BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

APRIL 24 and MAY 1, 1936.*

I.—GENERAL ; PLANT ; MACHINERY.

Heat transmission in rotary kilns. XII. W. Gilbert (Cement, 1936, **9**, 1—12, 27—32).—The effect of lump size in the decomp. zone is discussed. The use of independent slurry dryers with a kiln of reduced length is considered to be more efficient than the use of a long (400—500-ft.) kiln. T. W. P.

Volkonskoite as a hydrogen zeolite. F. E. Prochorov and A. P. Mamet (Izvest. Teplotech. Inst., 1935, No. 1, 40—47).—The mineral (Cr Mg silicate with 30% Cr_2O_3) disintegrates when dried at 100—150° and serves as a zeolite for boiler-feed H_2O. It is regenerated by approx. 10 times the calc. amount of NaCl. Ch. Abs. (*p*)

East Lansing (Michigan) [water-]softening and iron-removal plant. C. R. Erickson (Mich. State Coll. Eng. Exp. Sta. Bull., 1935, No. 61, 26—30).—The system includes a softening (greensand) and an Fe-removing zeolite, prepared by treating greensand with $MnCl_2$ and oxidising with $KMnO_4$. The zeolite–MnO,Mn_2O_7 complex lowers the [Fe] of H_2O from 1·0 to 0·1 p.p.m. Ch. Abs. (*p*)

Determination of pore diameter, pore number, and permeability of earthenware filters. H. Ruoss (Kolloid-Z., 1936, **74**, 221—224).—A method based on the measurement of rate of flow in conjunction with that of the pore vol. is described. F. L. U.

Emulsification. M. H. Fischer (Oil & Soap, 1936, **13**, 30—33).—The author's theory of emulsification (cf. " Soaps and Proteins," 1921 ; " Lyophilic Colloids," 1933), which postulates the presence of a lyophilic (solvated) colloid as the essential condition for the stability of an emulsion, is expounded. E. L.

Use and significance of aërodynamic processes in technique of measurement of very small particles. H. W. Gonell (Braunkohle, 1935, **34**, 118—122 ; Chem. Zentr., 1935, i, 3021).—Applications to dust pptn. and to the use of pulverised fuel are discussed, especially with reference to the avoidance of turbulent flow. J. S. A.

Heat insulation in paper industry.—See V.

See also A., Mar., 306, **Falling-sphere viscosimeter.**

Patents.

Heat-treatment of substances in rotary tube furnaces. C. P. Debuch and E. Markworth, Assrs. to Amer. Lurgi Corp. (U.S.P. 2,005,648, 18.6.35. Appl., 9.3.34. Ger., 27.3.33).—A rotary cylindrical kiln is operated at a uniform temp. over as great a length as is desired by the provision of tubular heat exchangers through which a cool gas is blown in the normally hotter parts. B. M. V.

Incinerator furnace. J. E. Greenawalt (U.S.P. 2,005,082, 18.6.35. Appl., 17.6.31).—A chain-grate or conveyor with pallets is provided with a combustion chamber above and with ignition means and a wind box below, together with means for dumping clinker at the end sprocket. B. M. V.

Cooling of furnaces by means of cooling chambers. G. Dörrenhaus and S. Walter, Assrs. to Verein. Stahlwerke A.-G. (U.S.P. 2,006,266, 25.6.35. Appl., 9.6.34. Ger., 23.6.33).—To prevent sludge formation in cooling chambers of blast furnaces and the like the H_2O is supplied in mist form, preferably produced by air at 0·1—0·2 atm. gauge pressure. B. M. V.

Drying apparatus. A. W. Ferre, Assr. to B. F. Sturtevant Co., Inc. (U.S.P. 2,005,580, 18.6.35. Appl., 7.9.34).—Apparatus for the drying by air of strip material the vapour from which may be explosive is provided with material inlets and outlets in the form of twin Venturi throats, air under slight pressure being supplied to the outer throats, thus inducing an inward current of air with or against the material in the inner throats. B. M. V.

Catalytic apparatus. A. O. Jaeger, Assr. to Amer. Cyanamid & Chem. Corp. (U.S.P. 2,004,758, 11.6.35. Appl., 2.12.27).—In a catalyser of the Tentelev type, the catalyst being contained in vertical tubes (*T*) secured at their lower end, part or all of the entering gases are caused to flow downwards out of contact with *T* (indirectly exchanging heat in either direction), then upwards in contact with the outside of *T*, and finally all the gases are passed downwardly inside *T*. B. M. V.

Apparatus for use in chemical digestions. A. Henwood and R. M. Garey (U.S.P. 2,004,868, 11.6.35. Appl., 30.10.33).—The neck of a Kjeldahl flask is fitted with an acid-resistant septum, in the form of a cylinder closed at the lower end, to exclude cold air, to prevent passage of H_2SO_4 mist, but to permit passage of gases outwards. B. M. V.

Heat-exchange apparatus. C. H. Leach (U.S.P. 2,004,469, 11.6.35. Appl., 13.11.29. Renewed 12.11.34).—Tubular condensers suitable for insertion in the upper part of a distillation tower are described. The upper tube-plate forms the lid of the tower, and the lower ends of the tubes with their return headers are free from constraint. B. M. V.

Plate heat exchangers for fluids. Cherry-Burrell, Ltd. From Cherry-Burrell Corp. (B.P. 442,293, 16.8.34).—A method of arranging the ports in the frames to give alternate flow of fluids is described. B. M. V.

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* The remainder of this set of Abstracts will appear in next week's issue.

Waterproofing of [fibrous] heat-insulating material. E. A. Toohey and A. Hughes, Assrs. to Johns-Manville Corp. (U.S.P. 2,005,356, 18.6.35. Appl., 4.8.27).—Upon loosely assembled fibrous material is deposited fusible, H_2O-repellent material, *e.g.*, insol. stearate soap and talc, which is spread by gentle heating. B. M. V.

Thermal insulation. N. V. Internat. Alfol-Maats. (B.P. 442,396, 30.1.35. Ger., 2.2.34).—The flow of heat through two or more layers of gas of const. total thickness is adjusted by altering the thickness of some or all of the individual layers by deflecting the separating laminæ. B. M. V.

Crusher [for coal]. E. C. Shiley, Assr. to J. W. Wetter (U.S.P. 2,005,758, 25.6.35. Appl., 20.8.32).—The material is dragged by a metallic conveyor under toothed rolls depressed by gravity to a stop which determines the min. size of the coal. B. M. V.

Ore-reducing machine. A. D. Hadsel (U.S.P. 2,006,269, 25.6.35. Appl., 7.2.33).—The ore is allowed to fall on an impact plate (*P*), whence the broken pieces fall into a tank of H_2O, the undersize being washed away and the oversize lifted by a mechanical elevator and dropped again on to *P*. B. M. V.

Grinding mill. W. P. Martin (U.S.P. 2,004,704, 11.6.35. Appl., 18.1.32).—A burr mill with revolving fan intended to separate Fe and stone from the grain during grinding is described. B. M. V.

Mixing machines. W. Gilbert (B.P. 442,355, 19.7.35).—Air or gas is admitted through the bottom of a mixing bowl through a loaded non-return valve. B. M. V.

Mixing of fluids and powders, or granular substances. Brit. "Rema" Manufg. Co., Ltd., and P. Howden (B.P. 442,141, 1.8.34).—The constituents slide down separate co-axial cones and unite on a rotating surface which mixes and delivers them much as would a centrifugal pump. B. M. V.

Sifting or screening apparatus. V. F. Feeny. From Sahut, Conreur, & Co. (B.P. 442,332, 21.3.35).—An inclined screen is hung by two transverse shafts on which eccentric masses are rotated, that at the upper end doing so at the higher speed. [Stat. ref.] B. M. V.

Filter casings or shells. J. Kirkland (B.P. 441,255, 26.6.35).—A construction in pressed metal plate is described. B. M. V.

Cleaning of [metallic] filter screens. E. H. Payne, Assr. to Standard Oil Co. (Indiana) (U.S.P. 2,004,796, 11.6.35. Appl., 14.12.33).—Metallic screens which have become plugged with tarry or other carbonaceous matter are heated at $<$ 455° in an inert atm. to remove volatile matter, then treated with a catalyst containing Cu or Pb, and heated again at $<$ 650° in an atm. of controlled composition to oxidise the C but not the metal, the ash being finally brushed off. B. M. V.

Centrifugal machine. W. Buddeberg, Assr. to A. T. Otto & Sons (U.S.P. 2,004,268, 11.6.35. Appl., 1.12.33. Ger., 1.8.32).—The apparatus comprises a horizontal drum overhanging the end of its shaft; collected solids are removed into a shoot by a scraper driven by a separate, preferably hydraulic, motor. B. M. V.

Centrifugal separator. H. O. Lindgren, Assr. to De Laval Separator Co. (U.S.P. 2,005,094, 18.6.35. Appl., 20.1.33. Swed., 25.1.32).—A fluid-tight cover and packing for a centrifuge of the closed type is described. B. M. V.

(a) **Scrubber.** (b) **Centrifugal separator.** C. G. Hawley, Assr. to Centrifix Corp. (U.S.P. 2,004,467—8, 11.6.35. Appl., [a] 2.2.32, [b] 2.4.32. Renewed [b] 14.11.34).—Both devices are of the non-rotating centrifugal type. B. M. V.

Treatment of [boiler-feed] water. J. M. Gillet, Assr. to Victor Chem. Works (U.S.P. 2,004,694, 11.6.35. Appl., 2.9.31).—Sol. phosphates are added and the H_2O is maintained quiescent at 110—125° and then decanted. B. M. V.

Device for indicating the temperature of liquids. J. L. Chaney (U.S.P. 2,004,092, 11.6.35. Appl., 15.12.33).—A glass case for the stem of a thermometer is described. B. M. V.

Distilling and fractionating apparatus. W. A. McMillan, Assr. to Texas Co. (U.S.P. 2,005,323, 18.6.35. Appl., 13.1.34).—An adiabatic fractionator for precise separations comprises a spiral passage formed between a tube and an axial wire by means of another, helical, wire of larger gauge than the core wire. A condenser, manometer, and other details are described. B. M. V.

Fractionating process and apparatus. S. C. Carney, Assr. to Shell Development Co. (U.S.P. 2,005,932, 25.6.35. Appl., 25.5.31).—In a tower, the decks are designed to hold a min. of liquid and are in pairs, the upper plate being provided with double-concentric, upstanding tubes through which vapour and liquid effect heat exchange without contact, the only mass exchange being effected during the drip on to and off the lower, funnel-shaped plate of each pair. B. M. V.

Rectifying process. D. E. Stines, Assr. to Standard Oil Development Co. (U.S.P. 2,006,186, 25.6.35. Appl., 29.12.31).—In a fractionator a liquid is withdrawn and mixed with a substance having a b.p. (θ) intermediate those of the constituents. The mixture is heated to above θ and injected below the fractionator, whereby the main residue is completely stripped of lower-boiling constituent. The pressure may be 12—200 lb. per sq. in. B. M. V.

Extraction of organic materials. K. Gebhardt (B.P. 442,232, 6.9.34. Ger., 7.9.33).—The material is heated dry and H_2O or other solvent is added in quantity to leave the mass substantially dry, followed by heating for several hr. Both heatings are at $<$ the b.p. of the solvent, *e.g.*, 40—50° and 50—80° for coffee and H_2O. B. M. V.

Device for estimating the mean specific gravity of a body of liquid. M. G. Ionides (B.P. 442,182, 5.1. and 17.9.35).—A vessel (containing a hydrometer) is lowered slowly into a tank of, *e.g.*, oil and the air is not allowed to vent, but the oil enters in quantity $\propto$ the depth of immersion. On lifting out, a non-return valve retains the average sample of the oil. B. M. V.

Apparatus for testing gases by chemical means. P. L. L. Vallery and J. F. P. Rosello (B.P. 442,403, 20.5.35. Fr., 23.5.34).—A volumetric absorption or reaction apparatus is described. B. M. V.

Catalytic converter. E. Pyzel, Assr. to Shell Development Co. (U.S.P. 2,006,078, 25.6.35. Appl., 23.3.32).—A high-pressure gas catalyser is provided with $\nless$ 3 alternate layers of coarse and fine catalyst (of the same composition) in contact with each other, the first stage being a coarse one. B. M. V.

Apparatus for diluting gas. H. Cleevely (U.S.P. 2,004,311, 11.6.35. Appl., 9.8.30).—Rich gas, *e.g.*, C_3H_8, under pressure operates a diaphragm which is coupled to a larger diaphragm to pump air or other diluent in const. proportion. B. M. V.

Dust collector. F. H. Wagner, Assr. to Bartlett Hayward Co. (U.S.P. 2,005,305, 18.6.35. Appl., 7.6.33).—A separator of the non-rotating centrifugal type is described. B. M. V.

Apparatus for the scrubbing of gas. W. L. Chewning, Assr. to United Engineers & Constructors, Inc. (U.S.P. 2,006,295, 25.6.35. Appl., 19.6.31).—A tower is provided with sprays which are fed intermittently and in turn by a continuously-acting pump. B. M. V.

Apparatus for [flue-]gas analyses. A. H. D. Howe (U.S.P. 2,005,036, 18.6.35. Appl., 3.2.32).—A continuous sample of flue gas completely freed from dust, CO_2, and H_2O and brought to a const. temp. between each of the following steps is passed at a const. rate over (1) a heated Pt catalytic wire, at which point any CO will be burned, (2) an exactly similar wire similarly situated in a compound Wheatstone bridge, the galvanometer connected to (1) and (2) being calibrated in % CO, and (3) after addition of a const. proportion of H_2 determined by a Venturi throat, over another Pt wire, the galvanometer of which indicates O_2 content. B. M. V.

Pipe joints or couplings. H. W. Brownsdon, F. Gee, H. F. Wagstaff, and Imperial Chem. Industries, Ltd. (B.P. 442,431, 3. and 13.7.34).—A capillary soldered joint for Cu pipes and the like is described. B. M. V.

Generation of foam for fire extinction. H. V. Reed (B.P. 442,372, 1.8.34).

Smelting furnace for black liquor.—See V. **Refrigerator brine.**—See VII. **Dried food products.**—See XIX.

II.—FUEL; GAS; TAR; MINERAL OILS.

Bright and dull coals. H. Brückner and H. Grevé (Brennstoff-Chem., 1936, **17**, 43—45; cf. B., 1934, 946).—The coking properties of the petrographic constituents (bright coal, dull coal, fusain) of two coking coals have been studied. The softening point, temp. of max. plasticity, gas and coke yields, etc. of mixtures of the bright and dull constituents differ from the vals. calc. from the simple mixture law. Fusain, however, in admixture with the other constituents behaves as an inert substance. A. B. M.

Concentration of banded ingredients of Illinois coals by screen-sizing and washing. L. C. McCabe (Amer. Inst. Min. Met. Eng., Tech, Publ., 1936, No. 684, 11 pp.).—Distribution of banded ingredients in Illinois screenings is studied together with methods of determining this. Samples were screened into 5 sizes and further separated by float-and-sink methods at different vals. of *d.* Microscopical and proximate analyses were carried out on all the fractions. Considerable data are accumulated, but no general conclusions drawn. D. M. M.

[Fuel] briquettes from light dust. E. T. Richards (Metallbörse, 1935, **25**, 49—50, 82—83; Chem. Zentr., 1935, i, 3077—3078).—The use of $ZnSO_4$, $FeSO_4$, and especially $Ca(OH)_2$ as a binder is discussed. J. S. A.

Pitch content of egg briquettes. H. A. J. Pieters (Het Gas, 1935, **55**, 6—7).—A method is given for correcting for the absorption of O_2 by coal particles during drying, after extracting pitch with C_6H_6. Ch. Abs. (*e*)

Influence of sulphur content of solid fuels on heat distribution. E. Praetorius (Wärme, 1935, **58**, 67—70; Chem. Zentr., 1935, i, 3368).—Presence of S is a source of error in analysis of burnt gases, since the SO_2 formed on combustion leads to high CO_2 figures. H. N. R.

Ignition temperatures of solid fuels. J. Roberts (Coal Carbonisation, 1935, **1**, 135—138, 142).—A new form of apparatus for determining ignition temp., employing a salamander crucible (*C*), a Pyrex glass tube (*T*), and a thermometer, is described. The crushed fuel is placed at the bottom of *C* and *T* upon it; when *C* is heated from below a current of air is induced to pass through the layer of fuel, the temp. at which the fuel begins to glow being taken as the ignition temp. Typical results obtained with coal, coke, and low-temp. coke are recorded. R. B. C.

Ignitability of solid fuels. J. Roberts (Coal Carbonisation, 1936, **2**, 38—40).—Experimental conditions to be observed when using the apparatus described previously (cf. preceding abstract) for determining ignition temp. of solid fuels are discussed. Glow, flash, and ignition points and proximate analyses are given for a no. of British coals. In general, the ignition temp. rises with increasing rank of coal; the proportion of clarain, durain, and especially fusain present in the coal, however, has an influence on the ignition point. Coke for use in the open grate should have an ignition point $\ngtr$ 485° and a glow point $\ngtr$ 465°. R. B. C.

Carbonisation control, and production of a high thermal yield. J. A. Derbyshire (Gas J., 1936, **213**, 628—629).—With low throughputs and operating the retorts (continuous verticals) under a slight back-pressure, gaseous yields of 95—105 therms per ton were obtained, the fuel consumption being 18·9 lb. of coke per 100 lb. of coal carbonised. The content of inerts of the gas was also reduced to a min. H. C. M.

Carbonisation of woods and their principal constituents. P. Lebeau, P. Marmasse, R. Michel, and G. Viel (Ann. Off. nat. Combust. liq., 1935, **10**, 1027—1076).—Various species of wood indigenous to France and the French colonies were investigated. The apparent H_2O and ash contents, and the % of substances extractable with H_2O and with $COMe_2$, were determined for each wood. The determination of pentosans, celluloses, and lignins in each species was effected by the methods of Bertrand and Brown, Cross and Bevan, and Willstätter, respectively. In the case of the elder the old and green wood, pith, and principal roots were examined by the above methods. Each wood was carbonised in absence of air in a laboratory retort at intervals of 100° from 100° to 1000° and the following were measured: total vol. of gas evolved, % of combustibles in the gas, yields of tar and H_2O. The first max. evolution of gas took place at 300—400° and the second at 700°. The max. evolution of CO occurred in six cases at 300° and in 4 cases at 400°. H_2 was evolved in max. amount at 700° and CH_4 at 500°. The total vol. of gas varied within wide limits from 146·5 cu. m./m. ton (maritime pine) to 231·4 cu. m./ton (elm). The amount of combustible gas in the total gas varied between 74·67% (poplar) and 85·25% (maritime pine). H_2 was the principal constituent of the combustible gas, varying from 32·97% (gorse) to 42% maritime pine, the remaining constituents being CH_4, CO, and CO_2. The best charcoal was obtained from non-resinous, dense woods, whilst the greatest yield of tar was given by resinous woods, *e.g.*, chestnut. R. B. C.

Partial gasification of coke. D. G. Woolfenden and H. J. Hodsman (Gas World, 1936, **140**, Coking Sect., 26—30).—The effect of partial gasification on ignitability or reactivity of the coke, and of size of the coke on bulk density were determined, a curve being plotted in the latter case. Measurements of bulk density were made on the treated cokes and on the surface layer and untouched core of the treated cokes; these showed that the effect was mainly confined to the outer layers. Direct tests in a fire-grate showed that the effects of treatment are confined to increase of ignitability and more rapid attainment of a bright fire. The treated coke also burned silently, whereas the untreated coke was crackling. The limitations of different classes of tests are considered; it is concluded that no single test will suffice, though a burning test in a grate will be most informative if no other is available. D. M. M.

Fusibility of coal ash. V. Relation between composition and fusibility of Japanese coal ashes. VI. Relation between fusibility and certain [other] characteristics of Japanese coal ashes. Y. Kosaka, H. Toda, and C. Kitagawa (J. Soc. Chem. Ind., Japan, 1936, **39**, 36—38, 38—40 B; cf. B., 1935, 258).—V. In general, the smaller is the ratio SiO_2/Al_2O_3 the higher is the refractoriness of the ash. Ash containing 10—20% each of CaO and Fe_2O_3 and having $SiO_2/Al_2O_3 > 2$, or ash with $CaO + Fe_2O_3 > 30\%$ and $CaO/Fe_2O_3 > 1$ fuses at $< 1250°$. In a reducing atm., ash high in Fe_2O_3 and low in CaO may be reduced to Fe and the fusibility raised, whilst with a higher proportion of CaO the more fusible FeO may be formed.

VI. No definite relation exists between fusibility and the proportion of constituents sol. in H_2O and acid. Ash of refractoriness $> 1400°$ has a solubility of $< 10\%$ in H_2O and of $< 17\%$ in acid. Similarly, no close relation exists between alkalinity of the ash and its fusibility, although the alkalinity of ashes having the lower refractoriness is the higher. The adsorption power of coal ash is roughly $\propto$ the $SiO_2 + Al_2O_3$ content. C. C.

Preparation of American carbon black. G. Ewald (Brennstoff-Chem., 1936, **17**, 41—43).—About 90% of the C black made in America is prepared by the "channel" process (described); it is used chiefly as a filler for rubber. A. B. M.

Combustion triangle in formation of soot. G. Ackermann (Arch. Wärmewirts., 1935, **16**, 47—48; Chem. Zentr., 1935, i, 3077).—Incomplete combustion in presence of excess of air is due largely to formation of soot. A diagram with triangular coordinates is given for calculating soot formation, consequent heat loss, and excess of air from the composition of the flue gases. J. S. A.

Production of water-gas and synthesis gas. R. Schmidt and E. Groh (Oel u. Kohle, 1936, **12**, 41—51).—The theoretical considerations underlying the production of "synthesis gas," *i.e.*, a water-gas in which the ratio $H_2 : CO$ is 2, are discussed. The conclusions have been confirmed by laboratory experiments in which such a gas was produced by gasifying a brown-coal coke in steam at 800°; at higher temp. too high a proportion of CO was formed. Bituminous-coal cokes were much less reactive. Gasification of a brown-coal coke in a continuously operated generator (throughput 30 kg. of coke/hr.; gas production 76 cu. m./hr.) gave a gas of composition CO_2 14·5, CO 26·9, H_2 54·4, CH_4 3·6, N_2 0·6%. The generator differed from the usual design in that the central portion comprised a series of 7 parallel tubes heated externally by hot combustion gases (at about 1100°) from an adjacent furnace. The fuel was gasified in a current of steam introduced into the lower part of the generator. By introducing additional steam into the upper part, the CH_4 content of the gas could be reduced to about 2·2%. The economics of the process is discussed; the estimated cost of production is 6·34 RM. per 1000 cu. m. of synthesis gas. A. B. M.

Control of a carburetted water-gas plant. F. J. Dent (Gas J., 1936, **213**, 622—626; cf. B., 1936, 5).—A discussion of the factors influencing output. H. C. M.

Value of exhaust [gas] analysis in power vehicles. A. Leye (Automobiltech. Z., 1934, **37**, 619—621; Chem. Zentr., 1935, i, 3368). H. N. R.

Protection of acetylene generators against frost. Freitag (Emailwaren Ind., 1935, **12**, 99—100; Chem. Zentr., 1935, i, 3172).—Addition of glycerin to the H_2O is recommended. J. S. A.

Active sulphur compounds in shale tars. G. Free (Brennstoff-Chem., 1936, **17**, 45—47).—The literature is summarised. A. B. M.

Conversion of lignite tar into motor fuel by pressure and heat. K. Kohlhardt (Oel, Kohle, Erdoel, Teer, 1935, **11**, 80—83; Chem. Zentr., 1935, i, 3229).—The conversion is carried out in a suitably heated worm tube, the process being described in detail. The plant may readily be adapted to the production of Diesel fuel. H. N. R.

Tar-fog removal. S. H. Stokes (Gas World, 1936, **104**, 226—228).—Tar fog (minute particles of tar, each enclosed in a film of H_2O, which renders coagulation and pptn. difficult), as distinguished from tar spray, is difficult to remove and causes back-pressure in oxide purifiers and wash-oil thickening in benzol plants. A tar-fog arrester is described and a method of testing for such fog with a series of tests carried out at the inlet and outlet of the arrester. Tar found in spent oxide being more than can be accounted for by fog present in the gas, the formation *in situ* of tarry and gummy deposits in the oxide by polymerisation and condensation of some of the unsaturated compounds in the gas is suggested. D. M. M.

Ageing of tars. Briancourt (Sci. et Ind., 1935, 258 pp., Spec. no., La Route, 23—25; Road Abs., 1936, **3**, No. 29).—The stages in the life of a road tar are: (1) the viscous stage—the condition immediately after spreading; (2) the plastic–elastic stage, lasting from the end of (1) for 2—3 years; (3) the brittle stage. Stage (2) corresponds with the useful life of the tar. A method for prolonging (2) is discussed and laboratory studies on ageing are described. T. W. P.

Viscosity of tars. V. O. Helmer (J. Kharkov Highway Inst., 1935, **1**, 100—109; Road Abs., 1936, **3**, No. 31).—Data on temp./η relations are given. T. W. P.

Constituents of binders for tar and bitumen fragments. W. Bierhalter (Teer u. Bitumen, 1935, **33**, 73—78; Chem. Zentr., 1935, i, 3232).—The influence of the nature of the tar or bitumen on the properties of suitable binders is discussed. H. N. R.

Practical significance of mechanical testing methods [for asphalts]. Bierhalter (Bitumen, 1935, **5**, 171—173, 194—195; Road Abs., 1936, **3**, No. 34).—For normal asphalts the compressive strengths at 40° are 60—68% of those at 22°. Variations from these vals. can be interpreted. Good materials should have high tensile strengths accompanied by high elongation vals. The possibility of elastic deformation below the solidifying point is discussed. T. W. P.

Composition of Fushun shale oil. IX. Olefine hydrocarbons, boiling at 115—133°. X. Presence of *m*-xylene and isolation of pure *n*-octane. F. Horie (J. Soc. Chem. Ind., Japan, 1936, **39**, 13—14 B, 14—15 B; cf. B., 1935, 885).—IX. The distillate from oil boiling at 115—133° is separated into fractions of 1° range; these contain 39·7—51·7% of Δ^{β}-octene, identified by conversion into the bromide, reduction, fractionation, and oxidation to AcOH, $H_2C_2O_4$, and *n*-hexoic acid, without C_3, C_4, C_5, or C_7 acids.

X. After olefines are removed by H_2SO_4, the shale oil fractions are nitrated; the yield of 2 : 4 : 6-trinitro-*m*-xylene shows that total hydrocarbons contain 0·85% of *m*-xylene. The residue, about 55% of the total hydrocarbons, is *n*-C_8H_{18}, identified by *n* and *d*, and isolated in a pure state by fractionation and treatment with $SbCl_5$. E. W. W.

Solubility of gases in crude oils. K. E. Zintschenko (Neft. Choz., 1935, **27**, No. 2, 39—42).—Light oils hold most gas, CO_2 being held most tenaciously and air only in small amounts. Data are recorded. Ch. Abs. (*e*)

[Distillation of] mineral oils. Louis and Larralde (Ann. Off. nat. Comb. liq., 1934, **9**, 703—731; Chem. Zentr., 1935, i, 3232—3233).—Distillation of mineral oil in a cathode-ray vac. yields products which may be used as transformer and lubricating oils; the process is more effective with the higher-boiling fractions. H. N. R.

Solvent refining of lubricating oils with nitrobenzene. Analytical methods. S. S. Kurtz, jun., C. E. Headington, and B. Zieber (Ind. Eng. Chem. [Anal.], 1936, **8**, 1—5).—Methods have been worked out for determining $PhNO_2$ (I) in (*A*) lubricating oil extract and raffinate containing 0—5% of (I), (*B*) oil containing 5—100% of (I), and (*C*) H_2O, as follows. (*A*) The sample is reduced with $TiSO_4$ at the boil and excess titrated with $Fe^{\cdot\cdot\cdot}$. Alternatively, for samples containing $< 1\%$ of (I), the amount is determined by the lowering of the flash point of the original stock in a Pensky–Martens closed-cup flash-point apparatus. This rapid method is applicable to all oils with flash points $> 150°$, but is more accurate and reliable with those flashing at $> 200°$. (*B*) In samples containing 5—100% of (I) the latter is determined from *d* or, more accurately, by vac. distillation to 250°/30 mm. in a stream of CO_2 (apparatus described), the purity of the distillate being checked by the f.p. and, if necessary, a correction based on the difference in f.p. compared with the original (I) being applied for light oil distilling over. (*C*) (I) in H_2O from the stripping plant containing $< 0·1\%$ is determined colorimetrically by reduction (Zn–HCl) to NH_2Ph and subsequent treatment with NaOCl, comparison being made with colour standards prepared from 15% $CoCl_2$ and 7·5% $FeCl_3$ solutions. Two methods are adopted for checking refining stocks for freedom from light oils, which would ultimately contaminate the solvent. For oils flashing at $> 232°$ the difference in flash points in open- and closed-cup apparatus should not vary by $> 5°$ F. In stocks with a lower flash point the light oil is determined by distillation at 300°/10 mm. followed by redistillation of the distillate to 152°/10 mm. The final distillate should not exceed 0·05%. S. C.

Oxidation mechanism of mineral oils. VI. Autoxidation of tetralin and decalin. T. Yamada (J. Soc. Chem. Ind., Japan, 1936, **39**, 20—21 B).—Tetralin (I) and decalin (II) were oxidised with O_2 at 100° and 140°. The tendency to form peroxides and alcohols is the greater with (I) and is favoured by the lower temp. The formation of acids and esters is also the greater with (I), the ester val. being particularly high at 140°. Aldehyde and ketones were observed in appreciable amounts in the case of (II) only at 100°, traces being recorded at 140° for both compounds. No measurable tar was formed in either case at 100°, but a relatively large amount was given by (I) at 140°. C. C.

Gasolines of high knock-rating. I. Production of gasoline by hydrodepolymerisation of caoutchouc. R. Kobayasi, M. Furihata, and S. Kajimoto (J. Soc. Chem. Ind., Japan, 1936, **39**, 40—42 B).—Caoutchouc (*d* 0·93) dissolved in transformer oil is heated in contact with NiO and acid clay under high pressure of H_2 in a Ni–Cr steel autoclave. The H_2 absorbed increases with rise in reaction temp. and time. The yield of gasoline also increases with the temp. and ranges from 30 to 60 vol.-% at 350—400°. The blending C_8H_{18} no. of the gasoline produced is 79, this high val. being probably due to the presence of branched-chain paraffins. C. C.

Chemical composition of hydrogenated gasoline. B. K. Tarasov and L. A. Alexandrov (Neft. Choz., 1935, **27**, No. 1, 66—67).—Results are given for the hydrogenation of a paraffin distillate at 425—450°/150 atm., using Co_2O_3, Ni_2O_3, and Fe_2O_3 catalysts. Ch. Abs. (*e*)

Volatility of fuels containing ethyl alcohol. VII. Total and partial vapour pressures of ethyl alcohol–pentane mixtures. VIII. Calculation of starting temperatures of an engine using ethyl alcohol–gasoline hydrocarbon mixtures. N. Isii (J. Soc. Chem. Ind., Japan, 1935, **38**, 705—707 B, 707—710 B; cf. B., 1936, 179).—VII. Total v.-p. data of $EtOH–C_5H_{12}$ mixtures have been observed at —10° to 20°, and partial v.-p. data calc. by Bose's method. The consts. *A* and *B* in the equation $\log p = A - B/T$ have been calc. for total and partial pressures for the complete range of mol. fractions.

VIII. Using the vals. of v.p. in sections (V)—(VII), the starting temp. with each of methyl*cyclo*hexane, n-C_6H_{14}, and n-C_5H_{12} mixed with EtOH as fuel in an engine have been calc. as in (II) (cf. B., 1935, 342). The ease of starting is only slightly affected by addition of EtOH to gasoline hydrocarbon until the EtOH : hydrocarbon ratio is 3 or 4 : 1. The ease of starting with EtOH as fuel is greatly improved by adding 20—30 mol.-% of the above hydrocarbons. R. S. B.

Pro-knocks and hydrocarbon combustion. A. R. Ubbelohde, J. W. Drinkwater, and A. Egerton (Proc. Roy. Soc., 135, A, **153**, 103—115; cf. B., 1936, 7).—Measurements have been made of the quantities of CH_2O and of total aldehydes formed during the combustion of petrol, C_6H_{14}, *cyclo*hexane, amylene, $COMe_2$, BuOH, EtOH, C_6H_6, *iso*-C_8H_{18}, and mixtures of aldehydes and petrol. The amounts of aldehydes formed are insufficient to account for "knock." This conclusion strengthens the evidence for the primary formation of peroxides in the oxidation of the higher hydrocarbons. Most hydrocarbon fuels can be made to knock provided mols. which can disrupt and give rise to a branched-chain reaction are produced. The main source of the NO_2 found in the previous experiments (*loc. cit.*) is not the flame but the surface of the hot exhaust valve. L. L. B.

Oxidation of benzine. C. Cândea and N. Cristodulo (Bull. Sci. École polyt. Timisoara, 1934, **5**, 233—243; Chem. Zentr., 1935, i, 3081; cf. B., 1934, 662).—*cyclo*Hexane and pinene favour the formation of peroxides by atm. oxidation, pinene causing resinification also. Aromatic hydrocarbons hinder oxidation. J. S. A.

Determination of "flow point" at very low temperatures; application to light petroleum. P. Woog, J. Givaudon, R. Sigwalt, and J. Lienhart (Bull. Soc. chim., 1936, [v], **3**, 269—271).—Apparatus and procedure are described. E. S. H.

Working-up of aged [used] oils. A. Scholz (Chem.-Ztg., 1936, **60**, 216—217).—Short notes amplifying those of Rösner (B., 1936, 7) are given, with special reference to the val. of German activated clays as bleaching agents. E. L.

Refining of lubricating oils by hydrogenation. M. Mizuta and C. Tada (J. Soc. Chem. Ind., Japan, 1936, **39**, 21 B; cf. B., 1934, 707).—Greatest colour improvement was obtained by hydrogenation (of turbine oil distillate from Niitsu crude) at 380—426°, but subsequent treatment with H_2SO_4 and distillation in vac. in contact with clay is necessary to give a colour-stable product. C residue and S contents were decreased and the f.p. was lowered. C. C.

Lowering the pour point of lubricating oils. K. S. Ramajja and S. Chaiman (Neft. Choz., 1934, **26**, No. 12, 37—44).—Paraffin (m.p. 52—54°) was treated with Cl_2, and the product condensed with $C_{10}H_8$ by means of $AlCl_3$ in naphtha solution. The chlorinated products were mainly liquid. Ch. Abs. (*e*)

Increasing the pressure in the preparation of lubricating greases. D. S. Velikovski and V. P. Varentzov (Neft. Choz., 1934, **26**, No. 12, 60—63).—In preparing lubricating greases from vegetable oil 15, mineral oil 80, CaO 3, and H_2O 2—5%, it was found that a better η-temp. ratio, a slightly higher m.p., and a saving in time resulted from the use of pressure (5—10 atm.) during compounding. Ch. Abs. (*e*)

Oiliness. H. Brillié (Mém. Soc. Ing. Civ. France, 1935, **88**, 623—631).—Theoretical. The factors contributing to the lubricating efficiency of oils are discussed. E. S. H.

CH_2O from water-gas.—See III. **Safranine and magenta from gasoline fractions.**—See IV. **Bleaching clay. H_2 for oil industry.**—See VII. **Ceramic firing.**—See VIII. **Road surfacings. Paving mixtures.**—See IX. **Fuel-tank corrosion.**—See X. **Light oil from soya-bean oil.**—See XII. **Rubber–bitumen mixtures.**—See XIV. **Perfumery oil from paraffin filtrate.**—See XX. **Determining PhMe etc. in air.**—See XXIII.

See also A., Mar., 294, **Detonation in C_2H_4–O_2 and in CO–O_2 mixtures. Combustion of hydrocarbons.** 329, **Phenols of anthracene oil.**

Patents.

Manufacture of briquettes from normally noncoherent substances, particularly coal dust, lignite dust, etc. W. W. Triggs. From Maats. tot Exploit. van "Ten Bosch Octrooien N.V." (B.P. 440,811, 23.4.35).—The material is compressed in a matrix so shaped that on releasing the pressure the differences in pressure on the different parts of the surface of the briquette are kept sufficiently small to avoid the formation of cracks. A. B. M.

Oil treatment of coal. A. O. Vinz (U.S.P. 2,005,512, 18.6.35. Appl., 18.1.34).—Lump coal is rendered dustless by spraying with heated heavy hydrocarbon oil in the form of a fine mist. B. M. V.

Treatment of carbonisable products for obtaining a dry fuel. R. Spatz and R. Sennac (B.P. 441,472, 18.5.34. Fr., 30.12.33).—Wood, seaweed, or other cellulosic substance is partly carbonised at 280—600°, and the product pulverised, mixed with $\not> 5\%$ of MgO, and compressed into blocks. A. B. M.

Processing of coal. H. Stevens, Assr. to H. Stevens (U.S.P. 1,993,756, 12.3.35. Appl., 14.1.24. Renewed 27.5.33).—Coal is carbonised in a horizontal cylindrical retort (*R*), constructed of steel lined with refractory material, by means of heat generated by passing an electric current through a longitudinal axial resistor, preferably made of a paper or wood tube filled with finely-divided coke. As carbonisation proceeds the coke formed carries more and more of the current. The process is carried out under pressure, produced initially by charging *R* with H_2. The volatile products pass to condensers, also maintained under pressure. A catalyst may be introduced into *R* to effect the conversion of tar acids into neutral compounds. A. B. M.

Carbonisation of coal or other carbonaceous substances. G. W. Wallace (B.P. 441,029, 19.9.34).—Coal is carbonised in an externally-heated retort or chamber in which the charge forms a layer between the walls and a central body of material (I), *e.g.*, coke, the volatile products being withdrawn from the lower part of (I). A. B. M.

Conversion of solid fuels and products derived therefrom or other materials into valuable liquids. C. Krauch and M. Pier, Assrs. to Standard–I. G. Co. (U.S.P. 1,994,075, 12.3.35. Appl., 29.7.32. Ger., 14.2.25).—The initial materials are destructively hydrogenated under pressure in presence of a catalyst containing a sulphide of a heavy metal, *e.g.*, Zn, Mn, Mo, Co, etc., associated with a free heavy metal, *e.g.*, Mo, W, or Ti, preferably of group VI, or with a difficultly reducible oxide, *e.g.*, MoO_3 (added as NH_4 molybdate or molybdic acid), preferably also of group VI. A. B. M.

Apparatus for production of coke and recovery of by-products therefrom. Z. H. Kevorkian (U.S.P. 1,993,934, 12.3.35. Appl., 4.9.30).—Coal is carbonised in a vertical cylindrical retort ; the spent gases from the surrounding annular combustion chamber pass down a duct extending centrally through the carbonising chamber and thence to a steam generator or to a vessel in which the NH_3 liquor is preheated. The coke produced is discharged into a cooling chamber forming an extension of the retort and so designed that the sensible heat of the coke can be utilised for preheating the air and gas fed to the combustion chamber, and for distilling the NH_3 liquor. A. B. M.

Improvement of quality of coke in coke ovens. Simon-Carves, Ltd., and J. T. E. Preston (B.P. 441,784, 16.8.34).—Tendency to froth and form a spongy coke on the top of the charge when carbonising certain coals, particularly those of high volatile content, is prevented by admixing a pulverulent material, *e.g.*, coke breeze, with the upper layer of the charge. A. B. M.

Tar-distillation and like stills. Yorkshire Tar Distillers, Ltd., and J. A. Stocks (B.P. 441,435, 7.3.35).—The domed bottom of the still, which projects into the shell, is secured to the lower edge thereof by welding in the acute-angled annular channel between the edges of the two parts. A. B. M.

Oxidised asphalt. E. W. Gard and B. G. Aldridge (U.S.P. 1,999,018, 23.4.35. Appl., 8.6.31).—Asphalt (or oil) is melted in a still (*S*) in which is a centrifugal pump which circulates the oil from the still, through a heat exchanger (*H*), and back again. Air is introduced through a nozzle into the asphalt as it passes from *S* to *H*. Steam is introduced into the asphalt through a perforated pipe in the bottom of *S*. By controlling the rate of air and steam supply and the temp. by means of *H*, asphalt of any desired m.p., penetration, and ductility can be obtained. D. K. M.

Hydrogenation of tar oils. South Metropolitan Gas Co., H. Stanier, and R. Leet (B.P. 441,509, 23.10.34. Addn. to B.P. 418,235 ; B., 1935, 5).—The tar oils and H_2 are passed together, under pressure, through a heated tube at a speed at which turbulent flow is produced, and the products, without appreciable lowering of temp., are passed into a catalyst chamber wherein hydrogenation is continued under known conditions. A. B. M.

Production of bituminous emulsion. P. R. Smith and O. R. Douthett, Assrs. to Barber Asphalt Co. (U.S.P. 1,994,542, 19.3.35. Appl., 26.7.28).—Asphalt is emulsified with an alkaline aq. dispersing medium containing a protective colloid and having p_H about 13, *i.e.*, just $<$ that at which the emulsion is inverted to the H_2O-in-oil type. A stable emulsion of extremely small particle size is produced ; it may, if desired, be further diluted with H_2O. A. B. M.

Manufacture of bitumen dispersions. Colas Products, Ltd., L. G. Gabriel, and J. F. T. Blott (B.P. 441,782, 2.8.34).—Ca rosinate (I), prepared by heating lime–rosin mixture, is incorporated with the bitumen, which is then dispersed in a neutral or alkaline aq. solution of K (II) or Na rosinate (III). If desired, $CaCl_2$ may be added to the dispersion to convert (II) or (III) into (I). A. B. M.

Treatment of hydrocarbon oils. G. Egloff, Assr. to Universal Oil Products Co. (U.S.P. 1,986,190, 1.1.35. Appl., 23.3.31).—In the cracking of petroleum to produce petrol, HOCl vapour is introduced into the pipe-line between the dephlegmator and the condenser to reduce the S, gum, and malodorous constituents during re-running. A. R. P.

Splitting of hydrocarbons of high b.p. into those of low b.p. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 442,592, 7.8.34).—Liquid hydrocarbons are heated at $> 350°$ $(400—500°)/> 1$ (> 40) atm. in presence of a finely-divided metal of group II or IV, *e.g.*, Zn, or Mn, or a member of the Fe group, together with an acid or a substance which acts as an acid under the operating conditions, preferably containing a halogen, *e.g.*, HCl or Cl_2, but in absence of a carrier. D. K. M.

Preparation of compounds from waste products obtained in the refining of cracked mineral oils. W. von Piotrowski and J. Winkler (U.S.P. 1,996,692, 2.4.35. Appl., 23.3.33).—Acid sludge from refining cracked mineral oils is mixed with a dil. alkaline solution and the two layers formed are separated. The upper layer is steam-distilled and the fraction having b.p.

50—280° is collected. The residue from this distillation is dry-distilled and the fraction of the same b.p. obtained. The two fractions are combined, and the product is used as, *e.g.*, insecticide, odorant for gas, and denaturant for EtOH. C. C.

Breaking of petroleum emulsions. M. De Groote and B. Keiser, Assrs. to Tretolite Co. (U.S.P. 1,984,633, 18.12.34. Appl., 15.3.34).—The emulsion is agitated with a mixture of H_2O-miscible and oil-sol. Na salts of sulphonated petroleum 45, blown castor oil 45, and kerosene 10%. A. R. P.

Desulphurisation of mercaptan-bearing (A) petroleum oil, (B) oil. (A) W. A. Schulze, (B) L. V. Chaney and W. A. Schulze, Assrs. to Phillips Petroleum Co. (U.S.P. 1,998,849 and 1,998,863, 23.4.35. Appl., [A] 11.4.32, [B] 10.5.32).—The mercaptan (I) is extracted from the oil by 8—20% aq. NaOH. Spent NaOH is revivified by (A) treatment with a halogen-yielding oxidising agent, *e.g.*, NaOCl, whereby the (I) is converted into a disulphide, (B) passing air through it at the b.p., whereby the higher-boiling (I) derivatives are volatilised and the lower-boiling ones converted into disulphides. The disulphides are separated from the aq. NaOH, which is then washed with gas oil. D. K. M.

Sweetening of stabilised hydrocarbon naphthas and unstabilised hydrocarbon naphthas. A. F. Endres, Assr. to Standard Oil Co. (U.S.P. 1,996,236, 2.4.35. Appl., 14.9.32).—Stabilised hydrocarbon naphtha is treated with caustic alkaline solution and then with aq. Na plumbite (I). The latter is separated and used for treating unstabilised naphtha, whereby the effectiveness of the (I) is regenerated. It is then recycled for treating further stabilised or unstabilised naphtha. C. C.

Treatment of hydrocarbon oils. C. C. Towne, Assr. to Texas Co. (U.S.P. 1,997,159, 9.4.35. Appl., 6.2.32).—Hydrocarbon oils, *e.g.*, gasoline, are reformed into products of high antiknock val. by bringing them in contact with molten Se at 400—600°/> 300 lb. per sq. in., so that a portion at least of the polymerides formed is liquid and, in contact with Se, is converted into gasoline. C. C.

Manufacture of [non-gumming] hydrocarbon oils. W. K. Lewis and B. Mead, Assrs. to Standard Oil Development Co. (U.S.P. 1,996,075, 2.4.35. Appl., 4.9.28).—Gum formation in cracked gasoline is inhibited by addition of 0·1—0·5 g. (per gal.) of a polyhydroxybenzene compound, *e.g.*, pyrogallol, phloroglucinol, resorcinol, quinol. C. C.

Preparation of motor fuels. R. E. Burk and E. C, Hughes, Assrs. to Standard Oil Co. (U.S.P. 1,997,480. 9.4.35. Appl., 21.1.31).—Straight-run gasoline is heated at approx. 450—700° in presence of O_2 ($\frac{1}{2}$—5 vols. of air per 1 vol. of gasoline vapour) at $<$ 100 lb./sq. in. for 0·075—1 sec. The product has a high antiknock val. C. C.

Revivifying adsorbent materials [from hydrocarbon oil treatment]. H. H. Gross, Assr. to Texas Co. (U.S.P. 1,997,174, 9.4.35. Appl., 20.10.32).—Spent fuller's earth or activated clay can be revivified by extraction with furfuraldehyde alone or mixed with benzol or gasoline at a temp. $>$ that at which the earth shows max. adsorptive efficiency, *e.g.*, 38—205°/100—200 lb. per sq. in. C. C.

Separation of oil from fuller's earth or similar material. E. R. Mitchell, Assr. to R. Kendall (U.S.P. 2,006,088, 25.6.35. Appl., 10.11.32).—The earth is mixed into nearly boiling brine (containing 4—6% of salt, on the total pulp) and allowed to settle. B. M. V.

Neutralisation of organic acidity in petroleum lubricating oils. W. B. Logan, Assr. to Texas Co. (U.S.P. 1,998,765, 23.4.35. Appl., 8.10.31).—The oil is mixed with aq. NaOH and heated at 400° (approx.) under pressure sufficient to prevent vaporisation. It is then passed into a fractionating column in which it is distilled under vac. D. K. M.

Cylinder oil. F. H. MacLaren and G. F. Bowers, Assrs. to Standard Oil Co. (U.S.P. 1,998,767, 23.4.35. Appl., 4.4.32).—To a hydrocarbon lubricating oil a hydrogenated fat (1—10%), free fatty acid (0·5—20%), and a small quantity of an oil-sol. stearate of Ca, Fe, or Al are added. D. K. M.

(A) Core, (B) core oil, compound. H. L. Quandt and J. J. Horak, Assrs. to Quandt Chem. Co. (U.S.P. 2,004,344—5, 11.6.35. Appl., [A] 7.11.30, [B] 5.7.34).—Emulsions in H_2O capable of further dilution with H_2O of tung oil, perilla oil, mineral oil, and (A) $N(C_2H_4{\cdot}OH)_3$ or (B) NaOH are claimed. B. M. V.

Solid lubricating compound. C. A. Miller and D. A. Smith, Assrs. to Valvoline Oil Co. (U.S.P. 2,005,553, 18.6.35. Appl., 20.8.32).—A dehydrated, boiled, hard grease comprises equal parts of a viscous hydrocarbon mineral oil (finally in the form of small distributed globules) and a hard alkali–higher fatty acid soap, the free fatty acid being 5% of the total mass. B. M. V.

Treatment of hydrocarbon oils. C. W. Watson and V. Stapleton, Assrs. to Texas Co. (U.S.P. 2,008,480, 16.7.35. Appl., 9.9.31). H. V. Atwell, Assr. to Gasoline Products Co., Inc. (U.S.P. 2,008,661, 23.7.35. Appl., 21.3.33). (A) J. G. Alther, (B) C. H. Angell, (C) C. P. Dubbs, Assrs. to Universal Oil Products Co. (U.S.P. [A, B] 2,009,128—9 and [C] 2,009,878, [A, B] 23.7.35, [C] 30.7.35. Appl., [A] 30.3.32, [B] 11.1.32, [C] 12.2.23. Renewed [C] 10.5.33). J. H. Forrester, Assr. to Standard Oil Co. (Indiana) (U.S.P. 2,011,479, 13.8.35. Appl., 20.2.33).

Treatment of [asphaltic] oils. U. B. Bray, Assr. to Union Oil Co. of California (U.S.P. 2,010,007—8, 6.8.35. Appl., 6.3.33).

Cracking of oils. J. S. Gallagher, Assr. to Texas Co. (U.S.P. 2,006,449, 2.7.35. Appl., 18.4.28).

Cracking of petroleum oils. R. A. Halloran and A. L. Strout, Assrs. to Standard Oil Co. of California (U.S.P. 2,008,550, 16.7.35. Appl., 10.10.28).

Cracking of hydrocarbons. G. C. Hargrove and W. B. Montgomery, Assrs. to Gasoline Products Co., Inc. (U.S.P. 2,006,571, 2.7.35. Appl., 20.2.28). C. B. Forward, Assr. to Forward Process Co. (U.S.P. 2,007,081, 2.7.35. Appl., 23.11.27).

Cracking of hydrocarbon oils. J. B. Heid, Assr. to Universal Oil Products Co. (U.S.P. 2,008,502, 16.7.35. Appl., 26.12.30).

Conversion of hydrocarbon gases. R. F. Ruthruff, Assr. to Standard Oil Co. (U.S.P. 2,009,277, 23.7.35. Appl., 26.12.33).

Conversion of hydrocarbon oils. J. B. Heid, (b) E. F. Nelson, (c, d) J. C. Morrell, (e) R. Pyzel, Assrs. to Universal Oil Products Co. (U.S.P. 2,006,552, 2,009,119, 2,010,369—10, and 2,010,376, [a] 2.7.35, [b] 23.7.35, [c—e] 6.8.35. Appl., [a] 11.12.31, [b] 12.12.32, [c] 31.8.32, [d] 24.10.33, [e] 28.1.33).

Conversion of high-boiling hydrocarbon oils into lower-boiling hydrocarbon oils. R. E. Wilson, Assr. to Standard Oil Co. (U.S.P. 2,009,367, 23.7.35. Appl., 1.6.31).

Reforming of hydrocarbon compounds. D. W. Hoge, Assr. to C. P. Ritter (U.S.P. 2,007,532, 9.7.35. Appl., 17.10.33).

Purification of hydrocarbons. J. F. Wait, Assr. to J. C. Wait (U.S.P. 2,009,366, 23.7.35. Appl., 18.10.30).

Oil filter. F. A. Howard, D. A. Shepard, and H. W. Fisher, Assrs. to Standard Oil Development Co. (U.S.P. 2,010,430, 6.8.35. Appl., 17.3.32).

Distillation of hydrocarbons. M. J. Burkhard, Assr. to Socony-Vacuum Oil Co., Inc. (U.S.P. 2,009,079, 23.7.35. Appl., 30.8.33).

Light hydrocarbon distillation. T. S. Cooke, Assr. to Standard Oil Co. (U.S.P. 2,008,578, 16.7.35. Appl., 17.5.30).

Fractional distillation. D. J. Bergman, Assr. to Universal Oil Products Co. (U.S.P. 2,011,030, 13.8.35. Appl., 26.12.33).

Fractionation of hydrocarbons. W. Mendius, Assr. to Sinclair Refining Co. (U.S.P. 2,009,557, 30.7.35. Appl., 30.11.31).

Combination high-pressure separator and dehydrator [for petroleum emulsions]. J. D. Brady (U.S.P. 2,009,646, 30.7.35. Appl., 19.4.32).

Production of motor fuels. R. H. Price, Assr. to Standard Oil Co. (U.S.P. 2,008,468, 16.7.35. Appl., 24.8.32).

Preparing stock for distillation of lubricating oil. A. E. Pew, jun., Assr. to Sun Oil Co. (U.S.P. 2,006,407, 2.7.35. Appl., 29.7.32).

Reclaiming crank-case oil. C. P. Shillaber, Assr. to Quigley Co., Inc. (U.S.P. 2,012,695, 27.8.35. Appl., 24.3.33).

Fractional crystallisation of waxes. E. Petty, Assr. to Alco Products, Inc. (U.S.P. 2,007,546, 9.7.35. Appl., 27.7.33).

Coal crusher. Cleaning filter screens. Rectification. Estimating the *d* of a liquid. Testing gases.—See I. **Road materials.**—See IX. **Insecticides.**—See XVI.

III.—ORGANIC INTERMEDIATES.

Synthesis of formaldehyde from water-gas. H. Küster (Brennstoff-Chem., 1936, 17, 103—109).—A review.

Purification of acetone. B. Pesce (Annali Chim. Appl., 1935, 25, 657—660).—A simple apparatus for fractional distillation in vac. is described. If completely dry $COMe_2$ (I) is required, the use of anhyd. $Ca(NO_3)_2$ (II) is recommended, obtained by carefully heating pure hydrated (II) to $\not>$ 270°. (I) dried by distillation under reduced pressure with anhyd. (II) remained unaltered after 1 month, whereas (I) dried by K_2CO_3 developed a yellow colour on keeping. The other drying agents tried gave less satisfactory results. A. M. P.

Effect of addition salts on the electrolytic reduction of 3 : 5-dinitro-*o*-cresol. W. E. Bradt and H. B. Linford (Trans. Electrochem. Soc., 1936, 69, Preprint 8, 95—105).—The effect of metallic salt additions to the catholyte on the diamine yield obtained on electrolysing the NO_2-compound in H_2SO_4 is closely related to the at. no. of the added metal. In 35 out of 43 cases investigated the additions lead to a decreased diamine yield. J. W. C.

Analysis of organic accelerators and anti-oxidants. II. Colour reaction of anti-oxidants in concentrated nitric acid and in Erdmann's reagent. III. Colour reactions of anti-oxidants in Mandelin's reagent and in concentrated sulphuric acid containing arsenic acid. H. Endoh (J. Soc. Chem. Ind., Japan, 1936, 39, 11—12 b, 12—13 b; cf. B., 1936, 181).—Colour reactions of 40 amines etc. are recorded and classified. E. W. W.

n-C_8H_{18} from shale oil. Autoxidation of tetralin and decalin.—See II. **Oxidation of sucrose and starch.**—See XVII.

See also A., Mar., 298, **Hydrogenation catalyst.** 312, **Prep. of lower alkanesulphonic acids.** 313, **Prep. of acetylenecarboxylic and ethylpropiolic acids.** 319, **Reducing org. compounds by ethanolamines.** 321, **Prep. of nitrosoguanidine, of butylpyrophosphorous acid, and of B alkoxy-halides.** 323, **Cl-derivatives of xylene.** 329, **Phenols of anthracene oil.** 330, **Prep. of α-naphthoic acid.** 331, **Prep. of tetrachlorophthalic acid.** 333, **Prep. of *m*-nitroacetophenone.** 338, **Conversion of β-aminoanthraquinone into indanthrone.** 342, **Prep. of 4-alkyl- and -aryl-quinolines.**

Patents.

Manufacture of esters from alcohols. Usines de Melle (B.P. 443,056, 4.3.35. Addn. to B.P. 410,373; B., 1934, 710).—The crude aq. solution of acid and Cr salts obtained as in B.P. 410,373 (*loc. cit.*) is allowed to flow down a column up which is passing the vapour of an alcohol. The Cr salts catalyse the direct esterification and the ester is separated in known manner, the residual liquid being electrolytically regenerated. E. J. B.

Conversion of unsaturated alcohols and/or ethers into saturated aldehydes and/or ketones. N.V. de Bataafsche Petroleum Maats., Assees. of H. P. A. Groll and C. J. Ott (B.P. 441,334, 9.7.34. U.S., 17.7.33).—The starting materials (+ steam if ethers are used) are heated with surface-active catalysts at 120—550° (200—350°). *E.g.*, *iso*butenol is passed over Cu at 285°/1 atm. or shaken with Cu in a pressure vessel at 200° to give $Pr^{\beta}CHO$ (76% of theory in first case).

Other catalysts used are porcelain at 200°, active C, SiO_2, brick, and pumice. H. A. P.

Production of polyglycerol esters. Lever Bros., Ltd., and R. Furness (B.P. 442,950, 4.9.34).—Purified concentrates of polyglycerol fatty acid esters, containing unesterified OH groups, are obtained by mixing the crude products of esterification with an aq. solution of inorg. salts, *e.g.*, Na, K, Al, Mg, Zn, or NH_4 sulphates, $Na_2S_2O_3$, Na_2SO_3 (at, *e.g.*, 80—100°), whereby the conc. ester separates as a distinct phase, and any unesterified polyglycerol and/or glycerol dissolves in the lower aq. layer, whence it can be recovered for further use. The esters have lathering and detergent properties. E. L.

(A) **Production of [dodecyl] esters [of polycarboxylic acids].** (B) **Decyl and** (C) **myristyl [tetradecyl] esters of polycarboxylic acids.** G. De W. Graves and W. E. Lawson, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,993,736—8, 12.3.35. Appl., [A] 10.6.31, [B] 20.6.34, [C] 31.8.34).—(A—C) *Di-dodecyl*, *-decyl*, and *-tetradecyl adipates*, *succinates*, and *phthalates*, *tridodecyl citrate*, *butyldodecyl*, m.p. 20—25°, and *butyltetradecyl adipate*, and *dodecyl* and *tetradecyl H phthalate* are described. H. A. P.

Preparation of fatty acids. E. T. Olson and A. W. Goos, Assrs. to Cleveland Cliffs Iron Co. (U.S.P. 1,994,433, 12.3.35. Appl., 13.10.33).—Simple or mixed dialkyl ethers are used as catalysts in the combination of metallic alkoxides with CO; *e.g.*, $NaOEt + Et_2O$ are treated with CO in an agitated autoclave at 20—60°/1000—2000 lb. per sq. in. to give $EtCO_2Na$. H. A. P.

Manufacture of cyanuric acid. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 443,119, 1.9.34. Addn. to B.P. 416,599; B., 1934, 1050).—The biuret and allophanic acid chlorides, respectively, are heated at 100—250° in an org. diluent, *e.g.*, petroleum (b.p. $>$ 100°), $C_2H_4Cl_2$, PhMe, $PhNO_2$, $C_{10}H_8$, until HCl is no longer evolved. The cyanuric acid is removed by filtration after cooling, washed (*e.g.*, with Et_2O, H_2O), and is obtained cryst., free from Cl, and in good yield (approx. 2 pts. from 3 pts. of initial material). E. J. B.

Manufacture of quaternary ammonium compounds and preserving and disinfecting media containing the same. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 441,473, 13.6.34).—Manufacture by known methods of compounds having $\nless$ 1 saturated alkyl radical of $\nless$ C_8 and $\nless$ 2 quaternary NH_4 groups is claimed. Examples are: *tetramethyldidodecylethylenediammonium hydroxide, bromide, cyanide,* and *thiocyanate*; *tetramethyldodecyl-oxy-* and *-thio-methyl-*, *tetrabutyldodecyloxymethyl-* (*chlorides*), and N′-*benzyl*-NN-*dimethyl*-N′N′-*diethyl*-N-*dodecyl-ethylenediammonium* salts; β-*hydroxy-tetramethyl-*, -NN′-*dibenzyl*-NN′-*dimethyl*-NN′-*didodecyl*-αγ-, s-*diallyldimethyldioctyl*-αγ-, and β-*ketotetramethyldioctadecyl*-αγ-*propylenediammonium* salts; β-*hydroxy-tetramethylbis*-(β-*hydroxydodecyloxypropyl*)*propylenediammonium chloride*, and the *quaternary chloride* from $NMe(C_2H_4{\cdot}NEt_2)_2$ (1 mol.) and *n*-decyloxymethyl chloride (3 mols.). H. A. P.

[Preparation of] chloro-sulphonated aromatic hydrocarbons. L. P. Kyrides, Assr. to Monsanto Chem. Co. (U.S.P. 1,993,722, 5.3.35. Appl., 29.6.31).—The eutectic mixture of *o*- and *p*-$C_6H_4Cl_2$ is treated with $ClSO_3H$ (3 mols.) at 20—25°; the *o*-$C_6H_4Cl_2$ alone is converted into a *sulphochloride*, m.p. 16°, b.p. 155°/18 mm. (*amide*, m.p. 134°; *ethylamide*, m.p. 83·5°), which is readily separated by distillation from the unchanged *p*-$C_6H_4Cl_2$. H. A. P.

Purification of nitrobenzene. Lonza Elektrizitätswerke u. Chem. Fabr. A.-G., Assees. of Lonza-Werke Elektrochem. Fabr. G.m.b.H. (B.P. 443,063, 17.5.35. Ger., 2.6.34).—Impure $PhNO_2$ is mixed with an alkaline oxide or hydroxide and an org. compound containing a OH group, or a substance capable of producing the latter, that is used in qual. tests of purity, *e.g.*, alcohols, phenols, ketones, aldehydes, and esters. Pure $PhNO_2$ is removed by distillation, extraction, etc. from the resinous condensation products of the reagents and the impurities. E. J. B.

Zinc 2 : 4 : 5-trichlorophenolate [-trichlorophenoxide]. L. E. Mills, Assr. to Dow Chem. Co. (U.S.P. 1,994,002, 12.3.35. Appl., 9.10.34).—The *salt*, $Zn(O{\cdot}C_6H_2Cl_3)_2,H_2O$, is prepared from $ZnCl_2$ and $C_6H_2Cl_3{\cdot}ONa$ in H_2O; it is used as a fungicide and antiseptic. H. A. P.

Manufacture of [stable] diazo[nium salt] preparations. G. Bonhôte, Assr. to Soc. Chem. Ind. in Basle (U.S.P. 1,993,433, 5.3.35. Appl., 16.6.34. Switz., 27.9.33).—The prep. of solid diazonium salts from *o*-aminocarboxylic acids of the C_6H_6 or $C_{10}H_8$ series is claimed. Examples are the *salts* 4 : 2 : 1-$NHAc{\cdot}C_6H_3(CO_2H){\cdot}N_2Cl$, 5 : 2 : 1-$OMe{\cdot}C_6H_3(CO_2H){\cdot}N_2Cl + nZnCl_2$, *5-ethoxy-2-carboxydiazobenzene* p-*chlorobenzenesulphonate*, p-*toluic acid-3-diazonium* 1 : 5-*naphthalenedisulphonate*, *5-nitro-2-carboxydiazobenzene* α-*naphthalenesulphonate*, and 3 : 2-$C_{10}H_6(CO_2H){\cdot}N_2Cl,nZnCl_2$. H. A. P.

Manufacture of monomethyl-*p*-aminophenol and its sulphate. C. H. W. Whitaker, Assr. to Industrial Dyestuff Co. (U.S.P. 1,993,253, 5.3.35. Appl., 18.9.34).—*p*-Hydroxyphenylglycine is decarboxylated by heating (at 140—145°) in *cyclo*hexanol or its esters, *cyclo*hexanone, or their homologues (technical methyl*cyclo*hexanone). The *p*-$OH{\cdot}C_6H_4{\cdot}NHMe$ is isolated as its sulphate by diluting the reaction mass with EtOH and adding H_2SO_4 at $\ngtr$ 30°. H. A. P.

Preparation of phenylmercaptans and intermediates therefor. E. Havas, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,993,663, 5.3.35. Appl., 11.8.33).—The Al compounds obtained from a C_6H_6 hydrocarbon (or its halogeno-derivative), $AlCl_3$, and SO_2 at a low temp. are reduced with a metal (Zn) and a conc. inorg. acid (HCl). *E.g.*, the *Al* compound from 1 : 4 : 2-$C_6H_3Me_2Cl$, $AlCl_3$, and SO_2 in CS_2 at 0—5° is reduced (Zn–HCl); the resulting thiol is converted without purification into 2 : 1 : 4 : 5-$C_6H_2ClMe_2{\cdot}S{\cdot}CH_2{\cdot}CO_2H$, m.p. 93°. The *Al* compound from *m*-C_6H_4MeCl is similarly converted into 1 : 3 : 6-$C_6H_3MeCl{\cdot}S{\cdot}CH_2{\cdot}CO_2H$, m.p. 123°. H. A. P.

Composition of matter [containing chlorodiphenyls]. M. Darrin, Assr. to F. N. Burt Co., Ltd.

(U.S.P. 1,994,810, 19.3.35. Appl., 31.12.29).—Chlorinated diphenyls (I), contaminated, if desired, by homologues thereof, but containing $\nless$ 80% of (I), are claimed, including mixtures with S, as impregnating agents, *e.g.*, for wood preservatives, fireproofing, etc. A. W. B.

Manufacture of pyrene compounds. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 441,408, 20.7.34).—Treatment of pyrene with strong sulphonating agents, *e.g.*, 30% oleum at 20—25° (the yield is increased by addition of kieselguhr or anhyd. Na_2SO_4), gives the 3:5:8:10-tetrasulphonic acid (Na_4 salt). Fusion of this with NaOH gives OH-derivatives ; *e.g.*, boiling 16% aq. NaOH gives 3-hydroxypyrene-5 : 8 : 10-trisulphonates (Na_3 salt), 50% aq. NaOH at 130—140° (30 min.) gives a Na_2 *dihydroxypyrenedisulphonate*, and 25% NaOH at 240—250° gives 3 : 5 : 8 : 10-*tetrahydroxypyrene*, m.p. 234—236° (decomp.). Conc. aq. NH_3 at 200—210° gives 3-*aminopyrene*-5 : 8 : 10-*trisulphonic acid.* H. A. P.

Manufacture of dibenzanthrone compounds. E. T. Howell, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,993,667—8, 5.3.35. Appl., [A] 27.12.32, [B] 5.5.33).—(A) In the fusion of benzanthrone or its derivatives with KOH–EtOH ($>$ 2 : 1) an oxidising agent is added, *e.g.*, chromate, permanganate, Cu^{II} or Fe^{III} compound, $NO_2\cdot C_6H_4\cdot SO_3H$ [preferably after the melt has reached 100—150° and before attainment of the final temp. (210—220°)]. Inert diluents, *e.g.*, $C_{10}H_8$, and retarders, *e.g.*, alkali-metal salts of the lower fatty acids, may be added. Improved yields and purity, due to inhibition of *iso*dibenzanthrone formation, are claimed. (B) The oxidising agent is an alkali-metal nitrite and the ratio KOH : EtOH is $>$ 3 : 1. H. A. P.

(A) Nitrite compound of 2-chloro-6-nitrobenzaldimercurioxide. (B) 2-Chloro-6-nitrobenzaldimercurioxide. (C) Preparation of 2-chloro-6-nitrobenzaldoxime. E. Havas, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,996,005—7, 26.3.35. Appl., [A—C] 27.7.33 ; cf. A., 1907, i, 1103).—(B) Interaction of 6 : 1 : 2-$NO_2\cdot C_6H_3MeCl$ with yellow HgO and NaOH in H_2O at the b.p. gives 2-*chloro*-6-*nitrobenzylidenedimercurioxide.* (A) This is converted by dil. aq. HNO_2 at 20—25° into its *nitrite,* decomposed at 50—60°. (C) The nitrite is converted by conc. HCl at 20—25° into 2-*chloro*-6-*nitrobenzaldoxime,* m.p. 156—157°. H. A. P.

Manufacture of [thioindigoid-]dyestuff intermediates. E. I. Du Pont de Nemours & Co. (B.P. 442,730, 13.8.34. U.S., 11.8.33).—See U.S.P. 1,993,663 ; *supra.*

Vat-dye intermediates.—See IV. **Conversion of terpenes.**—See VII.

IV.—DYESTUFFS.

Determination of direct dyes by precipitation. R. Marson (Rev. gén. Teint., 1935, **13,** 87—91 ; Chem. Zentr., 1935, i, 3348).—The best results are obtained by pptn. with cinchonine sulphate. H. N. R.

Separation and utilisation of *o*- and *p*-nitrotoluene from mononitrotoluene prepared from the gasoline fraction of Syukkôkô crude. III. Preparation of safranine and magenta. Conclusions. M. Mizuta (J. Soc. Chem. Ind., Japan, 1935, **38,** 723—724 B ; cf. B., 1936, 181).—The prep. of the above dyes from *o*- and *p*-$C_6H_4Me\cdot NH_2$ obtained from the PhMe fraction of the oil is described. These, and all products previously prepared, are of accepted standards of purity. J. W. B.

Evaluation of henna. W. A. N. Markwell (Chem. and Drug., 1935, **122,** 157).—Use of white wool (B.P. Codex) or of white flannel is unsatisfactory. The Lovibond tintometer is utilised to record the dyeing power on mohair. A. G. P.

Blue pigments.—See XIII.

See also A., Mar., 283, **Adsorption of dyes on gels.** 300, **Photo-reduction of vat dyes.** 323, **[Dyes from] xylene derivatives.** 328, **Diazotates.** 338, **Benzanthrone vat dyes. Purification of dinitroviolanthrone.** 347, **Prep. of benzoxazole dyes.** 348—9, **Cyanine dyes.**

Patents.

Manufacture of (A) [triarylmethane] dyes, (B) azo dyes, (C) azo dyes especially suitable for printing acetate artificial silk.] (A, C) J. Y. Johnson and (B) A. Carpmael. (A—C) From I. G. Farbenind. A.-G. (B.P. 441,389, 441,407, and 441,628, [A] 19.7.34, [B] 20.7.34, [C] 23.7.34).—(A) The dyes have as one of the basic groups $\cdot NR\cdot C_2H_4\cdot CN$ (R = H, alkyl, hydroxyalkyl, or aralkyl), and are claimed to be redder in shade, and, in the case of acid dyes, more sol. in H_2O, than dyes without the $\cdot C_2H_4\cdot CN$ group. *E.g.*, 4 : 4′-$CO(C_6H_4\cdot NEt_2)_2$ is condensed with α-$C_{10}H_7\cdot NH\cdot C_2H_4\cdot CN$ (cf. B.P. 404,744 ; B., 1934, 267) and $POCl_3$ to give a blue basic dye. Other examples are a dye of Formyl Violet type from $CH_2[C_6H_3NEt(CH_2Ph)\cdot SO_3H]_2$ and $NPhEt\cdot C_2H_4\cdot CN$ (I) (red-violet), a blue-violet dye from Michler's hydrol and $NPh(C_2H_4\cdot CN)\cdot CH_2\cdot C_6H_4\cdot SO_3Na$ (II), a yellow-green dye from *p*-$C_6H_4Cl\cdot CHO$ and (II), a blue dye from *o*-$CHO\cdot C_6H_4\cdot SO_3H$ and $NPh(C_2H_4\cdot OH)\cdot C_2H_4\cdot CN$ (converted into tetrasulphate and the CN hydrolysed for Al_2O_3 lakes), and a blue dye from $NPhEt\cdot C_2H_4\cdot CO_2H$ [hydrolysis (70% H_2SO_4) of (I)] and 1 : 2 : 4-$CHO\cdot C_6H_3(SO_3H)_2$. (B) Diazo or tetrazo compounds capable of forming complex metal derivatives are coupled with a OH-derivative of diphenylene oxide or sulphide, fluorene, or phenanthrene. Examples are : the *dyes* : 2 : 1 : 6 : 4-$NH_2\cdot C_6H_2(OH)(NO_2)\cdot SO_3H \rightarrow$ 3-hydroxydiphenylene sulphide (corinth), → 2- or 3-hydroxyphenanthrene (black), → 2-hydroxyfluorene (olive-brown), → 6-bromo-3-hydroxydiphenylene oxide (brown), and → 3-hydroxydiphenylene oxide-2-carboxylic acid (brown) ; 2 : 1 : 5 -$NH_2\cdot C_6H_3(CO_2H)\cdot SO_3H$ or 1 : 2 : 6 : 4 - $NH_2\cdot C_{10}H_4(OH)(NO_2)\cdot SO_3H \rightarrow$ 3 - hydroxydiphenylene oxide (III) (brown) and 4 : 4′ : 3 : 3′-$[\cdot C_6H_3\cdot NH_2(CO_2H)]_2 \rightarrow$ (III) (Cu ; brown). Except in the last-mentioned case the shades given are afterchromed. (C) Diazotised aromatic monoamines free from OH and SO_3H are coupled with 2 : 4-dihydroxyquinolinesulphonic acids or with 4-hydroxy-1-alkyl-2-quinolones. Examples are $NH_2Ph \rightarrow$ 2 : 4 - dihydroxyquinoline-6 (or 7)-sulphonic acid (24% oleum at 125°), or → 4-hydroxy-1-methyl-2-quinolone-6 (or 7)-sulphonic acid (IV), and *p*-$NH_2\cdot C_6H_4\cdot NO_2 \rightarrow$ (IV) (all green-yellow). H. A. P.

Manufacture of water-insoluble azo dyes [ice colours]. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 441,855, 23.7.34).—Red dyes of good fastness to light and NaOH are obtained by coupling in the fibre aminoaryl diketones of the type $ArCO{\cdot}Ar(NH_2){\cdot}COAr$ with 2 : 3-hydroxynaphthoic arylamides. Examples are the *dyes* : 1-amino-2:5-dibenzoylbenzene → 2:3-hydroxynaphthoic *o*-anisidide (I), 2 : 5 - dimethoxyanilide, 5 - chloro - 2 : 4 - (II) and 4 - chloro - 2 : 5 - dimethoxybenzene ; 1 - amino - 2 : 5 - di - *p* - toluoylbenzene → 2 : 3-hydroxynaphthoic *o*-phenetidide (III), *o*-toluidide (IV), (II), and α - naphthalide (V) ; 1 - amino - 2 : 5 - di - *p* - chlorobenzoylbenzene → (I), 2 : 3 - hydroxynaphthoic 5 - chloro - *o* - toluidide (VI) and β-naphthalide ; 1 - amino - 3 : 5 - dibenzoylbenzene → (III) and 2 : 3 - hydroxynaphthoic *p* - phenetidide ; and 1 - amino - 2 : 4 - dibenzoylbenzene → (I), (II), (III), (IV), and (V). H. A. P.

Manufacture of water-soluble monoazo dyes. Imperial Chem. Industries, Ltd., and A. H. Knight (B.P. 441,884, 27.7.34).—Dischargeable azo dyes for acetate silk are prepared by coupling a diazotised nitroaniline with an arylamino-ethane-, -propane-, or -hydroxypropane-sulphonic acid, both components being free from nuclear SO_3H or CO_2H. Examples are the *dyes* : $p\text{-}NH_2{\cdot}C_6H_4{\cdot}NO_2$ → $NPhEt{\cdot}C_2H_4{\cdot}SO_3H$ (I) or $NPhEt{\cdot}CH_2{\cdot}CH(OH){\cdot}CH_2{\cdot}SO_3H$ (II) (red), $NHPh{\cdot}C_2H_4{\cdot}SO_3H$ (III) (orange), or $NHPh{\cdot}CH_2{\cdot}CH(OH){\cdot}CH_2{\cdot}SO_3H$ (IV) (red-brown) ; $1:2:4\text{-}NH_2{\cdot}C_6H_3Cl{\cdot}NO_2$ → (III) (orange), (I) or (II) (crimson); (IV) (red-orange), $NPh(C_2H_4{\cdot}OEt){\cdot}C_2H_4{\cdot}SO_3H$ (crimson), or $m\text{-}C_6H_4Me{\cdot}NEt{\cdot}C_2H_4{\cdot}SO_3H$ (bordeaux) ; $1:2:6:4\text{-}NH_2{\cdot}C_6H_2Cl_2{\cdot}NO_2$ → (I) or $4:1:3\text{-}OMe{\cdot}C_6H_3Me{\cdot}NH{\cdot}CH_2{\cdot}CH(OH){\cdot}CH_2{\cdot}SO_3H$ (brown) ; $1:2:4\text{-}NH_2{\cdot}C_6H_3(NO_2)_2$ → $m\text{-}C_6H_4Me{\cdot}NBu^{n}{\cdot}CH_2{\cdot}CH(OH){\cdot}CH_2{\cdot}SO_3H$ or $4:1:3\text{-}OMe{\cdot}C_6H_3Me{\cdot}NBu^{n}{\cdot}CH_2{\cdot}CH(OH){\cdot}CH_2{\cdot}SO_3H$ (V) (violet); $1:4:3\text{-}NH_2{\cdot}C_6H_3Me{\cdot}NO_2$ → (II) (orange) ; $1:6:2:4\text{-}NH_2{\cdot}C_6H_2Cl(NO_2)_2$ → (II) (violet) or (V) (red-blue) ; and $m\text{-}NH_2{\cdot}C_6H_4{\cdot}NO_2$ → (I) (yellow-orange). H. A. P.

Manufacture of (a) secondary disazo and (b) monoazo dyes [for rayon]. Imperial Chem. Industries, Ltd., and A. H. Knight (B.P. 441,072 and 441,089, [a] 11.7.34, [b] 13.7.34).—(a) The dyes are of the type arylamine → arylamine (having a free *p*-position) (I) → end-component (II), (II) being an alkyl- or a β-alkoxyethyl-sulphatoalkylamine or a polyethenoxyalkylamine of the C_6H_6 series, or, where (I) is a 2 : 5-dialkoxyaniline or a $C_{10}H_8$ derivative, a phenylalkylsulphamic acid. Examples are the *dyes* : $p\text{-}NH_2{\cdot}C_6H_4{\cdot}NO_2$ → $3:1:4\text{-}NH_2{\cdot}C_6H_3Me{\cdot}OMe$ → $NPhEt{\cdot}C_2H_4{\cdot}O{\cdot}SO_3Na$ (III) (red-violet) or → $o\text{-}C_6H_4Me{\cdot}NH{\cdot}C_2H_4{\cdot}O{\cdot}SO_3Na$ (red-brown) ; NH_2Ph → $\alpha\text{-}C_{10}H_7{\cdot}NH_2$ → (III) or → $NPh(C_2H_4{\cdot}OEt){\cdot}C_2H_4{\cdot}O{\cdot}SO_3Na$ (both crimson) ; $o\text{-}NH_2{\cdot}C_6H_4Cl$ → $1:2:5\text{-}NH_2{\cdot}C_6H_3(OMe)_2$ → $[NHPhEt + 2(CH_2)_2O]$ (red-violet) ; and $o\text{-}NH_2{\cdot}C_6H_4Me$ (IV) → (IV) → $m\text{-}C_6H_4Me{\cdot}N(C_2H_4{\cdot}OEt){\cdot}C_2H_4{\cdot}O{\cdot}SO_3Na$ (yellow-red). (b) Dyes of the type : *p*-amino-phenyl or -tolyl hydroxyalkyl ether → *p*-cresol (V), free from SO_3H, CO_2H, or NO_2, are converted into H sulphate esters (conc. H_2SO_4). *E.g.*, the dye $p\text{-}NH_2{\cdot}C_6H_4{\cdot}O{\cdot}C_2H_4{\cdot}OH$ → (V) is stirred with 96% H_2SO_4 (at room temp. ?), the product is poured on ice, and the *H sulphate* produced is neutralised with NaOH, KOH, or NH_3. The H_2O-sol. dye produced gives greenish-yellow shades (dischargeable) on acetate rayon, fast to light, acids, alkalis, steaming, and hot-pressing. Similar *dyes* are obtained using $n\text{-}p\text{-}NH_2{\cdot}C_6H_4{\cdot}O{\cdot}C_3H_5{\cdot}OH$, $4:2:1\text{-}NH_2{\cdot}C_6H_3Cl{\cdot}O{\cdot}C_2H_4{\cdot}OH$, and 3 : 1 : 6- and $2:1:5\text{-}NH_2{\cdot}C_6H_3Me{\cdot}O{\cdot}C_2H_4{\cdot}OH$ as first components. H. A. P.

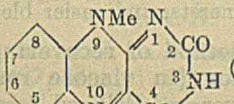
Manufacture of vat dyes. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 440,822, 7.2.35).—*N*-Alkylanthraquinoneazines are treated with halogenating agents to give blue dyes of good fastness to Cl_2, light, and kier-boiling. *E.g.*, the azine (I) from 2-bromo-1-amino- and 2-bromo-1-methylamino-anthraquinone is heated with Br and I in $PhNO_2$ at 100—110° to give a Br- or Br_2-derivative according to the amount of Br used, or with SO_2Cl_2 and I in $PhNO_2$ to give a Cl- or Cl_2-derivative. Other starting materials are the Bz derivative of (I) and the azines from 1-bromo-3-fluoro-2-amino- and 1 : 3-dibromo-2-methylamino-anthraquinone (II), and (II) (2 mols.). H. A. P.

Manufacture of [vat] dyes and intermediate products. Soc. Chem. Ind. in Basle (B.P. 441,041, 18.3.35. Switz., 17.3.34 and 6.3.35).—A 5-, 9-, or 10-methylbenzanthrone is treated with Br in 80—95% aq. H_2SO_4 at ≯ 100°, and the resulting 3-Br-derivative is converted into the corresponding dibenzanthrone by fusion with alkali, the Br being (optionally) previously replaced by S, Se, or 1-aminoanthraquinonyl. *E.g.*, 9-methylbenzanthrone is brominated in 90% H_2SO_4 at 55° ; a similarly prepared Br-derivative of 5-(or 9-)methylbenzanthrone (from 2-*p*-toluoylbenzoic acid, glycerol, and H_2SO_4) is condensed with 1-aminoanthraquinone in $PhNO_2$ at the b.p., and the product is fused with KOH–EtOH at 150—155° to give an olive-green dye. The methylbenzanthrone obtained from 2-methylanthraquinone after removal of 2-methylbenzanthrone is specifically claimed. H. A. P.

Manufacture of anthraquinone dyes. Chem. Works, formerly Sandoz (B.P. 441,845, 19.6.34. Switz., 17.8.33 and 17.1.34).—Phenylaminoanthraquinones (I) having a free *p*-position are condensed with aldehydes (CH_2O) in a neutral or acid medium (the use of H_2SO_3, or HCO_2H or other reducing acids is excluded) to give di-(or tri-)arylmethane derivatives. If (I) is free from SO_3H the product is sulphonated. Blue to green-blue acid wool dyes of good fastness to milling and light are produced. *E.g.*, 1-amino-4-anilinoanthraquinone-2-sulphonic acid is condensed with PhCHO or $(CH_2O)_n$ (II) in 60—70% H_2SO_4 at 60—100° ; alternatively, 1-aminoanthraquinone is condensed with (II) in 80% H_2SO_4 at 60° and the product sulphonated (oleum at 45°). H. A. P.

Manufacture of [anthraquinone] vat dyes containing two thiazole rings. I. G. Farbenind. A.-G. (B.P. 441,915, 3.5.35. Ger., 9.5.34).—An *o*-aminothiol of the C_6H_6, $C_{10}H_8$, or anthraquinone series is condensed with an arylthiazolecarboxylic acid halide (I), ≮ 1 component having an anthraquinone nucleus ; alternatively, an arylamine is condensed with (I), and the *o*-SH group subsequently introduced and the product cyclised. *E.g.*, 2-amino-1-thiolanthraquinone (II) is heated with 5-chlorobenzthiazole-1-carboxylic chloride (III) in $PhNO_2$ at the b.p. ; the *product* is a greenish-yellow vat dye of good fastness to light, Cl_2, and Na_2CO_3. The same compound is produced by condensation of (III) with 2-aminoanthraquinone, and conversion of the resulting amide successively into the *iminochloride*, m.p. 311—312° (PCl_5), and *iminothiol*, which latter is finally cyclised by conc. H_2SO_4 at 100—110°. Still another method is to heat the 1-*chloro-2-anthraquinonylamide* of (III) with Na_2S and S in EtOH and to cyclise the resulting *Na mercaptide* with p-$C_6H_4Me{\cdot}SO_2Cl$ in 1-$C_{10}H_7Cl$ at 270°. Other examples are the *dyes* from (II) and 5 : 6-benzbenzthiazole-1-carboxylic chloride and 1-methylbenzthiazole-5-carboxylic chloride. H. A. P.

Manufacture of *iso*alloxazine compounds. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 441,692, 20.7., 2.11., and 15.11.34, and 29.5.35).—*N*-Monosubstituted aromatic *o*-diamines (I) or their salts are condensed with alloxan or its derivatives, *e.g.*, dialuric acid, *iso*dialuric acid, or alloxantin. H_3BO_3 may be used as catalyst, or if hydroxyalkyl derivatives of (I) are used these may advantageously be converted into sulphate or phosphate esters before combination, and the products are then subsequently hydrolysed. In place of (I) the corresponding *o*-nitroamine may be used, the primary condensation products being later reduced and the leuco-compounds formed oxidised (*e.g.*, with air, $KMnO_4$, halogens). The products are yellow vat dyes and are allied in constitution to vitamin-*B*. Thus, o-$NH_2{\cdot}C_6H_4{\cdot}NHMe$ is boiled with alloxan hydrate (II) in dil. HCl to give 9-*methyl*iso*alloxazine* (III), m.p. 392° (decomp.) (*Ag* salt) ; alternatively, *o*-nitroarabinaminobenzene (from arabinamine and o-$C_6H_4Br{\cdot}NO_2$ in C_5H_5N) and (II) are reduced in conc. HCl with $SnCl_2$, and the leuco-compound formed is treated with $KMnO_4$ after dilution to give 9-*arabino*iso*alloxazine*. Other examples are : 9-*ethyl*-, m.p. 330° (decomp.), 3 : 9-*dimethyl*-, m.p. 320—325° (decomp.), 6 : 7 : 9- and 6 : 8 : 9-*trimethyl*-, 6 : 7-*dimethyl*-9-n-*amyl*-, m.p. 295—300° (decomp.), 9-*phenyl*-, 5 : 6-*benzo*-9-*methyl*-, decomp. > 330°, 6 : 7-*dimethyl*-9-*arabino*- (vitamin-B_2) [the l-*compound* has m.p. 293° (decomp.)], 9-βγ-*dihydroxy*-n-*propyl*-, m.p. 300° (decomp.), and 6 : 7-*dimethyl*-9-d-*ribityl*-iso*alloxazine*. 4-*Amino-5-methylamino*-o-*xylene*, m.p. 80°, is prepared by treating 4-*nitro-5-p-toluenesulphonamido*-o-*xylene*, m.p. 151°, with Me_2SO_4 and KOH, hydrolysing (H_2SO_4–AcOH) the resulting *Me* derivative, m.p. 149°, and finally reducing the product ($SnCl_2$–HCl). H. A. P.



(III)

V.—FIBRES ; TEXTILES ; CELLULOSE ; PAPER.

Differences in treatment of spun plant fibres and weaving and twine fibres. W. Fehre (Deuts. Färber-Ztg., 1935, **71**, 51—52, 61—63 ; Chem. Zentr., 1935, i, 3073).—A review of methods of treatment. H. J. E.

Comparative physical tests of cotton and "vistra" yarn. A. Grote (Melliands Textilber., 1935, **16**, 30—32 ; Chem. Zentr., 1935, i, 3222).—Mechanical tests lead to the conclusion that the adhesion of the single fibres is greater in "vistra" yarn than in cotton ; determinations of the tensile and breaking strengths are also recorded. H. N. R.

Testing the physical and chemical properties of wool by means of the microscope. W. von Bergen (Rayon and Melliand Text. Month., 1935, **16**, 527—529, 599—602, 663—665).—Photomicrographs of wool fibres are shown. Wool may be sorted by measurement methods according to width (by projection on to a screen), cross-section, fibre wt. The metal-plate technique, for cutting sections without embedding, is described. Damage caused by sunlight or by over-bleaching may be detected by swelling in aq. NaOH. Alkali damage and mildew attack can also be detected by microscopical tests. S. M. N.

Physico-chemical methods for determination of damage in wool. A. Itkina and Plechan (Melliands Textilber., 1935, **16**, 45—46, 106—108 ; Chem. Zentr., 1935, i, 3075).—A modification of the diazo reaction, using *m*-nitro-*o*-anisidine and tyrosine, is described. The degree of attack of swelling liquids (H_2O, HCO_2H, H_2SO_4) may be determined also by microscopical measurement, or gravimetrically. J. S. A.

[Production of] unshrinkable woollens. L. A. Jordan (Canad. Text. J., 1936, **53**, No. 4, 38—39).—A chlorination process is described in which wool (50 lb.) is immersed for 45 min. in a cold liquor prepared with H_2O (300), aq. NaOCl containing 15% of available Cl (2), and aq. HCl (*d* 1·14) (0·75 gal.), followed first by rinsing and then by an anti-chlor treatment in a warm liquor containing 4 lb. of $NaHSO_3$ in 100 gals. of H_2O. The resulting unshrinkable wool is stoved with SO_2 to produce a good white ; Fe stains are removed by treatment with warm dil. $H_2C_2O_4$. A. J. H.

Casein-wool. W. von Bergen (Rayon and Melliand Text. Month., 1936, **17**, 39—40).—The new Italian artificial wool is prepared from milk-casein dissolved in alkali. The process is similar to that used for viscose staple fibre. The product resembles a highly damaged wool in physical and chemical properties. The tensile strength is one quarter that of natural wool and the resistance to acid is poor. S. M. N.

Silk degumming. III. Rate of boiling-off silk hosiery. O. A. Hougen (Text. Res., 1935, **5**, 191—211 ; cf. B., 1935, 986).—The degumming coeff. for various alkalis and soap is determined. Other factors, notably temp., affecting the process are examined. Ch. Abs. (*p*)

Deterioration of silks by light of different wavelengths. E. Bruner and M. Goehring (Text. Res., 1935, **5**, 231—239).—The tensile strengths and *X*-ray diffraction patterns of weighted and unweighted silks after exposure to light of different λ are examined. Exposure results in a decrease in fibre orientation, causing the long fibre arc to expand towards the character of a powder pattern. Ch. Abs. (*p*)

Permeability of summer fabrics to ultra-violet rays ; their bactericidal action. I. Tiggemann (Arch. Hyg. Bakt., 1935, **113**, 354—363 ; Chem. Zentr., 1935, i, 3363).—Artificial silk materials are more transparent to ultra-violet light than is natural silk. H. N. R.

Synthetic yarns and their reaction in the boil-off. W. L. Bentley (Rayon and Melliand Text. Month., 1936, **17**, 28—30).—Gelatin sizing and "boiling-off" are discussed, with special reference to their effects on stretch and "pebble." S. M. N.

Examination of oxycellulose. P. Heermann (Rayon and Melliand Text. Month., 1935, **16**, 525—526, 619—620).—A large no. of qual. tests are critically reviewed. The methylene-blue, Prussian-blue, and ammoniacal Ag tests are considered most suitable. S. M. N.

Viscose staple fibre. I. Shortening of the ripening process by pulping alkali-cellulose at higher temperature and by mixing the viscose. H. Sobue and S. Itino (J. Soc. Chem. Ind., Japan, 1935, **38**, 725—728 B).—Alkali-cellulose was pulped for 30 min. at 0—30°, aged for 12 hr., treated with CS_2, xanthated for 2 hr., and dissolved in NaOH, and η was determined for the ripened solutions of viscose so obtained. η for cellulose pulped at 30° decreases with ripening time to a min. val. at 48 hr., but the NH_4Cl val. is high. The latter can be reduced by increasing the cellulose content, decreasing the alkali content, or ripening at 25—30°. The last is the best method since η is then decreased. The influence of mixing viscoses on η and on the NH_4Cl val. has been determined. The shortening of the ripening process may also be effected by mixing viscoses of different degrees of ripening and by decreasing η by pulping the alkali-cellulose at 30° without degradation. R. S. B.

Viscose. LXIII. Spinning of normal viscose in concentrated sulphuric acid to produce strong, fine filaments. G. Kita, S. Monden, G. Kanno, K. Kadowaki, and T. Ikeda. **LXIV. Spinning by the two-bath procedure to produce strong, fine filaments.** G. Kita, S. Riko, Y. Akizuki, and Y. Kikuti (J. Soc. Chem. Ind., Japan, 1936, **39**, 26—31 B, 31—35 B).—LXIII. Details are given of numerous experiments in which the % CS_2 (40—60), bath length (40—70 cm. at 70 m. per min.), % NaOH (5—7·5), % cellulose (6·5—7·0), duration of ripening (1—6 days), and $[H_2SO_4]$ (50—60%) were varied, and the viscose was spun to filaments of 0·78—3 denier. The greatest tensile strength obtained was 4·6 g. per denier for a 0·95-denier filament. In general, a long bath and high $[H_2SO_4]$ were favourable.

LXIV. Numerous spinnings were made with the object of obtaining a fine, strong, and extensible filament. The duration of ripening (2—8 days), the rate of spinning (40—60 m. per min.), and the lengths, compositions, and temp. of the baths were varied. When the first bath was short (10 cm.) the filament strength increased with increasing length of the second bath; when the first bath was lengthened and the second correspondingly shortened, the filament became weaker. Severe stretching was of no advantage. A. G.

Spinning of copper-silk in chemically dried air. E. Schurz (Melliands Textilber., 1935, **16**, 195—197; Chem. Zentr., 1935, i, 3074).—Cu-silk spun in H_2SO_4-dried air was superior in fineness and strength to that spun in a bath. H. J. E.

Physical properties of rayon and acetate yarns in relation to textile manipulations. J. A. van Laer (Rayon and Melliand Text. Month., 1935, **16**, 677—682).—Ultimate tensile strength is less important than resistance to stretch. In processing, loads > 50 g. per 100 deniers at 65% R.H. should be avoided. The time factor is important; all tension should be released during rest periods. The max. stretch advisable in slashing is 8%. S. M. N.

Production of extra-strong rayon yarns. H. Roche (Silk J., 1935, **11**, No. 131, 18; No. 132, 23).—The presence in viscose of CaO, $CaSO_4$, and certain Fe salts decreases, and of cholic acid increases, the strength of yarns. Chemical treatment of yarn to decrease absorption of H_2O increases its air-dry tenacity. Similar effects are produced by heating yarn, spun in a semi-coagulated condition, with H_2SO_4 and $(NH_4)_2SO_4$, or after complete coagulation with softening agents, *e.g.*, $ZnCl_2$, or halogenated fatty acids. Ch. Abs. (*p*)

Highly purified wood pulps in the viscose process. C. H. Goldsmith (Rayon and Melliand Text. Month., 1935, **16**, 513—514).—The viscose process is outlined and the advantage of using purified pulp are indicated. They are: low hemicellulose content, caustic liquor may be re-used more times, no ageing required, easier filtration of viscose, less clogging of spinnerets, and easier bleaching. S. M. N.

Method of recovering caustic soda from press liquor [in viscose manufacture]. T. Kawabata (Rayon and Melliand Text. Month., 1935, **16**, 659—660).—Chemical methods are impracticable. The Asahi dialyser, which employs the countercurrent principle, is described and its advantages are indicated. S. M. N.

Groundwood quality expressed by freeness and bursting strength. H. A. Paterson (Pulp & Paper Mag. Canada, 1936, **37**, 79—80, 126).—The exponential relationship between the freeness (F) and the bursting strength (S) of mechanical pulp is sensitive to all causes of change in quality (manufacturing conditions etc.), and by expressing it in semi-logarithmic chart form it can be used as an indication of quality, by means of which comparisons of different pulps may be made. An arbitrary standard F of 100 on the Canadian standard freeness tester is chosen; other instruments give curves of a different character, but still characteristic of the pulp stock. The F–S relations of mixtures of groundwood and sulphite pulp are considerably influenced by the characteristics of the latter, even when present in only small proportions, and are therefore of less practical val. H. A. H.

Theory of pulp washers. W. B. Van Arsdel (Paper Ind., 1936, **17**, 725—728).—A mathematical discussion of simple-type and countercurrent washers is given. H. A. H.

Pulp testing by a rapid sheet-making process. J. Coghill (Paper Trade J., 1936, **102**, TAPPI Sect., 127—144).—A complete equipment is described in detail. It includes determination of consistency, sheetmaking, drying, and testing. Operating times for both free and slow stocks are given. Beating is not discussed. H. A. H.

Welded [pulp] digester and other improvements. A. Danninger (Papier-Fabr., 1936, **34**, 65—69).—A digester with welded seams is described, and its advantages as opposed to one with riveted plates are indicated. The superiority of indirect (Brobeck) over direct heating is shown. A recent development in flat vibrating screens, both coarse and fine, is described. D. A. C.

Chemical composition of spruce wood and the reactions between the wood constituents and the cooking acid in the sulphite process. E. Hägglund (Suomen Pap. Puutav., 1934, 383—391; Chem. Zentr., 1935, i, 3222).—A review of earlier work. H. N. R.

Reaction mechanism of the sulphite-cooking process. E. Hägglund (Suomen Pap. Puutav., 1934, 628, 632; Chem. Zentr., 1935, i, 3222).—A reply to Kullgren (cf. B., 1934, 188). H. N. R.

Analysis of sulphite[-cellulose] waste liquor. A. M. Partansky and H. K. Benson (Paper Trade J., 1936, **102**, TAPPI Sect., 81—87).—Standard methods of determining the separate components have been modified so as to be applicable in presence of each other. In this way a systematic analysis (details given) has been evolved for the determination of total solids, residue on ignition, Ca, S, org. matter, volatile acids, minor volatile constituents (MeOH, EtOH, $COMe_2$), furfuraldehyde, lignin, and sugars. H. A. H.

Use of white pigments in paper. J. J. Crawford (Pulp & Paper Mag. Canada, 1936, **37**, 97—101, 104).—The effects on opacity, whiteness, and mechanical strength of adding TiO_2, lithopone (containing 30% of ZnS), ZnS, Titone-*P* (a mixture of 85% of lithopone and 15% of TiO_2), and $BaSO_4$ to sized beaten bleached kraft pulp, and the factors affecting their retention when made into sheets on the British pulp-evaluation equipment, are investigated. When the order of addition of the ingredients to the pulp is rosin size, alum to p_H 4·2, and filler, opacity is, in general, increased in the order $BaSO_4 <$ lithopone $<$ ZnS $<$ Titone-*P* $< TiO_2$. Retention of filler is markedly affected by the order of addition to the pulp; it is very low if no size is present, and if both size and alum are used the addition of filler last gives much poorer retention than if it is added before the alum. On the other hand, for a given % of filler present, opacity is highest when it is added last, and lowest when added first as a slurry with the size. This latter effect is ascribed partly to the particles of filler being coated with a film of size, and partly to the adverse effect of colouring matter pptd. from the H_2O by the subsequent addition of alum. Under ordinary papermaking conditions and with a clear H_2O supply, addition of filler first gives optimum opacity. Bursting strength is reduced by the presence of filler, but no consistent effect on tearing strength is observable. H. A. H.

Removal of metal particles from material for photographic and other papers. Anon. (Papeterie, 1935, **57**, 57—58; Chem. Zentr., 1935, i, 3222).—Large particles are removed by passage through long sand-traps; bleaching with Cl_2 then converts smaller particles into sol. chlorides, which are removed on washing. H. N. R.

Animal size for [tub-sizing] fine papers. F. S. Klein and J. E. Minor (Paper Ind., 1936, **17**, 729—733).—For properly extracted glues, η and *d* (Baumé) are directly proportional, but with overcooked or impure glues *d* may give misleading vals. which have no relation to sizing quality. Time and temp. cooking conditions can be regulated by η determinations. Addition of $Al_2(SO_4)_3$ to glue solution gives a temporary increase in η, which, however, rapidly falls on storage; the change in p_H has no appreciable final effect on η. For heating storage tanks, the use of indirect heat is to be preferred to live steam, which adversely affects η and gel strength. H. A. H.

[Heat-]insulation specifications for the paper industry. J. W. Hemphill (Paper Trade J., 1936, **102**, TAPPI Sect., 107—112).—Materials for the heat insulation of pipe-lines, boilers, furnaces, digesters, etc., and the specifications governing their application in the various parts of pulp- and paper-making plant, are discussed. H. A. H.

Drying rate for tissue and absorbent papers. A. E. Montgomery (Paper Trade J., 1936, **102**, TAPPI Sect., 112—114).—The drying rates are lower than for kraft paper or newsprint (cf. B., 1933, 423; 1934, 188). The substance of paper has a decided effect on its moisture content as it enters the dryers, especially in the lightest-wt. sheets. The drying rate on M.G. machines is about 5 times as high as on multiple dryers. H. A. H.

Rate of drying of glassine and greaseproof paper. V. F. Waters (Paper Trade J., 1936, **102**, TAPPI Sect., 114—115).—The equations of Montgomery on the drying rate of kraft paper (B., 1933, 423), and of Adams on the drying rate of newsprint (B., 1934, 188), have been extended to apply to glassine and greaseproof papers. The data on these latter vary more widely and the drying rates are lower than in the cases of kraft paper and newsprint. H. A. H.

Cowles system for detrashing and defibring waste paper stock. E. Cowles (Paper Trade J., 1936, **102**, TAPPI Sect., 102—106).—The equipment is described. The waste paper stock is broken up by the combined centrifugal, screening, and defibring action of the "classifiner," and the undefibred residue is continuously removed by the flow of about 10% defibred stock acting as a vehicle, this latter being recovered after settling. The system operates best at about 2% consistency, and there is only a comparatively small drop in freeness. H. A. H.

Woods and their constituents.—See II. **Lignocellulose stearate.**—See XII. **Treating sole leather.**—See XV. **Textile waste liquors.**—See XXIII.

Patents.

Production of cellulose. H. Dreyfus (B.P. 442,444, 7.8.34).—Lignin-containing cellulosic material is treated with caustic alkali ($> 6\%$) at $< 150°$ and under a pressure $>$ the v.p. of the solution, the excess pressure being produced by means of an inert gas (N_2). F. R. E.

Improvement of cellulose. E. Scheller (U.S.P. 1,998,389, 16.4.35. Appl., 12.11.30. Ger., 23.11.29).—Cellulose is treated with hot caustic alkali (5—10% NaOH) and partly bleached with Cl_2; bleaching is then completed with Na_2O_2 and the material acidified. The product has a high α-cellulose content. F. R. E.

Preparation of copper-containing cellulose solutions with employment of dilute aqueous ammonia. W. Traube (B.P. 442,357, 23.7.35).—Cellulose is saturated with a solution of a cuprammine salt (I) prepared by treating Cu salts with dil. aq. NH_3 ($\ngtr$ 8%) or equiv. amounts of aliphatic amines. The resulting mixture, or, alternatively, the (I) before addition to the cellulose, is treated with approx. the equiv. amount of aq. NaOH. F. R. E.

Preparation of [low-viscosity] cellulose nitrate. P. B. Cochran, M. V. Hitt, and L. V. Taylor, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,997,766, 16.4.35. Appl., 16.3.33).—Regenerated cellulose sheet is reduced to small crumpled pieces of single thickness, washed free from foreign materials (pigments, glycerin, etc.), and nitrated at 40—60° for $\frac{1}{4}$—2 hr. with 20—45 pts. of nitrating acid containing $H_2O \nless 16$, $H_2SO_4 \ngtr 65$, and HNO_3 19—30%. F. R. E.

Changing the solubility characteristics of the lower fatty acid esters of cellulose. A. F. Bidaud, Assr. to Du Pont Rayon Co. (U.S.P. 1,998,267, 16.4.35. Appl., 14.1.32. Fr., 19.2.31).—The solid cellulose ester is treated with an aq. inorg. salt solution capable of swelling the ester, but not of dissolving it [$CaCl_2$, $Ca(NO_3)_2$, NH_4NO_3], together with a small quantity of a mineral acid (3—10% of HNO_3). F. R. E.

Spinning of cuprammonium filaments. H. Hofmann, Assr. to Amer. Bemberg Corp. (U.S.P. 1,997,930, 16.4.35. Appl., 6.7.32).—The filaments are treated first with a setting solution containing a high NH_3 content (0·8—20 g. of NH_3 per 600 ml.) and then with solutions of diminishing NH_3 content. Apparatus is claimed. F. R. E.

Manufacture of artificial silk. I. G. Farbenind. A.-G. (B.P. 442,367, 3.7.34. Addn. to B.P. 434,881).—Viscose is spun into a rapidly coagulating bath, viz., one containing a sulphate of Na, Zn, Mg, or Al in addition to H_2SO_4, at a velocity $>$ 90 m./min., and is collected without the assistance of a thread guide or spinning funnel as in the prior patent. F. R. E.

Treatment of paper pulp. H. S. Holt and G. L. Schwartz, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,998,758, 23.4.35. Appl., 3.4.33).—Chemical pulp is given a light mercerising treatment by rapidly disintegrating it at 10—18% consistency (*e.g.*, in a disc refiner) in presence of 6·5—14% aq. NaOH at room temp. It is then promptly diluted and washed, and beaten under conditions producing " hydration " with the min. of cutting action. Swollen starch solution is finally added in ratios varying from 0·1 to 2 lb. per lb. of pulp, which is then converted into paper. D. A. C.

Bleaching of wood pulp. A. Danninger (B.P. 442,336, 18.4.35).—Ground wood is treated with materials capable of forming hydrosulphite *in situ*, *e.g.*, Zn dust and SO_2. F. R. E.

Apparatus for separating sulphurous acid from sulphite waste liquor. K. Heinemann, Assr. to Amer. Lurgi Corp. (U.S.P. 2,006,138, 25.6.35. Appl., 26.4.34. Ger., 11.7.30).—The liquor is degasified while trickling down a baffled tower. Means for relieving excess pressure or vac. are described. B. M. V.

Concentration of waste liquors [of the pulp industry]. C. C. Hunicke and C. L. Wagner (U.S.P. 2,005,422, 18.6.35. Appl., 31.10.33).—Hot flue gases, broken into bubbles of predetermined size, are injected under a predetermined head of the liquid (*e.g.*, sulphite waste), any froth being beaten down by inclined sprays of the liquid that has overflowed from the bubbling vessel. B. M. V.

Smelting furnace for black liquor. A. G. Kernin, Assr. to Mosinee Paper Mills Co. (U.S.P. 2,004,205, 11.6.35. Appl., 9.1.32).—Liquor from sulphate pulp is evaporated on a sloping bed and smelted in a pit at the bottom of the slope, air being introduced through tuyères. B. M. V.

Moistureproof [wrapping] material. W. H. Charch, Assr. to Du Pont Cellophane Co., Inc. (U.S.P. 1,997,857, 16.4.35. Appl., 2.5.32).—A cellulose derivative sheet (*e.g.*, cellulose acetate, ethylcellulose or its acetate) is coated on both sides with a moistureproofing composition consisting of a cellulose derivative 30—80, a gum 0—40, a wax 1—25, and a plasticiser 0—30% dissolved in a volatile solvent having substantially no swelling action on the base sheet, so as to give a total coating thickness of 0·00002—0·00005 in. The product is transparent, flexible, and non-tacky. F. R. E.

Composition and material [wrapping tissue] made therefrom. M. V. Hitt, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,997,583, 16.4.35. Appl., 28.9.33).—A suitable base sheet, *e.g.*, regenerated cellulose, is thinly coated on both sides with a solution of pyroxylin (10·5—11·4% N) 10, a plasticiser (Bu_2 phthalate) 4—12, a blending agent (ester gum) 1—2, and a wax (paraffin) 0·1—1·0 pts. by wt. The coating is moistureproof and flexible, has good surface slip, and is heat-sealable to produce a joint stronger than a similar one produced when the material is solvent-sealed with $COMe_2$. F. R. E.

Heat-insulating material.—See I. **Laminated glass.**—See VIII. **Rubber threads.**—See XIV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Practical pointers in bleaching cotton and cotton-rayon fabrics. T. F. Hughes (Rayon and Melliand Text. Month., 1935, **16**, 666—668).—The lime, caustic, and peroxide bleaches, the most common bleaching faults, and the merits of the superheater kier are discussed. S. M. N.

Dyeing of a solid shade on acetate rayon or acetate-silk. E. Herzog (Rayon and Melliand Text. Month., 1935, **16**, 509—510).—Practical details are given for the production of solid shades and of cross-dyeings. The latest drying machines are briefly discussed. S. M. N.

Two-tone dyeing as related to the shape and size of silk filaments. F. A. Mennevich and O. A.

Hougen (Rayon and Melliand Text. Month., 1936, **17**, 41—42, 44).—The size and shape of silk filaments are characteristic for different breeds of silkworms and cause 2-tone dyeing which cannot be corrected by chemical treatment. S. M. N.

Dyeing of pile fabrics. B. S. Hillman (Rayon and Melliand Text. Month., 1935, **16**, 674—676, 733—735; 1936, **17**, 17—19).—A discussion of technique and machinery, with typical dyeing recipes for the various fibres. S. M. N.

Dyeing and carbonising. Anon. (Z. ges. Textilind., 1934, **37**, 622—623; Chem. Zentr., 1935, i, 3048—3049). —In dyeing carbonised materials pretreatment with NH_3 at 50° is inadvisable. A method of softening and washing the material is described. H. J. E.

Factors in the absorption of substantive dyestuffs. A. M. Patel (Text. Manuf., 1935, **61**, 71—73). —Dye absorption by mercerised is $>$ by unmercerised oxycellulose (I). This was $<$ the amount absorbed by either bleached or mercerised cotton within certain limits of salt concn. Beyond these limits mercerised (I) absorbed $>$ bleached cotton. Ch. Abs. (*p*)

Faults in wool fabrics. H. R. Hirst (Text. Manuf., 1935, **61**, 32—33).—A dyeing technique is described. Ch. Abs. (*p*)

Printing with Naphthol AS and Rapidogen dyes. F. Streng (Mellliands Textilber., 1935, **16**, 204—205; Chem. Zentr., 1935, i, 3049).—Details of operating conditions are given. H. J. E.

Finishing of acetate-silk and acetate-rayon crêpes. E. Herzog (Rayon and Melliand Text. Month., 1935, **16**, 589—591).—Practical details are given for tentering and finishing. On account of the great shrinkage in dyeing, tentering is difficult and often requires two runs. In certain cases the goods may be finished without drying after the dyeing process. S. M. N.

Trubenising [of cotton fabric] and its relation to other processes. Anon. (Dyer, 1936, **57**, 258).—The trubenising process, in which a permanently semi-stiff unshrinkable fabric is made by sandwiching plain woven cotton fabric containing cellulose acetate rayon threads between two cotton or linen fabrics, followed by impregnation with a cellulose acetate plasticising agent or solvent (1 : 3 $EtOH-COMe_2$) and calendering at 30 lb. pressure and 121°, is discussed in relation to similar patented processes. Certain vat, naphthol, and Hydron dyes bleed or change colour in the process. A. J. H.

Use of drying oils in dressing artificial silk. H. Tatu (Rev. univ. Soies, 1934, **9**, 494—497; Chem. Zentr., 1935, i, 3073).—Fatty acids or the soaps of drying oils are unsuitable. Linseed oil may be used in solution in org. solvents, or as an aq. emulsion. H. J. E.

I. Effect of tin-weighting on strength of new silk. II. Effects of light and air on unweighted and tin-weighted silk. W. M. Forbes and P. B. Mack (Rayon and Melliand Text. Month., 1935, **16**, 719—721, 728; 1936, **17**, 21—25).—Bursting strength, abrasion-resistance, tensile strength per unit wt. of fabric, and resistance to light all decrease considerably with increase of Sn-weighting. S. M. N.

Degradation of weighted silk fibroin by acid and alkali. J. E. Ross, R. L. Johnson, and R. Edgar (Text. Res., 1936, **6**, 207—216).—Detailed results obtained in the analysis and in a determination of the reactivity towards aq. HCl and NaOH of silks weighted with Fe (I), Pb (II), Sn (III), Sn + Pb (IV), and Zn (V) are given. Such weighting substances do not catalytically promote hydrolytic cleavage of silk fibroin to form H_2O-sol. N compounds. The durability of a weighted silk is affected adversely more by alkaline than by acid treatment. After steeping for 10 hr. at 40° in aq. 0·8*N*-HCl, degummed non-weighted silk and (I), (II), (III), (IV), and (V) lost 50, 33, 46, 37, 46, and 43% of their original wet-warp breaking strength (this is a more reliable criterion of durability than the dry breaking strength), and 51, 53, 39, 60, 58, and 65%, respectively, of their original wet extensibility. Under similar conditions using 0·2*N*-NaOH the wet-strength losses were 50, 60, 64, 70, 86, and 80%, and the wet-extensibility losses 66, 52, 38, 74, 76, and 64%, respectively. A. J. H.

Evaluation of henna.—See IV. **Deterioration of silks by light. Synthetic yarns.**—See V. **Treating lizard skins. Dyeing leather.**—See XV.

See also A., Mar., 328, **Dyeing and negative diazotype printing.**

Patents.

Composition for use in laundering. S. M. Ratzkoff, Assr. to Publicker Res. & Development Co. (U.S.P. 1,986,286, 1.1.35. Appl., 30.7.32).—Fabrics which have been washed in an alkaline soap solution are rinsed and treated with aq. Zn, Al, or Mg sulphate to neutralise adsorbed alkali. A. R. P.

Treatment of dyed textile goods. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 441,767, 23.7.34).—The after-treatment of dyeings on cellulosic material with the products of B.P. 366,918, 383,634, 423,933, 435,388, and 440,488 (B., 1932, 544; 1933, 188; 1935, 396, 1132; 1936, 271), to improve washing-fastness, is modified by simultaneous application of soapy washing agents. A. W. B.

Bleaching wood pulp.—See V.

VII.—ACIDS; ALKALIS; SALTS; NON-METALLIC ELEMENTS.

Manufacture of sulphuric acid from hydrogen sulphide. W. Siecke (Metallges. Rev., 1936, No. 11, 14—18).—H_2S is burned with excess of air, and the combustion gases (containing SO_2 4—7 and O_2 5—8 vol.-%) are passed at about 400° over a V catalyst, the activity of which is not affected by the presence of H_2O vapour. The gaseous SO_3 and H_2O are fractionally condensed and 86—90% H_2SO_4 is obtained. C. R. H.

Slaking properties of lime. Fickert (Tonind.-Ztg., 1935, **59**, 281; Chem. Zentr., 1935, i, 3029).—Low-grade CaO gives only a small heat effect. J. S. A.

Extraction of potash and aluminium from alunite. B. Waeser (Metallbörse, 1934, **24**, 1513; Chem. Zentr., 1935, i, 3188).—The possibility is discussed. J. S. A.

Acidimetric determination of the water-soluble and total phosphoric acid in superphosphate. I. B. Mintz, E. S. Gavrilenko, O. B. Rabinovitsch, and S. S. Benina (Nauch. Zapiski Sach. Prom., 1934, 37—38, 78—86).—The method is based on neutralisation of the PO_4''' solution (Me-orange), addition of $K_2C_2O_4$ and NaCl, and further titration with NaOH (phenolphthalein). Ch. Abs. (*p*)

Manufacture of artificial cryolite. I. Preparation of sodium fluoride from sodium silicofluoride. T. Irie (Rep. Imp. Ind. Res. Inst., Osaka, 1931, 12, No. 12, 38 pp.).—The Na_2SiF_6 was melted with NaOH or $Ca(OH)_2$, treated with H_2O, and H_2SiO_3 filtered off. Ch. Abs. (*e*)

Porters Creek clay of Tennessee as a bleaching agent for oils. G. I. Whitlatch (Oil & Soap, 1936, **13**, 38—44).—The raw clays are naturally active, for decolorising mineral oils, and some are suitable for bleaching fatty oils; bleaching tests and relevant economic and geological data are discussed at length in connexion with the possible exploitation of the deposits. E. L.

Hydrogen for the oil industry. T. G. Richert (Oil & Soap, 1936, **13**, 33—37).—The Bamag electrolyser for the production of H_2 is described. E. L.

Progress in the production of oxygen on a large scale. R. Linde (Glückauf, 1936, **72**, 114—118).—The Linde process and Fränkl's modification thereof are discussed. The characteristic feature of the latter is the employment of intermittent regenerators instead of continuous counterflow exchangers for cooling the air feed. R. B. C.

Manufacture of pure sulphur dioxide. H. Weidmann and G. Roesner (Metallges. Rev., 1936, No. 11, 7—13).—Roaster gases containing 1—16 vol.-% SO_2 are scrubbed with equal vols. of H_2O and commercial xylidine (I) at 15—30°, the absorbing power being 15—20 times that of H_2O alone. Absorbed SO_2 is expelled by heating to 80—100°. Addition of Na_2CO_3 or Na_2SO_3 to the absorbent regenerates (I) from any (I) sulphate formed as a result of oxidation of SO_2 to SO_3. The SO_2 is freed from traces of (I) by scrubbing with H_2O at 20°. The purity of the SO_2 is $> 99\%$. C. R. H.

Catalytic decomposition of bleaching powder liquor in presence of copper and copper oxide. R. Kling (Z. ges. Textilind., 1935, **38**, 139—140; Chem. Zentr., 1935, i, 3363).—Catalytic decomp. by CuO is slow in alkaline, faster in neutral, and fastest and most complete in acid solution. H. N. R.

Volkonskoite.—See I. **NaOH from press liquor.**—See V. **PO_4''' as fertiliser.**—See XVI. **Determining CO and CO_2 in air.**—See XXIII.

See also A., Mar., 281, **Diffusion of H_2 through Al, of H_2O vapour through Cu, and of He through fused SiO_2.** 286, **Prep. of colloid solutions.** 298, **Cu-ZnO-Cr_2O_3 catalyst.** 299, **Prep. of O_2 from $Ba(OH)_2$. Prep. of D_2.** 301, **Prep. of $CaCr_2O_4$. Pb ferrites.** 302, **Prep. of selenic acid.**

Patents.

Acid-containing package. H. Adler and W. H. Woodstock, Assrs. to Victor Chem. Works (U.S.P. 2,004,926, 18.6.35. Appl., 12.10.33).—Claim is made for the storage and transport of H_3PO_4 of 89—100% concn. and free from $H_4P_2O_7$ and HPO_3 in common Fe or steel, the vessel being provided with a heating coil. B. M. V.

Preparation of ammonium sulphite or bisulphite solutions. R. W. Richardson, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,004,799, 11.6.35. Appl., 23.4.31).—SO_2 is caused to pass countercurrent to a falling shower of H_2O, NH_3 is introduced at several levels, and the temp. is controlled. B. M. V.

Brine solution [for refrigerators]. J. Fleischer, Assr. to Frigidaire Corp. (U.S.P. 1,985,632, 25.12.34. Appl., 27.11.31).—Claim is made for a solution of KCl 15, $BaCl_2$ 5, NaCl 5, and H_2O 75%; most of the solution solidifies as a cryohydrate at —11° and the remainder at —23°. A. R. P.

Preparation of superphosphate. E. H. Wight, D. L. Anderson, and W. N. Watmough, jun. (U.S.P. 1,985,810, 25.12.34. Appl., 18.4.32).—A plastic mixture of phosphate rock and H_2SO_4 is heated in a rotary reactor until the reaction is almost complete and a nodular product is obtained, which is allowed to cure to complete the reaction and then heated in a rotary dryer until the H_2O is reduced to $< 4\%$, all the HF expelled, and the SiO_2 substantially dehydrated. A. R. P.

Production of pyrophosphates. A. H. Fiske and C. S. Bryan, Assrs. to Rumford Chem. Works (U.S.P. 1,984,968, 18.12.34. Appl., 31.8.31).—$Na_2H_2P_2O_7$ for use in making baking powders is prepared by mixing NaOH and H_3PO_4 (*d* 1·53—1·6) in the correct proportions so that the heat of reaction evaporates the H_2O produced and raises the temp. to 200°, thereby producing a dry powder. A. R. P.

Production of basic aluminium sulphate. R. O. Wood, Assr. to Nat. Aniline & Chem. Co., Inc. (U.S.P. 1,986,091, 1.1.35. Appl., 22.7.29).—Al residues from org. syntheses are digested with aq. NaOH, and the solution is filtered to remove Fe etc. and adjusted to p_H 3·5—6 by addition of H_2SO_4 to ppt. basic Al sulphate. A. R. P.

Manufacture of sodium barium aluminate. E. E. Fisher, Assr. to Nat. Pigments & Chem. Co. (U.S.P. 1,985,318, 25.12.34. Appl., 13.5.31).—A mixture of $BaSO_4$, NaCl, and Al_2O_3 is heated at 1300—1500° to produce a 1 : 1 mol. mixture of $Na_2Al_2O_4$ and $Ba_3Al_2O_6$. A. R. P.

Production of catalytic masses. G. C. Connolly and J. A. Pierce, Assrs. to C. F. Hockley (U.S.P. 1,985,343, 25.12.34. Appl., 20.7.31. Renewed 17.2.34).—SiO_2 or TiO_2 gel is impregnated with a Zn, Fe, Ni, or Cr salt and, after coagulation, treated with an alkaline reagent to ppt. the metal oxide or hydroxide within the pores of the gel. A. R. P.

Catalyst [for conversion of terpenes]. H. Meerwein, F. Ulffers, R. Erbe, F. Aichner, and W. Klaphake, Assrs. to Schering-Kahlbaum A.-G. (U.S.P. 1,985,792, 25.12.34. Appl., 2.7.32. Ger., 8.7.31).—Claim is made for catalysts comprising TiO_2, SiO_2, V_2O_5, As_2O_5, Sb_2O_5, MoO_3, or WO_3, or the corresponding acids or complexes thereof with B_2O_3, P_2O_5, UO_3, etc.; 16 examples are given. A. R. P.

Manufacture of copper salts. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 437,022, 14.4.34).—Cupriferous burnt pyrites are given a chlorinating roast and then leached to produce a conc. Cu solution from which the Cu is separated by addition of Na_2SO_4 as Na Cu sulphate or by boiling with cement-Cu as Cu_2Cl_2. The latter is oxidised to form oxychloride by spraying it into hot air. [Stat. ref.] A. R. P.

Manufacture of penta- [quinque-]valent antimony compounds. A. L. Henne, Assr. to Gen. Motors Corp. (U.S.P. 1,984,480, 18.12.34. Appl., 5.6.31. Renewed 9.1.34).—SbF_3 is dissolved in fused $SbCl_5$ and the solution treated with Cl_2 to produce $SbCl_2F_3$. A. R. P.

Production of sulphur through reduction of gases containing sulphur dioxide. A. R. Lindblad (B.P. 437,236, 5.3.35).—SO_2 gases from roasting sulphide ores are passed through red-hot coke impregnated with about 1% of Na_2CO_3, Na_2S, or Na_2SO_4. A. R. P.

Manufacture of sulphur dioxide. B. E. F. Rhodin and D. Munroe (B.P. 442,437, 30.7.34).—Finely-powdered pyrites is shaken through a screen and falls through a throat to which air is supplied both inside and outside; a gas ring for ignition is provided at the narrow end of the throat. Combustion is completed while the material falls through a fluted, H_2O-cooled chamber, the bulk of the dust being settled and collected in a deflexion device at the bottom of the combustion chamber, and any remaining dust caught in "magnetic isolators" which are in duplicate so that one may be cleaned while the other is in use. B. M. V.

Production of pure phosphorus. A. H. Fiske and C. S. Bryan, Assrs. to Rumford Chem. Works (U.S.P. 1,984,674, 18.12.34. Appl., 24.11.33).—P vapours from the reduction furnace are condensed in dil. acid and the liquid P is withdrawn from the bottom of the vessel into an alkaline solution with which it is agitated and from which it is steam-distilled. A. R. P.

Testing gases.—See I. **SO_2 from sulphite waste liquor.**—See V. **ZnO pigments.**—See XIII. **Fertiliser.**—See XVI.

VIII.—GLASS; CERAMICS.

Singularities in the variations of the refractive index of glass below 300°. N. Tudorovskaja (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 27—30).—With Na_2O–SiO_2 and PbO–SiO_2 glass below the annealing temp. n increases with temp., but, on cooling, vals. of $n >$ before are obtained, except at low temp. At const. temp. n increases with time, becoming const. in approx. 10—15 min. On heating Na_2O glass, quenching in glycerol, and comparing with unheated glass, n decreases in 2—3 min. after placing the glass in the furnace at $<$ 170—200°, and then becomes const. Above 170—200° n decreases to a min. in 2—3 min., the change being $>$ before, and then rises to a const. val. The final change in n is the same in both cases, and the time of change is independent of temp. R. S. B.

Disappearance of a cause of anisotropy of glass by annealing. J. Herbert (Compt. rend., 1936, 202, 214—215).—Annealing is discussed. The relative rates of attack of HF on 8 glasses are recorded. T. G. P.

Velocity of cooling and heating multilayer safety glass. E. Albrecht (Glastech. Ber., 1935, 13, 89—91; Chem. Zentr., 1935, i, 3327).—The testing of safety glass at high and low temp. is described, and importance of the rate of temp. change is discussed. J. S. A.

Properties of fused silica. B. Moore (J.S.C.I., 1936, 55, 31—37 T, 70 T).—The structure and the relation of fused SiO_2 to the cryst. forms of SiO_2 are discussed. The principal properties of fused SiO_2 are described and their relations to the structure and variety of uses are discussed.

Inversion of quartz to tridymite. III. Effect of mineralisers on the inversion of quartz. IV. Influence of the amount of mineralisers on the inversion of quartz. V. *X*-Ray analysis of silica brick used for long periods in the open-hearth furnace, regenerator, or tank furnace. S. Kondo and T. Yamauchi (J. Soc. Chem. Ind., Japan, 1935, 38, 730—731, 731, 731—732 B; cf. B., 1936, 000).—III. Powdered rock crystal and pptd. SiO_2 (at 600—1300°), and mixtures of quartz (I) with 3% of various mineralisers (at 1300°) were heated for 5-hr. periods, the amounts of residual (I) and of the cristobalite (II) and tridymite (III) produced being measured by *X*-ray methods. Formation of (II) was distinct in amorphous SiO_2 after heating at 1000°, but was apparently only slight in (I) heated at 1100—1300°. KCl, $MgCl_2$, B_2O_3, Al_2O_3, MoO_3, and SrO were weak accelerators of the inversion of (I); $CaCl_2$, $BaCl_2$, $FeCl_3$, Cr_2O_3, and P_2O_5 were somewhat more effective. The following were strong accelerators, the last four being effective in producing (III): NaCl, NH_4Cl, CaO, $CaBr_2$, CaF_2, MgF_2, borax, TiO_2, $KMnO_4$, Na_2WO_4, Fe_2O_3, MnO_2, K_2CrO_4, Cu_2S, $Na_2O,2SiO_2$, and Na_2O.

IV. Mixtures of powdered (I) and 6% of mineralisers were tested as described above. Generally no marked difference resulted from the increased amount of mineralisers, except for KCl (3% almost inactive, 6% very effective), $BaCl_2$ (3% caused partial, and 6% almost complete, inversion), P_2O_5 (6% almost inactive), and CaF_2 and $CaBr_2$ (6% slightly effective).

V. Complete inversion of (I) to (II) in the surface layer (2—3 cm. thick), and to (III) in the adjacent 3-cm. layer, had occurred in a brick taken from the arch of an open-hearth furnace. The surfaces of chequerwork bricks exposed to temp. of 1300° consisted (apart from the glassy film) of (III), whilst grains scattered through the bricks were mainly (II). Chequer-bricks used at 800° were almost unaltered. The 3-cm. surface layer of a brick from the arch of a glass-tank furnace consisted of (II), the remainder of the brick being mainly (III). A. L. R.

Separation sequence of silicates from fluid magma, and their lattice energies. G. G. Laemmlein (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 33—35).—Approx. lattice energies have been calc. for olivine, pyroxene, amphibole, mica, and felspar quartz, and the bearing of the results on the separation of silicates is discussed. R. S. B.

Magnesium silicates ; steatite. IV. S. Nagai and G. Inoue (J. Inst. Silicate Ind. Japan, 1934, **43**, 134—141 ; cf. B., 1936, 60).—Steatite moulded by talc powder without H_2O and burned for 6 hr. at 1400° is superior to material moulded with H_2O. B_2O_3 and 12% $MgCl_2$ were used as plasticisers, but they caused subsequent deterioration of the products. Mixtures of MgO and SiO_2 in the ratio corresponding with the natural material gave poor results, unless the burning temp. was raised to 1450—1500° and plasticisers were used. Ch. Abs. (*e*)

[Siliceous] moulding masses. A. Leroux (Sprechsaal Keram., 1934, **67**, 589—591, 605—606 ; Chem. Zentr., 1935, i, 3180).—Rules for the calculation of the composition of moulding masses are given, and the avoidance of faults is discussed. J. S. A.

Barium oxide and zinc oxide as enamel-forming oxides. K. Kamp (Glashütte, 1934, **64**, 855—856 ; Chem. Zentr., 1935, i, 3327).—ZnO tends to give metallic deposits. The use of BaO is to be preferred. J. S. A.

Clarification of the adhesion problem in enamelling sheet iron. A. Dietzel (Sprechsaal Keram., 1935, **68**, 20 pp. ; Chem. Zentr., 1935, i, 3326—3327).—Three groups of oxides promote adhesion between sheet Fe and enamel : (1) oxides of Fe^{III}, Ce, Cr, Ti, V, U, and Nb form mixed crystals with superficially formed FeO, and adhere like hammer scale ; (2) oxidising agents promote formation of the hammer-scale layer ; (3) oxides such as NiO, CoO, Sb_2O_3 may be reduced by the Fe, and show characteristic changes on firing. The reactions involved with oxides of group (3) have been investigated electrometrically, and have been shown to lead to attack on, and roughening of, the Fe surface. J. S. A.

Products of hydrothermal reaction on clayey substances. II. S. Nagai (J. Soc. Chem. Ind., Japan, 1935, **38**, 732—737 B ; cf. B., 1935, 1043).—Samples of Japanese pottery clays and fireclays, acid and colloid earth, bentonite, and Zettlitz kaolin were heated with aq. NaOH under pressure, and the insol. residue obtained after washing and filtering was analysed. With the pottery clays and fireclays (with which the greater was the kaolinite content of the original clay, the greater was the amount of insol. product obtained) the rational formula of the product approximated to $Na_2O,Al_2O_3,2SiO_2,H_2O$; it was easily sol. in acid, and showed the property of base exchange. Japanese acid earth and bentonite (composed principally of montmorillonite) yielded products of the composition $Na_2O,0{\cdot}5(CaO,MgO),Al_2O_3,2{\cdot}5SiO_2,nH_2O$. Base exchange occurred on treatment with 5% $CaCl_2$ or $Ca(OAc)_2$ solutions, yielding products of the average formula $0{\cdot}7Na_2O,0{\cdot}8(CaO,MgO),Al_2O_3,2{\cdot}5SiO_2,2{\cdot}5H_2O$. Treatment of the clays with aq. NaOH under atm. pressure generally reduced the yield of the base-exchanging products, but 3 special samples of acid earth, bentonite, and colloid earth (especially the last) gave products of high base-exchange capacity. A. L. R.

Products of hydrothermal reaction on clayey substances. III. S. Nagai and T. Suzuki (J. Soc. Chem. Ind., Japan, 1936, **39**, 7—8 B ; cf. preceding abstract).—Autoclave treatment with steam of clays containing 25—40% of kaolinite and 60—70% of diaspore produced materials containing only small amounts of sol. compounds. Similar treatment with 30% NaOH solution caused the diaspore-Al_2O_3 to become sol. and left a residue of $Na_2O,Al_2O_3,2SiO_2,H_2O$ derived from the kaolinite. T. W. P.

Recent developments in ceramic firing. L. Bullin (Trans. Ceram. Soc., 1936, **35**, 53—96).—Advances made in kiln construction and firing during the past few years in Britain, America, and the Continent are reviewed. Economy has been secured in many cases by reducing the time of the H_2O-smoking period, by using automatic stokers and the step-grate firebox (types described), and by insulating periodic kilns (*e.g.*, with the improved refractory insulating products now available). Methods of automatic temp. control and its application to tunnel kilns, types of pressure-gas producers, and the electrostatic pptn. of tar fog are described. The operation of various types of tunnel kiln (*e.g.*, muffle, semi-muffle, direct-fired, circular, and electric) is discussed. The use of town's gas as a pottery firing fuel, a type of small regenerative tunnel kiln of high thermal efficiency (*e.g.*, 57%) employing town's gas, and a tubular kiln are described. It is suggested that pulverised coal will prove a satisfactory and cheap fuel for firing tunnel kilns containing bricks, refractory goods, or saggared biscuit ware, and for firing intermittent biscuit ovens. In an appendix, firing and fuel data for 17 tunnel and 5 intermittent kilns are given. A. L. R.

Significance of Röntgen-interference tests at high temperatures for ceramic research. D. Wilm, U. Hofmann, and K. Endell (Sprechsaal Keram., 1934, **67**, 573—575 ; Chem. Zentr., 1935, i, 3329).—High-temp. cristobalite (I) in absence of fluxes or below 1400° is not converted into low-temp. (I). On heating above 1400° or with fluxes the conversion occurs on cooling to 230°. J. S. A.

Manufacture of refractories from Indian magnesite. H. K. Mitra (Quart. J. Geol. Soc. India, 1934, **6**, 20—25).—Magnesite from Kadakola, Mysore, is crushed, mixed with 2% of Fe_2O_3 (added as mill scale), made into bricks, and calcined at 1600°. The product is a high-grade periclase brick for steel furnaces. Ch. Abs. (*e*)

Synthesis of spinel and its significance in the refractory materials industry. P. I. Judinson, K. S. Nikogosjan, and N. A. Dilaktorski (Ogneuporui, 1933, **1**, No. 1, 33—35).—Pure spinel was obtained by fusing corundum and magnesite. Magnesite can be fused at 1500—1800° with nephelite or refractory clay, the products containing spinel 32—36, $2MgO,SiO_2$ 60—66, and glass 3—8%. Bauxite similarly gave a glassy mass, which was useless because of the presence of reduced Fe. Ch. Abs. (*e*)

Lubrication of moulds used for preparing refractory goods. T. Ivanovskaja (Novo. Tech., Seri. Gorn. Prom., 1935, No. 3, 12).—Moulds may be moistened with mixtures containing naphthenic acids (*e.g.*, "acidoil" 5—20, kerosene 60—95, petroleum bottoms $\ngtr$ 20%). Ch. Abs. (*e*)

Determination of thermal conductivity of refractories. Report for American Society for Testing materials, Sub-Committee C-8. P. Nicholls (Bull. Amer. Ceram. Soc., 1936, **15**, 37—51).—The possible causes of the divergent results obtained by various laboratories on standard SiO_2 bricks and firebricks are discussed in detail under the headings: (1) similarity of test samples, (2) size and form of test piece, (3) "guarding" of hot plates, (4) guarding for straight-line flow, (5) inductive heating due to the use of a.-c. current, (6) errors of surface-temp. measurement. A plea is made for a thorough analytical investigation of these points, and such a scheme is outlined. J. A. S.

Earthenware filters.—See I.

See also A., Mar., 282, **Diffusion of He through fused SiO_2 and of Ag in glass.**

Patents.

Manufacture of laminated glass. B. J. Dennison, Assr. to Duplate Corp. (U.S.P. 2,005,075, 18.6.35. Appl., 18.8.34).—A cement for uniting cellulose nitrate to glass comprises a H_2O-sol. org. plasticiser, a H_2O-sol. silicate, and, optionally, gelatin or a borate. B. M. V.

Glass-to-metal seals. Brit. Thomson-Houston Co., Ltd. (B.P. 442,417, 2.9.35. U.S., 1.9.34).—A wire is sealed in a glass plug by fusion, the plug is placed in a tapering mouthpiece of the metal bulb or other vessel, and the glass melted to fill the mouthpiece by gravity alone. B. M. V.

Enamelling [of ferrous metals]. W. G. Martin, Assr. to A. O. Smith Corp. (U.S.P. 2,004,632, 11.6.35. Appl., 11.6.34).—In the vitreous enamelling of ferrous articles by the wet process, after drying the first coat the work is heated to oxidise the metal under the coating and the coat is then fused in an atm. containing no free O_2, H_2O, or H_2, but consisting mainly of N_2, CO_2, and CO. B. M. V.

Working-up of materials containing lead. D. Harkort (B.P. 437,325, 11.12.34. Ger., 5.2.34).—Roasted Pb ores or waste products are ground with suitable fluxes and heated to form frits or glazes for ceramic use. A. R. P.

Silicon carbide refractory. R. C. Benner and H. N. Baumann, jun., Assrs. to Carborundum Co. (U.S.P. 2,004,594, 11.6.35. Appl., 28.1.32).—SiC is bonded with CaF_2 and a little phosphate or chloride and the article is fired at $<$ 1600° in a reducing atm. B. M. V.

Manufacture of refractory products and the like. C. McMullen, Assr. to Carborundum Co. (U.S.P. 2,004,378, 11.6.35. Appl., 18.12.33).—Hollow articles of refractory material, *e.g.*, fused Al_2O_3, are formed by casting around a core of material, *e.g.*, Cu, of high heat conductivity and having a m.p. $<$ that of the refractory material, the interior face of the refractory article becoming solid before the core melts and runs out. B. M. V.

Manufacture of abrasive metal carbides. R. R. Ridgway, Assr. to Norton Co. (U.S.P. 2,005,956, 25.6.35. Appl., 2.12.31).—Carbides of B and Si are manufactured by reduction with C in an electric-resistance furnace. Centrally is a very small core of graphite, which is surrounded by partly converted material from a previous run, and that is surrounded by new mixture. B. M. V.

Manufacture of tools [grindstones and oilstones]. H. Kohl, Assrs. to Siemens & Halske A.-G. (U.S.P. 1,984,835, 18.12.34. Appl., 6.9.32. Ger., 9.9.31).—Very finely-ground Al_2O_3 is plasticised with dil. HCl, formed into the desired shapes, and these are dried and sintered at $<$ 1600° (1400°). A. R. P.

[Waterproof flexible] abrasive. J. B. Dietz and H. L. Plummer, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,004,466, 11.6.35. Appl., 28.4.31).—A binder for waterproof glass-paper or the like comprises a polyhydric alcohol–polybasic acid resin, tung and linseed oils, the actual binder containing about 40% and a sand varnish 49% of the resin. B. M. V.

Sound-absorbing material.—See IX.

IX.—BUILDING MATERIALS.

Soapstone as a lining for the sinter zone of rotary cement kilns. A. M. Palei (Ogneuporui, 1933, **1**, No. 2—3, 36—37).—Soapstone (SiO_2 31·4, Al_2O_3 2·5, Fe_2O_3 6·0, CaO 1·1, MgO 34·8, SO_3 0·3%) is suitable for lining cement kilns. It is burned in chamotte furnaces. Its life is approx. 60 days of operation. Ch. Abs. (*e*)

Ring formation in rotary cement kilns. F. Kremer (Tonind.-Ztg., 1935, **59**, 199—202; Chem. Zentr., 1935, i, 3180).—The causes and avoidance of "rings" in the kilns are discussed. J. S. A.

Fineness of cement raw mixtures. III. Fineness and chemical composition of clay. IV. Relation between fineness of raw mixtures and alite crystals. Y. Sanada and G. Nishi (J. Soc. Chem. Ind., Japan, 1935, **38**, 720—721 B, 721—722 B; cf. B., 1936, 194).—III. Samples of quartzite, ganister, shale, and clay were ground, separated by elutriation into 5 fractions (grain size from $>$ 58 to $<$ 15 μ), and analysed. In all cases the SiO_2 content diminished as the grain size of the fraction decreased.

IV. Microscopical examination of clinkers made from mixtures of 3 fractions of limestone ($>$ 58, 58—15, and $<$ 15 μ) and 2 fractions of clay ($>$ and $<$ 43 μ) showed that the alite crystals decreased in size as the grain size of the raw materials diminished, and increased in amount as the sizes of the limestone and clay approached one another. A. L. R.

Fineness of cement raw mixture. V. Effect on cement burning and clinker structure. VI. Effect on cement quality. Y. Sanada and G. Nishi (J. Soc. Chem. Ind., Japan, 1936, **39**, 9 B, 9—10 B; cf. preceding abstract).—V. Burning was easier and the size of the alite crystals decreased as the grain size of the raw mixture decreased. Additions of CaF_2 had more effect in burning than reduction in the raw mixture grain size.

VI. The strength of cement mortars and its rate of increase increased as the size of the alite crystals decreased. T. W. P.

Fine-grinding of cement. IV. Compressive strength of clinker. Y. Sanada (J. Soc. Chem. Ind., Japan., 1935, **38**, 722—723 b; cf. B., 1934, 883).—From measurements of the compressive strength (*S*) and the bulk *d* of 8 types of clinker differing in the degree of sintering, the following empirical relation between *S* (125—680 kg. per sq. cm.) and *d* (1·8—3·1) was found: $S = 22{\cdot}131d^{2{\cdot}9655}$. A. L. R.

Air separation [of cement]. R. Wilson (Cement, 1936, **9**, 41—48).—An improved method of describing air-separator performance, which defines the separation characteristics throughout the range of particle sizes affected, is discussed. T. W. P.

Chemistry of Portland cement. IV. L. Forsén (Zement, 1935, **24**, 191—197; Chem. Zentr., 1935, i, 3328; cf. B., 1935, 1095, 1143).—Swedish specifications for specialised uses of cement are outlined, and the properties appropriate to various purposes are referred to the ternary cement diagram. J. S. A.

Special Portland cements. IV. Chemical resistance of mangan[ic oxide]–chrom[ic oxide] Portland cement prepared from natural raw materials. K. Akiyama (J. Soc. Chem. Ind., Japan, 1935, **38**, 747—750 b; cf. B., 1936, 193).—The strength of mortars made from the Mn–Cr cements described previously (*loc. cit.*) was compared with that of ordinary Portland cement mortars after curing for periods up to 84 days in H_2O and in 1% and 3% H_2SO_4. The Mn–Cr cements made from natural raw materials did not differ in chemical resistance from those synthesised from pure substances, and were superior to Portland cement in strength and in resistance to dil. H_2SO_4. A. L. R.

Mixed Portland cements. S. Nagai, K. Matsuoka, and K. Nomi (Cement, 1936, **9**, 33—35; cf. B., 1936, 148).—The expansion or contraction of normal Portland cement during H_2O-curing is the same as that of the cement containing puzzuolanic or blast-furnace slag admixtures. The mixed cements showed high increments of strength increase during long curing, and were more resistant to sulphate and chloride attack than was ordinary cement. T. W. P.

Corrosion of Portland cement in water. J. G. Kay (Cement, 1936, **9**, 36).—The degree of corrodibility of set cement determined from the solubility of the material after grinding to a powder may give false results because unhydrated cement is exposed by the grinding. T. W. P.

Ore cement or iron cement. V. S. Nagai and K. Nomi (J. Soc. Chem. Ind., Japan, 1935, **38**, 737—739 b; cf. B., 1936, 193).—The properties of Portland cements of high Fe content (Fe cements), common Portland, mixed Portland (of high SiO_2 content), and blast-furnace slag cements are further examined. The free-CaO content of the hardened cement paste was rather less for the Fe cements, and considerably less for the mixed Portland, than for ordinary Portland cements. Heat of hydration measurements showed that the Fe and Kalicrete cements were suitable as low-heat cements for mass-concrete works. The strength of cement mortars after curing for 24 weeks and boiling for 1 day in 10% Na_2SO_4 or NaCl solutions was determined; the Fe and Kalicrete cement mortars showed the greatest resistance to the severe action of Na_2SO_4, and are most suitable for use in concrete for withstanding the action of sea-, mineral, or underground H_2O. A. L. R.

"Granite" cement. Portland cement from limestone and granite. D. Steiner (Tonind.-Ztg., 1935, **59**, 167—168; Chem. Zentr., 1935, i, 3027).—Replacement of clay by a suitable granite (I) gives a cement of the same gross composition. The excess of alkali in the (I) should be volatilised off during burning. J. S. A.

Acid-resisting silicate cements. A. O. Giller (Bumash. Prom., 1935, **14**, No. 4, 48—51).—Pretreatment of silicate cements with strong acids increased their resistance to H_2O, sulphite liquor, and 25% H_2SO_4. The strong acids accelerate the separation of SiO_2 gel, which acts as a cementing material. Ch. Abs. (*e*)

Determination of free calcium hydroxide in set cements and cement–trass mixtures, and of combined calcium hydroxide in cement–trass mixtures. V. Rodt (Zement, 1935, **24**, 94—97; Chem. Zentr., 1935, i, 3029—3030).—Free $Ca(OH)_2$ (I) is determined by Schläper and Bukowski's method with glycol, followed by titration with BzOH. Trass does not lower the free (I), but blast-furnace slag binds (I) strongly. The bound H_2O and sol. SiO_2 bear no relation to the bound (I) (cf. B., 1935, 228). J. S. A.

Influence of additions of lime and cement on road-building properties of clay soils. M. I. Volkov and B. R. Kusljik (J. Karkhov Highway Inst., 1935, **1**, 90—99; Road Abs., 1936, **3**, No. 22).—An addition of 4% of slaked CaO rendered the soil less permeable, increased its bearing power, and prevented drying-shrinkage. Cements were not effective. T. W. P.

Influence of bone glue on hydraulic binding media. H. Lafuma and R. Dubrisay (Asphalt u. Teer, 1935, **35**, 172; Chem. Zentr., 1935, i, 3328).—The setting time and mechanical properties of cement are little affected by up to 60 g. of glue per litre of H_2O used, but the permeability to H_2O is considerably decreased. J. S. A.

Testing and choice of cements for road construction. O. Graf (Beton u. Eisen, 1925, **34**, 89—93; Chem. Zentr., 1935, i, 3181).—Factors influencing the swelling and shrinkage of cements, and the influence of setting conditions on shrinkage strains and mechanical strength are discussed. Specifications for cement for motor roads are considered. J. S. A.

Principles of design of high-grade bituminous road surfacings. N. Ewers (Asphalt u. Teer, 1935, **35**, 320—322, 368—370, 381—384, 399—400, 449—453, 469—472, 492—499, 513—515, 533—535, 550—553, 573—575; Road Abs., 1936, **3**, No. 25).—A theory is developed to give conditions for the max. resistance to shear. Test-data are given in support. T. W. P.

Asphalt [road] surfacings with bitumen chips. C. Ziegs (Asphalt u. Teer, 1934, **34**, 987—993; Chem. Zentr., 1935, i, 3369).—The most reliable method of investigating the deterioration of such road surfaces is the A.S.T.M. distillation method D 20—30. H. N. R.

Physical nature of bituminous road materials: cementing power determinations. E. Flister (Diss., Tech. Hochschule Berlin, 1934, 32 pp.; Road Abs., 1936, 3, No. 28).—A method of test is described in which the adhesion of two brass pieces cemented together with a bituminous film is determined. T. W. P.

Impact test for studying characteristics of asphalt paving mixtures. R. Vokac (Assoc. Asphalt Paving Tech., Proc. Tech. Sessions, Chicago, Ill., Ann Arbor, Mich., 1935, 40—48; Road Abs., 1936, **3**, No. 35).—A method of test is described. T. W. P.

Rotary kilns.—See I. **Woods and their constituents.**—See II.

Patents.

Manufacture of cement in rotary-kiln plants. J. S. Fasting (B.P. 442,163, 3.8.34).—Part of the slurry is sprayed on moving chains or the like in a stationary or rotating preheating chamber, and the other part is sprayed direct into the mouth of the kiln in order to lower the temp. of the gases to $<$ the corrosion point of the chains. B. M. V.

Improving the qualities of hydraulic binding means. Chem. Fabr. Grünau, Landshoff & Meyer A.-G. (B.P. 442,765, 2.4.35. Ger., 27.4.34).—Rapid setting and high strengths are obtained by adding to the mortar an alkali silicate together with one or more other salts. Such salts must not form insol. silicates nor ppt. SiO_2 from the alkali silicate (*e.g.*, alkali salts of acids of P, B, S, and N, or of HCN, HCNS, HCNO, HBr, $HBrO_3$, etc.). T. W. P.

Road materials and road-making. E. D. S. Schlüter and J. de Miranda (B.P. 441,596, 23.5.35).—The road has a foundation consisting of broken stones and a filler composed of clay mixed with a fibrous felting agent, *e.g.*, sawdust, above which is a surface layer consisting of bituminous material mixed with the felting agent; the latter is used in a proportion by vol. of approx. 3 : 11 in both the filler and the surface layer. A. B. M.

Production of slabs or blocks for sound and heat insulation. H. Stössel (B.P. 442,287, 27.7.34. Ger., 21.8.33).—A mixture of long-fibred vegetable matter and a dispersion of rubber is pressed in moulds and left therein until it will retain its shape, *e.g.*, 16—24 hr. at room temp. or 4—6 hr. at 100—140°. [Stat. ref.] B. M. V.

Production of sound-absorbing material. C. Birchy, Assr. to S. D. Hewlett (U.S.P. 2,004,686, 11.6.35. Appl., 21.4.33).—A semi-plastic mass of ceramic body material (and colouring matter) is broken into particles and pre-burned, forming porous pieces which are then coated with a fusible adhesive sufficient to unite the points of contact only; the mass is moulded to the desired shape and burned. B. M. V.

Artificially colouring roofing granules. S. G. Wright (U.S.P. 2,004,682, 11.6.35. Appl., 20.11.33).—A mixture of (*a*) a finely-powdered cullet of low m.p., (*b*) another cullet of high m.p., a temporary adhesive, a pigment (Fe_2O_3 or Cr_2O_3), and the granules of rock or ceramic material is fired at a temp. between the m.p. of (*a*) and (*b*). B. M. V.

Composition containing chlorodiphenyls.—See III.

X.—METALS; METALLURGY, INCLUDING ELECTRO-METALLURGY.

Use of metals in furnace construction. Bassal (Chaleur et Ind., 1934, **15**, 1120—1142; Chem. Zentr., 1935, i, 3336).—A review, with particular reference to the influence of high temp. and oxidising gases on mechanical properties. J. S. A.

Ternary system $FeO-CaO-SiO_2$. Moray (Rev. univ. Mines, Mét., 1935, [viii], **11**, 141—152; Chem. Zentr., 1935, i, 3033; cf. A., 1933, 1120).—The relation of metallurgical slags to the $CaO-FeO-SiO_2$ system is discussed, most falling between ortho- and meta-silicate in a region of widely-spaced isotherms. The effects of other oxides (MgO, ZnO, Al_2O_3, and Fe_2O_3) commonly present in technical slags are discussed. J. S. A.

Fluxes for soldering iron and non-ferrous metals. Anon. (Metallbörse, 1935, **25**, 18—19, 50—51; Chem. Zentr., 1935, i, 3189—3190).—The mode of action of fluxes and their composition and desirable properties are reviewed in relation to the usual technical metals. J. S. A.

Desulphurisation of steel. M. Guédras (Aciers spéc., Mét., Alliages, 1934, **9**, 627—628; Chem. Zentr., 1935, i, 3334).—The slag reactions involved in desulphurisation are reviewed. The chief reaction, $FeS + CaO + C = Fe + CaS + CO$, is endothermic (—32,040 g.-cal.) and so is favoured by a high furnace temp. Desulphurisation with $CaCl_2$, $MgOCl_2$, and K_2O (as K Al silicate) is discussed, and heats of reaction are calc. The presence of CaC_2 in the slag is important for the promotion of reduction of FeO in the electric furnace. J. S. A.

Colouring agents for use in the microscopical examination of carbon steels. J. Malette (Compt. rend., 1935, **201**, 1385—1387).—Solutions of NH_4 nitromolybdate, -vanadate, or -uranate of suitable concns. in rectified spirit etch the surfaces of C steels and tint the various constituents in different colours which may be recorded by colour photography. T. G. P.

Zinc-covered steel wires for steel–aluminium ropes with brazed joints. M. Bosshard (Aluminium, 1935, **17**, 78—79; Chem. Zentr., 1935, i, 3036).—Soldered or Zn-covered steel in contact with Al greatly augments corrosion; soldered joints must be avoided. J. S. A.

Strength of [metallic] materials at low temperatures. W. Schwinning (Z. Ver. deut. Ing., 1935, **79**, 35—40; Chem. Zentr., 1935, i, 3039).—Investigation of steels and non-ferrous metals between 150° and —150° shows that whilst unalloyed steels develop brittleness with a small degree of cooling, sorbitic alloy steels, especially Ni steels, have a much smaller tendency to cold-brittleness. Of non-ferrous metals, only Zn shows appreciable brittleness. Fatigue strength, as distinct from static strength, increases for Cu and steels at low temp. J. S. A.

Influence of annealing on the quench-hardness and coercive force of tungsten magnet steel. G. Kojima (Kinz.-no-Kenk., 1935, **12**, 80—88).—The quench-hardness of two steels (C 0·5, W 5 and C 0·75, W 6%, respectively) decreased as the time of annealing increased at 850° and 900°, and had a min. val. on annealing at 900°. The optimum val. was obtained by annealing at 1000°. Ch. Abs. (*e*)

Embrittlement of alloy steels. F. C. Lea and R. N. Arnold (Inst. Mech. Eng., Dec., 1935, Preprint, 50 pp.; cf. B., 1935, 549).—The notched-bar impact val. of mild steels (0·16, 0·2% C) which have been overstrained $>$ 10% by drawing or tensile stress is rendered irregular and low by heat-treatment at 250°. This effect is less pronounced in some Cr-bearing alloy steels, but prolonged heating at 500° without prior strain causes marked embrittlement of Ni–Cr and Ni–Cr–Mo steels containing 2·5—4·5% Ni, as indicated by impact tests at room temp. on quenched or furnace-cooled material. The deterioration is more rapid in hardened and tempered than in annealed steels; it is slowed down but not prevented by Mo. Tensile properties at room temp. and notched-bar impact vals. at 500° are little affected by embrittlement, but the type of tensile fracture is modified, whilst the limit of proportionality is slightly raised and the yield point lowered. Steady stressing (5 tons/sq. in.) during heating does not affect the rate of embrittlement, but slow cycles of alternating stress accelerate deterioration. E. H. B.

Determination of fatigue strength [of alloy steels]. W. Ruttmann and R. Mailänder (Tech. Mitt. Krupp, 1934, **2**, 152—159; Chem. Zentr., 1935, i, 3338).—Methods of determination are critically reviewed; a consistent definition of fatigue strength is advanced. J. S. A.

Effect of additions of nitrogen on the properties of high-chromium iron alloys. J. A. Jones (Metallurgist, 1936, **10**, 109—111).—0·2% N renders ferritic 18% Cr irons hardenable, but causes difficulties in forging. The tensile and impact strengths of a 22% Cr alloy are improved by 0·2% N, and the susceptibility to embrittlement at high temp. of alloys containing 22 and 28% Cr is somewhat reduced. C. E. H.

Difference between structures shown by cold-working [of metals]. B. C. McCarthy (Metal Progr., 1935, **28**, 36—38).—Sorbite produced by "patenting" steel wires is a fine variety of pearlite which is suitable for reduction by drawing, but sorbite produced by quenching and tempering is very hard and quite unsuited for wire-drawing operations. W. P. R.

Tensile properties and corrosion behaviour of special structural steels. E. Maurer and H. Heine (Arch. Eisenhüttenw., 1935—6, **9**, 347—357).—Comparative tests have been made on 17 German and 3 American plain and alloyed structural steels; vals. are tabulated for the tensile properties at —20° to 20°, endurance strength (alternate bending) on smooth and notched bars at 20° in the air and in running H_2O and at —25°, loss in wt. on atm. exposure for 1—3 years, and the hardening and ageing properties. Steels made by the pig-Fe–scrap process are equal in all respects for building structures and machines to similar steels made directly from scrap Fe. A. R. P.

Yield limits and tensile strength of mild steel and other metals. G. Welter (Metallurgia, 1936, **13**, 89—92).—The tension–elongation diagrams showing the upper and lower yield points of mild steel and the fall in load immediately prior to rupture of ductile metals do not reflect intrinsic properties of the materials. Laboratory tests of mild steel, using dead-wt. loading and a modified dynamometer transmission system on a 5-ton Amsler machine, show that during a tensile test there is a continual, not interrupted, increase of load right up to the point of fracture. W. P. R.

Standardisation of the creep test on steel. H. Schmitz (Stahl u. Eisen, 1935, **55**, 1523—1534).—The provisional specification for the creep test drawn up by the Sub-Committee on Tensile Testing of the Verein deutscher Eisenhüttenleute is discussed. The need for a standard method for determining the creep test is emphasised, and the degree and duration of pre-stressing, rate of extension, the scattering of results of two test-series carried out according to the specification are discussed. W. P. R.

Provisional specification of the creep strength of steel. Anon. (Stahl u. Eisen, 1936, **55**, 1535).—The proposals of the Sub-Committee on Tensile Testing of the Verein deutscher Eisenhüttenleute for standardising the creep test applied to steels (see preceding abstract) are summarised. W. P. R.

Corrosion and other destruction of tube material in excavation. C. Abweser (Korros. u. Metallschutz, 1935, **11**, 59—64; Chem. Zentr., 1935, i, 3191).—The causes of corrosion of Fe and Pb pipes and the use of protective paints are discussed. The effects of stray earth currents are indicated. J. S. A.

Corrosion-resistance of condenser tubes of various alloys in relation to Brinell hardness. A. Siegel (Wärme, 1935, **58**, 173—177; Chem. Zentr., 1935, i, 3041).—In absence of stray electric currents, the usual alloys show little difference in their resistance to corrosion. Where stray currents are present, the harder alloys have the longer life. J. S. A.

Use of inhibitors in cleaning metallic pipe. A. Abrams and C. L. Wagner (Water Works and Sewerage, 1935, **82**, 192).—Inhibitors (NH_2Ph or C_5H_5N) added to HCl markedly lower the loss in wt. of metal in scale removal from rust-filled galvanised Fe pipes. Ch. Abs. (*p*)

Corrosion of fuel tanks. P. M. Grempe (Oel, Kohle, Erdoel, Teer, 1935, **11**, 118—119; Chem. Zentr., 1935, i, 3041).—Corrosion may be due to (*a*) attack by impurities in the fuel, (*b*) products of atm. oxidation, (*c*) attack by the pure fuel material. Tinned tanks show the highest resistance. J. S. A.

Possibility of protecting metals from corrosion. M. Straumanis (Korros. u. Metallschutz, 1935, **11**, 49—53; Chem. Zentr., 1935, i, 3340).—The suppression of corrosion by elimination of local elements by the use of very pure metals, or, in the case of alloys, the avoidance of the separation of individual phases, is discussed. J. S. A.

Protection against corrosion by introduction of opposed electrolytic actions. R. Lecoeuvre (Aciers spéc., Mét., Alliages, 1934, **9**, 520—525; Chem. Zentr., 1935, i, 3340).—The elimination of galvanic action, *e.g.*, of sea-H_2O on Al seaplane floats, by the juxtaposition of an appropriate light element is discussed. The protective effect of Zn or Cd is confined to the immediate neighbourhood of the metal. Coating with Cd is recommended as protection for Al. (Cf. B., 1934, 678.) J. S. A.

Protection of metal products against corrosion by special cementation. I. Experimental technique. II. Protection of iron and iron alloys. III. Experiments with copper. J. LAISSUS (Aciers spéc., Mét., Alliages, 1934, 9, 537—549; Chem. Zentr., 1935, i, 3190).—I. Standardised testing procedure is discussed.

II. Sherardisation below 500° confers good resistance to aq. $CuSO_4$, weathering, and salt fog, but not to NaOCl. The resistance is comparable with that of Zn- and Cd-coating. Nitride treatment or Al-coating (800—1000°) gives good protection. Cementation with Cr, Mo, W, Ta, V, Co, B, U, Zr, or Ti below 1000° is discussed. Treatment with W at 1100° confers a high resistance to acid.

III. The resistance of Cu is raised by Zn and Cd, and especially against HNO_3 and NaOCl, by cementation with W, Cr, V, Si, Zr, Mo, Ta, or U at 500—1000°. J. S. A.

Properties of nickel and nickel alloys in caustic-processing equipment. T. OKAMOTO (Japan Nickel Inform. Bur., 1934, B, 19, 50 pp.).—50% aq. NaOH in a Ni evaporator contains approx. 0·00002% of Ni. Steam high in CO_2 corrodes Ni. Potentials up to 0·5 volt were obtained by contact between Ni and Fe with hot conc. caustic solutions. NaOH made by the electrolytic process is more corrosive than that made by the NH_3–soda process. CH. ABS. (*e*)

New magnetic alloy "1040" with high initial permeability. H. NEUMANN (Arch. tech. Mess., 1934, 4, T168; Chem. Zentr., 1935, i, 3038).—A highly-permeable alloy composed of Ni 72, Fe 11, Cu 14, and Mo 3% having very little hysteresis and considerable resistance to ageing is described. J. S. A.

Röntgenographic and hardness investigations on nickel-rich nickel–tin alloys. E. R. JETTE and E. FETZ (Metallwirts., 1935, 14, 165—168; Chem. Zentr., 1935, i, 3337).—The lattice parameter of solid solutions of Sn in Ni increases linearly up to 10 at.-8% of Sn, with *a* 3·6013 Å. The solubility of Sn in the α-phase at 500°, 750°, 1000°, and 1100° is recorded. The hardness of the alloys increases linearly up to 25 at.-% of Sn; hardening effects have been investigated. J. S. A.

Quantitative spectral analysis: application to determination of chromium. H. TRICHÉ (Bull. Soc. chim., 1936, [v], 3, 249—254).—The procedure described formerly (A., 1935, 835) has been applied to Al–Cr alloys containing 0·1—4% Cr. Over this range the intensity of emitted radiation $\propto$ concn. The precision is about 10%. E. S. H.

Plastic deformation and hardness of lead. M. BALLAY (Compt. rend., 1936, 202, 222—224).—The greater velocity of deformation of Pb cold-worked and annealed at room temp. compared with specimens annealed at 250° is due to the smaller grain-size of the former. T. G. P.

Magnetic investigation of precipitation-hardening. H. AUER and W. GERLACH (Metallwirts., 1934, 13, 871—873; Chem. Zentr., 1935, i, 3038—3039).—At low tempering temp., an Al–Cu alloy (5% Cu) showed a rapid initial alteration in susceptibility followed by a slow further increase, perceptible after 500 hr. at room temp. Above 200° a const. val. is reached. The behaviour is to be correlated with at least two processes accompanying the segregation process. J. S. A.

Cold spraying of aluminium. O. KÜHNER (Maschinenbau, 1935, 14, 151—152; Chem. Zentr., 1935, i, 3038).—Procedure is described. J. S. A.

Spectral-analytical determination of arsenic, phosphorus, and sulphur in metals, particularly platinum. W. ROLLWAGEN and K. RUTHARDT (Metallwirts., 1936, 15, 187—189).—P and As may be determined in amounts $< 0·005\%$, and S $< 0·05\%$. An arc is used for the P and As determination, and a Geissler tube with condensed discharge for S. C. E. H.

Al from alunite.—See VII. **Enamelling Fe sheet.**—See VIII. **Fe–Ni alloys. Colouring metals.**—See XI.

See also A., Mar., 275, **Transformations in metals and alloys.** 280, **System Cu–Au. Cu–Ni alloys. Solubility of Mg in Al. Lipowitz alloy and Wood's metal. Systems Al–Cu–Si and Fe–cementite–Mn_3C–Mn.** 281, **Diffusion of H_2 through Al, of H_2O vapour through Cu, and of Ag in glass.** 286, **H_2O-sol. colloidal Pb. Emulsification of Hg.** 305, **Obtaining polished surfaces. Depositing Po on Ag.**

PATENTS.

Treatment of ferrous metals. C. R. CULLING and M. A. BAERNSTEIN, Assrs. to NAT. PIGMENTS & CHEM. CO. (U.S.P. 1,985,315, 25.12.34, Appl., 24.6.33).—In the manufacture of steel in an acid-lined electric furnace the slag is withdrawn after the refining operation and replaced with a layer of $BaCO_3$, which prevents "boiling" and the consequent absorption of Si from the lining. A. R. P.

Treatment of molten metal. E. P. FLEMING and S. L. PALMER, Assrs. to AMER. SMELTING & REFINING CO. (U.S.P. 2,005,540, 18.6.35. Appl., 28.9.33).—A reagent in a wooden box is submerged (exposed surface downwards) in a kettle of metal, *e.g.*, S for removal of Cu from Pb–Sb–Sn. B. M. V.

[Binder for] foundry core. E. WEATHERFORD, Assr. to BORDEN CO. (U.S.P. 1,984,905, 18.12.34. Appl., 8.11.33).—Evaporated skimmed milk is claimed as a binder for sand cores. A. R. P.

Manufacture of [grey] cast iron. W. RUFF (U.S.P. 1,985,553, 25.12.34. Appl., 18.8.33. Ger., 5.9.32).—The metal is superheated to reduce the graphite nuclei to a min., the Si content is adjusted to $> 0·5\%$ according to the size of graphite flake desired in the casting, and the charge is subjected to an oxidising treatment with air or a slag prior to pouring. A. R. P.

(A) **Cast-iron alloy articles.** (B) **Malleable iron casting.** (A) C. O. BURGESS, (B) R. C. GOOD, Assrs. to ELECTRO METALLURG. CO. (U.S.P. 1,984,458 and

1,984,474, 18.12.34. Appl., [A] 28.7.33, [B] 5.7.33).—(A) A wear-resistant cast Fe having a structure composed of pearlite, Cr-ferrite, flake graphite, and temper C contains C 1·5—4, Si 0·5—3·5, Mn 0·15—0·7, P 0·05—0·3, S $\not>$ 0·5, and Cr (W or V) 0·1—5% and is cast under conditions which produce a mottled structure, is then given the desired structure by prolonged annealing at 480—1040°. (B) The Fe contains C 1·5—3·5, Si 0·53—4, Cr 0·15—2, Mn 0·18—0·7, P 0·05—0·3, and S $\not>$ 0·2%, the Si, Mn, and C being in the same ratio as in ordinary white cast Fe, and an excess (0·03—2%) of Si is added so that this excess is 0·2—1·25 times the amount of Cr present. A. R. P.

Manufacture of rustless or stainless iron. W. W. Triggs. From Alloy Res. Corp. (B.P. 437,186, 23.3.34).—A 4 : 1 mixture of low-C rustless-steel scrap and roll scale is melted in a chromite-lined arc furnace to produce a metal and a slag layer, and a mixture of chromite and ferrochromium–Si is fed into the bath through the slag. A. R. P.

Alloy steel. R. P. de Vries (U.S.P. 1,985,316, 25.12.34. Appl., 12.11.30).—An air-hardening steel with a high creep limit at high temp. contains C 0·75—1·5 (0·9), Cr 3—6 (5), Mo 0·5—3 (0·75), W 0·5—4 (2), Si 0·3—1·5 (1·0), and Cu 0·15—1·5 (1·0) ; on heating to 950° and air-cooling, a Brinell hardness of 620 is obtained. A. R. P.

Non-stainable steel alloy. F. J. Maas, Assr. to A. J. Prominski (U.S.P. 1,986,208, 1.1.35. Appl., 25.8.33).—The steel contains Cr 19·9, Mn 7·19, Ni 3·3, Cu 2·16, Si 1·33, Mo 1·17, and C 0·1%. A. R. P.

Machinable stainless [steel] casting. F. A. Fahrenwald (U.S.P. 1,984,636, 18.12.34. Appl., 26.6.33).—The steel contains Cr 35, Ni 0·5—15 (9), and C about 2 (1·9)% ; it is claimed to be resistant to 10% H_2SO_4. A. R. P.

[Hardening] treatment of metals [steel]. G. F. Nelson (U.S.P. 1,985,456, 25.12.34. Appl., 6.7.31).—A martensitic structure is obtained by quenching from a red heat in 10% aq. NaOH at $<$ 100°. A. R. P.

Case-hardening [of ferrous metals]. D. A. Holt, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,984,411, 18.12.34. Appl., 8.6.33).—The articles are packed in SiO_2 or in a Ni vessel which has been heated at 540° in NH_3, and heated at 700—980° (870°) for 1—4 hr. in an atm. of $HCO{\cdot}NH_2$ vapour. A. R. P.

Coloring and hardening steel. H. C. Heide. From A. R. Stargardter (B.P. 437,233, 26.1.34, 17.3.34, and 26.1.35).—Razor-blade steel strip is hardened in an atm. containing $H_2 : H_2O = 0{\cdot}4$—$1{\cdot}14 : 1$ to form a blue film on the strip, which is then cooled rapidly by passing it through cold steel plates. A. R. P.

Increasing the strength of alloys. [Precipitation-hardening of cobalt–tungsten steel.] W. P. Sykes, Assr. to Gen. Electric Co. (U.S.P. 1,986,024, 1.1.35. Appl., 4.4.33).—Steel containing Co 15—35 and W (Cr or Mo) 12—30% is heated at 1000—1500° (1200°), quenched in a salt bath at 600°, air-cooled for 15 min. or cooled in CaO for 3 hr., and reheated slowly from 70° to 525°. A. R. P.

Bimetallic element. H. D. Matthews, Assr. to W. M. Chace Valve Co. (U.S.P. 1,985,181, 18.12.34. Appl., 9.7.34).—The strip of low expansion consists of an alloy of Fe with Ni 36—42 and C 0·1—0·25%, and that of high expansion of an alloy of Fe with Ni 22·15, Cr 3, Mn 0·43, Si 0·8, and C 0·15%. Since the m.p. of both alloys is about the same they may be welded together by direct pressure without burning or fracture. A. R. P.

Welding rod of copper. O. Brandenberger (U.S.P. 1,985,142, 18.12.34. Appl., 6.4.34).—An alloy of Cu with Sn 0·5—1, Si 0·3—0·4, and Zn 49—50% is claimed. A. R. P.

Copper-base alloy. R. F. Bolam (U.S.P. 1,985,814, 25.12.34. Appl., 17.5.34).—A mixture of Cu (100), Sn (18·5), Fe (6·75), Pb (0·5), Zn (0·5), Ni (0·375), V (0·125), W (0·125), and Mo (0·125 lb.) is treated while molten with KCN (1), As (2), and P (1 oz.), skimmed free from slag, and cast. A. R. P.

Copper alloy (A) for bearings, (B) for conducting electricity. (C) Non-stainable copper alloy. F. J. Maas, Assr. to A. W. Langkau, A. Kokoefer, and E. Csar (U.S.P. 1,986,209—11, 1.1.35. Appl., 20.4.34).—The alloy contains (A) Ni 0·45—9·5 (3·67), Al 0·4—14 (3·41), Mo 0·15—6 (0·38), Fe 0·08—1·5 (0·17), and Ca 0·03—0·8 (0·06)% ; (B) Ag 0·84, Al 3·81, Si 0·44, Ti 0·42, Mo 0·37, Fe 0·18, and Ca 0·06% ; (C) Ni 1·8—9·37 (4·7), Mn 0·93—9·16 (4·57), Si 0·95—2·85 (1·91), Mo 0·38—1·9 (0·38), Fe 0·18—0·93 (0·18), and Ca 0·06—0·35 (0·06)%. A. R. P.

Cleaning of non-ferrous alloys [brass or bronze]. L. O. Larsen, Assr. to Western Electric Co., Inc. (U.S.P. 1,984,534, 18.12.34. Appl., 30.12.32).—The alloy is pickled in a mixture of H_3PO_4 and HNO_3 and/or H_2SO_4. A. R. P.

Magnesium-base alloys. R. E. Paine, Assr. to Magnesium Development Co. (U.S.P. 1,985,420—1, 25.12.34. Appl., 18.5.34).—The alloy contains (A, B) Sn 1—15 (5), Zn 0·1—10 (4), Si 0·1—15 (0·2—0·3), and (A) Mn 0·1—2 (0·3)%. A. R. P.

Fabrication of aluminium and its alloys. R. J. Whitzel, Assr. to Aluminum Co. of America (U.S.P. 1,986,130, 1.1.35. Appl., 30.3.32).—Large ingots of Al alloys are rolled to 80% reduction prior to shaping into H-beams etc. A. R. P.

Light-metal [aluminium] alloy. Junkers-Motorenbau Ges.m.b.H. (B.P. 437,169, 19.3.35. Ger., 22.11.34).—Sliding-contact machine parts are made of an alloy of Al with Cu 1—12 (8), Zn 0·3—12 (8), and Fe 0·5—10 (6)%. A. R. P.

Production of surfaces printed with coloured designs on aluminium and its alloys. Peintal Soc. Anon. (B.P. 437,244, 24.4.35. Switz., 25.4.34).—The metal is coated with an oxide film which is uniformly dyed in any desired colour ; the design is then printed on the coloured film with a paste of starch and gum containing NaOH, which removes the coloured film from the parts of the metal where it is not wanted. A. R. P.

Electrodeposition of metals [nickel]. C. Arnold. From Harshaw Chem. Co. (B.P. 437,224, 3.11.34).—Small amounts of sulphonated petroleum distillates or

H_2SO_4 esters of $\nless C_3$ alkyl radicals are added as brighteners in sulphate Ni, Zn, Cd, Cu, or Sn baths, or in cyanide Cu or Cd baths. The preferred material is made by treating cracking-coil tar with oleum. A. R. P.

Alloy [for electric-resistance element]. M. A. Hunter, Assr. to Driver-Harris Co. (U.S.P. 2,005,423, 18.6.35. Appl., 18.1.33).—Wire for use as heating elements is composed of Ni 80 and Cr 20% (approx.) with Ca 0·03—0·2 (0·09)%. The Ca keeps the oxides of Ni and Cr below the solubility limit, CaO rises as slag, and Ca is sol., the result being that no impurities separate at the crystal grain-boundaries. B. M. V.

Manufacture of composite metal [steel-brass] strips. C. Arnold. From Cleveland Graphite Bronze Co. (B.P. 437,199, 23.4.34).

Ore-reducing machine. Pipe joints.—See I. **Glass-metal seals. Enamelling ferrous metals. Working up Pb materials.**—See VIII. **Electromagnetic cores.**—See XI. **Metal polish.**—See XII. **Zn lithographic plates.**—See XXI.

XI.—ELECTROTECHNICS.

Production of colour [on metals] by electrolysis. J. E. Stareck and R. Taft (Trans. Electrochem. Soc., 1936, **69**, Preprint 7, 89—94).—From alkaline solutions of Cu lactate operated for 1—10 min. at c.d. 50 milliamp. per sq. dm., coloured decorative films of Cu_2O can be deposited on most metals. With increasing film thickness the interference tints change from violet to red, a colour cycle occupying about 10 sec. The films are very stable and strongly adherent. J. W. C.

Physical investigations on new magnetic materials. M. Kersten (Z. tech. Physik, 1934, **15**, 249—257; Chem. Zentr., 1935, i, 3336).—The production of alloys of extremely low remanence by strong deformation by cold-rolling is discussed. The effect is attributed to segregation, enhanced by the high temp. developed in the slip-planes during rolling, which results in the development of a non-cubic, oriented, fibrous or layered structure, which forms a magnetically preferential layer in the sense of Becker's theory, perpendicular to the plane of rolling. J. S. A.

Magnetic behaviour of cold-rolled iron–nickel alloys due to separation-hardening. M. Kersten (Metallwirts., 1934, **13**, 769; Chem. Zentr., 1935, i, 3336).—Polemical against Dahl and Pfaffenberger (B., 1935, 905). J. S. A.

Mineral oils.—See II. **Electro-reduction of 3 : 5-dinitro-o-cresol.**—See III. **H_2 for oil industry.**—See VII. **Ceramic firing.**—See VIII. **Magnetic alloy. Spectral analysis of metals.**—See X. **Refining molasses.**—See XVII. **H_2O purification.**—See XXIII.

See also A., Mar., 280, **Ferromagnetic Cu–Ni alloys.** 286, **Prep. of colloid solutions.** 298, **Prep. of D_2.** 299, **Prep. of O_2 from $Ba(OH)_2$.** 302, **Analyses by photoelectric cells.** 305, **Obtaining polished surfaces. Depositing Po on Ag.**

Patents.

Electric [primary] cells. F. A. Gillan (B.P. 441,327, 9.4. and 12.9.34).—In a primary cell the depolarising powder is impermeable to electrolyte and permeable to air (that property being adjusted by pressure during packing) and has substantial conductivity, being composed of $\nless$ 2 varieties of C, one readily wetted and of high conductivity and another not readily wetted and of low conductivity. The electrolyte is preferably NaOH, though NH_4Cl and the like are not excluded; the anode is of perforated Ni, Fe, or stainless steel, preferably in two co-axial cylinders, the axial space being freely open to air and the C packed in the annulus. After an initial lag the voltage rises to the Zn–C, not Zn–Fe, val. B. M. V.

Electric-discharge tubes. N. V. Philips' Gloeilampenfabr. (B.P. 437,326, 9.1.35. Holl., 5.3.34).—In electric vapour lamps containing Na, Cd, Mg, Zn, or Tl the cap is made of a dispersion of powdered glass in a mixture of asbestos, cement, and talc with 20—25% of a low-melting glaze as binder; after fritting, the cap is impregnated with a hard resin. A. R. P.

Forming electric insulating material. Westinghouse Electric & Manufg. Co., Assees. of J. T. Goff (B.P. 442,738, 14.8.34. U.S., 23.9.33).—Cloth, paper, or other fibrous material is wetted with a fine suspension of a fusible resin, *e.g.*, shellac, alkyd, bakelite, in a non-solvent dielectric liquid, *e.g.*, mineral oil, and then heated. S. M.

Mica insulator. W. H. Banks, jun., and W. A. Graham, Assrs. to Macallen Co. (U.S.P. 1,984,911, 18.12.34. Appl., 19.8.31).—Mica flakes are formed into a sheet with a shellac, copal, or glyptal binder under heat and pressure, and the sheet is coated on both sides with a film of cellulose acetate to prevent peeling or flaking. A. R. P.

Electromagnetic cores. J. Swinburne (B.P. 437,126, 4.5.34).—FeC_2O_4 or pptd. Fe_3O_4 is warmed in a thin layer until it smoulders to form ferromagnetic red Fe_2O_3, which is mixed with a binder and pressed into a core; a small amount of fine Fe powder may also be added to reduce eddy currents. A. R. P.

Electrometric determinations. A. H. Davis, jun., Assrs. to Nat. Aniline & Chem. Co., Inc. (U.S.P. 2,004,569, 11.6.35. Appl., 14.5.26).—The conductivity of solutions is measured by a pair of electrodes connected to the filament and grid of a 3-electrode valve, the actual current passing through the solution electrodes being negligible. Preferably two solutions (one standard) and two valves heated from a common source through a common adjusting resistance are provided. B. M. V.

Electrical condenser. W. C. van Geel and H. Emmens, Assr. to N. V. Philips' Gloeilampenfabr. (U.S.P. 2,005,279, 18.6.35. Appl., 29.6.31. Holl., 24.7.30).—One electrode comprises a metal of the first sub-group of group IV, the dielectric comprises a stable film of a compound of the above metal, and the electrolyte, of smaller emissive power than the said electrode, comprises MnO_2 and at least one of the compounds $KClO_3$, BaO_2, and $KMnO_4$, together with a hygroscopic substance (P_2O_5). B. M. V.

Gas-filled electric incandescence lamps. Egyesült Izzólámpa és Villamossági R./T. (B.P. 442,172, 10.10.34. Hung., 10.10.33).

[Graphite] electrodes for electric-discharge vessels. W. Lehmann (B.P. 437,337, 31.5.35. Ger., 1.6.34).

Cathode-ray tubes and thermo-luminescent screens therefor. J. L. Baird, and Baird Television, Ltd. (B.P. 442,963, 19.12.34).

Attachment of paste to the plates of electric batteries. F. MacCallum and A. H. Redfern (B.P. 442,281, 26.4.34).

Specific-gravity indicating device [for accumulators]. Oldham & Son, Ltd., and T. G. Mair (B.P. 442,312, 2.11.34).

Gas-analysis apparatus.—See I. **Processing coal.**—See II. **Esters from alcohols.**—See III. **Abrasive metal carbides.**—See VIII. **Resistance alloy. Electrodepositing Ni.**—See X. **Bodying of oils.**—See XII. **Treating grain.**—See XIX.

XII.—FATS; OILS; WAXES.

Fractional distillation of the saturated fatty acids of highly hydrogenated oils. III. Composition of completely hardened beef tallow, lard, and horse fat. S. Ueno and T. Takeuchi (J. Soc. Chem. Ind., Japan, 1935, **38**, 740—742 b; cf. B., 1936, 241).—Determination of the usual physical consts. of the various fractions of the mixed fatty acids obtained by hydrolysis of completely hydrogenated (H_2–Ni at 180°/65 atm.) beef tallow [m.p. 58·7—61·2°, sap. val. 196·7, I val. (Wijs) 0·57], lard (58·8—60·6°, 195·0, 0·24), and horse fat (61·2—62·2°, 196·4, 0·31) indicates the following compositions: from beef tallow, C_{14}- 2·0, C_{16}- 30·3, C_{18}- 64·5; from lard, C_{16}- 23·7, C_{18}- 73·3; and from horse fat, C_{14}- 1·4, C_{18}- 34·8, and C_{18}-acids 60·7%. J. W. B.

Squalene as a constituent of yeast fat. K. Täufel, H. Thaler, and H. Schreyegg (Fettchem. Umschau, 1936, **43**, 26—29).—The chief constituent of the oily fraction (= 16·3% of the total fat) of the unsaponifiable matter of brewery-yeast fat (from *Saccharomyces* sp.) has been identified as squalene. Ergosterol and cryptosterol were isolated from the sterol fraction (= 3·3% of the fat). E. L.

(a) New catalysts for fat-hardening. (b) Extraction of fat from catalyst in fat-hardening. R. Heublum (Deuts. Parfüm.-Ztg., 1935, **21**, 63—64, 30—31; Chem. Zentr., 1935, i, 3068).—(a) A massive Ni (27%)-Al catalyst (Al_3Ni), etched with NaOH until 8% of the Al has been dissolved away, is suitable (cf. B., 1934, 802). The content of *iso*oleic acid in the hard fat obtained should be only 10%.

(b) Three methods of recovery of fat are reviewed. H. J. E.

Ketone formation in purified fats. VII. Judging nutrient value of fats by their ketone contents. H. Schmalfuss, H. Werner, and A. Gehrke (Margarine Ind., 1933, **26**, 261—263).—Experienced tasters can detect 4×10^{-6} of Me heptyl or Me nonyl ketone per g. 2×10^{-6} of the latter is shown by the salicylaldehyde test. Ch. Abs. (*p*)

Physico-chemical considerations on the detergent action of soap and practical questions of the soap industry. P. Rehbinder and D. Roschdestvenski (Seifensieder-Ztg., 1935, **62**, 215—217; Chem. Zentr., 1935, i, 3361).—A theory of the detergent action of soap, based on surface phenomena, is developed and applied to the determination of necessary properties of effective detergents. H. N. R.

Filtration of mineral powders in suspension in water and in different aqueous solutions. (Mlle.) P. Berthier (Compt. rend., 1935, **201**, 1368—1370).—The detergent actions of Na oleate (I) and Na citrate (II) on aq. suspensions of colcothar have been investigated by determining the turbidity (*T*) of the suspensions passing through a filter paper at different concns. of the salts. *T* increases with concn. of (I), but there is no clear relation between them or between *T* and surface tension (γ). *T* passes through a max. with (II), which has no influence on the γ of the solution. The results are probably due to the charges acquired by the suspended particles from the anions of the salts. T. G. P.

Influence of clay in soap solutions. B. Tiutiunnikov, N. Perstnev, S. Pleschkova, and A. Tschernitschkina (Maslob. Shir. Delo, 1935, 7—15).—Adsorbent clays are not beneficial in household soaps. Fatty acid soaps are more sensitive than naphthenates or resinates to clays. Those with low adsorbent capacity, *e.g.*, kieselguhr, are preferable for use as inorg. fillers. Ch. Abs. (*p*)

Polymerisation of fatty oils. Polymerisation of ethyl [β-]elæostearate. A. Steger and J. van Loon (Fettchem. Umschau, 1936, **43**, 17—21; cf. A., 1935, 1482).—The products obtained by the heat-bodying of Et β-elæostearate (I), with or without addition of S as catalyst, were saponified and re-esterified after removing any unsaponifiable substances formed, and the final ester product was examined by fractional distillation in vac., hydrogenation, etc. The results indicated that two reactions occur during the heating of (I), viz., (*a*) a true polymerisation and (*b*) a conversion (isomerisation) of elæostearate to form a non-polymerisable *cyclo*-derivative; (*b*) is more important during bodying at $>$ 300° than at lower temp., and also is far more marked (polymerisation being correspondingly reduced) when S is used as catalyst. In the case of (I) gelatinisation does not intervene (as with tung oil itself) and the bodying can be continued until the whole material has been isomerised or polymerised. E. L.

Lignocellulose stearate. N. J. Soletschnik (Lesochim. Prom., 1934, 3, No. 4, 12—16).—The prep. of stearic esters of cellulose, lignin, and xylan, by stearyl chloride, is examined. Ch. Abs. (*p*)

Physico-chemical theories underlying processes for recovery of vegetable oils, its experimental justification and its application in practice. A. M. Goldovski (Fettchem. Umschau, 1936, **43**, 21—26).—Theoretical considerations and experimental evidence are adduced in support of the view that, after crushing the seed, the oil (which in the uncrushed seed is held by capillary forces within the interstices of the plasma gel) becomes distributed as a thin film over the enormous area of pre-existent and newly-created surfaces of the meal particles, and is held there by surface tension and adsorption forces of very considerable magnitude. H_2O in the moist meal cannot be regarded (cf. Better and Munk, B., 1932, 354) as a "liquid" constituent, since observation shows that it is not present in liquid (drop) form in the meal, but has been absorbed to swell (solvate) the hydrophilic colloids forming the meal particles. E. L.

Preparation [and therapeutic use] of refined calophyllum oil. C. D. V. Georgi [with G. A. Ryrie] (Malay. Agric. J., 1936, **24**, 3—6).—The crude oil expressed from the kernels of *Calophyllum inophyllum*, and having an acidity of about 19% (as oleic acid) due to the presence of resin acids, can be refined by treatment with NaOH to an acidity of 0·5%. Tests at Sungei Buloh confirm results reported previously from Fiji (cf. Ryrie, Malay. Med. J., 1933, **8**, 238), that intramuscular injection of the refined oil or its Et esters produces striking alleviation of nerve-pain in lepers; the oil is not habit-forming. E. L.

Determination of tung oil in meal and press cake. C. B. Pollard and L. M. Ellis (Amer. J. Pharm., 1936, **108**, 31—32).—Press cake (25 g.) or meal (10 g.) is extracted with CCl_4 for 24 hr. in a Soxhlet apparatus through which a current of N_2 saturated with CCl_4 vapour is passed to prevent oxidation. S. C.

Acidification in stored oil cakes; determining approximately the age of a stored oil cake. J. Rallis (Bull. Mat. Grasses, 1936, **20**, 43—47).—The age can be estimated from a consideration of the free acidity of the oil extractable from the cake. The amount of free fatty acids of the contained oil increases more rapidly in press cakes which have been stored whole than in samples of ground cake, cake edge-parings, or unpressed meal from the kettle, kept under similar conditions. E. L.

Silver benzoate test [for olive oils]. M. F. Lauro (Oil & Soap, 1936, **13**, 45—47).—The val. of this test (cf. Oil & Fat Ind., Sept. and Nov., 1927) for the detection of S-oils is upheld; positive reactions are also obtained when traces of soap, Cu, Fe, or artificial colouring matters, which are equally undesirable in edible olive oils, are present. A few samples of authentic virgin oils, from Seville and Tunis, which had an unusually bitter taste (rendering them unfit for direct edible use), also gave positive results in the test, which so far are unexplained. Crude vegetable oils, other than olive oil, give erratic results, but, after refining, such salad oils give negative results in the test. E. L.

Nature of sediments formed on cooling sunflower-seed oil. A. Zinovev and I. Gurevitsch (Maslob. Shir. Delo, 1934, **10**, No. 7, 25—28).—The sediment usually consists of phosphates of a protein–gum complex. The amount of sediment is not increased by repeated freezing, and its vol. is decreased by heating to 50°. Ch. Abs. (*p*)

Mol. wt. of stand oil. H. Kurz (Fettchem. Umschau, 1936, **43**, 29—30; cf. Wolff, B., 1935, 1101).—The validity of the application of the Staudinger and Arrhenius formulæ to the determination of the mol. wt. of stand oils is disputed; even if such were admissible, the results obtained can indicate only the average degree of polymerisation of the complex product. It is claimed, moreover, that stand-oil formation is the result of condensation, not of polymerisation. E. L.

Chemical effect of water on drying-oil films. J. Milligan (J. Oil Col. Chem. Assoc., 1936, **19**, 59—61).—All linseed and tung oil films made by the author were found to undergo destructive liquefaction (hydrolysis) under prolonged conditions of heat (78—80°) and (100%) R.H., the early stages of the process being related to the toughening accompanying ageing. Highly polymerised (*e.g.*, stoved) films are more stable than oxidised (air-dried) films. F. C. B. M.

High-pressure hydrogenation of soya-bean oil. V. Preparation of light hydrocarbon oil. Y. Shinozaki, S. Kagawa, and M. Sato (J. Soc. Chem. Ind., Japan, 1936, **39**, 22 b; cf. B., 1935, 416).—A catalyst was essential for the production of a transparent light oil at $> 430°$ by this process. Higher initial pressures of H_2 favoured the reaction, which was complete in 1 hr. Experiments with stearic acid and various catalysts (Zn, Cu, Ni, Fe, and Cr salts) showed that Ni ($\nless 3\%$) gave the best results, the product having $d < 0{\cdot}7$ and 90% of it distilling at $< 200°$. C. C.

Lubricants.—See II. **Bleaching clay. H_2 for oil industry.**—See VII. **Analysis of oils etc.**—See XIII. **Tanning with fats.**—See XV. **[Oil of] *Tephrosia vogelii*.**—See XVI. **Determining milk fat. Butter.**—See XIX. **Perfumes from castor oil.**—See XX.

See also A., Mar., 286, **η relations in emulsions containing milk fat.** 302, **Colorimetric analysis [of cod-liver oil].** 311 and 313, **Sperm head and blubber oils.** 313, **Drying of oils.** 361, **Butter fat.** 368, **Mustard oil.** 390—2, **Vitamins.** 396, **Castanha mineira.**

Patents.

Preserving agents for animal and vegetable fats, fatty oils, and soap. W. S. Calcott, W. A. Douglass, and H. W. Walker, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,993,771, 12.3.35. Appl., 10.9.29).—The use of 4 : 4′-$(\cdot C_6H_4\cdot OH)_2$ (0·001—1%) is claimed. H. A. P.

Washing apparatus. H. W. Lehmkuhl (U.S.P. 2,006,085, 25.6.35. Appl., 1.4.33).—Aq. liquid for can or bottle washing is maintained at a const. content of alkali by passing some or all of the make-up H_2O over solid alkali to form an over-conc. solution. B. M. V.

Removal of foots from crude oil. E. C. Ragsdale, Assr. to A. E. Staley Manufg. Co. (U.S.P. 1,985,426, 25.12.34. Appl., 16.4.32).—Soya beans, maize germs, or the like are crushed, the oil is removed in a press and filtered to remove the foots, and these are treated in a squeezer to remove most of the remaining oil and then returned to the press with a new charge of beans. A. R. P.

Bodying of liquids [oils]. R. A. Carleton, Assr. to Nat. Electric Heating Co., Inc. (U.S.P. 1,998,073, 16.4.35. Appl., 23.10.29. Renewed 7.2.35).—Polymerisation of oils is effected by rapidly heating electrically a narrow and therefore rapidly flowing stream of the oil, and when the desired temp. is reached expanding the flow and holding the temp. by less intense electrical heat for the desired period, at the end of which treatment the oil is quickly cooled. The desired period is varied by varying the rate of flow, and the supply of heat is varied accordingly. Several forms of electrical resisters are described, one method being to form the dividing walls of a sinuous passage of resistance ribbon. B. M. V.

Metal polish. W. S. Calcott and R. G. Clarkson, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,986,388, 1.1.35. Appl., 8.1.30).—Wax and oleic acid are dissolved in solvent naphtha, tetrahydronaphthalene, *o*-$C_6H_4Cl_2$, or turpentine and the solution is emulsified with dil. aq. NH_3 containing $(NH_4)_2C_2O_4$ and Na 1-*iso*propylnaphthalene-2-sulphonate. A. R. P.

Lubricant. Cylinder oil.—See II. **Polyglycerol esters.**—See III.

XIII.—PAINTS ; PIGMENTS ; VARNISHES ; RESINS.

Exterior house-paint pigment combinations in relation to durability and type of injury. D. W. Robertson (Off. Digest, 1935, No. 146, 228—253).—Scaling is due to poor adhesion caused by formation of H_2O-sol. compounds at the film-surface interface. Chalking is caused by disintegration of the vehicle, and " washing " to the dissolution of the film in H_2O. Cracking is associated with Zn paints, but not with white Pb–Titanox preps. The latter are improved by additions of resin, which increases cracking with Zn paints. The pigment content in the non-volatile fraction should be 35—40 vol.-% for primers and 30% for top coats. Ch. Abs. (*p*)

Structure in paint and varnish systems. W. E. Wornum (J. Oil Col. Chem. Assoc., 1936, **19**, 42—58).—The theory is developed that mol. polymerides on aggregation give rise to two types of micelle, viz., straight-chain mols. (reversible aggregation) and cross-linked mols. (non-reversible aggregation). Micelle aggregation leads either to a plastic (*i.e.*, disorganised) structure held by van der Waals (cohesional) forces, or to a " fibrillar " structure due to orientation of the anisotropic micelles. The properties of paint and varnish films depend on the relative magnitudes of the above two forces. Thixotropy is believed to arise from the presence of anisotropic micelles. F. C. B. M.

Microscopy in the paint industry. G. Fearnley (Canad. Chem. Met., 1936, **20**, 38—39).—Practical details are given on the use of the microscope for examination of paint films, determination of particle size and *n* of pigments, etc. F. C. B. M.

Injury to paintings by *X*-rays. F. Müller-Skjold (Angew. Chem., 1936, **49**, 161—162 ; cf. B., 1934, 589).—A no. of Pb colours in presence of certain media were exposed to *X*-rays of approx. 100,000 *r* per sq. cm. for various periods of time. In 1 hr. white-Pb and PbO gave definite turbidities ; in 20—25 min. white-Pb gave a weak turbidity. Full details are given and the bearing of the results on the safe use of such rays on paintings is discussed. D. C. J.

The new blue pigment—copper phthalocyanine, Monastral Fast Blue BS, or Heliogenblau B Pulver. C. P. A. Kappelmeier (Verfkroniek, 1936, **9**, 39—41 ; cf. A., 1934, 1114).—The manufacture, properties, industrial uses, and relationship of this pigment to the porphyrins are discussed. D. R. D.

Analysis of lacquer thinners, oils, and resins. R. C. Martin (Metal Clean. Finish., 1935, **7**, 223—226, 242).—Methods for determining the C_6H_6- and PhMe-dilution factor, hydrocarbon, ester, and S contents, the flow-out and blush of thinners, oil consts., the m.p. of resins by the " gum plug," and the chill test for ester gums are described. Ch. Abs. (*p*)

Testing of lacquers by the Erichsen machine. Anon. (Farbe u. Lack, 1936, **11**, 123—124).—Standard steel plates coated with the lacquer or system under test are subjected to the pressure of a weighted ball, the depth of deformation being controllable, and the extent and nature of failure of the film give information on adhesion, elasticity, suitability of systems, change of properties on ageing, etc., typical test specimens being illustrated. The results of a series of tests on films of nitrocellulose lacquers containing different proportions of a range of plasticisers, at different ages, are tabulated. S. S. W.

Natural resins and their varnishes. C. L. Mantell, C. H. Allen, and K. M. Sprinkel (Off. Digest, 1936, No. 152, 4—13).—Natural weathering tests indicate the superior durability of varnishes made from phenolic resins in conjunction with natural resins (run copals or dammars) over those from phenolic resins and ester gums. D. R. D.

Congo copal. L. Hellinckx (Mém. Inst. colon. Belge, 1935, Reprint, 64 pp.).—Congo copal (I) is classified, according to its external appearance, into 14 groups, and their properties are examined. Fluorescence under ultra-violet light provides some means of identification. The dark colour of some varieties, produced by ageing, is mostly on the surface and may be removed by washing with solvents. Solubility of (I) in mixtures of solvents has been studied. Methods of separation of its constituents by selective dissolution are unreliable. On pyrogenation, an oily and an aq. distillate, CO_2, and small amounts of CO, CH_4, H_2, and C_nH_{2n} are produced. The primary reactions (up to 300°) are decarboxylation of dibasic to monobasic acids and formation of lactones by OH-acids. At higher temp. (300—350°) the monobasic acids lose CO_2, CO is produced by decomp. of lactones, and cracking occurs. The principal constituents of (I) are congocopalic acid, $C_{36}H_{58}(CO_2H)_2$ (about 43%), congocopalolic acid $C_{21}H_{32}(OH)\cdot CO_2H$, resenes which probably possess CO groups, and essential oils including limonene. About 40% can be acetylated, and the product (sol. in various solvents) is usable in lacquers. L. A. O'N.

Works tests on plastics materials and products. W. D. Owen (Brit. Plastics, 1935—6, **7**, 137—140, 218—220, 259—260, 314—315, 323, 368—369, 372, 416—418).—Testing methods for moulding powders (from the aspects of various physical properties, and behaviour in moulding operations) and for moulded articles (mechanical, electrical, thermal, and chemical properties) are detailed. Some general remarks are given on reliability of the tests and on the prep. of test specimens. S. S. W.

Pigments for paper.—See V. **Effect of H_2O on drying-oil films.**—See XII.

See also A., Mar., 328, **Diazo-resins, and** (329) **-pigments.** 340, **Elemi resin.**

Patents.

[Zinc oxide] pigment. E. H. Bunce and G. F. A. Stutz, Assrs. to New Jersey Zinc Co. (U.S.P. 1,986,183, 1.1.35. Appl., 21.1.31).—Calcined pptd. ZnS pigment (30) is ground wet with pptd. $CaSO_4$ (70%) and the mixture dried, with or without subsequent calcination. A. R. P.

Light-filtering overcoating. C. J. Staud and T. F. Murray, jun., Assrs. to Eastman Kodak Co. (U.S.P. 1,994,596, 19.3.35. Appl., 16.1.32).—Addition of 0·25—5·0 wt.-% of xanthydrol or phthalanil to cellulose acetate lacquers renders them substantially impermeable to ultra-violet light, particularly for protection of nitrocellulose coatings. A. W. B.

Manufacture of [finishing coat for] covering material. E. B. Grosh, V. Fish, and S. A. Cohen, Assrs. to Paraffine Companies, Inc. (U.S.P. 1,998,927, 23.4.35. Appl., 26.7.32).—A solution of an acidic alkyd, PhOH–CH_2O, or other resin in PhMe, $C_2H_4Cl_2$, etc. is emulsified with H_2O with the aid of $N(C_2H_4{\cdot}OH)_3$ and spread on uncured linoleum. S. M.

Coating and plastic compositions. E. I. Du Pont de Nemours & Co. (B.P. 442,872, 15.8.34. U.S., 15.8.33).—" Peracetylated " rubber (obtained by treating a solution of crêpe rubber in $CHCl_3$ with H_2O_2 and glacial AcOH at $>$ 60°) is incorporated with cellulose nitrate or other derivative, a natural resin, *e.g.*, dammar, and a solvent, *e.g.*, PhMe. Plasticisers, pigments, etc. may be added. 14 examples are given. S. M.

[Modified alkyd resin] baking enamel. R. T. Ubben, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,998,744, 23.4.35. Appl., 5.7.32).—Glycerol or other H_2O-sol. polyhydric alcohol is added to an aq. solution of an NH_4 salt of an alkyd resin which has been prepared with excess of acid and may be oil-modified. Resinification is completed during the baking. S. M.

(a) **Heat-convertible resin.** (b) **[Flexible, partly heat-convertible] resin.** A. Haroldson, Assr. to Continental Diamond Fibre Co. (U.S.P. 1,999,096—7, 23.4.35. Appl., 20.11.30).—(a) Glycol (9·12 mols.), a polyglycol (I) or ether derivative, *e.g.*, $OH{\cdot}[C_2H_4]{\cdot}OEt$, and a dibasic org. acid (II), *e.g.*, o-$C_6H_4(CO)_2O$ (16·75 mols.) are heated at $\not>$ 205° with compounds containing either $\not<$ two OH or both OH and CO_2H groups, *e.g.*, glycerol (7·44 mols.), shellac (III), or their mixtures until substantially all the H_2O has been removed. (b) Mol. proportions of (I) and (II) are heated at $\not>$ 185° with (III), Manila or Congo gum; the product is used as cement for mica boards etc. S. M.

Esters of polycarboxylic acids.—See III. **Ice colours.**—See IV. **Insulators.**—See XI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Determination of free sulphur [in rubber] by titration. B. Faĭnberg (Sintet. Kautschuk, 1934, No. 3, 27—29).—The iodometric method of Bolotnikov and Gurova (B., 1935, 162) is modified by addition of excess of I and back-titration with $Na_2S_2O_3$. In rubber mixtures containing PbO, the Na_2SO_3 extract contains colloidal PbS which may be coagulated with AcOH. Extracts from vulcanisates containing stearic acid and pine tar should be cooled in ice–NaCl and filtered prior to the determination. Ch. Abs. (*p*)

Physical properties of rubber–bitumen mixtures. W. S. Davey (J.S.C.I., 1936, 55, 43—48 t).—Small amounts of raw rubber (I) have been incorporated in bitumen (II) and the physical properties of the resulting mixtures determined by experimental methods used in the asphalt industry. The (I) was added to the (II) either as raw crumb or as latex. At temp. $>$ 170° homogeneous solutions were obtained by dissolving (I) directly in (II), but a more convenient method was to dissolve (I) in a flux oil, and then " cut back " the (II) with the (I)–oil flux. Latex can be satisfactorily dispersed in (II); the H_2O may, however, be troublesome to remove on a large scale. (I) when added to (II) without overheating increases the hardness (penetration), raises the softening point, and increases the elasticity. The properties of the (I)–(II) mixtures are modified by the period and temp. of heating. If the mixtures are overheated the (I) is decomposed and has a harmful effect on the properties of the (II), but the period of heating and the temp. required to produce the effect are distinctly $>$ is likely to occur in practice. Elastic products having high softening points can be obtained by heating small quantities of (I) and S with (II). Vibration tests made on asphalt mastic samples in which (I) was incorporated indicate an improved vibration absorption.

C black. Gasolines from caoutchouc.—See II. **Colour reactions of accelerators etc.**—See III.

See also A., Mar., 312, **Formation of high polymerides.** 396, **Castanha mineira.**

Patents.

Concentration of [rubber] latex. United States Rubber Co., Assees. of J. McGavack (B.P. 442,964, 24.12.34. U.S., 11.10.34).—The process of concentrating latex by creaming is interrupted at the stage when the rate of creaming shows a marked decrease, *e.g.*, when the rubber-rich portion contains approx. 45—55% of total solids or when the vol. of separated serum = approx. 30—45% of the total vol. This period may be ⅓—¼ of the time necessary for the normal production of 60% concentrate, and with untreated old latex, or fresh latex containing a small amount of added soap, corresponds with a reduced rate of separation of serum per hr. of approx. 2—3% of the total vol. The rubber-rich portion is then separated, diluted, treated with more creaming agent, and again allowed to separate. In the final creaming operation the separation is permitted to proceed until a concn. of 60% is obtained. D. F. T.

(a) **Formation of rubber threads or the like.** (b) **Manufacture of threads or filaments from rubber latex and the like.** (c) **Elastic rubber threads.** T. L. Shepherd (B.P. 442,935—7, [a, b] 12.5. and 23.8.34, [c] 15.5.34).—(a) Latex, which may contain fibre, is applied to a knife-edge rotating member or disc; coagulant is then applied to the latex, the latter then being continuously withdrawn and stretched before coagulation or "setting" is complete. (B) The latex is applied to a moving support, *e.g.*, a wire or the edge of a rotating disc, which has previously been treated with coagulant. The latex so treated (after being slit for removal from the wire) is further processed as in (A), and may be subjected to further coagulant action. (C) Rubber thread is coated with a covering (*e.g.*, of rubber, celluloid, etc.) containing suspended comminuted material, such as cotton, wool, or silk fibres, which may have been dyed; such threads may subsequently be twisted together, during which operation more comminuted material may be added. (A—C) Apparatus is described. D. F. T.

Conversion products of rubber. Rubber Producers Res. Assoc., and H. P. Stevens (B.P. 442,136, 26.7.34. Cf. B.P. 417,912; B., 1934, 1112).—Rubber latex is oxidised in presence of a catalyst, *e.g.*, a paint dryer such as Mn linoleate (0·15% on the rubber), with formation of a readily sol. material of reduced η in solution. Oxidation may be effected by air (20 hr./70°) or H_2O_2, and the product may be coagulated and dried. D. F. T.

Rubber compounding. A. B. Cowdery and T. A. Bulifant, Assrs. to Barrett Co. (U.S.P. 1,986,389, 1.1.35. Appl., 29.12.30).—Claim is made for a composition comprising rubber and a coal-tar oil of d^{38} 1·147 free from material which crystallises at 25° and containing $\ngtr$ 5% of compounds with b.p. $<$ 300°. A. R. P.

Vulcanisation of rubber. I. Williams, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,997,760, 16.4.35. Appl., 25.3.33).—Vulcanisation in presence of certain types of org. accelerator, *e.g.*, mercaptobenzthiazole, is effected with the aid of a propionate of Zn, Pb, Hg, or Cd as activator. D. F. T.

[Accelerators for] vulcanisation of rubber. Dunlop Rubber Co., Ltd., D. F. Twiss, F. A. Jones, and D. J. Hadley (B.P. 441,653, 16.11.34).—The use as non-scorching accelerators of condensation products of (negatively-substituted) arylseleno-halides or -cyanides with mercaptoarylenethiazoles, alkyl xanthates, alkyl (etc.) dithiocarbamates, or dithio-acids is claimed. *E.g.*, addition of o-*nitrophenyl selenobromide*, m.p. 64° (from o-NO_2·C_6H_4·N_2Cl and KSeCN, and bromination of the resulting selenocyanide), to mercaptobenzthiazole in EtOH + NaOH gives o-*nitrophenyl*-1-*benzthiazyl selenosulphide*, m.p. 136°. Similar *products* are obtained using as starting materials Na diethylthiocarbamate (m.p. 94°), K Pr^{β} xanthate (m.p. 66°), and Na pentamethylenedithiocarbamate (m.p. 134°). H. A. P.

Plastic composition.—See XIII.

XV.—LEATHER; GLUE.

Preparing chamois leather from rejected calf skins. V. A. Goldschtein (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1935, No. 5, 41—43).—Pretreatment with Na_2S–CaO is followed by pickling in HCl–NaCl, Cr-tanning, splitting, washing, greasing with alizarin oil and egg yolk, dehairing, and finishing. Ch. Abs. (*p*)

Treating lizard skins. V. N. Semenova (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1934, No. 5, 64—66).—Skins are bleached in H_2SO_4–$KMnO_4$ followed by a bisulphite bath, washed, and dyed. Ch. Abs. (*p*)

Prevention of "rust spots" on calf skins and large hides. V. G. Babakina and K. S. Kutakova (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1934, No. 5, 102—125).—"Rust" spots are caused by growth of a pink bacterium originating in hide or salt. Development is checked by addition of 2% of $C_{10}H_8$, 2% of p-$C_6H_4Cl_2$, or 3% of Na_2CO_3 to the brine. Hide-storage temp. should be $\ngtr$ 18°. Ch. Abs. (*p*)

Treating sole leather with "ampech" and "amsok" sulphite-cellulose extracts. M. G. Rusakov and A. I. Shemotschkin (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1934, No. 5, 41—43).—Treatment is described. Ch. Abs. (*p*)

Formation of deposit in aqueous extracts of vegetable tanning agents. V. Němec (Tech. Hlídka Kožel., 1934, **10**, 1—123, 44 pp.; Chem. Zentr., 1935, i, 3086).—For chestnut and oak-wood extract the wt. and vol. of the deposit formed increased with concn. up to a max. val. Cooling produced a large amount of deposit, which redissolved on raising the temp. Fatty acids dissolve the deposit, the efficacy increasing with the mol. wt. of the acid used. Lactic acid also has a peptising action. H. J. E.

Action of micro-organisms on vegetable tanning materials. III. Lactic acid fermentation. W. P. Doelger [with R. Partridge and L. Schreiberg] (J. Amer. Leather Chem. Assoc., 1936, **31**, 46—64; cf. B., 1936, 209).—The production of lactic acid (I) by *Streptococcus lactis* in vegetable tan liquors is diminished by yeasts under conditions of aëration and by reducing the p_H to $<$ 4, is increased by additions of glucose, and requires some org. N which is normally provided by the hides. (I) is not produced well in natural tan liquors of $p_H < 4·0$, but admixture with a less acid tan liquor improves the production. Oak bark, oak-wood, mangrove bark, chestnut oak, and myrobalans have a better (I)-producing val. than sumac, valonia, mimosa, chestnut, quebracho, divi-divi, and hemlock. D. W.

Tanning with fats. B. N. Dranitzuin (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1934, No. 5, 81—87).—Cod-liver, seal, and fish oils are examined. Oxidisable oils produce a tanning effect. Optimum conditions include a sufficiency of H_2O in the leather, and a temp. of 50°. Ch. Abs. (*p*)

Effect of preliminary operations on the dyeing of leather. B. I. Tzukerman and R. A. Metlitzkaja (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1934, No. 5, 44—63).—The p_H of leather after neutralisation is influenced by its initial p_H (after tanning), the liquid factor during neutralisation, and the hardness of the H_2O used. As neutralising agent borax gives the lowest p_H, aq. NH_3 + $(NH_4)_2SO_4$ the highest, with HCO_3' intermediate. The effects of the p_H of leather on the absorption of various dyes, their penetration and intensity, are recorded. Ch. Abs. (*p*)

Combined vegetable and chrome tanning. P. F. Shipkov (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1934, No. 5, 67—81).—The mechanism of changes occurring in treatment with compounds containing anionic and cationic Cr in conjunction with vegetable tannides are recorded. Ch. Abs. (*p*)

Determination of nitrogen in leather by the Kjeldahl method and by titration of the formol solution. M. E. Sergeev, F. A. Sapegin, and L. I. Belova (Tzent. Nauch.-Issledov. Inst. Kosh. Prom., Sborn. Rabot, 1934, No. 5, 36—37).—The technique includes the use of Se as catalyst for digestion, and the determination of NH_3 in the neutralised digest by formol titration. Ch. Abs. (*p*)

Chemistry and the glue industry. E. Sauer (Chem.-Ztg., 1936, **60**, 233—235).—A review.

Sizes for papers.—See V.

See also A., Mar., 396, **Castanha mineira.**

Patents.

Tanning of leather. F. Wayland (U.S.P. 1,998,567, 23.4.35. Appl., 12.1.32).—Skins under tension on a frame are Cr-tanned with such a large quantity of Cr-liquor that its basicity remains unaltered and it can be used again repeatedly. D. W.

Leather-tanning processes. Forestal Land, Timber, & Railways Co., Ltd., A. Fontana, R. O. Phillips, and J. T. Terrell (B.P. 442,590, 1.8.34).—Hides or skins are treated with a series of vegetable tanning liquors, *e.g.*, mimosa, mangrove, quebracho, commencing at p_H 6·0—7·5 and progressively decreasing to a final liquor of p_H 2·8—3·3. The liquors flow successively through the various stages from the final stage to the first. D. W.

Production of dry glues from dextrin. Jagenberg-Werke A.-G. (B.P. 441,658, 11.1.35. Ger., 11.1.34).—Powdered dextrin is heated for about 30 min. at 70—80° with a polyhydric alcohol of $< C_8$, *e.g.*, glycol. The product is a pulverulent dry glue, which is sol. in cold H_2O without formation of lumps. A. W. B.

Manufacture of an adhesive. G. Davidson, C. N. Cone, I. F. Laucks, and H. P. Banks, Assrs. to I. F. Laucks, Inc. (U.S.P. 1,985,631, 25.12.34. Appl., 18.7.31).—A glue for plywood is prepared by stirring slowly into H_2O (55 gals.) at 30—40° soya-bean flour (100), $KMnO_4$ (2), NaOH (4), CaO (0·375), and CH_2O or CS_2 (1·25 lb.). A. R. P.

XVI.—AGRICULTURE.

Terms indicating origin of soils. C. F. Shaw (Amer. Soil Survey Assoc. Rept. 15th Ann. Meet. Bull., 1935, No. 16, 4).—New terms of nomenclature are introduced. Ch. Abs. (*p*)

Meaning of the term solonetz. W. P. Kelly and C. F. Shaw (Amer. Soil Survey Assoc. Rept. 15th Ann. Meet. Bull., 1935, No. 16, 1—3).—Differences in morphological and chemical interpretation are discussed. Ch. Abs. (*p*)

What characteristics distinguish pedalfers from pedocals? C. F. Shaw (Amer. Soil Survey Assoc. Rept. 15th Ann. Meet. Bull., 1935, No. 16, 5).—A discussion, with special reference to Californian soils. Ch. Abs. (*p*)

Influence of artificial and natural factors on the structure of soils. J. Apsits (Z. Pflanz. Düng., 1936, **42**, A, 1—35).—Effects of various cultural operations on the porosity of surface soils and subsoils are examined. A. G. P.

Influence of the kind of forest trees on the biological condition of soils in north-west Germany. Wittich (Mitt. Forstwirts. Forstwiss., 1933, **4**, 115—158; Bied. Zentr., 1935, **6**, A, 99—100).—Differences between the humus accumulations under conifers and under leafy trees are examined. A. G. P.

Biological activity of forest soils in relation to acidification and buffering: methods for the biological examination of soil. Volkert (Mitt. Forstwirts. Forstwiss., 1933, **4**, 1—32; Bied. Zentr., 1935, **6**, A, 99).—A system of soil examination is described. High N contents are usually associated with good ammonifying power and buffer capacity. Nitrification is retarded by acidity unless the soil is well buffered. Ammonification is less affected. A. G. P.

Effect of raking-off surface litter on the composition of pine forest soils. A. Němec (Allgem. Forst- u. Jagdztg., 1933, **109**, 214—219; Bied. Zentr., 1935, **6**, A, 98).—The N, P, and humus contents of the surface soil are lowered and K is raised by removal of surface litter. Corresponding changes are effected in the mineral composition of the needles grown in the raked soil. The resin content of the needles is $>$, and of cellulose $<$, that of those grown on untreated soil. A. G. P.

Acidity and the humus question in forest soils. Kleinschmidt, Deines, and Olkers (Allgem. Forst- u. Jagdztg., 1933, **109**, 209—214; Bied. Zentr., 1935, **6**, A, 97—98).—Customary methods for determining p_H may yield unsatisfactory results for forest soils. The $[H^·]$ per unit of dry soil may be determined from H_2O content–$[H^·]$ curves by extra- or intra-polation. A. G. P.

Soils of Scotland. III. Central valley and southern uplands. W. G. Ogg (Empire J. Exp. Agric., 1935, **3**, 295—312; cf. B., 1935, 777).—Analytical data and profile characteristics are given. The effects of cultivation on the constitution of the soils are examined. A. G. P.

Sick soils. A. F. Bell (Proc. Queensland Soc. Sugar-Cane Tech., 1935, **6**, 8—18).—Infertility in certain sugar-cane soils was corr. by sterilisation with steam or with CH_2O. Ch. Abs. (*p*)

Report of the agricultural chemist, Bihar and Orissa, on nature of sand deposits in earthquake-affected areas. Anon. (Rept. Agric. Bihar and Orissa Bull., 1934, **3**, 12 pp.).—Mechanical and chemical analyses of soils and subsoils, together with physical data, are given. Ch. Abs. (*p*)

Carbonic acid determinations in soils. B. N. Singh and P. B. Mathur (Current Sci., 1935, **4**, 408—409).—A simple apparatus, accurate to ±1·25%, independent of atm. pressure variations, and eliminating the use of rubber tubing is described. N. M. B.

Lysimeter investigations. IV. Water movement, soil temperatures, and root activity under apple trees. R. C. Collison (New York State Agric. Exp. Sta. Tech. Bull., 1935, No. 237, 31 pp.; cf. B., 1934, 338).—Data obtained by the Russian type of lysimeter in orchard soils are examined, and the influence of soil type, profile character, plant cover, and soil temp. is discussed. Comparison is made with the old type of lysimeter. A. G. P.

Soil analysis as an index to fertility. B. E. Beater (S. Afr. Sugar J., 1935, 19, 151, 153, 155, 157).—A discussion. Ch. Abs. (*p*)

Determination of the phosphate requirement of soils by von Sigmond's nitric acid method. A. Němec (Z. Pflanz. Düng., 1936, 42, A, 143—150).—In soils rich in $CaCO_3$ the HNO_3 method yields higher vals. for available P than does Zimmermann's citrate method. In $CaCO_3$-free soils the reverse is the case. Calculations of fertiliser requirements from results of the two methods and from Neubauer tests show better general agreement in $CaCO_3$-rich than in $CaCO_3$-free soils. In comparison with field trials the HNO_3 method gives the better results for soils of moderate P content, whereas both this and the citrate method give comparable vals. when the soil-P is definitely high or low. A. G. P.

Fertilising value of various forms of phosphoric acid. P. Jolibois, H. Burgevin, G. Guyon, and A. Boullé (Compt. rend., 1935, 201, 1420—1422).—$CaH_4(PO_4)_2$ and $Ca_2H_2(PO_4)_2,4H_2O$ (I) are efficient fertilisers, whilst heated $Ca(PO_3)_2$ (II) and anhyd. (I) are less efficient. (II) cryst. at 500°, $Ca_2P_2O_7$ heated at 500°, $Ca_3(PO_4)_2$ (III) heated at 1200°, 3(III),CaF_2, and 3(III),$Ca(OH)_2$ heated at 1200° are ineffective. F. O. H.

Is the [manurial] action of superphosphate more rapid than that of basic slag? M. Gerlach (Phosphorsäure, 1934, 4, 747—748; Chem. Zentr., 1935, i, 3331).—Wilhelmj's contentions (B., 1935, 372) are refuted. J. S. A.

Plant-physiological evaluation of the phosphoric acid of manures. W. Sauerlandt (Z. Pflanz. Düng., 1936, 42, A, 187—229).—K and Ca glycerophosphates are readily decomposed in soil and their P content is as readily available to plants as that of sol. inorg. PO_4'''. The decomp. of phytin and its effect on plant growth are less rapid and are influenced by soil reaction. Org. P in cattle manures etc. increases yields and the P and N contents of crops to an extent $>$ does superphosphate applied at the same level of total P. Among various cattle manures the growth response per unit of P was greater for those having the higher total P contents. A. G. P.

Mobilisation of phosphoric acid in soil by means of green manure. C. Krügel, C. Dreyspring, and J. Görbing (Superphosphate, 1935, 8, 61—65).—Reserves of soil P are rendered sol. by ploughing-in rape as green manure, the effect being localised in the soil zone containing the manure. Green manuring induces less fixation of added fertiliser P and correspondingly greater utilisation by the crop. Ch. Abs. (*p*)

Nitrate- and ammoniacal nitrogen in soils and the plant-physiologically active nitrogen "*b*." E. A. Mitscherlich and W. Sauerlandt (Landw. Jahrb., 1935, 81, 623—654).—In pot cultures and field trials the physiologically active N content of soils (calc. from growth-curve equations) is linearly related to the $NO_3' + NH_3$ content. Removal of N from soil by cereals is more rapid than by root crops. Applications of $(NH_4)_2SO_4$ in two successive years effect changes in the NO_3'/NH_3 ratio of soils. No alteration results from the use of $NaNO_3$. A. G. P.

Manuring with magnesium. L. Schmitt (Z. Pflanz. Düng., 1936, 42, A, 129—143).—Poor growth of oats and rye in certain acid soils is attributed to lack of available Mg and consequent poor assimilation of C. The val. of fertilisers containing Mg is demonstrated. A. G. P.

Preparation of artificial farmyard manure and organic composts as suppliers of organic matter to soils. Anon. (Dept. Agric. Bihar and Orissa, Bull., 1932, No. 3, 4 pp.).—Analyses are recorded of products of composting various crop wastes with liquid cattle manure or dung as starter materials. Ch. Abs. (*p*)

Summary of theoretical considerations in modern manuring, management, and utilisation of grassland. P. Ehrenberg (Z. Pflanz. Düng., 1936, 42, B, 42—93).—A review. A. G. P.

Manuring of newly cultivated land. O. Pohjakallio (Valt. Maatalouskoet. Julkaisuja, 57, 48 pp.; Bied. Zentr., 1935, 6, A, 118).—Manurial trials on newly-broken moorland soils are recorded. A. G. P.

Plant-nutrient contents of moorland plants. E. Kivinen (Maatalous. seuran Julkaisuja, 27, 1—123; Bied. Zentr., 1935, 6, A, 119).—Analyses are recorded. Relationships between the C : N ratio of the soil, the nature of the vegetation, and other nutrient vals. are discussed. A. G. P.

Statistical interpretation of combined fertiliser trials. H. Niklas and M. Miller (Z. Pflanz. Düng., 1936, 42, A, 150—156).—Mathematical. A. G. P.

Pasture studies. VII. Effect of fertilisation on nutritive value of pasture grass. E. W. Crampton and D. A. Finlayson (Empire J. Exp. Agric., 1935, 3, 331—345; cf. B., 1935, 245).—Differences between the nutritive val. of fertilised and unfertilised pasture are not explicable on the basis of nutrient and mineral constituents alone. The NH_2-acid constituents of the proteins are probably concerned, although cystine is not a limiting factor in this respect. The effect of fertilisers on the NH_2-acid distribution may be the outcome of a changed bacterial population in the soil. A. G. P.

Effect of lime on pastures. O. Hagem (Vestl. forstl. forsoksstat. Medd., 1933, 16, 119; Bied. Zentr., 1935, 6, A, 46).—On moor and heath soils of high humus content, liming even in heavy amounts rarely penetrates to a depth of $>$ 5—7 cm. in 5 years unless harrowed in. On sandy and gravelly soils 9—11 cm.

are affected, but the action is less persistent. Effects on soil p_H and the bacterial population are examined.
A. G. P.

Relation of pasture development to environmental factors in S. Australia. H. C. Trumble (J. Austral. Inst. Agric. Sci., 1935, **1**, 30—31).—The maintenance of the appropriate nutrient status of *Danthonia* pasture soils is discussed. Ch. Abs. (*p*)

Thirty years' grassland experiments at Saxmundham, Suffolk. A. W. Oldershaw (J. Roy. Agric. Soc., 1934, **95**, 18—33).—Manurial trials are recorded. Ch. Abs. (*p*)

Conservation of grassland herbage. S. J. Watson (J. Roy. Agric. Soc., 1935, **95**, 103—116).—In haymaking, losses of starch and protein equivs. are heavy and of the same order. Artificial drying or ensilage either by the low-temp. method or with added molasses or acid provides a satisfactory means of conserving the herbage. Ch. Abs. (*p*)

Microbiological and fermentative methods for treatment of straw. A. Rokitskaja (Probl. Tierz., 1933, **6**, 31—35; Bied. Zentr., 1935, **6**, **A**, 142).—The effects of many species of soil organisms and of yeast on straw decomp. are examined. Best results were obtained by use of cow dung. A. G. P.

Interrelation of factors controlling the production of cotton under irrigation in the Sudan. II. A. R. Lambert and F. Crowther (Empire J. Exp. Agric., 1935, **3**, 289—294; cf. B., 1935, 73).—A summary and discussion of experimental data. A. G. P.

Comparison of calcium cyanamide and other standard sources of nitrogen on maize and cotton in Coastal Plain soils. H. Sherard (Com. Fertiliser, 1935, **50**, No. 3, 9—11, 32).—In equiv. dressings $CaCN_2$ (I), $NaNO_3$, and $(NH_4)_2SO_4$ were equally efficient. Mixtures containing NH_4 phosphate (II) were generally inferior to those containing superphosphate. Gypsum increased the yield and hastened the maturity of cotton grown with fertiliser mixtures containing (II). Dolomite improved cotton yields produced by (I)-(II)-KCl mixtures. Ch. Abs. (*p*)

Copper sulphate as a crop nutrient: tobacco, cotton, and corn (1934). R. Russell and T. F. Manns (Trans. Peninsula Hort. Soc., 1934, 97—129).—Addition to fertiliser mixtures of $CuSO_4$ (50 lb. per ton) increased the yield of maize, cotton, tobacco, and sweet potatoes, but had little effect on Irish potatoes. The quality of tobacco was improved. Ripening processes were somewhat delayed. Ch. Abs. (*p*)

Influence of lime on soil reaction and yield of Irish potatoes. J. B. Hester (Trans. Peninsula Hort. Soc., 1934, 45—51).—Seasonal variations in soil p_H are attributed to accumulations of sol. acids and salts during summer months. Marked increases in potatoes were obtained by applications of high-Ca or (preferably) high-Mg limes to produce p_H 5·5 in soils.
Ch. Abs. (*p*)

Influence of the anions of fertiliser salts on decomposition and degeneration of potatoes. K. Böning (Angew. Bot., 1935, **17**, 323—335).—Use of Cl'-containing fertilisers checks mosaic symptoms, but favours the development of "streak." Nitrates have the reverse effect and SO_4'' occupies an intermediate place. A. G. P.

Crops grown in the Santerre region. I. Wheat. G. Joret and M. Malterre (Ann. Agron., 1935, **5**, 632—677).—Excessive rainfall in summer or winter is unfavourable to the growth of cereals. A moderate moisture level throughout diminishes the grain : straw ratio. Heat and drought hasten maturation, lower the efficiency of fertilisers, but increase the *d* and N content of the grain. Manurial treatments are examined in relation to yield and quality. A. G. P.

Growth of marrowstem kale in Bohemia. Zuhr and Wildner (Blätt. f. Pflanzenbau, Pflanzenzucht, Tetschen, C.S.R., 1934, **12**, 3—8; Bied. Zentr., 1935, **6**, **A**, 23).—Cultural and manurial treatments are described. The nutrient val. of the kale is compared with that of common fodder crops. A. G. P.

Magnesium deficiency in vegetable crops. R. L. Carolus (Trans. Peninsula Hort. Soc., 1934, 81—87).—Use of dolomitic limestone increased the yield and Mg content of crops $>$ did an equiv. amount of Ca-limestone. The effect was more marked on lighter soils. Sol. Mg salts (kieserite, K Mg sulphate) were more effective on heavier soil types. Ch. Abs. (*p*)

Fertiliser studies with apples. F. L. Overley and E. L. Overholser (Proc. 30th Ann. Meet. Washington State Hort. Assoc., 1934, 45—49).—Application to Jonathan trees of N fertilisers, alone or in conjunction with K and/or P, increased the annual terminal growth and trunk circumference without having definite influence on the alternate bearing habit. Factors other than fertiliser treatment were more responsible for storage breakdown of the fruit. Ch. Abs. (*p*)

Effect of applying nitrogen [fertilisers] at various times and in various amounts to Yellow Transparent apple trees. F. S. Lagassé (Trans. Peninsula Hort. Soc., 1934, 66—71).—Applications of $NaNO_3$ or $(NH_4)_2SO_4$ did not greatly affect the biennial bearing habit of the trees, but early spring treatment with $NaNO_3$ increased fruit yields in the first and second pickings. Ch. Abs. (*p*)

Soil factors in relation to commercial peach production in Connecticut. M. F. Morgan and H. G. M. Jabobson (Amer. Soil Survey Assoc. Rept. 15th Ann. Meet. Bull., 1935, No. 16, 49—53).—A new type of injury causing premature yellowing and fall of leaves and young fruit is described. Customary soil factors offered no explanation. Ch. Abs. (*p*)

Mineral nutrition in Victorian fruit trees. F. M. Read and C. E. Cole (J. Austral. Inst. Agric. Sci., 1935, **1**, 33—34).—Symptoms of deficiency of Ca, Mg, K, N, and P are considered. The balance between mineral nutrients in soil is more important than the abs. amounts present. Ch. Abs. (*p*)

Elimination of mineral matter from plant roots. A. I. Achromeiko (Z. Pflanz. Düng., 1935, **42**, **A**, 156—186).—Two groups of plants are distinguished: (i) those which do not normally liberate mineral matter from roots (*Gramineæ*, root and tuber crops, vegetables, etc.), characterised by neutral sap and storage of starch, and

(ii) those eliminating minerals and P from roots as a normal function at the flowering period (*Leguminoseæ*, and oil-bearing plants), having acid sap, and accumulating protein and oil. The P liberated from the latter class ranged from 14 to 34% of the total P content of the aërial part of the plants. The mineral matter liberated by roots is available for the nutrition of other plants or of bacteria. Evidence is obtained of a small diurnal excretion of minerals during the whole growth period of all plants. The bearing of these observations on fertiliser practice is discussed. A. G. P.

Cuticular excretion of leaves. T. Lausberg (Jahrb. wiss. Bot., 1935, **81**, 769—806).—The excretions contain much K and smaller proportions of Ca. The quantity of salts excreted by old is $>$ that by young leaves, and increases when nutrient supplies are relatively more conc. Wetting of leaves causes a temporary but delayed increase in excretion which is greater from the upper side. *Ricinus* and *Vicia* having access to nutrients excrete in a relatively short time more salts than the total mineral content of the plants. A. G. P.

Action of new kinds of fertilisers on the yield and quality of sugar beet. I. K. Onischtschenko and P. A. Vlasiuk (Nauch. Zapiski Sach. Prom., 1934, **37—38**, 157—165).—Seed treatment with Zn, Ba, B, I, and especially Mn and Cr compounds produced faster-growing plants, greater root growth, and higher yields of sugar, % and per acre. Ch. Abs. (*p*)

Application of natural phosphates to [sugar-] cane land. W. M. L. Vogelsang (Meded. Cheribon Sugar Expt. Sta. Java, 1935, 74; Internat. Sugar J., 1936, **38**, 107).—Pot and field tests with cane and rice showed that on phosphate-deficient soils with p_H 5·0—6·2 and hydrolytic acidity 21—32 commercial double superphosphate may be replaced with advantage by finely-ground (and cheaper) Cheribon Al phosphate. J. P. O.

Relationship between soil moisture and crop growth [of sugar cane]. R. M. Cook (Proc. Queensland Soc. Sugar Cane Tech., 1935, **6**, 65—72).—Optimum growth of sugar cane occurs when the soil-H_2O content is $>$ 80% of its max. capacity. Effects of temp. are examined. Ch. Abs. (*p*)

Composition and toxic properties of seeds and leaves of *Tephrosia vogelii*, Hook. f. R. Wilbaux (Rev. bot. appl. agric. trop., 1934, **14**, 1019—1027).—Seeds have high N contents and no sugars. When properly dried *T. vogelii* retains its toxicity towards insects, bacteria, and fish for a long time. The tephrosin and deguelin present are lipin-sol. The seed oil is similar to that of other leguminous plants. Ch. Abs. (*p*)

Davis' modified method of predicting the germinative power of seeds. Y. Takiguchi (Bul. Sci. Fak. Terkult. Kjusu Univ., 1932, **5**, 103—116).—For viable seeds the ratio of catalase activity of seed soaked in H_2O for 12 hr. at 32° to that of the dry seeds is $>$ 1. Ch. Abs. (*p*)

Recent work on plant viruses. K. M. Smith (Current Sci., 1936, **4**, 565—569).—A review.

Control of root-rot diseases of cereals caused by *Fusarium culmorum* (W. G. Sm.), Sacc., and *Helminthosporium sativum*, P., K., and B. III. Effect of seed treatment on control of root-rot and on yield of wheat. J. E. Machacek and F. J. Greaney (Sci. Agric., 1935, **15**, 607—620).—Org. Hg preps. gave good control. Cu treatments were ineffective and CH_2O tended to increase the proportion of disease and to lower yields. A. G. P.

Pineapple wilt disease and its control. H. K. Lewcock (Queensland Agric. J., 1935, **43**, 9—17).—The occurrence of the disease is minimised by good drainage, and the maintenance of a high org. matter content and suitable acidity ($\not>$ p_H 5·1) in the soil. The latter is effected by use of acid fertilisers or, more rapidly, by incorporation of powdered S (600—700 lb. per acre). A. G. P.

Potato blight (*Phytophthora infestans*) investigations in Jersey. Prevention of disease in export produce. T. Small (Ann. Appl. Biol., 1935, **22**, 469—478).—In normal seasons spraying with $CuSO_4$–NaOH checks the disease until a satisfactory yield of potatoes is formed. Use of well-ventilated packages and fumigation with CH_2O reduce losses during transport of contaminated tubers. A. G. P.

Physiology of bean mosaic. A. L. Harrison (New York State Agric. Exp. Sta. Tech. Bull., 1935, No. 235, 48 pp.).—Exposure of infected seed to high temp. (100°), to CH_2O, and to X-rays failed to inactivate the virus. Infected plants are characterised by lower % of dry matter in the tops, low transpiration rates in leaves and high rates in pods, deformed reproductive organs, H_2O-soaked appearance of pods (hydrosis), delayed flowering, and many flowers but small pod yield, as compared with normal plants. A. G. P.

Camphor scale (*Pseudaonidia duplex*). A. W. Cressman and H. K. Plank (U.S. Dept. Agric. Circ., 1935, No. 365, 19 pp.).—Petroleum oil emulsions make the most effective sprays. Fumigation with HCN at $\not<$ 26·6° is suitable for nursery stock. A. G. P.

Action of insecticides on the intestinal tube of insects. M. Pilat (Bull. Entom. Res., 1935, **26**, 165—172).—The effects of Ca and Na arsenites, Na_2SiF_6, NaF, and Paris-green are compared histologically. A. G. P.

Tobacco decoction as an economic spray material for paddy thrips. T. V. S. Ayyar and K. P. Anantanarayanan (Madras Agric. J., 1935, **23**, 100—102).—Good control was obtained. Ch. Abs. (*p*)

New spray for potato leaf-hopper control. T. C. Allen (Ann. Rept. [1932—3] Wisc. Agric. Exp. Sta. Bull., No. 428, 107—108).—The customary repeated use of Bordeaux mixture is replaced by 3—4 applications of atomised petroleum oil containing 5% of pyrethrum extract. Ch. Abs. (*p*)

Myriapods as potato pests. K. Hauptfleisch (Kranke Pflanze., 1933, **10**, 21—24).—Spring application of acid fertilisers permits safe treatment with CaO at the time of appearance of the myriapods. Ch. Abs. (*p*)

Injurious effects of copper sprays. K. C. Menzel (Angew. Bot., 1935, **17**, 225—253).—The sensitivity of plants to Cu injury is inversely related to their suction force. The latter is increased by suitable manuring. Sprayed leaves transpire less and wilt less readily than untreated leaves. The action of Cu sprays is the same whether sulphate, chloride, or acetate is used in their prep. A. G. P.

Spraying fruit in New Jersey. A. J. Farley (Trans. Peninsula Hort. Soc., 1934, 132—136).—Bottom leaves of sprayed trees retained more As than did upper leaves. The difference was increased by rain, which removed more As from upper leaves. Ch. Abs. (*p*)

[Spray] programme against codling moth in 1933. C. R. Cutright (Ohio State Hort. Soc., Proc. 67th Ann. Meet., 1934, 96—103).—Among arsenicals Pb and Mg arsenates caused least defoliation of apple trees. Combinations of flotation S with arsenates (Ca, Mn, Zn) caused severe injury. Pb arsenate was the most effective of all sprays used. Zn and Mn arsenates gave fairly good results for late-season work. Ch. Abs. (*p*)

Possibility of controlling codling moth with nicotine vapour. R. H. Smith (Proc. 30th Ann. Meet. Wash. State Hort. Assoc., 1934, 72—75).—Codling moths were killed in 1—3 min. by enveloping trees in an atomised solution of nicotine in petroleum solvents, using BuOH as an intermediate solvent. Solutions of pyrethrum gave similar results. Ch. Abs. (*p*)

Increasing and maintaining lead arsenate deposits for codling-moth control. J. Marshall, P. M. Eide, and A. E. Priest (Proc. 30th Ann. Meet. Wash. State Hort. Assoc., 1934, 52—64).—Effects of various oil supplements are examined. Slow-drying were more effective than quick-drying fish oils. The breakdown of Pb arsenate (I) by soaps is controlled by other factors besides $[H^{\cdot}]$. Kerosene–triethanolamine oleate preps. produced a heavy and uniform coverage with (I). Caseinate preps. were rather less satisfactory. Ch. Abs. (*p*)

Toxicity of rotenone powders. D. G. Hoyer and M. D. Leonard (Soap, 1936, **12**, No. 3, 109).—The efficiency of an insecticide prepared to standard rotenone (I) content varies according to the content of other derris derivatives, as the latter are also toxic. The ratio total Et_2O-extractives : (I), called the "index of relative toxicity," affords a true basis of comparison. R. S. C.

Spraying for control of citrus scab. G. D. Ruehle (Citrus Ind., 1935, **16**, No. 5, 8—9, 17—18).—Cu fungicides were superior to S and Mg preps. Best results were obtained with 3 : 4 : 50 Bordeaux mixture containing 1% of oil. Ch. Abs. (*p*)

Contact poisons for controlling forest tree pests. III. K. Möbius and E. Wedekind (Mitt. Forstwirts. Forstwiss., 1933, **4**, 88—95; Bied. Zentr., 1935, **6**, **A**, 92).—*p*-$C_6H_4Cl_2$, *o*- and *p*-$C_6H_4Cl{\cdot}NO_2$ were effective against noctuid caterpillars. $C_6H_3Cl(NO_2)_2$ was notably toxic to leaf tiers. Neither these nor chloronaphthalenes controlled the nun-moth caterpillar. A. G. P.

Petroleum sprays for dandelions. W. E. Loomis and N. L. Noecker (Science, 1936, **83**, 63—64).—Certain of the higher-boiling hydrocarbons contained in distillates and kerosene show a marked differential action when sprayed on bluegrass lawns at the rate of 200—300 gals. per acre. Under favourable conditions the dandelions are completely killed, but the bluegrass is only temporarily affected. L. S. T.

Action of low concentrations of sodium arsenite as a weed killer. J. Vallega and R. Fresa (Bol. Min. Agric. Buenos Aires, 1933, **33**, 451—457; Bied. Zentr., 1935, **6**, **A**, 92—93).—The action of aq. Na_3AsO_3 (I) depends on its causticity, which increases with the H_2O content of the atm. High concns. do not show a proportionally increased toxicity. The root system of weeds is not readily injured by (I). Fixation of As by soils is such as to prevent injury to subsequent crops. A. G. P.

Minerals in relation to disease of the larger domesticated animals. H. H. Green (Empire J. Exp. Agric., 1935, **3**, 363—378).—A review. A. G. P.

Fruit washing. Removing spray residues.—See XIX.

See also A., Mar., 341, **Rotenone.** 391—4, **[Factors affecting] growth of plants.**

Patents.

Manufacture of phosphate fertiliser. M. Shoeld, Assr. to Oberphos Co. (U.S.P. 1,986,293, 1.1.35. Appl., 14.7.31).—A mixture of H_2SO_4 and ground phosphate rock is injected into an evacuated rotary reactor into which high-pressure steam is passed to provide heat for the reaction; at the end of the operation release of the pressure in the vessel affords a dry, nodular product. A. R. P.

Insecticide and fungicide. T. P. Remy, Assr. to Texas Co. (U.S.P. 1,986,218, 1.1.35. Appl., 16.6.31).—Claim is made for a dust consisting of dehydrated fuller's earth, acid-treated clay, or SiO_2 gel impregnated with mercaptans or org. disulphides derived from the refining of petroleum. A. R. P.

Preparation of insecticide and fungicide. E. R. de Ong and E. B. Smith, Assrs. to E. W. Colledge (U.S.P. 1,996,100, 2.4.35. Appl., 28.12.29).—Oil obtained from wood by steam-distillation or other method is treated with air or O_2 to develop latent acidity and then neutralised. The resultant oil (applied in an oil–H_2O emulsion) is harmless to foliage when sprayed as an insecticide. The oil has a great affinity for nicotine (I), and in a blend of the latter in wood oil with petroleum oil, emulsified with H_2O, the larger part of the (I) remains in the oil phase. C. C.

Parasiticides derived from higher alcohols. P. L. Salzberg and E. W. Bousquet, Assrs. to Grasselli Chem. Co. (U.S.P. 1,993,040, 5.3.35. Appl., 29.12.32).—The use of alkyl thio-, *iso*thio-, seleno-, *iso*seleno-, telluro-, and *iso*telluro-cyanates having $\nless$ C_6 (*n*-$C_{12}H_{25}{\cdot}SCN$ in the form of an aq. emulsion) as contact insecticides is claimed. H. A. P.

Means for combatting pests. P. H. Kaysing (B.P. 443,023, 15.8.34. Austr., 30.7.34).—To mixtures of a creosote oil (5—55% of phenols) and a non-drying vegetable or animal oil (castor, cottonseed, fish), emulsified with soap or insufficient alkali to saponify any of the oil, are added various known insecticides, *e.g.*, $C_{10}H_8$, pyrethrum, p-$C_6H_4Cl_2$, petroleum distillates, nicotine, Cu, S, and CaO, in amount dependent on the pest and the material to be treated. Stabilisers, *e.g.*, glue, casein, kaolin, may be added, and hygroscopic materials ($CaCl_2$) to prevent drying are preferably incorporated. Numerous examples are given. E. J. B.

(A) **[Adjuvant] spray material.** (B) **Active or toxic spray material.** E. L. Green, Ded. to U.S.A. (U.S.P. 2,004,788—9, 11.6.35. Appl., 16.9.32).—(A) A spray material for application after insecticide or the like to preserve the activity comprises bentonite flocculated with CaO or the like so that it will not swell in H_2O. (B) A plant spray comprises $CuSiO_3$ and CaO. B. M. V.

Compounds from cracked oils.—See II. **Zn trichlorophenoxide.**—See III.

XVII.—SUGARS; STARCHES; GUMS.

Alkalinity of the ash of sugar and of fodder beets. H. Colin (Publ. Inst. Belge Amél. Betterave, 1935, **3**, 247—254; Internat. Sugar J., 1936, **38**, 106).—In a good variety of sugar beets, the ratio of sol. to insol. alkalinity is 18 : 16, but in the case of the average fodder beet it is 130 : 20. In good sugar beets the sol. ash does not normally contain P_2O_5; this is not so with the fodder plant. J. P. O.

Changes in preserved sugar juices during storage. M. Z. Chelemski and I. I. Schoichet (Nauch. Zapiski, 1934, **11**, 1—14; Internat. Sugar J., 1936, **38**, 108—109).—Beet-diffusion juice treated with CaO to an alkalinity $\not<$ 0·6 % CaO and covered with a layer of mineral oil lost its sugar content at the rate of 0·0012—0·0017% per day. Heating the juice at the time of liming is not necessary, nor need the ppt. be removed. J. P. O.

Determination of colloids in the sugar factory. S. E. Charin and L. G. Smirnova (Trudi Zavod., 1935, No. 11; Internat. Sugar J., 1936, **38**, 109).—To 5 c.c. of the juice diluted to 10° Brix are added 5 c.c. of Et_2O and 45 c.c. of EtOH; after boiling for 3 min., the pptd. colloids are separated on a Gooch filter. Syrups and molasses should be diluted to 5° Brix, and the Et_2O–EtOH mixture added at the b.p. An optimum pptn. is obtained at p_H 5·0—6·0. J. P. O.

Return of molasses to the diffusion battery. L. E. Fleishman and S. I. Korolkov (Trudi Zavod., 1935, No. 11; Internat. Sugar J., 1936, **38**, 109).—Laboratory and factory-scale experiments show that by returning molasses to the diffusion battery the passage of non-sugars from the tissues of the cossettes into the diffusion juice is hindered by about 13%, as compared with the ordinary procedure. When half the production of molasses is returned, the juice draft must be increased 10% and the time of boiling and of centrifuging is increased. There are other disadvantages, and altogether the practice is not recommended. J. P. O.

Refining molasses by electrolysis. H. L. Tchang and Y. C. Wang (Bull. Nat. Acad. Peiping, 1935, **6**, No. 1, 49—54).—Molasses from Chinese sugar cane contains less sucrose (I) and more reducing sugar (II) than that of American origin. Electrodialysis converts much (I) into (II) and eliminates the bitter taste. Ch. Abs. (*p*)

Iodometric determination of copper in sugar and other liquids containing organic substances. E. Rosenblüh and G. Vavrinecz (Magy. chem. Fol., 1934, **40**, 89—95; Chem. Zentr., 1935, i, 3017).—The liquid is neutralised with AcOH or HCl, using the colour change of the Cu compound as indicator, and adjusted to p_H 3 (Me-orange). 1 g. of KI is added per 10 c.c. of liquid, and the I titrated with $0{\cdot}02N$-$Na_2S_2O_3$. H. J. E.

Permanganate method of estimating reduced copper in the determination of reducing sugars. H. R. Kraybill, W. J. Youden, and J. T. Sullivan (J. Assoc. Off. Agric. Chem., 1936, **19**, 125—130).—Titration of Cu_2O with $KMnO_4$ gives theoretical results if care is taken that the Cu_2O is completely dissolved in the aq. $FeNH_4(SO_4)_2$ and that the correct end-point is obtained. E. C. S.

Application of sucrose and starch. I. Oxidation with nitric acid. Y. Hachihama and H. Fujita (J. Soc. Chem. Ind., Japan, 1935, **38**, 744—745 B).—Oxidation of starch with 35% HNO_3 at 85° for 20 hr. and of sucrose with 30% HNO_3 at 85° for 15 hr. affords, respectively, 49·1% yield of saccharic acid and 10·1% of $H_2C_2O_4$, and 28·0 and 8·1%, respectively. Addition of V salts greatly accelerates the reaction. J. W. B.

Sugar beet and cane.—See XVI. **Molasses for yeast manufacture.**—See XVIII. **Sugars and disinfection.**—See XXIII.

See also A., Mar., 287, **Swelling of potato starch.** 305, **Apparatus for sugar titrations.** 319, **Influence of ClO_2 on potato and wheat starch.** 395, **Degeneration diseases of beet.**

Patents.

Molasses product and its production. H. C. Reiner (U.S.P. 1,995,519, 26.3.35. Appl., 13.4.32).—A powdery molasses product which does not agglomerate on storage is made by mixing spray-dried molasses, before it is allowed to deposit, with a small proportion of finely-powdered limestone also suspended in air. J. H. L.

Refining of sugar. P. Sanchez (U.S.P. 1,989,156, 29.1.35. Appl., 9.4.34).—Melts of washed raw sugars are decolorised at room temp. by a hypochlorite, preferably one the base of which can be pptd. by addition of an acid salt, *e.g.*, $Ca(OCl)_2$ with $CaH_4(PO_4)_2$. Evolved gas carries the ppt. to the surface, and the underlying clear liquor is drawn off, dechlorinated, *e.g.*, with H_2O_2, and boiled for refined sugar, or, if necessary, first filtered or further decolorised with active C or bone-char. J. H. L.

Treatment of starch or starch-containing materials. Distillers Co., Ltd., W. A. Davis, and P. D. Coppock (B.P. 442,757, 8.11.34).—Modified or cold-swelling starches are made by heating raw starches with a mixture of H_2O and a sol. org. liquid, *e.g.*, EtOH, $Pr^{\beta}OH$, $COMe_2$, or Et lactate, until the outer membrane of the starch granules is sufficiently disrupted, and then pptg. the starch by increasing the concn. of the org. liquid or adding another, and separating the pptd. starch. *E.g.*, potato starch (100 pts.) is heated at 79° with 33 vol.-% EtOH (600 pts.), then well mixed with 95% EtOH (500 pts.), cooled, filtered, washed with 95% EtOH, dried, and ground if necessary. J. H. L.

Treatment of native starches with oxidising agents. W. Seck (B.P. 437,890, 4.5.34. Ger., 4.5.33).—Raw starch is treated with HOCl solutions free from salts, or with hypochlorite solutions containing a stronger acid than HOCl. J. H. L.

Chemically pure starch and method of purification and separation. Wisconsin Alumni Res. Foundation (B.P. 442,033, 3.9.34. U.S., 22.9.33).—Starch-containing material or impure starch is treated (boiled) with an alcohol containing an oxidising agent, which without modifying the starch dissolves certain impurities and renders others insol. in H_2O, *e.g.*, with 85% EtOH containing 1% of HNO_3, or with a mixture of a halogen or halogen compound, a base, and a polyhydric alcohol. After separation from the alcoholic liquid the starch is further purified by known means. J. H. L.

Corn [maize] starch dextrin re-moistening gums. Internat. Patents Development Co. (B.P. 442,398, 4.3.35. U.S., 29.9.34).—Gums for envelopes etc. are produced from maize-starch dextrins by heating 40—65% pastes of the latter, adjusted to p_H 3·0—3·5, under a steam pressure of 10—50 lb./sq. in. for 60—10 min., instead of under atm. pressure as is the practice with tapioca-starch dextrins. Details of application to C.P.R. dextrins 158 and 231 are given. J. H. L.

Glues from dextrin.—See XV.

XVIII.—FERMENTATION INDUSTRIES.

Clarification of molasses in yeast manufacture. L. van der Snickt (Bull. Assoc. anc. Elèves Inst. supér. Ferment. Gand, 1934, **35**, 261—264, 286—287 ; Chem. Zentr., 1935, i, 3060).—Acid conditions favour decolorisation. Activated C (cold) gives good results. In practice the most suitable treatment is with Ba or Ca compounds followed by clarification with activated C. A. G. P.

Common rod bacteria of brewers' yeast. J. L. Shimwell (J. Inst. Brew., 1936, **42**, 119—127).—Most brewery yeasts contain nos. of a short, thick, rod bacterium, apparently regarded as being harmless. From three distinct samples of brewery yeasts such an organism, provisionally named *Bacterium Y*, has been isolated, and its cultural characters are described. On malt wort it produces H_2, CO_2, EtOH, and acids, with the development of a fruity odour. It is unable to develop at the p_H of finished beer. It is Gram-negative, and a method for distinguishing between it and the Gram-positive, but morphologically similar, *Saccharobac. pastorianus* is described. I. A. P.

Rapid autolysis of yeast as a means of determining its keeping qualities. A. M. Malkov (Brodiln. Prom., 1933, **10**, 33—37).—The keeping quality is measured by the increase in sol. N during autolysis at 100°. Ch. Abs. (*p*)

Drying of hops. P. Petit (Brass. et Malt., 1935, **24**, 341—345 ; Chem. Zentr., 1935, i, 3355).—Lowering of the drying temp. to 40—60° causes less loss of aroma. H. N. R.

Determination of preservative value of English hops. H. F. E. Hulton (J. Inst. Brew., 1936, **42**, 130—131 ; cf. B., 1932, 858).—In determining preservative val. (*P.V.*), the determination of α-resin is quicker and easier than that of total soft resins (*T*) required for obtaining the β-fraction ($\beta = T - \alpha$). Analysis of numerous hop samples with $\alpha \nless 1\%$ showed the % of β-resin to be 6·3—9·0 (average 7·66%); with $\alpha < 1\%$ the figures were 6·5—10% (average 8·41%). It is suggested that vals. for *P.V.* of sufficient accuracy can be obtained from the formula $P.V. = 10(\alpha +$ corresponding average $\beta/3)$, thus avoiding the necessity for determining *T*. I. A. P.

Hop antiseptic as a possible cause of ropiness [in beer]. J. L. Shimwell (J. Inst. Brew., 1936, **42**, 127—129).—The reaction of different bacteria to hop antiseptics is very varied, and reason is given for supposing that certain bacteria capable of producing ropiness in beer may actually be stimulated by high concn. of these antiseptics. I. A. P.

Correction of brewing water with acids. P. Petit (Brass. et Malt., 1935, **24**, 357—361 ; Chem. Zentr., 1935, i, 3355).—Several methods are discussed ; biological acidification with *Bac. delbrückii* gives variable results. H. N. R.

New light on malting and brewing. L. R. Bishop (J. Inst. Brew., 1936, **42**, 103—115).—The results of hand valuation of barley may be uncertain or even misleading, especially when the barley is used for low-gravity beers. A new method of valuation is proposed, based on the potential extract of the barley, calc. from the results of detailed (N content, 1000-corn wt., dry matter, % of dead corns) or rapid (N content, dry matter) barley analysis. From a consideration of wort N, it would appear that different groups of the valuation scheme are especially suitable for different classes of beer, and the type and proportion of foreign barleys suitable for blending are indicated. It is suggested that high-val., low-N barleys should be used for high-gravity beers, high-N barleys being suitable for beers of low *d*. The degree of modification (measured by the η of alkaline suspensions or by the coarse grind/fine grind method) might be used in the control of the malting process, malting being stopped as soon as the necessary modification is obtained, in order to avoid unnecessary loss of potential extract. I. A. P.

Determination of carbon dioxide in beer and carbonated beverages. P. P. Gray and I. M. Stone (J. Assoc. Off. Agric. Chem., 1936, **19**, 162—172).—The bottle is cooled to 0°, unstoppered, and 0·1—0·2 g. of infusorial earth and 1—2 c.c. of C_6H_{13}·OH or C_7H_{15}·OH are added. The gas is allowed to pass slowly into standard aq. KOH as the temp. is raised to 100°, and excess KOH is titrated (to Me-orange). The pressure method has two sources of error, viz., presence of air and the fact that tables used are based on the solubility of CO_2 in H_2O. Corrections for each source of error are given. E. C. S.

Determination of alcohol by means of the "ebulliometer." C. J. Niehaus (S. Afr. Wine-Ann., 1934, 4, 1693—1697).—The instrument is explained and its use described. Ch. Abs. (*p*)

[Determination of] higher alcohols in brandies. F. Trost (Annali Chim. Appl., 1935, **25**, 660—668).—A spectrophotometric method is described, which makes use of the colour reaction between the higher alcohols and salicylaldehyde. By applying this method in the region of the spectrum between 570 and 610 mμ the amounts of the more important homologues present can be determined approx. The higher alcohols present in brandies are classified thus: group (*A*), the "amyl" type, including $C_5H_{11}\cdot OH$ and $C_7H_{15}\cdot OH$; (*B*) the "*iso*butyl" type, including $Bu^{\beta}OH$ and *iso*hexyl alcohol. In all the brandies examined alcohols of group *A* were more abundant than those of group *B*. For brandies from the same district the ratio between the amounts of alcohols of groups *A* and *B* is const., and in the case of the French brandies was independent of the age of the brandy. Two Italian products tested also showed a const. ratio in the contents of higher alcohols of the two types, but this ratio was different from that found with French brandies. A. M. P.

Determination of thujone in absinthe-type liqueurs. J. B. Wilson (J. Assoc. Off. Agric. Chem., 1936, **19**, 120—124).—Enz's test (A., 1911, ii, 1040) is incapable of detecting with certainty $<$ 5 mg. of thujone (I), and is no more sensitive than the identification of (I) in the distillate by its odour. E. C. S.

Squalene in yeast fat.—See XII. **Storing barley and malt.**—See XIX.

See also A., Mar., 378, **Purifying glucosulphatase.** 381, **Yeast lipins.**

PATENTS.

Manufacture of a minim-alcohol beverage [of low alcohol content]. K. Schreder (U.S.P. 1,995,626, 26.3.35. Appl., 7.11.31. Austr., 14.7.31).—Malt well germinated at $\ngtr$ 17° is mashed at 52° and then at 65°. The wort, not boiled, is cooled to 1—2°, filtered from proteins, sterilised at 70°, cooled to 28—30° with strong aëration, and fermented with a pure culture of *Termobacterium mobile*, Lindner, which ferments glucose but not maltose. The fermented wort is cooled to 1—2°, filtered through a pulp and then a Seitz filter, and finally carbonated at 1—2° by means of Berkefeld candles. J. H. L.

Compounds from cracked oils.—See II.

XIX.—FOODS.

Storage conditions for barley and malt. K. Mohs (Tages-Ztg. Brauerei, 1935, **38**, 165; Chem. Zentr., 1935, i, 3355).—H_2O content should be as low as possible and ventilation good; the application of a no. of bactericides is described. H. N. R.

Gloss on rice due to mineral oil. P. Balavoine (Mitt. Lebensm. Hyg., 1935, **26**, 203—204).—The approx. max. amounts of fatty material extracted from natural and polished rice by Et_2O are 0·5 and 0·2%, respectively; it is considered that higher vals. indicate the use of mineral oil to enhance gloss. The Zeiss butyrorefractometer val. at 40° of polished rice is 56—59, but mineral oil raises it to 64—69. J. G.

Chemical composition and nutritive value of wheat- and maize-germ flour. G. Biscaro and L. De Caro (Quad. Nutrizione, 1935, **2**, 189—196).—Wheat-germ flour contains 6·64% of fat, 23·21% of nitrogenous substances (18·25 H_2O-insol.), and 31·8% of starch + dextrin + sugars. The corresponding vals. for maize germ are 21·72, 13 (8·44 insol.), and 26·5. Phospholipins are practically the same in both. Ash content was 3·75% for wheat and 4·84% for maize. 100 g. of wheat-germ flour contained CaO 0·2055, MgO 0·3802, K_2O 0·7250, Na_2O 0·0848, P_2O_5 2·180, SiO_2 0·075, Fe_2O_3 0·0068, CuO 0·0019, Mn_3O_4 0·0028, and ZnO 0·00252 g., the vals. for maize being 0·0966, 0·9150, 0·9271, 0·1110, 2·093, 0·136, 0·0031, 0·00078, 0·0142, and 0·00207 g. Wheat germ has a higher nutritive val. than has maize germ. Nutr. Abs. (*m*)

Comparison of the hydrophilic character of flours by means of triangular diagrams. A. G. Kuhlmann (Kolloid-Z., 1936, **74**, 224—230).—Aq. extracts of flour samples are mixed with varying quantities of a hydrophilic (*e.g.*, EtOH) and a hydrophobic liquid (*e.g.*, Et_2O), and triangular diagrams are constructed so as to show regions of partial and complete coagulation, and of the formation of liquid layers. The hydrophilic character of the flour judged from the area of the region of complete coagulation places the samples in the same relative order as is obtained by using other recognised methods. F. L. U.

Determination of flour plasticity by a simplified apparatus. G. Lucente (Annali Chim. Appl., 1935, **25**, 677—679).—A special type of burette is described, use of which enables the plasticity of flours, and consequently their val. in bread-making, to be ascertained. A. M. P.

Methods and apparatus used in measuring the quality of eggs for cake-making. F. B. King, H. P. Morris, and E. F. Whiteman (Cereal Chem., 1936, **13**, 37—49).—Attempts to correlate physical and chemical properties ($p_{\rm H}$ of white, yolk, and magma, CO_2 content, total solids, and η) of fresh eggs with measurements of their lifting power [*d* of butter; cake vol. by seed-displacement method; tensile strength or toughness by a modified Platt–Kratz method (B., 1933, 282); compressibility or softness by a modification of the penetrometer described by Bonner *et al.* (U.S. Dept. Agric., 1931, Circ. 164)] were unsuccessful. E. A. F.

Influence of various factors including altitude on production of angel food cake. M. A. Barmore (Cereal Chem., 1936, **13**, 71—78).—The effects of altitude on the baking process have been investigated by means of an "altitude laboratory" (illustrated), which is so designed that it can be ventilated, the temp. and humidity controlled, and the air pressure maintained at any val. from 0 to 18,000 ft. Graphs show the effect of altitude on internal cake temp. and on cake evaporation. Increasing altitude decreased the amount of browning or caramelisation in the crust due to lowered crust temp., and decreased the tensile strength. The equation $F - 0\cdot43S - 4\cdot1A + 24\cdot5 = 0$ (F = flour and S = sugar content in g.; A = altitude in thousands of ft.) expresses all the possible successful recipes for this type of flour mixture for any habitable altitude (providing that the amounts of the ingredients do not exceed reasonable limits, *e.g.*, F = 40—80 g.). E. A. F.

Nutritive value of soya-bean (a) **powder,** (b) **oil, treated with methyl alcohol.** S. Kajizuka (J. Soc.

Chem. Ind., Japan, 1935, **38**, 745 B, 746 B).—(A) The nutritive val. (N) of the powder treated with MeOH (I) and petroleum benzine (II) was > that treated with (II) alone. No (I) nor any increase in OMe groups could be detected in the product. No physiological effects were noted in rats on diets containing 0·1% and 1% of (I). (B) Extraction of the oil with (I) + (II) gave a slightly greater N than extraction with (II) alone. No decrease in η was observed and the vitamin-A content of the oil was not sufficient for normal rat growth. After methylation at 20° N is < that of the original. No ill-effects were noted on feeding oils containing 0·67% and 6·7% of (I). H. G. R.

Significant relations between milling and baking properties of various sorts (races) of wheat. T. Scharnagel (Z. ges. Getreidewes., 1935, **22**, 13—24; Chem. Zentr., 1935, i, 3212).—Experimental data are discussed. J. S. A.

Bacteriology and mycology applied to dairying. A. T. R. Mattick, E. R. Hiscox, and J. G. Davis (J. Dairy Res., 1935, **6**, 422—453).—A review with extensive bibliography. A. G. P.

Feeding butter fat to dairy cows. A. C. M'Candlish and J. P. Struthers (J. Dairy Res., 1935, **6**, 303—306).—Feeding of butter or cream did not affect the yield or composition of milk. A. G. P.

Milk at high altitudes. A. Staffe (Forsch. u. Fortschr., 1933, **9**, 506—507; Bied. Zentr., 1935, **6**, **A**, 6).—Removal of cows from districts of low to those of high altitude increased the fat and ash contents and conductivity and decreased the lactose, acidity, and d of the milk. Enzyme and bacterial changes also occur. A. G. P.

Determination of milk-fat yields of cows. A. Soloviev (Probl. d. Tierz., 1933, **5**, 50—56; Bied. Zentr., 1935, **6**, **A**, 17).—The technique of milk trials is discussed. A. G. P.

Determination of saline contents of milk. R. Bastin and L. Martens (Agricultura, 1935, **38**, 24—34).—Suitable methods for determining Cl′, P, K˙, Na˙, Ca˙˙, and citric acid in milk are given. Ch. Abs. (p)

Determination of vitamin-*C* in foodstuffs (milk, lemons, and fruit). G. Buogo (Annali Chim. Appl., 1935, **25**, 679—684).—Emmerie's method (A., 1934, 461) for the determination of ascorbic acid (I) has been simplified by removing the excess Hg left after the defecation of the solutions with $Hg(OAc)_2$ by means of Zn powder in place of H_2S. Action of the Zn must be prolonged until the filtrate shows no reaction for Hg with a drop of dil. aq. KI. The solution is then filtered and titrated with 0·005N-I [1 c.c. ≡ 0·44 mg. of (I)]. The method has been applied to the determination of (I) in various citrus-fruit juices, bananas, apples, cow's milk, dried milk powder, and human milk. The results obtained confirm those of earlier workers that the citrus-fruit juices are the richest source of vitamin-C. All the commercial dried milks examined gave very low vals. A. M. P.

Gravimetric determination of milk fat and total solids. G. Gorbach and R. Kadner (Milch. Forsch., 1935, **17**, 190—192).—The method requires 150—250 mg. of milk and is as accurate as are macro-methods. Total solids are determined by weighing and drying the milk in a vac. at 40°. Fat is determined on the residue by extraction with Et_2O in a micro-extractor. Nutr. Abs. (m)

Unusual variation in the butter fat content of milk. K. Hartley and D. W. H. Baker (J. Dairy Res., 1935, **6**, 353—362).—An instance is recorded in which the fat content of morning milk was consistently > that of evening milk during the wet season, the order being reversed in the dry season. Climatic rather than dietary factors were probably concerned. A. G. P.

Milk with low content of solids-not-fat. M. N. Nicholson and C. E. Lesser (Univ. Reading, Bull., 1934, No. 46, 239 pp.).—64% of samples of milk from Friesian cows were deficient in solids-not-fat (I) and 33% were deficient in both (I) and butter fat. The (I) of evening milk was usually < that of morning milk. Dietary changes (supplementary green food, vitamins, minerals) did not, in general, improve milk having low (I), although fresh young grass in early summer was beneficial in this respect. Samples deficient in (I) had subnormal % of total N, total protein, casein-N, and lactose. The % total N present as albumin, globulin, and protein-N was, however, > normal. Total ash, Ca, and P contents were <, and Cl′ contents much >, normal. The f.p. of poor but genuine milk was only slightly < normal. Ch. Abs. (p)

Biological purification of whey solutions. M. M. Muers (J.S.C.I., 1936, **55**, 71—77 T).—Approx. 90% purification of 10% whey solution was obtained with experimental filters, and a similar efficiency when the filter effluent was aërated in presence of active sludge, giving an overall efficiency of 99% or more. A second filtration stage or direct aëration of the whey solution was ineffective. Either process alone was satisfactory for solutions containing up to 1% each of milk and whey. The effects of fermentation of the feed, addition of milk, NH_3- or NO_3'-N, removal of albumin-N, and variation in rate of application and concn. of whey were studied. A rapid method of estimating the "strength" of feeds and effluents is described.

Diacetyl in cold-stored butters. C. R. Barnicoat (J. Dairy Res., 1935, **6**, 397—406).—CHAcMe·OH (I) and Ac_2 (II) occurring in butter made from slightly ripened cream are derived largely from the starter added. Little change in the proportions of these constituents occurred during cold storage (—9° to —10°) for > 6 months. Additions of (II) (4 p.p.m.) to butter from cream with (or without) starter largely disappeared during storage. In starter-made samples part of the loss of (II) was due to reduction to (I). A. G. P.

Reduction of acetylmethylcarbinol and diacetyl to 2 : 3[βγ]-butylene glycol by the citric acid-fermenting *Streptococci* of butter cultures. B. W. Hammer, G. H. Stanly, C. H. Werkman, and M. B. Michaelian (Iowa Agric. Exp. Sta. Res. Bull., 1935, No. 191, 381—407).—Under certain conditions the *Streptococci* effect a reduction of CHAcMe·OH and Ac_2 to βγ-butylene glycol. The change is retarded by acid conditions, low temp., and addition of NaCl. The bearing of the above on the retention of flavour in stored butter is discussed. A. G. P.

Fishy flavour in butter. III. Tallowiness in milk and cream due to metallic materials and the influence thereon of various substances. IV. "*Reductobacterium frigidum*" and the effect of bacterial activity on tallowiness. W. Ritter and M. Christen (Schweiz. Milch-Ztg., 1935, No. 7, 13 pp.; No. 12/13, 16 pp.; Chem. Zentr., 1935, i, 3064; cf. B., 1936, 217).—III. The presence of 0·01—8 mg. of Cu or 0·5—16 mg. of Fe per litre induces tallowy flavours. Quinol, metol, and H_2O_2 tend to neutralise this effect. The action of Cu is minimised by prolonged heating of the milk. Exclusion of O_2 restricts but does not prevent tallowiness.

IV. "*Reductobacterium frigidum*" and other alkali-forming bacteria retard the appearance of tallowiness in metal-containing milk. Heating destroys this protective action in milk, but not necessarily in cream. A. G. P.

Odour production by butyric bacteria. J. van Beynum (Vereen. Exploit. Proofzuivelb. Hoorn, [1933], 1934, 65—117; Chem. Zentr., 1935, i, 3064—3065).—"Aroma bacteria," as distinct from lactic organisms, produce the characteristic odour from lactic acid and also from citric acid. The mechanism of these changes and the effects of various conditions are examined. A. G. P.

Sugar- and lactate-fermenting butyric bacteria. J. van Beynum and J. W. Pette (Vereen. Exploit. Proofzuivelb. Hoorn, [1933], 1934, 119—159; Chem. Zentr., 1935, i, 3065).—Two types of non-liquefying butyric bacteria are distinguished: (*a*) *Clostridium tyrobutyricum*, having undesirable effects on cheese through lactic fermentation; (*b*) *Cl. saccharobutyricum*, having no ill-effect on cheese. A. G. P.

Function of pepsin and rennet in the ripening of Cheddar cheese. I. R. Sherwood (J. Dairy Res., 1935, **6**, 407—421).—Substitution of pepsin (I) for rennin (II) resulted in lowered protein degradation and small changes in N distribution. Increasing amounts of (II) caused more extensive breakdown of the proteins, but no appreciable change in N distribution. The decomp. of protein is effected largely by the enzymes of the milk coagulants. Proteolytic activity and the coagulating property of (I) are probably due to different enzymes. Heat-treatment at p_H 5·0 and 7·5 did not destroy (II) and (I), respectively. A. G. P.

Lactic acid bacteria in Swiss cheese cultures. F. Karnicki and W. Dorner (Landw. Jahrb. Schweiz, 1934, **48**, 1079—1100; Chem. Zentr., 1935, i, 3357—3358).—Data are given. *Tbm. lactis* and *Str. thermophilus* were the commonest lactic acid bacteria present. H. J. E.

Fruit washing during the autumn of 1934. W. A. Luce (Proc. 30th Ann. Meet. Wash. State Hort. Assoc., 1934, 88—91).—Oil added to Na silicate wash solutions gave less uniform improvement than when added to HCl washes. Ch. Abs. (*p*)

Spray-residue removal. F. L. Overley, E. L. Overholser, J. L. St. John, and K. Groves (Proc. 30th Ann. Meet. Wash. State Hort. Assoc., 1934, 77—82).—Methods for dealing with Pb arsenate–oil spray residues are compared. Ch. Abs. (*p*)

Spray-residue removal. E. Smith (Proc. 30th Ann. Meet. Wash. State Hort. Assoc., 1934, 85).—Few varieties of apples or pears were injured by immersion in washing solutions at 49° for 20 sec. Addition of 1% of mineral oil to acid wash liquids reduces the risk of injury to apples at high temp. and increases the efficiency of washing. Ch. Abs. (*p*)

Spray-residue removal. W. A. Ruth and K. J. Kadow (Trans. Ill. State Hort. Soc., 1934, **68**, 191—198).—Addition of CaO to Pb arsenate–oil sprays lowered the amount of residual Pb. In brush-washing machines the efficiency of Na silicate increased with temp. up to 52°. Wetting agents improved HCl washing in flotation machines. Ch. Abs. (*p*)

Removal of lead [spray] residues from apples in Maryland. J. H. Beaumont (Trans. Peninsula Hort. Soc., 1934, 88—96).—Pb residues on apples were increased by inclusion of mineral oil $>$ by that of fish oil (I) or casein spreader in the spray. Difficulty of removal of residue by HCl washing was not increased by (I). Addition of NaCl to HCl wash liquid did not facilitate the process. Ch. Abs. (*p*)

Fluorine spray-residue removal. A. L. Ryall (Proc. 30th Ann. Meet. Wash. State Hort. Assoc., 1934, 86—87).—A two-stage process, using Na silicate (I) or Na_2CO_3 followed by HCl, was more effective than either stage alone. For cryolite residues HCl is preferable to (I) unless fish oils are included in the spray. Mineral oil improves and NaCl lowers the effectiveness of acid washes. $FeCl_3$ and $Al_2(SO_4)_3$ tend to increase the solvent action of HCl. Ch. Abs. (*p*)

Removal of arsenical and lead spray residues. W. S. Hough (Proc. 67th Ann. Meet. Ohio State Hort. Soc., 1934, 104—109).—Combination of CaO or Bordeaux mixture with Pb arsenate sprays facilitated removal of Pb and As in residues. Use of casein spreaders complicated the washing process. A colloidal spreader prepared from soya-bean flour had no effect on the ease of washing. Ch. Abs. (*p*)

Bleaching citrus fruits for removal of sooty blotch blemish. V. A. Wager (Farming in S. Africa, 1935, **10**, 81—82).—Navel oranges are dipped for $\frac{1}{2}$—1 min. in a solution containing 0·25 lb. each of H_3BO_3 and bleaching powder per gal. of H_2O, and then washed in H_2O. If protected from sunlight the bleaching solution remains active for 2 weeks. Ch. Abs. (*p*)

Colouring citrus [fruit] with acetylene. R. H. Marloth (Farming in S. Africa, 1935, **10**, 84).—Oranges coloured well in C_2H_2 at a concn. of 1 in 1000. For grapefruit and lemons 1 in 2500 was preferable since it avoided burning. Ch. Abs. (*p*)

Uses of soluble borates in [citrus] packing houses. R. M. Stewart, 3rd (Citrus Ind., 1935, **16**, No. 5, 7, 22).—A cold solution of Metbor (largely $NaBO_2$) is as effective as an equiv. warm solution of borax in protecting citrus fruit from storage decay. Fruit dipped in Metbor solution does not develop the objectionable odour characteristic of that dipped in aq. borax. Ch. Abs. (*p*)

Vitamin-*A* and -*C* content of frozen blackberries. E. L. Batchelder, K. Miller, N. Sevals, and L. Starling (J. Amer. Dietetic Assoc., 1935, **11**, 115—118).—Slight growth (3·3—5·5 g. weekly) was observed when rats, previously depleted of vitamin-*A* (I), received 0·4—0·5 g. daily of frozen blackberries. A dose of 14 g. daily was needed to protect guinea-pigs against scurvy. The fruit therefore contained (I) and a small amount of vitamin-*C*. Nutr. Abs. (*m*)

Nutrient value and vitamin contents of muscat dates. R. Lecoq (Bull. Soc. bot. France, 1933, **80**, 333—348; Bied. Zentr., 1935, **6**, **A**, 22).—Analyses and results of feeding-trials are recorded. The date flesh contains vitamin-*A* and -*B*, but not -*D* or -*E*. A. G. P.

Permissible improvement of flavour of conserve and fruit products by lactic acid. E. Jacobsen (Braunschweig. Konserven-Ztg., 1935, No. 10, 3—4; Chem. Zentr., 1935, i, 3062).—Lactic acid improves flavour without undesirable effects. A. G. P.

Microbiology of fruit. R. G. Tomkins (J.S.C.I., 1936, **55**, 66—70 t).—The extent of rotting caused by green mould (*P. digitatum*) in the storage of oranges is determined by the spore load, which is chiefly influenced by pack-house conditions and can be estimated (*a*) by isolation of spores from the surface, (*b*) by the susceptibility to invasion, which is influenced by a no. of factors and is probably best measured by the extent of wastage following treatment with dil. acids, and (*c*) by storage conditions, of which the most important is temp.

Blackening of potatoes during cooking due to lessened protein stability. R. Nagy and W. E. Tottingham (Ann. Rept. Wisconsin Agric. Exp. Sta. [1932—3], Bull., 1934, No. 428, 29).—Blackening is due to weakening of the structure of proteins. Discoloration does not occur in absence of air. The compounds concerned [tryptophan (I), tyrosine] are removed by preliminary soaking in H_2O. Subjection of growing plants to drought followed by renewed H_2O supply does not increase the (I) content of tubers. Ch. Abs. (*p*)

Biological value of the albumin of beans and of the casein and myosin of muscles. S. V. Fomin and S. S. Gerschenovitsch (Ukrain. Biochem. J., 1934, **7**, No. 1, 69—77).—Vals. obtained for rats were: casein 91·7, globulin (beans) 81·75, albumin (beans) 98·4, myosin (rabbit muscle) 80·5. Ch. Abs. (*p*)

Neutralisation of *d*-glutamic acid hydrochloride and crystallisation of sodium *d*-glutamate during manufacture of glutamate condiments. Y. S. Wei and C. K. King (Science [China], 1935, **19**, 354—366).—*d*-Glutamic acid is best neutralised to the Na_1, salt by $NaHCO_3$ in H_2O. The hydrochloride (I) pptd. from HCl solution contains $2H_2O$. During neutralisation a double equimol. salt of (I) and $NaHCO_3$ is formed. Na *d*-glutamate in solutions containing $\nless$ 0·5 g. per c.c. is pptd. by abs. EtOH. Industrially, $EtOH–COMe_2$ could probably be used. Ch. Abs. (*p*)

Constituents of maté. W. Hauschild (Mitt. Lebensm. Hyg., 1935, **26**, 329—350).—Analyses of 8 samples and their extracts are given. Substances identified were caffeine (I), theobromine, *i*-inositol, a tannin (similar to chlorogenic acid and probably a depside), and a dihydroxysterol (*matesterin*, $C_{28}H_{46}O_3$), m.p. 276°, $[\alpha]_D^{20}$ +65° in C_5H_5N. Approx. 60% of the sugars are derived from the cane sugar used in the process of prep. The sol. matter obtained from the stalks is $<$ that from the leaves, the former containing least (I). If the leaves have been dried for a short period at a high temp. (Zapek process), approx. 50% instead of all of the (I) is in the bound state, and a much smaller proportion of the reducing sugars present before hydrolysis are monosaccharides; this supports the theory that the process destroys fermenting enzymes. J. G.

Determination of the condition (fresh or spoiled) of meat or fish pastry. V. N. Babitscheva, L. V. Redina, F. M. Belousskaja, S. V. Buikova, and V. A. Sidorov (Problems of Nutrition, U.S.S.R., 1933, **2**, No. 1—2, 63—84).—Ageing of the products was accompanied by a decrease in p_H and increases in NH_4, bacterial nos., and reducibility. Ch. Abs. (*p*)

Detection of formaldehyde in preserved fish products. T. von Fellenberg (Mitt. Lebensm. Hyg., 1936, **26**, 212—214).—The sample is distilled with 1% H_2SO_4, and 1 c.c. of H_2SO_4 (1 : 1) is added as a layer under a mixture of 2 c.c. of distillate and 1 drop of 1% PhOH; a white turbidity or red ring indicates $(CH_2)_6N_4$ or CH_2O (sensitiveness 0·1%). If any other colour is noticeable, the mixture is first boiled for 1 min., cooled, and the layer produced with a further 1 c.c. of H_2SO_4. J. G.

Ensiling with and without addition of mineral acids. II. J. C. de R. de Wildt, E. Brouwer, and N. D. Dijkstra (Vereen. Exploit. Proofzuivelb. Hoorn, 1933, 161—213; Chem. Zentr., 1935, i, 3214; cf. B., 1934, 978).—Results are given in continuation of work described previously (cf. B., 1934, 347). J. S. A.

Ensilage of straw does not increase its value. V. Ustjanov, P. Krupski, and V. Speranski (Probl. d. Tierz., 1933, **6**, 36—40; Bied. Zentr., 1935, **6**, **A**, 16).—Rye-straw silage showed a lower digestibility than the original material. A. G. P.

How can the nutrient value of straw be increased? D. Modin (Tierzucht, 1934, **2**, 38—39; Bied. Zentr., 1935, **6**, **A**, 18).—Treatment of straw with aq. $Ca(OH)_2$ for 3—5 days increased its digestibility coeff. Feeding treated straw to cattle improved the live-wt. increases. A. G. P.

Nutrient value of cereal seedlings. V. Famiani (Probl. aliment., 1933, **3**, 81—90; Bied. Zentr., 1935, **6**, **A**, 23).—Inclusion of 6—10% of germinated cereals in the ration improved growth and reproduction in animals. A. G. P.

Toxicity of certain sorgums. E. Miège (Rev. Bot. appl., 1933, **13**, 105—113; Bied. Zentr., 1935, **6**, **A**, 21—22).—The HCN content of *Andropogon sorghum* from Africa and America is relatively small, is highest in young plants, and is increased by growth in cold or dry conditions. Sun-drying for 24 hr. renders the crop suitable as a fodder plant. Sudanese varieties grown under favourable conditions are non-toxic. A. G. P.

Toxicity of sweet sorghums used as fodder. C. D. GIROLA (Ostenia [Tests. Cornelius Osten] Montevideo, 1933, 183—184; Bied. Zentr., 1935, **6**, **A**, 19).—The sorghum contains durin, a cyanogenetic glucoside, which disappears during haying or ensilage.
A. G. P.

Nutritional value of the soya bean. N. IVANOVA (Problems of Nutrition, Moscow, 1935, **4**, No. 4, 134—141).—Feeding experiments indicated that the bean is so rich in vitamin-*A* (I), and its proteins (II) are of such high biological val., that the beans can serve as the sole source of (I) and (II) for growing rats. The beans are poor in NaCl and Ca salts.
NUTR. ABS. (*m*)

Mineral matter content of German feeding-stuffs and the effect of variety and origin: beet, swedes, turnips, and potatoes. D. SCHRADER (Diss., Berlin, 1933; Bied. Zentr., 1935, **6**, **A**, 37).—With increasing H_2O content in potatoes is associated an increase in crude protein, ash, K, Na, and Cl. Climatic factors are more important than varietal differences in influencing the ash composition. Similar results were obtained with root crops. A. G. P.

Evaluation of fish meals. J. MAYRHOFER (Landeskultur, Wien, 1934, 15—16; Bied. Zentr., 1935, **6**, **A**, 23).—Analytical standards are given. The meals form valuable protein concentrates for pigs and hens, but do not improve the milk yields of cows. A. G. P.

Feeding poultry with various mineral substances. A. VECCHI (Proc. 5th World's Poultry Congr., Rome, 1933, **2**, 502—511).—Supplements of saccharised Fe carbonate, Fe phosphate, and $MgCO_3$ (0·5, 0·3, 0·5%) did not improve growth. Larger amounts (2, 2, 2%) did not increase egg production. The Fe and Mn contents of the eggs increased. CH. ABS. (*p*)

Value of liver meal for poultry nutrition. A. D. HOLMES, M. G. PIGOTT, and P. A. CAMPBELL (Proc. 5th World's Poultry Congr., Rome, 1933, **2**, 567—574).—Addition of liver meal to a ration of high nutritive val. (19% of protein) did not improve the growth rate of chicks. CH. ABS. (*p*)

Optimum [dietary] protein levels for chicken. J. L. ST. JOHN, J. S. CARVER, O. JOHNSON, and D. BRAZIE (Proc. 5th World's Poultry Congr., Rome, 1933, **2**, 567—574).—Supplementing a basal ration containing 10·9% of plant protein by additions of fish meal accelerated growth in the younger chicks, but differences disappeared at 32 weeks of age. The protein level had little effect on food utilisation. Optimum wt. increases and egg production were obtained with 13% of protein in the ration. CH. ABS. (*p*)

Composition, nutrient content, and digestibility of pasture grasses: nutrition of foals. H. NIETSCH (Landw. Jahrb., 1935, **81**, 525—575).—Analyses of the grasses and results of feeding trials at different periods of the year are recorded. A. G. P.

Comparative digestibility of artificially-dried pasture herbage by sheep and rabbits. C. J. WATSON and W. GODDEN (Empire J. Exp. Agric., 1935, **3**, 346—350).—The total digestibility of the org. matter of the herbage was much lower with rabbits than with sheep, the rabbits failing to make efficient use of the crude fibre. The digestibility coeff. of the N-free extractives was also lower in the case of rabbits.
A. G. P.

Arsenic content of fodder grass due to use of insecticides. F. BERAN (Anz. Schädlingsk., 1934, **10**, 43—47; Bied. Zentr., 1935, **6**, **A**, 23).—Orchard grass is normally safe for feeding purposes 5 weeks after the use of Schweinfurth-green–Cu–CaO sprays.
A. G. P.

Casein-wool.—See V. **Nutrient val. of fats. Oil cake. Determining tung oil in press cake etc. Test for olive oils.**—See XII. **Conserving grassland herbage. Marrowstem kale.**—See XVI. **Ash of sugar beets.**—See XVII. **Determining CO_2 in beverages.**—See XVIII. **Milk-factory effluents.**—See XXIII.

See also A., Mar., 286, **η relations in emulsions containing milk fat.** 361, **Butter fat.** 368, **Mustard oil. Porgy meat.** 390—2, **Vitamins.**

PATENTS.

Treatment of grain for extermination of insect life therein. J. H. DAVIS (U.S.P. 2,006,265, 25.6.35. Appl., 29.4.32).—The grain is passed through oscillating electric fields maintained between metal plates.
B. M. V.

Treatment of eggs. M. E. PENNINGTON and A. W. THOMAS, Assrs. to BORDEN Co. (U.S.P. 1,996,171, 2.4.35. Appl., 27.2.33).—Improved flavour, especially after storage, is obtained by incorporation into the liquid-egg mass of CO_2 at the rate of 1 g. per litre of egg. The mixture is frozen or kept in cold store. E. B. H.

Production of products comprising vegetable phosphatides. HANSEATISCHE MÜHLENWERKE A.-G. (B.P. 442,212, 25.6.34. Ger., 13.12.33 and 5.4.34).—After removal of oil from aq. raw phosphatide with a solvent, the mass is kneaded with H_2O, and residual solvent removed under reduced pressure. The emulsion so obtained may be further diluted with H_2O for spray-drying, with addition of starchy materials or carbohydrates if desired. E. B. H.

Manufacture of dried food products. D. D. PEEBLES (U.S.P. 2,005,238, 18.6.35. Appl., 6.1.32).—Tubers (*e.g.*) are shredded to paper thinness and suspended in an upward current of drying gas moving at diminishing velocity so that only completely desiccated shreds pass out with the gas, those shreds being finally separated in another vessel, *e.g.*, a cyclone. B. M. V.

(A) **Solid seasoning composition containing capsicum and [sodium] chloride.** (B) **Non-bleaching, and** (C) **stabilised, solid seasoning composition.** C. L. GRIFFITH and L. A. HALL, Assrs. to GRIFFITH LABS., INC. (U.S.P. 1,995,119—21, 19.3.35. Appl., 16.6.34).—The bleaching of flavouring compositions containing oleoresin of capsicum and an alkali chloride, due to development of acidity, is inhibited by addition of (A) an alkali, *e.g.*, $CaCO_3$, $Mg(OH)_2$, (B) an org. amine, *e.g.*, $N(C_2H_4{\cdot}OH)_3$, and (C) a salt of a weak org. acid and a strong base, *e.g.*, Na citrate. A. W. B.

Coating of fruit. T. W. W. FORREST, Assr. to SUN-MAID RAISIN GROWERS OF CALIFORNIA (U.S.P. 2,005,184, 18.6.35. Appl., 23.6.33).—Dried fruit is coated with an emulsion of oil, dextrin, H_2O, sugar, and pectin. B. M. V.

Treatment of coffee beans with solvents for reducing the caffeine content. W. A. C. HELMKE (B.P. 442,230, 27.8.34).—The beans are treated with a suitable solvent in two stages in inclined cylinders provided with worms for pushing the beans upwards; the cylinders are crossed at about 60° for convenience in transfer of the beans from the top of one to the bottom of the other. The solvent is drawn off about half-way up so that the beans drain in the upper half. Heating coils are provided. B. M. V.

Production of concentrated milk constituents. KRAFT-PHENIX CHEESE CORP. (B.P. 442,892, 17.8.34. U.S., 6.10.34).—See U.S.P. 1,961,960; B., 1935, 380.

Extracting materials [coffee].—See I. **Pyrophosphates.**—See VII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Chemistry of antimalarials. T. N. GHOSH (Current Sci., 1936, **4**, 576—578).—A brief review.

Determination of value and age of *Filix* drugs and extracts. J. STAMM (Pharmacia, 1934, **14**, 271—276; Chem. Zentr., 1935, i, 3311—3312).—Old preps. have a higher resin content (≯ 6% in fresh preps.) and a lower fat, wax, and oil content than fresh preps. H. N. R.

Tobacco and tobacco products. E. WASER (Mitt. Lebensm. Hyg., 1935, **26**, 205—211).—Suggestions are made for official tests for spoilage, adulteration, preservatives, and quality. Nicotine (I) in the tobacco is determined by the $SiO_2,12WO_3$ method after distillation in presence of NaCl and K_2CO_3; and (I) in the smoke by the Pfyl apparatus (B., 1927, 995) arranged so as to draw 40 c.c. of smoke for cigarettes (50 c.c. for cigars) in 2 sec., every 15 sec., and to leave a 15-mm. stump (20 mm. for cigars). The absorbed (I) is pptd. as dipicrate and titrated with $0\cdot1N$-NaOH in presence of PhMe to an orange colour. Suggested limits are: ≮ 60% of tobacco, ≯ 45% of H_2O, and ≯ 12% of acid-insol. ash in snuff; 0·5 g. of SO_2, 0·8 g. of BzOH, or 1·5 g. of HCO_2H (1 g. of B_2O_3 in pipe tobacco)/kg.; 0·5% of (I) for tobacco sold as low in (I) (0·8% for cigars), and 0·1% of (I) in tobacco sold as free from (I). J. G.

Synthetic perfumes from castor oil. S. NAMETKIN, V. ISAGULIANTZ, and V. ELISEEVA (Maslob. Shir. Delo, 1935, 31—32).—Octinenoic esters are prepared from Me ricinoleate. Undecenoic acid obtained from castor oil is converted into nonoic acid and $C_9H_{19}\cdot OH$. CH. ABS. (*p*)

Preparing perfumery oil from Grozny paraffin filtrate. J. A. BARASCHKOV and E. M. VELIKOVSKAJA (Neft. Choz., 1935, **27**, No. 2, 74—75).—The stock used had *d* 0·8781, Brenken flash 169°, pour point 12°, paraffin 8—10%. On distillation this yielded 24% of perfumery-oil distillate. The latter was treated with 45% oleum (18—20% SO_3), the sludge was separated, and sulphonic acids were extracted with EtOH. CH. ABS. (*e*)

Calophyllum oil.—See XII. **[Oil in] Congo copal.**—See XIII. **$CuSO_4$ as tobacco nutrient.**—See XVI. **Maté.**—See XIX.

See also A., Mar., 315, **Synthesis of vitamin-C.** 330, **Syntheses in the anæsthetic group.** 339, **Carbamide derivatives in terpene series.** 343, **Diaminoacridines. Dialkoxyalkylacridinium compounds.** 344, **Action of alkalis and alkali salts on antipyrine.** 345, **Sol. derivative of caffeine.** 350—1, **Alkaloids.** 352, **Hg salts of alkylfluoresceins.** 375, ***iso*Propylantipyrine.** 376, **Octaverine. New active principle in ergot.** 385, **Prep. of pure tuberculin.** 390—2, **Vitamins.**

PATENTS.

[Manufacture of] germicidal preparations. E. KLARMANN, Assr. to LEHN & FINK, INC. (U.S.P. 1,984,646, 18.12.34. Appl., 13.12.32).—Mixtures of (*o*- or *p*-) *cyclo*hexylphenol with a halogeno- or *C*-alkyl-phenol are dispersed in H_2O (with soap). The mixtures are claimed to have higher PhOH coeffs. than the separate phenolic components. H. A. P.

Preparation of a barbituric acid [derivative] and salts thereof. L. MELLERSH-JACKSON. From E. LILLY & Co. (B.P. 441,788, 4.9.34).—The prep. by standard methods from the Et_2 ester, b.p. 135—141°/8—10 mm., or *chloride* of ethyl-(βδ-dimethylamyl)malonic acid, or from *Et ethyl-(βδ-dimethylamyl)cyanoacetate,* of *5-ethyl-5-βδ-dimethylamylbarbituric acid,* m.p. 124—126° (*Na* salt), is described. (Cf. B.P. 365,135; B., 1932, 482.) H. A. P.

Expulsion of nicotine from tobacco. W. WAGNER (U.S.P. 1,984,445, 18.12.34. Appl., 8.8.34).—Tobacco leaves are hung in an atm. containing NH_3 to liberate the nicotine (I), then placed on muslin and subjected to warm AcOH vapours, whereby the (I) is absorbed by the muslin. A. R. P.

Smoking tobacco. S. S. SADTLER (U.S.P. 1,985,840, 25.12.34. Appl., 26.11.27).—Pellets of a mixture of fuller's earth 60, willow charcoal 20, and bentonite 20% are inserted in the pipe or cigarette to absorb objectionable constituents in the smoke. A. R. P.

Zn trichlorophenoxide.—See III. ***iso*Alloxazine compounds.**—See IV.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Rôle in photographic emulsions of ripening inhibitors present in the gelatin. A. STEIGMANN (Sci. Ind. phot., 1935, [ii], **6**, 1—3; Chem. Zentr., 1935, i, 3238).—Methods are developed for the determination of the no. and distribution of centres of inhibition of the ripening process. J. S. A.

Determination of filter factors and sensitivity differences by practical exposures with the stereo-camera. W. FORSTMANN (Phot. Ind., 1935, **33**, 132—134, 171—174; Chem. Zentr., 1935, i, 3239).—The method is described. J. S. A.

Simplified sensitometry of photographic films. H. FRICKE (Z. wiss. Phot., 1936, **35**, 70—79).—Apparatus consisting of a monochromator coupled with an arrangement for equalising energy is described. It is used to cast a spectrum of definite energy distribution on a photographic plate. The blackening produced on the latter is then examined in the usual way. A. J. M.

Hypersensitising action of infra-red rays. G. Semerano (Annali Chim. Appl., 1935, **25**, 668—676).—An attempt is made to explain why sensitivity increase is not $\propto$ the $[NH_3]$ in the sensitising bath, and why attempts to use gaseous NH_3 have been unsuccessful. Photographic emulsions were rendered sensitive to infra-red rays by allocyanines, and various salts added to the NH_3 bath used for hypersensitising. Salts giving the same anion as the Ag halide in the emulsion or NH_4 salts cause a decrease in sensitising action of the bath. This is explained in the first case by the decrease in $[Ag^{\cdot}]$ in the emulsion, and in the second by the decrease of alkalinity of the bath and the increased concn. of the NH_3 mol. Hypersensitisation is favoured by the presence of OH and delayed by high concns. of the NH_3 mol. NH_3 solutions free from CO_3'' or suitable mixtures of NH_3 with stronger alkalis are more suitable than is commercial NH_3 for hypersensitising baths. A. M. P.

Error in Schwarzschild's law observed with certain [photographic] plates in the ultra-violet. M. Lambrey and J. Corbière (Compt. rend., 1935, **201**, 1351—1352).—Considerable variations have been detected in the Schwarzschild index of certain plates between 3230 and 4300 Å. T. G. P.

Study, between 4000 and 2400 Å., of the contrast of [photographic] plates treated with solutions of sodium salicylate. T. Kiu (Compt. rend., 1935, **201**, 1348—1350).—Data for several commercial plates are recorded. The contrast factor is always stabilised and increased. T. G. P.

New formula for metol–quinol developer. G. Wyns (Assoc. belge Phot. Ciném. [Bull.], 1935, **2**, 23—24 ; Chem. Zentr., 1935, i, 3239).—The use of two solutions is advocated, " hard " and " soft " respectively, the solutions being combined in appropriate proportions for any purposes. J. S. A.

Fine-grain developers. G. Schwarz (Kinotechn., 1935, **17**, 73—78 ; Chem. Zentr., 1935, i, 3088).—A discussion. H. J. E.

Image reversed by diffuse after-exposure. Lüppo-Cramer (Phot. Korr., 1935, **71**, 33—35 ; Chem. Zentr., 1935, i, 3376).—A review of the phenomenon. J. S. A.

Metal particles from paper.—See V.

See also A., Mar., 300, **Photo-reduction of vat dyes.** 328—9, **Diazotype printing.** 348—9, **Cyanine dyes.**

Patents.

Photographic silver halide emulsions. I. G. Farbenind. A.-G. (B.P. 441,625, 23.7.34. Ger., 22.7.33, 14.11.33, and 9.7.34).—The use of sol. salts of aliphatic, aromatic, hydroaromatic, or heterocyclic sulphinic or seleninic acids, *e.g.*, $MeSO_2H$, $PhSO_2H$, $C_6H_{11}\cdot SO_2H$, as emulsion stabilisers is claimed. Fogging of films is thereby inhibited. A. W. B.

Preparation of zincographic plates for printing. K. Droege (B.P. 437,212, 30.4.34).—The design is produced as a negative on a sensitised albumin–gelatin film on the Zn plate and is converted into a positive by washing with a solution of shellac and colophony in EtOH, and then with paraffin. The plate is finally etched in a mixture of HCl (200), HNO_3 (200), and H_3PO_4 (200 c.c.) in 5 litres of H_2O containing 120 g. of $Na_2Cr_2O_7$. A. R. P.

Etching compositions [for zinc lithographic plates]. O. C., G., and O. H. Strecker (O. C. Strecker) (B.P. 437,127, 10.5.34. Ger., 31.5.33).—The etching solution contains $Al(NO_3)_3$, $Al_2(SiF_6)_3$, and $NH_4H_2PO_4$, preferably with small additions of $(NH_4)_2MoO_4$, $FeSO_4$, $Zn(NO_3)_2$, $H_2C_2O_4$, sugars, or gums as catalysts and/or stabilisers. A. R. P.

XXII.—EXPLOSIVES ; MATCHES.

Explosive action of hexogen and penthrite. A. Stettbacher (Nitrocellulose, 1935, **6**, 24—28 ; Chem. Zentr., 1935, i, 3235).—A crit. comparison is made of several methods of evaluating explosive action ; calculation of heats of explosion confirms the results obtained by the Pb-block test. H. N. R.

Patents.

Ignition composition. C. P. Spaeth, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,984,846, 18.12.34. Appl., 13.10.33).—An initiator for detonators comprising tetramethylene diperoxide dicarbamide is claimed. A. R. P.

Cellulose nitrate.—See V.

XXIII.—SANITATION ; WATER PURIFICATION.

Determination of small amounts of carbon monoxide with the Dräger CO-meter. E. Hofmann (Abh. Gesamtgeb. Hyg., 1935, **18**, 37—53 ; Chem. Zentr., 1935, i, 3014).—Precautions necessary for accurate results are discussed. In presence of H_2, high results are obtained. J. S. A.

Determination of small amounts of carbon monoxide in air by the iodine pentoxide method. O. Fischinger (Abh. Gesamtgeb. Hyg., 1935, **19**, 61—76 ; Chem. Zentr., 1935, i, 3014).—Air free from CO liberates a small amount of I, rendering a blank determination essential. J. S. A.

Determination of carbon dioxide in air. J. I. Paly (Rev. Hyg. Med. prévent., 1935, **57**, 182—189 ; Chem. Zentr., 1935, i, 3014).—CO_2 is absorbed in aq. $Ba(OH)_2$, the excess of which is titrated back with acid. J. S. A.

Rapid determination of carbon dioxide and detection of carbon monoxide in air by means of a simple apparatus. S. Mihaéloff (Ann. Hyg. pub., ind. soc., 1935, [ii], **13**, 22—27 ; Chem. Zentr., 1935, i, 3014).—Air is bubbled through $0{\cdot}001N$-Na_2CO_3 + phenolphthalein until decolorisation occurs, and the necessary vol. is measured. For CO, aq. $PdCl_2$ is similarly employed. J. S. A.

Efficiency of " carboxide gas " as an insecticidal fumigant for naval and merchant vessels. E. W.

Brown (U.S. Naval Med. Bull., 1934, **32**, 294—317).—Fumigation with carboxide [1 pt. of $(CH_2)_2O$ + 9 pts. of CO_2], in doses of 6 lb. per 1000 cu. ft., is recommended.
Ch. Abs. (*p*)

Pipetting device for disinfectant testing. S. Jacobson and B. Prindle (Science, 1936, **83**, 191—192).
L. S. T.

Determination of (A) xylene and xylene–toluene mixtures, (B) light benzine vapours, in the air of rooms. A. Luszczak (Abh. Gesamtgeb. Hyg., 1935, **17**, 1—18, 19—26; Chem. Zentr., 1935, i, 3014).—(A) 7—8 litres of air are shaken with EtOH, and the extinction coeff. of the solution at 2716 Å. is determined. PhMe and xylene contents are calc. therefrom.

(B) Air is extracted with EtOH [as in (A)] and the solution treated with fuming H_2SO_4 followed by H_2O. The presence and amount of benzine ($\not>$ 5 mg.) is shown by development of a yellow to brown coloration.
J. S. A.

Rapid detection of poison gases. A. Kling and M. Rouilly (Compt. rend., 1935, **201**, 1373—1375; cf. A., 1934, 216).—The presence of suffocating and vesicatory gases in dangerous concns. may be detected colorimetrically by their action on aq. bromothymol-blue.
T. G. P.

Mineralogical composition of air-borne foundry dust. T. Hatch and C. B. Moke (J. Ind. Hyg., 1936, **18**, 91—97).—The % of combustible matter and acid-sol. Fe, CO_3'', etc. increases with decreasing particle size. The SiO_2 content becomes less as the size decreases, and $>$ 90% of the total no. of particles are $<$ 2 μ. The determination of the composition of industrial dust gives erroneous results unless the particle size is taken into account.
J. N. A.

Effect of various physical factors on the counting of silica dust suspended in water. M. Annetts and J. D. Leitch (J. Ind. Hyg., 1936, **18**, 98—105).—Using a measuring cell 0·1 mm. deep, counting can begin as soon as the cell has been filled. Convection currents have no effect, and a low-power objective and high-power eyepiece are best. There must be a standard interval between the times of collecting and counting the dust, as the count decreases with time. There is very little difference in size distribution of dust produced by a picker tool and by a flat-chisel.
J. N. A.

Atmospheric pollution by household fires. E. Leclerc (Rev. univ. Mines, Mét., Trav. publ., 1935, [viii], **11**, 33—40, 61—68; Chem. Zentr., 1935, i, 3367).—The problem is discussed with special reference to the presence of S in the fuel and to the production of CO.
H. N. R.

Epidemiology of lead poisoning. A. J. Lanza (J. Amer. Med. Assoc., 1935, **104**, 85—87).—Daily dosage of 1·5—2·0 mg. of Pb is hazardous. Vapour is more dangerous than dust.
Ch. Abs. (*p*)

Destruction of micro-organisms in presence of sugars. II. Influence of sugars in chemical disinfection. M. D. Wallace and J. G. Baumgartner (J.S.C.I., 1936, **55**, 37—40 T; cf. B., 1934, 939).—Conc. solutions of sucrose (I) and glycerol (II) slow down the germicidal action of ionic germicides on *B. coli.* When the germicide is non-coagulating in its action on protein (represented by egg-albumin), as in the case of H_2O_2, the presence of conc. (I) or (II) solutions has no protective effect. The protective action may be due to intense hydration around the protein particles (bacteria) caused by adsorbed hydrated (I) or (II) mols. Longer time is required for germicidal action to be effective since more ions have to be adsorbed to offset the stabilising factor of hydration.

Sewage purification. I. C. T. Butterfield (Publ. Works, 1935, **66**, No. 5, 15—16, 18).—Zooglœa-forming bacteria occur in activated-sludge floc.
Ch. Abs. (*p*)

[Conversion of] sulphates into sulphides [in sewage]. C. C. Agar (Water Works and Sewerage, 1935, **82**, 189—191).—Factors contributing to sulphide formation in sewage-purifying systems are discussed. Adequate flushing, shorter retention, and controlled prechlorination should eliminate the trouble.
Ch. Abs. (*p*)

Chlorinated iron solves odour nuisance and improves digester performance. I. R. Riker (Water Works and Sewerage, 1935, **82**, 172—174).—Passage of the discharge from a solution-feed chlorinator over crushed tinned cans yielded a solution containing 420 p.p.m. of $FeCl_3$. Addition of this to the sewage system improved settling and sludge digestion, removed H_2S, lowered Cl consumption, improved the working of sprinkler filters, and facilitated sludge drying.
Ch. Abs. (*p*)

Effect of chlorination on activated sludge. II. Partial chlorination. W. Rudolfs and I. O. Lacy (Water Works and Sewerage, 1935, **82**, 175—177; cf. B., 1936, 222).—The O_2 requirement, the proportion of suspended solids in sludges, and the turbidity of the effluent increased with the extent of (partial) chlorination. Chlorination of sludges gave poorer effluents than did chlorination of sewage. Chlorinated sludge mixtures filtered and dewatered more readily than the unchlorinated. The O_2 requirement of treated sludge and effluents varied in amount and direction with the period of incubation and with the Cl_2 dosage.
Ch. Abs. (*p*)

Action of reservoirs in water purification. H. Brintzinger, H. Schlegel, and W. Bubam (Chem.-Ztg., 1936, **50**, 207—208).—A reservoir or lake through which a river flows purifies the H_2O both by sedimentation and aëration. For the latter a high ratio of surface to capacity is desirable. $KMnO_4$ absorption tests of H_2O taken from different points in a reservoir in the valley of the Saale and at different seasons are recorded.
C. I.

Activated carbon applied to a [water] reservoir. M. S. Wellington (Water Works and Sewerage, 1935, **82**, 193).—The settling of Nuchar (I) in treatment tanks is accelerated by addition of 0·5 p.p.m. of $CuSO_4$ 6 hr. prior to (I) treatment. (I)–CaO mixtures settle still more rapidly, but there is less absorption.
Ch. Abs. (*p*)

Electrochemical purification of water. R. Sommer (Oesterr. Chem.-Ztg., 1936, **39**, 36—39).—The Billiter–Hydor electro-osmotic process is intended to yield a product comparable to distilled H_2O at a much lower cost. Three concentric cells are used, the outer having a metallic cathode and wood-wool diaphragm. The anode chamber has a ceramic diaphragm and the H_2O to be purified flows between the two. Several cells are usually connected in series and at the outlet of each a conductivity determination indicates the purity of the H_2O produced. Skilled supervision is not required and the only attention needed is occasional cleaning and replacement of the wood-wool cloths. Energy consumptions are tabulated. C. I.

Ammonia and high bacterial counts [in water]. C. H. Burdick (Mich. State Coll. Eng. Exp. Sta. Bull., 1935, No. 61, 36—38).—Objections to NH_2Cl treatment include wide variability of results with conditions of treatment, inability to stabilise NH_2Cl sufficiently to pass through the plant, consequent liberation of NH_3 in settling tanks and filters thus providing bacterial food, and increased Cl′ demand through oxidation of NH_3 to NO_2'. Ch. Abs. (*p*)

Neutralisation of excess carbon dioxide in town's water. E. Naumann (Gas- u. Wasserfach, 1936, **79**, 161—166).—Aëration will not, in practice, reduce the CO_2 content below 5—7 mg. per litre and is therefore not suitable for soft H_2O, though the increase in O_2 content may be desirable. In the case of filtration through marble the reaction velocity depends on temp. and CO_2 content. It is applicable to soft H_2O with only traces of Fe and Mn. Treatment with $Ca(OH)_2$ is cheaper and more generally applicable, but requires more supervision. The "Magno" process employs burnt and granulated dolomite in which the $MgCO_3$ is reduced to basic carbonate, whereas the $CaCO_3$ is unaltered. It is suitable for all soft or fairly soft H_2O, whatever the CO_2 content and whether Fe and Mn are present or not. The MgO and $MgCO_3$ gradually disappear from the filter bed, which must eventually be changed. This process has been in use about 2 years and seems likely to find wide application. C. I.

Iron and acid troubles [in water treatment]. H. W. Pharoh (J. Penna. Water Works Operators' Assoc., 1934, **6**, 42—45).—Methods for CaO treatment of H_2O having hardness 800 and Fe 20 p.p.m. are examined. Ch. Abs. (*p*)

Use of activated carbon for determination of nitrate, nitrite, and ammonia in water and effluents. G. Gad (Gas- u. Wasserfach, 1936, **79**, 166—167).—Activated C is useful in determining N in coloured H_2O samples. The C must be carefully freed from any NH_4 salts by boiling with dil. aq. NaOH. Tests described with such C on H_2O containing NO_3' and NO_2' show that the latter are fairly completely absorbed in acid or neutral (but not alkaline) solution. If, therefore, the H_2O is made alkaline and shaken with activated C the colouring matter is adsorbed and the N content of the treated H_2O determined as usual. C. I.

Disposal and recovery of textile waste liquors. Chemical precipitation of colour-shop wastes. M. S. Campbell (Text. Res., 1935, **5**, 240—251).—Treatment with CaO (4·5 lb. per 1000 gals.), admixture with recirculated sludge to aid coagulation, and rapid sand filtration yields a clear innocuous effluent. Ch. Abs. (*p*)

Treatment and disposal of milk-factory effluents. I. By means of percolating filters and septic tanks. N. W. Barritt (J.S.C.I., 1936, **55**, 48—54 t).—Experiments are described showing that the difficulties of direct treatment of milk effluents on percolating filters are due to the accumulation of fat in the top layers of the filter. Pretreatment in a septic tank brings about separation of fat, and thus avoids this difficulty in subsequent treatment on a percolating filter. A rapid lactic acid fermentation also occurs, the effect of which depends on the buffer of the salts in solution. With distilled H_2O containing 1% of milk the reaction of the liquid falls below p_H 4·6 [the isoelectric point of casein (I)] and causes pptn. of (I) and inhibition of proteolysis. When hard tap-H_2O is used the p_H of the liquid may not fall below 5·5; the (I) then remains in solution and undergoes digestion by proteolysis. Such a liquid is quite suitable for treatment on a percolating filter at a rate of 100 gals. per cu. yard per day, and leaves behind a tank sludge of low N content.

Cleaning pipes.—See X.

See also A., Mar., 303, **Determining free CO_2 in waters.**

Patents.

Sewage[-sludge] treatment. Dorr Co., Inc. (B.P. 442,510, 2.6.34. U.S., 14.7.33).—In a 2-stage digestion process, the supply of sludge to the second (or quiescent) settlement stage is governed by the vol. of fresh sludge admitted to the primary tank in which the bulk of the fermentation takes place. The contents of this tank are maintained in circulation by revolving impellers, all of which are fixed at right-angles to a vertical shaft, except the one nearest to the surface which is tilted in order to break down and recirculate scum. Gas may be collected during one or both stages and the floating cover of the second tank may be used for gas storage. C. J.

Activated-sludge sewage treatment. W. Raisch, Assr. to Municipal Sanitary Service Corp. (U.S.P. 1,999,058, 23.4.35. Appl., 30.8.32).—Prior to treatment by the activated-sludge process the proportion of the suspended solids in the screened and settled sewage is reduced by the removal of all such solids from a portion of the liquor by treatment on vac. filters. C. J.

Purification of water by zeolites. F. Tschirner, Assr. to Zeolite Chem. Co. (U.S.P. 2,004,257, 11.6.35. Appl., 7.4.31).—Zeolite is indurated by treatment with a colloid, *e.g.*, $Fe(OH)_3$, then fully regenerated with NaCl, and treated with Na aluminate; it is then capable of removing Fe and Ca from raw H_2O, the former as a ppt. in the upper layers removable by back-washing. The bed is usually exhausted for Ca long before this is the case for Fe (so that an ordinary softener may follow), and is regenerated for both with NaCl and Na aluminate. A permanent deposit of colloids may be removed with a mild acid, acid salt, or $K_2S_2O_8$. B. M. V.

Disinfecting media.—See III.