. A distinguishing characteristic is the development, in the blown series, of an absorption band with a maximum between 2600 and 2700A. The specific absorption coefficient of this band increases with the viscosity, on blowing with air until a viscosity of about 4·5 poises is attained. After this stage of the process, continued blowing causes practically no change in the specific absorption coefficient at 2700A., although the viscosity continues to increase. Another absorption band with a maximum at 2320A. develops in the blown series. The specific absorption coefficient of this band continues to increase with the viscosity. The development in the heat-bodied series of a strong absorption band with a maximum at 2320A., attributed to the formation of conjugated octadecadienates, takes places with relatively little change in the viscosity. On further heating the specific absorption coefficient of this band decreases gradually as the viscosity increases. The presence of an absorption band at 2600 to 2700A. may be used to distinguish between linseed oil polymerised *in vacuo* and oxidised linseed oil in mixtures with raw linseed oil. By use of the specific absorption coefficient at 2320A., quantitative analyses of oxidised or heat-bodied linseed oil, ranging from 5 to 50 per cent., in mixtures with raw linseed oil have been made with an average percentage error of $\pm 2\cdot 12$. The physical constants for each of the samples are given. The acid number, specific gravity, and refractive index increase with the viscosity in each case, whilst the iodine number decreases. C.

Sheet Materials: Reflection-Transmission Relationships. H. F. Launer. *J. Res. Natl. Bur. Stnds.*, 1941, **27**, 429-442.

Reflectances of transmissive sheets, calculated from the transmissions of one and two sheets, are compared with reflections obtained by using the General Electric Recording Spectrophotometer. The expression used as a basis for calculation, $R_a = \sqrt{1-(T_a^2/T_{2a})}$, in which R_a is the reflectance, and T_a and T_{2a} are the transmissions of one and two sheets, respectively, of a, was derived by considering the infinite series of reflections undergone by light, or radiant energy in general in passing through the two sheets. The expression was found to be valid and useful over a wide range of reflectances and wave-lengths, for materials such as paper, glass, and an organic plastic. When transmission values for diffuse incidence are substituted into the expression, the reflectances thus calculated correspond to the conditions of diffuse incidence and diffuse viewing, and as such are somewhat higher than the usual directly measured reflectances for normal incidence and diffuse viewing (or diffuse incidence and normal viewing). For clear sheets with normal incidence, specular reflectance may be calculated. The method thus affords a means of determining from two simple measurements, the specular-plus-diffuse reflectance of transmissive sheets for diffused light or radiant energy in general. The expression as derived is theoretically inapplicable to diffusing sheets for light of normal incidence, but a compensation of errors allows close agreement over the visible range, at 365 mμ, and for " white " light, for all except tissue paper and other materials of like transmissivity. For diffuse incidence at 365, and to a certain extent, at 405 mμ, some papers show deviations from the simple theory because of fluorescence effects. This and other effects are discussed. Reflectances in the infra-red region near 850 mμ are also calculated but no standard for comparison is available for these values. Transmissions of papers were found to be dependent upon the angle of incidence. Reflectances throughout the visible region, measured at 45° from normal incidence were found to agree closely, for the type of papers studied, with those obtained using the General Electrical Recording Spectrophotometer which corresponds to the conditions of normal incidence and diffuse viewing. C.

Starch Grains: Optical Properties. A. Frey-Wyssling. *Ber. schweiz. botan. Ges.*, 1940, **50**, 321-336 (through *Chem. Abstr.*, 1941, **35**, 7227[6]).

The double refraction of starch grains approaching spherical forms is given by $n_e - n_o = \mathrm{F}_{max}/1\cdot 122r$, where n_e and n_o are the indices of refraction for the extraordinary and ordinary rays, respectively, and Γ_{max} is the path difference in that quadrant of the grain in which the distance, *r*, of the hilum from the surface is a minimum. The value for potato starch (0·015 to 0·016) is much greater than that given by other methods. The double refraction can be altered by mechanical means, which suggests that the grain does not possess a lattice of compact crystalline strands but a brittle molecular lattice that can easily be destroyed. C.

Combination of Proteins with Acids: Participation of Anions. J. Steinhardt. *Ann. N.Y. Acad. Sci.*, 1941, **41**, 287-320 (through *Chem. Abs.*, 1941, **35**, 6856).

Measurements are given of the combination of wool protein with 19 acids. The wide differences existing between the positions with respect to the *p*H axis of the titration curves of wool obtained with different strong acids are ascribed to wide variations in the anion dissociation constants characterising the corresponding protein-anion combinations. Equations previously derived to account for effects caused by variations in Cl concentration (see this *J.*, 1940, A 291) are adapted for use in calculating these dissociation constants. A scale of relative affinities of anions for wool, based on these constants, and applicable to acid dyes, is proposed. Predictions as to the effects of variations of anion concentration and of temperature are confirmed experimentally. Measurements of the combination of a number of the same acids with a soluble protein, crystalline egg albumin, are also given. Qualitative similar differences in the positions, with respect to the *p*H axis, of the titration curves obtained with different acids are found with both proteins. It is concluded that the property of combining with anions is not restricted to insoluble proteins. The affinity of anions for proteins of both classes appears to increase with the dimensions of the anion, and is higher in aromatic than in aliphatic ions of the same size. W.

Wool Fat, Sterols and Emulsifiers. H. Janistyn. *Fette u. Seifen*, 1940, **47**, 351-355 (through *Chem. Abs.*, 1941, **35**, 6348).

The active emulsifiers of lanolin and lanolin alcohols, which have been described as "hydroxycholesterol" and "metacholesterol," are mixtures of sterols and only partly precipitated by digitonin. The active principle of these mixtures is cholesterol and its emulsifying power is somewhat enhanced by the presence of fatty alcohols in the unsaponified portion of wool fat. Since cholesterol blown with oxygen showed increased emulsifying power, various sterols were tested. Lanolin alcohols were obtained by cold esterification of lanolin with sodium ethylate in ether. The ether-soluble portion contained about 33 per cent. cholesterol. Attempts to separate cholesterol from the alcohols by means of solvents gave unsatisfactory results. Pyridine was an excellent solvent for cholesterol. Separation through the benzoate of cholesterol was unsuccessful. When the fractions rich in cholesterol were blown with oxygen, the products were not superior to cholesterol. Pure *iso*cholesterol was difficulty soluble in petrolatum, and had no emulsifying properties. Lanolin alcohols from which pure *iso*cholesterol was removed increased in emulsifying power. The emulsifying action of hexadecanol was superior to hexacosanol. β-Cholestanol was slightly inferior to cholesterol. Pure cholestandiol had poor emusifying power even when mixed with cholesterol. α-Hydroxycholesterol, β-hydroxycholesterol and cholestandolon had good emulsifying properties. Lanolin and cholesterol when oxidised with perbenzoic acid in chloroform at room temperature gave products no better than the original lanolin. Cholestantriol had no emulsifying properties. Of the zo-osterols coprosterol was as good as dihydrocholesterol with which it is isomeric. The fungus sterols were difficultly soluble in petrolatum and gave no practical results. In general sterols precipitated by digitonin had emulsifying properties. W.

Blowflies: Physiology and Toxicology. VIII-IX. F. G. Lennox. *Australia: Council for Sci. & Ind. Res.*, Pamphlet No. 109, 1941.

A study of the distribution of ammonia in the body of the larva of *Lucilia cuprina*, the rate of and the enzymes responsible for its production. W.

Cobalt Manuring and Pining in Stock. R. L. Mitchell, R. O. Scott, A. B. Stewart and J. Stewart. *Nature*, 1941, **148**, 725-726.

Spectrographic examination of the herbage grown on cobalt-treated soil has shown, in some cases, a marked increase in the molybdenum intake, data being given for two soils. With some soils there may be a molybdenum excess effect on stock, and the addition of cobalt to such soils as a remedial measure may have deleterious results. Work is continuing on the inter-relationships of cobalt, molybdenum and other trace constituents which appear to enter into the nutritional balance of the plant and the animal. W.

Selection of Pyrometer Equipment. A. J. T. Eyles. *Mech. World*, 1941, **110**, 189.

A paper dealing with the characteristics of available types of pyrometer and their assessment for practical purposes. The types considered are resistance, thermo-couple, radiation, optical and photo-electric pyrometers. Stress is laid on the importance of position and size of the sensitive element especially when a controlling operation is included. La.

The Reynold's Number. J. Jennings. *Mechanical World*, 1941, **110**, 171, 202.

The derivation and use of the Reynold's number is considered from an engining aspect and an attempt to give a physical explanation is made in terms of inertia and viscous forces. Examples of the calculation of a Reynold's number are given and the questions of boundary layers, laminar and turbulent flow are considered. La.

PATENT

Fats, Oils, etc.: Inhibiting Oxidation. T. Sabalitschka and E. Böhn. G.P. 700,385 of 21/11/1940 (through *Chem. Abs.*, 1941, 35, 7223).

Compounds of the type $R_1COOR_2N{<}^{R_3}_{R_4}$ are added as anti-oxidants. R_1 = either hydrogen, alkyl, alkylene or aryl which, especially the aryl, may be substituted by a hydroxyl, oxalkyl, alkyl or amine: R_2 = alkylene containing <4 carbon atoms and R_3 = an alkyl containing <4 carbon atoms and R_4 = H or an alkyl containing <3 carbon atoms. W.

10—ECONOMICS

Textile Wholesale Price Index Numbers, November, 1941. *Board Trade J.*, 1941, **147**, 367.

The monthly Index numbers for November, 1940, to November, 1941, are tabulated; the latest figures include Cotton 142·1, Wool 171·7, Other textiles 127·9, " All articles " 155·2. C.

Cotton Supply and Price Statistics. J. A. Todd. *Textile Manufacturer*, 1941, **67**, 401-402.

Tables are given showing the supply and distribution and monthly consumption of all cottons in the United States, government controlled stocks in the United States, and cotton prices in New York and Bombay, and the American cotton situation, the situation in India, and South American reports are discussed. An improvement in supply in this country is noted and it is pointed out that most of the cotton at present reaching this country is being shipped from the United States under Lend-Lease terms. The November estimate of the American crop was 11,020,000 bales, indicating an average yield per acre of 233·3 lb. The supply in the United States is governed entirely by the amount of " free " cotton available and the present " free " supply should be fully ample for domestic requirements. The Government-owned stock on August 1 last was approximately 6,100,000 bales of which approximately 950,000 bales have been earmarked for shipment to this country under Lend-Lease provisions. A further 1,500,000 bales have been made available for export to approved countries and Canada is expected to purchase between 200,000 and 250,000 bales. In India, excessive heat, mainly in the Oomra and Broach districts, is believed to have reduced the harvest prospect to between 5,500,000 and 5,570,000 bales. Consumption by the domestic mills this season should take about 3,600,000 bales, leaving about 2,000,000 bales for export. Without a restoration of the Japanese and Chinese markets, however, it is improbable that the full season's export will be more than 500,000 bales. The acreage sown to cotton in Argentina this autumn is estimated at 919,496 acres, as against 831,773 acres last season. The 1941-42 Peruvian cotton acreage is slightly smaller than last season's area. Acreage under cotton in South Brazil is reported to be larger than in any previous season and sufficient to produce a crop of about 2,000,000 running bales. It is feared that Canada will now buy American cotton in preference to Brazilian and that the end-of-season surplus in Brazil will be somewhat larger than the 200,000 bales previously anticipated. Japan and China are important markets for Brazilian cotton. C.

Utility Cloths and Garments. *Textile Manufacturer,* 1941, **67**, 418.

Details are given of maximum margins and prices fixed by the order of November 6, 1941, for certain kinds of women's and maids' dresses and blouses of general utility made of utility cloths, and of revisions and deletions in Cloth and Apparel Order No. 4 relating to utility wool, cotton, rayon, knitted and corset cloths, and various types of utility hosiery garments. C.

11—INDUSTRIAL WELFARE, INDUSTRIAL PSYCHOLOGY, AND EDUCATION

Indian Central Textile Research Laboratory: Plea for Establishment. J. V. Saraiya. *Indian Text. J.*, 1941, **52**, 32.

The writer points out that, as a result of the war, the Indian textile industry has gained from the placing of large Government orders and the cutting off of Japanese competition in home and other markets, and suggests that some of the profits should be devoted to the establishment of a Central Textile Research Laboratory for the development of methods of increasing the technical efficiency of the mill industry and making it independent of foreign imports, such as machinery, spare parts, bleaching materials, dyes, etc., so as to ensure its survival in the post-war period. The work of the Matunga Technological Laboratory run by the Indian Central Cotton Committee does not extend to the production of machinery, dyes, etc. In Bombay Presidency, which in 1939 had 6,016,297 spindles and 73,705 looms against 10,059,370 spindles and 202,469 looms in the whole of India, there are only two important institutions that give special training in textile subjects and carry out research connected with the industry. Accommodation in these institutions is limited and there is great demand for the trained men. There is at present great scope in India for starting the feeder lines of the industry such as the manufacture of dyes, bleaching agents, machinery, etc., but private enterprise is discouraged by the lack of institutions to carry out preliminary research work. C.

United States Southern Regional Research Laboratory: Activities. W. M. Scott. *Amer. Dyes. Rept.*, 1941, **30**, 604-606, 619.

An account is given of the proposed organisation of research in the Cotton Chemical Finishing Division of the Southern Regional Research Laboratory established at New Orleans by the U.S. Department of Agriculture. Some of the properties of cotton that will receive attention are listed and mention is made of the fields in which each property is particularly important. The chemical finishing research is being organised in two sections: (1) an additive finishing section for the study of treatments depending on the addition of chemical compounds to the cotton, and (2) a modified finishing section for the study of treatments in which the surface characteristics of the cotton are altered by the action of chemical agents. Consideration will be given to the effects of the various compounds and agents on cotton properties, and to the development of new compounds and agents and new methods of application. A list is given of some of the items of textile testing equipment which will be used for the evaluation of finishing treatments. The Laboratory is being equipped to demonstrate on a pilot-plant scale the commercial practicability of each successful laboratory development. Practical trials on a full commercial scale will be carried out by manufacturers and finishers who have indicated their willingness to co-operate. It is planned to use every suitable means to acquaint consumers with the merits of new developments in cotton textiles and to this end a co-operative agreement has been effected with the U.S. Bureau of Home Economics. C

Felt Hat Industry: Elimination of Mercury Hazard. G. D. Beal, R. R. McGregor and A. W. Harvey. *Ind. Eng. Chem. News Edn.*, 1941, **19**, 1239-1244.

A short description is given of the manufacture of fur felt hats. The use of mercury is a danger to health from the carrotting of the skin to the finishing processes. Tables are given showing the amounts of mercury in hats and in the air at various stages of manufacture and in processing liquors from various operations, with a comparison of the mercury content of the processing bath and the prevailing atmospheric mercury concentration. Tabulated results are also given of the U.S. Public Health Service's medical examinations in various occupations in hat factories. A survey is made of the development of non-mercurial carrotting processes, the great majority of these being based on simultaneous oxidation and hydrolysis of the fur substance. With the use of chloric acid and hydrogen peroxide, hazards are purely mechanical. Both these may be used with synthetic fibres and wool in all proportions. W.