BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAY, 1937.

I.—GENERAL; PLANT; MACHINERY.

Influence of streaming, diffusion, and heat transference on the output of reaction furnaces. I. Development of a chemical process from the small to the large scale. II. Isothermal, constant-volume, homogeneous reaction of the first order. III. Maximal temperature in a tubular contact furnace for exothermal reactions. G. Damköhler (Z. Elektrochem., 1936, **42**, 846—862; 1937, **43**, 1—8, 8—13).—Theoretical. E. S. H.

Regenerative stationary preheater. B. Iwata (J. Fuel Soc. Japan, 1935, **14**, 1085—1095). Ch. Abs. (*e*)

Heat effects in capillary flow. M. D. Hersey (Physics, 1936, **7**, 403—407).—Approx. formulæ are deduced for the temp. distribution and other characteristics of capillary flow due to heat effects under idealised conditions, designated (*a*) complete adiabatic flow and (*b*) thermal equilibrium. D. F. T.

Applications and limitations of self-operating temperature regulators. B. T. Wingfield (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 117—119).—The applications and limitations of temp. regulators of the vapour-tension type are discussed. D. K. M.

Instruments for automatic control for temperature, pressure, and flow in chemical industry. W. J. A. Copeland (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 120—123).—The instruments and typical applications are described. D. K. M.

Automatic control of chemical processes. W. J. Clark (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 125—135).—The automatic controls in use at the Billingham factory of Imperial Chem. Industries Ltd. are described. D. K. M.

Influence of the characteristics of a plant on the performance of an automatic regulator. A. Ivanoff (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 138—150).—The performance of automatic regulators is considered both theoretically and mathematically. D. K. M.

Means of control as a factor of plant design. L. B. Lambert and H. R. Walton (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 152—155).—The importance of making provision for controls, automatic or otherwise, in the design stage is indicated and illustrated, with examples. D. K. M.

Experiences of the use of instruments as aids to plant control. E. I. Lowe and J. Frisken (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 156—164).—Experience with instruments (1) for maintaining a const. suction on furnaces by variation of the speed of the fan engine, (2) for maintaining a const. temp. by controlling the supply of oil fuel to a burner, (3) for measuring temp. in producer gas-fired furnaces, (4) for measuring the CO_2 content of gas, and (5) for measuring the SO_2 content of gas, are described. D. K. M.

Boiler water conditioning. C. W. Tod (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 52—59).—A discussion on H_2O softening and conditioning. D. K. M.

Chemical intercrystalline fracture of riveted joints in boilers. S. F. Dorey (Engineering, 1937, **143**, 392—393).—Caustic embrittlement in marine boilers is associated with (*a*) metal stressed beyond the yield point in fabrication (such as rivets and rivet straps, due to excessive riveting pressures), (*b*) high general or local [NaOH], (*c*) concns. > of the order of 0·64% of Na silicate in the NaOH (the norma condition of modern commercial boiler fluids). It can be minimised by avoiding these conditions and by addition of a sufficient quantity of Na_2SO_4 to ensure the formation of a protective scale. The earliest symptom is usually the breaking of rivet points, and the trouble can be readily diagnosed since the fractures are characteristically intercryst., whereas fatigue fractures and those due to simple overstressing are transcryst. F. J. B.

New process of refrigeration. P. C. Lemale and W. S. Yarrow (J. Inst. Brew., 1937, **43**, 101—108).—With the vac. refrigerating plant described, the use of refrigerating gases is avoided. The applications of the plant to air-conditioning, for which it is particularly suited, are discussed. I. A. P.

Laws of crushing, and present state of knowledge. E. C. Blanc (Rev. Ind. Min., 1937, No. 386, 35—43).—Von Rittinger's and Kick's laws are expounded and the experimental work bearing on them is summarised. The former holds for particles <2 mm. in diameter, and Kick's law for those >125 mm.; in the intermediate range neither applies. Researches on the distribution of particle sizes in a crushed product are described. The total surface of a particle may, due to cracks, be up to 3 times the external surface. Attempts made to measure the energy efficiency of crushing in a ball mill give vals. up to 25%. S. J. K.

Influence of reduction of height of Charpy samples on the impact-resilience value. V. V. Smirnov (Zavod. Lab., 1936, **5**, 331—340).—Resilience falls with increasing height of the sample. R. T.

Closed-circuit grinding as an engineering problem. J. S. Vrabek (Cement and Lime Manuf., 1937, **10**, 41—47).—Closed- and open-circuit grinding are compared and the advantages of the former are indicated. D. K. M.

Process of comminution. A. H. M. Andreasen [with B. Wesenberg and E. G. Jespersen] (Kolloid-Z., 1937, **78**, 148—156; cf. B., 1928, 915).—The size distribution in powders of glass, felspar, and earthenware produced from single cubes of the material by (*a*) pressure and (*b*) impact has been determined. No great difference is observed between the products obtained in the two ways. Powders produced by a force acting on a cube face have a fairly uniform size distribution, whilst those produced by a force acting on an edge are largely composed of fragments half the size of the original cube. In practice, however, the latter process is unimportant. F. L. U.

Separation of substances by flotation. I. F. K. T. van Iterson (Proc. K. Akad. Wetensch. Amsterdam, 1937, **40**, 94—100).—The geometry of flotation is developed. J. W. S.

Gradual separation and economy. III. J. P. Treub (Rec. trav. chim., 1937, **56**, 41—51; cf. B., 1934, 527).—In separation of a raw material into final products by continuous processes embodying the countercurrent principle, max. economy is obtained by introducing into any stage only material of the average composition of the two phases which are separated by that stage. The application of this principle is discussed. A. J. E. W.

Determination of hardness by a dynamic apparatus with a ball point. F. P. Morschanski (Zavod. Lab., 1936, **5**, 489). R. T.

Method of measuring and an apparatus for determining the elastic behaviour of elastic substances. C. W. Kosten and C. Zwikker (Physica, 1937, **4**, 221—234). H. J. E.

New instrument for measuring consistency [of pastes and jellies]. A. Liberman (Zavod. Lab., 1936, **5**, 501—503). R. T.

Safety in solvent extraction. M. Bonotto (Oil & Soap, 1937, **14**, 30—33).—Numerous practical safety precautions in plant design and operation are suggested and discussed. E. L.

Application of physico-chemical principles to liquid–liquid contact equipment. V. Mass transfer to liquids in turbulent flow. L. C. Strang, T. G. Hunter, and A. W. Nash (J.S.C.I., 1937, **56**, 50—54T; cf. B., 1935, 337).—The problem investigated was the variation of the individual liquid film extraction coeffs. with the dynamic conditions prevailing in the two liquids flowing countercurrently in a double liquid wetted-wall tower. It was found that the core liquid film extraction coeff. was entirely independent of the dynamic conditions prevailing in the wall liquid. The results obtained for the transfer of PhOH from a kerosene core flowing countercurrently to a H_2O layer falling down the tower walls were correlated by $k_pd/D_p = 28{\cdot}5(Vd\rho/\mu)^{0{\cdot}8}$, where D_p is the diffusion coeff. of PhOH in kerosene and k_p the kerosene film extraction coeff.

Acid-resisting industrial filters. I. Perforated stoneware filters. W. E. Speirs. **II. Porous filters.** F. Singer (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 166—168, 168—171).—Ceramic filters are described. D. K. M.

Application of automatic control to a typical problem in chemical industry. A. Callender and A. B. Stevenson (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 108—119).—The operation of automatic regulators is considered theoretically and mathematically and apparatus for controlling the steam passed into a distillation column so as to maintain a const. temp. at the top, and for controlling the p_H of liquor, are described. D. K. M.

High-pressure technique. R. Taylor (J.S.C.I., 1937, **56**, 41—50T).—A review of high-pressure technique in the light of experience gained at the Chemical Research Laboratory, Teddington, during the last ten years. Since most high-pressure apparatus is cylindrical in form, the stresses in a thick cylinder due to an internal fluid pressure are considered in some detail. The properties of steels under high temp. and the effect of H_2 and CO are described. Constructional details are given in respect to closures, valves, electrical leads, and sight-glasses. The compression, circulation, and storage of gases, also the measurement of pressure and rates of flow, are described. Safety precautions are also mentioned.

Viscosimeter suitable for materials of high viscosity. A. A. Clark and H. J. Hodsman (J.S.C.I., 1937, **56**, 67—70T).—The apparatus consists of two concentric cylinders, the outer being fixed. A known twisting moment is applied to the inner cylinder through a torsion wire, by the sudden rotation of a torsion head through 90°. The angular position of the inner cylinder is observed and plotted against time, and η is deduced from the analysis of the curve thus obtained. Temp. control is easy and η in the range 50—5×10^6 poises can be determined. It has been found convenient for viscous bituminous materials. The existence of plastic and thixotropic properties is shown by the abnormal shape of the curves.

Measurement of gloss. R. F. Hanstock (J. Oil Col. Chem. Assoc., 1937, **20**, 91—112).—Gloss is styled objective when conditioned only by the smoothness of the illuminated surface, and subjective when, as is usual, the effect of the brightness of the surface is included. Objective vals. are given approx. by the difference between the intensities of specular and diffuse reflexion at specified angles. With increase in the angle of reflexion the light intensity (I) from glossy paint films increases rapidly to a max. at the specular angle and even with matte paints a small and gradual increase is observed (graphed). Increasing the brightness of a surface by introducing a suitable colour produces a general increase in I, except that the specular max. is unaffected. I increases also with n of the surface, and this explains why, *e.g.*, a linseed oil surface is more brilliant than H_2O although their gloss may be equal; a lustre or brilliance factor is thus introduced. In absence of defined specular reflexion matteness appears; its measurement requires spatial-distribution data of the reflected light and is difficult. Various instruments are described for measuring the gloss of surfaces and n of dry paint films. S. M.

Methods of determining gloss. R. S. Hunter (J. Res. Nat. Bur. Stand., 1937, **18**, 19—39).—Different types of gloss are classified and methods by which each may be measured are described. Goniophotometric data provide a basis for the design and improvement of gloss-determining devices. J. W. S.

Flue-ash measurements. Badger pipe still. Compressor oil for freezing plants.—See II. **Pulp classifier. Micro-burette.**—See V. **Furnace linings. SiC refractories for boiler furnaces.**—See VIII.—**Grinding in cement works. Wood-flour [mill].**—See IX. **Waste-heat boilers. Recuperators. Steels for low temp. Flotation. Cu in chemical engineering.**—See X. **Thermo-electric pyrometer.**—See XI. **Pumps in fat industry.**—See XII. **Plant-protective coatings.**—See XIII. **Vac.-pan design.**—See XVII.

See also A., I, 202, **Measuring η of liquids.**

Patents.

Furnaces for solid fuels. E. J. B. Coenen Fils (B.P. 461,145, 24.8.35. Belg., 4.4.35).—An air-admission valve for a natural-draught furnace ash pit is balanced so that a slight internal pressure will close it. B. M. V.

Rotary drum dryers. Buell Combustion Co., Ltd. (B.P. 461,461, 7.2.36. Ger., 7.2.35).—Internal shelving occupying the whole internal cross-section is described. B. M. V.

Apparatus for drying and heat-treating material. F. Wernersson (U.S.P. 2,040,227, 12.5.36. Appl., 24.5.35).—The atm. (air) in a drying chamber is circulated in horizontal planes by two fans, and a minor circulation in vertical planes is maintained by another fan situated between an air-heating chamber and the drying chamber; very moist air is drawn off just before passing over the heaters. B. M. V.

Crushing devices. Prép. Industr. des Combustibles (B.P. 459,356, 7.10.36. Fr., 23.10.35).—A toothed-roll crusher provided with the usual crushing plate remote from the feed is also provided with a girder or bar across the feed shoot, which retains ultra-large pieces so that medium-sized lumps may be broken out of them by the teeth of the roll. B. M. V.

Impact mills. A.-G. Brown, Boveri & Co. (B.P. 461,040, 20.1.36. Fr., 18.1.35).—The mixing nozzle for the solids and motive gas contracts gradually over a considerable length to accelerate the mixture; to save space it may be of swan-neck or other shape. B. M. V.

[Roller] mills for grinding paints and other substances. S. R. N. Smith and C. Cooper (B.P. 461,023, 15.10.35).—The housing for the grinding block is attached to the base of the hopper and both are adjustable together. After passing under the bottom of the wall of the hopper the material passes into an enlarged cavity immediately prior to the block. B. M. V.

Froth-flotation apparatus. L. H. Logue (B.P. 461,103, 6.5.36. U.S., 6.5.35).—A belt drive by which the agitators of four cells in line are driven by one vertical-shaft motor is described. B. M. V.

Liquid filters. L. M. McLeod (B.P. 461,149, 25.9.35).—The elements of a pack of metallic plates or rings comprise non-oxidising metal formed on one or both faces with radial, wavy, shallow grooves. B. M. V.

Filtration of liquids. A. Swan and B. C. Carter (B.P. 461,581, 8.11.35).—A filter for, *e.g.*, petrol embodying means for collection of H_2O, removal of air, and rapid cleaning of the filter medium is described. B. M. V.

Apparatus for separating solids from liquids. F. A. Smith and D. C. Stern (B.P. 461,457, 21.1.36).—A bucket elevator is provided with a much smaller sprocket at the top than at the bottom and is run at such speed that the free H_2O is shot out in a course rather above the horizontal while the less fluid settled pulp falls out into a separate shoot. B. M. V.

Purification of liquids used in aircraft provided with propellers. M. Vullierme (B.P. 461,846, 24.3.36. Ger., 25.3.35).—The cooling or lubricating liquids employed are purified by utilising the centrifugal force developed in the propeller. D. M. M.

Fractional distillation. Foster Wheeler, Ltd. (B.P. 461,405, 4.5.36. U.S., 3.5.35).—Hydrocarbon oils, *e.g.*, are heated to the vaporising temp. and passed into a fractionator in which vapour is passed counter to a reflux and from which a residue is drawn off; an unvaporised side stream is automatically controlled to be a definite proportion of the feed irrespective of the rate of feed or rate of steam supply (if used). The automatic controllers are of known type. B. M. V.

Conveyance of boiling or gaseous liquids. P. Dmitrevskij (B.P. 461,227, 20.6.36).—The casing of a centrifugal pump, preferably having a vertical axis, is provided with an extension to which the feed liquid is admitted tangentially and forms a hollow cylinder moving downward into the rotor. The rotor is also provided with an upward cylindrical extension containing driving blades. B. M. V.

Liquid spraying installations. G. Bunau-Varilla (B.P. 461,422, 3.12.36. Fr., 4. and 11.12.25).—The motor of an air compressor operating several spray guns is started when any gun is put in use and stopped when all are out of use. In addition, the air conduit to any gun at rest is opened to atm. All these devices are electrically operated. B. M. V.

Apparatus for spraying liquid by compressed air or gas. I. D. Kelley, jun. (B.P. 461,112, 11.6.36).—The motive gas is contained in a pressure vessel of the sparklet type; devices for puncturing the bulb and afterwards controlling the flow of gas are described. B. M. V.

Aëration of liquids or dispersion of gases or vapours in liquids. Distillers Co., Ltd., and J. Lockey (B.P. 461,439, 23.8.35).—A perforated rotor is submerged in the liquid, but has an inlet opening near the axis above liquid level and injects air centrifugally in a distributed manner. B. M. V.

Mechanical treatment of thixotropes. I. G. Farbenind. A.-G. (B.P. 455,624, 23.4.35. Ger., 21.4.34).—In treating a thixotrope with a gas or to allow more rapid escape of steam during drying, local liquefaction is produced by drawing through it a metal brush or the like the wires or " needles " of which are caused to oscillate at high frequency by means of electromagnetic effects produced by a.c. A. R. P.

Freeing of liquids and fused masses from gases by means of ordinary sound waves. F. Krüger (B.P. 458,893, 8.4.36. Ger., 18.4.35).—The frequency of the waves is 20—20,000 $\sim$; the transmitter may be submerged in an electrically insulating liquid, but in conducting or fused masses a " sound repeater," *e.g.*, plunger, is dipped. B. M. V.

Preparations for use in production of foam. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 460,596, 1.8.35).—A liquid prep. consisting of a conc. solution of a wetting agent and albumin degradation products in a mixture of H_2O and a solvent capable of admixture with H_2O in any proportion is claimed. The liquid may contain $\not>20\%$ of albumin products and 40—50% of total substance, and be pourable even at 0°. H. C. R.

Continuous blending, for a predetermined quality, of liquids having different specific gravities. W. C. Holmes (U.S.P. 2,039,534, 5.5.36. Appl., 29.5.33).—A single pump draws all the liquids (*e.g.*, petrol) through suction pipes with individual control valves and delivers the bulk of the mixture to storage, but a small portion is delivered through a densimeter back to the inlet of the pump. B. M. V.

Vats for dye and other liquids. H. E. Partridge (B.P. 459,509, 8.7.35).—In a double-walled vessel, the outer wall is mechanically strong and the inner corrosion-resisting; to enable the inner wall to be thin, non-corrosive liquid is maintained in the space between the two to a level above the dye in the inner vessel, the latter level being limited by an always open overflow. Preferably the inner vessel is supported by a neck formed in it at its upper rim. B. M. V.

Washing of gases. I. G. Farbenind. A.-G. (B.P. 461,636, 20.8.35. Ger., 22.8.34).—A perforated container filled with loose bodies and partly submerged in a liquid is shaken, *e.g.*, by an unbalanced flywheel giving a circular or elliptical path, at some hundreds or thousands of oscillations per min. with an amplitude of some mm., so that the filling gradually circulates between the gas path and the liquid bath. B. M. V.

Gas washer. J. J. Seaver, C. E. Dougan, and H. L. Wetherbee, Assrs. to H. A. Brassert & Co. (U.S.P. 2,039,540, 5.5.36. Appl., 15.6.34).—A countercurrent tower is filled with rough-surfaced ceramic elements set in an orderly manner in several stories, the vertical openings through the upper elements being smaller than those lower down. Each deck of elements is held down by a screen above and through bolts. The lower decks are continuously irrigated; the upper normally serve as entrainment separators, but are flushed at intervals to remove deposits. B. M. V.

Gas filters. C. F. Burgess Labs., Inc. (B.P. 461,601, 26.6.36. U.S., 23.7.35).—Various forms of fibrous material (knitted mesh, paper laminations, etc.) suitable for wetting with oil are described. B. M. V.

Apparatus for separation of solid or liquid particles from gases, vapours, or smoke. M. Zander (B.P. 461,180, 11.6.35).—The gas is passed through a conduit having baffles extending from opposite walls alternately, the earlier ones being irrigated. Precautions to prevent the dirty liquid being carried away in the clean gas are described. B. M. V.

Dust collector. H. van Tongeren (U.S.P. 2,039,692, 5.5.36. Appl., 11.8.32. Holl., 17.8.31).—In a cyclone separator, the relative positions of a tangential inlet, an axial clean-gas outlet, and a dirty-gas outlet tangential to the cylindrical wall are specified. B. M. V.

Tubular gas-cooling apparatus. Bolidens Gruvaktieb. (B.P. 461,210, 18.11.35. Swed., 30.3.35).—An apparatus suitable for cooling SO_2 gases, having variable surface to adjust the final temp., comprises a no. of pipes in parallel rows, the ends being arranged at the corners of equilateral triangles, and the return bends being capable of being shifted to put a variable no. of tubes in series. B. M. V.

Cooling and drying of moint gases. W. L. De Baufre (U.S.P. 2,039,889, 5.5.36. Appl., 5.9.34).—In the drying of air by non-chemical means prior to rectification, 50% extra surface in the cooling apparatus is sufficient for defrosting because the heat exchangers are divided into a no. of (*e.g.*, 4) groups, each group comprising a horizontal section (H) and a vertical section (V). The ingoing air is cooled in H to $>0°$ and the liquid H_2O drained away; the remaining H_2O is allowed to form frost in V, and the frost is removed from one V at a time by admitting moist air at considerably $>0°$. B. M. V.

Apparatus for distribution of fluids. Soc. Anon. pour Tous Appareillages Mécaniques (B.P. 461,165, 27.4.36. Fr., 26.4. and 25.10.35).—One of a first set of n conduits is to be connected to another conduit of the same set or to any one of a second set of p conduits; then each of the first conduits is provided with a valve having $p + 1$ ways, and the corresponding p branch conduits. When $p = 2$ the valves are three-way and the branch conduits are connected to the suction and delivery of a pump. B. M. V.

Dehydrating compositions. H. H. Baker (U.S.P. 2,039,512, 5.5.36. Appl., 12.8.33).—A hygroscopic composition (*e.g.*, $CaCl_2$, p-$C_6H_4Cl_2$, NaCl, and wood charcoal mixed dry) is embedded in paraffin or other H_2O-resisting wax, and as the composition is " consumed " from the surface inwards the wax becomes porous, permitting the inner parts of the composition to be effective. B. M. V.

Liquid fuel for open-hearth furnaces.—See II. **Regenerative brickwork.**—See VIII. **Rubber–asbestos [brake linings].**—See XIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Composition and origin of coal. G. Stadnikov (Brennstoff-Chem., 1937, 18, 108—110).—By determining the ester- and ether-OMe contents of the bitumen and residual coal it is possible to classify coals as of (*a*) humic, (*b*) sapropelic, and (*c*) mixed origin (cf. B., 1935, 533, 1122). A. B. M.

Yorkshire, Nottinghamshire, and Derbyshire coalfield. Nottinghamshire and Derbyshire area. Analysis of commercial grades of coal. I. Anon. (Dept. Sci. Ind. Res., Fuel Res. Survey Paper 37, 1937, 141 pp.).—Proximate and ultimate analyses, ash-fusion temp., laboratory assays at 600°, etc. are recorded for various grades of coal from about 30 collieries, derived from the following seams: Kilburn, Mickley, Silkstone (Blackshale), Tupton (Low Main), Deep Hard, Deep Soft, Flockton, Dunsil, Top Hard, Main Bright, and Hazel. A. B. M.

Wetting of mine dusts. A. M. Bryan and J. Smellie (J. Roy. Tech. Coll., 1937, 4, 178—187).—The wetting of coal and stone dusts by H_2O and by 1—5% solutions of Perminal W (I) has been studied. With the exception of shale dust, the stone dusts are not assisted in their wetting by the use of (I). The ease of wetting of coal dust increases with decrease in volatile content and with increase in C content. The hygroscopic and binding effects of $CaCl_2$ are examined. The firmness of the bound mass depends mainly on the (I) content, and the moisture on the $CaCl_2$ content. No advantage appears to be gained by pptn. of $CaSO_4$ in the interstices of the dust by addition of $MgSO_4$. C. R. H.

Supervision of gas production in coal mines. K. Peters (Brennstoff-Chem., 1937, 18, 127—129).—A sample of the coal from the face of the seam is crushed to a standard particle size and transferred to a flask to which a manometer is attached. The flask is evacuated and the rate of evolution of gas from the coal is observed on the manometer. A change in the rate of gas evolution, in the total amount evolved, or in its composition gives warning of the approach to a part of the seam liable to give rise to dangerous gas conditions in the mine. A modified apparatus in which the glass flask is replaced by a metal box is described. A. B. M.

Prevention of spontaneous heating of large coal piles. M. K. Drewry (Combustion, 1937, 8, No. 8, 28—32).—Experiments showed that a seal of asphalt or, preferably, fine coal applied to the sides and top of a coal-storage pile effectively inhibits spontaneous heating and permits prolonged storage with small loss in calorific val. A layer of lump coal above the fine coal prevents erosion of the latter by wind and rain and is an additional safeguard against air movements within the pile. R. B. C.

Position of pulverised coal in present industrial heating installations. E. Damour (Chim. et Ind., 1937, 37, 229—236).—Progress has recently been made in the standardisation of methods of determining particle-size distribution and in the production of very finely pulverised coals. Certain fine coals are best utilised by first submitting them to low-temp. carbonisation and then utilising the semi-coke in the form of pulverised fuel. The design of combustion chambers is briefly discussed. Attention is directed to the advantages of using pulverised fuel and to possible future developments, *e.g.*, in admixture with gases of low calorific val., and its utilisation in various types of metallurgical furnaces. A. B. M.

Chemical constitution of a bituminous coal as revealed by its hydrogenation products. B. S. Biggs and J. F. Weiler (J. Amer. Chem. Soc., 1937, 59, 369—372).—The C_6H_6 extract (I) and the residue (II) (after such extraction) from Edenborn coal are repeatedly hydrogenated (Cu–Ca chromite catalyst at 350°; method: B., 1936, 770) to light petroleum-sol. oils (containing 87 and 79·7%, respectively, of the original C), which are then further reduced [H_2 (120 atm.), Raney Ni, *cyclo*hexane, 220°] to the saturated oils [(I*a*) and (II*a*), respectively]. Comparison of the C : H ratios, mol. wts. [in Ph_2 and o-$C_6H_4(OH)_2$], and n_D^{25} of the various fractions (all of which contain small amounts of OH) of (I*a*) and (II*a*) indicates that (I) and (II) contain similar units [containing 2—7 (?) condensed rings] distributed to approx. the same extent. The view (*loc. cit.*) that (I) and (II) differ owing to the size of the polymeric aggregate is thus supported. H. B.

Behaviour of bituminous coal in taking up and giving up carbon dioxide. O. Ruff and P. Geselle (Z. Berg, Hütt., u. Sal. Wes., 1936, 84, 425—436).—Four coals, one sample of which contained a high % of vitrain, were ground to $<$0·1 mm. size and moulded under pressure (250—1000 kg./sq. cm.) into cylindrical briquettes. The increases in vol. which took place when the briquettes, either unloaded or loaded up to 120 kg./sq. cm., were subjected, in a special apparatus, to the action of CO_2 at pressures up to 500 kg./sq. cm. are shown by means of curves. The effect on the strength and surface nature of the specimens of suddenly decreasing the CO_2 pressure was investigated. Preheating the coals at 300° markedly decreased their ability to dissolve CO_2; coals preheated at 600° no longer absorbed CO_2. When various briquetted materials, *e.g.*, wood, casein, starch, sugar, were subjected to the action of CO_2 under pressure it was found that the highly polymerised, O-containing substances, *e.g.*, lignin, humic acids, amber, and resin, dissolved CO_2 most easily. It is probable that substances of this type in coal, *e.g.*, vitrain, are responsible for absorption of CO_2. R. B. C.

Oxidation of a Pittsburgh seam bituminous coal and low-temperature coke by alkaline permanganate. B. Juettner, R. C. Smith, and H. C. Howard (J. Amer. Chem. Soc., 1937, 59, 236—241).—Exhaustive oxidation ($KMnO_4$, 0·4*N*-KOH) of Edenborn coal (I) and coke (prepared at 500°) gives mixtures (≡93 and 91%, respectively, of original C) of CO_2 (45, 40·7), AcOH (2·2, 1·6), $H_2C_2O_4$ (15, 11·6), and H_2O-sol. aromatic acids (*A*) (30·8 and 37·1%, respectively). The condensable hydrocarbons obtained by decarboxylation of (*A*) consist chiefly of C_6H_6 (50—60%) and Ph_2 (up to 20%), indicating that a significant fraction of the C in (I) is in cyclic structures; coking increases the proportion of such cyclic C. (*A*) + $H_2C_2O_4$ are best isolated from the mixed K salts by electrolysis. Fractionation of (*A*) + $H_2C_2O_4$ through insol. and sol. NH_4 and Ba salts and subsequent esterification gives small amounts of various benzenepolycarboxylic acids (*B*). Evidence indicating that (*A*) contain a large proportion of (probably) condensed aromatic acids [more complex than (*B*)], containing CO groups, is given. H. B.

Application of Goutal's formula to determination of calorific value of anthracites and semi-cokes. D. Florentin (Ann. Falsif., 1936, **29**, 545—546; cf. *ibid.*, 1932, 453).—The val. of the coeff. *a* in Goutal's formula for hard anthracite varies from 50 to 90, the lower vals. corresponding with samples containing $>4\%$ of H_2O. For Welsh, Hong Hay, Donetz, and Moroccan anthracites $a = 100$—110; for anthracitic coal, *e.g.*, Belgian and Ruhr anthracite, $a = 120$—145. The calc. val. may differ by 100—150 kg.-cal. per kg. from the true val. For semi-cokes $a = 80$—110, depending on the % of volatile matter. E. C. S.

Mechanisation of preparing coal samples. A. P. Schachno and D. A. Podsharskaja (Zavod. Lab., 1936, **5**, 431—436).—The application of cascade segregators to the prep. of coal samples for determination of heat of combustion is recommended. R. T.

Apparatus for rapid determination of moisture content of peat, coal, and other materials, by determination of condenser capacity. S. A. Kotkov (Zavod. Lab., 1936, **5**, 358—359).—Apparatus for determination of H_2O content, on the basis of determination of ε, is described. R. T.

Determination of sulphur in solid fuels by Eschka's method, without oxidation of the filtrate. A. T. Sveschnikov and E. V. Smirnova (Zavod. Lab., 1936, **5**, 497—498).—Oxidation of Na_2SO_3 to Na_2SO_4 by atm. O_2 takes place in the conditions of Eschka's method; addition of Br or H_2O_2 is superfluous. R. T.

Decomposition of sulphur compounds in coal. II. Determination of pyritic sulphur by means of hydrogen peroxide. A. Lissner and H. Brandeis (Brennstoff-Chem., 1937, **18**, 81—84; cf. B., 1935, 534).—From a study of the conditions under which pyritic S, but not org. S, is oxidised by H_2O_2 the following method of determining the former has been developed. 1 g. of finely-pulverised coal is mixed to a paste with a small quantity of H_2O (in order to ensure its being completely wetted) and treated with a mixture of 85 c.c. of H_2O, 5 c.c. of HCl (*d* 1·19), and 10 c.c. of perhydrol (Merck). The mixture is heated to 80° and held at that temp. for 2—2½ hr. The Fe in solution is pptd. by addition of aq. NH_3, and after separation of the coal and $Fe(OH)_3$ by filtration the SO_4'' in the filtrate is determined as $BaSO_4$ in the usual manner. The sulphate-S is determined in a separate sample of the coal by extraction with hot HCl (1 : 2), the difference between the two vals. giving the pyritic S. The method is simpler and more rapid, if not more accurate, than that of Powell and Parr (B., 1920, 713A). A. B. M.

Determination of nitrogen in Kuznetzki-basin coals by titration of ammonium salt in presence of formalin. T. M. Slobodskaja (Zavod. Lab., 1936, **5**, 600—601).—0·5 g. of coal is subjected to combustion with 10 ml. of H_2SO_4, the product diluted with 150 ml. of H_2O, and the solution made exactly neutral (Me-red), boiled, and cooled. 20 ml. of neutral formalin are added, and the solution is titrated (phenolphthalein) with 0·1*N*-NaOH (1 ml. of NaOH ≡ 1·4 mg. N). R. T.

Rapid determination of ash in coal. T. A. Zikeev and M. G. Schifrin (Zavod. Lab., 1936, **5**, 292—294).—The samples are ashed without addition of acids. R. T.

Fusibility of coal ash. J. J. Brennan, D. F. Mitchell, F. P. Tierney, and W. C. Thompson (Ind. Eng. Chem. [Anal.], 1937, **9**, 106—111).—Modified procedure, with photographic recording, for determining fusion temp. is described. E. S. H.

Flue-ash measurements. ter Linden (Z. Dampfk. Unters. u. Versich. Ges., 1936, **61**, 75—78, 87—91, 96—98; Feuerungstech., 1937, **25**, 26).—Flue ashes are distinguished according to particle size as (*a*) coarse, $>50\ \mu$, which forms an independent gas stream, (*b*) medium, 10—50 μ, and (*c*) fine, $<10\ \mu$, which follows the gas stream exactly (terminal speed $\not>$0·5 m./sec.). A device involving a suction nozzle–cyclone fan with provision for by-passing and filtering part of the stream is recommended for taking samples of the ash. A filterless cyclone attached to the suction pipe is best for routine measurements, especially for determining heat losses. A small metering cyclone for fitting directly in the gas stream is described. Ash balances of boilers based on flue-ash measurements are given, and attention is drawn to sources of error. R. B. C.

Inherent ash of bright and dull coals. F. Büchler (Glückauf, 1936, **72**, 1289—1295).—A systematic examination was made of the ash distribution in a coal seam containing distinct bands of bright and dull coal in juxtaposition. Samples taken at different heights along a vertical section were crushed and separated by the float-and-sink method into as many fractions as possible. The *d*, ash contents, and ash analyses of the various fractions are tabulated, and the relation between ash constitution and probable mode of formation of the banded coal constituents is discussed. R. B. C.

Progress in the coking industry. II. H. Jordan (Brennstoff-Chem., 1937, **18**, 85—90).—German patents published during 1935—6 dealing with modifications in coke-oven design, particularly in the methods of withdrawing the volatile carbonisation products, and with new types of rotary and vertical retorts, principally for the low- or medium-temp. carbonisation of coal or briquettes, are summarised. A. B. M.

Recent development in German coking practice. A. Thau (Gas World, 1937, **106**, Coking Sect.,

34—38).—By using double collecting mains on plants carbonising high-volatile coals at high temp., large fluctuations in pressure are eliminated with consequent increases in the tar and benzol yields of 5—12 and 12—15%, respectively, the yield of gas remaining unaltered. The two mains are of different diameter, only the larger being connected directly to the suction main; the smaller main serves as a buffer to compensate any variations in pressure, and is connected by means of a pipe to the larger main. A direct-recovery saturator with mechanical agitator for the production of a coarse-grained $(NH_4)_2SO_4$ is described. The salient features of the Koppers, Still, and Otto systems for the production of low- and medium-temp. cokes are discussed.
H. C. M.

Development of the low-temperature carbonisation of bituminous coal in Germany. A. Thau (Brennstoff-Chem., 1937, **18**, 110—113).—A brief account is given of the history and present position of the process, with a description of some of the newer types of carbonising plant (cf. B., 1937, 103).
A. B. M.

Economic importance of low-temperature treatment of coal in Germany. H. Jäger (Gas- u. Wasserfach, 1937, **80**, 168—175).—The commercial success of low-temp. carbonisation depends mainly on the nature of the semi-coke, which can be controlled within limits by suitable choice of coal and method of heating. The economics of the process are discussed in relation to the gas and coal-mining industries and from the German national viewpoint.
A. R. Pe.

Electrode carbon from coal. H. Mönnig (Bergbau, 1936, **49**, 445—447).—Coals most suitable for the manufacture of electrode C are those having a pronounced macrostructure and containing a small % of ash and 30—40% of volatiles. The crushed coal is moulded to shape without use of a binder and subjected to low-temp. carbonisation. The coke is subsequently heated at 700—1000° until it conducts electricity.
R. B. C.

Application of high-vacuum distillation in the characterisation of coke and bitumens. A. Vila (Compt. rend., 1936, **203**, 1166—1168).—Distillation at $<10^{-3}$ mm. affords large quantities of products which do not distil at higher pressures. The curves obtained enable the sample to be classified with respect to its content of material which inhibits distillation.
J. L. D.

Determination of the real specific gravity of coke. J. Hiles and R. A. Mott (Fuel, 1937, **16**, 64—71).—The pyknometer method gives accurate results if air-free H_2O is used as the liquid, and if this is boiled in contact with the coke at 100° (glycerin–H_2O bath). It is necessary to control to within 0·25° the temp. at which the pyknometer is filled. A much closer temp. control is necessary if org. liquids are used instead of H_2O. The use of org. liquids has also the disadvantage that a condensed liquid layer is formed on the surface of the coke, thereby giving too high a val. for *d*; the same effect is produced with H_2O if a wetting agent is added. All the closed pores in the coke are opened by crushing it to pass 60-mesh, and there is no necessity to crush more finely to obtain the real *d*.
A. B. M.

Dessau vertical retorts with continuous water-gas production in separate chambers at Rostock gasworks. G. Vater, F. Richardt, and A. Thau (Gas- u. Wasserfach, 1937, **80**, 146—149).—The construction described by Buëb and Thau (B., 1934, 1042) is simplified by placing a carbonising chamber on each side of the water-gas generator. Results of a 2-day test are given.
A. R. Pe.

Gasification of brown coal in the Rostock process. M. Permien and H. Bausch (Gas- u. Wasserfach, 1937, **80**, 149—151).—Brown coal can be substituted for coke in the water-gas generator (see preceding abstract) without seriously affecting the calorific val. of the gas or the nature of the tar.
A. R. Pe.

Generation and industrial uses of gas from wood. A. Ebner (Pulp & Paper Mag. Canada, 1937, **38**, 211—219).—Wood is compared with other fuels as regards its suitability for gasification, and the economics of vac. gas from wood for motor vehicles and other purposes are discussed in detail.
H. A. H.

Gum formation in [town's] gas. B. T. Tjabbes (Het Gas, 1936, **56**, 31—37; Chim. et Ind., 1937, **37**, 50).—The characteristics of liquid- and vapour-phase gums, and methods for preventing their formation, are discussed. Vapour-phase gum is best prevented by removing NO_2 from the gas by passage through Fe sulphide.
R. B. C.

Cleaning coke-oven and water-gas. W. F. Judd (Amer. Gas J., 1937, **146**, No. 2, 51—52).—An apparatus comprising a Blaw–Knox gas scrubber and a superimposed $C_{10}H_8$ scrubber combined in one unit is described. Tar fog and $C_{10}H_8$ are removed in succession by passage through water-gas tar and gas oil, respectively. A high cleaning efficiency is claimed.
R. B. C.

Desulphurisation of gases. P. Ferenc (Tech. Kurir, 1937, **8**, 20—22).—A review.
E. P.

Modified Bone and Wheeler gas-analysis apparatus. C. L. Evans (Gas J., 1937, **217**, 654—655).—H_2O-operated pressure and vac. connexions are employed to control the Hg in the burette, to agitate the reagents in the absorption pipette, and to wash Hg leaving the pipette.
A. R. Pe.

Application of Raoult's law to the calculation of equilibrium curves for naphthalene in the system coking gas–absorption oil. V. V. Shdanov (Chimstr., 1935, **7**, 414—416).—The oil should be freed from the solid impurities at 15°. Coking gas should be washed at a scrubber temp. of 20°.
Ch. Abs. (*e*)

Benzol extraction. J. Curry (Gas World, 1937, **106**, Coking Sect., 39—40).—Experiences with various types of wash oils are discussed. Use of anthracene oil for scrubbing necessitated very frequent changing of the oil, due to high η, thereby entailing a high cost of oil per gal. of benzol recovered. The efficiency of benzol extraction using a mixture of creosote and redistilled creosote is 92—95·5%, the quantity of oil in circulation being 90 gals. per hr. per ton of coal carbonised. The effect of gas and oil temp. on benzol yields is also discussed. H. C. M.

Benzol recovery. E. Hecker (Gas- u. Wasserfach, 1937, **80**, 182—187, 203—208).—The oil-washing process at Hamburg gasworks is outlined. Tests extending over 12 months show that to obtain max. recovery the condition of the oil must be carefully watched and its η kept down by additions of fresh oil; the rate of oil circulation must be correctly adjusted. Thorough stripping by means of superheated steam and efficient cooling of the stripped oil before recirculation are also necessary. A. R. Pe.

Calculation of diaphragm gas-flow meters. W. Schreiber (Gas- u. Wasserfach, 1937, **80**, 208—209).—A nomogram is given connecting flow rate, d, and pressure drop with contraction and orifice ratios. A. R. Pe.

Continuous distillation plant for road tar. Anon. (Coal Carbonisation, 1937, **3**, 37—41).—A Clayton "cascade" plant at Tudhoe Ironworks designed to treat 40 tons per day of crude coke-oven tar comprises three cylindrical stills arranged in series. When distilling to produce soft pitch for road purposes the temp. of the stills are 180—190°, 230—240°, and 260—270°, respectively. The products are crude naphtha from the first still and tar acids and $C_{10}H_8$ from the second. Steam is employed in the final stage to remove heavy anthracene oil and leave pitch. R. B. C.

Determination of cyanide in aqueous extracts of road tars. W. G. Moffitt and E. H. Williams (Analyst, 1937, **62**, 101—106).—The aq. extract is shaken with AgOAc and NaOH, and after 15 min. the mixture is distilled with $SnCl_2$. The distillate is extracted with $CHCl_3$, the phenolphthalein test (B., 1935, 656) being applied to the aq. portion or an aliquot thereof. The Ag_2O produced *in situ* oxidises the tar acids, and 0·1 p.p.m. may be determined colorimetrically. J. G.

Hydrogenation of low-temperature tar under various conditions. H. Winter (Chem.-Ztg., 1937, **61**, 136; cf. B., 1936, 773, 1028).—Low-temp. tar from bituminous coal can be converted by destructive hydrogenation into high-quality motor fuel (80%) and low-boiling phenols suitable for production of artificial resins etc. (20%). A. B. M.

Low-temperature tar acids as raw material for the plastics industry. W. D. Spencer (Gas J., 1937, **217**, 843).—A brief discussion.

Physical properties of asphalt. Viscosity–temperature susceptibility. S. Mason, R. J. Loomis, S. D. Patterson, H. G. Nevitt, and L. C. Krchma (Ind. Eng. Chem. [Anal.], 1937, **9**, 138—139).—The η-temp. susceptibility coeffs. of different asphalts have been determined. E. S. H.

The asphalt sea of Trinidad. E. Graefe (Brennstoff-Chem., 1937, **18**, 113—115).—A short account is given of the asphalt sea and of the properties of the asphalt. It was probably formed by petroleum flowing into hot volcanic mud, followed by condensation of the hydrocarbons in the petroleum under the influence of air, light, and S, with elimination of H. A. B. M.

Effect of temperature on the consistency of asphalts. Viscosity–temperature susceptibility coefficient as an index. H. G. Nevitt and L. C. Krchma (Ind. Eng. Chem. [Anal.], 1937, **9**, 119—122).—The η-temp. susceptibility coeff. is represented by $S = 0{\cdot}221 \log(\log[\mu_1 + 0{\cdot}8]/\log[\mu_2 + 0{\cdot}8])/\log(T_2/T_1)$ where μ_1 and μ_2 are the kinematic viscosities at abs. temp. T_1 and T_2. The applicability of the coeff. is illustrated by reference to data. E. S. H.

Application of brown-coal cracked bitumen as a road-building material. R. Heinze and G. Tschirpig (Braunkohle, 1936, **35**, 845—851, 866—870).—A bitumen of softening point (Kraemer–Sarnow) 25°, obtained by cracking brown-coal tar, was investigated. Experiments showed that substitution of bituminous coal-tar pitch (softening point 67°) by brown-coal cracked bitumen in standard bituminous road dressings was entirely satisfactory. The compositions and properties of the various mixtures tested are given. R. B. C.

South African oil shales. A. J. Petrick (J. Chem. Met. Soc. S. Africa, 1936, **37**, 209—288).—Following an extensive survey of the literature, the results are given of a detailed study of the oil obtained by carbonisation of 7 samples of Ermelo oil shale. The yield of oil (d 0·83—0·90) varied from 14·5 to 17·5 wt.-%, but the oil from different locations was of fairly consistent quality. Hydrogenation of oil shale at 450—460°/95 atm. (MoS_2 catalyst) increased the yield of oil, but the high ash content (28—46%) of the shale renders this procedure uneconomic. Increasing the rate of carbonisation or using superheated steam increased the yield but decreased the quality of the oil in both cases. Increasing the pressure yielded oils of lower final b.p. (260°), but gave decreased yields. When carbonisation rates are low the oil is more saturated. The crude oils yielded $\sim$20% of light oil (b.p. $<$170°) which could be refined easily, but refining losses were high. Hydrogenation of the higher fractions from shale oil at 450°/100—210 atm. yielded 18—41% of petrol according to the catalyst used, and this process is preferable to cracking as a higher yield of better-quality oil was obtained with less gas formation. C. C.

Badger vacuum pipe still. Y. Kawachi (J. Fuel Soc. Japan, 1937, **16**, 15—16).—A brief description is given of the Badger still, which is, on account of its low fuel (3% of the charge) and steam comsumptions, particularly suitable for small-scale continuous operation. When redistilling machine oil, 95% of the charging stock was recovered without any decomp. or deterioration. A table of typical operating data is given. H. C. M.

Evaluation of the hydrocarbons in petroleum. G. Pastonesi (Annali Chim. Appl., 1936, **26**, 518—527).—Determination of the lowering of the crit. solution temp. of NH_2Ph and of the Me_2SO_4, nitration, and sulphonation vals. affords a rapid method for ascertaining the distribution of aromatic, naphthenic, and paraffinic constituents. F. O. H.

Solvent refining of mineral oils. H. Steinbrecher and H. Kuhne (Angew. Chem., 1937, **50**, 233—235).—The proportions of the various hydrocarbon classes contained in a brown-coal tar oil as given by (*a*) the usual extraction with H_2SO_4, (*b*) cold fractionation with solvents, and (*c*) treatment with conc. HI are compared. Methods (*b*) and (*c*) give similar results, and differ widely from those of (*a*), which are erroneous. H. C. R.

Effect of sulphur and its compounds on mineral oils. F. Schmeling (Oel u. Kohle, 1937, **13**, 273—279).—A review.

Examination of petroleum products using fuller's earth. H. Suida and H. Pöll (Petroleum, 1937, **33**, No. 10, 1—2).—A method of separating oil and wax from petroleum and asphaltic resins by adsorption with fuller's earth and extraction of the washed earth with $CHCl_3$, C_5H_5N (I), and (I)–CS_2 (1 : 1) is described. Carbenes and carboids are determined in a separate portion by extraction with CCl_4 and CS_2. H. C. R.

Hypochlorite treating [of petrols]. H. Bottomley (Refiner, 1936, **15**, 359—362).—The refining of petrols and straight-run petroleum distillates by means of NaOCl is discussed. The material treated should be free from H_2S, to avoid formation of free S. An efficient treating solution contains 10—12 g. of available Cl per litre and an excess of NaOH (4 g./litre). Treatment with $Ca(OCl)_2$ or bleaching powder, although practicable, is less efficient owing to the formation of an insol. CaO sludge. Costs of treating petroleum distillates are given. R. B. C.

Formation of ethylene by thermal decomposition of Rumanian petrol from Mareni. C. Candea and C. Manughevici (Atti V Congr. Naz. Chim., 1936, **14**, 718—726).—The thermal decomp. of the petrol, b.p. range 150—300°, has been studied at temp. between 500° and 900° and in presence of various catalysts. Under the conditions employed, the best yields of C_2H_4 were obtained at 800°, using a Cu tube, which tends to prevent decomp. into C and H_2. Good yields of unsaturated hydrocarbons and increases in aromatic content of 9—20% were obtained at lower temp., in a glass tube with Cu catalyst. L. A. O'N.

Commercial aspects of thermal polymerisation [of hydrocarbon gases]. J. S. Carey (Gas, 1936, **12**, No. 11, 20—21, 26; Nat. Petroleum News, 1936, **28**, No. 45, 64—65).—The manufacturing costs of producing "polymer" petrol from natural gas by the unitary thermal process (no catalyst, 500—600°, 1000—3000 lb. per sq. in.) are discussed. Flow sheets are given. R. B. C.

Modern hydrocarbon synthesis. G. Egloff (Brennstoff-Chem., 1937, **18**, 115—117).—A brief account is given of the production of high-C_8H_{18} no. motor spirits by the cracking of petroleum, Fischer's kogasin, etc., and by the polymerisation of gaseous olefines, in particular C_4H_8, produced by cracking. Lubricating oils also are produced by the catalytic polymerisation of olefines. A. B. M.

Examination of motor fuels. C. A. Lobry de Bruyn (Chem. Weekblad, 1937, **34**, 217—219).—The connexion between physical and physico-chemical consts. and the antiknock properties (C_8H_{18} and cetene nos.) of petrols and the properties of Diesel engine fuels are discussed. S. C.

Fuels for aircraft engines. E. L. Bass (J. Roy. Aero. Soc., 1935, **39**, 879—962).—The effects of mixture strength, antiknock characteristics, intake temp., and ignition timing on detonation were studied. Ch. Abs. (*e*)

Synthetic motor spirits produced by reduction of carbon monoxide by hydrogen; methyl alcohol, Fischer's motor spirit. C. Berthelot (Chim. et Ind., 1937, **37**, 211—223).—The synthesis of MeOH from CO + $2H_2$ and the Fischer–Tropsch process for the production of hydrocarbon oils from the same gas mixture are described. The choice between hydrogenation and these synthetic processes for the production of motor spirit depends largely on the nature and quality of the raw material available. The position in France is briefly discussed. A. B. M.

Alcohol and alcohol–gasoline blends as fuels for automotive engines. III. Performance tests of alcohol, gasoline, and alcohol–gasoline mixtures as fuels for an eight-cylinder automobile engine. A. L. Teodoro (Philippine Agric., 1935, **24**, 352—387).—Up to 50% of 193°-proof EtOH was miscible with gasoline at all temp. $>21°$; 190°-proof denatured alcohol was used for mixtures with $>50\%$ of EtOH. Mixtures with up to 20% of EtOH were more economical than was gasoline at full load. Ch. Abs. (*e*)

Modern high-duty aero engines and their fuels. F. R. Banks (J. Inst. Petroleum Tech., 1937, **23**, 63—177).—These engines are developed to employ fuels of C_8H_{18} no. 87 containing $PbEt_4$. Fuels of C_8H_{18} no. 100 are now prepared, using *iso*-C_8H_{18} or $Pr^{\beta}{}_2O$ as blending agents with aviation gasoline and $PbEt_4$. Both these products are now prepared synthetically on a commercial scale. Alcohol fuels appear to be very crit. to operating conditions and their employment is uneconomical. Correlation of laboratory knock tests with full-scale engine performance is difficult. The C.F.R. motor method is fairly satisfactory for rating fuels up to C_8H_{18} no. 87, whilst above this figure the U.S. Army Corps method appears to be superior. The principal considerations which should determine the design of cylinder head and combustion chamber are discussed together with modern developments in materials and construction of valves and sparking plugs. The troubles due to cold corrosion of engines which have used fuel containing "Ethyl" fluid have now been to a large extent eliminated by the use of suitable metals and the application of anticorrosive materials, *e.g.*, a mixture of $N(C_2H_4 \cdot OH)_3$, BuOH, Al stearate, and lard oil (details of the manufacture and method of application are given in an appendix). Corrosion of Mg alloy fuel tanks (induced by moisture) has been largely prevented by using suitable inhibitors such as NaF, $ZnCrO_4$, $SrCrO_4$, and $CaCrO_4$ fluxed with borax. The advantages given by the use of fuel of C_8H_{18} no. 100 in relation to increased power and reduction in fuel consumption are outlined. Appendices include a description of full-scale tests of 100-C_8H_{18} fuel and also a method for cleaning exhaust valves electrolytically. C. C.

Diesel oils from coals and cannels. J. L. Strevens (Gas Oil Power, 1936, **31**, 225—227).—A satisfactory fuel for high-speed Diesel engines is obtained by blending $\nless$25% of oil from the low-temp. carbonisation of bituminous coal with petroleum Diesel oil. The coal oil should be free from acidic and phenolic constituents and inhibited against ageing. Oils obtained from the distillation at 600° of coal–oil mixtures appear to have higher cetene vals. than those yielded by the dry distillation of coal at 600—700°. Gas oil blended with 80% of neutral oil obtained by the low-temp. carbonisation of cannel coal is an efficient high-speed Diesel fuel. R. B. C.

Composition of light oil for high-speed Diesels. K. Yamazaki and S. Ōta (J. Fuel Soc. Japan, 1937, **16**, 17—19).—The suitability of each of the following methods for the analysis of light Diesel oils has been examined: (*a*) Griffith's, for the gas oil fraction; (*b*) Dănăilă's (B., 1934, 438), for the gasoline and lamp-oil fractions; and (*c*) the H_2SO_4 method. In all three methods the naphthenic hydrocarbons are determined from the crit. NH_2Ph dissolution temp. The most reliable result for the unsaturateds figure is given by (*c*), provided the $[H_2SO_4]$ is carefully selected; (*a*) and (*b*) give unsatisfactory results. The use of 2 vols. of 90% H_2SO_4 for the unsaturated, and of 2·5 vols. of 96% H_2SO_4 for the aromatic, hydrocarbon determination is recommended. Analyses are given of 11 commercial light Diesel oils; the oils are rich in naphthenic and poor in unsaturated hydrocarbons. H. C. M.

Storage stability of Diesel fuels. R. Heinze and M. Marder (Brennstoff-Chem., 1937, **18**, 117—121; cf. B., 1936, 966).—Petroleum Diesel fuels showed little or no change in *d*, parachor, b.-p. index, or (calc.) cetene no. (*C*), after storage (in glass bottles, $\frac{3}{4}$-filled) in the dark for 500 days. Brown-coal tar fuels showed a slight deterioration, on the average an increase of 0·0025 in *d*, and a fall of 0·5 in *C*; the change occurred during the first 350 days, and thereafter the fuels were apparently stable. A rough measure of storage stability was given by the asphalt insol. in light petroleum; in general, the higher is the asphalt content the less stable is the fuel. This rule was, however, not applicable to mixtures of fuels of different origin. A. B. M.

Combustion in the Diesel engine. K. Neumann (Angew. Chem., 1937, **50**, 225—233).—Diagrams of German systems of cylinder-head design for high-speed Diesel engines, and a theoretical treatment of the conditions governing fuel ignition and flame propagation under engine conditions are given. The results of recent experimental work with the spectrograph etc. in this field are included. H. C. R.

Cause of rapid resinification of compressor oils in freezing plants. E. Pyhälä (Petroleum, 1937, **33**, No. 10; Motorenbetr., **10**, 2).—An instance is given of the resinifying effect of SO_2 on an apparently suitable, light compressor oil which was accompanied by the formation of an asphaltic deposit on the piston crown and oil ducts and by the development of corrosive acidity in the oil. H. C. R.

Sulphur compounds and optically active hydrocarbons present in a mineral lubricating oil derived from Venezuelan crude oil. E. André (J. Pharm. Chim., 1937, [viii], **25**, 156—159).—$COMe_2$ separates the S compounds, $d > 1$, mol. wt. 219, from a fraction of low S content *d* 0·887, mol. wt. 380, which is feebly dextrorotatory. J. L. D.

Properties of synthetic lubricating oils from kogasin. H. Koch (Brennstoff-Chem., 1937, **18**, 121—127).—Lubricating oils prepared from the olefines in kogasin by the action of anhyd. $AlCl_3$ have flat η–temp. curves (η-pole height 1·4—1·9, η index 90—100); for the same η they have a higher mean mol. wt. than paraffin-base mineral lubricating oils. The η of the fractions and residue obtained on distillation of the oil in vac. increase regularly with their mean mol. wt. All the fractions have approx. the same η-pole height. The olefinic linkings in the lubricating oils are readily hydrogenated, *e.g.*, by the action of H_2 at 180°/100 atm. in presence of a Ni catalyst. The η of the oil increases on hydrogenation. The oils are as stable towards air and light at room temp. as are mineral oils, and their stability is increased by hydrogenation. Subjected to the British Air Ministry oxidation test, the oils show a greater increase in η, but a smaller increase in Conradson C, than do mineral lubricaring oils; no asphalt separation occurs with the kogasin oils. By subsequent hydrogenation of an oxidised oil the properties of the original fresh oil are to a great extent regained. The kogasin oil behaved satisfactorily in a road test. The less viscous synthetic oils have a high dielectric strength and are suitable as insulating oils. A. B. M.

Gas in the "oil laundry." (Recovery of automotive lubricating oil.) E. H. Ronsick (Industr. Gas, 1935, **14**, No. 5, 20, 22).—A method of oil recovery by mixing with refining clay, heating to 325°, treating with steam, and filtering is described. Ch. Abs. (*e*)

Micro-determination of viscosity of lubricating oils. H. Levin (Ind. Eng. Chem. [Anal.], 1937, **9**, 147—149).—Technique for determining η on a 15-mg. sample from the rate of rise in a vertical capillary is described. E. S. H.

Thin layers of tin and other metals. III. Interaction between metals and lubricating oils. P. J. Haringhuizen and D. A. Was (Proc. K. Akad. Wetensch. Amsterdam, 1937, **40**, 39—46; cf. B., 1936, 581).—Four different lubricating oils were heated for 1350 hr. at 96° alone and in contact with thin layers of Cu, Sn, and Pb. The η of all the samples was increased, but there was no change in γ. No free acid was formed. The amount of sludge produced varied markedly with the character of the oil, being greatest in that with the highest content of aromatic hydrocarbons. Sludge formation is promoted by Cu, and strongly inhibited by Sn and by Pb. The metals were attacked, Cu being completely dissolved, whilst Sn and Pb are protected by a film of reaction product. The corrosive property of the oils is increased by storage, especially if air is present. F. L. U.

Plant control.—See I. **Synthesis of CH_4 from CO and H_2. $C_{10}H_8$ and its uses. Separation of naphthene and paraffin hydrocarbons. High-pressure hydrogenation.**—See III. **Impregnating materials in paper.**—See V. **C brick. Road emulsions and surfaces. [Active C from] wood flour.**—See IX. **Gas-fired open-hearth furnaces. Corrosion of condenser tubing.**—See X. **Hydrocarbonaceous soaps. Bleaching earths for oils.**—See XII. **Soot. Bakelite carbonisation.**—See XIII. **Carbohydrates from wood.**—See XVII.

See also A., I., 190, **Burning of gases. Temp. of open flames.** III, 151, **Œstrogenic action of products of petroleum refining.**

Patents.

Production of coal powder by froth flotation. P. Biesel (B.P. 460,761, 1.8.36).—Pure coal containing $<1\%$ of ash is prepared by subjecting the raw coal, already comparatively low in ash, to froth flotation in a special apparatus divided into several compartments, each consisting of an agitating cell and one or more separating cells. The tailings are instantly removed from each compartment while the coal froth is directed to the next compartment and so on all through the apparatus, its collection being aided by false bottoms arranged in the separating cells and conveying devices to conduct it to each next compartment. D. M. M.

Separation of coal. K. C. Appleyard, S. D. Pollitt, and Birtley Co., Ltd. (B.P. 461,503, 13.8.35. Cf. B.P. 421,401; B., 1935, 259).—Coal is separated electrically by the difference in κ causing different doors to open in the passage down which it passes. The opening of the doors is controlled by means of a thermionic valve and commutators connected to flexible discriminating fingers between which the coal passes. D. M. M.

Separation of coal portions poor in ash from those rich in ash. S. G. Rohrlich (B.P. 462,268, 17.6.36).—Coal containing only small quantities of H_2O is separated after first grinding and grading by size, by treating the individual size groups with $FeCl_2$ solution as a gravity liquid. Joint after-treatments may be given if desired, and the ash-rich parts may be worked up to give acid-resisting stones by a fusion process if required. D. M. M.

Obtaining extracts from coal and peat. Gewerkschaft M. Stinnes (B.P. 462,478, 15.10.35. Ger., 9.3.35).—Solid and fusible extracts are obtained by extraction under pressure with hydrogenated org. solvents, *e.g.*, tetrahydronaphthalene, preferably mixed with phenols. The temp. is progressively raised stepwise during extraction up to 400° and the extraction is carried out in an atm. of or containg H_2 at 10—200 atm. and with or without catalysts. D. M. M.

Vertical retorts for carbonisation of coal and like materials. (Sir) F. J. West, E. West, and West's Gas Improvement Co., Ltd. (B.P. 462,758, 1.11.35. Cf. B.P. 450,333; B., 1936, 967).—The coke-discharge door of the vertical retorts is provided with a jointing face consisting of strips of resilient material, *e.g.*, rubber, in grooves along the two sides and across the ends of the door face. The strips are slightly narrower than the groove widths, and metal plates are held in place against the rubber by bevelled holding-down plates which engage corresponding bevelled edges on the opposite sides of the metal plates; the plates are all flush with the door face. D. M. M.

Vertical coke ovens and gas generators. Heymer & Pilz A.-G. (B.P. 462,089, 27.4.36. Ger., 30.7.35).—A vertical coke oven or gas-generating chamber having a bottom-discharge hopper with means for regulating the vertical width of the coke-discharge slots is provided with a rock shaft having a downward-pointing blade and also two sleeves, one on each of its end-portions, each sleeve also being provided with a downward-pointing blade. Each sleeve and the rock shaft can be separately oscillated to push coke through the slots into the discharge hopper. The throw of each of the three blades can also be separately varied. D. M. M.

Horizontal chamber oven for production of gas and coke. H. Koppers' Industr. Maats. N. V., Assees. of H. Koppers Ges.m.b.H. (B.P. 462,278, 31.8.36. Ger., 31.8.35).—The penetration of air through the chamber doors is prevented by avoiding increased suction just under the ascension pipe and adjacent to the door. This is accomplished by effecting the entire discharge of gas through the charging opening nearest the pipe, the lower end of this opening being enlarged and connected to the pipe by an oblique, upwardly extending passage D. M. M.

Coking or coal-distillation apparatus. T. Kretz (B.P. 462,516, 17.7.36. Ger., 17.7.35).—The coking chamber, fixed between two internally heated heating chambers, has sideways-movable walls distinct from the fixed walls of the heating chamber, which walls can be either moved apart to allow discharge of the coke, or can form a removable box in which the coke can be removed to a cooling plant. Alternatively, the walls are connected together to form a casing capable of sideways movement. D. M. M.

Apparatus for manufacture of carbon black. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,497, 17.7.35).—A mixture of C_2H_2, or other materials rich in C, and limited air is passed in substantially non-turbulent flow, at a velocity only slightly $>$ that of flash-back, to form an unrestricted flame (temp. by optical pyrometer $\ngtr 1500°$) in a chamber the walls of which may be cooled by trickling H_2O. B. M. V.

Adsorbent carbon. C. G. Wortz, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,036,380, 7.4.36. Appl., 14.12.34).—Ash-free C is prepared by maintaining a solution of sucrose in conc. HCl for several days at room temp. until a carbonaceous gel is formed, heating the gel at 35—40° so as to harden it, heating the hardened gel under reflux with 20% HCl to b.p. so as to form a hard C mass, and finally igniting the mass at 630°. The resultant C is activated in steam at 830°. The processing time can be considerably reduced by carrying out gelation at 90° and under pressure sufficient to prevent disruption of the mass due to gas evolution. H. C. M.

Carrying out catalytic reactions [with combustible materials]. M. Pier, P. Jacob, and W. Simon, Assrs. to Standard–I.G. Co. (U.S.P. 2,038,599, 28.4.36. Appl., 15.1.32. Ger., 30.1.31).—Highly efficient catalysts for destructive hydrogenation of hydrocarbon products are obtained by treating metals, other than Fe, of group VI and their compounds with a sulphidising agent at 150—700° (300—600°)/ 2—15 atm. for 20—50 hr., any added free H_2 being present in amounts $\not>10\%$ of the entire amount of volatile constituents. All substances having a substantial oxidising action must be excluded during and after the prep. of the sulphide. Such catalysts, eminently suitable for the hydrogenation of S-containing materials, permit lower hydrogenation temp. and higher throughputs. Apparatus is described and figured. H. C. M.

Gas producers. Stein & Atkinson, Ltd., and T. A. Booth (B.P. 460,913, 7.8.35).—A H_2O-cooled agitator is described. D. M. M.

Gas producers. I. B. Wollaston (B.P. 462,135, 4.9.35).—Gas producers of the "water-bottomed" type suitable for gas generation from waste carbonaceous fuels of variegated size, shape, and *d* are made with large cross-sectional area in rectangular form, the length being at least twice the breadth, and having considerable fuel depth, *e.g.*, 5—7 ft. above the oxidation zone. Air is introduced under pressure from behind steeply inclined gratings running the whole length, at both sides, and in the middle. D. M. M.

(A, C) **Gasification of solid fuels in gas producers.** (B) **Gas producers.** F. Krupp A.-G. (B.P. 462,933, 462,937, and 462,939, [A] 17.3.36, [B] 1.5.36, and [C] 6.5.36. Ger., [A] 23.3.35, [B] 4.5.35, and [C] 13.5.35).—(A) Solid fuels are gasified in a gas producer in which the gasification zone is kept shallow and air supplied from above to the centre of the producer shaft while the products are drawn off towards the periphery in an obliquely downwards direction, the flow of air and products being reversible. (B) A producer as in (A) has annular gaps in the periphery of its shaft and a central pipe extending downwards into the shaft, one serving as air inlet and the other as gas outlet according to the direction of gasification, the gaps being so placed relative to the pipe that a relatively shallow gasification zone is formed. (C) A producer has a central air-inlet pipe extending upwards into the shaft and co-axially with it, and uniformly distributed gas outlets at the periphery of the shaft, so disposed as to produce a shallow gasification zone, the direction of gasification being reversible. D. M. M.

Production of a gas of definite stoicheiometric composition by carbonisation of fuels. Didier-Werke A.-G. (B.P. 461,402, 21.4.36. Ger., 22.7.35).—Gas suitable for org. syntheses is produced directly from non-coking fuels by first preheating the fuels to 400° in its continuous passage through a preheater, externally heated by waste gases, the products of preheating, containing most of the H_2S and impurities, being removed. The fuel is then carbonised at high temp. ($>850°$) by continuous passage through the three zones of an externally heated chamber, in which carbonisation takes place in the first zone, the products travelling down to the second or reaction zone, in company with the fuel, and being mixed with excess of steam at the start of this zone, in which CO and H_2 are formed from the carbonisation gases. Below the reaction zone is a third or water-gas zone in which water-gas is generated by passing steam through the hot coke. The water-gas from the water-gas zone is withdrawn separately and mixed externally with the reaction gases to give a mixture in the correct proportions. D. M. M.

Apparatus for producing a reducing gas atmosphere by partial combustion of gaseous hydrocarbons. Brit. Thompson-Houston Co., Ltd. (B.P. 462,439, 29.7.36. U.S., 30.7.35).—Gas suitable for a reducing gas atm. is produced in a combustion apparatus provided with an electric, thermostatically controlled gas-preheating chamber. The combustion chamber is provided with broken firebrick impregnated with Ni, Fe, and Cu particles, the gases passing over them in this order. D. M. M.

Cooling of the gaseous products of destructive distillation. A. V. Abbishaw and W. G. Parker (B.P. 462,528, 10.11.36).—The hot gases from the retort pass from the ascension pipe into a conduit, where they pass downwards in intimate contact with liquid cooling means forced in under pressure through jets suitably protected by hoods and provided with spreading discs under each. A butterfly gas-cut-off valve is provided below the spreading discs and has escape means in it for the cooling liquid should such not be cut off at the same time as the gas. D. M. M.

Purifying masses for use in the purification of gases. M. F. Bertrand (B.P. 462,934, 21.3.36).—Purifying nodules (diameter 5—20 in.) are made from a mass consisting of Fe oxide and wood sawdust with CaO as desired, to which has been added an agglomerant which forms a gel within the mass and includes a resin, resinate, or a silicate and a phenol. A suitable agglomerant is an aq. solution of $<1\%$ of phenol or cresol and $<5\%$ of Na silicate. The nodules are regenerated when spent by extraction with a solvent (C_6H_6). D. M. M.

Removal of organically combined sulphur from gases. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,001, 2.7.35).—The gas is brought in contact with strong org. bases or basic-reacting salts of strong org. or inorg. bases (and H_2O) at a temp. sufficiently high to convert organically combined S (*e.g.*, in CS_2 or COS) into H_2S. *E.g.*, water-gas, freed from H_2S but containing 148 mg. of S per cu. m., is passed through 20% $N(CH_2{\cdot}CH_2{\cdot}OH)_3$ in H_2O or *iso*amyl alcohol at 95°. Other basic substances exemplified are K_2CO_3, alanine, and a condensation product of $CH_2Cl{\cdot}CO_2H$ with triethylenetetramine. H. A. P.

Tar and like hydrocarbon materials for road surfacing. Soc. du Gaz de Paris (B.P. 463,065, 20.9.35. Fr., 30.10.34).—A durable, quick-drying road covering is prepared by mixing tar with 10—20% of spent oxide from coal-gas purification. The oxide, containing about 50% S, is finely ground and screened (100-mesh). The coarser material is rejected and may be used for further gas purification. The fines are gradually mixed with tar, in the desired proportion, with const. stirring, the temp. during mixing being $\not>$ 100°. D. M. M.

Production of asphalt coating material. W. A. Craig and F. E. Griffith, Assrs. to W. C. McDuffie (U.S.P. 2,038,023, 21.4.36. Appl., 1.3.35. Cf. U.S.P. 1,997,569; B., 1936, 438).—Asphalt-base petroleum oil residuum is mixed with 5—50% of fuller's earth, similar decolorising material (the spent material may be used), or, preferably, finely-divided petroleum coke, and is blown with air and steam at 200—300° until it acquires the requisite consistency. A. B. M.

Production of bituminous emulsions. J. A. Montgomerie and P. K. Archibald (B.P. 462,111, 2.7.35).—Aq. emulsions of pitch, bitumen, asphalt, etc., in which the aq. phase is the continuous phase, are prepared by dispersing the bituminous material in a hot dil. aq. solution of a fixed alkali (containing, *e.g.*, 0·5% of KOH, calc. on the bituminous material) and using as emulsifying agents a proportion of fatty acid pitch and a protein, *e.g.*, casein, the quantity of H_2O in which the material is first dispersed and the proportion of the protein being sufficient to prevent reversal of the phases. A. B. M.

Preparation of stable bituminous emulsions. V. E. Watts, Assr. to Amer. Bitumuls Co. (U.S.P. 2,040,115, 12.5.36. Appl., 1.11.32).—A quick-breaking emulsion is stabilised by alkali caseinate neutralised with acid to p_H 8·5, and a later addition of CH_2O as preservative of the casein. B. M. V.

Gasification of mineral oils. C. Padovani (B.P. 460,801, 4.2.37. It., 8.11.34).—Heavy oils are converted into permanent combustible gases by passing the vapours, with enough O_2 to convert all C into CO, over a porous catalyst (active C, earthenware, SiO_2 gel) containing at least one from each of the following groups: (*a*) Cr, Mn, Ni, Co, (*b*) Fe, Cu, Zn, (*c*) an oxide of Al, Mg, Ca, Zr, or Th. The catalyst is heated at 600—1000° and any reaction is avoided until the gases come in contact with it. A mixture rich in CH_4 is obtained by working at 600—900°/>1 atm. H. C. R.

Vapour-phase cracking of hydrocarbons. A. Cambron and C. H. Bailey (B.P. 461,392, 17.3.36. Addn. to B.P. 425,606; B., 1935, 482).—Vapour-phase cracking of heavy hydrocarbons, producing spirit with high aromatic content, is effected by passing them at a high space velocity, *e.g.*, >3 litres of liquid per litre of reaction space per hr., at $\not>$ 800° through a reaction tube provided with disc-like baffles of diameter < that of the tube. In this way the velocity of the gases at successive annular spaces adjacent to the heated wall of the tube is varied while permitting unobstructed flow along the wall. D. M. M.

Conversion of hydrocarbons. F. E. Frey, Assr. to Phillips Petroleum Co. (U.S.P. 2,038,834, 28.4.36. Appl., 6.10.32).—Hydrocarbons consisting largely of butanes are continuously fed at 500—5000 lb. per sq. in. through a non-catalytic heating zone at 400—650°, and the resultant products separated into a gasoline and heavier fraction, a re-cycle fraction of approx. the boiling range of the original charging stock, a lower fraction (predominantly CH_4), and a fraction containing principally hydrocarbons intermediate in b.p. between CH_4 and the re-cycle fraction. The re-cycle fraction is returned for re-processing, the high-CH_4 fraction discarded, and the intermediate fraction further cracked at 675—950°/$\not>$500 lb. per sq. in. to aromatic oils which are recovered. Plant for continuous conversion is described. H. C. M.

Thermal conversion of hydrocarbons into valuable products. Ruhrchemie A.-G. (B.P. 461,366, 6.11.35. Ger., 18.3.35).—Hydrocarbons are converted into more valuable products, *e.g.*, CH_4 alone into C_2H_2, or with NH_3 into HCN and C_2H_2, by upward flow in a regenerator furnace under vac. (50 mm. Hg) at 1600°. The operation is cyclic, the furnace being heated in alternate cycles by down-flowing hot gases, under normal pressure. The furnace is surrounded by a pressure jacket, the annular space between the jacket and the outer wall of the furnace being used to preheat air during the heating periods and evacuated when the furnace is under vac. The final gas, in one example, contained 8—9% of C_2H_2 and in another 20% of C_2H_2, whilst in the second case HCN $\equiv$ 40% of the NH_3 used was formed. D. M. M.

Continuous chemical treatment of petroleum oil. L. D. Jones, Assr. to Sharples Specialty Co. (U.S.P. 2,035,655, 31.3.36. Appl., 15.5.33).—Cylinder stock and H_2SO_4 are intimately mixed (about 42 gals. of oil to 45 lb. of acid) for 1 min. and the treated oil is separated from the acid centrifugally. C. C.

Refining of mineral oil stocks. M. B. Miller & Co., Inc., Assees. of M. H. Tuttle (B.P. 460,902, 8.2.37. U.S., 25.6.35. Addn. to B.P. 424,000; B., 1935, 346).—The stock is extracted with a mixture of a liquefied, normally gaseous hydrocarbon (I) (C_3H_8) and (o-)$C_6H_4Me{\cdot}NH_2$ (II) and maintained at a temp. (29·5°) at which (I) and (II) separate the oil into two layers, one of which contains the bulk of the paraffinic constituents. H. C. R.

Refining of mineral oils. Steel Bros. & Co., Ltd., and S. S. Bhatnagar (B.P. 461,813, 19.8.35).—Liquid petroleum oil fractions are refined by extraction with $\not<$ half their vol. of AcOH of >97% concn., preferably glacial AcOH. The operation is conducted preferably on the countercurrent system, either by batches or continuously, and AcOH may be recovered from both oil and extract and used again after concn. A pre-extraction with 85% AcOH may be desirable if the unrefined oil contains H_2O in solution or suspension. D. M. M.

Refining of hydrocarbon oils. N.V. de Bataafsche Petroleum Maats., Assees. of P. J. Roelfsema (B.P. 462,630, 17.3.36. U.S., 20.3.35).—

S compounds are removed from a hydrocarbon fraction by rectifying it together with a selective solvent for the S compounds, such solvent forming one liquid phase with the hydrocarbon fraction at the b.p. and having itself such b.p. as will depress that of the highest-boiling hydrocarbon below that of the lowest-boiling S compound. The rectification is continuous, the top product containing a hydrocarbon fraction and the solvent, S-free, and the bottom product the greater part of the S compounds with or without the solvent. Preferred solvents are furfuraldehyde, NH_2Ph, MeCN, $(CH_2{\cdot}NH_2)_2$, $MeNO_2$, and Ac_2O. D. M. M.

Separation of hydrocarbon mixtures. N.V. Machinerieen- en Apparaten-Fabrieken "Meaf" (B.P. 460,906, 8.2.37. Ger., 7.8.34).—Mineral oil is separated into a no. of fractions of different *d* by extraction in the cold with a solvent (benzine, Et_2O–EtOH, or $COMe_2$) of $d <$ that of the mixture to be extracted or of any of the fractions. The solvent is first run into a receptacle and the oil then distributed uniformly over the entire cross-section and set aside until the sol. hydrocarbons have dissolved, forming layers of different *d*, the residue settling to the bottom. The different layers are separately drawn off and the extracting material is recovered. H. C. R.

Recovery of *iso*butylene from hydrocarbon mixtures containing same. I. G. Farbenind. A.-G. (B.P. 462,558, 30.9.35. Ger., 3.10.34).—Extraction with acid in the liquid phase is employed, the hydrocarbons being led up through fine-pored solid materials, *e.g.*, filter stones, porous clay, or glass plates, into the acid. Alternatively, the acid may be led down through the porous solid into the liquid hydrocarbons. A suitable acid is 70% H_2SO_4 or H_3PO_4, or the mixed acids may be used. D. M. M.

Resolution of mixtures of liquid hydrocarbons into the components thereof by means of selective solvents. Edeleanu Ges.m.b.H., and W. Grote (B.P. 462,198, 29.11.35).—Hydrocarbon oils are separated into H-rich and H-poor constituents by washing with a selective solvent, *e.g.*, C_6H_6 and H_2SO_3, on the countercurrent principle, a higher temp., *e.g.*, 15—60° higher, being maintained at the place where the solvent enters the system than where the oil enters. D. M. M.

Working-up [oil-refining] acid sludge and similar materials. C. E. Every-Clayton. From Pape & Co. G.m.b.H. (B.P. 460,973, 6.8.35).—The acid sludge is emulsified mechanically at 30—210° with 20—50% of H_2O without adding alkali, and the emulsion is separated into two layers consisting of aq. H_2SO_4 and tar by allowing it to remain under pressure. The acid and tar are recovered separately. Apparatus is claimed. H. C. R.

Preparation of petroleum sulphonic acids and sulphonates. E. Field, Assr. to Standard Oil Co. of California (U.S.P. 2,036,469, 7.4.36. Appl., 26.3.34).—2 vols. of an aromatic–olefinic kerosene extract (b.p. 177—288°) is sulphonated with 1 vol. of 98—100% H_2SO_4 (55—60°; 2—3 hr.), diluted with 1 vol. of H_2O, and the middle sulphonate layer neutralised with aq. NaOH (*d* 1·21—1·32) at 94—99°. The Na sulphonate solution is extracted (C_6H_6), conc., and salted out to yield a friable powder possessing detergent and other properties. A. H. C.

Manufacture of emulsifiable oil product. N. N. Gay, Assr. to Standard Oil Co. of California (U.S.P. 2,036,470, 7.4.36. Appl., 24.10.31).—0·4—0·8 pt. of rosin is saponified (KOH; 105—120°) in presence of a white-oil soap (1 pt. of petroleum Na sulphonate in admixture with mineral oil, H_2O, etc.) and the neutral product is adjusted to contain 10—95% of soaps (1 pt. of Na sulphonate : 0·2—0·8 pt. of rosin soaps), 5—90% of oil or wax, and 0·5—14·5% of H_2O. A. H. C.

Production of motor fuels. E. Solomon (B.P. 462,307, 4.9.35).—Pine (etc.) wood is soaked until soft in H_2O, and then slightly acidulated with H_2SO_4 or H_3PO_4. The extract is filtered, treated with solvents, and distilled. The residue is given several further treatments with solvents followed by distillation and then diluted with petrol and $C_2H_2Cl_2$, when a petrol-engine fuel results. D. M. M.

Motor fuels. W. J. Tennant. From A. H. Fleming (B.P. 461,671, 17.8.35).—A Diesel-engine fuel is prepared by mixing furfuraldehyde (5—95%) with a liquid fuel boiling at $>150°$. Such mixture may also be diluted with $\ngtr 49\%$ of low-boiling fuels, *e.g.*, C_6H_6, EtOH. D. M. M

Motor fuels. J. C. Geniesse and R. Reuter, Assrs. to Atlantic Refining Co. (U.S.P. 2,039,894, 5.5.36. Appl., 9.3.28).—Petrol is fractionated into two portions and the higher-boiling fraction is subjected to thermal treatment only (450—650°/2 sec.—10 min.), to reduce the detonation characteristic; the two fractions are then reunited. B. M. V.

Manufacture of motor fuels of high antiknock value. N. V. de Bataafsche Petroleum Maats. (B.P. 460,746. 3.2.37. Holl., 24.4.35).—Derivatives of Co or Fe carbonyl hydride, or a metal salt of one of these compounds, *e.g.*, $Hg[Co(CO)_4]_2$, are added to the fuel. H. C. R.

Fuel oil and motor spirit. E. Solomon (B.P. 460,379, 2.8.35).—Oils and spirits for lighting, heating, and motive purposes are prepared by mixing products from the destructive distillation of coal at 800—1000° and 300—400°, respectively, with benzine, turpentine oil, and methylated spirit. H. C. R.

Stabilisation of lead tetraethyl and antiknock mixtures containing same. I. G. Farbenind. A.-G. (B.P. 461,604, 13.8.36. Ger., 26.10.35. Cf. B.P. 414,581; B., 1934, 952).—$PbEt_4$ and mixtures containing it are stabilised by boiling under reflux for 1—2 hr. with excess of finely-divided alkali fluorides, *e.g.*, equal amounts of KF and NaF, at 40—50°/10—15 mm. The liquid is then filtered. D. M. M.

Stabilisation of motor fuels. E. I. Du Pont de Nemours & Co. (B.P. 462,593, 7.8.35. U.S., 8.8.34).—Gum formation in motor fuels, *e.g.*, benzol or cracked petrol, is inhibited by addition of 0·001—0·006% of *p*-*cyclo*hexylaminophenol. D. M. M.

Treatment of difficultly volati[li]sable liquid fuels for internal-combustion engines. W. Dutzmann (B.P. 461,797, 3.7.36. Ger., 4.7.35).—Difficultly volatilisable liquid fuel is atomised or split up with the aid of heat, mixed with H_2O vapour and air, heated, and further air supplied to the mixture in stages at least once in the course of heating and once at its conclusion. Heat from the exhaust gases may be utilised, the latter having their temp. raised by burning with air any remaining combustible constituents left in them. D. M. M.

Use of liquid fuel in open-hearth furnaces. W. W. Triggs. From "Terni" Soc. per l'Industria e l'Elettricità (B.P. 461,327, 13.8.35).—Waste gases from the furnace, after passing through the regenerator, are further cooled (if necessary), dried, and used to dil. the atomised fuel, producing a fluid that can be burned much as producer gas is, the ordinary gas uptakes and ports of the furnace being used. B. M. V.

Preparation of hydrocarbon products from acid sludge. F. W. Sullivan, jun., Assr. to Standard Oil Co. (Indiana) (U.S.P. 2,036,973, 7.4.36. Appl., 30.5.30).—Lubricating oil of high η is obtained from petroleum acid sludge by heating the latter to 205—260°, to eliminate S and H_2SO_4 compounds, and then hydrogenating the heated sludge in presence of a catalyst. C. C.

Dewaxing oil. L. D. Jones, Assr. to Sharples Specialty Co. (U.S.P. 2,036,966, 7.4.36. Appl., 20.12.30).—Diluted mineral oil is cooled to −29° to −40° (−35°), whereby wax is separated in a form in which it can be removed by centrifuging. Removal of the solvent gives a lubricating oil of pour point −18° and η (Saybolt) 300—800 sec. at 37·8°. C. C.

Lubricating oils. A. W. Ralston, C. W. Christensen, and W. M. Selby, Assrs. to Armour & Co. (U.S.P. 2,033,546, 10.3.36. Appl., 1.7.35).—Products consisting of a mineral lubricating oil containing 0·1—1% of a Friedel–Crafts reaction product from a coal-tar fraction and a fatty acid chloride ($\nless C_6$), *e.g.*, stearyl chloride, are claimed. C. C.

Lubricating oil. Texaco Development Corp., Assees. of C. C. Towne (B.P. 460,583, 29.7.35. U.S., 31.5.35).—The η-index of oils is increased by incorporating 0·5—40% of a purified reaction product of rubber with $SnCl_4$, $SnBr_4$, BCl_3, BF_3, HBF_4, H_2SnCl_6, H_2SnCl_4, H_2SnBr_6, or H_2SnBr_4 from which undesirable darkening material has been removed. The resinous rubber product may be dissolved in a solvent (aromatic hydrocarbon) and added to the lubricating oil. Undesirable material may be pptd. from the solution by means of an anhyd. acid, and the solution separated from the ppt. before adding it to the oil. Alternatively, the desirable material may be pptd. from solution with a ketone and subsequently dissolved in the oil. H. C. R.

Lubricating compositions. Celluloid Corp. (B.P. 462,556, 25.9.35. U.S., 2.10.34).—Lubricants are claimed comprising a mineral oil, an emulsifying agent and H_2O, and a neutral ester of H_3PO_4 or $PS(OH)_3$ containing at least one aryl group, *e.g.*, $(C_6H_4Me)_3PO_4$ in amount $\ngtr 10$ wt.-% of the mineral oil. A small proportion of free cresol is an advantage and animal or vegetable oil, fat, or wax may be added. D. M. M.

Castor oil [lubricating] composition. F. H. MacLaren, Assr. to Standard Oil Co. (U.S.P. 2,034,405, 17.3.36. Appl., 7.3.32).—A solubilising agent (Al, Zn, or Mg stearate or oleate) (2—4 pts.) is heated to 150—175° with mineral oil [prepared by polymerising ($AlCl_3$) the unsaturated distillate from cracked paraffin wax] (71—93 pts.), the mixture cooled to 38°, and castor oil (5—25 pts.) incorporated, giving a stable homogeneous solution. S. S. W.

Upper-cylinder lubricants. A. Duckham, and A. Duckham & Co., Ltd. (B.P. 460,345, 3.4.36).—A solid or semi-solid lubricant is claimed which is completely sol. in motor fuel and has a lower apparent *d* than that of the fuel, due to the incorporation in the mass of small gaseous or vaporous inclusions. The gas (*e.g.*, CO_2) is dissolved in the lubricant under pressure, or introduced by beating mechanically at about the m.p. of the lubricant. H. C. R.

Oil composition. B. W. Story and E. W. Fuller (B.P. 462,146, 2.1.36).—A viscous, highly refined mineral oil, *e.g.*, transformer oil or lubricant, is stabilised by addition of small quantities, *e.g.*, 0·001—0·05%, of inhibitor consisting of an aliphatic or substituted aliphatic disulphide, *e.g.*, dibenzyl disulphide, tetramethylthiuram disulphide. D. M. M.

Manufacture of compositions from coal tar and higher fatty acid chlorides. Armour & Co. (B.P. 463,014, 20.4.36. U.S., 1.7.35).—See U.S.P. 2,033,545; B., 1937, 208.

Separation of gasoline from cracked mineral oil. A. E. Pew, jun., and H. Thomas, Assrs. to Sun Oil Co. (U.S.P. 2,036,358, 7.4.36. Appl., 18.4.30).

Treatment of cracked hydrocarbon distillates. H. V. Atwell, Assr. to Gray Processes Corp. (U.S.P. 2,042,448, 2.6.36. Appl., 24.11.34).

Hydrocarbon oil conversion. L. C. Huff, Assr. to Universal Oil Products Co. (U.S.P. 2,037,238 and 2,039,797, [A] 14.4.36, [B] 5.5.36. Appl., [A] 27.4.27, [B] 14.1.33).

Conversion of hydrocarbon oils. R. F. Trow, Assr. to Texas Co. (U.S.P. 2,037,952, 21.4.36. Appl., 19.5.31). C. B. Watson and C. L. Smith, Assrs. to Pure Oil Co. (U.S.P. 2,037,953, 21.4.36. Appl., 8.8.30). J. G. Alther, Assr. to Universal Oil Products Co. (U.S.P. 2,039,379, 5.5.36. Appl., 3.10.32. Renewed 2.4.34).

Distillation of oils. G. B. Coubrough, Assr. to Lummus Co. (U.S.P. 2,035,945, 31.3.36. Appl., 23.3.33).

Distillation of hydrocarbon oils. M. G. Paulus and A. E. Thompson, Assrs. to Standard Oil Co. (U.S.P. 2,039,979, 5.5.36. Appl., 16.10.30).

Distillation of hydrocarbon oils for production of lower-boiling hydrocarbon oils. W. H. Bahlke and W. G. Whitman, Assrs. to Standard Oil Co. (U.S.P. 2,037,674, 14.4.36. Appl., 18.12.30).

Apparatus for distilling petroleum and the like. W. M. Fraser (U.S.P. 2,038,103, 21.4.36. Appl., 10.4.34).

Apparatus for fractionally distilling oils. G. C. Connolly and A. F. Wurzbacher, Assrs. to Davison Chem. Corp. (U.S.P. 2,037,677, 14.4.36. Appl., 15.5.30).

Refining of mineral oil distillates. J. B. Hill, Assr. to Gray Processes Corp. (U.S.P. 2,039,904, 5.5.36. Appl., 21.6.26. Renewed 6.12.33).

Absorption system [for hydrocarbon fractions]. E. G. Ragatz, Assr. to Union Oil Co. of California (U.S.P. 2,038,314, 21.4.36. Appl., 3.7.33).

Treatment of mineral oils. M. R. Fenske and W. B. McCluer, Assrs. to Pennsylvania Petroleum Res. Corp. (U.S.P. 2,037,318—9, 14.4.36. Appl., [a] 13.3.35, [b] 21.11.33).

Treatment of oils [to separate asphalt]. (a—c) U. B. Bray, (d) B. G. Aldridge and B. Hopper, Assrs. to Union Oil Co. of California (U.S.P. 2,041,275—8, 19.5.36. Appl., [a] 23.5.33, [b] 1.8.33, [c] 23.5.33, [d] 13.6.33. Renewed [c] 26.3.35).

Treatment of hydrocarbons. W. F. Faragher and E. J. Houdry, Assrs. to Houdry Process Corp. (U.S.P. 2,035,467, 31.3.36. Appl., 11.7.32). A. D. Smith, Assr. to Jenkins Petroleum Process Co. (U.S.P. 2,035,727, 31.3.36. Appl., 23.11.31). J. D. Seguy, Assr. to Universal Oil Products Co. (U.S.P. 2,039,459, 5.5.36. Appl., 14.12.32). J. H. Boyd, jun., Assr. to Atlantic Refining Co. (U.S.P. 2,042,452, 2.6.36. Appl., 8.9.33).

Filter for liquids. Purifying aircraft [lubricating] liquids. Fractional distillation. Continuous blending of liquids.—See I. **Purifying olefines. Dehydrating alcohols. Polyketo-fatty acids. Phenol extraction. Naphthenic acids. Nitrogen bases.**—See III. **Treating salt solutions from petroleum refining. SO_2 from acid sludge.**—See VII. **Coverings for roads etc.**—See IX. **Steel-pickling inhibitors.**—See X. **Wax polishes**—See XII. **Resins from pitch.**—See XIII. **Liquid rubber compositions.**—See XIV.

III.—ORGANIC INTERMEDIATES.

Synthesis of methane from carbon monoxide and hydrogen. C. Padovani and P. Franchetti (Atti V Congr. Naz. Chim., 1936, **14**, 818—828).—By treatment of $CO + H_2$ mixtures, coal gas $+ H_2$, and coal gas, under pressure, at 270—400° in presence of catalysts (Ni with other metals on kieselguhr or C) high % conversions into CH_4 were obtained at first; these rapidly diminished owing to catalyst deterioration. L. A. O'. N.

Reactions of olefines in presence of metals. G. Egloff and C. I. Parrish (Chem. and Ind., 1937, 321—325).—The lit. regarding the pyrolytic polymerisation, isomerisation, and decomp. of olefines with metal catalysts is summarised, mainly on the basis of the periodic group to which the metal belongs. The main conclusions are as follows. The characteristic action is the formation of C and H_2, although liquids are formed in presence of Na, Fe, Co, Ni, Cu, and ascoloy (Cr–Fe); deposition of C on the metallic catalyst inhibits its power to form liquids. Although the formation of intermediate organo-metallic compounds has been suggested as a reaction mechanism, when stable chemical compounds of olefine or H with the metal have been isolated their formation decreases the activity of the catalyst. The results obtained with reduced Cu catalysts are completely dependent on the method of catalyst prep. The alloys monel, chromel, and alumel are active towards the formation of C and H_2, whilst ascoloy is nearly non-catalytic. J. W. B.

Changes in the process of contact transformation of ethyl alcohol into butadiene in connexion with fatigue of the catalyst. J. A. Gorin, O. M. Neĭmark, and F. N. Kogan (Sintet. Kautschuk, 1935, No. 5, 6—10).—Fatigue resulted from (i) deposition of C resulting from thermal decomp. of the org. mols., (ii) change of crystal structure of the surface during burning-off of the C deposit. Ch. Abs. (*p*)

Choice of optimal pressure of absorption of butadeine. J. L. Shigalin (Sintet. Kautschuk, 1935, No. 5, 22—26).—Economically, the optimum pressure is 5 atm. Ch. Abs. (*r*)

Drying methyl chloride. E. W. McGovern (Power, 1935, **79**, 579—580).—The system is dried by flushing with MeOH, blowing out with dry air or MeCl gas, followed by chemical drying after charging. $CaCl_2$ induces corrosion, especially in the expansion valve. It should not be allowed to absorb $>16{\cdot}2$ wt.-% of H_2O. CaO, soda-lime, and activated Al_2O_3 are satisfactory. $Mg(ClO_4)_2$ or $Ba(ClO_4)_2$ should not be used. Ch. Abs. (*e*)

Toxicity of methyl alcohol. M. Settimj (Atti V Congr. Naz. Chim., 1936, **14**, 865—869).—The industrial applications of MeOH, and its toxicity, are discussed. L. A. O'N.

Determination of *iso*propyl alcohol by immersion refractometer. J. Batscha and S. Reznek (J. Assoc. Off. Agric. Chem., 1937, **20**, 107—115).—Tables are given correlating the vol.-% of $Pr^{\beta}OH$ (I) in mixtures of (I) with H_2O with the Zeiss immersion-refractometer readings at 20—25°, and correlating the α^{20}_{20} and d^{25}_{25} with the vol.-% of (I) in such mixtures. E. C. S.

Manufacture of higher aliphatic alcohols. G. Tocco and E. de Bartholomaies (Atti V Congr. Naz. Chim., 1936, **14**, 876—879).—Their production by hydrogenation of the corresponding acids under pressure is discussed. L. A. O'N.

Developments of hydrogenation at high pressures and the first Italian realisations. M. G. Levi and C. Padovani (Atti V Congr. Naz. Chim., 1936, **14**, 788—797).—Recent progress is reviewed, and Italian plants for the production of higher alcohols from oils, fats, and fatty acids, and for the hydrogenation of $C_{10}H_8$, tar, and mineral oils, are described. L. A. O'N.

Removal of alcohol from ethyl acetate. III. V. Longinov and V. Dzirkal (Trans. Inst. Pure Chem. Reagents U.S.S.R., 1935, No. 14, 42—48).—Scrubbing of the vapour with H_2O enables pure EtOAc to be obtained by distillation of ternary mixtures with H_2O and EtOH. Ch. Abs. (r)

Industrial preparation of higher alkylsulphonates. L. Szegö and G. de Ponte (Atti V Congr. Naz. Chim., 1936, **14**, 870—875).—The prep. of $C_nH_{2n+1}{\cdot}SO_3Na$ (where $n = 12, 16$, and 18) by the action of Na_2SO_3 on the corresponding sulphuric esters has been studied at 120—200°. A temp. of 200° is necessary for complete transformation of the ester; the yield of sulphonate decreases and the loss by hydrolysis of the ester increases with increase in mol. wt. Max. yields of 70%, 61·5%, 55%, respectively, have been obtained. L. A. O'N.

[Manufacture of] acetic acid and acetic anhydride from acetylene. Anon. (Chem.-Ztg., 1937, **61**, 196—198).—Commercial processes are summarised. E. H. S.

Testing of acetic acid. E. C. Craven and J. M. Kershaw (J.S.C.I., 1937, **56**, 72—74T).—Analytical methods used in testing AcOH are discussed in relation to various published specifications.

Evaluation of foaming, wetting, washing, and similar agents. Flow time. J. Hetzer (Fette u. Seifen, 1937, **44**, 54—55).—Instead of counting the no. of drops given by a definite quantity of solution in a Traube stalagmometer, the total time of flow is determined. Results by the two methods are in good agreement. F. C. B. M.

Naphthalene and its present uses. F. Schuster (Chem.-Ztg., 1937, **61**, 133—134).—The industrial applications of $C_{10}H_8$ are briefly reviewed, and the necessity for increasing its production, *e.g.* by increasing the efficiency of its recovery from high-temp. tar, by cracking low-temp. tar etc., is emphasised. A. B. M.

Separation of constant-boiling mixtures of naphthene and paraffin hydrocarbons by distillation with acetic acid. S. T. Schicktanz (J. Res. Nat. Bur. Stand., 1937, **18**, 129—136).—Paraffins and naphthenes in petroleum fractions boiling between 130° and 174° can be partly separated by distillation with AcOH. Further separation can be effected by fractionation of the acid-free products. A. J. E. W.

Manufacture of amino-benzamido-derivatives. P. Predelli (Atti V Congr. Naz. Chim., 1936, **14**, 849—857).—The syntheses by standard methods of the 5-amino-2-benzamido-derivatives of 1 : 4-$C_6H_4(OMe)_2$, -$C_6H_4(OEt)_2$, -$C_6H_4Cl{\cdot}OMe$, and -$C_6H_4Me{\cdot}OMe$, and the difficulties of industrial adaptation, are discussed. L. A. O'N.

Colorimetric determination of phenol. G. P. Lutschinski (Zavod. Lab., 1936, **5**, 233—234).—PhOH is extracted from the aq. solution with $CHCl_3$, the combined extracts are diluted with $CHCl_3$ to a final concn. of $\ngtr 0{\cdot}3\%$ of PhOH, 10 ml. of the solution are mixed with 10 ml. of 1% $TiCl_4$ in $CHCl_3$, and the intensity of the resulting coloration is compared with that given by a standard PhOH solution. R. T.

Assay of dinitrophenol. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 82—83).—The sample, in H_2O, is treated as for hexylresorcinol (cf. following abstract). E. C. S.

Determination of hexylresorcinol. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 81—82).—The sample, in MeOH, is treated with excess of aq. KBr–$KBrO_3$. The excess of reagent is determined iodometrically. E. C. S.

Determination of picric acid in picramic acid. E. Rostovtzeva (Zavod. Lab., 1936, **5**, 234).—20 g. of crude picramic acid (I) are suspended in 20 ml. of 80% AcOH, 100 ml. of H_2O are added, the suspension is filtered, and the residue of (I) washed (100—120 ml. of H_2O). 25 ml. of 0·5% acridine in 10% HCl are added to the filtrate + washings, and the ppt. of acridine picrate is collected, washed, dried at 95°, and weighed. R. T.

Synthetic anthraquinone and its derivatives. A. Beretta (Atti V Congr. Naz. Chim., 1936, **14**, 668—681).—The production of synthetic anthraquinone, anthraquinone-2-sulphonic acid, and 2-aminoanthraquinone, and their employment in the synthesis of indanthrene, are discussed. L. A. O'N.

Rapid determination of completeness of oxidation in production of anthraquinone. G. Chalas and A. Smirnova (Zavod. Lab., 1936, **5**, 677).—Completion of oxidation of $C_{10}H_8$ to anthraquinone (I) by $K_2Cr_2O_7$ in H_2SO_4 is tested as follows. A portion of reaction mixture is filtered, and 0·5 g. of the washed, dried residue is shaken with 2 ml. of PhCl and 3 ml. of a saturated solution of picric acid in PhCl. The intensity of the red coloration given by a drop of the mixture on filter-paper is compared with that given by a series of standards of different $C_{10}H_8$ and (I) contents. R. T.

[Phenols from] low-temp. tar. C_2H_4 from petrol. Synthetic MeOH.—See II. **Analysis of NaOAc. Catalyst for SO_2 oxidation.**—See VII. **[Distillation products of] wood flour.**—See IX. **Electro-reduction of $(NO_2)_3$-compounds to amines. Adsorption by mineral suspensions.**—See XI. **Electrolysis of soap solutions.**—See XII. **[AcOH from] wood conversion.**—See XVII. **Determining βγ-butylene glycol etc. in wine. $COMe_2$–EtOH fermentation. Glycerin from cane juice.**—See XVIII. **Determination of AcOH in butter milk. Determining glycerol in marzipan etc.**—See XIX. **Anæsthetic Et_2O.**—See XX.

See also A., II, 137, **Catalytic synthesis of $NHEt_2$. Colorimetric determination of $CO(NH_2)_2$.** 140, **Prep. and analysis of $SiEt_4$ and $SiBu_4$.** 143, **Synthesis of 1-aminophenanthrene.** 144, **Purifying diazoamino-compounds.** 145, **Prep. of 1- and 4-phenanthrol.** 148, **Prep. of *p*-$C_6H_4Br{\cdot}CO_2H$.** 149, **Prep. of hexahydroterephthalic acid. Synthesis of *N*-β-chloroethylphthalimide.** 150, **Prep. of phenylbenzylsuccinic acids. Syntheses in the phenanthrene series.** 154, **CH_2BzAc from NPh_2Ac and COPhMe.** 158, **Prep. of pure α-bromo-**

d-camphor-π-sulphonic acid. 165 Electro-reduction of maleimide and pyrrolidine.

Patents.

Manufacture of halogenated hydrocarbons [hexachloroethane]. A. A. Levine and H. A. Bond, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,037,419, 14.4.36. Appl., 20.6.33).—Pure C_2Cl_6 is prepared by chlorinating C_2Cl_4 or C_2Cl_4–C_2Cl_6 mixtures at 80—100° in presence of catalysts (I, $AlCl_3$), distilling off volatile reactants and by-products at 60—100°/30—75 mm. with agitation, and, if necessary, subliming. A. H. C.

Apparatus for purification of carbon disulphide. A. M. Harkness and C. Iddings, Assrs. to Gen. Chem. Co. (U.S.P. 2,037,468, 14.4.36. Appl., 16.9.32).—CS_2 is purified by passing through a series of vertical rectifying columns and coolers. A. H. C.

Dehydrogenation of saturated hydrocarbons. Usines de Melle (B.P. 462,349, 9.12.35. Fr., 27.12.34).—Saturated hydrocarbons are dehydrogenated, *e.g.*, paraffins converted into olefines, by means of a catalyst consisting of CrO, either alone or mixed with Cr_2O_3 and with or without a carrier, at 475—525°. The unconverted residue is separated from the products and recycled. D. M. M.

Purification of olefines. F. M. Archibald and P. Janssen, Assrs. to Standard Alcohol Co. (U.S.P. 2,035,449, 31.3.36. Appl., 21.11.33).—Harmful *sec.* and *tert.* olefines are removed from olefine mixtures (naphtha) to be used for prep. of alcohols by passing the vapours over a catalyst (*e.g.*, bauxite, SiO_2 gel) at 225—500°. S compounds are scrubbed out of the resulting gas and unwanted *tert.*-olefines removed by 65—70% H_2SO_4. P. G. C.

Butadienes and chlorinated derivatives thereof. I. E. Muskat, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,038,593, 28.4.36. Appl., 21.10.31).—Boiling BuCl and Cl_2 give a mixture of dichlorobutanes, converted by soda-lime at 700—730° into butadiene, which with Cl_2 in CS_2 gives αβ-dichloro-Δ^{γ}-, b.p. 45—45·5°/40 mm., 115°/760 mm., αδ-dichloro-Δ^{β}-butene (I), b.p. 75—76°/40 mm., 145°/760 mm., and two tetrachlorobutanes, m.p. 72°, b.p. 110—111°/40 mm., and m.p. 72°, respectively. (I) and KOH (2 pts.) at 90° give α-chlorobutadiene, b.p. 67—68°, and acetylenic compounds. The unsaturated compounds polymerise readily. R. S. C.

Preparation of halogenobutadienes. W. H. Carothers, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,028,538, 28.4.36. Appl., 2.11.31).—γδ-Dichloro-Δ^{α}-butene (106 g.) is heated at 95° with alkali (KOH, 210 g.); the distillate, β-chlorobutadiene, b.p. 60°, (62 g.) is redistilled at <1 atm. and/or with addition of an inhibitor. R. S. C.

Production of dispersions of halogenobutadienes. E. I. Du Pont de Nemours & Co. (B.P. 461,279, 15.8.35. U.S., 23.8.34).—β-Halogenobutadienes are added in a stream to a 1—4% (1·5—3%) solution of certain emulsifiers and a stabiliser (polyhydric phenols or their ethers, *e.g.*, eugenol, aminophenylmethylpyrazololone); the diene polymerises when kept at 18° (cooling). Emulsifiers used are quaternary salts of long-chain amines (cetyl- and stearyl-pyridinium bromide etc.) or amides, $RCO{\cdot}NR{\cdot}[CH_2]_x{\cdot}NR_2$ (*N*-oleyl-*N′N′*-diethylethylenediamine). The dispersed particles are positively charged. The products are very stable and are used alone or with thickening agents (gelatin, starch, etc.), other dispersed substances [*e.g.*, oleyl alcohol, $Be(OH)_2$], natural or synthetic rubber. R. S. C.

Effecting [organic] chemical reactions. C. J. Frankforter and D. W. Mapes, Assrs. to Frankforter Oil Process, Inc. (U.S.P. 2,037,712, 21.4.36. Appl., 30.3.31).—The reduction in the liquid or vapour phase of org. compounds, *e.g.*, esters, phenols, aldehydes, ketones, NO_2- and unsaturated compounds, or the oxidation of hydrocarbons, alcohols, aldehydes, amines, etc., is carried out at, *e.g.*, 300—1000°, and at sufficient pressure to produce intimate contact, by means of H_2 or O_2, activated outside the reaction vessel by contact with highly energised electrically charged particles. N. H. H.

Production of ethyl alcohol. R. N. Graham, Assr. to Union Carbide & Carbon Corp. (U.S.P. 2,038,512, 21.4.36. Appl., 1.12.31).—Et sulphates are added continuously to boiling H_2O, and the EtOH is removed, as formed, by distillation. By this method, the Et_2O formed during the hydrolysis is < when the reactants are mixed at room temp., and then heated and distilled. N. H. H.

Dehydration of alcohol. W. J. Hale and L. M. Christensen, Assrs. to Chem. Foundation, Inc. (U.S.P. 2,038,357, 21.4.36. Appl., 27.2.35).—Aq. alcohols, *e.g.*, Cologne spirits, are dehydrated by treatment at 150—300° (250—300°) in presence of a catalyst, *e.g.*, Al_2O_3, ThO_2, clay, with an alkyl ether (Et_2O, $Pr^{\beta}{}_2O$, $Bu^{\beta}{}_2O$) in sufficient amount to combine with the H_2O present with the formation of the corresponding alcohol. The use of the product in motor fuel is indicated. N. H. H.

Hydration of olefines. Usines de Melle (B.P. 462,576, 5.3.36. Fr., 22.3.35).—An olefine is converted into an alcohol (*e.g.*, $Pr^{\beta}OH$, $Bu^{\beta}OH$, $Bu^{\gamma}OH$, $C_5H_{11}{\cdot}OH$) by dissolution, in some cases under $\gg$ atm. pressure, in aq. H_2SO_4 of such concn. (50—75%) that R·OH but not $R{\cdot}O{\cdot}SO_3H$ is formed, and extracting R·OH with a solvent, *e.g.*, PhOH, cresol, or a homologue, ether, or phosphate. An oxide of Cu, Ag, Pb, Bi, or Au is used as catalyst. P. G. C.

Production of hydrated olefines [alcohols]. F. A. Bent and S. N. Wik (U.S.P. 2,036,317, 4.7.36. Appl., 18.7.34).—Olefines are hydrated using as catalysts N bases, preferably the salts of cyclic bases. In examples, $Pr^{\beta}OH$ is obtained (80% yield) by circulating $CHMe{:}CH_2$ mixed with C_4H_{10} over 5% aq. quinoline sulphate at 225°/3000 lb. per sq. in. and $Bu^{\beta}OH$ from mixed butylenes (40%) and C_4H_{10} (60%) over a 10% aq. solution of the basic sludge from petroleum refining at 286°/3000 lb. per sq. in. K. H. S.

Manufacture of olefine oxides. Distillers Co., Ltd., H. Langwell, C. B. Maddocks, and J. F.

Short (B.P. 462,487, 22.11.35).—Olefines are oxidised directly to olefine oxides by O_2 in presence of a finely-divided Ag and/or Au catalyst previously subjected to a heat-treatment (400—450°). The prep. of a catalyst from Ag leaf is described. P. G. C.

Preparation of glycols from oxides of olefine. Soc. Carbochimique, P. Ferrero, C. Vandendries, and F. Berbé (B.P. 462,581, 19.5.36).—A mixture of $(CH_2)_2O$ and H_2O is added to a 20% aq. solution of $(CH_2{\cdot}OH)_2$ (I) containing 0·1% of $H_2C_2O_4$ (II) at 75°. The concns. of (I) and (II) are kept at the above vals. throughout the reaction. The solution formed is continuously run off, treated while hot with $Ca(OH)_2$, CaC_2O_4 removed, and the (I) separated by distillation. Some $(OH{\cdot}CH_2{\cdot}CH_2)_2O$ is formed. P. G. C.

Purification and granulation of pentaerythritol tetranitrate. W. A. P. Challenor, and Imperial Chem. Industries, Ltd. (B.P. 461,641, 20.8.35).—Pentaerythritol tetranitrate is obtained in granular form of high bulk *d*, viz., 0·65—0·9 g./c.c., suitable for use in detonator or fuse manufacture, by diluting with H_2O (with agitation) a conc. solution of crude or purified starting material in $COMe_2$ (I) or media rich in (I) at or near the b.p. of the solution, the concn. of (I) during the addition being $\nless$25% and at the end 33—50%. N. H. H.

Separation of formic and acetic acids. T. O. Wentworth and S. N. Baechle, Assrs. to Vulcan Copper & Supply Co. (U.S.P. 2,038,865, 28.4.36. Appl., 2.4.35).—Mixtures of HCO_2H and AcOH, with or without H_2O, are separated by distillation with thiophen either batchwise or in a continuous fractionating column. HCO_2H and H_2O form an azeotrope and AcOH is left as residue. K. H. S.

Refining fatty acids. H. G. Vesterdal, Assr. to Standard Oil Development Co. (U.S.P. 2,038,617, 28.4.36. Appl., 1.12.33).—Paraffin wax oxidised at 130—140° to acid val. 50 is treated in naphtha solution with 0·1—0·025 vol. of conc. H_3PO_4 (cf. U.S.P. 1,820,907; B., 1932, 635). Alternatively the crude oxidation products are removed from the wax with 90—95% aq. MeOH and the extract is treated with the H_3PO_4, which withdraws more highly oxidised substances from the fatty acids. K. H. S.

Preparation of organic acids from ketones. A. T. Larson, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,037,654, 14.4.36. Appl., 25.5.33).—Lower aliphatic ketones yield acids by interaction at 200—500°/25—900 atm. with CO and H_2O over a catalyst (metallic halide, activated C): $2CORR' + H_2O + CO \rightarrow CR_2R'{\cdot}CO_2H + R'{\cdot}CO_2H$. The prep. of $Bu^{\gamma}CO_2H$ and AcOH from a gaseous mixture of CO, H_2O, and $COMe_2$ (1·5—10%) over activated C and HCl catalyst is claimed. A. H. C.

Manufacture of organic acid anhydride. H. E. Potts. From Shawinigan Chemicals, Ltd. (B.P. 461,808, 18.5.35 and 24.4.36).—In the oxidation of MeCHO to Ac_2O (cf. B.P. 446,259; B., 1936, 920) the decrease in yield which occurs at the later stages is diminished by using an ester as diluent, *e.g.*, MeOAc, $CHMe(OAc)_2$, o-$C_6H_4(CO_2Bu)_2$. Operation may be batchwise or continuous. Among examples (8), MeCHO (80) mixed with EtOAc (20 pts.) was 98·8% oxidised (Mn–Cu acetate catalyst), yielding 18·4%, of Ac_2O (9·6% without solvent). In continuous working EtOAc and MeCHO (1 : 1) (0·1%Cu : 0·05% Co acetate catalyst) gave 52% of Ac_2O (24% without solvent). K. H. S.

Manufacture of wetting, washing, dispersing, and like agents. E. A. Mauersberger (B.P. 462,202, 15.1.36).—Wetting, washing, and dispersing agents are prepared by halogenation of aliphatic alcohols C_{10-20}, or their boric or phosphoric esters, followed by sulphonation (anhyd.) at >50°. *E.g.* $C_{16}H_{33}{\cdot}OH$ is converted into a mixture of $C_{16}H_{32}Cl{\cdot}OH$ and $C_{16}H_{31}Cl_2{\cdot}OH$, and the product stirred at 60° with H_2SO_4; the Cl are replaced by SO_3H and the OH is simultaneously converted into $O{\cdot}SO_3H$. P. G. C.

Production of esters. J. A. Nieuwland and F. J. Sowa, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,036,353, 7.4.36. Appl., 11.10.34).—BF_3 is passed into an aromatic or aliphatic amide until 1 mol. has been absorbed and the double compound is then treated with 1 mol. of an alcohol or phenol. After a short period of heating the ester is isolated by fractionation. In examples, NH_2Ac,BF_3 is treated with MeOH (yield of ester 71%) and PhOH (yield 50%). BF_3 can be recovered from the residue. K. H. S.

Manufacture of methacrylic esters of polyhydric alcohols. E. I. Du Pont de Nemours & Co., and J. C. Woodhouse (B.P. 461,979, 26.8.35).—Lower alkyl esters of methacrylic acid are heated with an ester-interchange catalyst and an aliphatic polyhydric alcohol, *e.g.*, glycerol, glycols, pentaerythritol, and sorbitol and their alkali alkoxides. The ingredients are heated with or without a solvent and with a polymerisation inhibitor until the lower alcohol distils off. In examples, Na (7·4) is dissolved in diethylene glycol (106), mixed with Me methacrylate (I) (600) and quinol (36 pts.), and heated (oil-bath, 150°) under a column so that the MeOH–Me methacrylate binary distils away; diethylene glycol dimethacrylate is obtained on fractionating the residue (14·4% yield). Similarly, decamethylene glycol (200), (I) (700), C_6H_6 (550), quinol (48), and H_2SO_4 (5 pts.) afford decamethylene glycol dimethacrylate (86% yield). K. H. S.

Xanthates. L. Rosenstein, Assr. to Amer. Cyanamid Co. (U.S.P. 2,037,437, 14.4.36. Appl., 11.11.29).—Cryst. alkali xanthates result on treating *sec.* alcohols in the cold, or *tert.* alcohols on warming, with CS_2 and an alkali hydroxide (anhyd. or 50% aq. solution). *Na* and *K isopropylxanthates*, $OPr^{\beta}{\cdot}CS{\cdot}SM$ (M = Na or K), and a *hydrate*, $OPr^{\beta}{\cdot}CS{\cdot}SNa,5H_2O$, are specifically claimed. A. H. C.

Oxidation of hydrocarbons. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,972, 26.8.35).—Aliphatic and *cyclo*aliphatic hydrocarbons or their mixtures are treated with mineral acids, the subsequent oxidation then proceeding smoothly without formation of resinous or coal-like deposits. Among examples, a brown coal hydrogenation product (50 pts.), b.p. 200—300°/vac., is treated with conc. H_2SO_4 (40) at 10°, ice (50) is added, and the mixture heated to 30° and treated with aq. NH_4NO_3 (30)

in H_2O (30), the temp. being raised to 60°. The product (55 pts.) has wetting and emulsifying properties. K. H. S.

Manufacture of paraformaldehyde. E. I. Du Pont de Nemours & Co., and W. S. Hinegardner (B.P. 462,319, 6.9.35).—A composition containing up to 90% of polymerised CH_2O, and having a high solubility in H_2O, is produced by treating an aq. solution of CH_2O of $\nless$10 ($\nless$20) wt.-% at, *e.g.*, 50—100° with a silicate (of an alkali metal), and preferably an acid, *e.g.*, HCl, H_2SO_4, and drying the resulting gel of SiO_2 and CH_2O polymeride (at $\ngtr$70°). N. H. H.

Manufacture of oxygenated organic compounds. Brit. Celanese, Ltd. (B.P. 462,906, 17.9.35. U.S., 18.9.34).—Aliphatic hydrocarbons are oxidised with 7—14 vols. of air in presence of 90—200 vols. of a diluent (steam, N_2) by maintaining at 290—455°/200—1000 lb. per sq. in. for 0·2—3 sec. and then rapidly cooling. The oxidation of C_4H_{10} to a mixture of CH_2O, MeCHO, MeOH, $COMe_2$, etc. (apparatus described) is claimed. A. H. C.

Preparation of oxygenated aliphatic compounds. Carbide & Carbon Chemicals Corp., Assees. of J. N. Wickert and B. T. Freure (B.P. 461,662, 18.12.35. U.S., 20.12.34).—An aliphatic aldehyde ($\nless C_4$) is condensed in aq. or alcoholic alkali with an aliphatic ketone to give a ketol ($\nless C_{10}$), which is dehydrated (preferably by fractionally distilling the acidified crude reaction mixture) to an unsaturated ketone, which by hydrogenation at 10—200° (150°)/1—100 atm. yields the saturated ketone or *sec.* alcohol. Double condensation may occur in the first reaction, leading to a dienone. The Na sulphates of the alcohols are claimed as wetters. Prep. of the following is described: β-*methyl*-Δ^{ϵ}-*nonen-δ-one*, b.p. 205°/760 mm., 75°/6 mm.; β-*methylnonan-δ-one*, b.p. 194°/760 mm., 76°/9 mm., and -δ-*ol*, b.p. 205°/760 mm., 92—93°/13 mm.; Δ^{δ}-*undecen-ζ-ol*, b.p. 224—225°/760 mm., 1[illegible]—113°/18 mm.; *undecan-ζ-one*, b.p. 225°, m.p. 14°, and -ζ-*ol*, b.p. 228—229°, m.p. 24·2°; ζ-*ethyl*-Δ^{δ}-*decen-γ-one*, b.p. 235°/760 mm., 130—140°/20 mm.; ζ-*ethyldecan-γ-ol*, b.p. 225°/760 mm., 115—118°/10 mm.; ι-*ethyl*-$\Delta^{\delta\eta}$-*tridecadien-ζ-one*, b.p. 222°/760 mm., 158—160°/13 mm.; ι-*ethyl*-Δ^{η}-*tridecen-ζ-one*, b.p. 255°/760 mm., 150—155°/14 mm.; εη-*diethyl*-Δ^{ϵ}-*undecen-δ-one*, b.p. 240°/760 mm., 118—120°/6 mm.; ι-*ethyltridecan-ζ-ol*, b.p. 276—277°/760 mm., 143—144°/7 mm.; εη-*diethylundecan-δ-ol*, b.p. 264—265°/760 mm., 113—114°/10 mm.; ε-*methyl*-ι-*ethyl*-$\Delta^{\delta\eta}$-*tridecadien-ζ-one*, b.p. 290°/760 mm., 148—153°/8 mm., and -Δ^{η}-*tridecen-ζ-one*, b.p. 285°/760 mm., 148—150°/11 mm.; ε-*methyl*-ι-*ethyltridecan-ζ-one*, b.p. 284—285°/760 mm., 143—144°/9 mm., and -ζ-*ol*, b.p. 287—288°/760 mm., 155—157°/10 mm. R. S. C.

Polyketo-fatty acid bodies. M. De Groote, B. Keiser, and A. F. Wirtel, Assrs. to Tretolite Co. (U.S.P. 2,039,063—4, 28.4.36. Appl., [A] 31.12.34, [B] 14.11.35).—O_2 is blown at 1—6 atm. into an oil of castor type, in presence of 2·5—10% of a true drying oil and about 2·5% of a Petrov reagent (sulphonic acid) at 120—135° for 10—30 hr. The product, neutralised with $N(C_2H_4{\cdot}OH)_3$ or esterified, and consisting of polymerised keto-acids partly esterified with OH-acids, is used for resolving H_2O-in-petroleum emulsions and as a plasticiser, *e.g.*, for artificial leather. R. S. C.

Production of aliphatic or *cyclo*aliphatic primary amines. W. Schrauth, Assr. to "Unichem" Chemikalien-Handels A.-G. (U.S.P. 2,033,866, 10.3.36. Appl., 12.8.32. Ger., 13.8.31).—Naphthenic or aliphatic alcohols ($>C_7$) are converted into primary amines by passing with NH_3 over a catalyst (*e.g.*, Al_2O_3–MgO) at 300—450°/50—150 atm. The conversion of $C_{16}H_{33}{\cdot}OH$, $C_{18}H_{37}{\cdot}OH$, $C_{12}H_{25}{\cdot}OH$, and naphthenic alcohols (sap. val. 206) into amines is described. P. G. C.

Manufacture of amine oxides. Soc. Chem. Ind. in Basle (B.P. 462,881, 3.7.36. Switz., 6.7.35. Addn. to B.P. 437,566; B., 1936, 91).—*tert.*-Amine oxides containing residues $\ngtr C_6$ and at least one OH are condensed with aliphatic or hydroaromatic compounds ($\nless C_6$) reacting with the OH to yield products possessing strong capillary-active properties. *E.g.*, diethylaminoethanol oxide is acylated in C_5H_5N with lauryl chloride to yield the oxide of diethylaminoethyl laurate. A. H. C.

Manufacture of alkylene imines. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 460,888, 15.7.35. Cf. A., 1936, 194).—The interaction of αβ- or αγ-aminoalkylsulphuric acids with dispersions or solutions of bases (aq. alkali or alkaline-earth metal hydroxides) is claimed. *E.g.*, $(CH_2)_2NH$ is produced by distilling a solution of $NH_2{\cdot}[CH_2]_2{\cdot}O{\cdot}SO_3Na$ in excess of aq. NaOH, KOH, or $Ca(OH)_2$ (suspension). Other examples describe the prep. of $(CH_2)_3NH$, $(CH_2)_2NBu$, $(CHMe{\cdot}CH)_2NH$, and *N*-*cyclo*hexyl-, *N*-phenyl-, and *N*-dodecyl-ethyleneimine. H. A. P.

Manufacture of polymerisation products. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,354, 15.7.35).—$(CH_2)_2NH$ and its *N*-derivatives are polymerised at $\ngtr$200° (50—120°) by acids or acidic substances, surface-active materials, or peroxides, alone or in a diluent. The products find use as levelling agents in dyeing, with wetting agents, etc. R. S. C.

Synthesis of urea. H. C. Hetherington, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,038,564, 28.4.36. Appl., 5.8.31).—The corrosive action on valves is diminished by withdrawing the urea melt (from NH_3 and CO_2) from the synthesis vessel by apparatus (figured) in which it is caused to pass successively through (1) a heat exchanger with melt already cooled, (2) a pressure-reducing conduit, (3) a valve controlling admission to the cool, low-pressure reservoir whence excess of NH_3 is distilled. K. H. S.

Manufacture of *iso*cyanates [carbimides]. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 462,182, 3.9.35).—Carbimides are obtained in good yield by the action of $COCl_2$ on the hydrohalide of primary aliphatic, aralkyl-, or *cyclo*aliphatic amines, suspended, if desired, in a diluent (PhCl), under such conditions that the H halide formed is continuously removed, *e.g.*, by excess of $COCl_2$, or an inert gas (N_2, CO_2). Examples are: $COCl_2$ and the hydrochloride or hydrobromide of the appropriate amine at about 140° yield *octadecyl-*, b.p. 190—200°/10 mm., *benzyl-*, b.p. 80—84°, cyclo*hexyl-*, b.p. 54°/11 mm., β-*phenylethyl-*, b.p. 98—100°/10 mm., *dodecyl-*, b.p., 140—145°/11 mm., ac-*tetrahydro*-β-*naphthyl-*, b.p. 134—6°/10 mm., n-*butyl-*, b.p. 114—116°, and β-*chloroethyl-*, b.p. 38—39°/11 mm., *-carbimide.* Similarly, naphthenamines and amines from palm-kernel fats, train fats, or oxidised paraffins yield mixtures of carbimides. *Mono-*, m.p. 101° after sintering at 98°, and s-*di-octadecylcarbamide*, m.p. 105—106°, are also described. N. H. H.

Manufacture of cyanic or thiocyanic anhydrides and condensation products thereof. Soc. Anon. des Mat. Col. et Prod. Chim. de St.-Denis, and J. Claudin (B.P. 460,889, 30.7.35. Fr., 1.8.34).—Interaction of a xanthate or a dithiocarbamate with CNCl gives a compound containing the group ·CS·SCN; this reacts further with compounds containing active H (R′H; phenols, thiols, amines, dithiocarbamates, and xanthates are claimed) to give substances containing the group ·CS·R′ with elimination of HSCN. These reactions are applied particularly to the production of *as*-tetrasubstituted thiuram monosulphides; *e.g.*, passage of CNCl into aq. $NMe_2\cdot CS\cdot SNa$ at 0° gives the *thiocyanate*, $NMe_2\cdot CS\cdot SCN$, which with $NEt_2\cdot CS\cdot SNa$ at room temp. gives NaSCN and NN-*dimethyl*-N′N′-*diethylthiuram monosulphide*, m.p. 54·5—55°, with arylamines gives N-*phenyl-*, m.p. 127°, N-p-*tolyl-*, m.p. 167°, and N-p-*anisyl*-N′N′-*dimethylthiocarbamide*, m.p. 123°, and N-*phenyl*-NN′N′-*trimethylthiocarbamide*, m.p. 79°, and with phenols gives *phenyl*, o-*nitrophenyl*, o-, m.p. 55°, and p-*tolyl*, m.p. 93°, and 3-*nitro*-p-*tolyl dimethylthiocarbamate*, m.p. 136°. Interaction of NPhMe·CS·SCN with thiolbenzthiazole gives 1-*benzthiazyl dimethyldithiocarbamate*, m.p. 112°. Many of the products are vulcanisation accelerators or anticryptogamic agents. H. A. P.

Manufacture of unsaturated aliphatic carboxylic acid nitriles. I. G. Farbenind. A.-G. (B.P. 462,181, 3.9.35. Ger., 4.9.34).—Low-mol. ($\ngtr C_6$) unsaturated aliphatic carboxylic acid nitriles are obtained by treating the corresponding saturated halogenonitriles, or the halogeno-acids and NH_3, with basic substances of basicity $\ngtr$ that of $Ba(OH)_2$, *e.g.*, NH_3, CaO, MgO, and/or catalysts for removing H halide, *e.g.*, TiO_2, $BaCl_2$, at >50° (250—500°), and if desired, at <1 atm. Examples are: methacrylonitrile, b.p. 90—92°, is obtained when (mono)-chlorinated $Pr^{\beta}CN$ is passed either alone over TiO_2 at 400—450°, or with NH_3 over SiO_2 at 200—250°, or heated with NH_3 at 80—100° in a closed vessel; chlorinated $Pr^{\beta}CO_2H$ and NH_3 at 380° with SiO_2 yield the same product. N. H. H.

Production of solutions of polymeric acrylic acid nitrile. I. G. Farbenind. A.-G. (B.P. 461,675, 19.8.35. Ger., 21.8.34).—Polymerised CHMe:CH·CN is dissolved by addition to a molten mixture of a base (C_5H_5N) and a halide (CH_2PhCl, $CH_2Cl\cdot CO_2Et$), which are heated to form the quaternary salt; dissolution occurs during salt-formation. A polypeptide and/or cellulose may be incorporated in the solution. R. S. C.

Recovery of alkyl lead compounds from their reaction masses. L. S. Bake and A. E. Parmelee, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,038,703—4, 28.4.36. Appl., [a] 30.3.33, [b] 30.3.34).—(a) The crude reaction mass is treated with H_2O, a dispersing agent (cf. U.S.P. 1,645,375; B., 1928, 124), and an acid (AcOH) to reduce the alkalinity to p_H 7—11 and the Pb tetra-alkyl recovered by steam distillation. (b) The reaction mass is mixed with H_2O, steam-distilled, treated with H_2SO_4, $(NH_4)_2SO_4$, AcOH, etc. to reduce the alkalinity to p_H 7—11, and again steam-distilled. K. H. S.

Manufacture of naphthalene derivatives. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 462,468, 12.9.35).—1-Methyl-4-naphthylamine-7-sulphonic acid is diazotised and boiled with EtOH to yield 1-*methylnaphthalene*-7-*sulphonic acid* (*chloride*, m.p. 107°; *amide*, m.p. 131°; *anilide*, m.p. 149°), which with NaOH at 280—310° gives 1-methyl-7-naphthol, m.p. 69—70° (*Bz*, m.p. 88°, and 8-p-*nitrobenzeneazo*-derivative, m.p. 262°). R. S. C.

Manufacture of 2 : 6-dimethylnaphthalene-1-sulphonic acid. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 461,894, 22.8.35).—The above *acid* (*chloride*, m.p. 116—117°; *amide*, m.p. 124—125°) is obtained by sulphonating molten 2 : 6-$C_{10}H_6Me_2$ for $\ngtr 2$ hr. In examples, the sulphonating agents are conc. H_2SO_4, $ClSO_3H$, and 20% oleum. The acid is transformed by fusion with caustic alkali into 2 : 6 : 1-$C_{10}H_5Me_2\cdot OH$, m.p. 113°. K. H. S.

Manufacture of 2 : 6-dimethylnaphthalene-7-sulphonic acid. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 462,337, 12.9.35).—2 : 6-$C_{10}H_6Me_2$ is converted into the 7-sulphonic acid (*chloride*, m.p. 62—63°; *amide*, m.p. 265—266°) by heating with conc. H_2SO_4 at 110—120° for 14 hr.; or 2 : 6 : 1-$C_{10}H_5Me_2\cdot SO_3Na$ is heated with 90% H_2SO_4 at 115—120° for 14 hr. P. G. C.

Manufacture of 2 : 6-dimethylnaphthalene-8-sulphonic acid. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 462,664, 7.9.35).—Sulphonation of 2 : 6-$C_{10}H_6Me_2$ in a neutral solvent (*e.g.*, $C_6H_4Cl_2$, $PhNO_2$, $C_2H_2Cl_4$) at $\ngtr 50°$ (25—30°) gives 2 : 6-dimethylnaphthalene-8-sulphonic acid (*Na* salt; *chloride*, m.p. 107—108°; *amide*, m.p. 206—207°). R. S. C.

Manufacture of styrene. G. D. Graves, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,036,410, 7.4.36. Appl., 20.8.29).—PhEt is dehydrogenated to styrene (15—20% conversion; 90% yield) over metal oxide catalysts (Ce_2O_3, ZnO) promoted by W, U, or Mo oxides in a glass-lined tube at 450—700°. Other vinylaryl hydrocarbons are produced similarly. A. H. C.

Manufacture of diarylamines. F. H. Kranz, Assr. to Nat. Aniline & Chem. Co. (U.S.P. 2,038,574, 28.4.36. Appl., 11.2.33).—$C_{10}H_7\cdot NH_2$, an arylamine, and a trace of I are boiled in a solvent (PhMe, C_6H_4ClMe) at 185—210° under conditions allowing escape of NH_3. Thus are obtained good yields of α-$C_{10}H_7$·NHPh, N-p-, m.p. 59—60°, and N-o-*phenetyl-α-*, m.p. 58—59°, b.p. 230—232°/10—12 mm., and N-p-*tolyl-β-naphthylamine,* m.p. 98·5—100°, b.p. 232—235°/8—10 mm. R. S. C.

Manufacture of amino-methylnaphthalenesulphonic acids. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 462,465, 9.9.35).—1 : 4-$C_{10}H_7Me·NH_2$ (157) with H_2SO_4,H_2O (200—300) at 120—150° or H_2SO_4 (200)–$ClSO_3H$ (116 pts.) at 100° gives 65% of 4-*amino-*1-*methylnaphthalene-*2- and 35% of the -7-*sulphonic acid,* the orientation of which is proved by conversion into the methylnaphthols. R. S. C.

Manufacture of derivatives of *o*-nitroanilines and *o*-phenylenediamines. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 461,245, 7.8.35 and 21.7.36).—Interaction of pentoses or hexoses with o-$NH_2·C_6H_4·NO_2$ and its homologues, preferably in presence of halides of N bases (NH_4Cl), gives condensation products of glucosidic structure, the NHAr taking the place of OAlkyl in a normal glucoside. These are reduced (*e.g.*, catalytically) successively to the o-NH_2-compounds and the corresponding glucamine derivatives. *E.g.*, 4 : 1 : 2 : 5-$NH_2·C_6H_2Me_2·NO_2$ and *d*-ribose in abs. EtOH at 130° give 5-*nitro-*4-d-*ribosidamino-*o-*xylene,* m.p. 164° (separated chromatographically by Al_2O_3 and isolated as its Ac_3 derivative, m.p. 163°), reduced by H_2–PtO_2 at 20°/2 atm. to a mixture of the corresponding NH_2-compound and 5-*amino-*4-d-*ribitylamino-*o-*xylene.* Other examples describe the prep. of o-*nitro-α-glucosido-*d-*xylosido-* and -l-*arabinosido-aniline* (Ac_3 derivatives, m.p. 184°, $[\alpha]_D^{20}$ −75°, m.p. 149°, and m.p. 151°, $[\alpha]_D^{22}$ +134°, respectively), and 5-*nitro-*4-d- and -4-l-*arabinosidamino-*o-*xylene* (Ac_3 derivatives, m.p. 212°, $[\alpha]_D^{20}$ +133° and −137°). (All $[\alpha]_D$ are in MeOAc.) The polyhydroxyalkyl-*o*-phenylenediamines condense with alloxan to give *iso*alloxazines having vitamin-like properties. H. A. P.

Phenol extraction. B. W. WINSHIP, Assr. to BETHLEHEM STEEL CO. (U.S.P. 2,037,295, 14.4.36. Appl., 4.1.34).—Phenols are extracted from gas liquors with alkali and isolated by passing in CO_2 and extracting the issuing gases, carbonate, and phenol layers, either separately or in one stage, with a H_2O-insol. solvent having high affinity for PhOH, *e.g.*, $(C_6H_4Me)_3PO_4$. The phenols are removed from the solvent by vac. distillation. Plant is described. A. H. C.

Manufacture of sulphonic acids of 5-[3-]hydroxyacenaphthene. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 462,681, 12.9.35).—3-Aminoacenaphthenesulphonic acids in H_2O with or without a little acid or alkali (p_H 1—7) at about 180° give excellent yields of the corresponding 3-OH-acids. 3-*Hydroxyacenaphthene-*4-, -5-, and -6-*sulphonic acids* (NH_4 and *Na* salts) are thus obtained. R. S. C.

Preparation of purified *p*-aminophenols. I. OSTROMISLENSKY and A. V. TOLSTOOUHOV, Assrs. to OSTRO RES. LABS., INC. (U.S.P. 2,035,502, 31.3.36. Appl., 19.10.33).—Aminophenols (I) are purified by dissolving in a non-oxidising acid (HCl, H_2SO_4) at p_H 1·5—2·5, extracting impurities (*e.g.*, with Et_2O), and adding sufficient alkali bisulphite or sulphite to bring p_H to 8. The (I) is pptd. and can be dried. Aminocarvacrol, aminothymol, and 5-amino-*p*-xylenol are exemplified. P. G. C.

Preparation of purified aminophenol salts [aminothymol hydrochloride.] S. SEMENOFF, Assr. to OSTRO RES. LABS., INC. (U.S.P. 2,035,510, 31.3.36. Appl., 9.4.32).—Coloured impurities are removed from aminothymol hydrochloride (I) by dissolving in HCl of p_H 1·5—2·5, extracting with a solvent ($CHCl_3$) or filtering, and pptg. pure (I) by concn., or addition of HCl to bring the acid concn. to 6—15%. P. G. C.

Manufacture of 3 : 4 : 5 : 6-halogeno-2-amino-1-hydroxybenzenes. I. G. FARBENIND. A.-G. (B.P. 460,911, 7.8.35. Ger., 24.11.34. Addn. to B.P. 443,580; B., 1936, 685).—Chloro- or bromo-*o*-aminophenols (1 halogen in 6) other than 1 : 3 : 4 : 6 : 2-$OH·C_6HCl_3·NH_2$ are converted into oxazolones ($COCl_2$) which are then halogenated and hydrolysed. *E.g.*, 6-*chlorodihydrobenzoxazolone,* m.p. 228° (1 : 6 : 2-$OH·C_6H_3Cl·NH_2$ and $COCl_2$), is chlorinated in AcOH, and the resulting Cl_4-compound is hydrolysed (NaOH). Bromination of 4 : 6-*dichlorodihydrobenzoxazolone,* m.p. 206—207°, gives the *dichlorodibromo-*compound, m.p. 274°, which is hydrolysed by NaOH to 4 : 6-*dichloro-*3 : 5-*dibromo-2-aminophenol.* The prep. of 3 : 4 : 5 : 6-*tetrabromo-dihydrobenzoxazolone,* m.p. 294° (from the 4 : 6-Br_2- or 3 : 4 : 6-Br_3-compound), and -2-*aminophenol,* m.p. 280—290° (decomp.), is described. H. A. P.

Manufacture of *o*-nitroanisole. H. J. WIELAND and O. STALLMANN, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,038,620, 28.4.36. Appl., 23.8.34).—1 : 2-$C_6H_4Cl·NO_2$ and 1·3 mols. of alkali hydroxide are heated with MeOH, the temp. being gradually raised from 40° at the beginning to 62° at the end of the reaction. The 1 : 2-$NO_2·C_6H_4·OMe$ is of better quality than that obtained if the MeOH boils throughout the reaction. K. H. S.

Manufacture of chrysenecarboxylic acids. I. G. FARBENIND. A.-G. (B.P. 461,676, 19.8.35. Ger., 18.8.34).—Halogenochrysenes and CuCN at >250° give nitriles, whence the acids are obtained by hydrolysis. The following are prepared: 2-*chloro-* (by S_2Cl_2 in $PhNO_2$), m.p. 162°, -*cyano-* (I), m.p. 193°, -*bromo-* (by Br in $PhNO_2$), m.p. 152°, 2 : 8-*dichloro-*, m.p. 267—268°, -*dicyano-*, m.p. 406°, -*dibromo-*, m.p. 272°, 2-*nitro-*8-*cyano-*, m.p. 366—367°, and 8-*cyano-*2-*acetoxy-chrysene,* m.p. 243°; *chrysene-*2-*carboxylic,* m.p. 314°, and -2 : 8-*dicarboxylic acid,* m.p. >400°; 2-*hydroxychrysene-*8-*carboxylic* acid, decomp. about 290°. (I) is also obtained (Sandmeyer) from 2-aminochrysene, new m.p. 206°. R. S. C.

Purification of naphthenic acids. F. J. EWING, Assr. to UNION OIL CO. OF CALIFORNIA (U.S.P. 2,035,696 and 2,035,741—2, 31.3.36. Appl., [A] 12.8.33, [B] 2.10.33, [C] 12.3.34).—(A) Naphthenic acids (I) of improved odour and high colour-stability are obtained by removing phenolic and carbonaceous impurities by alkali treatment and distillation and further distilling with 1—6% of a metal (Cu) oxide or naphthenate. An acid of improved characteristics, high acid val., and b.p. 270—290° is specifically claimed. (B) The further distillation as in (A) is conducted in a stream (10—50 vols.) of a gaseous oxidising agent (air, air–N_2O_4 mixtures), preferably in presence of 0·001—0·1% of the metal oxide as catalyst. (C) (I) are deodorised and decolorised by treatment with 0·005—0·1 vol. of an inorg. O-containing acid (50% H_2SO_4—15% oleum) and then treating the org. phase with an adsorbent (fuller's earth) at 105—160°, in presence or absence of H_2O, but preferably in presence of inorg. acid salts or with an acid-activated adsorbent. A. H. C.

Catalytic oxidation of naphthalene. C. Pleydell-Bouverie and O. D. Lucas (B.P. 461,949, 25.7.35).—In the catalytic oxidation at $C_{10}H_8$ to o-$C_6H_4(CO)_2O$ with air the latter is supplied in approx. theoretical vol. and diluted with 2—3 vols. of inert gas. CO_2 is used at the start but afterwards residual gas from the process is utilised. The apparatus figured is smaller than that generally used for the same throughput. K. H. S.

Manufacture of aromatic sulphocarboxylic acid amides and imides. Soc. Chem. Ind. in Basle (B.P. 461,054, 15.4.36. Switz., 27.4.35).—The condensation of a primary or *sec.* amine having $>C_2$ with a sulphophthalic anhydride, halide, or ester is claimed. The products are claimed to be capillary-active and to be of val. as textile assistants and detergents. Examples are condensation *products* from 4 : 1 : 2-$SO_3H{\cdot}C_6H_3(CO)_2O$ and n-$NHMe{\cdot}C_{16}H_{33}$, amylamine, p-aminolauranilide, and p-aminostearanilide. H. A. P.

Manufacture of 6-amino-2-naphthol-3-carboxylic acid. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 462,699, 14.9.35).—2 : 6 : 3-$OH{\cdot}C_{10}H_5Br{\cdot}CO_2H$ or its Na salt with 25% aq. NH_3 and a little Cu-bronze or Cu salt at 50—180° give >90% of 2 : 6 : 3-$OH{\cdot}C_{10}H_5(NH_2){\cdot}CO_2H$, m.p. 295° (decomp.), also obtained less well without Cu. Pure 2 : 6 : 3-$C_{10}H_5(OH)_2{\cdot}CO_2H$ melts at 260° (decomp.). R. S. C.

Manufacture of 3-alkoxy-4-[hydr]oxybenzaldehydes. C. N. Geneff (B.P. 462,901, 13.9.35).—4-Hydroxy-3-alkoxyphenyltrichloromethylcarbinols are treated in aq. alkali with an inorg. oxidising agent, preferably in presence of Cu or a Cu compound as catalyst. The prep. of 4-hydroxy-3-methoxybenzaldehyde, using $Na_2Cr_2O_7$ in aq. NaOH (14 hr. at 40° or 2 hr. at 150°), is described. A. H. C.

Manufacture of alginic acid. (A) D. E. Clark and H. C. Green, (B) H. C. Green, Assrs. to Kelco Co. (U.S.P. 2,036,922 and 2,036,934, 7.4.36. Appl., [A] 31.1.35, [B] 21.4.34).—(A) Fresh kelp is leached with cold aq. HCl, and then treated with hot 2—4% aq. solution Na_2CO_3 (20—40 min.), and the liquid is diluted to 2—4 vols. with H_2O (p_H 9—11) and pptd. with aq. $CaCl_2$ (p_H 10—11). The cellulose content of the product is controlled by blending filtered with unfiltered solutions before pptn. Alginic acid of increased η and improved colloidal properties is liberated from the washed (and bleached) salts by adding aq. HCl (p_H 2·25) and washing with acid and H_2O. (B) The extraction is effected by milling with cold aq. Na_2CO_3, and aq. HCl of graded p_H (1·3—1·9) is used for the final liberation and washing. A. H. C.

Manufacture of hydroxy[coumaran]carboxylic acids and of amides derived therefrom. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 461,189, 8.8.35 and 12.5.36).—5- or 6-Hydroxycoumaran or the 2- or 3-alkyl derivatives thereof, when heated at 120° with an excess of K_2CO_3 and then with CO_2 at 110—130°, give o-hydroxycarboxylic acids. Thus are obtained 5-*hydroxycoumaran*-4- or -6-, m.p. 203—205° (3'-*chloro*-2' : 6'-*dihydroxyphenyl*-, m.p. 218—219°, and β-*naphthyl-amide*, m.p. 251—253°), 5-*hydroxy*-3- and -2-*methylcoumaran*-6- (or -4-)-*carboxylic acid*, m.p. 178° (β-*naphthylamide*, m.p. 190—191°). Amides are obtained by adding PCl_3 to a mixture of the acid and amine in $NPhMe_2$. R. S. C.

Manufacture of bases derived from α-aminopyridine. G. T. Morgan and J. Stewart (B.P. 461,185, 6.8.35).—A NO_2-compound having at least one C_5H_5N nucleus carrying a 2-NHR group, R being a non-reduced cyclic residue, is catalytically hydrogenated. *E.g.*, 5-nitro-2 : 2'-dipyridylamine with H_2–PtO_2 or –Pd–C gives the 5-NH_2-compound, m.p. 91°; 2' : 4'-*dinitro-2-anilinopyridine*, m.p. 156—157°, gives the 2' : 4'-$(NH_2)_2$-compound, m.p. 150°, and 2'' : 4''-*dinitro-5-anilino*-2 : 2'-*dipyridylamine*, m.p. 198°, gives the 2'' : 4''-$(NH_2)_2$-compound, m.p. 187°. H. A. P.

(A, B) **Separation and** (A) **purification of nitrogen bases [from petroleum].** J. R. Bailey, Assr. to Union Oil Co. of California (U.S.P. 2,035,583—4, 31.3.36. Appl., [A] 4.2.32, [B] 30.7.32).—(A) N bases (I) in petroleum fractions are removed by extracting with liquid SO_2 and the extract, partly freed from SO_2, is treated with H_2O to separate hydrocarbons. (I) are liberated from the aq. solution by an inorg. base and purified by distillation at <1 atm. Continuous apparatus is described and the isolation of 2 : 3 : 8-trimethylquinoline (II) from kerosene (crystallisation of picrate) is claimed. (B) Mixtures of (I) obtained as in (A) are separated into aromatic and non-aromatic classes by selective extraction of the hydrochlorides, sulphate, or acid sulphates of the latter with chlorinated solvents ($CHCl_3$, $C_2H_4Cl_2$). Separations by these means of (II) from an accompanying pyrindacine base from kerosene are claimed. A. H. C.

Manufacture of vinyl compounds. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,357, 28.8.35. Addn. to B.P. 438,281; B., 1936, 140).—The addition of C_2H_2 to pyrroles or diarylamines to give the corresponding N-vinyl derivatives, by the processes described in B.P. 438,281 and 451,444 (B., 1936, 1082) is accelerated by employing as catalysts an alkali metal or strongly alkaline compound and Zn or a Zn compound, either as such or pptd. on carriers. Examples are : carbazole, C_2H_2, and *cyclo*hexane or hexahydroxylene, in presence of KOH and Zn dust, ZnO, or ZnS, at 180°/20—25 atm., give pure vinylcarbazole, and

$NHPh_2$ when similarly treated in presence of KOH and ZnO gives vinyldiphenylamine. N. H. H.

Production of morpholine vinyl ethers and *N*-bismorpholinium halides. Carbide & Carbon Chemicals Corp., Assees. of A. L. Wilson (B.P. 462,383, 27.6.35. U.S., 19.7.34).—Di-(β-halogenoalkyl) ethers with 2—20 pts. of NH_3 or morpholine alone at 50—55°/50—55 lb. or in a solvent (*e.g.*, MeOH at 100—110°), with or without a catalyst (CuCl), give *N*-bismorpholinium halides (the quaternary *N*-*spiro*-compounds), which may be isolated as such or converted by heating with alkali by way of the hydroxides into *N*-alkenoxyalkylmorpholines. Thus are prepared N-*bismorpholinium chloride*, decomp. about 300° (darkens at about 280°), N-β-*vinyloxyethylmorpholine*, b.p. 209—211°, β-2 : 5-*dimethyl*-N-*morpholinyl*-iso*propyl* β-*propenyl*, b.p. 230—240°, and -*ethyl vinyl ether*, b.p. 215—225°. R. S. C.

Manufacture of imidazole-dihydrides-(4 : 5) [4 : 5-dihydroglyoxalines. Pharmaceuticals]. A. Sonn (B.P. 460,528, 31.1.35).—An imino-ether or its salt derived from a carboxyalkyl, aryl, aryloxy-, heterocyclyl, or heterocyclyloxy-substituted HCO_2H, AcOH, $EtCO_2H$, or $PrCO_2H$ (the substituent group being OH-free) is condensed with an αβ-diamine. *E.g.*, interaction of carbethoxyacetimino Et ether with N_2H_4,H_2O in EtOH gives *Et* 2-4 : 5-*dihydroglyoxalinylacetate* (*hydrochloride*, m.p. 110—112°). Other examples describe the prep. of: 2-*benzyl*- (I), b.p. 147°/9 mm., and 2-p-*amino*- (II), -p-*methoxy*-, m.p. 118—120°, -3′ : 4′-*methylenedioxy*- (III), -3′ : 4′-*dimethoxy*- (IV), -2′ : 3′ : 4′-*trimethoxy*-, m.p. 86—87°, and -3′ : 4′ : 5′-*trimethoxy-benzyl*- (V), m.p. 76—77°, b.p. 170—171°/0·15 mm. [*hydrochlorides*, m.p. (I) 168—170°, (II) (+2HCl) 280—285°, (III) 202—203°, (IV) 210—211°, (V) 168—170°], 2-2′-*methoxy*-6′-*allyl*-γ-*phenoxypropyl*- (*picrate*, m.p. 189—190°), 2-8′-*quinolyloxymethyl*- (VI), 2-o-*hydroxy*- (VII) and 2-3′ : 4′ : 5′-*trimethoxy-phenyl*-, m.p. 183—184°, 2-*phenoxymethyl*- (VIII), 2-o-*anisyloxymethyl*- (IX), 2-*benzhydryl*- (X), and 2-3-*quinolyl*-4 : 5-*dihydroglyoxaline*, m.p. 104—105°, b.p. 172—173°/6 mm. [*hydrochlorides*, m.p. (VI) 190—192°, (VII) 209°, (VIII) 130—132°, (IX) 167—169°, (X) 192—193°], and 2-*benzylhexahydrobenziminazole*, m.p. 117—118° (*hydrochloride*, m.p. 257°). H. A. P.

***iso*Butylene from mixed hydrocarbons. Petroleum sulphonic acids. Stabilising $PbEt_4$.**—See II. **CS_2 from viscose.**—See V. **Washing compositions.**—See VI. **HCN.**—See VII. **Carotene from soaps etc. Elaidic acid and derivatives.**—See XII. **Condensation products. Resinous compositions.**—See XIII. **Citric acid.**—See XVIII. **Alkyl ethers of 4-chlororesorcinol.**—See XX. **Detecting mustard gas. Acetylated alkyltrimethylolmethanes.**—See XXII.

See also A., II, 150, **Pechmann dyes**, 171. **Influence of anion on properties of thiocyanine dyes.**

IV.—DYESTUFFS.

Anthanthrone dyes. A. Corbellini (Atti V Congr. Naz. Chim., 1936, **14**, 731—741; cf. A., 1933, 1054).—The synthesis and properties of anthanthrone, naphthastyryl, and their substituted derivatives are discussed. L. A. O'N.

Patents.

Manufacture of azo dyes. A. H. Knight, and Imperial Chem. Industries, Ltd. (B.P. 462,176, 30.8.35).—A diazo compound of the C_6H_6 series having a nuclear alkyl C_{8-20} is coupled alkaline with acids 2 : 8 : 6-$NXY{\cdot}C_{10}H_5(OH){\cdot}SO_3H$ where X = alkyl or hydroxyalkyl (C_{1-4}) and Y = H, hydroxyalkyl, acyl, aroyl, or arylsulphonyl. Among examples (18) are *p*-$NH_2{\cdot}C_6H_4{\cdot}C_{12}H_{25}$ and 1 : 4 : 3-$NH_2{\cdot}C_6H_3(C_{12}H_{25}){\cdot}SO_3H$ coupled with intermediates where X and Y are paired thus: ${\cdot}C_2H_4{\cdot}OH$ + H or Bu^a or Bz or *p*-$C_6H_4Me{\cdot}SO_2$ or ${\cdot}C_2H_4{\cdot}OH$, Me + H, Me + Ac. Animal fibres are dyed brown shades of excellent fastness to milling. K. H. S.

Manufacture of [azo] dyes. Soc. Chem. Ind. in Basle (B.P. 462,629, 27.2.36. Switz., 28.2.35).—Aldehyde–$NaHSO_3$ derivatives of 2 : 8 : 6-$NH_2{\cdot}C_{10}H_5(OH){\cdot}SO_3H$ (I) are coupled with diazo compounds, particularly those derived from aminosulphones (cf. B.P. 451,970; B., 1937, 122), in alkaline, neutral, or acid medium. In examples, (I) treated with CH_2O–$NaHSO_3$ is coupled acid with 1 : 2 : 4-$NH_2{\cdot}C_6H_3(SO_2Me){\cdot}NO_2$ or 1 : 2 : 4-$NH_2{\cdot}C_6H_3(SO_2Ph){\cdot}NO_2$. MeCHO and furfuraldehyde are also mentioned. The dyes afford blue shades on wool or silk from an acid bath. K. H. S.

Halogenated indigos. T. L. Masterman, Assr. to Nat. Aniline & Chem. Co. (U.S.P. 2,036,487, 7.4.36. Appl., 11.5.33).—Indigoid dyes are halogenated in solution or suspension and the crude halogenated dehydroindigo, after removal of excess of halogen, is treated directly with a reducing agent until converted into the halogenated indigo. In the example, indigotin is tetrachlorinated in AcOH and the yellow product treated with SO_2; 5 : 5′ : 7 : 7′-tetrachloroindigotin is formed in improved yield and quality. K. H. S.

Phthalocyanine dyes. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 462,239, 29.8.35).—70% yields of phthalocyanines are obtained by heating aromatic *o*-dinitriles (or compounds capable of forming such) with metal amides or cyanamides, and high-mol. monohydric (or any polyhydric) alcohols, phenols, or mercaptans. The dinitrile may be mixed with the metal amide or cyanamide, and with an org. solvent containing no OH or SH group, and the mixture heated with the alcohol etc.; in this case, low-mol. monohydric alcohols may replace those of high mol. wt. Twelve examples are given. F. M. H.

Vat for dyes etc.—See I. **Halogenated compounds as pigments.**—See XIII.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Textile fibres of vegetable origin: forty years of investigation at the Imperial Institute. E. Goulding (Bull. Imp. Inst., 1937, **35**, 27—56).—A review.

Gibb's process for obtaining linen fibre. A. H. Kridel (Chim. et Ind., 1937, **37**, 224—228).—

The stems are crushed and combed in a specially designed machine and are then chemically treated for removal of gums and pectins. The process has been developed for the recovery of linen fibre from the stems of flax grown for the seed. The normal retting process cannot be applied to this material, which has therefore hitherto been considered as a waste product and burned. A. B. M.

Recovery of wool grease in the Bradford trade. F. Brock (J. Text. Inst., 1937, **28**, P 30—39).—An historical review. A. G.

Chlorination of wool. E. Justin-Mueller (Rev. Gén. Mat. Col., 1937, **41**, 78—86).—The action of Cl_2, hypochlorites, bisulphites, and H_2O_2 on wool results in the elimination of labile S, Cl_2 and hypochlorites giving $SOCl_2$. At the same time, the keratin complex undergoes partial hydrolysis, the resulting products reacting with $SOCl_2$ to give closed-ring condensation products which aid in the retention of the tensile strength of the fibre, otherwise reduced by hydrolysis It is suggested that such condensations may be regarded as more complete keratinisation than normal, the longitudinal striations visible on microscopical examination of chlorinated wool being evidence of such " meta-keratinisation." The increased ease of wetting-out, greater lustre, and softer handle of chlorinated wool are explained by the action of Cl_2, or more particularly $SOCl_2$, on traces of fatty matter and Ca soaps remaining in the wool after scouring. The decreased contractile power of chlorinated wool is attributed to the presence of a new epithelial layer of meta-keratin, forming a covering which resists contraction. H_2O_2, though reacting with the labile S in wool, has a very different effect from Cl_2, the resultant fibre being harsh, non-elastic, and tendered. S. G. S.

Artificial wool. H. Deile (Chem.-Ztg., 1937, **61**, 272—275).—A review.

Advances in production of artificial silk and cellulose wool. H. Radestock (Papier-Fabr., 1937, **35**, 41—45).—A survey. D. A. C.

German artificial substances industry and foreign cotton. K. Brandenburger (Chem.-Ztg., 1937, **61**, 216—217).—Cotton is used as a raw material in chemical industry on account of its chemical and mechanical properties. For both these purposes it can now be replaced by wood-cellulose, even in the prep. of artificial plastic masses. A. G.

Determining the fineness of fibres by the weighing method. H. Fischer (Rayon Text. Month., 1936, **17**, 798—799; 1937, **18**, 86).—With the apparatus described a known length is cut from a combed tuft of fibres and weighed; the width is calc. from the wt. per unit length. A. G.

Existence of transverse elements in native vegetable spun threads. R. Haller (Helv. Chim. Acta, 1937, **20**, 199—203).—A reply to criticism (cf. B., 1936, 1145). E. S. H.

Ironing as a factor in the deterioration of cotton fabrics. R. E. Elmquist and K. M. Downey (Rayon Text. Month., 1936, **17**, 814—816, 820; 1937, **18**, 41—44, 91—93).—Various grades of sheeting were put through a roll-type ironer, the temp., pressure, and time of contact being controlled. After treatment the material was examined photometrically, and the Cu no., absorption of methylene-blue, fluidity in cuprammonium solution, and breaking load were determined. The photometric measurement of the reflectance of violet light was much more sensitive than visual observation, and was the most sensitive of the tests used. Over-ironing resulted in an increased Cu no. and fluidity, and a decreased methylene-blue absorption and breaking load; the last test was much less sensitive than were the chemical tests. At 167° deterioration could be detected after 15 sec. at 1·3 lb. per sq. in. or after 5 sec. at 4·0 lb. per sq. in., and at higher temp. after correspondingly shorter times. Laundering subsequently to scorching approx. doubled the loss in breaking load. A. G.

From atom to visible fibre. K. Freudenberg (Papier-Fabr., 1937, **35**, 49—52).—The cellulose crystal structure and formation of the wood fibre are described. D. A. C.

Wood substances. VI. Use of wood thinnings for cellulose preparation and their fundamental investigation along and across the fibre. I. K. Nishida and M. Otani (J. Cellulose Inst. Tokyo, 1937, **13**, 48—52; cf. B., 1937, 124).—The lengths and width of fibres from thinnings of various species are recorded; the data indicate that such wood, especially from pines, is suitable for paper manufacture. A. G.

Dissolution of chemically modified cotton cellulose in alkaline solutions. III. In solutions of sodium and potassium hydroxides containing dissolved zinc, beryllium, and aluminium oxides. G. F. Davidson (J. Text. Inst., 1937, **28**, T 27—44; cf. B., 1936, 734).—Solutions of NaOH containing ZnO behave like those of NaOH alone in that the solubility of modified celluloses increases with falling temp. and passes through a sharp max. as the [NaOH] is progressively increased. Increasing the molar ratio ZnO/NaOH increases both the solvent power and the [NaOH] corresponding with max. solvent power. At $-5°$ even unmodified cellulose has a considerable solubility. The best conditions for preparing conc. stable solutions of modified cellulose are $[NaOH] = 2{\cdot}5N$, $ZnO/NaOH = 0{\cdot}1$ approx., and a temp. of $-5°$; when the [NaOH] is higher the solutions tend to gelatinise, and when the ratio ZnO/NaOH is higher ZnO ppts. are formed. ZnO also increases the solvent power of KOH, and BeO that of NaOH, but Al_2O_3 in NaOH has the reverse effect. A. G.

Quality of sulphite cellulose from fast- and slow-growing pines. O. Routala, K. Linkola, and O. Pölkkynen (Suomen Kem., 1937, **10**, **A**, 1—2, 17—19).—Differences in physical character and chemical composition are discussed. The slow-growing pines give the longer fibres, yielding a tougher and more resistant paper. M. H. M. A.

Acetylation of mannocellulose from the nuts of the "Dum" palm. G. Turco (Atti V Congr.

Naz. Chim., 1936, **14**, 925—927).—Acetylation produces the triacetate. Its solubility and the η of its solutions have been studied. L. A. O'N.

Aromatisation of cellulose by heat. R. C. Smith and H. C. Howard (J. Amer. Chem. Soc., 1937, **59**, 234—236).—Oxidation (alkaline $KMnO_4$) of the products obtained by pyrolysis of cellulose linters at 250—400° (little change occurs at 190°) in N_2 gives CO_2 (51·6—73·8), AcOH (1—1·8), $H_2C_2O_4$ (11·1—18·5), and aromatic acids (*A*) (13·7—34%). Decarboxylation of (*A*) affords C_6H_6 (main product) and Ph_2 in amounts similar to those obtained from a bituminous coal (I) (B., 1936, 225). The presence of C_6-rings in (I) does not exclude the possibility of (I) being derived from cellulose. H. B.

Nitration of cellulose. A. Bouchonnet, F. Trombe, and (Mlle.) G. Petitpas (Bull. Soc. chim., 1937, [v], **4**, 560—570).—The nitration of cotton by HNO_3–P_2O_5–H_2O mixtures is studied. 100% HNO_3 (92) and HPO_3 (8 pts.) or mixtures containing a little more H_2O give guncottons with $\not<$13·5% N, which are stabilised by boiling with H_2O and have satisfactory properties. The baths can be regenerated. Stainless-steel vessels are used. R. S. C.

Nitration of cellulose by nitric acid and nitrogen peroxide. P. P. Schorigin and E. V. Chait (J. Gen. Chem. Russ., 1937, **7**, 188—192).—Cellulose is oxidised but not nitrated by N_2O_4 either alone (70°) or with H_3PO_4, HCl, $HClO_3$, or HCO_2H. The N content of the product rises with increasing $[N_2O_4]$ of HNO_3–N_2O_4 solutions, to a max. at 20—30% N_2O_4, but the cellulose nitrate so obtained is contaminated with oxidation products. R. T.

Nitration of hemp. N. Parravano and G. Centola (Gazzetta, 1936, **66**, 735—740).—Treatment of hemp fibre of varying degrees of purity with HNO_3–H_2SO_4 gives a nitrocellulose (I) more stable than that from cotton. This is attributed to the greater proportion of non-cellulose constituents in hemp; these, removed in nitration, leave larger spaces in the micelle, permitting more effective internal washing of the resulting (I). E. W. W.

Stabilisation of nitrocellulose. G. Centola (Atti R. Accad. Lincei, 1936, [vi], **24**, 147—150).—The stabilising action of MeOH (or EtOH) on nitrocellulose (I) is due to the fact that it penetrates the intermicellar spaces and removes the SO_4'' impurities which render the (I) unstable. *X*-Ray investigations show that the cryst. structure of the (I) is not altered as a result of the stabilising process. O. J. W.

Relations between the structure and mechanical properties of cellulose acetate films and threads. G. Centola (Atti R. Accad. Lincei, 1936, [vi], **23**, 881—887).—The weakening of the mechanical properties of films and threads of cellite (I) by treatment with MeOH is attributed to a recrystallisation of the (I) and not to depolymerisation processes or to extraction of cementing substances by the MeOH. O. J. W.

Developments in the continuous drying of staple rayon. F. K. Howell (Rayon Text. Month., 1937, **18**, 35—36, 105—106).—When staple fibre is dried on a moving belt through which air is blown, the irregular permeability of the matted fibre results in uneven treatment. In some modern plants the fibre is carried on a belt running spirally through a chamber, and heated air is blown over the surface; this method is both cheaper and more efficient. A. G.

Desulphurisation of crude viscose rayon. P. C. Scherer (Rayon Text. Month., 1937, **18**, 33—34, 38, 83—85).—The crude rayon can be desulphurised in 3 sec. by a 1% Na_2S or Na_2SO_3 solution at $\not<$70°; $NaHSO_3$, NaOH, soap, Na_2CO_3, and Na_3PO_4 require longer times. The treatment results in a slight rise in tensile strength and a marked increase in extensibility. A. G.

Aspects of modern [wood] pulp manufacture. G. A. Hall (Paper-Maker, 1937, **93**, TS 37—48, 57—63).—Innovations and improvements in many stages of the manufacture of various types of wood pulp are discussed. H. A. H.

Grinding characteristics of various woods. R. I. Wynne-Roberts (Paper Trade J., 1937, **104**, TAPPI Sect., 74—76).—The grinding characteristics of eight different kinds of wood have been determined under closely controlled conditions. The pressure employed (20 lb. per sq. in. pocket area) was < that used in commercial practice, but the wood classification arrived at is believed to hold in general for other grinding pressures, and it is shown that freeness, strength, production, and power consumption are interrelated variables which permit comparative evaluation of woods of given physical and chemical properties under identical operating conditions. Spruce wood shows a marked superiority over all the other woods examined, with balsam, Eastern hemlock, jack pine, shortleaf pine, poplar, loblolly pine, and cottonwood, in decreasing order, except as regards whiteness and brightness, where cottonwood is best, followed by balsam and spruce, with jack pine last. If shortleaf pine is first subjected to a mild acid cook, keeping the wood structure intact, and subsequently ground, the resulting pulp is very long-fibred and resembles sulphite pulp. H. A. H.

Groundwood studies. III. Process variables, using a miniature pulp grinder. J. Edwards, G. D. O. Jones, G. J. C. Potter, and H. W. Johnston (Pulp & Paper Mag. Canada, 1937, **38**, 121—132; cf. B., 1935, 1088).—The influences of process variables on the grinding of white spruce mechanical pulp in a miniature one-pocket grinder have been studied. Variations in peripheral speed of stone from 1600 to 6600 ft./min., in grinding pit temp. from 60° to 93·5°, and in pit consistency from 2% to 9% produced little effect on power consumption and pulp properties. Production $\propto$ stone speed and increased more rapidly with respect to pressure. A combination of dull stone faces and high pressures may lead to higher freeness for a given burst, and to lower power consumption for a pulp of definite properties. H. A. H.

Grinding of jack pine for newsprint manufacture. H. A. Paterson (Pulp & Paper Mag. Canada, 1937, **38**, 146—147).—The strength, cleanliness, fineness, and colour of mechanical pulp from jack pine (*P. Banksiana*) are <, and the grinding cost

>, those of spruce pulp. When an appreciable proportion is used pitch trouble is liable to arise. An improved strength is possible by a preliminary steaming or boiling of the wood, but greater care in grinding is then necessary in order to obtain uniformity and cleanliness, and more coarse-ground material is produced. H. A. H.

Possibility in the sulphite pulping of jack pine. O. Brauns (Pulp & Paper Mag. Canada, 1937, **38**, 148—149).—The ordinary sulphite process is not suitable for pulping jack pine, owing partly to the resistance of the heartwood to penetration, and partly to the presence of some indefinite material which is resistant to $Ca(HSO_3)_2$. Even Na_2SO_3 is unable completely to delignify the heartwood, and the resulting pulp, although satisfactory in such characteristics as strength and bleachability, contains brown shives which prohibit its use for most purposes, since they cannot be separated by screening. This cooking process is also uneconomical at the present. H. A. H.

Pulping of hardwoods by the sulphite process. I. Survey of the literature. G. J. C. Potter and F. H. Yorston. **II. Softness and opacity in hardwood sulphite pulps.** H. Green, C. R. Mitchell, and F. H. Yorston (Pulp & Paper Mag. Canada, 1937, **38**, 103—108, 108—115).—I. Their structure, chemistry, and pulping properties are reviewed.

II. Birch and aspen are as readily penetrated and delignified as is spruce during sulphite pulping, but since they contain less lignin, less severe digestion conditions are required to give pulp of the same bleachability. Easy-bleaching pulps made from these woods by the indirect process are hard and transparent, and from the results of small-scale trials it is believed that changes in the cooking procedure combined with alkaline bleaching will be necessary to obtain opaque and bulky pulps. H. A. H.

Sulphite pulps for parchmentising purposes. O. Wurz (Papier-Fabr., 1937, **35**, 54—56, 57—60).—It is considered that the pectin content of sulphite pulps determines their mechanical parchmentising properties, and hence their beating time. Ru-red gives a good indication of these properties by developing a red colour with pectins, which, by examination of fibre cross-sections, was found to be most intense in the middle lamellæ and secondary cell walls. The most suitable pulps are produced by a mild cook and incomplete bleaching; suitable cooking conditions are described. The rate of parchmentising is considerably lower at higher beating consistency; *e.g.*, with stone tackle, by reducing consistency from 4% to 1% the beating time was reduced by 30%. D. A. C.

High-yield sulphite [pulp] for newsprint. H. J. Rowley (Pulp & Paper Mag. Canada, 1937, **38**, 92—96).—Equipment installed at a prominent Canadian newsprint mill for manufacturing sulphite pulp under modified digestion conditions so as to remove less ligneous matter than is usual, and for converting such pulp into paper, is described. Several economies are claimed, and the resulting paper is stronger and brighter in colour. H. A. H.

Results of chip packing and indirect cooking in sulphite [pulp] mill operation. J. E. Taylor (Pulp & Paper Mag. Canada, 1937, **38**, 97—102).—The steam saving resulting from chip packing, indirect cooking, and the use of steam meters is analysed. Indirect cooking results in higher strength and colour, less dirt, and less loss in strength after bleaching than direct cooking. H. A. H.

Heat-balance calculation on sulphate [wood pulp] recovery system. W. T. Webster (Paper Trade J., 1937, **104**, TAPPI Sect., 73—74).—The typical calculation given is for a spray-type unit with waste-heat boiler, superheater, air preheater, and H_2O walls. H. A. H.

Effect of varying the concentration of combined sulphur dioxide in soda-base sulphite pulping [of wood]. G. H. Chidester [with P. S. Billington] (Paper Trade J., 1937, **104**, TAPPI Sect., 67—70).—The yield and strength (burst and tear) of pulps made from white spruce, second-growth Western hemlock, and slash pine containing much heartwood, by digestion on a small scale to about the same cooking degree in about the same time with soda-base sulphite liquors of const. (6%) initial total [SO_2], but with increasing combined [SO_2], pass through a max. at 2—3% and again at 6% combined [SO_2], there being a min. at 4—5%. Mixtures of $NaHSO_3$ and Na_2SO_3 liquors produce pulps of very inferior strength, low α-cellulose content, and low η. $NaHSO_3$ liquor produces pulps of high strength, but again vals. for α-cellulose and η are low. Slash-pine heartwood can be pulped by its use. H. A. H.

Causes for non-uniformity in sulphite pulp manufacture. O. E. Anderson (Paper Trade J., 1937, **104**, TAPPI Sect., 70—72).—The 1% NaOH solubility test affords a reliable, convenient check on wood quality, increasing solubility indicating lower tearing strength and yield of sulphite pulp made therefrom. Wood of high lignin content produces pulp of high lignin content. Various types of penetration curves are given, the penetration at higher temp. (below the crit. point) resulting in pulp of higher α-cellulose content. H. A. H.

New method of determining the cooking degree of sulphite pulps. W. Nippe (Papier-Fabr., 1937, **35**, 60—64, 65—67).—The method is based on the reaction of benzidine (I) with the lignin in the pulp, all of which is assumed to be present as lignosulphonic acid. Excess of (I) [0·5*N*-(I) solution containing 0·02*N* free HCl] is added to the pulp, which after a short reaction time is filtered, excess of (I) in the filtrate being determined by pptn. with Na_2SO_4 containing $BaCl_2$; the ppt. is centrifuged out and titrated (phenolphthalein) with 0·1*N*-NaOH. The method is largely independent of the reaction time and temp., and the subdivision of the pulp. Moist and both fresh and stored air-dry pulps give the same results, and the method gives reasonably good agreement with the Willstätter and Sieber methods, although compared with the latter it tends to give higher results with pulps which are at the extreme ends of the hardness scale. D. A. C.

Bleaching of sulphite pulp. S. Samuelsen (Proc. Tech. Sect. Papermakers' Assoc., 1937, **17**, 293—319).—Numerous factors affecting the rate and degree of bleaching with hypochlorite (I) in one- and two-stage processes are investigated, and the significance of the relative importance of chlorinating and oxidising effects is discussed. In single-stage bleaching there is a steady, almost linear rise in the total Cl consumption with decreasing p_H of the reaction mixture, some irregularities about p_H 7 being excepted. This rise in reaction velocity is connected with a change in the oxidising intensity of the system. The amount of incrustants dissolved during definite time intervals also shows a dependence on p_H, especially over the range p_H 5—10; discrepancies above the higher val. are due to the alkali-solubility of hemicelluloses and ligneous matter. There also exists a close linear relation between the amount of incrustants released from the pulp and the Cl consumption, quite irrespective of p_H. The relation between α-cellulose content, whiteness, bleach consumption, and p_H is also investigated. Relations between similar and other variables in the two-stage bleaching process are discussed, with particular reference to the intermediate washing processes. A specified degree of whiteness can be attained with a min. Cl consumption provided that the first stage comprises treatment with Cl_2–H_2O at a low pulp consistency, and the second with (I) at a high pulp consistency, due attention being given to the correct distribution of the bleaching agent between the two stages. The short-fibred fraction of bleached pulp is much lower in colour than the remainder of the pulp. H. A. H.

Bleaching kraft [pulp]. J. D. Rue (Paper Trade J., 1937, **104**, TAPPI Sect., 79—81).—Economic methods of producing bleached kraft pulps of various degrees of whiteness are discussed. For low-white shades a single-stage process with hypochlorite (I) is sufficient. For medium-white shades a chlorination–(I) two-stage process is advocated, the pulp being passed through a refiner before chlorination, to break up fibre bundles. For high-white shades a three-stage process, with NaOH extraction as the middle stage, is essential, and it is preferable even to split up both chlorination and (I) treatments into stages, both for economy and for permanence of high colour. Preliminary refining is not recommended for this class. Although the strength of bleached kraft is much superior, and the colour equal (for the 5-stage process) to that of bleached sulphite, its opacity, softness, and absorbency are not so good. H. A. H.

Developments in improving the quality of chemical wood pulps. J. D. Rue (Paper Trade J., 1937, **104**, TAPPI Sect., 82—85).—Recent advances are discussed, with special reference to bleaching. H. A. H.

Discoloration of wood pulp by light and heat. S. R. H. Edge and H. M. McKenzie (Proc. Tech. Sect. Papermakers' Assoc., 1937, **17**, 437—451).—Bleached sulphite pulps when exposed to light first exhibit rapid and appreciable yellowing, followed by a whitening effect which takes place much more slowly and probably indicates the bleaching of residues not removed by the normal bleaching process. The effects of heat, ultra-violet light, and prolonged keeping at 30° were also studied. Colour measurements were made by the Blancometer. H. A. H.

Johnston screen classifier: action on various pulps. W. B. Campbell and W. C. Lodge (Pulp & Paper Mag. Canada, 1937, **38**, 75—76).—The fibre-length classifying action of the apparatus is reproducible. With groundwood and ordinary sulphite pulps the distribution of fibre lengths in the various functions is fairly uniform, but with birch sulphite the fibres are not only shorter but are also almost all the same size. H. A. H.

Fractionation of mechanical pulps and its relation to refining. P. D. Bray, R. A. Thompson, and J. Shyr (Paper Trade J., 1937, **104**, TAPPI Sect., 49—50).—It is claimed that the Appleton Institute fractionating apparatus, with screens of 24-, 50-, 90-, and 200-mesh wire, gives satisfactory separation of a wide variety of mechanical pulps. It can similarly be employed to control the degree of refining given to the fine-screen rejects with the object of converting them into usable pulp. H. A. H.

Design and refining action of discs [for treatment of paper pulp]. D. M. Sutherland, jun. (Paper Trade J., 1937, **104**, TAPPI Sect., 134—137). —The effects of various arrangements of tangential bars and grooves, bar clearances, and pressures on the action of disc refiners for treating wood-pulp suspensions are discussed. Attention is drawn to the possibility of refining raw sulphate pulp at high temp. H. A. H.

Evaluation of starch products used in the beater and tub [in papermaking]. J. P. Strasser (Paper Trade J., 1937, **104**, TAPPI Sect., 51—60).—Replies to a TAPPI questionnaire are discussed. It is believed that retention of starches commonly used in the paper trade for addition to the beater is purely mechanical; there is no adsorption by the cellulose. The functions of starches (described) are assisted by the presence of size and alum, and conversely sizing is improved by the use of starch, whereas the supposed effect of increased filler retention is very doubtful. The higher is the cooked starch consistency, the more efficient it becomes. The efficiencies of various kinds of starches are compared. Pascoe's method for determining starch in paper is advocated in preference to the TAPPI standard method. The uses of starch for the surface treatment of paper are also discussed. In this connexion oxidised starches seem preferable. H. A. H.

Drainage characteristics [of paper-pulp suspensions]: laboratory studies. W. B. Campbell and W. C. Lodge (Pulp & Paper Mag. Canada, 1937, **38**, 189, 200).—The freeness test, although affording a measurement of the drainage rate of stock immediately after its discharge on to the machine wire, does not clearly indicate the drainage characteristics after suction has been applied. A study of this latter property did not lead to a conclusive test being developed. H. A. H.

Drainage measurements on a paper-machine wire at various points. A. A. Scott (Pulp & Paper Mag. Canada, 1937, **38**, 172—178).—Methods of measuring the flow of H_2O and of fibre through the wire at various points are described. H. A. H.

Theory of drainage in relation to the wire section of the paper machine. E. Cowan (Pulp & Paper Mag. Canada, 1937, **38**, 85—91, 199—200).—A method of calculating the drainage of H_2O from the table rolls and from the suction boxes of a paper machine is presented, and the results of its application are compared with actual drainage tests made on a high-speed newsprint machine. H. A. H.

Removal of dirt from papermaking stock. H. Freeman and C. H. Skelton (Pulp & Paper Mag. Canada, 1937, **38**, 170—171, 188).—The limitations of the usual types of equipment are briefly discussed, and the development and application of a new centrifugal device, termed the Vortrap, are described. H. A. H.

Factors affecting dryer performance [of paper machines]. R. J. Chambers (Pulp & Paper Mag. Canada, 1937, **38**, 154—162).—Various factors are reviewed, and the possibility of other factors than those connected with the drying cylinders is illustrated. The distribution of heat units in a typical drying operation is shown, and the important heat uses are individually discussed. H. A. H.

Behaviour of condensate in [fast-running] paper-machine dryers. B. A. Malkin (Pulp and Paper Mag. Canada, 1937, **38**, 291—295).—Equipment is described for investigating the movement of various amounts of condensed steam in a paper-machine drying cylinder of specified dimensions and rotating at different speeds. Graphs are given to show the effect of peripheral speed on power consumption when widely differing amounts of H_2O are present. The use of internal ribs is advocated; the uniform film of H_2O so formed removes the zone of instability due to the movement of a single large mass of H_2O, and also reduces power consumption very appreciably. H. A. H.

Instrumentation studies. VIII. Analysis of "smoothness" [of paper]. Inst. Paper Chem. (Paper Trade J., 1937, **104**, TAPPI Sect., 157—160; cf. B., 1937, 332).—Various factors affecting the smoothness characteristics of printing papers are analysed, in order particularly to elicit whether they arise in the uncoated paper or in the coating process, or both. The usual methods of determining smoothness are considered to be unsound. The possibility of an optical method of measuring surface irregularities is suggested, but attempts to devise a suitable instrument have not yet been successful. H. A. H.

Cause and cure of grainy edges, curl, and cockles in paper. E. W. G. Cooper (Paper Trade J., 1937, **104**, TAPPI Sect., 161—167).—Numerous papermaking factors are discussed. H. A. H.

Use of wax emulsions in surface-sizing paper and board. R. W. Kumler (Paper Trade J., 1937, **104**, TAPPI Sect., 154—156).—Patents relating to the process are reviewed. H. A. H.

Oil–paper relationship in the printability of paper. G. L. Larocque (Pulp & Paper Mag. Canada, 1937, **38**, 77—84).—Measurements of the rate of penetration (R) of oil under pressure through paper are described, and a method has been developed for determining the magnitude of the capillary pressure causing natural penetration, and also the mean effective radius of the capillary pores. Tests with three oils showed that $R \propto \gamma/\eta$ of the oil employed. These results support the belief that the absorption of oil by paper takes place in accordance with known laws governing the capillary flow of liquids into porous materials. Variation in absorption time with temp. is solely dependent on the oil-η, and a table of temp. corrections is given. Increase in atm. R.H. results in a marked and irreversible decrease in the magnitude of absorption. Apparatus is described for measuring the oil absorptiveness of paper surfaces. The reproducibility of the method and the differentiation of a wide variety of papers and boards are considered satisfactory. Oil-flotation and other similar methods depending on the penetration of an excess of oil through the sheet do not afford a measure of the absorptiveness of the paper surface for printing ink. H. A. H.

Micro-burette for testing the absorptiveness of thin paper. F. T. Carson (J. Res. Nat. Bur. Stand., 1937, **18**, 41—45).—A micro-burette to measure and deliver 0·01 ml. of liquid comprises a capillary tube which can be tilted to any angle, and the flow of liquid from it be regulated thereby; the tube has a sliding scale. Tests of absorptiveness can with advantage be carried out with the small amounts of liquid which this burette delivers. J. W. S.

Detection and determination of some special impregnating materials in paper. F. Burgstaller (Papier Fabr., 1937, **35**, 46—48, 52—54).—The more commonly used impregnating agents for paper are listed and include those from natural sources (resins, waxes, proteins, bitumens, oils, etc.) synthetic (esters of higher alcohols, cellulose derivatives, vinyl chloride polymerides, rubbers, etc.), and various additional reagents (plasticisers, emulsifying agents). Methods for their identification and determination by extraction with suitable solvents are described. D. A. C.

Determination of resin in papers and pulps. H. F. Launer (J. Res. Nat. Bur. Stand., 1937, **18**, 227—234).—The material is extracted with 95% EtOH acidified with conc. HCl, the extract dissolved in Et_2O, the solution filtered, and the Et_2O evaporated; the residue is weighed. The equiv. wt. of the extract, determined by titration with $K_2Cr_2O_7$, is a criterion of its purity. A. J. E. W.

Conductivity measurement of paper extracts. A. Lambertz and B. Schulze (Zellstoff u. Papier, 1937, **17**, 104—106).—A method (Wheatstone bridge) is described, and it is stated that the κ of aq. extracts of papers is an indication of the insulating properties of the paper. D. A. C.

Flotation method for treating white-water [in paper mills]. S. Anspach (Paper Trade J., 1937, **104**, TAPPI Sect., 138—142).—The Adka save-all is described and its application in white-H_2O clarification discussed. H. A. H.

Paints for the maintenance of paper mills. G. C. Attfield (Proc. Tech. Sect. Papermakers' Assoc., 1937, **17**, 399—410).—Numerous types of paints and their application in paper mills are described.
H. A. H.

Larch-tree [cellulose].—See IX. **Paper-machine wire.**—See X. **Sulphite liquors in soap industry. Combing oils.**—See XII. **Cellulose acetobutyrate.**—See XIII. **Ligninsulphonic acid in tanning.**—See XV. **Carbohydrates from wood.**—See XVII. **EtOH from wood hydrolysates.**—See XVIII. **Sulphite waste [as core binder].**—See XXIII.

See also A., I, 182, η **of collodion solutions. Damp-proof Cellophane.** II, 136, **Cryst. components of cellulose.** 137, **Hydrolysis of cellulose.** III, 119, **Determining cystine in wool.**

Patents.

Manufacture of mixed fabrics. Brit. Celanese, Ltd. (B.P. 460,082, 7.8.36. U.S., 15.8.35).—A fabric composed of both animal and artificial fibres is agitated, *e.g.*, by steam or air, in a heated (70—90°) bath containing a lubricant (soap + sulphonated oil), together with a dye if desired, until the proportion of the animal fibres in the surface of the fabric has been increased.
F. R. E.

Manufacture of [compound] fabrics. J. Morton (B.P. 459,458, 13.7.35).—A no. of webs of superimposed, side-by-side, non-interwoven yarns are united by treatment with a cellulose solution and then with a coagulant therefor.
F. R. E.

(a) **Manufacture of textiles [containing undegummed silk].** (b) **Silk yarn prepared from natural silk in the gum.** (c) **Yarn.** (d) **Mixed cellulose acetate–natural silk fabrics.** (e) **Making a knitted fabric.** L. Wallerstein, R. A. Gale, and T. G. Hawley, jun., Assrs. to Wallerstein Co., Inc. (U.S.P. [a—e] 2,029,968—72, 4.2.36. Appl., 6.4.34).—(a) Even degumming of fabrics containing a proportion of raw silk yarn (more difficult to de-gum since it has a higher twist or is buried in the fabric) is avoided by impregnating and drying such yarn (before weaving or knitting) with a proteolytic enzyme prep. (an activator may be added) under conditions such that no degumming occurs. Similar pretreatment is used to make raw silk yarn (b) more flexible and amenable to winding and knitting operations, (c) more H_2O-absorptive, (d) more easily degummed on silk + acetate-rayon fabrics where the rayon is susceptible to hydrolysis in the degumming bath, and (e) more amenable in fabric and hose to simultaneous degumming and dyeing.
A. J. H.

Incorporation of elastic filaments or threads in textile fabrics or other articles. W. Warne & Co., Ltd., J. P. Griffiths, C. R. Pinnell, F. R. Gladstone, and L. V. Cole (B.P. 459,508, 6.7., 1.8., and 19.10.35).—Elastic threads, while free from tension or under a predetermined degree thereof, are combined with non-extensible threads, *e.g.*, cellulose acetate, by treatment with a softening agent for one of the threads, or by binding them with a permeable covering. After forming into fabrics etc., the non-extensible threads are removed by dissolution in a suitable solvent.
F. R. E.

Manufacture of cellulose. H. Dreyfus (B.P. 459,531, 10.7.35).—Lignocellulosic material is treated with bisulphite liquor containing only a small proportion of free SO_2 at 90—120° for 80—120 hr. and, after washing, with aq. NaOH ($\not>$5%) at 90—130°, in each case under a pressure $\not<$10 atm. above the v.p. of the liquid at the temp. employed. The product is finally bleached after treating with cold 12—20% NaOH, if desired.
F. R. E.

Manufacture of cellulose. H. Dreyfus (B.P. 459,790, 11.7.35).—Lignocellulosic material is treated uninterruptedly with $2\frac{1}{2}$—10% aq. NaOH at a temp. rising continuously or in stages (5° per hr.) from 120—145° to 155—180°.
F. R. E.

Alcoholic treatment of ligneous cellulosic material. S. I. Aronovsky, Assr. to Northwest Paper Co. (U.S.P. 2,037,001, 14.4.36. Appl., 18.7.34).—The material is digested at raised temp. with an aq. alcohol (BuOH, n-$C_5H_{11}\cdot OH$) containing a protective agent for minimising acidity (alkali, urea). The delignified pulp is separated from the liquid, and the latter on cooling separates into an aq. layer containing inorg. salts and an alcoholic layer containing ligneous material.
F. R. E.

Method of concentrating lyes obtained in the cellulose industry. E. Öman and H. E. A. Göth, Assrs. to Industrikemiska Aktieb. (U.S.P. 2,039,444, 5.5.36. Appl., 21.2.31. Swed., 21.2.30).—Flue gases from a combustion furnace exchange heat indirectly with cold lye until the gases are below the dew point, there being no substantial evaporation of lye at this stage; the hot lye is evaporated by contact with fresh air. The moist air is used as total air supply for combustion furnaces the gases from which may possibly pass through a steam boiler and may have to be saturated by direct contact with lye before passing to the first-mentioned stage, wherein the latent heat of the moisture is recovered.
B. M. V.

Production of cellulose derivatives. E. I. Du Pont de Nemours & Co. (B.P. 461,436, 16.8.35. U.S., 16.8.34).—A cellulose ether containing esterifiable OH groups in the cellulose mol. is treated with an aromatic sulphonyl halide (p-$C_6H_4Me\cdot SO_2Cl$) in presence of a *tert.* base (I) (C_5H_5N) at <90°, until the product is swollen or preferably sol. in (I).
F. R. E.

Manufacture of cellulose derivatives and of artificial filaments, films, and other shaped structures therefrom. L. Lilienfeld (B.P. 462,283, 29.5.35).—An alkyl, hydroxyalkyl, or OH-acid derivative of cellulose which (*a*) is insol. in H_2O and org. solvents, (*b*) is practically insol. in caustic alkali, and (*c*) cannot be made sol. therein by cooling its mixture with caustic alkali to 5° to −25° and then allowing the temp. to rise to between 0° and room temp., the derivative being produced by the use of less alkylating agent, a lower temp., or a shorter esterification period than is required for production of the corresponding alkali-sol. cellulose derivative, is treated with CS_2 in presence of caustic alkali. The cellulose derivative xanthate is shaped and treated with a coagulant and a plasticiser (25—70% H_2SO_4). F. R. E.

Production of aqueous dispersions of nitrocellulose. C. R. N. Strouts, and Imperial Chem. Industries, Ltd. (B.P. 459,850, 12.6.35).—A mixture of nitrocellulose (I), a plasticiser if desired, an aliphatic carboxylic acid (II) which is miscible with H_2O and is a solvent for (I), *e.g.*, AcOH, and an NH_2-acid colloid sol. in (II), *e.g.*, glue or gelatin, is mechanically worked to a viscous solution and treated with H_2O or a dil. aq. solution of (II) until the (I) is thrown out of solution to form a milky liquid. A flocculating medium, *e.g.*, aq. NH_3, is then added before or after separation of part of (II), and the resulting flocculum is separated and dissolved in an aq. medium of suitable p_H to re-form the milky liquid, which is capable of being formed into films. F. R. E.

Stabilisation of cellulose esters. Gevaert Photo Producten N. V. (B.P. 459,819—20, 24.2.36. Austr., 25.2.35).—The esters are treated with (A) saturated or supersaturated vapours of org. liquids (EtOH, C_6H_6) at $>$50° under pressure or vac., or (B) liquid, non-solvent, non-acid aliphatic and/or aromatic hydrocarbons, alcohols, ethers, ketones, or their Cl-derivatives, at 50—150° $\nless$ 1 atm. F. R. E.

Recovery of carbon disulphide from viscose products. W. F. Richter, Assr. to Chem. Holding Corp. (U.S.P. 2,035,981, 31.3.36. Appl., 28.2.31).—Filaments etc. are treated in a closed chamber with aq. metal sulphide (Na_2S) substantially inert to CS_2 at a temp. (50°) sufficient to liberate and vaporise CS_2, which is drawn off, condensed, and recovered. F. R. E.

Spinning of viscose. I. G. Farbenind. A.-G., and W. W. Groves (B.P. 460,026, 19.7.35. Addn. to B.P. 443,971; B., 1936, 637).—The coagulated threads, films, etc. made in accordance with the prior patent are washed with H_2O or strongly diluted electrolyte solution (0·1—0·3% H_2SO_4) used as the pptg. bath, whereby S impurities are largely removed before decomp. of the xanthate to cellulose. F. R. E.

Manufacture of artificial silk. Brit. Bemberg, Ltd. (B.P. 459,353, 31.7.36. Ger., 9.3.36).—In the spinning of cuprammonium cellulose from comparatively narrow spinneret holes into a strongly acting pptg. bath, the spun filament is drawn through a conical tube in the pptg. bath, while fresh pptg. liquid is forced through the tube from the spinneret side. F. R. E.

Manufacture of artificial threads, bands, or the like. W. W. Groves. From Deuts. Celluloid-Fabr. (B.P. 459,796, 12.7.35).—A non-elastic, synthetic polymeride of the vinyl group (vinyl chloride, polystyrene) is heated above its softening point and subjected to a pressure of 5000—8000 kg./sq. cm. in a press with a conical mouthpiece tapering to an orifice $<$1 mm. diameter for issue of the thread etc. F. R. E.

Manufacture of artificial filaments, threads, bands, and the like. Courtaulds, Ltd., and J. H. Givens (B.P. 459,294, 5.7.35).—Before setting of the filaments is complete or the usual after-treatment processes have been carried out, spun cakes of viscose thread are subjected on the inside to a force in an outward radial direction which is maintained until setting is complete. The product shows improved uniformity in denier and dyeing properties. F. R. E.

Production of artificial fibres and the like. Deuts. Bekleidungsind. G.m.b.H., Assees. of L. Ubbelohde (B.P. 461,825, 30.9.35. Ger., 10.10.34).—Preheated viscose is extruded through orifices and dried by a direct flow or a countercurrent of cold or warm air or gas in the neighbourhood of the orifices, the resulting threads being stretched before or during their regeneration to cellulose. Colloids (starch, glue) to give a honeycomb structure, insol. materials (kieselguhr), or natural or artificial resins may also be added to the spinning material. F. R. E.

Production of artificial fibrous products. S. Sordelli (B.P. 462,073, 8.1.36. It., 23.11.35).—To improve their mechanical properties, filaments spun from solutions of cellulose or cellulose derivatives (viscose) are subjected to a gradual and continuous stretching of 40—80% between the spinning nozzle and the receiver, during substantially the whole period (15—60 sec.) necessary for complete coagulation and setting. Apparatus is claimed. F. R. E.

Manufacture of highly-twisted crêpe threads consisting of or containing filaments of a cellulose ester or ether. Brit. Celanese, Ltd. (B.P. 461,108, 29.5.36. U.S., 4.6.35).—The threads are steamed in a mixture (at 95—98°) of steam and cool air or other inert gas during at least the last part of the crêpe-twisting process. If desired, the threads may contain any suitable plasticiser and/or an oil. Apparatus is claimed. F. R. E.

Manufacture of [twisted] crêpe threads and fabrics made of or containing filaments of cellulose esters or ethers. Brit. Celanese, Ltd. (B.P. 461,224, 18.5.36. U.S., 18.5.35).—Cellulose derivative threads containing a softening agent (I), *e.g.*, $(C_6H_3Me)_3PO_4$, and an oil, *e.g.*, olive, which has only a small tendency to dry out, are steamed during at least the last part of the crêpe-twisting process. (I) may form 5—80% of the (I) + oil. F. R. E.

Manufacture of [curled, staple] threads from viscose. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 462,184, 5.9.35).—Viscose is coagulated, *e.g.*, with $(NH_4)_2SO_4$ and Na_2SO_4, to form threads of cellulose xanthate which are mechanically curled, cut to staple length, and subsequently converted into cellulose hydrate by means of acid or by heating in a liquid which does not itself decompose the xanthate (glycol at $>$100°). F. R. E.

Manufacture of [voluminous] artificial yarns. Brit. Celanese, Ltd., H. Dreyfus, and W. I. Taylor (B.P. 459,781, 14.6. and 5.12.35).—Flat filaments of org. derivatives of cellulose containing a plasticiser (p-$C_6H_4Cl_2$) are crinkled by treating with a hot aq. medium and converted into staple fibre. F. R. E.

Conditioning of artificial thread. H. Hofmann, Assr. to Amer. Bemberg Corp. (U.S.P. 2,036,174, 31.3.36. Appl., 11.12.31).—A bundle of spun threads is flattened to a ribbon, which is cupped and collapsed first on one side and then on the other before collecting the bundle of threads. Apparatus is claimed. F. R. E.

Production of [low-lustre] artificial silk. M. J. Theumann, Assr. to Du Pont Rayon Co. (U.S.P. 2,035,997, 31.3.36. Appl., 28.10.32. Fr., 14.11.31).—A white, H_2O-insol., inorg. compound is formed by chemical reaction in the esterifying mixture containing a cellulose derivative, *e.g.*, $BaSO_4$ by pptn. of a Ba salt, or TiO_2 by hydrolysis of $TiCl_4$. The cellulose derivative with the delustrant distributed therethrough is pptd., washed, dried, and dissolved in a suitable solvent for spinning. F. R. E.

Manufacture of [figured or relief] fabrics. Brit. Celanese, Ltd., H. Dreyfus, and W. A. Dickie (B.P. 462,250, 4.9.35).—Artificial yarns of high extensibility (cellulose acetate spun under suitable conditions or treated with swelling agents) are introduced into fabric with yarns (artificial or otherwise) of lower (normal) extensibility, so that, after dyeing, finishing, etc., the highly extensible yarns are elongated and form puckered or crinkled areas giving the required relief effect. F. R. E.

Manufacture of (A) [thick] cellulose ester foils or films, (B) foils or films of cellulose triacetate. Deuts. Gold- u. Silber-Scheideanstalt vorm. Roessler (B.P. 461,592—3, 6.3.36. Ger., 6.3.35).—(B) A stabilised acetylating solution containing $>10\%$ of cellulose triacetate ($\nless 59\%$ AcO), after neutralisation of the catalyst, is cast in an aq. pptg. bath containing 7—20% of AcOH at $<30°$, washed, and dried, or (A) the undried film, while in such condition that it is beginning to solidify, is used as a support for further films deposited as in (B). F. R. E.

[Manufacture of ornamental] films and foils of cellulose or cellulose derivatives. Celluloid Corp. (B.P. 461,730, 29.5.36. U.S., 7.6.35).—A no. of sheets of foil ($<0·02$ in.), at least one of which contains a cellulose derivative or regenerated cellulose, are stuck together, *e.g.*, with shellac, and then roped, twisted, crushed or otherwise cleansed to impart a cryst. appearance to the product, which is smoothed and used as such or separated into single sheets. F. R. E.

Treatment of cellulose derivative sheets. T. B. Wells, Assr. to Eastman Kodak Co. (U.S.P. 2,036,377, 7.4.36. Appl., 26.5.33).—Cast cellulose ester sheets are dyed, or may receive a lubricating or gelatin film, by spreading the film on to the cellulose sheet while it still contains appreciable quantities of solvent. The dye is dissolved in a solvent or swelling agent for the cellulose ester, so that it substantially penetrates the sheet. D. A. C.

Curing [removal of solvent from] cellulose derivative sheeting. E. K. Carver, Assr. to Eastman Kodak Co. (U.S.P. 2,037,704, 21.4.36. Appl., 5.5.33).—The sheeting is passed through a water-bath or -baths in which the H_2O is maintained at a successively rising temp. with the travel of the sheeting. F. R. E.

Manufacture of composite foils. N. V. Internat. Alfol Maats., and W. Liehr (B.P. 459,980, 23.1.36).—Cellulose ester or regenerated cellulose is applied to thin, pliable, textile fabric, *e.g.*, muslin, and when the adhesive is tacky the treated fabric is secured between two metal foils, preferably of Al, by the action of heat and pressure. The products are resistant to bending stresses and are suitable for insulation against heat, moisture, and sound. J. W. Cr.

Sheet materials. Celluloid Corp. (B.P. 460,061, 1.11.35. U.S., 2.5.35).—Non-fibrous flexible sheets having a basis of cellulose derivative, preferably plasticised, *e.g.*, with 5—30% of Bu_2 phthalate, are pleated while in softened condition and in this form are allowed to harden. The sheets have superior elasticity in a direction normal to the pleats. J. W. Cr.

Manufacture of artificial sponges. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 459,725, 13.7.35).—A paste composed of cuprammonium cellulose and a pore-forming material (Na_2SO_4, gas, or vapour), with or without fibrous material and colouring matter, is coagulated with Na_2SO_4 and/or H_2SO_4, and washed. F. R. E.

Production of paper pulp from fibrous materials. Champagne Paper Corp. (B.P. 460,812, 6.1.36. U.S., 10.4.35).—Decorticated flax or hemp is crushed in presence of H_2O (*e.g.*, in a rod mill) and digested at about 50 lb. per sq. in. with 5—15% of a 95 : 5 aq. mixture of NaOH and Na_2SO_3. The pulp is then chlorinated, washed with dil. aq. alkali, and bleached with NaOCl. D. A. C.

Pulp preparation. C. D. Altick (U.S.P. 2,035,447, 31.3.36. Appl., 27.7.34).—Pulp is produced from any fibrous material, but mainly from straw or bagasse, by digestion in a series of interconnected tanks, the pulp and liquor being withdrawn from the bottom and circulated by means of centrifugal pumps to the top of each tank. A by-pass through a continuous refiner is interposed in each circulating system. The material is soaked, digested, washed, bleached, and finally washed in successive tanks. Digestion and bleaching may be carried out under a hydrostatic head, and the treatment may be fully controlled by instantly discharging the pulp to any desired point in the system. D. A. C.

Chemical purification and modification of cellulose fibre. G. A. Richter, Assr. to Brown Co. (U.S.P. 2,036,606, 7.4.36. Appl., 10.1.35).—Wood or cotton-rag pulp is freshly treated with aq. NaOH of approx. mercerising ($\nless 10\%$) concn. It is washed, hydrolysed, *e.g.*, by digestion with dil. aq. mineral acids, acid salts, Cl_2, etc., washed, and again mercerised. Pulp of high α-cellulose content and low solution-η is claimed. D. A. C.

Treatment of [waste] black liquors [from pulp etc. treatment]. J. A. Hambly, Assr. to Consolidated Paper Corp., Ltd. (U.S.P. 2,036,213, 7.4.36. Appl., 7.6.33).—The black liquor (from alkaline digesting processes) is sprayed into a smelting furnace the air supply to which is controlled so that the volatile constituents form producer gas. This is scrubbed and cooled by leading through a spray of fresh black liquor, and is then used as an independent fuel supply, whilst the black liquor is collected for the smelting furnace. D. A. C.

(Production of) non-cellulosic organic material derived from the black liquor resulting from the pulping treatment of wood or other fibrous material. Mead Corp., Assees. of H. J. Reboulet (B.P. 460,885, 2.5.35. U.S., 9.7.34).—CO_2 is bubbled through the black liquor (without previous concn.) from the sulphate or soda process, until the p_H reaches 8—9. The liquor is then heated to 50—70° and the pptd. org. material filtered off, neutralised with dil. aq. H_2SO_4, washed, and dried. D. A. C.

Moulding of pulp articles. Moulded Pulp Corp. (B.P. 461,372, 16.11.35. U.S., 25.1., 11.2., and 9.3.35).—After introduction of a liquid suspension of pulp fibres into a foraminous mould at atm. pressure, a second suspension containing, if desired, fibres different in size and material from those in the first suspension, together with lacquer constituents, is introduced under pressure to flush the pulp layer, continue its deposition, and smooth its surface. A gaseous medium at $>100°$ is then introduced in two stages under low and then high pressure to complete the deposition and compact the fibres. F. R. E.

Manufacture of paper. P. T. Gale, F. Hamilton, R. J. W. Reynolds, and Imperial Chem. Industries, Ltd. (B.P. 462,254, 4.9.35).—Inorg. cellulose esters are incorporated in the paper by addition, in dil. aq. NaOH, to the beater furnish, which is then neutralised to litmus when admixture is complete. D. A. C.

Colouring of paper. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 461,042, 30.1.36).—The application of ice colours to paper with elimination of drying after grounding with the arylamide component is claimed. *E.g.*, paper is coloured deep yellow by passage successively through baths of alkaline diacetoacet-*o*-tolidide and diazotised *o*-$C_6H_4Cl{\cdot}NH_2$. H. A. P.

Manufacture of safety paper. C. E. Every-Clayton. From F. Schoeller & Bausch (B.P. 460,405, 20.5.36).—Paper is impregnated with inorg. salts which produce a distinctive colour with both a mild reducing and an oxidising agent; *e.g.*, $Mn_2Fe(CN)_6$ is added in the beaters and the paper finally impregnated with a conc. alkali selenite solution. D. A. C.

Manufacture of safety paper. F. L. Simons, Assr. to G. La Monte & Son (U.S.P. 2,037,937, 21.4.36. Appl., 9.5.33).—Paper is passed through a bath containing an approx. neutral $K_4Fe(CN)_6$ or $Na_4Fe(CN)_6$ solution, to which are added an alkali phosphate and fluoride as stabilisers, and a buffer if necessary. D. A. C.

Lithographic re-transfer paper. L. and E. Nestler and K. Nauman (R. Nauman) (B.P. 459,760, 25.3.36. Ger., 13.8.35. Addn. to B.P. 408,872; B., 1934, 538).—The re-transfer paper is provided with marks or lines formed by the application of a penetrating liquid dye, the marks being visible from both sides to indicate the general direction of the fibres for the purpose of pulling the paper off the stone. F. R. E.

Moistureproof paper. L. E. Branchen and G. R. Clark, Assrs. to Eastman Kodak Co. (U.S.P. 2,036,392, 7.4.36. Appl., 27.6.32).—Paper is impregnated with wax by passing through a $\not>10\%$ solution of it (*e.g.*, in C_6H_6), or adding it to the beaters. The paper is dried and then coated with a nitrocellulose solution containing a H_2O-immiscible plasticiser (Bu_2 phthalate) and a resin (ester gum, coumarone). By thus treating glassine a transparent paper is formed. D. A. C.

Apparatus for conditioning or drying paper. Hall & Kay, Ltd., H. Kay, S. Hall, and A. Myers (B.P. 461,342, 9.5.35).—The web is passed between hollow casings from which, at the paper inlet end, jets of air issue, the air being conditioned to give correction to the H_2O in the paper either way. After passing along the paper the air is drawn back into the casing and is caused to pass in the opposite direction in contact with the wall of the casing. B. M. V.

De-inking of paper printed with oxidisable inks. P. R. Hines (B.P. 461,219, 30.3.36. U.S., 30.9.35).—Paper printed with, *e.g.*, a linseed oil vehicle is shredded and has its sizing removed by saponification and washing. The paper is then oxidised (air) in presence of dil. aq. NaOH until brown stains appear, and the reaction continued out of contact with air but in presence of further aq. NaOH, by completely submerging the pulp until the ink is readily detachable. The paper is then disintegrated and the ink removed. D. A. C.

Manufacture of artificial leather. N. Strachovsky (B.P. 461,558, 10.7.35 and 10.7.36).—A thin sheet of fibrous material, mixed with plaster of Paris or Portland cement to absorb liquid, is impregnated with an aq. dispersion of rubber containing $\not>5\%$ of a rubber solvent (petrol), a rosin–NH_3 soap, NH_3 to give $p_H \not< 6{\cdot}8$, and Na silicate to assist gelling. F. R. E.

Manufacture of synthetic products [hard board]. G. H. Ellis, Assr. to Insulite Co. (U.S.P. 2,036,466, 7.4.36. Appl., 21.6.30).—Board composed mainly of groundwood is impregnated with a high-m.p. asphalt and then heat-pressed at 190—230°/450—600 lb. per sq. in. The pressure during pressing is varied, and at least once the process is interrupted by completely relieving the pressure to permit access of air to the board. D. A. C.

Manufacture of hard board. T. A. I. Lundbäck, Assr. to Aktieb. Mo och Domsjo Wallboard Co. (U.S.P. 2,037,522, 14.4.36. Appl., 25.4.35. Swed., 5.10.32).—Boards made by heat-pressing and composed of groundwood (or wood pulp made by any means which do not remove the lignin) are formed from stock containing 0·1—10 (5)% (on fibre wt.) of an aldehyde. D. A. C.

Manufacture of elastic yarn. T. A. Clayton. From United States Rubber Products, Inc. (B.P. 461,931, 6.12.35).

Artificial fibres. Plastic sheets. Resin-fibre products. Imitation leather finish.—See XIII. **Shoe stiffener. Adhesive for cellulose derivatives.**—See XV. **Casein products.**—See XIX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Printing vat colours on cotton–viscose piece goods. Anon. (Rayon Text. Month., 1937, **18**, 107—109).—The presence of viscose necessitates special care in the boiling process. Rayon does not absorb printing pastes as readily as does cotton, and the prep. of smooth pastes is especially necessarily. A. G.

Application of compounded rubber latex to textile printing. C. S. Powell (Rayon Text. Month., 1937, **18**, 118).—Latex is a valuable ingredient of pastes for discharge and pigment printing as it is more flexible than are gums, and it is also a useful constituent of binders for flock printing. A. G.

Identification of mercerised cotton. E. Lindemann (Angew. Chem., 1937, **50**, 157—164).—Treatment of the material with I–KI or I–$ZnCl_2$ is not sufficiently certain or generally applicable for the determination of the degree of mercerisation of cotton. The following process is described. The fabric is boiled with H_2O, thoroughly washed and dried overnight in the air, and divided into 4 equal portions (1—2 g.). One is left unchanged, whilst the others are treated on frames under tension for 3·5 min. at 15—20° with 10%, 15%, and 25% NaOH, respectively; the solutions contain also 10 g. of Floranit per litre. The samples are washed, acidified, again washed, and air-dried. The weighed samples are dyed in the 25-fold amount of a solution of 120 mg. of Chicago-blue 6B (I) and 480 mg. of Na_2SO_4 in 100 c.c., in a closed flask, the temp. being raised gradually to 70° in ½ hr. and kept at this point for a further ½ hr. The mixtures are rapidly cooled, the samples removed, and the residual dye is determined colorimetrically in the solution by comparison with a solution of 3 mg. of (I) and 12 mg. of Na_2SO_4 in 100 c.c. By plotting the affinity no. against [NaOH] graphs are obtained varying in form with absence of or degree of mercerisation of the sample. With cotton mercerised with dil. NaOH (about 10%) the affinity diagram does not attain the height of that of unmercerised material, whilst after-mercerisation with 15% NaOH causes a marked increase of affinity. Cotton treated with about 15% NaOH shows little increase in affinity on after-treatment with 10% and 15% NaOH, and in the region of complete mercerisation marked differences are not observed. H. W.

Soda prints on pile fabrics. B. S. Hillman (Rayon Text. Month., 1937, **18**, 94—96).—Patterns formed by local removal of the pile are made by printing suitable substances on the back of the velvet, the best being $AlCl_3$ for rayon pile and NaOH for piles of animal hairs; back-printing results in the destruction of the binding loops, and the pile is then easily removed by brushing or, preferably, by calendering. If the remaining pile is to be colour-printed, this should be done on the same machine to secure accurate registration, and the dyes used must be fast to the carbonising agent. A. G.

Benzine and latex in the rubbering of fabrics. Anon. (Gummi-Ztg., 1937, **51**, 195—196, 219—220, 243—244).—Whether calendering or dough- or latex-spreading is the most appropriate method for the rubbering process for a particular purpose involves several considerations, the most important of which, *e.g.*, cost, technical conditions, characteristics desired in the product, etc., are discussed in detail. D. F. T.

Colloidal methods of combating hard-water damage in textile processes. A. Chwala (Österr. Chem.-Ztg., 1937, **40**, 101—106).—Methods of H_2O softening are discussed with special reference to wetting-out agents and the colloidal properties underlying their use. C. R. H.

Evaluation of washing etc. agents.—See III. **Deterioration of cotton fabrics by ironing. Bleaching pulp.**—See V. **Mordanting and dyeing.**—See XV.

See also A., I, 178, **Adsorption of alkalis by cellulose.**

Patents.

Continuous bleaching [of fabrics]. P. V. A. Comey, Assr. to R. H. Comey Brooklyn Co., Inc. (U.S.P. 2,037,119, 14.4.36. Appl., 31.7.33).—Fabrics, especially cotton, are bleached by wetting with a cold ($<25°$) H_2O_2 solution (I), squeezing out the excess of liquid, and subjecting them to NH_3 vapour (II) for 3—15 min. at, *e.g.*, 20°. The materials are then washed and may be finished in a customary manner. (I) is preferably a 25—30-vol. solution and may contain a stabiliser, *e.g.*, 1% Sn sulphate. (II) is diluted with air, *e.g.*, to about 6%. The process is rapid, and boiling-out, desizing, etc. pretreatments are stated to be unnecessary since the action of the reagents renders the impurities either innocuous or easily removed in the final washing. R. J. W. R.

[Preparation of] compositions for use in the washing of textile materials or for other washing purposes. R. H. Marriott, B. B. Dugan, and F. W. Berk & Co., Ltd. (B.P. 461,221, 17.4.36).—Compositions containing detergents of the type $R{\cdot}CO{\cdot}NH{\cdot}R'{\cdot}SO_3H$, and/or $R{\cdot}CO_2{\cdot}R''{\cdot}SO_3H$ (1 pt.) and/or $R{\cdot}O{\cdot}SO_3H$, R, R′, and R″ being aliphatic hydrocarbon residues of C_{10-20}, C_{1-5}, and C_{1-10}, respectively, and bentonite (1—5 pts.), and (optionally) borax, Na_2HPO_4, Na_2CO_3, etc. are claimed as detergents. Turkey-red oil is specifically excluded. (Cf. B.P. 401,413; B., 1934, 208.) H. A. P.

Treatment of textile and other fibrous materials. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,614, 15.7.35).—The use is claimed as washing, wetting, dispersing, levelling, softening, and impregnating agents of sulphoxides and sulphones $R{\cdot}SO{\cdot}R'{\cdot}Y$ and $R{\cdot}SO_2{\cdot}R'{\cdot}Y$ (R = aliphatic radical of $\nless C_6$ or a homo- or hetero-cyclic radical, R′ = aliphatic radical of $\ngtr C_7$ which may

contain hetero-atoms, Y = CO_2H, residue of inorg. acid, polyether, NH_2 or substituted NH_2). Examples are octadecyl β-sulphoethyl sulphoxide (levelling and softening agent and detergent), octadecyl β-β′-sulphoethylaminoethyl sulphoxide and sulphone, and octadecenyl (oleyl) β-β′-carboxyethylthioethyl sulphoxide.
H. A. P.

[Automatic] control of washing or dyeing machines. Laundry Automatic Appliances, Ltd., and S. H. Ribbans (B.P. 461,555, 7.7.36).—Timing is effected by removable pins in a rotating disc making contact with stationary blades.
B. M. V.

Coloration of textile and other materials. Brit. Celanese, Ltd., and P. F. C. Sowter (B.P. 462,222, 25.7.35).—Cellulose esters or ethers (I), *e.g.*, the acetate, are treated with a freely fluid solution of the H_2SO_4, H_3PO_4, etc. ester of a leuco-vat dye, *e.g.*, of the indigoid or anthraquinone series, preferably in the form of a salt of an org. base, *e.g.*, NH_2Me, C_5H_5N, or an alkyl ester, in a liquid of which the major portion is an org. liquid of b.p. $<130°$, *e.g.*, a volatile ester (EtOAc), or, if desired, a mixture of this and a H_2O-miscible alcohol, and H_2O, in such proportions that the mixture is not a solvent for (I), and subsequently converting the leuco-ester into the parent dye by, *e.g.*, treatment with a nitrite and acid.
N. H. H.

Coloration of materials. British Celanese, Ltd. (B.P. 462,724, 11.9.35. U.S., 13.9.34).—The fastness to rubbing of dyeings on fabrics of or containing cellulose acetate is improved by heating the dyed fabric at 150—180°. In one example a cellulose acetate–cotton union is dyed with indigo and heated for 15 min. at 160° in hot air. K. H. S.

Production of stencils for printing textile fabrics. J. Kessel (U.S.P. 2,034,437, 17.3.36. Appl., 3.11.32. Ger., 5.11.31).—Clearly-defined patterns on a silk or wire-gauze fabric are produced by applying to one side of the gauze an adhesive, porous, H_2O-sol., auxiliary coating composed of ZnO bound with sulphite-cellulose waste liquor, and to the other side the pattern in relief by means of an auxiliary stencil with the coating tinted with a red dye followed by coating with a varnish-like caoutchouc solution (linseed oil 1, caoutchouc 1, pigment 3 pts.); after drying, the raised pattern is ground off with pumice stone and the sol. parts are removed by washing.
A. J. H.

Treatment of textile materials. Brit. Celanese, Ltd., D. Finlayson, and R. G. Perry (B.P. 462,599, 11.10.35).—A creaseless effect is produced in textile materials by immersing them successively in solutions of N_2H_4 or NH_2OH, or their acyl, higher alkyl, CH_2Ph, or *cyclo*hexyl derivatives, and a solution of an aldehyde; a resin is formed in the fibre when the impregnated fabric is heated. In examples, viscose fabric is soaked in 5% solutions of $N_2H_4,2HCl$ and NH_2OH,HCl, dried, dipped in 40% aq. CH_2O, dried, and heated at 130° for 5 min. K. H. S.

Impregnation [weighting] of textile [silk and rayon] materials. G. J. Esselen and W. M. Scott, Assrs. to Hooker Electrochem. Co. (U.S.P. 2,034,696, 24.3.36. Appl., 26.5.34).—Weighting is effected by impregnation with a 35% solution of $SbCl_3$ in an org. solvent (I), followed by squeezing out excess of liquor, drying at $\not>$40° (25°), and treating successively with aq. Na_2HPO_4 and aq. Na silicate. (I) may be MeOH, PhMe, and C_2HCl_3, but it is cheaper to use a mixture of "Stoddart solvent" (4 : 1 mixture of white spirit and PhMe); addition of 5 g. (per litre) of stearic acid or other oily product to (I) much reduces the loss of tensile strength which may accompany the drying of the impregnated silk. A degree of weighting = that given by the usual $SnCl_4$ process results, but it is more resistant to laundering and has less deleterious action on the silk. Rayon materials treated by the process claimed have a reduced lustre and greater "covering" power in fabrics, and knitted goods are less susceptible to "laddering." Sn salts may be used instead of $SbCl_3$. A. J. H.

Manufacture [lubrication and weighting] of artificial textile materials. Brit. Celanese, Ltd. (B.P. 459,388, 2.10.35. U.S., 3.10.34).—Materials composed of filaments of org. derivatives of cellulose containing as lubricating agent 1—8% of a salt of an alkylolamine with a higher fatty acid (triethanolamine stearate) are treated with a H_2O-sol. salt ($BaCl_2$) to form a H_2O-insol. salt of the metal and the fatty acid. F. R. E.

Impregnating and/or coating of textile threads. Etabl. Flinois, Colmant, & Cuvelier, Colmant & Cuvelier Succrs., Soc. Anon. (B.P. 459,410, 30.12.35. Belg., 28.1.35).—After wetting, *e.g.*, with H_2O, the threads are drawn through a layer of difficultly impregnated liquid which is contained in or forced countercurrentwise through a long narrow tube, so that the friction between the thread and the liquid prevents the latter being carried alongside the former. Apparatus is claimed. F. R. E.

Production of stiffened fabrics and articles made thereof. Brit. Celanese, Ltd. (B.P. 462,242, 31.8.35. U.S., 13.8.34).—Stiffened fabrics and fabric articles are prepared by heat- and pressure treatment of a thermoplastic cellulose derivative (I) (*e.g.*, cellulose acetate), or of two layers of a non-thermoplastic textile having an intermediate layer of (I), in presence of a plasticising agent. A pigment may be present. P. G. C.

Preparation of thermo-adhesive textile fabrics. Sayles Finishing Plants, Inc. (B.P. 461,847, 30.3.36. U.S., 18.11.35).—A textile fabric coated with a thermoplastic composition, viz., an alkyl *o*-benzoylbenzoate (alkyl $\not>$ C_2) (I) and a H_2O-insol. cellulose derivative sol. in solvents for (I), by applying a solution of the components in one or more volatile solvents and drying, is a thermo-adhesive lining for multi-ply textile material, which is bonded by applying heat and pressure, *i.e.*, ironing. The assembly does not break down during laundering, and has a permanently starched finish. N. H. H.

Preparation of gas-retaining fabrics. T. P. Sager (U.S.P. 2,037,049, 14.4.36. Appl., 4.10.33).—Fabrics coated several times with polyvinyl alcohol (I) in H_2O give light, flexible, and durable gas-retaining materials of low permeability, especially to H_2, for use, *e.g.*, in airship gas-cells. The spreading mixture may contain a plasticiser (*e.g.*, glycerol), latex, and a compound to render (I) H_2O-insol., *e.g.*, CH_2O. The reaction product from (I) and PrCHO, dispersed in a solvent, may also be used. R. J. W. R.

Treatment of textile fabrics. Calico Printers' Assoc., Ltd., and J. R. Whinfield (B.P. 462,005, 30.8.35 and 7.1.36).—Cotton or rayon textile fabrics are impregnated at approx. room temp. with (*a*) aq. CH_2O, (*b*) an aq. solution of a salt (at 70% of its saturated concn.) having a strong affinity for H_2O, but without sp. swelling action on cellulose or its derivatives, *e.g.*, $CaCl_2$, $AlCl_3$, $MgCl_2$, and free acid, *e.g.*, HCl, and after washing free from the latter, are dried. The solutions (*a*) and (*b*) may be used separately (drying in between), or combined. The fabrics are rendered crease-resistant and more non-shrinkable, and when ornamented with mechanically produced effects the latter are rendered fast to washing. N. H. H.

Production of stiffened fabrics and fabric articles. Brit. Celanese, Ltd., D. Finlayson, and H. Crawshaw (B.P. 462,011, 31.8.35).—Stiffened fabrics are produced by uniting under heat (at 80—180°) and pressure (10—600 lb./sq. in.) a fabric consisting of yarns of thermoplastic material, *e.g.*, org. cellulose derivatives (I), viz., the acetate, and yarns of relatively non-thermoplastic material, the former forming floats on both sides of the fabric, and two outer fabrics. The union is assisted, when the latter are non-thermoplastic fabrics, by the presence of volatile liquids which are either solvents, *e.g.*, $COMe_2$, or non-solvents, *e.g.*, $EtOH-H_2O$, for (I), but when they are thermoplastic in character by incorporating a plasticiser, *e.g.*, Me_2 phthalate, in the intermediate layer, which serves to lower the m.p. of the cellulose derivative in this layer. N. H. H.

Manufacture of coated sheet or strip material for use as a protective coating. F. C. D. Teague, and Detel Products, Ltd. (B.P. 462,008, 30.8.35).—A textile fabric, paper, or similar material, coated by impregnating with chlorinated rubber, a resin, *e.g.*, coumarone resin, and a plasticiser, *e.g.*, $(C_6H_4Me)_3PO_4$ (in the ratio 100 : 25 : 15 or 30 pts. by wt.), and drying, gives a flexible, waterproof, non-inflammable, electrically insulating, and chemically resistant covering. N. H. H.

Carbonisation of fabrics. J. Charlesworth (B.P. 462,030, 29.8.35).—Apparatus for the thorough impregnation with acid of woollen, mohair, and like fabrics, prior to the carbonisation of vegetable matter contained therein, is claimed and illustrated. N. H. H.

Rendering textiles water-repelling. G. W. Johnson. From I. G. Farbenind A.-G. (B.P. 461,670, 17.8.35).—Textile fabrics (cotton) are made H_2O-repelling by impregnation with dialkyl carbonates or alkyl carbamates having at least one aliphatic radical of $\nless C_6$, *e.g.*, $CO(O{\cdot}C_{18}H_{37})_2$, $NHEt{\cdot}CO_2{\cdot}C_{18}H_{37}$. It is claimed that the compounds may be used as aq. emulsions (subsequent heating to 80—90° is desirable) and that the effects produced are resistant to washing. H. A. P.

Improving [waterproofing] natural or artificial fibrous materials. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 461,179, 8.6. and 27.7.35).—Wool, silk, cotton, artificial silk, etc. are rendered H_2O-resistant by immersion in long-chain alkyl or isocyclic carbimides, thiocarbimides, carbamyl or thiocarbamyl chlorides, or similar compounds containing O, S, N, or CO between the N and the alkyl, dispersed in H_2O or dissolved in an org. solvent. R. S. C.

Rot-proofing jute fibres, yarns, and fabrics. A. S. Lowry (B.P. 462,306, 4.9.35).—Jute is made rot-proof by immersion in a boiling solution of cutch, and treatment with $K_2Cr_2O_7$, whereby an insol. Cr-containing (2·0—2·5%) org. compound is deposited on the fibres. P. G. C.

Maintenance of moisture content in textiles. A. G. Rodwell, S. G. Barber, and Flexatex, Ltd. (B.P. 462,230, 19.8.35).—Fabric is treated with an alkaline silicate solution and then with acid to ppt. finely dispersed SiO_2 gel on the fibres. [Stat. ref.] F. R. E.

Oxygenated compounds. Wetting etc. agents. Polymerisation products. Sulphocarboxylic amides etc.—See III. **Figured etc. fabrics. Colouring paper.**—See V. **Shaped acetate silk [for dyeing]. Articles comprising plastics.**—See XIII. **Dyed rubber.**—See XIV. **Dyeing of leather.**—See XV.

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

Rapid colorimetric control of the chamber and tower [sulphuric acid] processes. I. N. Kuzminich, E. J. Turchan, and A. A. Popova (Zavod. Lab., 1936, **5**, 418—421).—The $[NO_2]$ of the gases is determined colorimetrically in tubes 20—100 cm. in length. R. T.

Rapid separate determination of nitrogen peroxide and nitric oxide in the gases of tower-process sulphuric acid factories. M. N. Merlis and O. D. Petrov (Zavod. Lab., 1936, **5**, 290—291).—500 ml. of gas are bubbled through 4 wash-bottles each containing 75 ml. of aërated H_2O, 20 ml. of Griess reagent and 2 ml. of 60% AcOH are added, the solution is warmed to dissolve any ppt. formed, then diluted to 1 litre, and 25 ml. of the solution are added to 150 ml. of hot H_2O. 2 ml. of Griess reagent and 20 drops of 60% AcOH are added to 150 ml. of H_2O, and the solution is titrated with standard $NaNO_2$ until the colour matches that of the above solution, whence the $NO + NO_2$ content is calc. The NO content in excess of that corresponding with N_2O_3 is determined similarly in the gas after absorption in H_2SO_4. R. T.

Catalysis of sulphuric acid by vanadium in the contact process. G. Canneri and A. V. de Pava (Annali Chim. Appl., 1936, **26**, 560—570).—The catalytic formation of SO_3 from SO_2 and O_2 in presence of K, Na, and Tl vanadates indicates that the catalysis is dependent on the type of both base and vanadic acid (I). Catalysis is probably due to conversion from one type of (I) into another. Molybdovanadates appear to be excellent catalysts for the contact process. F. O. H.

Vanadium catalysts. Performance and poisoning by arsenic in sulphuric acid manufacture. J. C. Olsen and H. Maisner (Ind. Eng. Chem., 1937, 29, 254—267).—Tests have been made of the claimed immunity of V_2O_5 catalysts to As poisoning. Weighed quantities of As_2O_3 were sublimed into the gas stream in the preheater of the converter. Four catalysts were prepared and their conversion performances at 480° and with varying loads carefully determined. The most efficient catalyst, containing 6·6% V_2O_5 without promoter on an inert carrier with KOH added, had >99% efficiency even when overloaded. When treated with 12% As_2O_3 its efficiency fell to 95%. The other catalysts, which contained Ba promoters, showed similar steady deterioration under As treatment, and such deterioration is permanent. The so-called immunity of V_2O_5 to As poisoning is therefore only relative, and tests giving the contrary result are faulty, as in such cases the As was not introduced with the gas. C. I.

Best concentration of sodium chloride for the alkali–chlorine cell. D. V. Adamovitsch (Chim-str., 1935, 7, 481—486).—A discussion. Ch. Abs. (e)

Rapid determination of sesquioxides in caustic soda. V. I. Sokolov and J. V. Bartoschevitsch (Zavod. Lab., 1936, 5, 500).—A solution of 10 g. of NaOH is neutralised with HCl, and the solution boiled for 10 min. with 0·5 ml. of HNO_3. 4—5 ml. of 20% H_2SO_4 and 2 ml. of 10% $(NH_4)_2S_2O_8$ are added, followed by aq. NH_3 20 min. later. The ppt. of Al, Fe, and Mn hydroxides is collected, washed, dried, evaporated to dryness with 2—3 ml. of HF (twice), to eliminate SiO_2, and the residue ignited and weighed as $Al_2O_3 + Fe_2O_3 + Mn_3O_4$. R. T.

Determination of carbonate in bicarbonate. V. I. Sokolov and E. P. Sitnik (Zavod. Lab., 1936, 5, 364).—The U.S.S.R. Bureau of Standards method gives incorrect results; Tananaev's colorimetric method is preferred. R. T.

Determination of lime in blast-furnace slag and limestone, in systematic analysis. R. N. Golovati (Zavod. Lab., 1936, 5, 356—357).—The material is dissolved in HNO_3, SiO_2 determined gravimetrically, and Fe and Al are pptd. from the filtrate by aq. NH_3. The filtrate from $Al(OH)_3$ and $Fe(OH)_3$ is treated with aq. NH_3 and excess of aq. $(NH_4)_2CO_3$, and the $CaCO_3$ collected, washed, and dissolved in 0·1N-HCl, excess of which is titrated. R. T.

Cooling of salt solution in a cooling tower. O. Mertens (Kalii, 1934, 6, 26—29).—A discussion of the method of crystallising KCl. Ch. Abs. (e)

Analysis of sodium acetate. C. B. Hurd and W. Fiedler, jun. (Ind. Eng. Chem. [Anal.], 1937, 9, 116—117).—NaOAc (I) is determined (*a*) by igniting to Na_2CO_3 and weighing or titrating, or (*b*) by distilling aq. (I) with H_3PO_4, collecting, and titrating the AcOH. E. S. H.

Recovery of potassium chloride by electrolysis with silver electrodes. N. A. Petrov and M. V. Lazareva (Trans. Inst. Pure Chem. Reag. U.S.S.R., 1935, No. 14, 76—80).—Cl′ can be completely removed from aq. KCl by deposition on Ag electrodes. The method is not suitable for purifying aq. KOH. Ch. Abs. (e)

Potassium nitrate from potassium chloride and nitrogen peroxide. D. L. Reed and K. G. Clark (Ind. Eng. Chem., 1937, 29, 333—336).—Gases from the oxidation of NH_3 with air, containing 5·2—11·0 vol.-% NO_2, were passed through moistened solid KCl. The reaction $2NO_2 + KCl = KNO_3 + NOCl$ is more rapid but less complete with increasing $[NO_2]$. Increasing the particle size of the KCl decreases the rate of reaction. Best yields are given by several towers with intermediate oxidation chambers. Probably NO_2 reduction occurs and the rate of reoxidation is the controlling factor in the later stages of the process. C. I.

Rapid determination of cyanide in cyanide melt. L. M. Jolson and E. I. Dubovitzkaja (Zavod. Lab., 1936, 5, 282—283).—10 g. of the material and 1 g. of bone-C are shaken for 1 min. with 50 ml. of H_2O, and the suspension is diluted to 100 ml. and filtered. 75 ml. of hot H_2O, 0·1 g. of N_2H_4,HCl, and 5 ml. of conc. aq. NH_3 are added to 25 ml. of standard $Cu(NO_3)_2$ (1 g. of Cu per litre), and C_2H_2 is passed to complete pptn. of Cu_2C_2. The suspension of Cu_2C_2 is titrated with the above filtrate, to a rose-red colour, when % CN′ in the melt is given by 307/a, where a is the no. of ml. of filtrate used for titration. R. T.

Rapid determination of water-soluble and free phosphorus pentoxide in superphosphate. V. I. Zimarev (Zavod. Lab., 1936, 5, 362).—1 g. of superphosphate is dissolved in 25 ml. of H_2O, and the solution titrated with 0·1N-NaOH, in presence of Me-orange–indigo-carmine indicator, to a green colour. 20 ml. of 5% $CaCl_2$ are added, and the titration is continued, in presence of phenolphthalein–naphtholphthalein, to a blue colour. R. T.

Polarographic analysis of technical zinc chloride, in relation to the U.S.S.R. Bureau of Standards specification. J. P. Gochschtein (Zavod. Lab., 1936, 5, 158—161).—The polarographic determination of Zn in $ZnCl_2$ requires 35 min., of sulphates 15 min., and of Fe and Al 1 hr. R. T.

Influence of magnesia additions on solubility of calcium aluminate slags. G. K. Magarschak (Legk. Met., 1935, 4, No. 5, 22—27).—7—15% of MgO was added to slags containing Al_2O_3 40—54, CaO 22—48, and SiO_2 7—10%. After crushing, the slags were extracted with aq. Na_2CO_3 at 75—95°. The extraction of Al_2O_3 was $\leqslant$ that in slags with no MgO. Mg spinel and melilite were formed. Ch. Abs. (e)

Leaching alunite with sulphuric acid. L. C. Pan (Chem. Ind. China, 1935, 10, No. 1, 35—42).—15% H_2SO_4 was most effective for leaching calcined alunite. Heating the acid to 100° brought no advantage. The yield of alum is max. when the acidity is min. Ch. Abs. (*p*)

Beneficiation of spodumene by decrepitation. F. Fraas and O. C. Ralston (U.S. Bur. Mines, Rept. Invest. 3336, Feb., 1937, 13 pp.).—Spodumene is converted into the β-form by heating at approx. 1000°, gently mulling, and then screening or classifying. Experimental results are tabulated. D. K. M.

Improvements in technique of gas analysis. I. F. Getz (Zavod. Lab., 1936, 5, 284—288).—The errors involved in determining CO by absorption in neutral or ammoniacal CuCl, with different types and nos. of washbottles, have been evaluated. R. T.

Determination of organic sulphur in hydrogen and gases containing hydrogen. S. N. Kazarnovski, T. N. Efremova, and R. S. Oks (Zavod. Lab., 1936, 5, 427—431).—Roelen's method (B., 1931, 1033) is preferred. R. T.

The oxygen industry. B. Waeser (Chem.-Ztg., 1937, **61**, 213—216, 236—237).—A review.

Application of the methane cycle in the liquefaction of air. M. Z. Ruzman and J. M. Rjabinin (Chimstr., 1935, 7, 464—468).—A mathematical treatment of the auxiliary CH_4 cycle. Ch. Abs. (e)

Rapid interferometric determination of nitrogen oxides. I. E. Adadurov and L. N. Tzeitlin (Zavod. Lab., 1936, 5, 288—289).—NO (0·05—8%) in mixtures with N_2 is conveniently determined by an interferometric method. R. T.

Black precipitate (Fe_3O_4) from β-naphthylamine production as a carrier for platinum in contact oxidation of SO_2. I. E. Adadurov, I. M. Orlova, T. J. Fomitscheva, and A. N. Tzeitlin (Ukrain. Chem. J., 1936, **11**, 425—432).—Catalysts prepared by pptn. of Pt (0·1%) on Fe_3O_4, obtained as a by-product of the production of β-$C_{10}H_7 \cdot NH_2$, are distinguished by their high activity and stability. R. T.

Recovery of sulphur from waste gases. G. Roesner (Chem. Fabr., 1937, **10**, 101—106).—The recovery of S by reduction by C at 950—1100° according to $SO_2 + C = CO_2 + \frac{1}{2}S_2$ has been studied. The equilibria of the side products COS and CO have been studied at 400—750° on bauxite and chamotte catalysts, when $4COS + 2SO_2 = 4CO_2 + 3S_2$, $4CO + 2SO_2 = 4CO_2 + S_2$, and $2CS_2 + 2SO_2 = 2CO_2 + 3S_2$. The technical application is described. The SO_2 is first conc. by means of an org. base, then reduced over coke, and freed from side products over a catalyst. The S is condensed by H_2O-cooling and electrical pptn., and is 99·99% pure and free from As, Se, and bitumen. R. S. B.

Sources, production, and uses of selenium and tellurium. Anon. (Bull. Imp. Inst., 1937, **35**, 56—67).—A review.

Acid-resisting filters.—See I. **[$(NH_4)_2SO_4$ in] coking practice. Desulphurising gases.**—See II. **Hydraulic limes.**—See IX. **Determining S in Fe ores and SiO_2 in slags. Research at McGill.**—See X. **Acid pumps.**—See XII. **Determining K and urea-N in fertilisers.**—See XVI. **Determining CO_2 in air.**—See XXIII.

See also A., I, 181, **Prep. of SnO_2 sols. Pure $Cr(OH)_3$ sol.** 191—2, **NH_3 synthesis.** 192, **Rare-earth catalysts. Prep. of active Cu and Co catalysts. Electrolysis of aq. NH_4Br. Anodic oxidation of Cr^{III} salts to chromates.** 193, **Electrolysis of $GeHCl_3$ or hydrochlorogermanic acid. Anode reactions.** 195, **Prep. of $H_4P_2O_6 \cdot Cl_2O_6$.** 196, **Prep. of pure $FeCl_2$.** 197, **Determining Br in mineral waters.**

Patents.

Manufacture of sulphuric acid. C. F. Silsby, Assr. to Gen. Chem. Co. (U.S.P. 2,028,416, 21.1.36. Appl., 4.5.33).—In the production of reaction gas mixture for the contact process, finely-powdered pyrites is allowed to fall down a roasting chamber at 930—960° up which ascends a current of hot air sufficient to burn the S and leave the required excess. Cinder is removed continually by a conveyer at the bottom of the roaster. L. C. M.

(A) Production of sulphuric acid by the contact process. (B) Sulphuric acid manufacture. C. B. Clark, Assr. to Amer. Cyanamid Co. (U.S.P. 2,028,733 and 2,028,739, [A] 21.1.36, [B] 28.1.36. Appl., [A] 6.6.33, [B] 21.9.33).—(A) Sludge H_2SO_4 from petroleum refining is treated with hot furnace gases in a rotary kiln; the gaseous products are passed through a condenser to remove hydrocarbons and H_2O, mixed with air, dried by scrubbing with H_2SO_4, and passed through a contact chamber, where the burning of combustible gases present suffices to maintain the reaction temp. The SO_3 is absorbed in conc. H_2SO_4, and the exhaust gases pass through an electrostatic precipitator. (B) Gas containing SO_2 7—8% and As, Se, Zn, F, and Pb, derived from low-grade pyrites, is passed through a dust precipitator at 400°, where partial combination of the impurities occurs with formation of a heavy dust; the dust-free gas, mixed with air, is then passed over a V_2O_5 catalyst. L. C. M.

Manufacture of hydrofluoric acid. E. I. Du Pont de Nemours & Co., and J. C. Lawrence (B.P. 462,131, 2.9.35).—H_2SO_4 and a mineral fluoride (CaF_2) are continuously introduced into a reaction zone kept at $>$ atm. pressure, the temp. at the point of introduction being 140—160°, rising to 310—320° at a part whence sol. residue is continuously removed. The vapours escape near the point of introduction of the reactants and undergo precooling at $\ngtr 15°$, the condensate being then removed and the vapours themselves condensed at $-20°$. W. J. W.

Manufacture of hydrocyanic acid. E. I. Du Pont de Nemours & Co. (B.P. 460,598, 1.8.35. U.S., 2.8.34).—A mixture of NO (from NH_3 oxidation) and hydrocarbon ($\nless C_2$) vapour with 2—10 vols. of inert gas per vol. of NO is passed through a SiO_2 tube at 800—1400° (1300°). A 64% conversion of NO into HCN is obtained with C_2H_4 and C_3H_6, and a 50—55% conversion with paraffins between C_3H_8 and C_9H_{20}. A. R. P.

Preparation of phosphoric acids. C. L. Levermore, Assr. to Gen. Chem. Co. (U.S.P. 2,022,050, 26.11.35. Appl., 30.11.32).—Molten $NH_4H_2PO_4$ is decomposed by treatment with steam at 300—350°. L. C. M.

Production of anhydrous boric acid. A. J. Somer and K. Harding (B.P. 460,330, 9.10.35. Addn. to B.P. 439,634; B., 1936, 542).—Fused B_2O_3 is poured into H_2O in a thin stream, or thin streams of molten B_2O_3 are blown with a spray of H_2O and compressed air. The dried product can be readily pulverised. A. R. P.

Catalysis. [Oxidation of ammonia.] W. W. Triggs. From E. I. Du Pont de Nemours & Co., and Baker & Co., Inc. (B.P. 461,127, 10.5.35).—A catalyst for the oxidation of NH_3 comprises an alloy, *e.g.*, of Pt and Rh, at least one metal being in the Pt group, coated with substantially pure Pt, 0·1—1·0% of the whole. B. M. V.

Decalcification of magnesian dolomites. C. D. Wygal, Assr. to Inland Lime & Stone Co. (U.S.P. 2,028,639, 21.1.36. Appl., 26.10.34).—Dolomite ($CaCO_3$ 50—70, $MgCO_3$ 25—46%) is calcined, treated with H_2O, and the slurry chlorinated. $Mg(OH)_2$ is allowed to settle and the aq. $CaOCl_2$ siphoned off. L. C. M.

Production of potassium sulphate. I. L. Clifford, and Imperial Chem. Industries, Ltd. (B.P. 460,281, 25.7.35).—A 3-stage cyclic process is claimed; the steps are: (*a*) sylvinite is treated with Na_2SO_4 and glaserite (I) in H_2O at 0° to give K_2SO_4 and a mother-liquor, which is (*b*) treated with Na_2SO_4 to give a ppt. of (I) for stage (*a*) and a second mother-liquor, which is (*c*) evaporated to remove NaCl and cooled to ppt. a mixture of KCl and (I) [returned to stage (*a*)] and leave a third mother-liquor which is returned to the head of stage (*c*). A. R. P.

Treatment of raw phosphates. Kaiser-Wilhelm-Inst. f. Eisenforschung Eingetragenen Ver. (B.P. 453,646, 11.2.35. Ger., 15.8.34).—A mixture of ground phosphate rock with sand (approx. 15 wt.-%) is heated at $>1000°$ (1400°) in a tubular rotary furnace; F compounds are carried away by a stream of hot gases containing H_2O which passes over the molten material. L. C. M.

Manufacture of phosphates. G. E. Taylor, Assr. to Gen. Chem. Co. (U.S.P. 2,028,632, 21.1.36. Appl., 12.7.32).—Aq. H_3PO_4 is freed from org. material and Fe by treatment with just sufficient $Na_2Cr_2O_7$; on neutralisation with Na_2CO_3, Fe and Cr hydroxides are filtered off to give pure aq. Na_2HPO_4. L. C. M.

Manufacture of acid alkali pyrophosphates. Chem. Fabr. Budenheim A.-G. (B.P. 461,871, 14.9.36. Ger., 2.11.35).—An alkali metaphosphate (I), moistened with H_2O, is heated in presence of steam at 170—300° (200°). Alternatively, an aq. solution of (I) may be employed, being rapidly dried on a heated band or roller. W. J. W.

Production of metallic sulphates, and ammonium sulphite and sulphur or ammonium thiosulphate. Amer. Zinc, Lead & Smelting Co. (B.P. 461,849, 14.4.36. U.S., 15.4.35).—Metallic sulphides are heated with $(NH_4)_2SO_4$ in a furnace in absence of O_2 at 350—440°, so as to volatilise S and $(NH_4)_2SO_3$ without decomposing the metallic sulphate produced. The volatilised products pass to a tower kept at 100—150°, from which the sublimate is removed almost entirely as $(NH_4)_2S_2O_3$, and the gaseous NH_3 passes to an absorption tower in which it is absorbed in H_2O. W. J. W.

Manufacture and recovery of ammonium chloride and sodium bicarbonate. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 462,132, 3.9.35).—The reaction of NaCl with NH_4HCO_3 is carried out in presence of such substances as urea, biuret, and $(CN{\cdot}OH)_3$, so that NH_4Cl is deposited in coarse cubical crystals. It may be separated by decanting the $NaHCO_3$, or by treatment with flotation agents (oil, fatty acid salts), or by sieving. W. J. W.

Manufacture of zinc sulphide. T. A. Mitchell and R. L. Sessions, Assrs. to Hughes–Mitchell Processes, Inc. (U.S.P. 2,028,162, 21.1.36. Appl., 8.1.32).—Roasted blende is dissolved in dil. HCl, and the solution, purified from Fe, SO_4'', etc., is treated with BaS. The ZnS is collected, and the filtrate treated with aq. $NaSO_4$. The $BaSO_4$ is removed and reduced to BaS by heating with C, and the NaCl obtained by evaporating the solution is treated with H_2SO_4 (prepared from the roaster gases), regenerating HCl, which is utilised for dissolving the ZnO, and Na_2SO_4 for pptn. of the $BaCl_2$. L. C. M.

Treatment of metallic salt solutions [from petroleum refining]. P. C. Rich, Assr. to Vapor Treating Processes, Inc. (U.S.P. 2,028,473, 21.1.36. Appl., 11.6.34).—Heavy-metal aq. solutions (*e.g.*, of $ZnCl_2$) containing org. N bases etc. are treated with the metal oxide or hydroxide (*e.g.*, ZnO); the org. material which separates as an oily layer is removed and the solution returned to working. L. C. M.

Manufacture of chromium hydroxide green. G. Siegle & Co. G.m.b.H. (B.P. 461,799 and Addn. B.P. 461,800, [A, B] 17.7.36. Ger., [A] 2.8.35, [B] 7.2.36).—(A) A mixture of $Na_2Cr_2O_7$, H_3BO_3, and S is heated for 1 hr. at 600—620°, and the hot mass boiled with H_2O, washed, and dried. The use of S ensures a darker and more transparent product. (B) Instead of, or in addition to S, reducing agents (thiosulphate, thiourea, polysulphides) or carbohydrates (starch, dextrin) may be employed. W. J. W.

Extraction of titanium compounds from titanium-containing ore. United Color & Pigment Co., Inc., Assees. of W. J. Cauwenberg (B.P. 457,719, 27.1.36. U.S., 4.3.35).—Ground ilmenite (200-mesh) 1 pt. is heated at 120—130° with H_2SO_4 (*d* 1·84) 2 pts.; dextrin or sugar 0·006 pt. is added, and after the reaction has ceased the cooled, porous mass is leached with H_2O, yielding aq. $Ti(SO_4)_2$. L. C. M.

Manufacture of titanium dioxide. R. H. Monk and A. S. Ross, Assrs. to Amer. Zinc, Lead & Smelting Co. (U.S.P. 2,028,292, 21.1.36. Appl., 12.7.34).—Aq. $Ti(SO_4)_2$ 100—200 g. per litre (2 vols.) is added slowly to aq. 0·5% dextrin (3 vols.) at 80°; the mixture is boiled to complete hydrolysis, diluted, and the TiO_2 collected. L. C. M.

Manufacture of hydrated titanium compounds. Titanium Pigment Co., Inc. (B.P.

462,206, 31.1.36. U.S., 2.2.25. Addn. to B.P. 387,720; B., 1933, 316).—The mineral acid solution of Ti salts containing $CaSO_4$ is pptd. with NH_4, or alkali, or alkaline-earth compounds, *e.g.*, Na_2CO_3, KOH, aq. NH_3, $CaCO_3$, CaO, $Ca(OH)_2$, or $Ba(OH)_2$, to produce the hydrated Ti compounds. W. J. W.

Treatment of silicate ores [zircon]. C. Deguide (B.P. 460,410, 17.6.36).—An intimate mixture of zircon 100 and $BaCO_3$ 320 pp. is heated at 1400° to yield a sintered mass of Ba_2SiO_4 (I) and $BaZrO_3$ (II), which is extracted with H_2O to remove $Ba(OH)_2$ from (I), leaving a mixture of (II) and $BaSiO_3$ (III). The insol. material is digested with Na_2CO_3 to convert (III) into $BaCO_3$ (IV) and yield a solution from which Na_2SiO_3 is recovered by evaporation. The mixture of (II) and (IV) is calcined at 1400° to produce Ba_2ZrO_4, or mixed with sufficient ZrO_2 and calcined to produce pure (II). Both (II) and (V) are useful refractories; they yield a residue of ZrO_2 on leaching with HCl. A. R. P.

Working-up of [catalytic] materials containing molybdenum or tungsten. H. E. Potts. From Internat. Hydrogenation Patents Co., Ltd. (B.P. 459,554, 24.8.35).—W and Mo are recovered from catalytic masses employed in hydrogenation reactions etc. by burning off org. material at >800° (1000°) and autoclaving the calcine at 140° with 48% $(NH_4)_2CO_3$ solution. The liquor, containing NH_4 tungstate or molybdate, is worked up by treatment with $(NH_4)_2S$. L. C. M.

Production of hydrogen peroxide. H. Schmidt (B.P. 461,792, 3.6.36. Ger., 22.6.35).—Distillation of solutions containing H_2O_2 is effected in heated tubular stills under vac., the vapours being drawn off both at the upper and lower ends at a speed controlled by regulators. The distillation is effected in stages, the vapours at each stage being removed by means of a separator and the solution being diluted with a salt or acid solution akin to it before entering the next stage. W. J. W.

Distillation [for production of hydrogen peroxide]. C. W. Tucker and F. Dorrill, Assr. to E. I. Du Pont de Nemours & Co., Inc. (U.S.P. 2,028,481, 21.1.36. Appl., 29.7.33).—Aq. $H_2S_2O_8$ (270 g. per litre) is distilled by passage through a spiral tube at 120°/120—200 mm., and the distillate redistilled in steam, yielding aq. 6% H_2O_2. L. C. M.

Ozonising apparatus. F. O. Read (B.P. 461,217, 27.3.36).—The apparatus comprises (above) a hermetically sealed transformer compartment and (below) a ventilated ozoniser, with suitable plug connexions between the two and to the supply. B. M. V.

Sulphur-burning apparatus. D. Teatini (B.P. 461,665, 14.5.36. Belg., 17.5.35).—A S-melting chamber is superposed on at least two combustion chambers, the S being run to the latter separately or in cascade. Cooling jackets are placed between the combustion chambers; the inlet of air is central and the outlet of SO_2 peripheral. B. M. V.

Sulphur dispersion. G. R. Tucker, Assr. to Dewey & Almy Chem. Co. (U.S.P. 2,028,482, 21.1.36. Appl., 3.7.33).—The dispersing agent is prepared by sulphonation of $C_{10}H_8$ with conc. H_2SO_4 at 160°, adding H_2O and 40% CH_2O to the cooled liquid, and stirring the mixture for 3 hr. with further addition of 40% CH_2O. After stirring for 18 hr. at 95—100°, the mixture is cooled, neutralised with NaOH, evaporated, and dried. Aq. dispersions are prepared containing S, either finely ground or produced from $H_2S + SO_2$, with 2—5 wt.-% of dispersing agent. L. C. M.

Production of sulphur dioxide from [petroleum-refining] acid sludge. F. J. Bartholomew, Assr. to Chem. Construction Corp. (U.S.P. 2,028,713, 21.1.36. Appl., 2.12.33).—The sludge acid is decomposed by treatment with sand heated to 820°. A gas containing SO_2 75—90% is obtained; the clinker is burned and most of the sand thereby recovered. L. C. M.

[SO_2] gas-cooling apparatus.—See I. **Separating Fe from ores [bauxite].**—See X. **Washing compositions.**—See XII. **Fertilisers.**—See XVI. **Ca pectinate.**—See XIX.

VIII.—GLASS; CERAMICS.

Technical proposals and data for an examination of the thermal performance of glass-melting tanks. W. Friedmann (J. Soc. Glass Tech., 1936, **20**, 596—639T).—A comprehensive treatment of a heat balance and proposals for a standardised method of comparison are described. J. A. S.

Proposals for a standard basis for the expression of tank-furnace performances. W. A. Moorshead (J. Soc. Glass Tech., 1936, **20**, 640—650T).—The effects of load factor and age of the tank on melting efficiency are eliminated by (1) making the comparison at a standard load (L_s) of 15 sq. ft./ton/24 hr., the standard amount of cullet being $33\frac{1}{3}\%$, (2) assuming a standard coal/glass ratio of 0·15 (0·09 for oil) for a Na_2O–CaO–SiO_2 bottle glass and obtaining the fuel consumption (F_a) and load (L_a) during the first third of the estimated life of the tank (neglecting the first 1—2 weeks), (3) calculating the amount of glass from the batch charge. The fuel consumption for the standard load $(F_s) = F_a + 0{\cdot}15[L_s - (1{\cdot}10 - 0{\cdot}3n)L_a]$, n being the amount of cullet. The corr. performance is L_s/F_s. The application of this method of comparison to several tanks is illustrated. J. A. S.

Methods of investigating glass currents in tank furnaces. W. Schneekloth and W. Spielvogel (J. Soc. Glass Tech., 1936, **20**, 651—675T).—Methods previously used and the authors' own experience with the "bore-hole" method are described. Holes 18 mm. diameter × 30 mm. deep were drilled in the surface of the refractory. The direction of the glass flow is clearly revealed by the directional erosion of the holes. The rebuilding of a worn-out tank in a "grave yard" has also given useful information about glass flow. J. A. S.

Flow of glass in tanks. A. L. Marden (J. Soc. Glass Tech., 1936, **20**, 676—679T).—It is proposed to reduce the longitudinal and increase the lateral

currents by feeding the batch at several points and by providing air-cooled side walls inclined at 45°. The Mulholland 3-stage melting tank is discussed.
J. A. S.

Report from Committee II of the D.G.G. on refractory materials for glass-furnace regenerators. O. Bartsch (J. Soc. Glass Tech., 1936, **20**, 595T).—A brief summary is given of Tech. Rept. No. 34 of the Deuts. Glastech. Ges. (D.G.G.), dealing with tests on 45 different materials of all types.
J. A. S.

Bricks of artificial agglomerated mullite for regenerator packing. P. Bergeron (J. Soc. Glass Tech., 1936, **20**, 586—594T).—The results of laboratory and service tests on a clay-bonded aggregate of electro-cast grog are described. The bricks had an excellent resistance to corrosion.
J. A. S.

Fireclay grog for glass refractories. R. Barta (J. Soc. Glass Tech., 1936, **20**, 570—573T).—The properties and uses of various types of grog are described.
J. A. S.

Destruction of grog brick by carbon monoxide. P. P. Budnikov (Novo. Tech., 1934, No. 26, 11).—FeS_2 in the clay changes into oxide when fired. This catalyses the formation of CO_2 and C from CO at 450—500°, and C deposits in the pores of the brick and destroys them. Addition of small amounts of $CuSO_4$ to the mix increases the resistance of grog bricks to the effects of CO. The Fe content of the brick should be reduced to 1—1·3% and uniformly distributed. The porosity should be $\ngtr$18% and the brick fired at 1300—1350°. FeO increases the *d* and promotes formation of mullite.
Ch. Abs. (*e*)

Testing of [glass-]tank blocks. O. Bartsch (J. Soc. Glass Tech., 1936, **20**, 536—547T).—Report No. 38 of the Technical Committee of the Deuts. Glastech. Ges. is summarised. Tests of the solubility of a refractory in molten glass (model tank, immersed rod, and floating body) do not give a reliable measure of the important factors of stone and cord formation. Physical measurements (porosity, permeability) of the refractory, a study of the glass–refractory interlayer, and direct measurement of the tendency to form cord and stones are quite as important as solubility tests.
J. A. S.

Testing of [glass-]tank blocks. J. F. Hyslop (J. Soc. Glass Tech., 1936, **20**, 566—569T).—Useful information is obtained from a petrological examination of a material in the "as-received" condition and after a severe heat-treatment (*e.g.*, 24 hr. at 1600°). The treatment serves to render the microscopical examination easier and to reveal the metamorphic tendencies of the material, which, in absence of harmful fluxes, should not be high.
J. A. S.

Testing of refractory blocks for glass-tank furnaces. J. H. Partridge (J. Soc. Glass Tech., 1936, **20**, 548—565T).—A scheme is proposed for the physical examination of texture and mineralogical constitution and the chemical examination of resistance to attack by acid mixtures and molten glasses.
J. A. S.

Heat-resisting steels for the glass industry. R. J. Sarjant and T. H. Middleham (J. Soc. Glass Tech., 1936, **20**, 685—716T).—A comprehensive discussion of all phases of the subject.
J. A. S.

Effect of the chemical composition of colloids in moulding sand. A. Glazunov (Metallwirts., 1937, **16**, 13—19).—Colloidal Fe_2O_3, SiO_2 gel, clay, and sugar were added to quartz and other sands, which were then compressed, baked at 110°, and tested for strength. In general, appreciable bonding occurs only when the colloid reacts with the sand, although there is some physical adhesion as well. When two colloids of opposite sign are present together the bonding effect of one is destroyed by that of the other.
C. E. H.

New developments in glass for constructional purposes. J. Polivka (J. Soc. Glass Tech., 1936, **20**, 764—768T).—Heat and acoustical insulation, uniformity and diffusion of room lighting, and the mechanical testing of glass construction units are briefly discussed.
J. A. S.

Co-operative tests on mechanical strength of glass. L. Navias (J. Soc. Glass Tech., 1936, **20**, 530—535T).—Compressive and cross-bending tests carried out at several laboratories on a variety of glasses are reported. The effects of the size and surface-finish of the test-piece and the method of application of the load are indicated.
J. A. S.

Determination of the coefficient of expansion of glass from the curvature of a double thread. B. V. Rabinovitsch (Zavod. Lab., 1936, **5**, 624—629).—A thread of standard thickness is drawn out of a double plate, formed by fusing a plate of standard glass to one of the glass under examination. The coeff. of expansion of the latter is derived from measurements of the curvature of the thread.
R. T.

Glasses of special composition. O. Knapp (Tech. Kurir, 1937, **8**, 18—20).—A review.
E. P.

Czechoslovakian specifications for lead glasses. V. Čtyroký and M. Fanderlik (Glastech. Ber., 1937, **15**, 22—25).—Chemical and physical analytical data for 33 glasses are recorded. The PbO content alone is an insufficient criterion of the quality of a glass and the following specifications are proposed for "Bohemian lead glass," "Bohemian Pb crystal glass," and "Composition glass for Gablonz ware and imitation jewels," respectively: M_D $\nless$1·519, 1·530, 1·61; r^{-1} (relative dispersion) $\nless$0·017, 0·020, 0·027; *d* $\nless$2·56, 2·78, 3·54; PbO content $\nless$9·0, 20·0%, —.
J. A. S.

Simple unsintered lead glazes [for ceramics]. K. Litzow [with B. Jaeschke and I. Friedrich] (Sprechsaal, 1937, **70**, 43—46).—Devitrification, due to crystallisation of tridymite, occurs in $PbO–SiO_2$ glazes when the mol. ratio of SiO_2 is $>$1·8. This tendency is corr. by adding $<$0·1 mol. of Al_2O_3 per mol. of SiO_2 present, but this increases the η of the glaze.
G. H. C.

Absorption-reflexion spectra of the [ceramic] chrome colours. A. G. Gaydon (Trans. Ceram. Soc., 1937, **36**, 49—55).—Details of the method are given by which the absorption curves (cf. Mellor, B., 1937, 345) were obtained for 7 tiles glazed with various Cr colours. The curves (optical d/λ) were calc. from measurements of the spectra (of the light scattered from the tile surface) photographed through a neutral-tint wedge and against a comparison spectrum of the light scattered from the white back of a tile. For the chrome-green (probable colouring material, Cr_2O_3), Victoria-green ($CaCr_2O_4$), chrome-yellow ($PbCrO_4$), and chrome-brown ($ZnCr_2O_4$) tiles, vibrational structure of the spectrum of a definite chemical mol. was suggested. The chrome-Sn crimson (colloidal Cr_2O_3 on SnO_2), chrome-Sn pink, and coral-red (basic Pb chromate) colours seemed to be more like those produced by variation of particle size or some interference phenomenon. A. L. R.

Production of cooking utensil enamels. H. Lang (Glashütte, 1937, 67, 5—8).—The quality and economics of the early and present-day enamels are compared. A plea is made for a return to the well tried orthodox enamels from which careful progress should be made. It is emphasised that no satisfactory adhesion-promoting agent is known which can replace Co_2O_3. The general principles for the production of ground- and cover-coat enamels are briefly described. J. A. S.

Gas opacification in enamels. R. Aldinger (Keram. Runds., 1937, **45**, 13—15).—The history and principles of gas opacification are outlined. The method is of great val. in Germany where there is no natural source of the solid opacifying agents, such as ZnO, Sb_2O_3, and ZnO_2. J. A. S.

Rapid determination of granulometric composition of ceramic powders and masses. E. M. Skibina (Zavod. Lab., 1936, 5, 637—643).—Apparatus for determination of content of granules of different size is described. R. T.

Volumetric determination of silica in Dinas, quartzite, clays, and fireclays by means of hydroxyquinoline. M. I. Volinetz (Zavod. Lab., 1936, 5, 162—164).—Modifications of Berg and Teitelbaum's method (A., 1928, 383) are described. R. T.

Alsimag 196—a new ceramic insulating material for high-frequency purposes. H. Thurnauer (Radio Eng., 1935, **15**, 15—16, 25).—The properties of a group of steatite materials are reviewed. Ch. Abs. (*e*)

Pottery manufacture. A. S. W. Odelberg (Trans. Ceram. Soc., 1937, **36**, 56—62).—Practical recommendations regarding the various processes are made. The importance of controlling the raw materials and the grain size of the mill products is emphasised. The Dorr mill is the most economical and reliable for grinding large quantities, and de-airing is advantageous. Mechanical conveyance of ware should be employed as much as possible. Producer-gas firing, combined with the use of saggars, is considered still to be the most economical for biscuit and glost tunnel kilns, whilst the electric tunnel kiln is best for hardening-on and enamelling. A. L. R.

Vitreous china in the field of sanitary ware. A. Staerker (Ber. deut. keram. Ges., 1937, **18**, 11—24).—The merits of the material are set forth. G. H. C.

[Application of] expansion measurements in the control of crazing [on glazed pottery]. H. Möhl (Sprechsaal, 1937, **70**, 71—73, 83—85).—The development of crazing is associated with swelling due to absorption of H_2O by the body, and is accelerated by superheated steam. The production of crazing, or the expansion of a test-piece, after 24 hr. in saturated steam at 2 atm. is a good test for the tendency for crazing to develop on ageing. Crazing is associated with underfiring and excess of felspar in the body; addition of basic material, *e.g.*, $CaCO_3$, reduces it. Excess of SiO_2 produces another form of crazing due to differing thermal expansions of glaze and body. G. H. C.

Caustic magnesia lining for arc furnaces. V. Bogolulov (Novo. Tech., 1934, No. 37, 1—2).—Caustic MgO (I) fired at 800—1000° crystallises more easily than sintered magnesite (II). A rammed mix for arc furnaces contained 80% of (II) and 20% of (I). It recrystallised with every melting and changed finally into a monolithic structure resisting highly oxidising melts. Such linings were used successfully in Héroult arcs for melting steel and ferrochrome. Ch. Abs. (*e*)

Chromite lining for industrial furnaces. Grigoriev (Zitein-So., Ser. 79, No. 1828).—Chromite refractory mortar is prepared by mixing chromite (80—95%) with aluminous cement (2—5%) and a little H_2O. The mixture is highly refractory, resists pressure, and is chemically resistant. Ch. Abs. (*e*)

Silicon carbide refractories and their application in boiler furnaces. J. Walker (Steam Eng., 1934, 3, 341—342).—SiC refractories do not deform at high temp. under load; they resist the attack of slag with a low Fe or Ca content but are attacked by liquid slag high in basic oxides. Ch. Abs. (*e*)

Engobing and glazing of fireclay ware. Anon. (Keram. Runds., 1937, **45**, 25—26).—Manufacturing instructions are given. J. A. S.

Action of slags on refractories; methods of testing. A. E. Dodd (Trans. Ceram. Soc., 1937, **36**, 63—73).—The use of equilibrium diagrams (exemplified by the system $CaO–Al_2O_3–SiO_2$) and their limitations in predicting the extent of slag attack are described, and the effect of the physical properties (texture, tensile strength, and resistance to abrasion, thermal conductivity, and emissivity of the surface) on the slag-resistance of the refractory is considered. The chief difficulties inherent in laboratory slag tests are (1) completely reproducing service conditions or, conversely, eliminating all but one factor, (2) obtaining quant. results. It is concluded that empirical tests have probably reached the limit of usefulness; work on the fundamental chemical and physical effects involved is advocated. A. L. R.

Gas-permeability of refractories. N. Lozinski and S. German (Ukrain Nauch.-Issledov. Inst. Ogneu. Kis., 1934, **30**, 24 pp.).—An apparatus for measuring permeabilities is described. The coeffs. of gas-permeability at room temp. of grog and SiO_2 brick were 1·40—3·92 and 0·146—0·807, respectively. Ch. Abs. (*e*)

Comminution. Stoneware filters.—See I. **Cement-kiln lining.**—See IX. **Influence of molten Al on firebrick.**—See X.

See also A., I, 186, **Systems SiO_2–CaO–MnO and CaO–TiO_2,SiO_2–MnO,TiO.** 198, **Rapid determination of SiO_2 in clay, emery, etc., and microdetermination of silicic acid in sol. silicates etc. Determining quartz in presence of silicates.** 206, **Accelerated weathering of felspars.**

Patents.

Manufacture of moulding sand. A. P. Thurston. From Babcock & Wilcox Co. (B.P. 461,480, 15.5.36).—Al silicate is heated in a continuous kiln (preferably rotary) to the temp. of incipient fusion (1590—1700°), cooled, and comminuted to form artificial sand, which is mixed before use with unburnt kaolin free from uncombined SiO_2. B. M. V.

Tunnel kilns. Gibbons Bros., Ltd., and W. E. Gibbons (B.P. 461,088, 11.9.35).—The kiln is of the counterflow recuperative type, having two lines of goods travelling in opposite directions. Mechanical circulation of the internal atm. is effected in the heat-exchanging end-portions by conduits and fans on the roof outside the goods space, the inlet and outlet ports being in the side walls. Additional internal fans under the crown of the roof may be provided to effect mixing of the atm. B. M. V.

Tunnel kiln. C. H. Parmelee, Assr. to Onondaga Pottery Co. (U.S.P. 2,039,445, 5.5.36. Appl., 20.4.35).—In a kiln suitable for glost firing of articles not in saggers, in a stagnant atm. fully saturated with volatile constituents of the glaze, convection currents are reduced to a min. consistent with uniform temp. by reducing the height of the side muffle walls in comparison with the width of the tunnel; the hearth is also heated. There are no trucks, the goods being placed on hearth plates which are advanced by a walking-beam motion situated on the centre line, on each side of which are flues heating the plates from below. B. M. V.

Melting of glass. P. L. Geer, Assr. to Amco, Inc. (U.S.P. 2,039,955, 5.5.36. Appl., 9.6.32).—In a continuous, recuperative, non-reversing furnace the flames pass concurrent with the glass in a melting chamber (*M*), then turn upwards around an arch wall to a flue above *M*. Between *M* and the working chamber (*W*) is another transverse wall upstanding from the hearth and perforated for flow of glass; the two walls jointly prevent direct flow of hot gas from *M* to *W*. B. M. V.

Melting of glass by electricity. D. Stenhouse, Assr. to Hazel–Atlas Glass Co. (U.S.P. 2,039,853, 5.5.36. Appl., 3.10.33).—Batch material is added to molten glass in a rotary cylindrical furnace. Electrodes are embedded in the cylindrical wall and the current is passed between two at a time by means of a commutator, one of those two being below the bath level and the other above on the rising side of the furnace. The upper electrode is surrounded by a mass of glass which has been lifted by suitable refractory projections from the interior of the wall, and when the mass spills out it forms an arc which is the principal source of heat. B. M. V.

Laminated glass and like products. A. Kämpfer (B.P. 461,201, 20.9.35. Ger., 12.4.35).—Interposed sheets consisting of polymerised vinyl acetate (I) or acrylic ester (II) are caused to adhere to the glass by pre-immersion in a solution of low-η (I) or (II), or both, in a high-boiling solvent, *e.g.*, $OH\cdot[C_2H_4]\cdot OEt$. S. M.

Laminated glass. A. Kämpfer (B.P. 461,684, 23.8.35).—A vinyl acetate or acrylic ester polymeride (mol. wt. 720—800) is incorporated at 80—140° with 7—20% of a softening agent, *e.g.*, o-$C_6H_4(CO_2Bu)_2$, and forced out of the containing vessel to form a layer the thickness of which is 70% that of the glass sheets. S. M.

Production of laminated glass. A. Kämpfer (U.S.P. 2,038,494, 21.4.36. Appl., 18.3.35. Ger., 14.3.34).—Sheets of glass are joined by a comparatively thick layer of a partly polymerised resin, the exposed edges of which are subjected to O_2 or other polymerisation catalyst until they harden. S. M.

Safety glass. Carbide & Carbon Chemicals Corp., Assees. of E. W. Reid (B.P. 460,230, 24.7.35. U.S., 29.8.34).—Polyvinyl acetal resins produced by the process of B.P. 459,878 (B., 1937, 470) are used for the interposed layers. S. M.

Decoration of pottery, glass, and like articles. B. Capper (B.P. 461,011, 15.8.35).—A "dry" or "semi-dry" colour is applied by transfer and fired, giving a matte pattern on the bright ground; the whole is then covered with bright Au, Ag, or Pt and again fired, the pattern still showing as a dull one on a contrasting bright surface. B. M. V.

Producing a ceramic body. R. C. Benner and H. N. Baumann, jun., Assrs. to Carborundum Co. (U.S.P. 2,036,190, 7.4.36. Appl., 30.12.32).—A mixture of SiO_2, Al_2O_3, and an alkaline-earth oxide (*e.g.*, MgO 15, Al_2O_3 35, SiO_2 50%) is fused and either (1) cast in the molten state with subsequent annealing, or (2) granulated by cooling and crushing or by pouring into H_2O, after which the granular material is moulded and sintered (1200—1400°). During the heat-treatment the material is allowed to devitrify to a certain degree so that the product has a low coeff. of expansion ($<2{\cdot}5 \times 10^{-6}$) and a high resistance to thermal shock. J. A. S.

Joining of ceramic insulating members and metallic members. Porzellanfabr. Kahla, and H. Handrek (B.P. 461,262, 13.8.35. Ger., 13.8.34, 17.8.34, and 26.1.35).—The metal is very thin ($<0{\cdot}1$ mm.) at the joint irrespective of the thickness elsewhere, and a fused joint is run by a blow lamp or high-frequency induction by means of glass or a fluxing glaze of lower m.p. than that of the main ceramic part and preferably of 10—40% lower coeff. of expansion. Preferably also the metallic member is shrunk on to the ceramic part. B. M. V.

Manufacture of refractory ware. Silika- u. Schamotte-Fabriken Martin & Pagenstecher A.-G. (B.P. 461,240, 6.7.35. Ger., 16.7.34).—A composition containing chrome ore, sintered or fused

MgO, or other refractory material is composed of fine and coarse particles, the surface of the latter being coated with a highly refractory material, *e.g.*, talc, spinel, Al_2O_3. The mixture, which is moulded and fired in the ordinary way, possesses a high resistance to spalling. *E.g.*, grains of sintered magnesite (0·8—3 mm.) are sprayed with conc. aq. $Al(NO_3)_3$ and set aside. This treated material (7) is mixed with grains of fine ($<0\cdot1$ mm.) sintered magnesite (3 pts.), pressed, and fired. J. A. S.

Regenerative brickwork. W. M. Bailey Co. (B.P. 461,458, 27.1.36. U.S., 27.9.35).—The bricks are in the form of hollow squares with recesses in the corners to afford a firmly locked but very open structure. B. M. V.

Production of resin-coated abrasive grain for abrasive articles. W. J. Tennant. From Carborundum Co. (B.P. 461,437, 16.8.35).—To prevent caking, the abrasive grains after being coated with (a thermo-hardening phenolic) resin and plasticiser are exposed in a thin layer to an atm. having v.p. $<$ that of the mixture. S. M.

Zircon refractories.—See VIII. **Pickling ferrous metals.**—See X. **Acetal resins [for glass].**—See XIII.

IX.—BUILDING MATERIALS.

Hydraulic limes—and how to distinguish them. J. Ward (Proc. Soc. Chem. Ind., Chem. Eng. Group, 1936, **18**, 44—45).—The classification of limes on the basis of analysis, hydraulicity, and tensile and crushing strength is discussed. D. K. M.

Puzzuolana. IV. Analysis. Q. Sestini and L. Santarelli (Annali Chim. Appl., 1936, **26**, 533—557; cf. B., 1936, 885).—Analytical data for various types of puzzuolanas and derived cements are tabulated. F. O. H.

Grinding in cement works. A. Baouman (Rev. Mat. Constr., 1936, 196—201).—The theory of tube mills is examined in relation to the nature and grading of the balls and the design of the diaphragms between the chambers. The degree of grinding of the clinker should follow a nearly linear course through the length of a compound mill, and deviations from this ideal may arise from incorrect feeding of one or more chambers due to wrong feed or separating diaphragm, or from balling of partly ground clinker due to insufficient small balls in the charge. Bad overall grinding is due to insufficient balls in the mill.
G. H. C.

Magnesite lining for cement kilns. Grigoriev (Zitein-So., 1934, Ser. 79, No. 61).—Addition of calcined MgO to cement does not affect the vol. stability of concrete. MgO present in magnesite brick is dead-burnt and therefore does not react with the constituents of the cement mix. Magnesite brick is recommended for lining cement kilns.
Ch. Abs. (*e*)

Determination of sulphur occurring as sulphide in Portland cement. H. A. Bright (J. Res. Nat. Bur. Stand., 1937, **18**, 137—139).—The S is liberated as H_2S by boiling with aq. HCl, in presence of $SnCl_2$ to reduce oxidising impurities. The H_2S is collected in ammoniacal $ZnSO_4$ solution, and titrated with KIO_3. A. J. E. W.

Constitution of Portland cement and the development of its technical properties. J. M. Jaspers (Rev. Mat. Constr., 1936, 127—129, 148—152, 178—182, 201—206, 224—226, 255—259, 273—277; 1937, 10—13, 29—32).—Existing phase-rule data and methods for calculating mineral constitution of cement are reviewed. G. H. C.

Attempt at rational classification and nomenclature for Portland cements. S. Solacolu (Zement, 1936, **25**, 419; Rev. Mat. Constr., 1937, 14—15).—Using SiO_2 modulus (*S*) as ordinate and Al_2O_3 modulus (*A*) as abscissa, the various types of cement are assigned to appropriate areas of a diagram. The following basic classification is proposed: Portland cements, $S = 1\cdot8$—$2\cdot5$, $A = 1\cdot5$—$2\cdot4$; high-SiO_2 Portland cements, $S > 2\cdot5$, $A = 1\cdot5$—$2\cdot4$ (for mass concrete); ferro-Portland cements, $A < 1\cdot5$ (rapid-hardening cements) and aluminous Portland cements, $A > 2\cdot4$ (high H_2O-tolerance, for grouting, poured concrete). G. H. C.

Lime-saturation value and chemical composition [of cements]. A. R. Steinherz (Rev. Mat. Constr., 1937, 3—8).—Curves are given relating hydraulic modulus and SiO_2 modulus for various degrees of CaO saturation at const. Al_2O_3 modulus $= 2\cdot00$, together with a table of correcting factors for other Al_2O_3 moduli. G. H. C.

Can the Anstett test be used for cements for use in sea-water? C. Miroir (Rev. Mat. Constr., 1936, 246—252).—The test (grinding the set cement and compressing the powder with gypsum to form a cake, which crumbles if action ensues) is valuable if a mixture of $MgSO_4,7H_2O$ 86·7, $CaSO_4,2H_2O$ 11·8, and $KHCO_3$ 1·5% be used in place of pure $CaSO_4,2H_2O$. For testing the resistance to H_2O containing SO_4'', the Anstett procedure is applicable only if metals other than Ca are absent.
G. H. C.

New tests on cements for marine works. P. Dumesnil (Rev. Mat. Constr., 1937, 1—3).—Laboratory tests can never replace practical marine tests.
G. H. C.

Anomalous behaviour of mortar coats. E. Abel and F. Halla (Ind. Eng. Chem., 1937, **29**, 330—333).—The peeling off of circular patches was traced to the presence of CaO which had escaped hydration through overburning and therefore did not absorb CO_2 as fast as the surrounding mortar. When ordinary white CaO was slaked, soaked for 3 days in H_2O, and passed through a $\frac{1}{8}$-in. sieve, particles from the residue remaining on the sieve produced the same defect when implanted in otherwise sound mortar.
G. H. C.

Best thermal treatment for concrete. S. A. Mironov (Rev. Mat. Constr., 1936, 152—155).—Ultimate strength of mortar and concrete is increased by exposure to a temp. of 0—4° during setting and at early ages. Lower or higher temp. impair ultimate strength; heating, if applied, should be gradual and $\nless 36$ hr. after placing. G. H. C.

Effect of temperature on the stress-deformation of concrete. A. U. Theuer (J. Res. Nat. Bur. Stand., 1937, **18**, 195—204).—The effect of temp. changes between 3·3° and 50·5° on the elastic and plastic properties of Portland cement concrete under compressive stress has been investigated. The deformation of moist specimens increases with rising temp.; with dry specimens the deformation is almost independent of temp. A. J. E. W.

Corrosive effect of ground-water on concrete. T. Karttunen (Tekn. Aikak., 1935, **25**, 301—302).—Changes in composition of the cement lining of a well are recorded. Ch. Abs. (*p*)

Usefulness of Ukrainian granites for acid-resisting construction. A. I. Kogan and L. E. Schvartzburg (Chimstr., 1935, **7**, 429—431).—These granites may be successfully used in place of andesite. Ch. Abs. (*e*)

Production of dynamidon brick from bauxite. N. P. Kotschubei (Tekh-So, 7099, Ser. 79, 4 pp.).—Brick production from bauxites containing hydrargillite and diaspore is described. Ch. Abs. (*e*)

Carbon brick. M. A. Uralov and A. S. Bereshnoi (Ukrain. Nauch.-Issledov. Inst. Ogneu. Kis., 1934, No. 31, 76 pp.).—Production details are given. Ch. Abs. (*e*)

Shape of crushed stone and gravel and its measurement. A. H. D. Markwick (Chem. & Ind., 1937, 206—213).—Methods of measuring the shape of crushed stone, with a no. of results, and their bearing on practice are described. D. K. M.

Road emulsions and their new uses. R. G. Smith (J. Inst. Eng. Australia, 1935, **7**, 361—368).—An apparatus is described for measuring the stability as a function of film thickness of asphalt coatings. The properties and uses of road emulsions are discussed. Ch. Abs. (*e*)

Safe road surfaces. D. M. Wilson (Proc. Soc. Chem. Ind., Chem. Eng. Group., 1936, **18**, 46—50).—For new roads, non-skid surfaces can be obtained by rolling granite chippings precoated with bitumen on to compressed asphalt which has been coated with bituminous paint, by light rolling granite chippings into a layer of mastic asphalt containing similar chippings, by use of tar macadam to which topping coats are added when required, and by surfacing concrete with asphalt. For old roads, surfaces are made of binding material and granite chippings, the latter in some instances being precoated with bitumen. The results of some skidding tests are given. D. K. M.

Utilisation of the larch tree in the U.S.S.R. I. S. Matjuk (Bull. Appl. Bot., U.S.S.R., 1934, *A*, No. 14, 185—194).—Data for the turpentine and cellulose content of larch are summarised. Ch. Abs. (*e*)

Impregnation of wood. B. Häger (Trävaruind., 1935, **20**, 281—284).—Logs are treated for some hr. with aq. Na arsenate at 92—94°, kept in this solution for 12 hr. at 75—80°, and then immersed for 12 hr. in cold aq. $ZnCl_2$. The pptd. Zn arsenate is insol. and non-poisonous, although it poisons wood-destructive organisms. Ch. Abs. (*e*)

Intake and fixation of mercuric chloride in wood impregnation. H. Haas (Österr. Chem.-Ztg., 1937, **40**, 124—126).—The intake of $HgCl_2$ by pine shavings follows the course of an adsorption isotherm. The process is reversible and not affected by drying the wood. A. G. P.

Wood flour, its production and use. E. Belani (Chem.-Ztg., 1937, **61**, 176—177).—A description is given of the latest type of mill for grinding wood flour, with an investigation of the results obtained and its efficiency and power requirements. The woods used and the uses of the wood flour are reviewed, in particular those for plastic masses, light constructional sheets, active charcoal, and the distillation processes yielding AcOH etc. J. L.

Wetting of dusts. Road tar. Road-building material.—See II. **Constructional glass. Chromite linings.**—See VIII. **Carbohydrates from wood.**—See XVII. **Dust preventives.**—See XXIII.

Patents.

Treatment of mineral slurry in the manufacture of cement or lime. M. Vogel-Jørgensen (B.P. 461,323, 12.8. and 5.9.35).—The slurry is frothed by any of several processes claimed and then dried by hot gases on a suction grate, or merely spread on the chains of a rotating kiln; in either case burning produces a porous clinker. B. M. V.

Bricks. H. Warburton and W. A. Wright (B.P. 461,314, 6.8.35).—A non-refractory building brick is formed with passages parallel to the bedding face which are filled with magnesia, glass wool, slag wool, sawdust, cork, hair, felt, rubber, asbestos, diatomaceous earth, or metal foil, retained in position by plugs of cement. B. M. V.

Shingle elements. W. J. Tennant. From Bakelite Building Products Co., Inc. (B.P. 461,655, 22.8.35).—Shingles of slightly arched contour are formed of fibrous, waterproof material on the concave and hydraulic cement on the convex side. An intermediate coat of agglutinant or adhesive material with partly embedded mineral particles to form a key may be necessary. B. M. V.

Compositions for covering roads, floors, walls, tennis courts, and the like. N. H. Taylor (B.P. 460,526, 30.7.35).—Relatively coarse, basic mineral matter is pretreated with bitumen and incorporated with rubber (*e.g.*, latex). Non-basic materials may be rendered basic by admixture with cement. The bitumen may be applied in the form of a slow-breaking emulsion. A friable composition is obtained which binds together on the application of pressure. H. C. R.

Treatment of wood [for pencils]. Anglo Pencil Co., Ltd., and M. Smith (B.P. 461,131, 10.7.35).—Softening prior to manufacture of pencils is effected by drying and allowing a treating medium (*e.g.*, cod and paraffin oils) to percolate by capillary attraction, elevated steam pressure being used to prevent volatilisation; the wood may subsequently be cooled naturally or quenched in a mixture of cedar-wood oil and H_2O. B. M. V.

Road-surfacing materials.—See II. **Hard board.**—See V. **Plastic floor coverings and sheeting. Coatings for wood.**—See XIII.

X.—METALS; METALLURGY, INCLUDING ELECTROMETALLURGY.

Use of coke-oven and town gas in open-hearth furnaces. J. B. R. Brooke (Iron Steel Ind., 1935, 9, 3—5).—The best results were obtained by using a mixture of blast-furnace gas with 25—30% of coke-oven gas. The mixture should be preheated to 1150—1250° and have a low moisture content.
Ch. Abs. (*e*)

Waste-heat boilers in open-hearth practice. Report II of the Open-Hearth Committee. R. P. Smith *et al.* (Iron Steel Ind., 1935, 8, 511—515).—A review and discussion. Mechanically induced draught of the boiler frequently gives an increased output in the open-hearth furnace. Ch. Abs. (*e*)

Simplified calculation of recuperators. K. Rummel and F. Kessler (Arch. Eisenhüttenw., 1936—7, **10**, 233—242).—Mathematical. Expressions are derived and graphs constructed for calculating the dimensions of blast-furnace air preheaters and for the regenerators of open-hearth furnaces.
A. R. P.

Improvement of iron ores. P. Henry (Rev. Ind. Min., 1937, No. 386, 44—52).—Fines may be sintered or nodularised, the former process giving an excellent product. Concn. may be by gravity or by magnetic or flotation methods. Magnetic concn. is the most important and gives recoveries up to 98%; precalcination may be necessary. The use of powerful magnetic fields to recover the non-magnetic Fe minerals presents serious difficulties. Flotation will be very valuable when the richer ore deposits are exhausted. S. J. K.

Determination of sulphur in iron ores. N. I. Zaitzev (Zavod. Lab., 1936, **5**, 280—281).—A mixture of 5 g. of ore, 4 g. of $CaCO_3$, and 4 g. of C is placed between two layers of $CaCO_3$, and heated at 1200—1250° for 90 min. The product is heated with 10 g. of Zn and 100 ml. of 50% HCl, and the H_2S evolved is absorbed by a solution of Cd or Zn salt. Standard I solution and 40 ml. of 50% HCl are added to the suspension of sulphide, and excess of I is titrated.
R. T.

Rapid determination of sulphur in iron ores. I. I. Zemlianski and V. M. Razumov (Zavod. Lab., 1936, **5**, 363).—Johnson's method is recommended for factory practice. R. T.

Reduction of iron ores under high pressure. E. Diepschlag (Arch. Eisenhüttenw., 1936—7, **10**, 179—181).—Increase in pressure of CO or H_2 at 400—600° leads to a rapid increase in the rate of reduction of Fe_2O_3 ores up to 3 atm.; further increase in pressure has a very much smaller effect. CO is more effective than H_2 since C is deposited in the pores of the mineral and has a loosening action on the structure.
A. R. P.

Oxidising power of basic open-hearth slags. P. N. Ivanov and G. A. Romodin (Arch. Eisenhüttenw., 1936—7, **10**, 229—232).—Increase in the $CaO : SiO_2$ ratio (R) in the slag produces first a linear increase to a flat max. and then a decrease in oxidising power; these effects are due to an increase in the FeO content and to changes in the η of the slag. The R at which max. oxidising power is obtained depends on the temp. and on the CaF_2, Al_2O_3, and MgO contents since these constituents greatly affect η. When R is $<2·5$ or $>3·3$ the partition coeff. of Mn between metal and slag attains a const. val. and it is therefore difficult to reduce MnO from the slag.
A. R. P

Rate of melting of iron in contact with carbon. G. Tammann and H. Hartmann (Arch. Eisenhüttenw., 1936—7, **10**, 223—224).—In contact with a C rod Fe begins to melt at points of contact at temp. > the eutectic point, the rate of melting increasing with rise in temp. and depending on the nature of the Fe and the C. Electrolytic Fe and steel made therefrom melt more rapidly than do technical steels and Ceylon graphite, and spectrograph carbons produce melting at lower temp. than do arc-lamp carbons. A. R. P.

Production of cupola malleable castings. F. B. Riggan (Trans. Amer. Found. Assoc., 1935, Preprint No. 35—19, 11 pp.).—Malleable Fe melted in a cupola is adapted to the continuous production of light castings and has a higher C and lower strength than malleable Fe melted in an air furnace.
Ch. Abs. (*e*)

Improved apparatus for determining the total oxygen in iron by the vacuum melting method in a graphite special furnace. F. Willems (Arch. Eisenhüttenw., 1936—7, **10**, 193—195).—The new apparatus is designed to prevent spraying of the metal during melting and to avoid errors due to the thermal decomp. of the rubber gaskets and to seepage of lubricant or sealing grease into the hot zone. Improvements are also made in the gas-collecting apparatus and vac. pump. A. R. P.

Rapid determination of silicon in cast iron. K. Moroz (Zavod. Lab., 1936, **5**, 667—668).—1 g. of Fe is dissolved in 20 ml. of $HCl-HNO_3$ mixture, the solution shaken with 10 ml. of 1% starch solution, 20—30 ml. of hot H_2O are added, and the ppt. of SiO_2 is collected, washed, ignited, and weighed.
R. T.

Applied spectrography in the metal-working industries. III. Quantitative spectral analysis, particularly for the estimation of silicon in cast iron. G. Heidhausen (Metallwirts., 1937, **16**, 37—45).—Accuracy, sources of error, and rapidity in routine control work are discussed with particular reference to the estimation of Si in cast Fe. Practical details are given. C. E. H.

Determination of molybdenum in cast iron. E. Taylor-Austin (Analyst, 1937, **62**, 107—117).—The Pb molybdate, sulphide, and α-benzoinmonoxime methods are compared. They give equally reliable results, but the last is preferred because samples >3 g. may be taken; it occupies only 1·5—2 hr., and one operation suffices to separate Mo from all other possible constituents of cast Fe (except Si, which is removed prior to pptn.). Pptn. should take place in presence of 5 vol.-% H_2SO_4 and at $<10°$; three times the theoretical quantity of reagent, and a pptn. period of 10 min., are required. J. G.

Spectrum analysis of wrought iron for silicon and chromium. S. L. Mandelschtam, S. M. Raiski, and V. V. Tzeiden (Zavod. Lab., 1936, 5, 295—302).—Si and Cr are determined by spectrum-analysis methods. R. T.

Changes in the tensile strength and Brinell hardness of cast iron with wall thickness. H. Jungbluth (Arch. Eisenhüttenw., 1936—7, **10**, 211—216).—The strength of separately cast test-pieces of cast Fe varies with wall thickness to a much greater extent than does that of actual castings; this deviation becomes less pronounced the higher is the intrinsic strength of the metal, *i.e.*, the better is the quality. For metal with a tensile strength of $>$26—28 kg./sq. mm., test-pieces cast on to the actual casting give results in the tensile test comparable with those obtained from pieces cut out of the casting. A. R. P.

Spatial arrangement of graphite in cast iron. P. Schafmeister (Arch. Eisenhüttenw., 1936—7, **10**, 221—222).—On heating thin (0·2—2 mm.) sections of cast Fe in dry Cl_2 at 600° all the Fe is sublimed as $FeCl_3$, leaving a residue of graphite and SiO_2 in the forms in which these constituents existed in the metal. The graphite of grey Fe forms a dendritic skeleton made up of leaflets, among which are finer particles of secondary graphite derived from the eutectic or solid solution. The shape and distribution of the graphite explain the brittleness of cast Fe and the absence of appreciable graphite segregation during solidification. A. R. P.

Primary structure of cast iron. R. Mitsche (Arch. Eisenhüttenw., 1936—7, **10**, 263—266).—White cast Fe generally has a dendritic, whilst grey cast Fe has either a dendritic or globular primary, structure, superheating favouring the former type and the separation of graphite in finely-divided form. A. R. P.

Endurance limit of black-heart malleable iron. E. G. Mahin and J. W. Hamilton (Trans. Amer. Found. Assoc., 1935, Preprint No. 35—2, 7 pp.).—Malleable Fe (Si 1·00, C 2·44, Mn 0·31, S 0·072, P 0·168%) with 55,340 and 35,500 lb. per sq. in. tensile strength and yield point, respectively, and 18·5% elongation, had an endurance limit of 30,500 lb. per sq. in. and an endurance ratio of 0·54. Ch. Abs. (*e*)

Retardation of the dissolution of iron in sulphuric acid. V. F. Postnikov and I. P. Kirillov (Chimstr., 1935, 7, 431—434).—On adding 0·5% of $CS(NH_2)_2$ to 26·6% H_2SO_4 the rate of dissolution of Fe was reduced to 1/19 in 6 hr. and to 1/93 in 72 hr. Ch. Abs. (*e*)

Development of an outer [decarburised] zone on annealing iron–carbon alloys in hydrogen. W. Baukloh (Arch. Eisenhüttenw., 1936—7, **10**, 217—219).—When steels containing up to 0·9% C are heated in H_2 at 750—1050° no outer decarbonised zone is formed since the rate of diffusion of C through the metal is $>$ that at which it is removed from the surface by the H_2; when the gas is under pressure or the steel contains $>$0·9% C a decarburised zone is formed, the depth and C content of which depend on the H_2 pressure and the limiting solubility of C in γ-Fe at the temp. of the test. It follows that by heating in H_2 under carefully regulated conditions an outer zone of steel containing 0·9—1·7% C can be obtained in cast Fe. A. R. P.

Formation of flakes in steel ingots. K. Honda and T. Hironé (Sci. Rep. Tôhoku, 1936, **25**, 713—725).—The internal pressure in minute cavities in the steel, caused by evolution of dissolved H_2 during cooling, has been calc.; it reaches a max. at 300—200° and then diminishes, reaching zero at 0° abs. This pressure, combined with thermal and transformation stresses, causes flaking. The effects of alloying elements and of the size of ingots on flaking are discussed. H. J. E.

Granular structure of steels. N. V. Grum-Grshimailo (Zavod. Lab., 1936, 5, 602—604).—Conditions influencing the crystal size of steels are discussed. R. T.

Mass control of granular structure of carbon and alloy steels. S. A. Bernasovskaja and I. N. Golikov (Zavod. Lab., 1936, 5, 605—611).—Various types of microstructure are discussed. R. T.

Isothermic determination of granular structure of steel. A. P. Guljaev (Zavod. Lab., 1936, 5, 612—614).—The sample is heated at 930° for 20 min., cooled to 700°, maintained at 700—710° for 10 min., rapidly cooled, and the microstructure examined by the usual methods. R. T.

Testing of size of grains in hypo-eutectoid carbon steels. J. L. Frid and L. N. Podvojski (Zavod. Lab., 1936, 5, 311—321).—The applications in steel practice of McQuaid's method for determining the size of austenite grains are discussed. R. T.

Evaluation of steels for roll bearings by their slag inclusions. H. Diergarten (Arch. Eisenhüttenw., 1936—7, **10**, 197—204).—Photographs of slag inclusions in steels used for roll bearings are given to show how such steels may be classified as regards their quality. The type and distribution of the inclusions determine this classification. The inclusions may consist of sulphide slags, brittle oxide slags, and semi-plastic oxide slags in a spherical, oval, or streaky form; examples of all these in varying proportions are illustrated. A. R. P.

Identification of non-metallic inclusions in steel. R. Graham and R. Hay (J. Roy. Tech. Coll., 1937, 4, 77—84).—The steel is polished with Al_2O_3 polishing powder mixed with stearic acid, the latter protecting the steel (but not the inclusions) from the solvents used to dissolve the oxides and silicates. Microchemical methods are described for the identification of Fe^{II}, Fe^{III}, Mn, Ca, Si, and Al. C. R. H.

Microscopy of non-metallic inclusions in steel. D. S. Beljankin (Zavod. Lab., 1936, 5, 682—685).—Microscopical methods of identification of inclusions are discussed. R. T.

Rôle of inclusions in the corrosion of steels. A. Portevin and L. Guitton (Compt. rend., 1937, 204, 125—127).—Corrosion of polished Cr steels by aq. and alcoholic acids, and I, in the neighbourhood of surface irregularities, has been studied by microscopical examination. A. J. E. W.

Corrosion of condenser tubing in a Gulf Coast oil refinery. H. M. Wilten (Min. and Met., 1937, 18, 143—147).—Tubes of 18/8 Cr–Ni steel fail more rapidly in service than a Cu-base alloy when exposed to neutral H_2O containing Cl′ and little CO_3''. The failures are due to pitting and cracking. G. H. C.

Laboratory corrosion tests of welded low-carbon stainless steel. G. A. Ellinger and L. C. Bibber (J. Res. Nat. Bur. Stand., 1937, 18, 69—82).—Welded specimens of stainless steel ($<$0·06% C) showed no intergranular corrosion in either the plate or weld after attack by hot aq. $CuSO_4 + H_2SO_4$ or HCl, whilst after attack by HNO_3 intergranular corrosion appeared only in certain heat-treated pieces. The rate of corrosion of the plate metal in HCl was unaffected by heat-treatment, but that of the weld was decreased considerably by heat-treatment at 650° or 980°. The results are explained by selective attack by the corrosive agents on certain constituents of the steel. J. W. S.

Prevention of surface damage to metals by furnace atmosphere control. J. L. Robinson (Gas J., 1937, 217, 779).—Oxidation and decarburisation of steel during heat-treatment are prevented by using a muffle furnace supplied with products of complete or partial combustion of coal gas the H_2O content of which has been reduced by condensation or by dehydrating agents. A. R. Pe.

Testing of protective coatings on ferrous metals. N. J. Chlopin (Zavod. Lab., 1936, 5, 277—280).—Corrosivity is inversely $\propto$ the time elapsing between placing a drop of 10% $CuSO_4$ on the given Fe surface and the appearance of $\nless$3 centres of deposition of Cu (observed under magnification). The stability of oxide films formed in alkaline solutions is $>$ that of phosphate films. R. T.

Favourable compression stresses in nitride layers [on steel]. F. Gentner (Tech. Mitt. Krupp, 1937, 5, 19—21).—In the process of nitriding the surface of steel, compressional stresses are set up in the nitride layer whilst tensile stresses in the core are relieved by the prolonged heat-treatment at relatively low temp. (500°). These effects leave the steel in the most favourable condition for resisting alternating stresses, especially under corrosive conditions. Nitriding, therefore, is regarded as a better means than mechanical treatment for producing compression stresses in the surface layers. The magnitude of these stresses induced by nitriding a plain nitriding steel is of the order of 19 kg./sq. mm. A. R. P.

Internal stresses and endurance strength of nitrided steels. R. Mailänder (Arch. Eisenhüttenw., 1936—7, 10, 257—261).—Vol. changes which occur in N-case-hardening of steels are much more regular than those which occur during quenching-hardening or carburising, but the nitride case has fairly large internal stresses owing to the increase in vol. produced by the N. The endurance limit under alternate bending is $>$ that of carburised steel since the nitride case itself has a high limit. A. R. P.

Tension and notched-bar tests on an alloy steel. J. Muir (J. Roy. Tech. Coll., 1937, 4, 1—11).—Ordinary tension, Brinell hardness, and notched-bar tests, and the effects of various heat-treatments on a fractured crank-web of Ni–Mo alloy steel are described. C. R. H.

Technical tests for bending and hardening of boiler and furnace steel. T. A. Vladimirski and V. J. Tschernaschkin (Zavod. Lab., 1936, 5, 478—482).—Standard tests are verified. R. T.

Machine for determination of fatigue [of steel] by means of alternate stretching and compression, at high temperatures. V. S. Zinoviev and I. A. Levin (Zavod. Lab., 1936, 5, 494). R. T.

Appliance for testing the creep of steel. L. J. Liberman and G. N. Bistrov (Zavod. Lab., 1936, 5, 341—344). R. T.

Rapid determination of creep [of steel]. N. A. Schaposchnikov (Zavod. Lab., 1936, 5, 630—637).—Barr and Bardgett's method (B., 1932, 347) is recommended. R. T.

Representative samples of ferrochromium. N. V. Udovenko and A. G. Bogdantschenko (Zavod. Lab., 1936, 5, 226—229).—The Cr content of different samples of the same ingot of Fe–Cr–Si alloy varied from 48 to 57%, and the Si content from 0·9 to 1·7%. The necessity of specifying standard conditions of sampling is pointed out. R. T.

Structure and properties of chromium-manganese steels containing up to 1% C, 15% Mn, and 30% Cr. F. Brühl (Arch. Eisenhüttenw., 1936—7, 10, 243—245).—The microstructure and the magnetic, tensile, and corrosion-resistant properties of the steels have been determined after various heat-treatments. Mn does not extend the austenite field to lower C content, but reduces the crit. rate of cooling for the retention of the austenitic structure and renders the austenite, once formed, stable to prolonged annealing provided that $\nless$5% Mn is present. The structure of quenched steels of this type consists of α, $\alpha + \gamma$, or γ + carbide, according to the C content. In alloys containing $>$10% Mn, in which stable austenite is formed by annealing after quenching, the α of the $\alpha + \gamma$ quenched structure decomposes into FeCr + austenite on annealing at 700°; all alloys with 30% Cr behave similarly. The amount of FeCr formed and its rate of formation are independent of the Mn, Cr, or C content, but Mn favours its formation. Mn–Cr steels can be welded readily, but are less resistant to scaling at high temp. and to corrosion by acids than are Ni–Cr steels. A. R. P.

Types of tool-steel microstructure. G. I. Pogodin-Alexeev (Zavod. Lab., 1936, 5, 454—464).—Typical microstructures are illustrated. R. T.

Fusion test for quality of tool steel. P. I. Orletz (Zavod. Lab., 1936, 5, 306—310).—Known methods are discussed. R. T.

"Roneusil"—a silver-coloured stainless steel for cutlery and table ware. K. Fuchs (Metallwirts., 1937, **16**, 215—220).—The alloy is a low-Cr, high-Mn steel (composition not given). Its fabrication and mechanical properties are described.
C. E. H.

Steel alloys [in food manufacture]. W. M. Mitchell (Food Ind., 1935, **7**, 598).—18 : 8 steels are satisfactory in food processing. Ch. Abs. (*p*)

Change of transformation points of chromium steels due to cooling conditions. T. Murakami and H. Kishimoto (Sci. Rep. Tôhoku, 1936, **25**, 726—744).—The change in transformation point (T) due to cooling conditions was measured magnetically in a series of Cr steels (C 0·12—1·55, Cr 1·14—27·8%). When the [C] is const. the lowering of T is facilitated by increasing the [Cr], provided the γ-phase appears. When the [Cr] is const. the lowering is facilitated by increasing the [C] up to a definite limit. With 14—26% Cr lowering occurs only at a high [C].
H. J. E.

Study of silicon–chromium–copper–manganese steels at low temperatures. A. S. Falkevitsch (Zavod. Lab., 1936, **5**, 219—221).—The steel, containing C 0·22, Mn 1, Cr 1·2, Si 1·25, Cu 0·8, P 0·024, and S 0·012%, is recommended for use at low temp. (—185°). R. T.

Spectrum analysis of alloy steels. S. L. Mandelschtam, V. F. Smirnov, and V. V. Tzeiden (Zavod. Lab., 1936, **5**, 447—453).—Cr, Ni, Si, W, V, Mo, Co, and Mn can be determined, with an error of ±10—30%. R. T.

Determination of silicon in cast iron and steel. L. D. Raskin and I. F. Drozd (Zavod. Lab., 1936, **5**, 400—404).—A 0·2-g. sample is dissolved in 20 ml. of acid mixture (H_3PO_4 25 ml., HNO_3 400, H_2O 1200), with addition of 6—8 drops of H_2O_2, at 80—90°. 30 ml. of 12·5% $(NH_4)_2CO_3$ solution are added to the solution, followed successively by 1·5 g. of $CaCO_3$ and 5 ml. of 12·5% aq. $(NH_4)_2CO_3$. The mixture is boiled, cooled, diluted to 100 ml., and filtered. 12—15 drops of conc. HCl and 0·2—0·3 g. of $(NH_4)_2MoO_4$ are added to 50 ml. of filtrate, and the coloration obtained is compared with that of a standard solution.
R. T.

Rapid gravimetric determination of silicon in special steels. N. V. Udovenko and F. F. Prokopenko (Zavod. Lab., 1936, **5**, 229—230).—1 g. of steel is dissolved in 14 ml. of 2 : 3 : 10 H_2SO_4–HNO_3–H_2O mixture, the solution is boiled for 10 min., 5 ml. of conc. HCl are added, and the solution is diluted to approx. 50 ml., boiled, filtered, and the washed residue of SiO_2 ignited and weighed. R. T.

Rapid determination of silicon in special steels. S. I. Malov, P. J. Jakovlev, and A. A. Eliseev (Zavod. Lab., 1936, **5**, 665—667).—0·5 g. of steel is dissolved in 12 ml. of 33% HNO_3 + 6 ml. of 50% HCl, 8 ml. of conc. H_2SO_4 are added, and the solution is evaporated to evolution of SO_3, when 50 ml. of H_2O are added, and the ppt. of SiO_2 is collected, washed, ignited at 900—950°, and weighed. SiO_2 is eliminated by treatment with HF and the crucible again weighed; the difference between the weighings represents SiO_2.
R. T.

"Calculation of the error" in collaboration work in the field of steelworks chemistry. H. Grewe (Arch. Eisenhüttenw., 1936—7, **10**, 189—192).—The results obtained for Cr and Si in two steels by several analysts in each of numerous steelworks laboratories are tabulated and the mean error is calc.; in both cases the individual results differed from the mean by ±0·05%. A. R. P.

Analysis of non-metallic inclusions in steel. N. F. Michailova (Zavod. Lab., 1936, **5**, 404—407).—A procedure for the complete analysis of the non-metallic residue obtained after electrolytic dissolution of steel is described. R. T.

Rapid determination of nickel in steel, with preliminary separation of copper. L. Volkova and E. Schmulevitsch (Zavod. Lab., 1936, **5**, 668—669).—1 g. of steel is dissolved in 20% H_2SO_4, and the solution boiled with Al for 2 min., to eliminate Cu, and filtered. The filtrate + washings are boiled with 2—3 ml. of HNO_3 and 1—2 ml. of HCl, to elimination of oxides of N, when the solution is cooled. Then 50 ml. of 20% citric acid, and aq. NH_3 to an alkaline reaction, are added, followed by 2 ml. of standard $AgNO_3$ and 3 ml. of 2% KI, and the solution is titrated (Moore's method). R. T.

Potentiometric determination of molybdenum in steel. E. I. Fogelson and N. V. Kalmikova (Zavod. Lab., 1936, **5**, 148—151).—1—2 g. of steel are dissolved in 50 ml. of 50% HCl, the solution is evaporated with 0·7 g. of $KClO_3$ to 5—6 ml., diluted to 20 ml., and poured into boiling 10% NaOH. The resulting suspension is cooled, diluted to 250 ml., and filtered. 100 ml. of filtrate are evaporated to 50 ml., 50 ml. of conc. HCl are added, and the solution is electro-titrated at 30—40° with 0·02N-$SnCl_2$. R. T.

Rapid potentiometric determination of iron and chromium in ferrochromium. N. J. Chlopin (Zavod. Lab., 1936, **5**, 580—583).—Two 0·2-g. portions of Fe–Cr are dissolved in a boiling solution of 40 ml. of H_2SO_4 in 100 ml. of H_2O, 55 ml. of 10% H_3PO_4 are added to one solution, and Fe^{II} is determined by electrotitration with $K_2Cr_2O_7$. HNO_3 is added to the second solution, which is evaporated to elimination of oxides of N, when 150 ml. of hot H_2O, 20 ml. of 1·7% $AgNO_3$, and a drop of Reinhard's solution are added, the solution is brought to 70—80°, boiled for 20 min. with 6—8 g. of $(NH_4)_2S_2O_8$ and then with 10 ml. of 5% NaCl, cooled, and electrotitrated with standard $FeSO_4$. R. T.

Colorimetric determination of phosphorus in steel and iron, involving ether extraction of the phosphomolybdate complex. L. D. Raskin (Zavod. Lab., 1936, **5**, 267—271).—0·5 g. of steel is dissolved in 20 ml. of HNO_3, the solution boiled with 5 ml. of 2% $KMnO_4$ to disappearance of the violet colour and then with 5 ml. of 3% $(NH_4)_2C_2O_4$ until colourless, when it is cooled and diluted to 100 ml. 2 ml. of solution are shaken with 1 ml. of $(NH_4)_2MoO_4$ reagent and 2 ml. of Et_2O, 6—7 drops of 2% $SnCl_2$ in 1·2% HCl are added to the Et_2O layer, and the coloration is compared with that given by standard solutions. R. T.

Determination of small amounts of arsenic in iron and steel. A. T. Sveschnikov and E. V. Smirnova (Zavod. Lab., 1936, 5, 271—272).—1 g. of cast Fe or steel is dissolved in 30 ml. of HNO_3, the solution evaporated to dryness, and the residue ignited (30 min.) and then warmed with 40 ml. of conc. HCl and $KClO_3$ until evolution of Cl_2 ceases. 20% H_2SO_4, $SnCl_2$, and Zn are added to the solution, and the gases evolved are passed over a wet $HgCl_2$ paper, the final coloration of which is compared with that of a series of standards. R. T.

Progress reports—Metallurgical Division [of the United States Bureau of Mines]. R. S. Dean (U.S. Bur. Mines, Rept. Invest. 3331, 1937, 49 pp.).—Smelting of manganiferous Cu ores to matte results in part of the Mn entering the matte, but the recovery of Mn thus effected is the smaller the higher is the Cu content of the matte and the greater is the slag : matte ratio. SO_2 can be recovered from roaster gases almost completely by scrubbing with $(CH_2{\cdot}NH_2)_2$ solutions, by mixing the cooled gases with moist NH_3, whereby $(NH_4)_2SO_3$ and $(NH_4)_2S_2O_5$ are pptd., and by scrubbing with aq. $(NH_4)_2SO_3$ containing 0·025% of tannic or gallic acid. Fe–Cr can be decarburised by treatment with Ca at high temp., and Cr can be conc. from low-grade chromite by smelting with pyrites and Cu material to obtain Cr–Fe–Cu matte and white metal. Recovery of $CrCl_3$ from chromite by heating it with C in a current of Cl_2 at 750—850° is feasible as a continuous process only if the charge is mixed with granular quartz to keep it porous. Brief accounts are also given of the results obtained in flotation tests on various metallic and non-metallic ores, and in recovery tests on various Au ores; other subjects studied include explosive shattering, steel making, dust settling, and metallic interfaces. A. R. P.

Comments suggested by Samuel's paper on flocculation. R. F. Powell (Chem. & Ind., 1936, 998—1001; cf. B., 1936, 964).—Electrophoresis tests on slimes derived from grinding a Cu ore containing several different types of colloid are described. Grinding with CaO gave a pulp containing negatively charged colloids which readily flocculated. Some parts of the ore contained both clay and graphite slimes; addition of starch caused dispersion of the clay, whereas addition of tannin produced dispersion of the graphite. Hydrated Fe_2O_3 was also dispersed by tannin. A. R. P.

Application and functions of chemical reagents in flotation. R. D. Nevett (Proc. Austral. Inst. Min. Met., 1936, No. 102, 89—154).—The functions of various chemicals are discussed on the basis of results obtained by their use in the flotation treatment of complex Pb–Zn–Cu–Fe sulphide ores in Australia. $Ca(CN)_2$ is more effective than are alkali cyanides in depressing Fe minerals and is an efficient deactivator for marmatite. CaO is the best depressant for pyrite and pyrrhotite, and colloidal S a good one for marmatite. Na_2SiO_3 has a slight, and starch a marked, depressant action on galena. $CuSO_4$ is a powerful activator for Zn sulphides, pentasol xanthate for marmatite and Fe sulphides, and Na-Aerofloat + $CuSO_4$ for ZnS minerals in presence of Fe minerals in a CaO circuit. $MgSO_4$ may also behave as an activator on some Zn minerals. The behaviour of certain of the above reagents with ores from other mines is described, detailed results being given in the discussion. A. R. P.

Rapid determination of copper in copper sulphide ores and concentrates. L. M. Jolson and A. I. Voronova (Zavod. Lab., 1936, 5, 411—415).—1 g. of ore or 0·5 g. of concentrate is heated with 15 ml. of HNO_3 and 3 g. of $KClO_3$ to complete elimination of N oxides and Cl. 50 ml. of hot H_2O, 3—5 g. of $Na_4P_2O_7$, excess of aq. NH_3, and 0·1 g. of N_2H_4,HCl are added to the solution, and C_2H_2 is passed for 1 min. The suspension of Cu_2C_2 is titrated with standard aq. KCN. R. T.

Determination of silicic acid in copper smelting slags. M. K. Bitschkov and A. I. Ivanova (Zavod. Lab., 1936, 5, 500—501).—0·5 g. of slag is fused with 4—5 g. of K_2CO_3–Na_2CO_3, the melt treated with 15 ml. of HNO_3 at 100°, 40—50 ml. of hot H_2O and 10 ml. of 0·1% gelatin are added, and the ppt. of SiO_2 gel is collected, washed, ignited, and weighed. R. T.

Copper in chemical engineering. S. Baker (Soc. Chem. Ind., Chem. Eng. Group, Mar., 1937, 18 pp.).—A comprehensive survey of the physical and mechanical properties of Cu is given. The principal methods for making seams in Cu sheets and joining Cu tubes are outlined. Cu alloys are described, and a table is given showing their mechanical properties, and applications in general engineering. The corrosion-resistance of Cu and its alloys is discussed, and the names and compositions of alloys suitable for use in plant dealing with a great variety of chemical substances are tabulated. A. J. K.

Copper and its alloys in automobile design. D. P. C. Neave (Metal Ind., 1937, 50, 267—273).—A survey. Particular reference is made to Cu-alloy cylinder heads. A. J. K.

Recovery of copper from brass and gunmetal scrap. E. J. Kohlmeyer (Metallwirts., 1937, 16, 220—224).—The mixed scrap was heated in a rotary furnace so as to volatilise and burn the Zn, which was recovered as ZnO. Fe was almost completely removed simultaneously, but Sn and most of the Pb remained in the Cu. The formation of a Cu slag, as in the converter process, was avoided. The Sn and Pb were removed from the Cu by oxidation of the molten metal, or treatment of the granulated Cu with an air blast in a converter filled with coke. C. E. H.

Rapid determination of manganese in bronzes. A. M. Dimov (Zavod. Lab., 1936, 5, 664).—0·1—0·5 g. of bronze is dissolved in 8—12 ml. of conc. H_2SO_4, and 100 ml. of H_2O are added to the solution, which is boiled with 0·2—1 g. of Al until colourless and then filtered. 5 ml. of HNO_3, 1—2 ml. of H_3PO_4, 10 ml. of 0·8% $AgNO_3$, and 10 ml. of 25% $(NH_4)_2S_2O_8$ are added to the filtrate + washings, and the solution is boiled for 30 sec., cooled, and titrated with Na_2HAsO_3. R. T.

Direct determination of aluminium in aluminium–iron–manganese bronze. M. I. Schubin

(Zavod. Lab., 1936, **5**, 407—411).—0·5 g. of alloy is dissolved in 15 ml. of 33% H_2SO_4 and 3 ml. of HNO_3, and the solution evaporated to evolution of SO_3, diluted, and again evaporated. 40 ml. of H_2O are added to the residue and the solution is boiled and filtered from SiO_2. The filtrate + washings are conc. to 30 ml., neutralised with aq. NH_3, 10 ml. of 10% H_2SO_4 are added, and the solution is electrolysed to complete elimination of Cu. HCl and Na_2SO_3 are added to the solution, which is then evaporated down to 250 ml., and $Al(OH)_3$ is pptd. by aq. NH_3. The washed ppt. is dissolved in HCl, and $Al(OH)_3$ is again pptd., washed, ignited, and weighed. Cu, Mn, Ni, Zn, Si, Pb, and Sn do not interfere. R. T.

Advance in zinc smelting. E. H. Bunce (Metal Ind., 1937, **50**, 205—210).—The development and present operating technique of the vertical retort process are described. A. J. K.

Determination of zinc in cadmium. J. J. Lurie and V. F. Neklutina (Zavod. Lab., 1936, **5**, 587—589).—10 g. of Cd are dissolved in 120 ml. of 25% HCl containing 4—6 ml. of HNO_3, 4 g. of Al foil are added, followed at 20-min. intervals by two further 1-g. portions of Al, the solution is filtered, and the residue of Al and Cd washed with 2% HCl. 15—20 ml. of H_2SO_4 are added to the filtrate, which is evaporated to evolution of SO_3, and cooled. 150—200 ml. of H_2O and 5 g. of citric acid are added, the solution is made neutral with aq. NH_3, and 5 ml. of H_2SO_4 are added per 100 ml. of solution. H_2S is passed to complete pptn. of CdS, the filtrate is neutralised with aq. NH_3, 5 ml. of AcOH are added per 100 ml. of solution, ZnS is pptd. by H_2S, the washed ppt. dissolved in HCl, Al pptd. by aq. NH_3, and ZnS repptd. from the filtrate, collected, washed, ignited, and weighed as ZnO. R. T.

Corrosion-resisting nickel alloys. H. E. Searle (Canad. Chem. Met., 1936, **20**, 355).—Brief notes on the properties of monel, K-monel, pure Ni, inconel, stainless steel, niresist, nickel-silver, and cupronickels are given. A. R. P.

Electrolytic analysis of chromium ores. I. E. Rikkert (Zavod. Lab., 1936, **5**, 593—595).—1—3 g. of ore are warmed with 10—30 ml. of $HClO_4$–H_2SO_4 mixture (3—4 hr.), and the solution is evaporated to evolution of SO_3 fumes, diluted, and filtered. The residue of SiO_2 is ignited and the crucible is weighed before and after treatment with HF, when the difference in wt. gives the SiO_2 content. The residue is fused with $KHSO_4$, and the melt added to the filtrate from SiO_2. $(NH_4)_2C_2O_4$ is added, and the solution electrolysed, with const. addition of $(NH_4)_2C_2O_4$, to complete deposition of Fe, Co, Ni, and Cu, when the deposit is dissolved in HNO_3, the electrode replaced, and electrolysis continued to complete oxidation of C_2O_4''. The electrolyte is acidified, boiled, and aq. NH_3 is added, to ppt. Al, Ti, and PO_4'''. The washed ppt. is dissolved in H_2SO_4, H_2O_2 added, and Ti determined colorimetrically in the solution, from which Al and Ti hydroxides are pptd., ignited, and weighed; the Al content is derived therefrom. H_2SO_4 and standard aq. $FeSO_4$ are added to the filtrate after pptn. of Al and Ti, and excess of $FeSO_4$ not oxidised by CrO_4'' and VO_4''' is titrated. R. T.

Nickel and its alloys [in food manufacture]. F. L. LaQue (Food Ind., 1935, **7**, 580—582).—The non-corrosiveness of these alloys in food processing is recorded. Ch. Abs. (*p*)

Detection of small amounts of tin in ores by means of cacotheline. I. P. Alimarin and M. S. Veshenkova (Zavod. Lab., 1936, **5**, 152—158).—3 g. of mineral, containing 0·02—0·03% Sn, are fused with NaOH–Na_2O_2, the melt is extracted with 200 ml. of H_2O, and the filtrate acidified (HCl) and saturated with H_2S. The pptd. sulphides are dissolved in hot HCl–H_2SO_4, the vol. is made up to 50 ml. with conc. HCl, NaCl and Pb are added, and the solution is boiled for 30 min., in a CO_2 atm. Aq. cacotheline is added at 40—50°, when a violet-red coloration is obtained in presence of Sn. The Sn content may be approx. determined by comparison with a series of standard $KMnO_4$ solutions. The reaction is also given by U, Nb, Mo, W, V, Cr, and Ti, after reduction with Pb in HCl. R. T.

Replacement of tin solders by other soft solders. A. Schaefer (Metallwirts., 1937, **16**, 61—63).—The eutectic alloy of Cd and Zn is stronger than are the Sn–Pb solders, and its strength may be further increased by small additions of Cu, Pb, or Ag. It may be used with the usual fluxes, and flows well. Other Cd–Zn alloys are much less suitable. C. E. H.

Soft-soldering problems. C. C. Miller (Metal Ind., 1937, **50**, 295—297).—The use of ambiguous trade terms is deprecated, and it is suggested that solders be bought to a recognised grade of the British Standards Institution Specification. The best solders for use on Cu alloys, tinplate, and Pb are described. A. J. K.

Investigations in ore dressing and metallurgy. Jan.—June, 1935. W. B. Timm (Canada Dept. Mines, Mines Branch, 1936, No. 763, 237 pp.).—Detailed results are given of tests made to devise treatments for 23 Au ores, 1 Pb–Zn, 1 Cu, and 1 Cu–Zn ore, and methods recommended for various other ores are summarised. A. R. P.

Flotation of banket sands. H. R. Adam and F. Wartenweiler (J. Chem. Met. Soc. S. Afr., 1936, **37**, 108—114).—The sand fraction of the ground ore from the Government Gold Mining Areas reduction works amounts to 28% of the total feed to the mill; by direct cyaniding 90% of its Au content is recovered, but a 3—5% better recovery may be made by flotation followed by cyaniding of the concentrate and tailing separately. With a feed of 4·1 dwt. of Au per ton the concentrate (chiefly FeS_2) contains 81% of the Au (70 dwt./ton) and the tailing 19% (0·81 dwt./ton). After cyaniding the concentrate, the residue contains 1·89 dwt. of Au per ton (2·7% of the total), and after cyaniding the tailing the residue contains 0·19 dwt. of Au per ton (23·5% of the total). The consumption (lb./ton) of chemicals in flotation is: pine oil 0·14, xanthate 0·1, acid 0·75; and in cyaniding, CaO 0·48, cyanide 0·12. By grinding the ore to obtain a slightly coarser sand the recovery by the above process is reduced slightly, whilst regrinding of the flotation tailings and refloating improves the flotation recovery but has little effect on the overall recovery. A. R. P.

Flotation of a Transvaal refractory gold ore. L. P. Durham and J. E. Laschinger (J. Chem. Met. Soc. S. Afr., 1936, **37**, 196—203).—The ore is a chloritic schist containing about 1% of pyrite and arsenopyrite and is of rather a clayey nature. After grinding to 80% through 200-mesh, a 94% extraction of Au in a concentrate containing 150—250 dwt./ton is obtained by flotation in an alkaline pulp (20% of solids), using K Bu xanthate, K amyl xanthate, and pine oil to the extent of 0·2, 0·1, and 0·05 lb./ton, respectively. The Au is readily leached out from the concentrate by cyanide after roasting. A. R. P.

Attempt at quantitative analysis of silver–gold alloys by optical spectroscopy. W. Mankin (J. Proc. Roy. Soc. New South Wales, 1937, **70**, No. 1, 95—99).—A pellet of Ag–Au alloy of known composition was subjected to a C arc, and the intensities of certain corresponding Ag and Au lines in its spectrum were compared. The results showed no relation between relative intensity and composition, probably owing to variation in the rates of volatilisation. A. Li.

Spectrographic determination of platinum by the constant-pair method. J. J. Manning and J. Coull (Ind. Eng. Chem. [Anal.], 1937, **9**, 28—29).—Technique for the determination of Pt in precious-metal alloys, using Mo as the internal standard, is described. E. S. H.

Tantalum : occurrence, properties, and uses. J. G. Yager (J. Proc. Austral. Chem. Inst., 1937, **4**, 59—65).—A review.

Thermal expansion of cemented tungsten carbide. P. Hidnert (J. Res. Nat. Bur. Stand., 1937, **18**, 47—52).—The average coeff. of linear expansion of WC–Co mixtures (5·9% Co) increases linearly with rise of temp. from $4·4 \times 10^{-6}$ at 20—60° to $5·9 \times 10^{-6}$ at 300—400°. For samples containing 12·9—13·2% Co the coeffs. for these temp. intervals are $5·0 \times 10^{-6}$ and $6·7 \times 10^{-6}$, respectively. J. W. S.

Possible developments in the manufacture of sodium and magnesium. F. Oettel (Chem.-Ztg., 1937, **61**, 155—156).—For the production of Na it is suggested that a mixture of Na_2CO_3 and C be heated in a MgO chamber lined with cast Fe, which acts as a resistance-heater and is the only cheap material which is unattacked by fused alkali. Mg could be produced from this pure Na by running it in a thin stream into molten carnallite in a cast-Fe kettle the atm. in which is maintained free from O_2. A. R. P.

Magnesium alloys for aircraft. C. H. Desch (Metal Ind., 1937, **50**, 161—167).—Mg alloys suitable for castings, wrought forms, and use at high temp. are described. Foundry practice and rolling and forging technique are summarised. Corrosion problems and abrasion difficulties are discussed. A. J. K.

Cost of production of aluminium. A. von Zeerleder and H. Hurter (Z. Elektrochem., 1937, **43**, 139—141).—The economics of Al production are discussed. J. W. S.

Determination of the gas content of aluminium alloys by high-temperature vacuum extraction. J. A. Kljatschko (Zavod. Lab., 1936, **5**, 572—579).—Apparatus for determination of H_2, CH_4, N_2, and CO in Al alloys is described. R. T.

Determination of copper in pure aluminium. A. Brenner (Chem.-Ztg., 1936, **60**, 957).—The Al is dissolved in aq. NaOH, the insol. residue digested with HCl and Br, and the Cu pptd. from the resulting solution with H_2S and determined colorimetrically as $Cu_2Fe(CN)_6$ in AcOH solution containing gum arabic. A. R. P.

Influence of molten aluminium on firebrick linings of electric furnaces. A. N. Luisenko (Legk. Met., 1935, **4**, No. 5, 8—13).—In remelting Al, it penetrated into the porous brick, reduced SiO_2 and Fe_2O_3, and rendered the brick conducting for electricity. The slagging of the walls progressed upward from the level of the metal to the top of the furnace, where it short-circuited the Ni–Cr resistor units. Ch. Abs. (*e*)

Tensile strength and elastic limit of refined aluminium sheet. H. Röhrig and K. Schönherr (Aluminium, 1937, **19**, 6).—The tensile properties of 99·992% pure Al sheet, parallel and perpendicular to the direction of rolling, were determined in both the cold-rolled and the annealed condition. The ratio of the strength in the rolled condition to that in the annealed condition is particularly high. C. E. H.

Chemical oxidation of aluminium foil by the M.B.V. process. H. Neunzig (Aluminium, 1937, **19**, 2—3).—M.B.V. treatment should not be applied to foil $<0·03$ mm. thick, otherwise perforation may occur. When the foil is 0·03 mm. thick the duration of treatment must not exceed 1 min., but a 10-min. treatment is safe with foil 0·05 mm. thick. C. E. H.

Artificial oxide films improve the durability of paint coatings on light metals. W. Nicolini (Aluminium, 1937, **19**, 4—5).—Both Eloxal and M.B.V. treatments improve the resistance of painted Al to corrosion by salt spray and in a cooling tower. The Eloxal treatment has the greater effect. C. E. H.

Structure of aluminium alloys. W. Hanemann (Aluminium, 1937, **19**, 7—11).—Comparable structures suitable for microscopical examination are obtained by melting and cooling small standard samples under standardised conditions. Commercial forms of Al alloys usually have indefinite structures which are not comparable. C. E. H.

Influence of alloying elements on aluminium and magnesium alloys. A. S. Lugaskov (Legk. Met., 1935, **4**, No. 5, 32—34).—A discussion of the influence of Be, Ca, Ce, Si, Mn, and Na. Ch. Abs. (*e*)

Influence of foreign elements on some industrial aluminium alloys. I. T. Kolenov and B. F. Graschtschenko (Legk. Met., 1935, **4**, No. 4, 40—55).—The influence of Fe, Si, Zn, and Cu on the mechanical and corrosion-resistant properties of duralumin, aludur, and silumin was studied. Ch. Abs. (*e*)

Spectrographic analysis of silumin. A. R. STRIGANOV (Zavod. Lab., 1936, **5**, 614—620).—A method based on determination of extinction of appropriate bands of the emission spectra is described. Mg, Fe, Co, Cu, and Si are determined (mean error ±10%). R. T.

Diagrammatic representation of the aluminium alloys. H. WIESTHALER (Aluminium, 1937, **19**, 11—19).—The composition and mechanical properties of the commercial Al alloys are shown in a series of vectorial diagrams. C. E. H.

Flotation, a summary of present knowledge. CHATAIGNON (Rev. Ind. Min., 1937, No. 386, 53—61).—The various classes of reagents used in flotation are described and attempts made to explain their respective modes of action. Experimental results and theories are not yet far enough advanced to provide definite rules of procedure; flotation practice is still largely empirical. S. J. K.

Possibilities of flotation. CHATAIGNON (Rev. Ind. Min., 1937, No. 386, 62—65).—Flotation processes are reviewed with special attention to Au ores and minerals other than sulphides. Au in a finely-divided and native state may be floated after addition of C, whilst in sulphide ores the Au may be conc. and thus cheapen extraction. Non-sulphide minerals may be floated either by pretreatment with sulphide (Pb and Cu ores), or by using a soap or fatty acid as reagent. S. J. K.

Metallurgical research at McGill. A. STANSFIELD (McGill News, 1935, **16**, No. 4, 27—31).—Results are reported for investigations on the penetration of Au, Ag, Pt, and Cu into Pb cylinders, the electrolytic production of Mg and Cl_2, the electric smelting of Zn and Fe ores, the elimination of S, the softening points of mixtures of SiO_2, CaO, and "Ti_3O_5" with Al_2O_3, and the production of TiO_2 pigments. CH. ABS. (*e*)

Crystal growth across [metal] interfaces. B. S. BARHAM and W. D. JONES (Metal Ind., 1937, **50**, 181—182).—Crystal growth has been observed across the interface when two pieces of Au, previously polished and etched, have been pressed together and annealed, and similarly when an internal cavity in Sn has been closed up by hammering and the metal annealed. A. J. K.

Use of the microscope in the study of the structure of metals. W. KÖSTER (Metallwirts., 1937, **16**, 129—137).—A crit. review. C. E. H.

Properties of metals at low temperatures. A. S. FALKEVITSCH and B. A. SMIRNOV (Chimstr., 1935, **7**, 436—442).—Physical and mechanical tests on Fe and Cu alloy specimens, with and without welded seams and after treatment at −183° to 50° for various times, are recorded. CH. ABS. (*e*)

Fatigue fracture and brittle fracture. A. SMEKAL (Metallwirts., 1937, **16**, 189—193).—The characteristics and mode of development of the two types of fracture are described. C. E. H.

Rapid determination of silica in insoluble slags. A. F. ALEXANDROV (Zavod. Lab., 1936, **5**, 232).—0·2 g. of slag, 5—6 drops of H_2SO_4, 2—3 drops each of HNO_3 and H_2O, and 1 ml. of HF are evaporated to dryness, and the residue is ignited at 1000° and weighed; % SiO_2 is given by $A + M/0{\cdot}93 - M + F/0{\cdot}9 - F$, where A is % SiO_2 as calc. from the difference between initial and final wts. of the sample, M is % MnO, and F is % FeO. R. T.

Determination of metallic inclusions. P. DONTZOV (Zavod. Lab., 1936, **5**, 354—356).—Known methods are described. R. T.

Analysis of non-metallic inclusions in welded joints. N. F. RUSANEVITSCH (Zavod. Lab., 1936, **5**, 273—277).—Scott's method is recommended. R. T.

Determination of arsenic in ferrous and non-ferrous metals by means of calcium hypophosphite. E. I. FOGELSON and N. V. KALMIKOVA (Zavod. Lab., 1936, **5**, 584—586).—As is determined by Brandt's method (B., 1914, 28), using $Ca(H_2PO_2)_2$ in place of NaH_2PO_2. R. T.

Metallurgical aspect of the fourdrinier [paper-machine] wire. H. H. PARRETT (Proc. Tech. Sect. Papermakers' Assoc., 1937, **17**, 339—351).—Paper-machine wire manufacture and the problems involved are described. H. A. H.

Oven for testing corrosion by gases from combustion of benzine mixtures. V. S. ZINOVIEV and I. A. LEVIN (Zavod. Lab., 1936, **5**, 495). R. T.

Apparatus for study of corrosion of metals. N. A. UDALOV (Zavod. Lab., 1936, **5**, 195—198).—A chamber with automatic control of temp. and humidity is described. R. T.

Cored or coated electrodes [for welding steel]? R. HACKERT and K. L. ZEYEN (Tech. Mitt. Krupp, 1937, **5**, 22—31).—Modern coated welding electrodes are designed to give a fluid slag which is not retained as inclusions in the weld, but protects the weld metal from oxidation and N absorption and allows it to cool more slowly; with such electrodes a weld metal may be deposited which has practically the same composition as that of the metal being welded. With cored electrodes alloying constituents must be present to overcome deleterious gas absorption and to give sufficient strength to the seam. The slag coating produced by coated electrodes readily separates in large scales on cooling, so that relatively little cleaning is required; cored electrodes have the advantage that several layers can be laid down without cleaning off the slag. The N absorption with the former is about 25—30% of that with the latter and the crystal structure is finer and more uniform. The notched-bar impact strength of seams made with coated electrodes is about double that of those made with cored ones and is somewhat improved by normalising, whereas that of the latter is slightly reduced by this treatment. There is little difference in the tensile strength of seams or in their bending properties, whatever type of electrode is used, but gas-welded seams have better bending properties than electric-welded seams. The conclusion is reached that all type of modern welding rods have their particular uses, some being better for certain purposes and others for other purposes. A. R. P.

Non-ferrous welding. H. W. G. Hignett (Metal Ind., 1937, **50**, 275—278).—The applicability of the various welding methods to non-ferrous metals is described. A. J. K.

Arc-welding in argon gas. G. E. Doan and W. C. Schulte (Elec. Eng., 1935, **54**, 1144—1149).—A stable arc cannot be maintained in purified A under ordinary conditions, and crater formation and " pinch effect " are absent. The melting rates per kw.-hr. in A and in air are approx. equal. Pure Fe welds made in A have high ductility, 90% reduction of area, and 30% elongation. Ch. Abs. (*e*)

British electroplating practice. E. J. Dobbs (First Internat. Electrodep. Conf., 1937, 6 pp.).—A summarised account of modern practice, including data on the deposition of Ni, Cr, Cu, Cd, Sn, Zn, and Rh. J. W. C.

French nickel-plating practice. M. Ballay (First Internat. Electrodep. Conf., 1937, 11 pp.).—A review of development during the past 10 years. The present state of the industry is discussed and reference made to the Ni- and Cr-plating specifications of the French railways. J. W. C.

Bright nickel-plating. L. W. Johnson (J. Electrodep. Tech. Soc., 1937, **12**, 93—103).—A review. C. E. H.

Adhesion of electrodeposited nickel to nickel. A. W. Hothersall (First Internat. Electrodep. Conf., 1937, 8 pp.).—Etching to remove the surface layer of the Ni deposit improves adhesion. The best results are obtained by anodic treatment in 25—30% H_2SO_4 (free from Cu) for 10 min. at c.d. 20 amp. per sq. ft. and temp. 15—25°. The c.d. is subsequently raised to 200 amp. per sq. ft. for 2—3 min., after which the polarity is reversed for approx. 1 sec. After washing, the work is transferred immediately to the Ni-plating bath. J. W. C.

Sources of organic contaminants in nickel-depositing solutions and methods of purification. A. W. Hothersall and G. E. Gardam (J. Electrodep. Tech. Soc., 1937, **12**, 81—92).—Org. impurities may arise from contact with wood or textiles, and lead to pitting, exfoliation, or brittleness of the deposit. They are removed by adding $KMnO_4$, setting aside for 48 hr. at 35°, removing the excess of $KMnO_4$ by addition of H_2O_2, and finally filtering. Methods involving adsorption only are less effective. C. E. H.

Corrosion of nickel anodes. A. G. Spencer (Metal Ind., 1937, **50**, 141—144).—The effect of the presence in Ni anodes of O_2, C, Fe, Si, Al, Mn, and S is discussed in relation to even dissolution during electroplating. The effect of insol. materials, grain size, casting, rolling, and moulding practice is also summarised. A. J. K.

German electroplating practice. R. Springer (First Internat. Electrodep. Conf., 1937, 8 pp.).—A review of development, including data on the deposition of Ni, Sn, Cd, and Cr, the anodic oxidation of Al, and p_H control in alkaline solutions. The electroplating of non-metallic articles and applications of the Bullard–Dunn descaling process are also discussed. J. W. C.

***Résumé* of silver-plating.** F. C. Mesle (First Internat. Electrodep. Conf., 1937, 8 pp.).—A *résumé* of current American practice in the production of high-quality electrodeposits of Ag from cyanide solutions. J. W. C.

Structure of thin coatings of copper electrodeposited on crystalline copper. P. A. Jacquet (First Internat. Electrodep. Conf., 1937, 15 pp.).—The microstructure of deposited Cu on a Cu base of cast and drawn, and electrodeposited metal, respectively, was examined. Preliminary anodic etching of the latter revealed a curious " dendritic " structure which appeared to determine the mode of distribution of the first, thin, subsequent deposit. A detailed, illustrated description of the structures observed is given and an attempt made to relate them to the crystal orientation of the underlying metal and also to the concept of the existence of active centres on a cathode. The age of the electrolyte is an important factor, being associated, probably, with the $[Cu^{\cdot}]$. S. J. K.

Crystal structure of copper electrodeposits. I. A. Phillips and W. R. Meyer (First Internat. Electrodep. Conf., 1937, 6 pp.).—The small-scale, geometrical condition of the cathode, *i.e.*, scratches, holes, projections, etc., is discussed in relation to the orientation of the electrodeposited Cu. The c.-d. limits for the extension of the crystal structure of Cu cathodes by acid Cu deposits are given. It is shown that Pb markedly influences the structure of Cu electrodeposits even at concns. as low as 0·01 g. per litre, and that Zn has only a slight effect. A. J. K.

Etching of copper by ferric chloride solutions. B. Baars and L. S. Ornstein (First Internat. Electrodep. Conf., 1937, 8 pp.).—Electrolytic Cu dissolves smoothly in aq. $FeCl_3$, $d \ngtr 1{\cdot}48$, the rate of attack increasing with decrease in crystal grain size. Further increase in d leads to the formation of etch pits. The effects of variation in temp. and of agitation are discussed, and a theoretical explanation of the etching processes is advanced. J. W. C.

Chemical study of alkaline cyanide degreasing and coppering baths. A. Chaybany (First Internat. Electrodep. Conf., 1937, 8 pp.).—The electrolytic bath recommended contains NaCN (100%; 50 g. per litre), NaOH (80 g.), and CuCN (5 g.), with addition of 100 g. of industrial $Na_2S_2O_4$ per 20 sq. m. of total surface degreased, the c.d. being maintained at ≯5 amp. per sq. dm. Cu anodes are employed. During use NaCN is slowly oxidised to NaCNO (I) with corresponding decrease in operating efficiency. Addition of finely-divided Cu reduces (I). J. W. C.

Polarographic analysis of brass. Principles of rapid series analysis of alloys, carried out with the dropping mercury cathode. H. Hohn (Z. Elektrochem., 1937, **43**, 127—139).—Satisfactory polarographic analysis of brass is obtained if the sample is dissolved in HNO_3, pptd. with NH_3 and $(NH_4)_2CO_3$, and filtered. The solution contains the Cu, Zn, and Ni. The ppt. is extracted with HNO_3 to dissolve Fe and Pb, and the residue weighed to determine Sn. Portions of the first solution are treated with special

solutions containing NH_3 (for determination of Cu and Zn) and KCN (for Ni), respectively, whilst the second solution is treated with an NH_4Cl solution to determine Fe and Pb. Details of the prep. and use of the special solutions are given, and the interpretation of the polarographic data is explained.
J. W. S.

Method of obtaining adherent electrodeposits on chromium and stainless steel. G. E. Gardam (First Internat. Electrodep. Conf., 1937, 8 pp.).—By cathodically polarising the work for 5 min. in a solution containing 240 g. of $NiSO_4$ and 50 g. of H_2SO_4 per litre, operated at c.d. 150 amp. per sq. ft. and temp. 35°, a thin adherent coating of Ni (approx. thickness 0·00005 in.) is formed over the surface. Subsequent building up may take place from any standard Ni-plating bath. Overall adhesion is greatly improved if a layer of Cu 0·001—0·002 in. thick is interposed between the primary and secondary Ni deposits. Cr and its alloys cathodically treated as above may be soft-soldered, using $ZnCl_2$ as flux. Treatment with dil. HNO_3 removes excess of Ni from solder-free surfaces. J. W. C.

Zinc and cadmium plating in the U.S.S.R. N. A. Isgarischev (First Internat. Electrodep. Conf., 1937, 6 pp.).—An outline of present-day practice in the electrodeposition of Zn and Cd from both sulphate and cyanide solutions. J. W. C.

Cyanide cadmium-plating solution. G. Soderberg (First Internat. Electrodep. Conf., 1937, 12 pp.).—A dissertation on the practical electrochemistry of Cd plating, including data on the constitution of the electrolyte, its conductivity, and the effect of operating conditions on the appearance and character of the plate. Anodic and cathodic conditions are discussed in detail. J. W. C.

Analysis of carbonate–hydroxide–cyanide [cadmium-plating bath] mixtures. B. S. Evans (Analyst, 1937, **62**, 122—123).—CO_3'' is determined by pptg. with $Ba(NO_3)_2$ in absence of CO_2 (cf. A., 1926, 707) and titrating the ppt.; OH′ by adding to the filtrate $AgNO_3$, NH_4NO_3, and an excess of 0·1N-H_2SO_4, filtering, pptg. with NaCl, and back-titrating the excess of acid to Me-red; alkalinity due to CO_3'' and OH′ by the same method as for OH′, using the original sample; and CN′ as AgCN.
J. G.

Rapid analysis of cadmium electrolyte. O. M. Sklovskaja and Z. S. Gildovskaja (Zavod. Lab., 1936, **5**, 669—670).—5 ml. of electrolyte are boiled with 5 ml. of H_2SO_4, to complete elimination of HCN, and the solution is diluted to 250 ml. and boiled with 13 g. of NaOAc. Cd is titrated in the resulting solution with standard 3·3% $K_4Fe(CN)_6$, with $UO_2(OAc)_2$ as external indicator. KCN is determined by adding 5 ml. of aq. NH_3 to 5 ml. of electrolyte, and titrating with standard $CuSO_4$. R. T.

Electrolytic lead plating of chemical apparatus. P. P. Beljaev and J. N. Birman (Chimstr., 1935, **7**, 426—428).—The following bath composition (g./litre) gave good deposits of Pb on Fe at room temp.: 0·5—1·5N-$PbSiF_6$ 87—261, 0·25—1N-H_2SiF_6 18—72, 0·5% H_3BO_3 5, and 0·1—0·2% glue 1—2. $C_6H_4(OH)\cdot SO_3H$, $C_6H_4(SO_3H)_2$, or $C_6H_3Me(OH)\cdot SO_3H$ may be substituted for H_2SiF_6. The plated products may be stamped, machined, and formed without distortion. Ch. Abs. (*e*)

Anodic coating of magnesium alloys. R. W. Buzzard and J. H. Wilson (J. Res. Nat. Bur. Stand., 1937, **18**, 83—87).—Various Mg alloys can be anodically coated in a bath containing about 10% of $Na_2Cr_2O_7,2H_2O$ and 2—5% of NaH_2PO_4,H_2O. The film produced combines corrosion-resistance with paint-holding properties, and its formation causes no appreciable change in dimensions, even on machined surfaces. J. W. S.

Deterioration of chromic acid baths used for anodic oxidation of aluminium alloys. R. W. Buzzard and J. H. Wilson (J. Res. Nat. Bur. Stand., 1937, **18**, 53—58).—The failure of the anodising baths is due to neutralisation of free H_2CrO_4 by Al, and may be prevented by periodic additions of H_2CrO_4.
J. W. S.

Electrolytic coatings on aluminium and its alloys. K. Altmannsberger (Metallwirts., 1937, **16**, 161—162).—Recent processes for plating Al and its alloys with Ni, Zn, Cr, Cu, brass, and Ag are reviewed, with particular reference to the prep. of the basis metal. C. E. H.

Preparation of aluminium and its alloys for electroplating. H. Krause (Metallwirts., 1937, **16**, 162—164).—Processes comprising immersion in acid $FeCl_3$ or alkaline Zn solutions, or cathodic treatment in Cu solutions, are described. In each case the Al is covered with a thin film of a less oxidisable metal before plating. C. E. H.

Losses from plating solutions. G. B. Hogaboom (Metal Ind., 1937, **50**, 219—222).—The solution adhering to the article and thus carried out of the bath is an important source of loss. The extent of this loss is determined for many solutions of standard composition. The effect of size of article, addition agents, and length of bottom edge is determined, and a method of calculating the optimum draining period is outlined. A. J. K.

Rapid determination of iron in electrolytes encountered in electroplating practice. V. A. Zettler (Zavod. Lab., 1936, **5**, 595—597).—The intensity of coloration produced on filter-paper by a drop of solution and of 1% NH_4CNS in $COMe_2$ is compared with those colours given by a series of standard $FeCl_3$ solutions; Co, Ni, Cu, PO_4''', and AsO_3''' do not interfere except when present in large excess. R. T.

Inclusions in electrodeposits, their origin and their effect on the structure and mechanical properties. M. Cymboliste (First Internat. Electrodep. Conf., 1937, 14 pp.).—Pure electrodeposits can be obtained only from electrolytes completely devoid of impurities. Such deposits are coarse-grained and in their mechanical properties resemble annealed metal. Impurities in colloidal suspension in the electrolyte, and incorporated in the cathode metal on discharge, lead to a fine-grained, hard deposit. The crystal dimensions of deposits formed in presence of colloidal impurities flocculated near the cathode, thereafter entering into the cathode metal, are related to the size and degree of flocculation of the impurities. In this case the hardness and structure of the deposit approach those of the pure metal. The presence of localised inclusions largely explains the mediocre properties of electrodeposited metals. J. W. C.

Evaluating the brightness of electrodeposits. B. Egeberg and N. E. Promisel (First Internat. Electrodep. Conf., 1937, 11 pp.).—The intensity of specular reflexion and of diffuse reflexion from 0° to 45°, with incident light at 45°, are measured photometrically and the results plotted. A formula has been derived for giving numerical expression to the relative brightness. Colour etc. of the surface does not affect this evaluation. S. J. K.

Comparative properties of metallic surfaces polished mechanically and electrolytically. P. A. Jacquet (First Internat. Electrodep. Conf., 1937, 11 pp.).—After mechanical polishing there exists below the Beilby layer a more or less thick zone of micro-crystals having no resemblance to the normal crystals of the metal or alloy. The properties of mechanically polished surfaces are bound up with this special structure and are not sp. to the metal or alloy itself. Electrolytic polishing exposes the crystal faces, and thus facilitates the interpretation of phenomena concerned with electrodeposited metals. A. J. K.

Comments on the electrolysis of solutions of complex salts. A. Glazunov and M. Schlötter (First Internat. Electrodep. Conf., 1937, 8 pp.).—During the electrolysis of complex salt solutions complex cations are always present, being a dissociation product of complex anions. The cation complex on discharge is chemically decomposed, leading to cathodic deposition of metal. Traces of the undecomposed complex enter the deposit, and are preserved in the interior of the space lattice. J. W. C.

Operation of fused-electrolyte cells with an increased charge of alumina. A. I. Sheleznov and B. N. Maximenko (Legk. Met., 1935, 4, No. 5, 4—8).—The Al_2O_3 charged at one time to two Hall cells at the Dnieper Al plant was increased to 120—140 kg. (*i.e.*, 50—75%) for a 4-months period. The output increased 1%, and the consumption of cryolite and of anodes decreased 10% and 15%, respectively. Ch. Abs. (*e*)

Production of titanium–aluminium alloys in fused-electrolyte cells. A. I. Sheleznov and B. N. Maximenko (Legk. Met., 1935, 4, No. 4, 24—32).—Alloys with up to 1·53% of Ti were made by dissolving and electrolysing a mixture of Al_2O_3 and TiO_2. The tendency of Ti to segregate was prevented by frequent stirring. Ch. Abs. (*e*)

Oxidation of foam carbon [from aluminium cells] with air. B. I. Ivanov and B. N. Maximenko (Legk. Met., 1935, 4, No. 5, 14—18).—The foam formed in the electrolysis of the fused Al salt bath was crushed and heated in a muffle at 700—900° to oxidise C. At 780° the C was reduced from 12% to 0·24% in 2 hr. The loss of cryolite was insignificant. Ch. Abs. (*e*)

Determination of elasticity of metals by methods of radio technique. J. I. Levando and P. F. Vasilevski (Zavod. Lab., 1936, 5, 176—181).—Apparatus and methods are described. R. T.

Magnetic study of ferromagnetic powders. M. A. Grabovski (Zavod. Lab., 1936, 5, 188—191).—Methods of determining magnetic properties are described. R. T.

Intercryst. fracture of riveted joints in boilers. Flotation.—See I. **Pulverised coal [for furnaces]. Metals and lubricating oils.**—See II. **Determining CaO in slag etc.**—See VII. **Arc-furnace linings. Moulding sands. Heat-resisting steels for the glass industry.**—See VIII. **Acid pumps.**—See XII. **Rust-preventive pigments. Alkyd resins.**—See XIII. **Corrosion of Al alloys by tannins.**—See XV. **H_2O-pipes. Sulphite waste [as core binder].**—See XXIII.

See also A., I, 176, **Cu–Zn and –Sb diagrams.** 177, **Systems Ni–Cu, Fe–Zn, Ag–Al, Sn–Ge, and Sn–Be. Cu, Al, and Si binary systems.** 181, **Prep. of colloidal Au.** 188, **Electrodeposition of Ni.** 188, **Al–Cu and Zn–Fe electrodeposits.** 191, **Corrosion of metals.** 196, **Corrosion of Fe.** 200, **Analysis by *X*-rays.** 201, **Taking *X*-ray photographs [of steels etc.].**

Patents.

Separation of iron from iron-containing substances [ores]. F. Krupp Grusonwerk A.-G. (B.P. 457,605, 26.3.35. Ger., 22.5.34).—The powdered mixture of ore and fuel is treated as in U.S.P. 2,026,683 (B., 1937, 248). Claim is also made for the similar treatment of ferruginous bauxite, especially with addition of Na_2CO_3 or $CaSO_4$, when Al_2O_3 may be recovered by leaching the slag. L. C. M.

Metallurgical furnace. J. D. Pugh (U.S.P. 2,039,738, 5.5.36. Appl., 3.5.33).—In a stationary reverberatory furnace, the tap hole is always open and an external L-pipe is attached thereto and turned up to regulate and stop the flow. B. M. V.

Melting of metals. W. T. Henley's Telegraph Works Co., Ltd., and P. Dunsheath (B.P. 458,089, 11.6.35).—A form of automatically fed furnace for melting ingots in an inert atm. is described. L. C. M.

Refining of carbon-containing alloys and metals. I. Rennerfelt (B.P. 458,025, 7.5.35. Ger., 9.5.34).—The metal is melted in an induction furnace under a fluid slag; the current is then cut off, the air displaced by an inert atm. (*e.g.*, steam or CO_2), and the latter in turn by a reducing gas. The slag is then removed before the current is switched on and the refining proceeded with. L. C. M.

Apparatus for removing metal by fusion. Air Reduction Co., Inc. (B.P. 457,636, 30.3.36. U.S., 18.4.35).—A semi-automatic machine for removing imperfections from the surface of steel billets by a system of oxidising flames is described. L. C. M.

Production of foamed slag from liquid [blast-furnace] slag. E. B. Bjorkman (B.P. 457,774, 4.6.35).—The molten slag is poured continuously into a series of moulds carried on an endless chain; the moulds have perforated bottoms, and steam is blown through these and also directed on the surface of the slag. The foamed slag is allowed to set hard in the moulds and then tipped out; the moulds are washed and returned to be recharged. L. C. M.

Deoxidation of ferrous metals with cyclic utilisation and regeneration of slags. Soc. d'Electro-Chimie, d'Electrométall., et des Aciéries Electr. d'Ugine (B.P. 457,856, 4.6.35. Fr., 2.6.34).—An acid siliceous slag containing MnO 5—30 and FeO <5 (MnO : FeO $= \not< 4$) is employed; when the above ratio falls to <4, the slag is reduced to remove Fe and used again. L. C. M.

Casting and apparatus therefor. Ford Motor Co., Ltd. (B.P. 457,642, 1.7.36. U.S., 7.9.35).—Claim is made for the process of melting a no. of batches of metal, transferring these to a holding furnace, which is maintained at a const. temp., and casting the metal continuously into a series of moulds, which travel past the furnace, by means of an automatically operated ladle. L. C. M.

Moulds for casting metals. W. H. Millspaugh (B.P. 458,416, 18.6.35).—Claim is made for a construction of refractory-lined mould fitted with vents to allow gases to escape. L. C. M.

Manufacture of unchilled metallic castings by the centrifugal casting process. W. Ridley, P. H. Wilson, and Cochranes' (Middlesboro') Foundry, Ltd. (B.P. 458,424, 19.6.35).—In the construction of an automatic centrifugal casting machine, claim is made for the fitting of a helical distributor which coats the interior of each mould with powder (Fe–Si) before the molten metal is introduced. L. C. M.

Bright annealer. P. J. McIntyre (U.S.P. 2,028,941, 28.1.36. Appl., 6.3.31).—A construction of annealing furnace, filled with inert gas and provided with a mechanical conveyor and non-aq. seal, is claimed. L. C. M.

Treatment of material which is passed through baths, such as salt-quenching, annealing, or galvanic baths. A. Roesch, jun. (F. Wagner), and W. Radecker (B.P. 453,805, 16.10.35. Ger., 19.11.34).—Claim is made for appliances incorporating spiral drums which simultaneously raise the liquid of the bath to the level of the metal requiring treatment and maintain the bath in a state of agitation. L. C. M.

Surface-hardening of metal pieces by a flame. I. G. Farbenind. A.-G. (B.P. 458,267, 15.6.35. Ger., 16.6.34).—In the hardening of toothed wheels by means of a blowlamp, melting of the extremities of the teeth is avoided by pressing shoes of heat-conducting metal, *e.g.*, Cu, against the rotating periphery. L. C. M.

Manufacture of iron. H. A. Brassert & Co., Ltd., H. A. Brassert, and T. P. Colclough (B.P. 460,138, 17.4.35 and 27.3.36).—The fluxes added to the blast-furnace charge in the smelting of Fe ores are so adjusted that the CaO : SiO_2 ratio is 1·15—0·9 : 1, 1·125—0·85 : 1, 1·05—0·8 : 1, or 0·95—0·75 : 1 when the Al_2O_3 content of the slag is 15, 20, 25, or 30%, respectively. The Fe in the ladle is desulphurised by treatment with H_2 or by covering it with alkali carbonate or hydroxide and blowing H_2 on the surface. A. R. P.

Manufacture of magnetisable iron–nickel alloys. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 458,315, 8.7.35).—Fe–Ni alloys (which may contain small amounts of Cr, Mo, W, Si, or Al) of const. permeability are obtained by hot-rolling the metal after forging to 4-mm. sheet and then cold-rolling (in one plane) to 0·4 mm.; the sheet is then annealed for 1 hr. at 700—900° (900°), cold-rolled to 0·08 mm., and annealed in H_2 for 1 hr. at 350—450° (400°). L. C. M.

Pickling of [ferrous] metals. W. Heimberger (B.P. 453,704, 14.3.35. Ger., 23.10.34).—In the prep. of Fe sheets for vitreous enamelling, they are first treated in a hot oxidising bath, containing, *e.g.*, H_2SO_4 20 and KNO_3 20 g. per litre, then in a more dil. one containing, *e.g.*, H_2SO_4 2·5 and KNO_3 20 g. per litre, in which the oxide film first produced is dissolved and a perfectly blank surface remains. L. C. M.

Pickling, cleansing, swilling, and washing metal plates and the like. A. E. Ridley (B.P. 453,880, 21.3.35).—Pickling and washing tanks are fitted with pulsators which impart to the liquids a jerky motion in any required direction. L. C. M.

Cleansing of metal articles. Henkel & Co. Ges.m.b.H. (B.P. 458,163, 12.6.35. Ger., 23.6.34).—Claim is made for the use of aq. HNO_3 containing org. amines or amides, *e.g.*, NH_2Ac 12, 50% HNO_3 25; urea 16, 50% HNO_3 16; or 33% aq. NH_2Me 10, 25% HNO_3 32 pts., in the removal of incrustation from vessels employed in the manufacture of foodstuffs, beer, etc. The solutions may also be applied in the form of a paste with kieselguhr. L. C. M.

Preparation of steel-pickling inhibitors. N. V. De Bataatsche Petroleum Maats., Assees. of J. D. Ruys and R. L. Kittle (B.P. 459,420, 19.3.36. U.S., 3.4.35).—H_2SO_4 sludge (from the treatment of petroleum distillates) is neutralised with aq. NH_3, and the oily layer separated and treated with a slight excess of aq. NH_3 at 80°. The aq. extract is separated, and the oil treated with hot aq. 67% H_2SO_4 containing $(NH_4)_2SO_4$. Then this second acid extract is mixed with the first, the liquid saturated with $(NH_4)_2SO_4$, and the oily org. bases which separate are employed as corrosion inhibitors. L. C. M.

Protection of iron and steel. A. Folliet, N. Sainderichin, and Follsain Synd., Ltd. (B.P. 457,764, 4.5.35. Addn. to B.P. 337,562; B., 1931, 26).—The white-Fe castings are coated by heating at 850—1050° in a mixture of Al powder with carborundum 40—60, $CrCl_3$, $NiCl_2$, or $MnCl_2$ 2—5%, and NH_4Cl 1—2·5%. The use of $FeCl_3$ in place of the non-ferrous chloride is claimed. L. C. M.

Apparatus for coating with metal by dipping. F. C. Williams (B.P. 459,925, 19.7.35).—Claim is made for an apparatus for galvanising Fe articles, consisting of a bath of molten Pb, covered by a layer of flux, at one end of which is placed a vessel, open at top and bottom and containing molten Zn, which floats upon the Pb. The Fe articles are passed through the flux into the Pb, and then upwards through the Zn; due to their thorough heating, they acquire a closely adherent coating. L. C. M.

Coating of metallic objects with layers of other metals. T. Sędzimer (B.P. 453,803, 23.9.35). The metal (*e.g.*, Fe or steel) is surface-oxidised by heating in air and then this layer reduced (H_2) and cooled in a reducing atm. before immersion in a bath of molten coating metal. The freshly reduced metal is claimed to improve the adhesion of the coating. L. C. M.

Prevention of corrosion in aircraft. Metallisation, Ltd., and W. E. Ballard (B.P. 457,938, 1.7.35).—Metal (steel) aircraft bodies are protected by applying a layer $\not>$0·004 in. thick of $\not<$98 (99·5)% Al to the sandblasted or etched surface by means of a spraying pistol, and finally coating with lacquer. L. C. M.

Alloy steels. W. M. Burden, R. Genders, and R. Harrison (B.P. 457,760, 30.4.35).—Alloy steels containing carbides of Ta, Nb, V, Zr, B, or Ti are prepared by adding the required metal to Fe (*e.g.*, white pig; C 3·5—4%) in sufficient quantity to leave approx. 0·7% of free C; alloying metals, *e.g.*, Cr ($\not>$30), W ($\not>$20), or Mo ($\not>$10)%, may then be added. The hard carbide particles may also be separated by dissolving away the matrix with aq. HCl. L. C. M.

Production of titanium steel. W. Mathesius (B.P. 459,432, 2.4.35. Ger., 7.4.34).—Pig Fe is melted under a slag containing TiO_2 and CaO ($\not>$70 : 30) and free from SiO_2, and the slag then reduced at 1450—1500° by addition of C; the Ti liberated removes N, O, and S from the Fe, which pass into the slag; this slag is then removed, and replaced by one containing TiO_2, C, and CaO, in such proportions that the liberated Ti is sufficient to combine with the C in the molten Fe. The resulting steel contains TiC 0·5—1 and P 0·05—0·5%. L. C. M.

Molybdenum alloy steels. C. H. Wills (B.P. 457,872, 2.3.35. U.S., 14.3.34).—Steel containing Mo 0·2—1·5 (0·2—0·3, 0·25), C 0·15—2 (0·6—0·7, 0·65), and Mn 0·3—3 (0·7—0·9, 0·8), with or without Si 0·15—2·5 (0·2—0·3, 0·25) and Cr 0·032—0·8%, after deoxidation is treated at 1540° with Al 1—2 lb. per ton to produce a non-normal structure of fine grain size. L. C. M.

Bimetallic electrical trolly wire. Verein. Aluminium-Werke A.-G., Assees. of O. Kobolb, and Verein. Deuts. Metallwerke A.-G. Zweigniederlassung Heddernheimer Kupferwerk (B.P. 459,743, 23.1.36. Ger., 1.2.35).—The bimetal wire is of galvanised steel with an insert of Al or an Al alloy of swallowtail cross-section, flattened where contact is made with the trolley. L. C. M.

Case-hardened articles made from alloy steels. Deuts. Edelstahlwerke A.-G. (B.P. 458,385, 6.12.35. Ger., 7.12.34).—Claim is made for the use of steels containing C 0·1—0·2 (0·15), Co 1·5—2·5 (2·0), Ni 1·0—2·5 (1·0, 2·0), and Mo 0—0·3 (0·2)% for case-hardened gear wheels, crank shafts, cam discs, etc. L. C. M.

Roasting of mineral sulphides in gaseous suspension. Consolidated Mining & Smelting Co. of Canada, Ltd. (B.P. 459,823, 12.3.36. U.S., 29.7.35).—Sulphide ores, *e.g.*, ZnS or CuS, are roasted at 900—930° in a mechanically rabbled shaft furnace fitted with perforated shelves, and the S-free product may then be treated with gases containing SO_2 (from the roaster) at approx. 480° if a highly sulphated material is desired. L. C. M.

Concentration of oxidised ores by froth flotation. E. D'Orelli (B.P. 460,072, 27.2.36. Ger., 4.3.35).—The ore pulp is agitated with a little Na_2SnO_3, Na_2WO_4, Na_2MoO_4, or NH_4VO_3 and the mineral floated by addition of a fatty acid and a frother in an alkaline circuit. *E.g.*, chromite is floated with $(NH_4)_2MoO_4$, oleic acid, Aerofloat, and pine oil; pyrolusite with Na_2SnO_3, stearic acid, K amyl xanthate, and terpin oil; and cassiterite with Na_2WO_4, Na palmitate, and cresol. Gangue minerals are depressed by addition of Na_2SiO_3 and/or quebracho extract. A. R. P.

Refining of metals [*e.g.*, copper]. Scovill Manufg. Co., Assees. of L. W. Bahney (B.P. 457,565, 19.10.35. U.S., 26.10.34. Addn. to B.P. 400,259; B., 1934, 103).—The metal at $\not>$1140° (1125°) is poured into moulds preheated to 105—110° and dressed with a prep. of boneblack, under an atm. of charcoal producer gas consisting of N_2 with CO >10 and CO_2 <15%. L. C. M.

Production of metallic [zinc] dust. H. V. Casson. From Electrolytic Zinc Co. of Australasia, Ltd. (B.P. 460,620, 30.4.36).—Zn (or Cd) vapour is passed into a condenser in which N_2 is circulated at >1 atm. through a small opening. A. R. P.

Bearing-metal alloys. Electrolytic Zinc Co. of Australasia, Ltd. (B.P. 458,324, 10.9.35. Austral., 14.11.34).—Claim is made for Cd alloys, containing Ag 0·05—0·45 (0·25) with or without Cu 1—2 (1·45) and/or Mg 0·01—0·15 (0·1)%. L. C. M.

Manufacture of nickel and nickel alloys. Mond Nickel Co., Ltd. From Internat. Nickel Co., Inc. (B.P. 459,431, 1.4.35).—Red-shortness in Ni and Ni alloys is prevented by addition of small amounts of, *e.g.*, Ti, Zr, Mg, B, P, or As to the molten alloy, containing, *e.g.*, Cu 30 or Cu 78 and Al 2%. The proportion of alloying element required is ascertained by adding Ti or Zr, Mg, then B or P, and examining samples until the alloy has the desired properties. L. C. M.

Heat-resistant alloys. W. T. Griffiths and L. B. Pfeil (B.P. 459,848, 9.5.35).—The use of Ni alloys containing rare-earth metal 0·01—0·5% with at least one of the elements Co, Mn, Si, As, or Sb for electrical-resistance purposes is claimed. L. C. M.

Electrical resistance alloys. Brit. Driver-Harris Co., Ltd., and W. M. Kay (B.P. 459,319 and 459,390, 11.10.35. U.S., [A] 14.6.35, [B] 12.10.34).—The use of Ni alloys containing Cr 15—25, with or without Fe 8—30, and/or Mn 0·02—2 (0·05—1), and/or Si 0·2—2 (0·4—1·25), and including (A) Zr

0·01—0·5, or (B) Zr 0·01—0·5 (0·1—0·3), Ca 0·01—0·2 (0·01—0·05), and Al 0·01—1 (0·07—0·38)%, is claimed. L. C. M.

Production of coatings of tin on metal articles. R. Thomas & Co., Ltd., A. W. Kieft, E. Mehl, and O. Smetana (B.P. 457,780, 4.6.35).—A bright electrolytic deposit of Sn (resembling that produced by the tin-pot process) is obtained by first applying a thin electroplated layer of Ni, Cu, or Co, electroplating with Sn, immersing the article for a short period in a bath of oil or glycerin at 250—260°, and quenching in glycerin or aq. soap. The melting of the Sn layer may also be accomplished electrically, in an atm. containing H_2, NH_4Cl, or HCl. L. C. M.

Recovery of tin from tin scrap. A. Thomas (B.P. 460,029, 19.7.35).—The scrap is degreased and heated with HCl containing $Cl_2 <$ that necessary to produce $SnCl_4$. The resulting solution of $SnCl_2$ and $SnCl_4$ is boiled with HNO_3 and/or NH_4NO_3, neutralised with NaOH, and poured into 10 vols. of boiling H_2O to ppt. metastannic acid. A. R. P.

[Precious metal] ore extraction. G. J. MacKay (U.S.P. 2,028,940, 28.1.36. Appl., 24.9.34. Can., 7.9.34).—A mixture of Na_2CO_3 (or K_2CO_3), $NaNO_3$ (or KNO_3), and ground ore containing As, S, and Fe (*e.g.*, arsenopyrite, marcasite) is heated in a covered crucible at 510—650° without fusion, and quenched in H_2O. The ppt. is treated with $Ca(OH)_2$ and treated by the cyanide process; a small proportion of Au is recovered from the solution. L. C. M.

Metallurgical processes for recovery of metals [gold and silver] from ores. L. D. Mills, T. B. Crowe, J. C. Haun, and Merrill Co. (B.P. 460,183, 19.6.35).—The slimes are separated from the sand by classification, the sand is cyanided directly, and the thickened slime pulp agitated with cyanide and treated, in turn, with $NaHSO_3$ to remove dissolved O_2, with Zn to ppt. the Au and Ag, and finally with $CuSO_4 \equiv$ the CN′ present; the Au and Ag are then recovered by flotation and cyanidation of the concentrate. A. R. P.

Recovery of crude precious metals. Deuts. Gold- u. Silber-Scheideanstalt vorm. Roessler (B.P. 457,902, 11.10.35. Ger., 12.10.34).—Finely-ground residues, sweep, ore concentrates, etc. are smelted with powdered CaO and Fe_2O_3 so that a slag containing CaO 23—37, FeO 8—20, and SiO_2 33—42% is formed. The values separate either in the metallic state with Pb, Cu, etc., or, if much S be present, as a matte bottom. L. C. M.

Treatment of cyanide solutions containing dissolved precious metals. Merrill Co., L. D. Mills, and T. B. Crowe (B.P. 460,969, 3.8.35).—Pregnant cyanide solutions from the leaching of Au or Ag ores are deaërated by vac. treatment and treated with Zn dust and $Na_2S_2O_4$ to complete the removal of dissolved O_2 before being passed to the Zn pptn. boxes. A. R. P.

Manufacture of free metallic [gold] leaf. Peerless Gold Leaf Co., Ltd. (B.P. 459,545, 11.7.35. U.S., 13.7.34).—A continuous band of Ag passes through an electrolytic bath in which a thin layer of Au is deposited upon its surface. The Au leaf is removed by passage of the composite strip through a bath of HNO_3, and the free Au is washed, by floating over a second bath, and then taken up by a tape of slightly adhesive carrier material. The Au leaf and carrier are subsequently wound on to a bobbin (the reverse of the carrier tape being coated with rouge or talc to render it non-adhesive) and later separated and made up into Au-leaf books. L. C. M.

Manufacture of [thin] tungsten carbide castings. O. F. Marvin, Assr. to Mills Alloys, Inc. (U.S.P. 2,028,911, 28.1.36. Appl., 19.3.32).—The mould (of graphite) is provided with an outer casing of Cu or Ag; both are filled with molten WC before centrifuging. L. C. M.

Sintered hard carbide composition. Brit. Thomson-Houston Co., Ltd. (B.P. 460,013, 28.9.36).—A 1 : 1 mixture of Mo_2C and VC is ground finely and melted (m.p. 2450°) in a graphite furnace in H_2. Co, Ni, or Fe may be added to the melt, which is then cast in a graphite mould. A. R. P.

Hard metal alloys, particularly for tools. Verein. Edelstahl A.-G. (B.P. 453,824, 10.1.35. Ger., 18.4.34).—A mixture of carbides of $\not<$ 3 metals from groups III—VI is prepared, and $\not<$ 10% is fused, yielding two groups of mixed crystals; these are incorporated with the remainder of the original mixture and the mixture is re-treated, yielding a further quantity of mixed crystals, which are consolidated at 1400—1600° with 3—25 wt.-% of a metal of group VI or VIII. Claim is made, *e.g.*, for an alloy prepared as above containing $WC + WC_2$ 60—75, TiC 10—20, Mo_4C_3 1—25, and Fe, Co, or Ni 3—25%. L. C. M.

Preparation, by melting, of moulded bodies of a difficultly fusible alloy. J. Mayor (B.P. 459,854, 13.7.35. Switz., 15.7.34).—A powdered mixture of the constituents of the alloy, which may contain, *e.g.*, WC 85, Co 12, and Ni or Mo 3%, is placed in a closed graphite mould of the desired form which is fitted with a channel holding excess material in which a graphite piston slides. The mould is heated in vac. in an electric furnace to 1900—2500°, a pressure of 5—50 kg. per sq. cm. being maintained by the piston; when the charge melts, the pressure is increased by 50 kg. per sq. cm. and these conditions are maintained for 5—15 min. before cooling in a current of H_2. L. C. M.

Manufacture of alloys containing boron. Soc. d'Électrochim. d'Électrométall., et des Aciéries Électr. d'Ugine, and J. L. Andrieux (B.P. 458,314, 2.7.35. Fr., 2.7.34).—Alloys of, *e.g.*, Fe, Co, Ni, Cr, Mo, Si, W, Ti, or Al with B are prepared by heating powdered mixtures of Ca_3B_2 or Ba_3B_2 with either the metal or its oxide and a reducing agent (Al, Mg, Ca, Na, Si, or C) at $\not<$ 1000° under a layer of flux. L. C. M.

Production of alkali metals [lithium]. M. G. Hanson (U.S.P. 2,028,390, 21.1.36. Appl., 29.9.33).—A 1 : 1 mixture of Li_2O and Mg or Al in 100-mesh powder form is compressed into pellets, which are heated at 750—900°/<6 mm. in H_2, and the Li vapour is condensed. L. C. M.

Casting of light metals and their alloys. Oesterr. Amerikanische Magnesit A.-G. (B.P. 458,093, 11.6.35. Austr., 31.5.35).—Castings of finely-cryst. structure and free from gas are obtained by the use of temporary moulds consisting of, *e.g.*, MgO or roasted chromite 85—90, SiO_2 3—5, Fe_2O_3 3—4, Al_2O_3 1, CaO 1—3, clay 4, coal dust 1, and Na_2SiF_6 3 or $MgSiF_6$ 1% plasticised with asphaltic petroleum 3 wt.-%, which are dusted or washed with aq. Na_2SiF_6 or $MgSiF_6$ before casting. L. C. M.

Melting, refining, and preparation for casting of metals such as magnesium and its alloys which, in the molten condition, are subject to attack by the atmosphere. L. G. Day, Magnesium Casting & Products, Ltd., and High Duty Alloys, Ltd. (B.P. 457,826, 7.6.35).—The metal is melted in a crucible covered by a domed lid provided with an aperture to admit a ladle, and an inert atm. is maintained inside and streaming from the vessel by a series of burning jets around the interior. L. C. M.

Heat-treatment of cast aluminium–magnesium alloys. Aluminium, Ltd., Assees. of F. P. Somers (B.P. 453,849, 18.3.35. U.S., 24.7.34).—Alloys containing Mg 6—14 (9—11)% are subjected to a solution heat-treatment, cooled in oil to 93—176°, and kept at that temp. for 5—60 min. L. C. M.

Refining of magnesium and its alloys. I. G. Farbenind. A.-G. (B.P. 459,912, 1.4.36. Ger., 10.5.35).—Mg obtained by reduction with CaC_2 and containing approx. 0·2% Ca is stirred at 720° under a fluid flux (*e.g.*, $MgCl_2$); the flux is rendered viscous by addition of MgO, the temp. raised to 850° to free the metal from flux, lowered again to 720°, and the Mg free from Ca is cast into ingots. L. C. M.

Solders for thin aluminium plates. F. Strasser (B.P. 460,113, 18.5.36. Switz., 5.6.35).—An alloy of Sn 38—70 (60), Cd 5—30 (25), Ag 2—12 (7·5), and Al 5—20 (7·5)% is claimed; the m.p. of the preferred alloy is 180—200°. A. R. P.

Production of aluminium-containing iron alloys suitable for preparation of metallic bodies. H. C. Heide. From Deuts. Edelstahlwerke A.-G. (B.P. 458,065, 14.5.36).—Fe alloys, containing Al 6—16 and Ni 20—32%, are prepared by melting an excess of Al, removing the dross, weighing the required amount of clean metal, and adding to it the Fe and Ni, previously melted together in another crucible. L. C. M.

Aluminium bronzes. Mansfeld A.-G. f. Bergbau u. Hüttenbetrieb Abt. Kupfer- u. Messingwerke (B.P. 460,615, 14.3.36. Ger., 24.4.35).—Corrosion-resistant bronzes contain Al 6—8 (7·2 or 7·87), Ni 4·7—5·3 (4·78 or 5·25), and Fe 3·5—4·2 (4·18 or 3·55)%. A. R. P.

Clad aluminium alloys. Verein. Leichtmetallwerke Ges.m.b.H. (B.P. 458,339, 2.4.36. Ger., 22.5.35).—In order to ensure corrosion-free welds, Al alloys containing Mg 5—12% (magnalium) are coated with pure Al or with alloys containing Mg 2—2·5, Mn 1—2, and Sb 0—0·2%. L. C. M.

Electric arc-welding. M. Zack (B.P. 459,247, 3.10.35. Ger., 11.6.35).—A welding device incorporating an auxiliary electrode for striking the arc is claimed. L. C. M.

Manufacture of flux-coated electrodes for electric arc-welding. M. R. Moritz, and Metropolitan–Vickers Electrical Co., Ltd. (B.P. 458,134, 20.6.35).—An apparatus for coating wire with fluxing material (in the form of a paste) is described. L. C. M.

Apparatus for carrying out welding or coating of metals and chemical reactions electrically. A. Kratky (B.P. 459,446, 4.7.35).—Claim is made for a device, consisting of a H_2O-cooled hopper containing powdered metal, the nozzle (which serves as an electrode) of which is provided with a shaking arrangement which prevents clogging of the aperture. L. C. M.

Welding rod. J. B. Austin, Assr. to Una Welding, Inc. (U.S.P. 2,022,307, 26.11.35. Appl., 12.8.25. Renewed 16.2.31).—The rod of steel containing C 0·05—0·25, V 0·02—0·25, and Ti 0·04—0·2 (Ti + V = 0·16—0·29)% is coated with approx. 0·3 wt.-% of flux (alundum + clay). L. C. M.

Welding-rod alloy. H. W. Butterbaugh, Assr. to Amer. Brass Co. (U.S.P. 2,028,317, 21.1.36. Appl., 5.3.35).—Alloys for brazing, containing Cu 55—65 (57·5), Ni 0·1—0·3 (0·75, 2), Zn 31·3—44·9 (41·5, 40·4), and Si 0·02—0·75 (0·25, 0·1)%, are claimed. L. C. M.

(A) **Welding rods.** (B) **Welding of alloy steels.** Electro Metallurg. Co., Assees. of (A) R. Franks, (B) C. G. Chadwick (B.P. 459,366—7, 4.7.35. U.S., [A] 28.7.34, [B] 1.9.34).—(A) Claim is made for a steel welding rod containing Cr 3—30 (or Cr 12—30 and Ni 5—30), C 0·01—0·3, Nb 0·1—5, and Si 0—1%, coated with fluxing material (*e.g.*, a mixture of CaO, felspar, chromite, and binder) containing Si 1—50%. (B) In the welding of steels containing Cr 2—35 and C 0·07—0·3, with or without Ni 6—35%, a welding rod coated with fluxing materials [similar to those in (A)] containing Nb 2—40 (5)% is employed. L. C. M.

Welding wires. Gebr. Böhler & Co A.-G., and F. Leitner (B.P. 459,715, 8.6.35).—Claim is made for a hollow wire-welding electrode consisting of Fe with Si 0·2—3, Mn 0·3—4, Zr 0·1—3, and Ni 0·3—3·5%, cored with, *e.g.*, a mixture of SiO_2 30, NaCl 10, TiO_2 27, CaO 3, and Na_2CO_3 30%. L. C. M.

Attachment of iron parts to non-ferrous metal or other bodies. J. Lucas, Ltd., J. L. Miller, and S. Roberts (B.P. 460,371, 26.7.35).—An arrangement of projecting parts which can be electrically welded together is claimed. A. R. P.

Manufacture of magnetic materials adapted to load-transmission lines. Heraeus-Vacuumschmelze A.-G. (B.P. 457,995, 23.1.36. Ger., 25.2.35).—Treatment of Fe alloys containing Ni 35—60 (40—50)% by cold-working and annealing at 150—500° (350—400°, 400°) for ½—6 (1—3) hr. is claimed to diminish the change in hysterisis due to the passage of d.c. through the metal. L. C. M.

Production of finely-divided metallic layers. Radio-A.-G. D. S. Loewe (B.P. 459,231, 30.5.35. Ger., 1.6.34).—Mosaic electrodes (for television transmitting valves), consisting of sheets of mica or ceramic material coated with minute particles of Ag, are produced by coating the base with a layer of Ag 0·1—0·01 μ in thickness by thermal condensation, and heating it at 450° in an oxidising atm., when separation into crystals of approx. 1 μ in diameter occurs. L. C. M.

Electroplating apparatus. R. Cruickshank, Ltd., and G. Major (B.P. 459,859, 15.7.35).—A form of plating tank for small articles is claimed. L. C. M.

Nickel-plating. M. Schlötter (B.P. 459,887, 18.7.35).—Claim is made for the use of bright-plating baths containing an alkali or alkaline-earth halide and arylsulphonic acids or their salts with buffering constituents, *e.g.*, $NiSO_4$ 150, KCl 50, $C_6H_3Me(SO_3Na)_2$ 40, and H_3BO_3 15 g. per litre ($p_H < 5$). L. C. M.

[Bath for] depositing zinc electrolytically. F. Maertens (B.P. 460,676, 23.12.35. Ger., 7.1.35).—The bath consists of conc. aq. ZnI_2 (*d* 1·7) containing 5% of $NaAlO_2$. A. R. P.

Electrodeposition of (A, B) tungsten and (A—C) tungsten alloys. H. H. Armstrong and A. B. Menefee (B.P. 460,840, 460,886, and 460,931, 1.5.35. U.S., [A, C] 18.9.34, [B] 2.4.35).—(A) The bath consists of aq. WO_2F_2, with or without a sol. salt of a metal, *e.g.*, Ni, to be deposited with the W. It is operated at p_H 5—6, 35—80°, and 14 amp./sq. ft. (B) WO_3 80 is fused with NH_4HF_2 170 g. and the product dissolved in 1 (U.S.) gal. of H_2O containing NaF 160 and NaCl 80 g. The p_H is adjusted to 5·3—6·3 by addition of NH_3 if pure W is to be deposited, and of basic Ni carbonate if a Ni–W alloy plate is required. (C) A WC anode is used in baths of the above type. A. R. P.

Anodic coating of aluminium and its alloys and electrolytes therefor. Schering-Kahlbaum A.-G. (B.P. 459,263 and Addn. B.P. 459,264, [A] 27.4.36, [B] 14.4.36. Ger., [A] 25.4.35, [B] 14.10.35).—(A) The use of electrolytes containing H_2WO_6 or H_2MoO_6 is claimed; *e.g.*, a solution of freshly pptd. WO_3 (20 g.) in 30% aq. H_2O_2 (30 c.c.) is added to H_2O (1 litre) containing citric acid (20) and H_2SO_4 (50 g.). Anodisation for 1 hr. at 20°/15—20 volts produces a hard, transparent coating. (B) The electrolyte contains in addition 1·5—2 g. of H_3PO_4 per litre. L. C. M.

Production of [rolled] metal articles. A. R. Walton (B.P. 458,076, 11.4.35).

Manufacture of metal tubing from skelp. L. Mellersh-Jackson. From Air Reduction Co., Inc. (B.P. 459,519, 8.7.35).

[Automatic apparatus for] electric welding. Brit. Thomson-Houston Co., Ltd. (B.P. 458,334, 18.2.36. Ger., 18.2.35. Addn. to B.P. 449,117).

Composite foils.—See V. **Joining ceramic and metallic members.**—See VIII. **Vulcanising rubber to metal.**—See XIV. **Printing and photolithographic plates. Stencil.**—See XXI.

XI.—ELECTROTECHNICS.

Thermoelectric pyrometer for very high temperatures (1500—2000°). A. M. Borzdika (Zavod. Lab., 1936, **5**, 204—207).—C–SiC and C–MoC thermocouples are recommended. R. T.

Ballistic equipment for testing feebly magnetic materials. J. S. Schur and R. I. Janus (Zavod. Lab., 1936, **5**, 621—624).—Apparatus is described. R. T.

Cuprous oxide rectifier in electrochemical practice. Turkuletz (Zavod. Lab., 1936, **5**, 349). R. T.

Causes of the evolution of oxygen from lead accumulators at rest. G. Tedeschi (Atti R. Accad. Lincei, 1936, [vi], **24**, 139—144).—O_2 evolution at the anode of Pb accumulators at rest is attributed to the reaction: $PbO_2 + H_2SO_4 = PbSO_4 + H_2O + \frac{1}{2}O_2$, the rate of evolution depending on the state of subdivision of the PbO_2. O. J. W.

End-point voltage of the lead-acid storage cell. K. Kinoshita (Bull. Chem. Soc. Japan, 1937, **12**, 25—31).—The terminal voltages of Pb–acid cells have been measured during charge and discharge at 1·5, 2·0, 2·5, and 3·0 amp. Except for vals. of the terminal voltage (e) near to the end-point voltage, proportionality exists between e and C^n, where n is a const. and C the % ratio of the remaining capacity to the total capacity of the cell. The significance of the val. of n in representing the structural features of the plate is discussed. The end-point voltage is less for large than for small discharge currents. C. R. H.

Influence of design [of pocket-lamp batteries] on corrosion-resistance. G. Garre (Chem.-Ztg., 1937, **61**, 258).—A large consignment of the batteries was found useless after a sea voyage owing to corrosion of the brass fittings. This was traced to the construction of the battery not allowing NH_3 evolved from the filling to escape. C. I.

Electrolytic reduction of aromatic trinitro-compounds to their respective triamines. J. Phillips and A. Lowy (Trans. Electrochem. Soc., 1937, **71**, Preprint 8, 65—74).—The $(NO_2)_3$-compounds reduced include 2 : 4 : 6-$(NO_2)_3C_6H_2\cdot CO_2H$, 2 : 4 : 6-$C_6H_2Me(NO_2)_3$, and 2 : 4 : 6-$(NO_2)_3C_6H_2\cdot OH$. The highest yields of triamine are obtained by using a closed cell with perforated Pb cathode and Pt anode contained in a porous Al_2O_3 cup. The catholyte is 50% HCl, and the cathode c.d. is 3—4 amp. per sq. dm. Methods of isolating and purifying the $(NH_2)_3$-compounds are given. J. W. C.

Photoelectric cells and their use in chemical industry. R. Suhrmann (Chem.-Ztg., 1937, **61**, 245—247).—A review.

Anode materials for high-vacuum tubes. E. E. Spitzer (Elec. Eng., 1935, **54**, 1246—1251).—A discussion of the use of W, Mo, Ni, and graphite. Ch. Abs. (*e*)

Effect of total voltage on breakdown in vacuum. H. W. Anderson (Elec. Eng., 1935, **54**, 1315—1320).—Tests with metal electrodes are described and discussed. Ch. Abs. (*e*)

Electric breakdown of colophony in non-uniform fields. S. S. Gutin and L. N. Zahgeim (Bull. Acad. Sci. U.R.S.S., 1936, 589—599).—The crit. val. of the field intensity at the electrodes for the breakdown of colophony between plane-spherical and plane-cylindrical electrodes increases as the radius of curvature *R* of the smaller electrode is decreased until a limiting val. of *R* is reached, below which the crit. field intensity is const. The max. val. of the crit. field intensity obtained was 7000 kv. per cm. with cylinders of 0·03 and 0·02 mm. diameter. The breakdown intensity in a uniform field depends on the size of the electrode surfaces and varies between 2500 and 5500 kv. per cm. It is suggested that these variations are due to the presence of weak spots in the material. Higher breakdown intensities between cylinder-plane electrodes are observed at const. than at variable voltage. O. D. S.

Breakdown and flash-over of solid dielectrics in compressed nitrogen. B. M. Vul and I. M. Goldman (Bull. Acad. Sci. U.R.S.S., 1936, 579—588; cf. A., 1936, 924). O. D. S.

Technique of electro-endosmotic measurements. N. A. Krilov (Kolloid. Shurn., 1936, 2, 119—125).—The H_2O content and κ give different vals. for the total cross-section of the pores in a paper diaphragm. The electro-osmotic velocity of H_2O through blotting paper increases more rapidly than the current strength. J. J. B.

Automatic control.—See I. **Electrode C from coal. Determining moisture content.**—See II. **Measuring κ of paper extracts.**—See V. **Alkali–Cl_2 cell. KCl.**—See VII. **Arc-furnace linings. Ceramic insulating material.**—See VIII. **Determining Al in bronze. Electric-furnace linings. Research at McGill. Engineering in electrochemistry etc. Welding steel. Arc-welding in A. Determining Mo in steel, and Fe and Cr in Fe–Cr. Analysis of Cr ores. Electroplating practice. Ni-plating. Corrosion of Ni anodes. Ag-plating. Cu electrodeposits. Etching Cu. Degreasing and coppering baths. Brass analysis. Deposits on Cr and stainless steel. Zn- and Cd-plate. Analysing Cd electrolyte. Pb-plating. Anodic coating of Mg alloys, and oxidation of Al alloys. Coatings on Al and its alloys. Prep. of Al and its alloys. Losses from plating solutions. Determination of Fe in electrolytes. Inclusions in electrodeposits. Brightness of electrodeposits. Polished metallic surfaces. Electrolysis of complex salt solutions. Electrolyte cells [for Al and Ti–Al]. Determining elasticity of metals. Ferromagnetic powders.**—See X. **Electrolysis of soap solutions.**—See XII. **Determining CaO requirement of soils.**—See XVI. **Measuring p_H of milk.**—See XIX.

See also A., I, 188, **Electrodeposition of Ni. Al–Cu and Zn–Fe electrodeposits.** 192, **Electrolysis of aq. NH_4Br. Anodic oxidation of Cr^{III} salts to chromates.** 193, **Electrolysis of $GeHCl_3$ or hydrochlorogermanic acid. Anode reactions.** II, 165, **Electro-reduction of maleimide and pyrrolidine.**

Patents.

Thermocouples for use in temperature-control systems of electric furnaces. A. Sadler. From Electric Furnace Co. (B.P. 461,370, 12.11.35).—The sheath is ventilated so that the couple is surrounded by air even though the furnace is filled with H_2 or the like. B. M. V.

Electrical [electrolytic] condenser. P. Hetenyi, Assr. to Solar Manufg. Co. (U.S.P. 2,028,775, 28.1.36. Appl., 25.5.32).—Use of an electrolyte of high η and consisting of agar-agar 1, potato starch 7, NH_4 borate 56, and glycerin 36% is claimed. L. C. M.

Electrode system [for electrolytic condenser]. W. C. van Geel and J. H. de Boer, Assrs. to Radio Corp. of America (U.S.P. 2,038,616, 28.4.36. Appl., 14.6.32. Ger., 26.6.31).—A spirally-wound Zr band with spaced windings is supported within a Cu vsssel containing a solution of KH_2PO_4 in H_2O-free glycerin. J. S. G. T.

Electrical condensers. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 461,313, 2.8.35).—The dielectric is formed of a chlorinated hydrocarbon (about 35% Cl) containing also ·CN, *e.g.*, 1-$C_{10}H_7$·CN. B. M. V.

Dielectrics for electrical apparatus. Brit. Thomson-Houston Co., Ltd. (B.P. 461,681, 21.8.35. U.S., 23.8.34).—Aralkyl ethers, halogenated in the aryl nucleus, prepared by causing polyhalogenated aromatic hydrocarbons to react with aliphatic alcohols in presence of hydroxides or basic materials, *e.g.*, NaOH, and a catalyst, *e.g.*, Cu_2Cl_2, at 200—260°, either alone or mixed with other dielectric materials, *e.g.*, oils, halogenated Ph_2 derivatives, are high-const. liquid dielectrics, which when containing sufficient halogen are non-inflammable. N. H. H.

Dielectric materials and electrical apparatus using such materials. Standard Telephones & Cables, Ltd., Assees. of A. H. White and W. A. Yager. From Western Electric Co., Inc. (B.P. 459,816, 17.1.36).—Use of porous non-conducting material impregnated with *cyclo*hexanol is claimed. J. S. G. T.

Manufacture of insulated electric conductors. Brit. Thomson-Houston Co., Ltd. (B.P. 460,347, 23.4.36. U.S., 23.4.35).—Condensation products of aldehydes (CH_2O) with partly or completely hydrolysed vinyl ester (acetate) polymerides are used as coatings. [Stat. ref.] S. M.

Production of magnetic cores. Associated Electric Labs., Inc. (B.P. 459,669, 12.7.35. U.S., 6.9.34).—Fe dust (200-mesh) is treated with linseed oil $<1\%$ and tumbled in a warm oxidising atm. to dry the oil, which may contain Co, Ni, or Mn compound as a drier. The coated Fe powder is then pressed to shape. L. C. M.

Dry batteries. A. H. Redfern and F. MacCallum (B.P. 459,945, 18.4.35).—In dry batteries containing C-coated Zn plates, the edges of the plates are sealed with an adherent coating of insulating material to insulate the electrolyte of one cell from that of those on either side. A. R. P.

Leclanché [electric primary] cells and depolarisers for same. E. Nossen (B.P. 460,898, 2.8.35).—A depolariser having a high [$Mn^{\cdot\cdot\cdot}$] and a method of manufacturing it from Mn ore are claimed. Thus, *e.g.*, finely-ground Mn ore is boiled with a manganous salt + H_2O, and then treated with $Ca(OH)_2$ and/or CaO to form manganites or polymanganites, the surplus $Ca(OH)_2$ and/or CaO and the $Mn(OH)_2$ being finally treated with NH_4Cl. Alternatively, the finely-ground ore is heated at 200° in H_2 and then treated with an acid, *e.g.*, HCl. Salts, *e.g.*, of HF or H_3PO_4, are added to the electrolyte to protect the $Mn^{\cdot\cdot\cdot}$. J. S. G. T.

[Multi-cell] storage batteries. A. H. Stevens. From Usl Battery Corp. (B.P. 460,656, 1.6.35).—Inter-cell connexions, employing a min. amount of Pb, arranged in depressed sealing-grooves in the cell covers, are covered with acid-resistant material, *e.g.*, rubber, to prevent acid seepage on to the covers. J. S. G. T.

Electrolytes for electric storage batteries. A. O. Nicholson (B.P. 461,836, 1.1.36).—Sulphation of batteries of the $Pb-H_2SO_4$ type is prevented by addition of tartaric or citric acid or a salt of the acid and, if desired, an alkaline-earth sulphate, to the H_2SO_4. Thus a solution containing tartaric acid (40 g.), $MgSO_4$ (40 g.), and H_2O (2000 c.c.) may be added. J. S. G. T.

[Separator for] storage batteries. Koehler Manufg. Co. (B.P. 460,658, 26.6.35. U.S., 26.6.34 and 14.6.35).—A battery, especially for use with miners' hat lamps, is provided with a light wood separator, *e.g.*, of balsa from which the sap and wood acids have been removed by treatment with very dil. alkaline solution, *e.g.*, aq. Na_2CO_3, and then with diluted battery electrolyte. J. S. G. T.

Electric-discharge tubes having a cadmium vapour filling. N. V. Philips' Gloeilampenfabr. (B.P. 461,111, 4.6.36. Ger., 6.8.35).—At least that part of the bulb surrounding the discharge is formed of SiO_2 55—78, Al_2O_3 12—33, and CaO 10—30%; B_2O_3 and alkali are absent. B. M. V.

Electric-discharge devices. Gen. Electric Co., Ltd., and L. C. Jesty (B.P. 461,450, 13.11.35).—A cathode-ray tube is surrounded (except at the ends) with a sheath of conductive material, *e.g.*, of tinplate, to protect it from electrostatic disturbance, and is also protected from magnetic disturbance by material of high μ, applied only locally. B. M. V.

Glow-discharge device. D. S. Gustin, Assr. to Westinghouse Lamp Co. (U.S.P. 2,040,173, 12.5.36. Appl., 1.7.32).—Electrodes are coated with Mg, Cs, K, and NaCl so that a glow will be produced on application of an ordinary domestic voltage. The device may be used as a discharge lamp or as indicator when one of a series of low-voltage lamps breaks; in the latter case the exposed part of the lead-in wires to the filament are coated. B. M. V.

Activation of the cathodes of electric-discharge devices. Brit. Thomson-Houston Co., Ltd. (B.P. 460,177, 4.9.36. U.S., 6.9.35).—The formation of blotches on the electrodes is avoided by connecting a pair of devices, during the activating process, with reversed connexions, to a single source of steep wave-front oscillations. J. S. G. T.

Light-sensitive layers for photoelectric cells. Zeiss Ikon A.-G. (B.P. 460,012, 7.8.36. Ger., 8.8.35).—Cs or Rb deposited from vapour on a layer of Sb or Bi (containing, if desired, adsorbed O) is caused to alloy therewith by heating. J. S. G. T.

Envelopes coated with luminescent materials adapted to enclose a source of radiation. Gen. Electric Co., Ltd., and H. G. Jenkins (B.P. 460,850, 30.7.35).—The source of radiation is enclosed within an envelope having a wider portion (the body) coated internally with luminescent material, *e.g.*, ZnS + CdS, whilst the narrower portion (the neck) is uncoated. [Stat. ref.] J. S. G. T.

Means for illumination comprising luminescent materials. Gen. Electric Co., Ltd., and (a) J. T. Randall and J. W. Ryde, (b) H. G. Jenkins and J. W. Ryde (B.P. [a] 460,890 and [b] 460,963, [a] 30.7.35 and 15.2.36, [b] 1.8.35).—(a) Part only of the internal surface of the envelope of an electric-discharge device is coated with luminescent material (I), *e.g.*, Zn or Cd silicate. (b) The lower part only of the surface of a reflecting hood employed with a discharge lamp is coated with (I). J. S. G. T.

Means for producing illumination resembling daylight. (a) Brit. Thomson-Houston Co., Ltd., and (b) Gen. Electric Co., Ltd., (a, b) Assees. of E. Germer (B.P. 462,815, 20.10.36. Ger., 23.12.35).—A Hg- and a Na-discharge lamp are mounted within a reflector together with a luminescent substance, *e.g.*, rhodamine, which emits red radiation under the incidence of radiation from the Hg-radiation lamp; if desired, other luminescent materials, *e.g.*, U salts, may be included. J. S. G. T.

Electric storage batteries. J. Lucas, Ltd., and G. D. Spencer (B.P. 462,004, 30.8.35).

[Making electrode plates for] electric storage batteries. Pritchett & Gold and E.P.S. Co., Ltd., and K. Preston (B.P. 462,157, 3.9.36).

Röntgen-ray apparatus. Siemens-Reiniger-Werke A.-G. (B.P. 462,152, 30.7.36. Ger., 26.8.35).

Treating thixotropes.—See I. **Separating coal.**—See II. **H_2SO_4. Ozonisers.**—See VII. **Melting glass. Joining ceramic insulating members to metal.**—See VIII. **Refining C-containing alloys etc. Fe–Ni alloys. Trolley wire. Resistant alloys. Sn-coated metal. Au leaf. Welding. Magnetic materials. Finely-divided metallic layers. Electroplating. Ni-plate. Electrodeposited Zn, and W or W alloys. Coating Al and its alloys.**—See X. **Electric heater shells. Thermoplastic mouldings. Articles comprising plastics.**—See XIII. **Ageing alcoholic liquids.**—See XVIII. **Printing plate.**—See XXI.

XII.—FATS; OILS; WAXES.

Glandless pumps in the fat industry. W. Lehmann (Fette u. Seifen, 1937, **44**, 69—72).—A glandless pump with rotor (piston) executing a paracyclic motion is described. F. C. B. M.

Acid pumps for the fat and oil industry. A. Foulon (Fette u. Seifen, 1937, **44**, 72—74).—Pumps constructed of Krupp acid-resistant steel and of thermisilid are described. F. C. B. M.

Reaction mechanism and equilibrium of fat hydrolysis. H. P. Kaufmann and M. C. Keller (Fette u. Seifen, 1937, **44**, 42—47).—Experiments on the hydrolysis of sunflower-seed oil by H_2O showed that reaction rate increases with rise of temp. and with addition of 0·2% of ZnO to the oil, and that the max. degree of hydrolysis is independent of temp. but is determined by the fat/H_2O ratio. F. C. B. M.

The "Descha" boiling procedure for soap bases and curd soaps. J. Schall (Fette u. Seifen, 1937, **44**, 55—57).—A short account is given of the process, and its economic advantages are stressed. F. C. B. M.

Hydrocarbonaceous soaps. J. P. Sisley (Rev. Gén. Mat. Col., 1937, **41**, 66—77).—Literature and patents relating to such soaps are reviewed, and the composition, methods of prep., and trade names of many of them are given; the use of high- and low-boiling solvents is discussed, together with the detergent action and efficiency of the soaps in various hydrocarbon solvents. S. G. S.

Behaviour of perfumes in soaps. Nature of fixators. Changes in colour and stain formation. I. Herold (Fette u. Seifen, 1937, **44**, 67—69).—A general account. F. C. B. M.

Use of waste sulphite [pulp] waste liquors in the soap industry. I. K. Braun (Fette u. Seifen, 1937, **44**, 57—58).—The decolorised liquors yield soap with good washing properties. This is ascribed, in part, to the action of ligninsulphonic acids. F. C. B. M.

Calculations in the soap industry. K. L. Weber (Öle, Fette, Wachse, 1937, **2**, No. 1, 1—5).—The derivation of some of the common factors used for calculating the amount of alkali required for neutralisation or saponification, the soap yield, etc. are explained. E. L.

Electrolysis of soap solutions. W. H. McAllister (Oil & Soap, 1937, **14**, 39—43; cf. U.S.P. 2,022,894; B., 1936, 1191).—Experimental data are quoted showing that high total yields ($\not<$57—80%) of high-mol. alcohols (containing one C < the parent soap) and olefines can be obtained by the electrolysis of solutions of the soaps of, *e.g.*, coconut oil acids, lauric or stearic acid, provided a graphite anode is employed; it is advantageous to add an inorg. salt (chlorate or perchlorate) and a low-mol. alcohol, *e.g.*, MeOH, to the soap solution. E. L.

Hydrolysis of sodium soaps in aqueous solution. B. Lustig and F. Schmerda (Fette u. Seifen, 1937, **44**, 51—54).—In aq. solution the degree of hydrolysis of Na soaps of fat acids is in the order high-mol. wt. saturated acids > lower-mol. wt. saturated acids > oleic acid > linoleic, linolenic, stearolic, and ricinoleic acids. Addition of an unsaturated or low-mol. wt. soap to Na stearate raises the solubility of the latter and lowers that of the addendum. F. C. B. M.

Colloid-chemical and detergent properties of hydratisable colloids in comparison with those of soap. III. Detergent power and surface activity of colloid solutions. K. Lindner (Fette u. Seifen, 1937, **44**, 47—51; cf. B., 1937, 256).—The detergent properties, surface activity, and η of the colloid solutions used previously (*loc. cit.*) were determined. The albumin colloids possessed powerful cleansing properties, but were less efficient than was Na oleate. Capillary activity largely determines detergent power, but emulsifying power depends also on "displacement elasticity." F. C. B. M.

Parasitic diseases of olives and physicochemical changes in the extracted oil. R. Salgues (Compt. rend. Soc. Biol., 1937, **124**, 817—819).—Infection with *Macrophoma dalmatica* decreases the oil content of the fruit and considerable variation is observed in the characteristics of the expressed oil, particularly an increase in the I and Hehner vals. H. G. R.

Olive oil and other combing oils. W. Garner (J. Text. Inst., 1937, **28**, P 57—68).—One disadvantage of olive oil is its tendency to oxidise during long storage; this is chiefly due to the presence of traces of heavy metals. The patented Nilox treatment greatly improves both olive and arachis oils, and Nilox Ester Oil S is almost completely immune from this fault. A. G.

Detection of arachis oil in olive and almond oils. N. Evers (Analyst, 1937, **67**, 96—100).—In a modified Bellier's test, 50 ml. of 70% EtOH and 0·8 ml. of HCl are added to the warm saponified olive oil; if, on cooling, the liquid remains clear at 9°, arachis oil is absent. In absence of other oils the clouding temp. (39·0—40·0° for pure arachis oil) is a measure of the amount of arachis oil present in olive oil. Since pure almond oil clouds at −0·5° to 1·0°, and apricot-kernel oil at −4·0° to −8·5°, it is necessary to cool to 4° in this case when applying the test, which is then sensitive to 5% of arachis oil. J. G.

Oil-palm fruits from Kenya. Anon. (Bull. Imp. Inst., 1937, **35**, 19—22).—*Elaeis guineensis* cultivated experimentally in Kenya yielded fruits of normal size similar to those obtained in Nigeria, but containing slightly more oil in the pericarp. Pulp and kernel oil were of normal character; the residual kernel meal contained slightly less crude proteins than is usual in the ordinary commercial article. E. L.

Relation between refractive index and iodine value of raw linseed oil. T. H. Hopper and L. L. Nesbitt (Oil & Soap, 1937, **14**, 34—36).—The data for 1485 samples of (fresh) expressed oil, with n^{25} 1·47420—1·48047 and I val. 144—196 show a straight-line relation between n and I val., which is sufficiently accurate for the examination of large nos. of samples from, *e.g.*, breeding trials, provided oxidation of the oils is avoided. The n and I val. for warm-pressed oils (60—70°) differ by $\not>$ ±0·00025 and ±1·7, respectively, from the vals. for cold-pressed oils. E. L.

Effect of iodine value on drying time of linseed oil. F. Scofield (Sci. Sect. Nat. Paint, Var. Assoc., Mar., 1937, Circ. 530, 119—122).—The prolonged drying times of samples of N. American linseed oil, 1936 crop, were found to be related to their unusually low I vals. (147—161·7 Hanus). One sample (I val. 149) dried in normal time after being mixed with an equal amount of perilla oil (I val. 201). S. M.

Influence of environment and the nourishment of flax plants on the degree of saturation of linseed oil. K. Schmalfuss (Fette u. Seifen, 1937, **44**, 31—33).—Experiments with flax plantations in different parts of Germany and with pot-grown plants show that warm dry conditions lower the I val. of the oil. Ions which assist H_2O economy, *e.g.*, $K^{\cdot}$, Cl', increase I val., whereas $Ca^{\cdot\cdot}$ and SO_4'' have the reverse effect. F. C. B. M.

[Determination of] oil in flax seed. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 74—75).—2·5 g. of the finely-ground, well-mixed seed are ground with 5 c.c. of a mixture of halowax (74%) and 1-$C_{10}H_7Br$ (26%) and filtered. The n^{25} of the filtrate is determined to within ±0·00002. The relation between % of oil and n is tabulated. This latter val. is corr. by determining the n of the oil obtained by extraction with light petroleum or by expression and allowing for the difference in n between this sample and that used in compiling the table. E. C. S.

Rapid stand oil formation. E. Rossmann (Fette u. Seifen, 1937, **44**, 59—60).—General methods of making stand oils are reviewed, particular attention being paid to vac. oils. The properties (generally well known) of different types of stand oil are given. F. C. B. M.

Determination of the number of double linkings in oil and resin [molecules]. E. Rossmann (Angew. Chem., 1937, **50**, 187—190).—Direct measurement of Br absorption is recommended; 30 min. contact suffices for theoretical vals. even for conjugated linkings as in tung oil. The calc. I vals are never < those obtained, *e.g.*, by Wijs' method, and may be unduly increased by OH groups as in castor oil and linoxyn. With volatile compounds excess of Br is titrated, but this modification also gives high results with some substances, *e.g.*, rosin and terpenes. Overnight contact with Br produces fission of 3- and 4-C rings without substitution; data indicate the presence of 4-C ring structure in stand oil. S. M.

Chemical microscopy of fats and waxes. III. Castor oil. L. W. Greene (Amer. J. Pharm., 1937, **109**, 67—71; cf. B., 1934, 332).—Castor oil treated with a saturated solution of KOH in Bu^aOH forms crystals of characteristic shape. Procedure for micro-identification consists in mixing a drop each of oil and reagent and observing the mixture under the microscope. This method cannot be used for identification of sulphonated or blown castor oil. T. G. G.

The benzine point as a new constant for castor oil. W. Leithe and H. J. Heinz (Fette u. Seifen, 1937, **44**, 33—34).—The following procedure is recommended. 6 g. of castor oil are dissolved in 10 ml. of benzine (Schering–Kahlbaum "refractometric" or "normal") on the water-bath. The benzine point is that temp. at which the solution becomes turbid on cooling. Vals. for various samples lay between 32·0° and 36·3° for refractometric benzine and between 27·8° and 32·4° for normal benzine. The presence of free fatty acids had little effect, but 2% addition of another oil (linseed etc.) gave a depression of about 1·2°. F. C. B. M.

Hydrogenation of oxidised and polymerised sunflower oil. A. I. Kalfe (Ukrain. Chem. J., 1936, **11**, 483—492).—Less H_2 is required for hydrogenation of polymerised than of untreated oil; the products are solid or semi-solid, according to the temp. of polymerisation. The OH-acid content and the I val. of oxidised oils are not significantly affected by hydrogenation. R. T.

Seed oils of Formosan plants. XII. Sapotaceæ oil. K. Kafuku and C. Hata (J. Chem. Soc. Japan, 1935, **56**, 1081—1083).—*Sideroxylon ferrugineum*, Hook and Arn., yields a non-drying oil, d_4^{30} 0·9082, n_D^{30} 1·4650, acid val. 20·41, sap. val. 189·13, I val. 77·63. It contains 26% of solid acids (palmitic with smaller amounts of myristic and stearic) and liquid acids of which 77% is oleic and 23% linoleic acid. *Palaquium formosanum*, Hay, contains 56·7% of oil, solidifying at 27°, m.p. 57—60°, d_4^{60} 0·8855, n_D^{60} 1·4520, acid val. 9·41, sap. val. 189·75, I val. 4496. The oil contains 60% of solid acids (stearic with less arachidic). Oleic acid is the principal liquid acid. Ch. Abs. (*p*)

Granadilla (passion fruit) seed [and oil] from Kenya. Anon. (Bull. Imp. Inst., 1937, **35**, 22—23).—The seeds, which might be worth expressing or extracting locally, contain 8·5% of H_2O and 22·4% of a pale oil (extracted by light petroleum) having $d_{15 \cdot 5}^{15 \cdot 5}$ 0·9261, n^{20} 1·4761, acid val. 0·3, sap. val. 190·9, I val. (Wijs, 1 hr.) 141·2, unsaponifiable matter 0·8%; it could be employed for soap-making and, perhaps, edible purposes. Thin films exposed for several days at room temp. did not dry. The extracted meal (oil, 0·1%) was free from alkaloids and cyanogenetic glucosides and contained H_2O 11, crude protein 12·1, crude fibre 56·0, ash 1·6, carbohydrates etc. (by diff.) 19·2%; it had nutrient ratio 1 : 1·6 and contained 50 food units. It is unsuitable for feeding purposes on account of its high crude fibre content. E. L.

Direct determination of elæostearic acid in tung oil. P. S. Ku (Ind. Eng. Chem. [Anal.], 1937, **9**, 103—106).—Tung oil with boiling 5% KOH–EtOH, followed by treatment with $2N$-H_2SO_4 at 41°, affords fatty acids from which 76% EtOH at 0° separates elæostearic acid quantitatively; the acid is titrated against $0 \cdot 2N$-NaOH in EtOH. 2% of vegetable oil adulterants can be detected. J. L. D.

Treated wood oils. V. N. Sheets (Amer. Paint J. [Conv. Daily], 1935, **19**, 9).—In cooked varnishes treated oils are inferior to raw oils in respect of drying and durability, have less gassing tendency at the expense of drying, and with progressive fumeproofness increase in acid val., drying time, and miscibility. CH. ABS. (*p*)

Perilla oil [in paint manufacture]. O. EISENSCHIND (Amer. Paint J., 1935, **20**, 16—18).—The oil bodies more quickly than linseed oil, but is not nearly as delicate as tung oil. It works well with synthetic resins, but the film is not as hard or as waterproof as that from tung oil. CH. ABS. (*p*)

Indian vegetable oils. III. Viscosity and its variation with temperature. G. N. BHATTACHARYYA (Indian J. Physics, 1936, **10**, 403—411; cf. B., 1936, 1053).—The η of groundnut, chaulmoogra, neem, kapok, punnag, and mahua oils have been determined at 25° F. intervals from 75° F. to 200° F. The η vals are $>$ those of mineral insulating oils. The variation with temp. is, in all cases, in agreement with the equation deduced previously (*loc. cit.*). O. D. S.

Cashew nut-shell oil. Changes produced in the oil by action of heat. N. M. PATEL and M. S. PATEL (J. Univ. Bombay, 1936, **5**, Part II, 114—131).—Oil obtained from the shell of *Anacardium occidentale* nuts by extraction with ligroin (b.p. 45—80°) or spirit varies widely from batch to batch. The following are recorded, the figures in parentheses referring to roasted nuts: acid val. 94—109 (0), sap. val. 106—132 (4·5), I val. 240—270 (294), *d* 0·9960—1·0026 (0·9578), mean mol. wt. 470 (340), Ac val. 130 (114). At 250—280°/10 mm. much decomp. occurs; the distillate is phenolic and has *d* 0·8972, acid val. 7·2, sap. val. 13, I val. 185, and mol. wt. 155. One batch of oil contained 56·4—58% of cardol (I), the remainder being anacardic acid (II). (I) absorbs 12 Br and (II) 4 Br; the oil absorbs $>$ the amount calc. from these figures; less Br is absorbed by the oil from roasted nuts. The *d*, sap. val., acid val., I val., and mol. wt. of the oil are determined after heating for varying times (0·5—6 hr.) in air, N_2, and in sealed tubes at 100°, 125°, 150°, 175°, and 200°. The changes disclose fairly rapid loss of CO_2 from (II) and probably also decomp. into unsaturated substances, followed by slow polymerisation. The oil does not absorb O_2; thickening of its films is thus due to polymerisation. R. S. C.

Acidity of vegetable oils stored under diverse conditions of aëration and illumination. M. GISONDI (Ann. R. Staz. Chim. Agrar. Sperim., 1935, II, **15**, No. 323, 12 pp.).—The acid content of well-purified oils increases by $\not> 0{\cdot}3\%$ annually. Air and light have but a very slight effect. With oils containing enzymes a rapid increase in acidity is observed. E. P.

Identification of animal fats and oils, particularly the detection of hardened fish-liver oils in mixed fats. S. H. BERTRAM (Öle, Fette, Wachse, 1937, **2**, No. 2, 13—14).—A new colour reaction given by all animal (except pork) fats, but not by vegetable oils, is described. The fat is mixed with cryst. $CCl_3{\cdot}CO_2H$ in a test-tube and warmed in a bath at 60° for 5 min. The tube is removed and 10 ml. of $CHCl_3$ are added. Fish-liver oils and fat from egg yolk give a deep violet coloration; other animal fats yield a pale yellow colour. The depth of colour may be used as a rough quant. test for hardened liver oils in fat mixtures. Artificially coloured fats should previously be decolorised with absorptive charcoal and bleaching earth. F. C. B. M.

Fish-liver oils and vitamins. F. UNGER (Pharm. Ztg., 1937, **82**, 223—233, 272—274; cf. B., 1937, 59).—A review of the constituents of liver oils, and decomp. of the oils by hydrolysis, ketone formation, polymerisation in absence of O_2, and autoxidation of the unsaturated acids. The livers of several fish and their oil and vitamin contents are described. Purification, physical and chemical consts., and analysis of liver oils are also discussed. J. N. A.

Analysis of sulphonated (sulphated) oils: Committee report No. 3. Determination of inorganic salts in sulphonated oils. R. HART (Oil & Soap, 1937, **14**, 71—75; cf. B., 1936, 750).—The Amer. Assoc. Text. Chem. & Colorists' method (cf. B., 1934, 635) is described in detail and proposed as a standard method. E. L.

Carbonate content of oil lye clarified by centrifugation and long settling. J. E. S. HAN (Ind. Eng. Chem. [Anal.], 1937, **9**, 140—141).—The average content of Na_2O as Na_2CO_3 is 0·10%, but varies with the temp. at which the lye has been settled. E. S. H.

Determination of oils and phosphatides in organic raw material. B. REWALD (J.S.C.I., 1937, **56**, 77—78T).—Oil and phosphatides cannot be extracted in the ordinary way with one solvent only; a second extraction must be performed with two different solvents. The best method is to extract first with an 80 : 20 EtOH–C_6H_6 mixture and then with EtOH alone.

Individual suitability of different kinds of bleaching earth for bleaching various oils. E. ERDHEIM (Öle, Fette, Wachse, 1937, **2**, No. 2, 24—31).—The order of superiority of four earths was different for each of two colza oil samples, and depended on the amount of earth used. The same earth had very different effects on a colza and a mineral oil. (Cf. B., 1936, 1214.) F. C. B. M.

Removal of mucilage from vegetable oils and fats. C. KERKHOVEN (Öle, Fette, Wachse, 1937, **2**, No. 1, 6—7).—The need for the purification, and hydration method of pptg., mucilage is discussed. E. L.

Refractometric measurements in the oil, fat, and related industries. L. IVANOVSKY (Öle, Fette, Wachse, 1937, **2**, No. 2, 1—11).—Descriptive of methods and apparatus. F. C. B. M.

Application of chromatographic analysis to detection of artificial colouring in fats and oils. H. THALER (Fette u. Seifen, 1937, **44**, 38—42).—Chromatic or "selective absorption" analysis procedure is described. It is shown that with Al_2O_3 and clarit, a bleaching earth, the natural oil colouring matters, such as carotene and xanthophyll, are only slightly absorbed, coloured vegetable extracts, such as those of calendula, saffron, and curcumin, give complex chromatographs, and synthetic fat-sol. dyes give characteristic and distinguishable chromatographs. Acid dyes are absorbed strongly by Al_2O_3 but not by clarit, and *vice versa*. F. C. B. M.

Paste and liquid waxes. C. S. Glickman (Soap, 1937, **13**, No. 3, 99—107, 111).—Satisfactory products contain several waxes which have graded properties as follows : (*a*) high m.p. and gloss and low solubility, *e.g.*, carnauba; (*b*) intermediate m.p. and gloss and good solubility, *e.g.*, ozokerite; (*c*) low m.p. and gloss and excellent solubility, *e.g.*, paraffin. The mixture may be dissolved in solvent naphtha with addition of small proportions of CCl_4 or $(\cdot CHCl_2)_2$ to prevent "graining." The choice of solvent according to method of application, manufacture, and analysis are discussed and the characteristics of suitable natural and synthetic waxes and solvents are tabulated. S. M.

High-pressure hydrogenation. Evaluation of washing etc. agents.—See III. **Wool grease. Wax emulsions for paper etc.**—See V. **Media for paints.**—See XIII. **Effect of refining [oils and fats] on lipin content. Determining fat in chocolate. Menhaden oil as chick food.**—See XIX.

See also A., II, 159, ***Taraxacum* root oil.** III, 153—6, **Vitamins.** 153, **Carotene of milk fat.** 161, **[Oil of] *Rhus glabra*. Hanfangchi oil.**

Patents.

Perfume-emitting [soap] materials. W. C. Meuly, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,035,494, 31.3.36. Appl., 8.12.33).—The $NaHSO_3$ compound of an odorous aldehyde or ketone is added to dry (alkaline) soap; it liberates the aldehyde when moist, but is permanent when dry. Only small amounts (0·2—0·5%) are thus needed. R. S. C.

Complex phenolic soap. H. A. Bruson, Assr. to Röhm & Haas Co. (U.S.P. 2,036,916, 7.4.36. Appl., 28.5.34).—The non-resinous condensation products of simple, substituted, or fairly complex phenols having a free *o*- or *p*-position with $\not<$1 mol. each of CH_2O and a non-aromatic *sec.* base ($<C_7$) give with soap-forming acids bactericidal soaps, sol. in oil; if no substituent of the phenol has $>$4C, the soap is also H_2O-sol., even if the acid used is not. R. S. C.

(A) **Recovery of carotene from soaps.** (B) **Extraction of carotene [from oils and fats].** (A) R. J. Cross, (B) H. M. Barnett, W. O. Frohring, and A. F. O. Germann, Assrs. (A, B) to S. M. A. Corp. (U.S.P. 2,032,006 and 2,032,165, 25.2.36. Appl., [A] 7.4.34, [B] 11.11.32).—(A) In order to recover easily oxidisable or heat-sensitive substances [*e.g.*, carotene (I)] from oils etc. (*e.g.*, saponified palm oil) which contain so much H_2O as would prevent the direct extraction of (I) by solvents without heat treatment, the oils are mixed with an innocuous dehydrating or bibulous material, *e.g.*, soda ash, SiO_2 gel, in order to produce a dry mass from which (I) can be extracted by ordinary solvents (*e.g.*, $COMe_2$) at low temp. The residual soap + Na_2CO_3 (SiO_2) can be recovered for use as a detergent. (B) A solvent (light petroleum) extract of a plant material (*e.g.*, carrots) containing carotene (I) and fat is partly evaporated [any pptd. (I) being separated] and the residual, hot, (I)-rich lipoid extract is diluted with an oil or fat to make a mixture containing about 0·3% of (I), which, although supersaturated, will not deposit (I) at room temp. E. L.

Detergent composition. J. K. Berresford (U.S.P. 2,035,940, 31.3.36. Appl., 17.7.34).—A pasty detergent designed to remove grease etc. from the hands comprises a mixture of 14—52% of kerosene containing in solution $\not>$30 wt.-% of an emulsifying agent, *e.g.*, $N(C_2H_4\cdot OH)_3$ soap, and 86—14% of a solid abrasive consisting of an inorg. H_2O-sol. salt (*e.g.*, a mixture of anhyd. Na_2CO_3 and $Na_2CO_3,10H_2O$ in granular form). E. L.

Washing and cleansing [compositions]. R. E. Hall, Assr. to Hall Labs., Inc. (U.S.P. 2,035,652, 31.3.36. Appl., 4.4.34).—A detergent for cleaning greasy dishes etc. in hard H_2O comprises a mixture of $(NaPO_3)_6$ 23—63 (40), Na metasilicate 25—65 (40), Na_3PO_4 10—48 (15), and NaOH 2—8% (5%), such that the washing solution has $p_H \not< 10\cdot5$. E. L.

Extraction of vegetable oils. Ges. zur Verwertung Fauth'scher Patente m.b.H. (B.P. 459,763, 28.4.36. Ger., 10.5.35).—Oil seeds or kernels are comminuted (preferably in stages) in presence of a countercurrent flow of solvent or its vapour, the material thus being extracted during comminution, and also as it is conveyed from one comminutor to the next; press rolls may also be interposed (within the extractor) between such stages. E. L.

Manufacture of stable phosphorus-containing cod-liver oil emulsions. Chem. Fabr. J. A. Benckiser G.m.b.H., and F. Draisbach (B.P. 461,535, 13.7.36. Ger., 20.7.35).—Stable aq. cod-liver oil emulsions are prepared by using as emulsifier a small quantity of an alkali metaphosphate, either alone or with alkali pyrophosphates. N. H. H.

Conversion of oils, fats, and fatty acids into elaidic acid or derivatives thereof. N. V. Nederl. Res. Centrale (B.P. 462,665, 7.9.35. Holl., 7.9.34).—The oleic–elaidic acid and analogous isomerisations are effected (12·5—70% conversion) with min. decomp. by heating at 140—240° (0·5—30 hr.) in presence of Se or Te (0·1—1%) or compounds thereof. The catalyst may be pure, crude, or deposited on a carrier. [Stat. ref.] A. H. C.

Refining of natural waxes. E. W. Fawcett, and Imperial Chem. Industries, Ltd. (B.P. 459,540, 10.7.35).—Crude carnauba or flax wax etc. is subjected to short-path, high-vac. distillation, the distillate of refined, pale wax being collected in graded fractions of rising m.p. etc. if desired. E. L.

Manufacture of polishing wax compositions. E. I. Du Pont de Nemours & Co. (B.P. 462,692, 13.9.35. U.S., 17.10.34).—A molten wax or wax mixture is added to a cold solvent at such a temp. that the product can be just poured into containers, and cooled by a current of air. *E.g.*, an aliphatic hydrocarbon solvent at 20—25° is treated with molten carnauba and paraffin waxes to yield a composition at 45—65° (56—60°) and then cooled. A. H. C.

Polish [for painted or lacquered surfaces]. J. A. Tumbler and M. M. Esterson (J. A. Tumbler Labs.) (B.P. 462,295, 29.7.35. U.S., 3.8.34).—The composition comprises a homogenised mixture of castor oil (I) (*e.g.*, 1 pt.) or modified (I) [*e.g.*, blown, nitrated, or condensed with o-$C_6H_4(CO)_2O$], mineral lubricating oil (*e.g.*, 3 pts.), H_2O, an emulsifier (*e.g.*, Na oleate, gum arabic), and a thinner, with or without addition of a tar solvent (o-$C_6H_4Cl_2$). E. L.

Soap-making machinery. A. Paterson (B.P. 461,344, 14.5.35).

Lubricants.—See II. **Washing etc. compositions.**—See VI. **Condensation products. Coloured masses from waxes etc.**—See XIII. **Shortening. Determining fat in milk. Margarine. Fish oil.**—See XIX. **Vitamins.**—See XX.

XIII.—PLASTICS; RESINS; PAINTS; COATING COMPOSITIONS.

Casein materials as applied to plastics. R. Dodd (Chem. & Ind., 1937, 273—276).—A review.

Casein plastics. G. Besana (Mat. Plast., 1936, **3**, 181—188).—The prep. and properties of casein plastics and a plant suitable for their manufacture are described. L. A. O'N.

Cellulose acetobutyrate—a new raw material for lacquers and plastics. G. Schultze and R. Hebermehl (Farben-Chem., 1937, **8**, 78—80).—Compared with cellulose acetate, the technical mixed acetic–butyric ester is sol. in a larger variety of solvents and possesses improved H_2O-resistance, dilution ratios, and compatibility with plasticisers and lacquer resins. Its films show greater elasticity so that smaller proportions of plasticiser suffice. It can be mixed with nitrocellulose (in common solvents therefor), vinyl acetate, and acrylic acid polymerides. Its electrical properties, light- and oil-resistance, and non-inflammability are satisfactory and it should be useful for plastic moulding. S. M.

Injection moulding of thermoplastic compounds. P. A. Delafield (J. Soc. Dyers and Col., 1937, **53**, 82—86).—The historical development is briefly surveyed, the more important thermoplastics suitable for injection moulding (with plant required) are described, and their properties and costs compared with those of thermo-setting compositions. J. W. Cr.

" Firnagral " as binder for putty. E. Rossmann and K. Bätz (Farbe u. Lack, 1937, 115—116).—" Firnagral " (a mineral drying oil) can replace 30% of the linseed oil used in making putty to give a harder, smoother surface. With >30%, however, the product is soft. Alternatively, it may be worked up with small proportions of chlorinated rubber and dissolved in, *e.g.*, C_2HCl_3. S. M.

Resins. XXVI. Almeioina gutta resin. XXVII. A recent Congo copal. E. Stock (Farben-Ztg., 1937, **42**, 259—260; cf. B., 1936, 651).—XXVI. A sample of a rare (rubber) resin, from Belgian Congo, had acid val. 20·65, sap. val. 217·8, ash 0·1278% (Ca, Fe). Fluorescence phenomena in $CHCl_3$ and EtOH solutions are detailed. The resin has no commercial val.

XXVII. A sample of resin from living *Copaifera Demeusii*, Harms, had acid val. 136·6, 133·9; sap. val. 205·7, 200·3; m.p. 102·5°, 101·0°; ash 0·019, 0·018%; and gave a brown Storch–Morawski reaction and a colourless $Cu(OAc)_2$ reaction. Appearance under the microscope, solubility data, and fluorescence phenomena are detailed. S. S. W.

Chemistry of phenol–formaldehyde resins. N. J. L. Megson (Chem. & Ind., 1937, 293). J. Scheiber (*Ibid.*).—A claim for priority (cf. B., 1934, 28) and an acknowledgment.

Application of alkyd resins. Anon. (Farben-Chem., 1937, **8**, 82—84, 91).—Suitable synthetic resins and pigments for particular purposes (wood-priming, enamels of various kinds, nitrocellulose and chlorinated rubber lacquers, metal coatings, etc.) are named and discussed. S. M.

Carbonisation product of bakelite. A. Lister and H. J. Hodsman (J.S.C.I., 1937, **56**, 76T).—A " coke " prepared by carbonising ash-free bakelite resin at 900° was heated in a stream of CO_2 at 900° so as to remove up to 30% of the C. The " wet oxidation " figure of the " coke " (Blayden and Riley, B., 1935, 789) was very low, but that for the residue after gasification was exceptionally low, pointing to absence of graphite. This supports current views of the structure of bakelite (cf. Houwink, B., 1936, 1008).

Thermo-plastic synthetic resins from aniline[–formaldehyde] condensation products. K. Frey (Brit. Plastics Year Book, 1937, 76—81).—The mechanism of the process is discussed (cf. B., 1935, 734) and properties of various products are described. J. H. Be.

Glass from potato meal. Anon. (Chem. Weekblad, 1937, **34** 221—222).—The transparency of " Anras " glass, *d* 1·3, a new thermoplastic, to ultra-violet light (292—350 mμ) is discussed. S. C.

Permeability to moisture of synthetic resin finishes for aircraft. G. M. Kline (J. Res. Nat. Bur. Stand., 1937, **18**, 235—249).—The moisture-permeability of various commercial finishes and gas-cell fabrics, under different moisture and temp. conditions, has been investigated. A film of finish probably functions as a colloidal membrane, through which H_2O is transmitted by a chemical diffusion process. A. J. E. W.

Lithopone in white enamel manufacture. F. Ohl (Paint Manuf., 1935, **5**, 302—304).—Use of lithopone in spirit and other acid varnishes prevents livering. Lithoxin-pigmented enamels thicken slightly shortly after manufacture. This is prevented by use of 20% of ZnO, and a flow-improving agent, *e.g.*, BzOH or crotonic acid. Ch. Abs. (*p*)

Zinc oxide: properties and uses in paint manufacture. J. S. Remington (Paint Manuf., 1935, **5**, 262—265, 306—308, 355—357).—A review. Ch. Abs. (*p*)

New rust-preventive pigments. Rossmann (Farbe u. Lack, 1937, 53—54, 68, 78).—Pb_3O_4 (I) can be partly replaced by " Osmal " blacks (activated

C which has adsorbed NH_3) particularly for exposure to S gases; they function by their alkaline effect. Other possible substitutes briefly discussed are: "Carnitt" blacks, bauxite, carborundum ("Silcar"), Al–Si alloy ("Sigal"), scale pigments (Al bronzes, micaceous Fe oxides, graphite), and hammer scale. (I) functions by forming soaps, polarising the coated Fe, and rendering the medium alkaline. Seven-year exposure trials show that presence of (I) in either the primer or the finishing coat of a 3-coat system prevents rusting with most paints. This inhibitive action is extended to inactive pigments, *e.g.*, natural Fe oxides, when stand oil is used for the top coat; hence (I) can again be dispensed with. S. M.

Physicochemical aspects of iron-blues. A. Wooller (Paint Manuf., 1935, **5**, 328—331).—A general discussion. Formulæ are given for a medium-bronze soda-blue and a non-bronze blue. Ch. Abs. (*p*)

Micro-analysis of pigments used in the fossæ of the incisions of Chinese oracle bones. A. A. Benedetti-Pichler (Ind. Eng. Chem. [Anal.], 1937, **9**, 149—152).—A red pigment was found to be cinnabar; a black pigment consisted of unidentified carbonaceous matter. E. S. H.

Morphology of pigments. Adsorptive power and activation of soot. A. V. Pamfilov and E. N. Rosliakova (Kolloid. Shurn., 1936, **2**, 187—192).—Adsorption of methylene-blue, neutral-red, and erythrosin by seven samples of soot was measured; it is increased by heating the soot to 900°. J. J. B.

Inks. C. E. Waters (U.S. Bur. Stand., Dec., 1936, Circ. C413, 54 pp.).—A detailed account is given of the development, prep., and testing of inks for paper (writing, drawing, washable, etc.), fabric, glass, metals, etc., the ageing of writing and its restoration, dating of documents, and eradicators. Suitable dyes and literature references are listed. S. M.

Turpentines. J. L. Simonsen (J. Oil Col. Chem. Assoc., 1937, **20**, 79—87).—Turpentines produced in Sweden, Finland, and Russia (*Pinus sylvestris*), and India (*P. longifolia*) differ from the common American product in that their main components are not terpenes but d-Δ^3- and -Δ^4-carene and hence they are not available as sources of terpineol and camphor. The technical properties of both types are similar, but carenes oxidise more rapidly than pinenes (graphs given) and require an antioxidant to prevent deterioration. Components of various Indian turpentines are listed. S. M.

Fatty materials as media for paints and their substitution. J. Scheiber (Farbe u. Lack, 1937, 137—138. Cf. Schmid; B., 1937, 260).—Possible methods for meeting the shortage of linseed oil in Germany are: use of train, tall, and prepared stand oils; application of crit. oil absorption data when grinding pigments; extension of nitrocellulose–resin lacquers, alkyd and polyvinyl resins, and chlorinated rubber; prolongation of the life of paint films by adding an antioxidant or inserting a H_2O-resistant intermediate coat; development of synthetic drying oils from C_2H_2 and petroleum products. Possible substitutes for tung oil are perilla, oiticica, and dehydrated castor oil. S. M.

Secrets of white enamel primers. H. Krause (Farben-Chem., 1937, **8**, 80—82).—The consistency, flow, spreading and hiding power, settling and thickening tendencies during storage, production of matt effects, elasticity, and hardness are briefly discussed. S. M.

Water-absorption of paint films as a measure of rust inhibition of pigments. H. Hebberling (Oberflächentech., 1937, **14**, 1—2).—Pigments which increase the H_2O-absorption (W) of dry paint films are unsuitable. If W is reduced the adhesion, abrasion-resistance, etc. of the film must be considered. W is not the only criterion. S. M.

Factory painting. J. R. S. Rhodes (Gas World, 1937, **106**, 323—329).—The economics of the prevention of corrosion by painting are discussed and illustrated by the results of exposure trials under various degrees of corrosive conditions. A general dissertation is given on the prep. and painting of the various types of surface met with in factories. S. S. W.

Protective coating of chemical plant. K. Würth (Zellstoff u. Papier, 1937, **17**, 113—114).—Various coating materials (cellulose lacquer, chlorinated rubber, bitumen, etc.), their methods of application and uses, are briefly described. D. A. C.

Properties of plasticisers for nitrocellulose lacquers. VII. A. Kraus (Farbe u. Lack, 1937, 79—80, 89—90; cf. B., 1936, 703).—Exposure trials with 23 plasticisers show that aliphatic compounds *e.g.*, dimethylurea, do not impart weather-resistance. Introduction of aromatic nuclei into the compounds produced marked improvement, *e.g.*, triphenylurea. Benzyl Bu phthalate (Palatinol BB) was also very effective. The action of common plasticisers varies with the kind of resin incorporated. With dammar triamyl citrate gave max. durability, but with ester gum o-$C_6H_4(CO_2Ph)_2$ (I) was best. With a soft alkyd resin durability was consistently good, but a hard alkyd resin gave resistant films only with "Casterol," thickened rape oil, and (I). S. M.

Corrosive action of scrubber water on [varnish] coatings. A. F. de Ravignon *et al.* (Amer. Paint J. [Conv. Daily], 1935, **19**, 12—13).—Resistance of tung oil and modified oil varnishes to corrosion increases with the oil length. Vinylite-type resin has high corrosion-resistance. Short "coumar" varnish was superior to any other clear vehicle tested. A lacquer was little affected by scrubber H_2O, but adhered badly to metal. Among pigments incorporated with a common 100% phenolic vehicle for use as a primer, prepared mica gave best results and was slightly superior to red Pb. Ch. Abs. (*p*)

Determination of elasticity of varnish films by residual deformation. E. J. Goldschtein and A. M. Lazarev (Zavod. Lab., 1936, **5**, 471—478).—Apparatus and methods are described. R. T.

Measuring gloss.—See I. **Low-temp. tar in plastics industry.**—See II. **Artificial substances [for plastics]. Impregnating materials in paper. Printability of paper. Paper-machine paints.**—See V. **Uses of wood flour.**—See IX. **Research at McGill. Painting light metals.**—See X. **Electric breakdown of colophony.**—See XI. **Treated wood oils. Perilla oil in paint. Double linkings in resin mols.**—See XII. **Cubeb resin.**—See XX.

See also A., II, 158, **Catalytic prep. of α-pyroabietic acid.** 159, ***Taraxacum* root resin. Resin components of galbanum.**

PATENTS.

Manufacture of plastic masses. I. G. FARBENIND. A.-G. (B.P. 459,515, 8.7.35. Ger., 7.7.34).—Insol. masses which remain plastic are prepared by treating a polyvinyl ketone (*e.g.*, the Me derivative) in solution in, *e.g.*, $COMe_2$ or CH_2Cl_2, if desired, with an alkaline reagent. J. W. CR.

Manufacture of artificial masses [from phenyl vinyl ketone]. W. W. GROVES. From DEUTS. CELLULOID-FABR. (B.P. 461,495, 11.7.35).—The ketone is purified, *e.g.*, by crystallisation from C_5H_{12} at −70°, and polymerised at 50—100° in presence of a catalyst, *e.g.*, Bz_2O_2. The product is sol. in MeCl, C_6H_6, etc. and may be used for making plastic masses, varnishes, etc. Other polymerides may be incorporated. S. M.

Manufacture of articles comprising plastic materials. J. C. PATRICK (B.P. 460,139, 17.5.35. U.S., 26.5.34. Addn. to B.P. 456,351; B., 1937, 63).—A plastic product of the type described in the prior patent is used as a protective layer for electric cables, fabric and rubber articles, etc. S. M.

Plastic compositions and articles made therefrom. UNITED STATES RUBBER PRODUCTS, INC. (B.P. 462,274, 31.7.36. U.S., 2.8.35).—An olefine polysulphide plastic (I) (100) is mixed with a plastic (5—60 pts.) made by the process of B.P. 407,948 (B., 1934, 512). Strength may be increased by loading with C black. The products have superior petrol- and oil-resistance to those made from (I) mixed with rubber. K. H. S.

Plastic compositions [for floor coverings]. A. G. RODWELL, S. G. BARKER, and FLEXATEX, LTD. (B.P. 461,680, 19.8.35).—Fillers, *e.g.*, (hard-)wood flour 20, china clay 2½, sand 2½ pts. by vol., are mixed with rubber latex stabilised by SiO_2 gel and used, preferably, in a semi-dry condition. Dyed wood flour, pigments, or sawdust may be included. I. C. R.

Plastic sheet compositions. J. T. CASTLES, jun. (U.S.P. 2,036,195, 7.4.36. Appl., 7.7.34).—Kapok fibre and pieces of relatively thin sheets of regenerated cellulose (1 : 1) are masticated with H_2O, most of the H_2O is drained off, casein glue is added, and the resultant plastic formed into sheets, constituting fire- and water-proof wallboards of low heat conductivity. S. S. W.

Manufacture of sheet material [for packings or gaskets]. BAKELITE, LTD. (B.P. 459,544, 11.7.35. U.S., 13.7.34).—Asbestos fibres and rubber dispersion are suspended in an aq. medium and felted. Synthetic resin is incorporated prior to felting, or is used for coating or impregnating the felted sheet. J. W. CR.

Moulding compositions. MEAD CORP., Assees. of C. A. HOCHWALT and H. J. REBOULET (B.P. 460,939, 2.5.35. U.S., 9.7.34).—Non-cellulosic org. material derived from spent alkaline liquor from the soda, sulphate, and sulphite digestion of wood etc. (cf. B.P. 460,885; B., 1937, 431) is used as binder in conjunction with fillers (20—70% of the total wt.), *e.g.*, barytes, wood flour. A thermosetting binder, *e.g.*, $PhOH–CH_2O$ resin, or a thermoplastic binder, *e.g.*, shellac, may be included. I. C. R.

Moulding compositions. W. S. CALCOTT and H. H. REYNOLDS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,034,895, 24.3.36. Appl., 2.3.29).—A mixture of a liquid, aliphatic, polymerisable polymeride of C_2H_2 non-volatile at 100° (25), α-$C_{10}H_7{\cdot}NHPh$ (I), and wood flour (74 wt.-%) is heated for 40 min. at 160°/2000 lb. per sq. in., giving an insol., non-volatile, non-thermoplastic, inert, and H_2O- and oil-resistant product. S. S. W.

[Phenolic resin] moulding composition. K. M. IREY, Assr. to RESINOX CORP. (U.S.P. 2,038,113, 21.4.36. Appl., 1.9.33).—Gluten, casein, and other proteins may partly replace phenolic resins in moulding compositions. *E.g.*, $PhOH–CH_2O$ resin (288 pts.), gluten (330), wood flour (350), CaO (5), wax (4), Zn stearate (3), and dye (20) form a suitable mixture. S. M.

Preparation of mouldable composition [from rubber and asbestos]. W. NANFELDT, Assr. to WORLD BESTOS CORP. (U.S.P. 2,037,687, 14.4.36. Appl., 18.5.34. Cf. B.P. 367,176; B., 1932, 407).—Crude rubber is worked up with S and PbO, MgO, etc., made into thin sheets which are subsequently dissolved in gasoline etc., and then successively mixed with asbestos fibre, latex, and graphite–Fe_2O_3–kaolin. The product is suitable for brake linings etc. S. M.

Manufacture of thermoplastic moulding compositions containing rubber. E. R. DILLEHAY (B.P. 459,360, 4.6.35).—Moulding compositions primarily for battery cases are prepared by first milling together bituminous binder and rubber and then mixing this blend with the other ingredients, viz., fibrous material and filler. The products have great toughness, tensile strength, and shock-resistance. J. W. CR.

Manufacture of thermoplastic moulding compositions and articles. E. R. DILLEHAY (B.P. 461,175, 4.6.35. Cf. B.P. 459,360; preceding abstract).—To a mixture of bituminous binder and mineral fillers is added a minor proportion, *e.g.*, 10% of the total wt., of softened rubber, prepared by heating (used) rubber with oil, *e.g.*, wood tar, tar oil, or mineral oil, by means of live steam, and passing through rolls. Fibrous fillers, *e.g.*, cotton linters or asbestos, may also be included. I. C. R.

Production of moulded articles. BAKELITE, LTD. (B.P. 461,270, 14.8.35. U.S., 22.8.34).—A laminated structure of (crêped) fibrous sheets, impregnated with heat-hardenable resin (25—50%, dry basis), is pressed while wet, and without altering the resin, into a rough shape, which, before or preferably after drying, is coated with a heat-hardenable resin varnish, *e.g.*, phenolic resin 10, EtOH 10, BuOH 3 pts., and subjected to heat and pressure. The sheets may be prepared from an aq. suspension of wood or rag pulp in which is dispersed a phenolic resin. I. C. R.

Manufacture of coloured masses from cellulose derivatives, natural or artificial resins, or waxes. Soc. Chem. Ind. in Basle (B.P. 459,334, 6.2.36. Switz., 6.2.35).—The masses (*e.g.*, nitrocellulose lacquers, carnauba wax, rubber, etc.), which are free from oils and may contain solvents which are not H_2O-sol. alcohols, are dyed with complex metal compounds derived from logwood extract. J. W. Cr.

Manufacture of shaped materials from highly polymeric compounds [*e.g.*, acetate silk]. W. W. Groves. From Aceta Ges.m.b.H. (B.P. 459,711, 9.4.35).—The affinity for basic dyes of cellulose derivatives and resins which are sol. in org. solvents, *e.g.*, polyvinyl polymerides, is increased by incorporating during manufacture either (*a*) a H_2O-resistant artificial resin, *e.g.*, a maleic anhydride–vinyl chloride polymeride, in which heat-stable acidic groups (CO_2H, SO_3H, etc.) are present or can be produced by hydrolysis etc., or (*b*) a cellulose derivative in which CO_2H groups are formed by oxidation or other treatment, *e.g.*, an ethoxy-cellulose ester. S. M.

Production of a caoutchouc-like material. R. Beyer Industrial Inventions, Ltd. From R. Beyer (B.P. 461,632, 19.8.35).—A mixture of starch and a vinyl compound, *e.g.*, chloride, is autoclaved at 150—200° with CH_2O and one or more of 13 named aromatic compounds, *e.g.*, $CH_2Ph{\cdot}OBz$, $(C_6H_4Me)_3PO_4$. A metallic soap, *e.g.*, Al palmitate, may be added as catalyst. S. M.

Laminated articles [containing rubber]. Internat. Latex Processes, Ltd. (B.P. 462,101, 25.7.36. U.S., 26.9.35).—Resistance to rubber solvents of tanks, fabric sheets, etc. is provided by a layer of rubber latex and a top coating of a butadiene polymeride or olefine polysulphide plastic. S. M.

Sealing composition. F. A. Madenwald and N. J. Beno, Assrs. to Continental Can Co., Inc. (U.S.P. 2,037,913, 21.4.36. Appl., 3.10.30).—Hardened rosin is heated with a plasticiser (Et abietate), the mixture is ground and suspended in a peptising medium (aq. NH_3), and a filler (talc, rubber) and a sol. soap (oleate), to reduce γ, are incorporated. S. S. W.

Sealing compositions for air tubes of tyres etc. H. Heil (B.P. 458,909, 6.7.36).—Mixtures of Pb, Zn, or Al soap in colloidal solution, with saponifiable oil (linseed, colza), thickened, if desired, by heat-polymerisation, air-injection, or S_2Cl_2 treatment, and emulsified with H_2O by means of gum tragacanth, casein, etc., together with fillers [$Al(OH)_3$ etc.] are claimed. S. S. W.

Printing plates. H. Swan and S. Higgins, Assrs. to Bakelite Corp. (U.S.P. 2,028,709—12, 21.1.36. Appl., 26.5.34).—Relief plates, suitable for use on rough paper and prepared from matrices of hardened synthetic resin, are manufactured from: (A, B, D) vulcanised rubber faced with (A) Cellophane, (B) cellulose acetate, (D) vinyl-base synthetic resin; or (C) synthetic phenolic resin faced with cellulose acetate. (D) The bases are backed with metal, and incorporate a layer of material to resist stretching. L. C. M.

Fluorescent solid composition. B. H. Jacobson, Assr. to Klipstein Chem. Processes, Inc. (U.S.P. 2,037,793, 21.4.36. Appl., 5.7.33).—Perylene and its derivatives are incorporated with various partly transparent substances, *e.g.*, resins, rayon, to impart fluorescence. S. M.

Refining of rosin. D. C. Butts, Assr. to Hercules Power Co. (U.S.P. 2,035,141, 24.3.36. Appl., 31.5.32).—Refined wood rosin from which latent colouring matter has been removed by treating a solution of the rosin (in petrol) with a selective org. solvent (furfuraldehyde) is heated at 250—350° in absence of O_2 and under a pressure at which substantial distillation of the rosin is avoided, until the colour is materially improved. S. S. W.

Treatment of low-grade resin. W. B. Logan and I. E. Knapp, Assrs. to Newport Industries, Inc. (U.S.P. 2,033,947, 17.3.36. Appl., 4.8.33).—"B"-grade wood rosin is treated at 100° with an aq. solution of an alkali compound (Na_2CO_3) which combines with the acid constituents of the resin; the non-acid (dark-coloured) constituents are extracted at 125—130° with H_2O-immiscible hydrocarbon (petroleum) solvents and separated from the aq. soap solution, which is then freed from solvent. S. S. W.

Manufacture of resins [from wood-tar pitch]. W. B. Borst and C. G. Gerhold, Assrs. to Universal Oil Products Co. (U.S.P. 2,035,860, 31.3.36. Appl., 20.10.34).—$(CH_2)_6N_4$, CH_2O, etc. and a filler, *e.g.*, pine-wood flour, asbestos, are incorporated with molten wood-tar pitch which, preferably, is derived from a hard wood and has m.p. $>93°$. S. M.

Production of resinous material suitable for use in compounding chewing gum. G. A. Hatherell, Assr. to F. A. Garbutt (U.S.P. 2,036,577, 7.4.36. Appl., 6.7.34).—A suitable resin (coumarone resin, m.p. 66°) is dispersed mechanically in hot aq. alkali, small pieces of a "latex gum" (jelutong etc.) are incorporated above the m.p. of the resin, and the mixture freed from H_2O-sol. and other reaction products arising from the action of the alkali and then neutralised. S. S. W.

Manufacture of urea–formaldehyde resins. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 459,788, 10.7.35).—In the process of B.P. 404,664 (B., 1934, 288), the fatty acid ester is replaced by a cyclic alcohol free from phenolic OH, *e.g.*, abietinol, *iso*borneol. The products may be used with and without cellulose esters and drying oils for making lacquers. (Cf. B.P. 433,536; B., 1935, 1005.) S. M.

Manufacture of urea–formaldehyde resins. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 460,275, 23.7.35).—In the processes of B.P. 404,664 (B., 1934, 288), 433,536 (B., 1935, 1005), and 459,788 (preceding abstract) the urea–CH_2O resin is heated with the appropriate OH-compound in presence of a H_2O-insol., non-alcoholic liquid, *e.g.*, benzine, the temp. of which rises (from 120° to 130°) during the dehydration of the solution. A small quantity of an acid, *e.g.*, *o*-$C_6H_4(CO)_2O$, may be then added and the heating continued. S. M.

Producing vinyl resins. Carbide & Carbon Chemicals Corp., Assees. of S. D. Douglas (B.P. 459,947, 14.5.35. U.S., 15.6.34).—Vinyl resins are produced continuously with high average mol. wt. by heating vinyl compounds (*e.g.*, a 4 : 1 mixture of vinyl chloride and acetate) in presence of a polymerising catalyst ($AcBzO_2$) and a medium (*e.g.*, C_4H_{10}) which is a solvent for the monomerides but a non-solvent for the polymerides, separating the pptd. polymerides, *e.g.*, by circulating through a filter press, and compensating with additional monomeric compound. J. W. Cr.

Polyvinyl acetal resins. Carbide & Carbon Chemicals Corp., Assees. of H. F. Robertson (B.P. 459,878, 17.7.35. U.S., 29.8.34).—A polyvinyl alcohol (2·5—7 mols. of monomeride content) is condensed with an aldehyde (1 mol.) in presence of a relatively large quantity of inorg. acid, *e.g.*, HCl, without heating. Partial acetals are formed which are sol. in H_2O and org. solvents and are adhesive to glass. S. M.

Manufacture of polyvinyl derivatives containing nitrogen. I. G. Farbenind. A.-G. (B.P. 461,635, 20.8.35. Ger., 21.8.34).—CNHal is caused to react with a polyvinyl alkoxide. S. S. W.

Manufacture of sheets from polyvinyl chloride or the like. W. W. Groves. From Deuts. Celluloid-Fabr. (B.P. 459,514, 8.7.35).—Synthetic polymerisates which can be rolled only with difficulty, *e.g.*, after-chlorinated polyvinyl chloride, are incorporated with an easily-rolled but brittle polymerisate, *e.g.*, polyvinyl chloride, instead of the usual softening agents. Use of a mixed polymerisate from vinyl chloride and an acrylic acid derivative or styrene is claimed. The products have good mechanical properties and a high softening point. J. W. Cr.

Manufacture of [resinous] polymerisation products. I. G. Farbenind. A.-G. (B.P. 462,165, 26.7.35. Ger., 26.7.34).—The catalysts used for polymerising unsaturated substances are peroxides of fatty acids containing $\not<4$ O. The acids may be of single- or branched-chain type, or unsaturated, or halogenated, or mixed, *e.g.*, from stearic and succinic acids. Vinyl esters are the substances specially used, and polymerisation is carried to a high degree without losing solubility in solvents for the lower polymerides. Among examples (3), $CH_2{:}CH{\cdot}OAc$ is heated at 80—85° for 20 hr. with oleic acid peroxide (0·5 pt.). The glass-clear polymeride dissolves in solvents for polyvinyl acetate, but has η 80—100 times that of the polymeride made with Bz_2O_2. K. H. S.

Preparation of sulphur resins. W. Seaman, Assr. to Standard Oil Development Co. (U.S.P. 2,035,098, 24.3.36. Appl., 16.11.31).—Resins obtained by heating an aromatic OH-compound (nuclear OH) with a resin-forming substance (aldehyde, ketone, olefine, S_2Cl_2, S) and org. S compounds (a mixture of mercaptans extracted from a petroleum oil) are claimed. S. S. W.

Manufacture of phenolic resins. F. M. Murdock, Assr. to Fiberloid Corp. (U.S.P. 2,037,585, 14.4.36. Appl., 31.7.34).—Discoloration and oxidation are prevented by condensing the PhOH and CH_2O in an atm. of CO_2 generated by adding Na_2CO_3 and an acid (lactic) to the reaction mixture. S. M.

Manufacture of [phenol–aldehyde] resinous condensation products. Beck, Koller & Co. (England), Ltd. (B.P. 459,549, 16.7.35. Austr., 17.7.34).—Phenolic substances of high mol. wt. obtained with the aid of metal halide catalysts from phenols and terpene halides containing $\not>2$ halogen atoms in the mol. are condensed with aldehydes. The resins obtained are pale, non-yellowing, and intended for use as varnish bases. J. W. Cr.

[Phenol–aldehyde] resin–fibre (A) products, (B) compositions. Bakelite, Ltd. (B.P. 461,271—2, 14.8.35. U.S., 22.8.34).—(A) A phenol and an aldehyde are caused to react in presence of a fusible H_2O-repellant, *e.g.*, limed rosin, pitch, wax; an aq. dispersion of the product is worked up with a suspension of a fibre, *e.g.*, paper pulp. (B) A relatively large amount of a dry fibre or wood flour is kneaded with a fluid (phenolic) resin and the product added to an aq. suspension of the same fibre. (A, B) The dried materials are sheeted and hot-moulded. Improved uniformity is claimed. S. M.

Manufacture of [cast phenolic] resins. G. H. Wilder, Assr. to Du Pont Viscoloid Co. (U.S.P. 2,035,515, 31.3.36. Appl., 5.5.34).—The p_H of a mixture of PhOH (1 mol.) and CH_2O (2 mols.) is adjusted to 6·5—6·9; after heating until a hydrophilic resin is formed the p_H is adjusted to 2·0—3·1 by addition of an org. acid and the heating continued. The resinous reaction product is dehydrated by vac. distillation without cooling, and poured into moulds. Improved uniformity is claimed. S. M.

Tempering electric heater shells made of phenol–formaldehyde condensation product. S. Freeman (U.S.P. 2,037,375, 14.4.36. Appl., 19.5.30). —Blistering of hot-moulded phenol–CH_2O shells which contain electric coils is prevented by heating the finished shell for 16 hr. at 85° and for 2 hr. at 130°. S. M.

Production of [oil-soluble] polyhydric alcohol–polybasic acid resin. I. Rosenblum (B.P. 461,742, 21.6.35. U.S., 27.6.34).—Glycerol (I), a polybasic aliphatic acid, *e.g.*, maleic, and fatty acids insufficient completely to esterify (I) can be condensed to a homogeneous oil-sol. resin if (I) is preheated with <1 equiv. of a saturated, monobasic, aliphatic acid (C $\not>5$), *e.g.*, AcOH. The last is subsequently removed by heating in presence of a high-b.-p. inert solvent, *e.g.*, a petroleum distillate. S. M.

Manufacture of condensation products and of lacquers and plastic masses. W. W. Groves. From Deuts. Celluloid-Fabr. (B.P. 461,352, 11.7.35).—Acid condensation of CH_2O with urethanes of alcohols $>C_2$ (*iso*propylideneglycerol etc. can also be used) give stable, oily to resinous products which can be used alone or with other materials as film-forming masses. The Bu compound in particular can replace castor oil in artificial leather.
R. S. C.

[Alkyd] synthetic resin. M. M. Brubaker, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,035,528, 31.3.36. Appl., 16.4.32).—*o*-$C_6H_4(CO)_2O$ is condensed with a mixture of an aliphatic alcohol ($>C_7$), *e.g.*, cetyl, and glycerol. Improved durability is claimed for the prepared varnish. S. M.

Manufacture of thermoplastic resins. E. I. Du Pont de Nemours & Co. (B.P. 460,241, 24.7.35. U.S., 24.7.34).—Solid masses produced by the polymerisation of acrylic and alkylacrylic acids and their derivatives at temp. < that of bubble formation are heated at rather > the b.p. of the monomerides until max. hardness is obtained. The final products have improved hardness and are free from flaws. *E.g.*, Me methacrylate is heated at 95—115° for approx. 24 hr. J. W. Cr.

Production of cast synthetic resins [from methyl methacrylate etc.]. E. I. Du Pont de Nemours & Co. (B.P. 460,239, 24.7.35. U.S., 24.7.34).—A solid, shaped body is gradually built up by spreading and polymerising successive layers of Me methacrylate etc. in a suitable mould. S. M.

(A, B) Manufacture of (B) diene-type (A, B) reaction products. C. Ellis, Assr. to Ellis–Foster Co. (U.S.P. 2,033,131—2, 10.3.36. Appl., [A] 7.7.31, [B] 7.8.31).—Tung oil is heated with an acid containing CO·CH⁚, *e.g.*, maleic. The product is sol. in dil. alkalis, and aq. NH_3 solutions are used as varnishes. Stoving the films is recommended. (A) 17, (B) 51, examples of the reaction and modifications are given.
S. M.

[Resinous] compositions [and fibres]. W. W. Triggs. From E. I. Du Pont de Nemours & Co. (B.P. 461,236, 9.5.35).—ω-NH_2-acids are heated at 150—290° alone or in an org. solvent [best, phenols (1 pt.)] in an inert atm. in presence of an antioxidant (syringic acid), if necessary at >1 atm., H_2O being continuously eliminated by distillation, until the intrinsic η of the polymerised product is $\nless 0{\cdot}4$. The product, a polymerised amide (mol. wt. $>10{,}000$), is freed from solvent by pouring into, *e.g.*, EtOH or by evaporation. It is converted into fibres by extrusion of the molten product in an inert atm. or by extrusion of its solution into a coagulating bath; during this process it may be blended with other fibre-forming materials. The resultant fibres are preferably further cold-drawn in absence of a plasticiser, elongation being 200—700% and permanent. The stretched fibres, which give fibre *X*-ray patterns (the original polymeride gives cryst. *X*-ray patterns), are unusually strong (2—6 g. per denier) and pliable and almost perfectly elastic with short recovery times. In examples, polymerisation of $NH_2{\cdot}[CH_2]_x{\cdot}CO_2H$ ($x = 8$, 6, and 5) is detailed. π-*Aminoheptadecoic acid* is obtained from π-carbamylundecoic acid. The "superpolyamides" from θ-aminononoic, κ-aminoundecoic, and π-aminoheptadecoic acid have m.p. 186°, 175°, and 150°, respectively. Films, ribbons, etc. may also be prepared.
R. S. C.

Production of resin emulsions. Bakelite, Ltd. (B.P. 461,649—50, [A, B] 21.8.35. U.S., 22.8.34).—(A) A synthetic resin is dissolved (dispersed) in an org. solvent, *e.g.*, C_6H_6, EtOAc, $COMe_2$, and emulsified in H_2O, in presence of at least two emulsifying agents, one being a colloidal clay, *e.g.*, bentonite, and another a soap, *e.g.*, Na oleate; the solvent is removed by distillation. (B) Heat-reactive resins are mixed with an emulsifying agent, *e.g.*, triethanolamine oleate, soap, clay, casein–NH_3, gum arabic, (1—10 wt.-%), without heating, preferably in a kneading machine, and H_2O is added gradually until the H_2O-in-resin emulsion is changed to resin-in-H_2O. Pigments or fillers may be added at the H_2O-in-resin stage. (Cf. B.P. 296,685 and 313,027; B., 1928, 827; 1929, 652.)
I. C. R.

Manufacture of halogenated compounds [green pigments]. R. P. Linstead, C. E. Dent, and Imperial Chem. Industries, Ltd. (B.P. 461,268, 14.8.35).—By direct chlorination or bromination of phthalocyanines, bluish-green to green pigments, having $\nless 8$ (10—12) halogen atoms per mol. are obtained. The method is to heat the phthalocyanine at $>200°$ with Cl_2, Br, $SOCl_2$, or SO_2Cl_2; a halogen carrier may be used. F. M. H.

Manufacture of [writing] ink. H. Terra (B.P. 461,408, 18.6.36).—A mixture of methylene-blue (25), Me-violet (5), K_2CrO_4 (2), Na_2CO_3 (3), and sugar (7 pts. by wt.) is pulverised and compressed into cakes, readily stored and transported, and convertible into ink by addition of H_2O. S. S. W.

Ink-transfer media. P. H. Gill, Assr. to Gill Corp. (U.S.P. 2,036,471, 7.4.36. Appl., 29.12.33).—Typewriter ribbons, C papers, and the like comprise a flexible fibrous base (cotton, silk) carrying a pigmented, highly oxidisable oil vehicle (lard oil) and an antioxidant phenolic compound (*e.g.*, α-$C_{10}H_7{\cdot}OH$), inhibiting the oxidation of the oil vehicle to an extent affording sufficient flexibility and oil-diffusibility for the purpose indicated. S. S. W.

Production of [multi-coloured heat] transfers. J. M. Steven (B.P. 461,367, 6.11.35).—Patterns are printed successively with differently coloured non-drying inks on a paper base, fusible powder is dusted on, and the powder fused in a single heating operation.
S. S. W.

Oil paints. L. C. Neale (B.P. 461,508, 17.8.35. S. Afr., 16.4.35).—Scrap vulcanised rubber containing vegetable fibre is heated with a drying oil (linseed) in a closed vessel to $\nless 250°$, whereby the rubber dissolves and the fibre is completely carbonised; further oil, thinners, and driers are added as desired.
S. S. W.

Anticorrosive paint. A. F. M. Ragg (U.S.P. 2,038,444, 21.4.36. Appl., 22.4.32. Ger., 22.4.31).—Oil paints containing as anticorrosive pigment basic Pb salts of the acids of P, N, and Sb, giving rise to passive protective films, are claimed. S. S. W.

Anti-rust coating agents containing chromium compounds. A. V. Blom and H. Schnyder (B.P. 459,149, 1.7.35. Ger., 30.6.34).—Pastes of adsorbent substances (soot, SiO_2 gel, Fe_2O_3) with aq. solutions of H_2CrO_4 or its salts are dried (at 70°), ground, and incorporated with known binding media (linseed oil, varnish). S. S. W.

Covering of wood with resistant coatings. E. W. Frenkel (H. Frenkel) (B.P. 459,312, 23.7.35. Ger., 31.1., 28.2., 12.4., and 21.6.35).—Wood is moistened with a 30—70% aq. or EtOH solution of a low-temp.-hardening PhOH–CH_2O resin, and the latter is hardened at temp. up to 80°. J. W. Cr.

Air-drying imitation leather finish. H. G. Kittredge and A. J. Turner, Assrs. to Kay & Ess Chem. Corp. (U.S.P. 2,037,331, 14.4.36. Appl., 28.12.34).—A synthetic (PhOH–CH_2O) resin varnish is incorporated with a natural resin (Batu gum) varnish, tung oil, and a drier in stated proportions. S. M.

Crystallising [nitrocellulose] lacquers. T. A. Neuhaus, Assr. to Glidden Co. (U.S.P. 2,037,734, 21.4.36. Appl., 4.5.34).—Brushing lacquers comprising solutions [η >120 sec. (150—300 sec.) in a No. 4 Ford cup at 26·7°] of nitrocellulose, resin, plasticiser, and a " crystallising " agent ($C_{10}H_8$) in volatile solvents are claimed. S. S. W.

Manufacture of condensation products [lacquers etc.]. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,827, 4.10.35).—Aliphatic aldehydes are treated with *sec.* alkyl- or aralkyl-amines and the distillates obtained on heating the condensation product are further condensed by means of alkalis. Thus CHMe:CH·CHO (I) (2300) treated with $NHEt_3$ lactate (50 pts.) affords on distillation at 15 mm. fractions (*a*), b.p. 80—125° (500), (*b*) 125—175° (180), and a (*c*) resinous residue (822 pts.). Fraction (*a*) (100) is shaken with solid KOH (5 pts.) for 1 hr. and the emulsion split with acid, affording an oil (*d*) (86 pts.), which has drying properties. A rapidly drying lacquer can be made by heating the resin (*c*) until it has a softening point of approx. 81° and dissolving it in the oil (*d*). Again, (I) (2100) is treated with $NHEt_2$ (90) and H_2O (625 pts.) under reflux (2 hr.), fractionated, and the two fractions are treated alone or mixed with aq. KOH (1 : 1). Similar drying oils are obtained. K. H. S.

Preparation of varnish basis [from cashew liquid]. C. Ellis, Assr. to Ellis–Foster Co. (U.S.P. 2,033,133, 10.3.36. Appl., 9.2.34).—Cashew nut-shell liquid is condensed with maleic anhydride and may then be incorporated with glycerol. The product is sol. in drying oils. S. M.

[Plasticisers for] cellulose derivative compositions. P. L. Salzberg, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,037,740, 21.4.36. Appl., 24.1.34).—The use of H_2O-insol. sugar-ethers, *e.g.*, benzyl- and ethyl-sucrose, is claimed. S. M.

Synthetic resin varnish and process. J. D. Cochrane, jun., Assr. to Formica Insulation Co. (U.S.P. 2,038,345, 21.4.36. Appl., 10.1.34. Cf. U.S.P. 1,997,358—9; B., 1936, 464).—Crazing in the surface of urea–CH_2O and other synthetic resin varnish films is prevented by incorporating 5—10% of finely-ground (200-mesh) paper fibre. S. M.

(A, B) Synthetic [alkyd] resin varnish compositions. C. L. Gabriel, Assr. to Resinox Corp. (U.S.P. 2,033,280—1, 10.3.36. Appl., 11.5.31).—*o*-$C_6H_4(CO)_2O$ is heated with (A) a polyhydric alcohol, *e.g.*, glycerol, (B) $(\cdot CH_2\cdot OH)_2$ or other dihydric alcohol, and the product further esterified with BuOH. The mixed esters are sol. in common solvents and may be incorporated with thermo-hardening resins for impregnating paper etc. S. M.

Surface finishes of paint, varnish, enamel, and lacquer type comprising a baked coating carrying a synthetic resin. C. Ellis, Assr. to Ellis–Foster Co. (U.S.P. 2,037,710, 21.4.36. Appl., 3.2.30).—For coating automobiles etc. a low-η nitrocellulose lacquer is applied on a baked coating of an alkyd resin. S. M.

Production of insoluble coatings, impregnations, pressed masses, and the like. Chem. Fabr. Buckau, Assees. of Deuts. Tornesit G.m.b.H. (B.P. 461,631, 19.8.35. Ger., 28.9.34).—Chlorinated rubber is hardened and rendered insol. in practically all solvents by treating with org. bases with a dissociation const. of $\nless 10^{-5}$, *e.g.*, an alkylamine or homologue, piperidine, $(CH_2)_4(NH_2)_2$, at $\nless$ room temp., the base being in the vapour, liquid, or solid form. I. C. R.

Paint mills.—See I. **C black.**—See II. **Solutions of polyacrylic acid nitrile. Polyketo-fatty acids. Polymerisation products. Artificial threads etc. Composite foils. De-inking printed paper.**—See V. **Gas-retaining fabrics.** See VI. **Cr-green.**—See VII. **Safety and laminated glass. Resin-coated abrasives.**—See VIII. **[Turpentine from] larch trees. Wood for pencils.**—See IX. **Insulated conductors.**—See XI. **Polish.**—See XII. **Liquid rubber compositions. Condensation derivatives of rubber.**—See XIV. **Casein products.**—See XIX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Distribution of rubber in rubber-bearing plants. A. Prokofiev (Sovet. Kautschuk, 1935, No. 1, 19—23).—In plants examined, roots were the principal source of rubber. Analyses are given. Ch. Abs. (*p*)

Complete utilisation of rubber-bearing plants. D. Kraft (Sovet. Kautschuk, 1935, No. 4, 44).—Guayule furnishes rubber 6—8, tars, terpenes, and essential oils 12%. Roots of tau- and kok-sagiz give H_2O 15, rubber 10—14, tars 4—6, inulin 35—40, sugars 3—4, pectin 5—6, and lignin 15%. Ch. Abs. (*p*)

Obtaining natural latex from rubber-bearing plants. A. Ignatiev (Sovet. Kautschuk, 1935, No. 3, 22—26).—Yields and composition of latex from tau- and kok-sagiz are recorded. Ch. Abs. (*p*)

Physical testing procedure for [rubber] latex stocks. L. A. Wohler (Ind. Eng. Chem. [Anal.], 1937, 9, 117—118).—Proper η of the mixture, uniform

dispersion of the ingredients, and a perfectly smooth surface on the dried slab are essential. The standard mixture adopted contained 60% centrifuged latex 166, 40% ZnO dispersion (in 2% saprotin solution) 2½, 50% S dispersion (in 10% glue solution) 3 pts., piperidine pentamethylenedithiocarbamate ¾ pt., 10% ammoniacal casein 10, H_2O 26¼ pts. In order to prevent surface-cracking of the slabs during drying, 1 pt. of Aquarex D was also added. It is necessary to condition the test-strips at controlled R.H. (preferably at zero humidity, which results in max. tensile strength and modulus) to obtain reproducible results.
D. F. T.

Carbon reinforcement of rubber. W. B. Wiegand (Canad. Chem. Met., 1937, **21**, 35—41).—The effect of various proportions of C black is reviewed and the unsatisfactory character of the various theories to explain the reinforcing effect is indicated. A new "discrete rubber" theory is propounded, postulating the existence of the rubber phase in structural units or macromols. larger than the C black particles, with which they form new mol. complexes with altered chemical and physical properties. Such attachment of single layers of C particles around each rubber macromol. also serves to link adjacent macromols. together. This stage marks an optimum proportion of C black for electrical resistivity. Higher proportions lead to the development and filling of "voids" or interstitial spaces, at which stage max. are reached in the properties of energy-capacity and wear-resistance. With still larger proportions wedging apart of the C-enveloped structural units of rubber results and reinforcement progressively declines. The different characters of the various less-reinforcing forms of amorphous C are attributed to their lower degree of surface activity and frequently greater particle size.
D. F. T.

Reinforcement of rubber by gas black. W. Esch (Kautschuk, 1937, **13**, 41—42).—Polemical as to the circumstances of the original discovery of the reinforcing action of gas black. D. F. T.

Manufacture of eraser rubbers. W. Esch (Gummi-Ztg., 1937, **51**, 267—268, 291—292).—A review is given of various rubber compositions used for the production of erasers. D. F. T.

Isoprene and rubber. XLVII. Degradation of rubber by acids. H. P. Mojen (Kautschuk, 1937, **13**, 39—41; cf. B., 1937, 371).—The well-known effect of acids in causing a gradual decrease in the η of rubber solutions is not observed if O_2 is rigorously excluded, even if light is not excluded. The fission of the macromols. consequently is attributable to autoxidation, which is facilitated by inactivation of the natural autoxidants by acids. Similarly, the macromols. remain intact in solid rubber containing $CH_2Cl{\cdot}CO_2H$ or $CCl_3{\cdot}CO_2H$ (introduced by diffusion) if O_2 is absent. The spontaneous development of stickiness in raw rubber may be caused by joint action of O_2 and H_2CO_3. D. F. T.

Properties of hard rubber. II. Scleroscope resilience. H. F. Church (J. Rubber Res., 1937, **6**, 9—12; cf. B., 1936, 419).—The vulcanisation range over which the scleroscope resilience of ebonite shows marked variation is much shorter than are the times used in manufacturing practice. Scleroscope tests, however, may be of val. for distinguishing between loaded and non-loaded samples. D. F. T.

After-effect or "drift" in rubber under constant load. M. L. Braun (Physics, 1936, **7**, 421—425).—Similar vulcanised rubber bands were subjected to 4 different tensions producing extensions 2—5 times the original length. Their average life was about 33 weeks, during which period they stretched (by "drift") an additional 100—200% and finally broke. No correlation was found between the magnitude of the load and the period before breaking. The rate of drift passed through a min. val. D. F. T.

Rheology of raw rubber. M. Mooney (Physics, 1936, **7**, 413—420).—A rotating-cylinder viscosimeter, applicable to measurements with raw rubber, is described. In order to prevent slippage and displacement of the rubber, the surfaces of the cylinders are fluted and means are provided for holding the rubber in place. As it measures thixotropy and elastic recovery as well as η, the instrument is designated a rubber rheometer. The relationships revealed are very complicated. D. F. T.

Application of infra-red spectroscopy to rubber chemistry. D. Williams (Physics, 1936, **7**, 399—402).—Preliminary results with isoprene, styrene, polymerised butadiene, rubber (natural and vulcanised), and rubber hydrochloride indicate that valuable results may be obtained by infra-red methods; although the measurements do not show all the minor frequencies obtained in Raman work, the procedure has the advantage of not needing a solvent. The polymerisation process appears to lead to certain variations in the 5·5—6·5 μ regions; the effects of vulcanisation also are visible in the spectra.
D. F. T.

Determinations of the water-soluble constituents in rubber. Analysis of rubber. I. P. Dekker (Kautschuk, 1937, **13**, 34—38).—The customary methods give low results and, indeed, for vulcanised rubber are valueless. For raw rubber 2 g. should be dissolved in a mixture of xylene (I) (80 c.c.) and AcOH (5) on a water-bath. After further addition of AcOH (5 c.c.) and H_2O (10) heating is continued for 3—4 hr. with frequent shaking. The mixture, together with 50 c.c. of H_2O, is steam-distilled to remove (I), and the aq. liquid is then filtered and dried at 100°. For vulcanised rubber the 2-g. sample is extracted with $COMe_2$ and heated with the (I) for several hr. before adding AcOH, and finally completing dissolution by heating under reflux in an oil-bath; the solution is then heated with additional AcOH and H_2O in an oil-bath (110—120°). The eventually dried extract (obtained as above), however, is redissolved in H_2O and the solution treated with H_2S (to remove Zn) before final evaporation, drying, and weighing. Presence of Ca, Mg, glue, or textile material necessitates appropriate modification of the procedure. D. F. T.

Artificial rubber. H. Lamel (Österr. Chem.-Ztg., 1937, **40**, 127—132).—A review.

Impregnating materials in paper.—See V. **Rubbering of fabrics. Latex in textile printing.**

—See VI. **Alkyd resins. Almeioina gutta resin.** —See XIII. **Rubber for gas masks.**—See XXIII.

See also A., I, 177, η **of synthetic rubber solutions.**

PATENTS.

[Treatment of] rubber latex. A. G. RODWELL, and FLEXATEX, LTD. (B.P. 461,679, 19.8.35. Cf. B.P. 402,422; B., 1934, 159).—An irreversible gel is obtained by mixing the latex (containing 70% of rubber and 0·75% of NH_3) with the fluid gel obtained by mixing Na silicate solution of suitable concn. with an aq. acid. D. F. T.

Surface treatment of [latex] rubber. VEEDIP, LTD., and S. D. SUTTON (B.P. 462,492, 15.1.36. Cf. B.P. 293,111; B., 1928, 650).—Successive layers of latex of increasing concn. or η are applied to an article (hot-H_2O bottle) and the composite layer is roughened or wrinkled by coagulation and swelling (*e.g.*, in C_6H_6 or C_2HCl_3). D. F. T.

Manufacture of stabilised acid latex. H. J. BILLINGS, Assr. to A. D. LITTLE, INC. (U.S.P. 2,038,709, 28.4.36. Appl., 5.4.35).—Latex stabilised with a H_2O-sol. glycyrrhizin salt ($>2\%$ of the Na, K, NH_4, or Mg salt, calc. on rubber) can be acidified without coagulation. The acid latex obtained shows a reduced tendency to foaming and retention of bubbles. D. F. T.

Rubber latex composition. P. LA F. MAGILL, Assr. to E. I. DU PONT DE NEMOURS & CO., INC. (U.S.P. 2,037,423, 14.4.36. Appl., 26.10.34).—Latex is diluted with $HCO\cdot NH_2$ or combinations of this with other materials, *e.g.*, casein. D. F. T.

Manufacture of dyed rubber products [from latex]. M. E. HANSEN, Assr. to AMER. ANODE CO., INC. (U.S.P. 2,037,898, 21.4.36. Appl., 29.12.32).—A form, coated with a substantially non-coagulating dye (or no. of such dyes), *e.g.*, Me-violet, a coagulant, and/or an adhesion-preventing material (mica etc.), is given a deposit of a coagulable dispersion of rubber which is kept in contact with the form sufficiently long for the dye to diffuse into the wet rubber layer, which is thereafter dried. D. F. T.

Manufacture of hollow articles of or containing rubber or similar material and apparatus therefor. INTERNAT. LATEX PROCESSES, LTD., E. A. MURPHY, G. W. TROBRIDGE, and J. A. ANDREWS (B.P. 461,137, 10.8.35).—During the process of forming articles from aq. dispersions by dipping, the internal formers are passed through apertures in a plate which forms the exterior. B. M. V.

Rubber compositions and method of preserving rubber. W. L. SEMON, Assr. to B. F. GOODRICH CO. (U.S.P. 2,035,620, 31.3.36. Appl., 8.11.33). —Naphthphenothiazines or the polysulphides therefrom are added to rubber mixtures as preservatives. R. S. C.

Vulcanisation of rubber on to articles of light metal. R. BOSCH A.-G. (B.P. 462,448, 10.11.36. Ger., 18.12.35).—Improved adhesion between a light metal (*e.g.*, electron) and a rubber layer vulcanised thereon is effected by precoating the metal with a thin layer of Fe (by spraying). D. F. T.

Direct bonding of rubber and metal. H. C. ANDERSON, Assr. to CHRYSLER CORP. (U.S.P. 2,037,749. 21.4.36. Appl., 27.12.34).—A rubber composition for attachment to (ferrous) metal by vulcanisation contains as a bond-forming ingredient a vulcanisation accelerator (I) of the carbosulphhydryl polysulphide class ($[NMe_2\cdot CS]_2S_2$, $[NMe_2\cdot CS_2]_2Zn$, etc.) and also a vulcanisation-accelerating component including Zn dust, which has substantially no activating effect on (I). D. F. T.

Manufacture of tacky rubber compositions. H. L. FISHER, Assr. to UNITED STATES RUBBER CO. (U.S.P. 2,035,698, 31.3.36. Appl., 7.3.32).—Non-vulcanisable rubber is rendered permanently tacky by adding an aromatic NO-compound (preferably 2—5%) and exposing to air for several days at room temp. or heating (141°) in air with or without steam for a few hr. R. S. C.

Liquid composition containing rubber. C. ELLIS, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,038,556, 28.4.36. Appl., 24.12.32).—Rubber is dissolved in a solvent (b.p. approx. 93—135°) obtained by destructive hydrogenation of a petroleum distillate, b.p. $\ngtr$ approx. 370° (including gasoline, burning oil, and gas oil). D. F. T.

(A) **Rubber derivatives.** (B) **Oxidation products of rubber.** RUBBER PRODUCERS RES. ASSOC., H. P. STEVENS, and F. J. W. POPHAM (B.P. [A] 462,613, 17.10.35, and [B] 462,627, 24.12.35. Cf. B.P. 417,912; B., 1934, 1112).—(A) Rubber in solution ($>20\%$ concn.) is oxidised under pressure (air at 40—50 lb. and 60—80°) in presence of a sol. or dispersed catalyst (Co linoleate, 2½%) and possibly also of linseed or other fatty oil. (B) Rapid oxidation and/or depolymerisation of catalysed rubber are/is effected by dispersing it over the surface of a powdered or porous material (wood flour) exposed to O_2 or air (by milling at 75—85°). D. F. T.

Condensation derivatives of rubber. H. R. THIES, Assr. to WINGFOOT CORP. (U.S.P. 2,039,238, 28.4.36. Appl., 19.1.34).—A mass of mouldable, thermoplastic material obtained by treating rubber with the halide of an amphoteric metal or H_2SnCl_6 is protected from oxidation by an O_2-excluding film of a mould lubricant (soap or waxes). D. F. T.

Reinforced india-rubber [valves] and other plastic articles. E. LORD and W. K. WEBSTER (B.P. 461,857, 29.5.36).

Dispersions of halogenobutadienes. Cyanic etc. anhydrides.—See III. **Elastic fabrics. Artificial leather.**—See V. **Gas-retaining fabrics. Coated sheet.**—See VI. **Coverings for roads etc.** —See IX. **Articles comprising plastics. Floor coverings. Sheet material. Mouldable composition. Thermoplastics containing rubber. Coloured masses from resins [*e.g.*, rubber]. Caoutchouc-like material. Laminated articles. Printing plates. Oil paints. Insol. coatings.**— See XIII.

XV.—LEATHER ; GLUE.

Influence of temperature on liming of ox hides and goat skins. I. Liming of fresh ox

hide in presence of sodium chloride. W. B. Pleass (J. Soc. Leather Trades Chem., 1937, **21**, 89—100).—Fresh ox hide was limed in $Ca(OH)_2$, $Ca(OH)_2 + 0{\cdot}1M$-NaCl, and $Ca(OH)_2 + 2M$-NaCl liquors and curves were derived to show the effect of temp. on H_2O absorption and also the loss of N by the hide for periods up to 20 days. Plumping increased to a max. in 5 days, and thereafter diminished at a rate increasing progressively with rise of temp. It was little affected by addition of $0{\cdot}1M$-NaCl, but was diminished at first by the $2M$-NaCl and ultimately was much increased thereby. The N matter in the $Ca(OH)_2$ liquor was increased by the NaCl additions and reached a min. between 15° and 20°, which is suggested as the optimum temp. of liming to obtain good plumping with efficient removal of interfibrillary proteins without loss of collagen. Max. plumping is thereby attained in 5 days. D. W.

Bleaching animal skins with permanganate preparatory to tanning. J. A. Wilson (Hide and Leather, 1935, **90**, No. 19, 17, 24—27).—After bating or pickling, skins are bleached with $KMnO_4$, $NaHSO_3$, H_2SO_4, and NaCl. The p_H is then adjusted to the normal val. prior to tanning in the usual way. Bleaching results in improved colouring and does not injure leather. Ch. Abs. (*p*)

Mangrove (*Rhizophora mucronata*) of Italian Somaliland. G. A. Bravo (Annali Chim. Appl., 1936, **26**, 527—532).—Data for the tannin content (35—40%) of the bark are given and the use of extracts for tanning purposes is discussed. F. O. H.

Nature of the combination of wattle-bark tannin with collagen. II. R. O. Page and H. C. Holland (J. Amer. Leather Chem. Assoc., 1937, **32**, 78—85; cf. B., 1933, 358).—A min. of 18% of tannin for hide powders tanned at p_H 5 rising to a max. of 30% for those tanned in absence of air at high and low p_H vals. cannot be extracted from the tanned powders with dil. aq. alkali. Less alkali-resistant tannin is fixed by deaminised hide powder. A large amount of tannin and alkali-resistant tannin is fixed by hide powder in presence of air at p_H 8—9. A degree of tannage of 160 is obtained by tanning hide powder with wattle-bark extract at p_H 8·4 in presence of air. D. W.

Ligninsulphonic acid and its tanning properties. K. Freudenberg (Collegium, 1937, 3—9).—The same acids, but in different proportions, are produced by oxidation of ligninsulphonic acid (I) and a product derived from Erdtman's acid, respectively. Alternative formulæ are deduced therefrom for (I) in which the SO_3H is in a side-chain. (I) contains several phenolic groups widely separated in the mol. Secondary and tertiary OH groups increase its diffusibility, which is also favoured by strong polarity and by the diversity in the size of the particles. It is also capable of condensation and possibly the products thereof yield a better compound with the hide substance. D. W.

Mordanting and dyeing processes. XXXI. Theory of mineral tannage. E. Elöd and T. Schachowskoy (Kolloid-Z., 1937, **78**, 164—171; cf. B., 1935, 1008).—Recent work on the action of Cr compounds on gelatin and collagen is discussed. The fact that Cr is taken up from solutions of varying concn. in accordance with the Freundlich adsorption isotherm does not exclude a chemical mechanism. Measurements of light absorption by mixtures of gelatin and Cr salts indicate that the latter interact with the NH_2 and CO_2H end-groups, but that an inner complex is not formed. F. L. U.

Resistance of light metals [aluminium alloys] to corrosion by vegetable tannins, synthetic tannins, sulphite-cellulose waste extract, and different curried vegetable-tanned leathers. F. Stather and H. Herfeld (Collegium, 1937, 9—23).—Max. loss in wt. by corrosion in tan liquors (3% of solid matter) at natural p_H vals. was obtained with cupriferous Al alloys. Losses in wt. did not always accompany the appearance of corrosion. An Al–Cu alloy was badly corroded but without much loss in wt. An Al–Mg–Mn alloy was the most resistant, followed by an Al–Mg alloy, but they were not as resistant as was Cu or brass. Corrosion increased as the p_H of the tan liquors fell, but not directly, and varied in the following order of increasing effect: sulphited quebracho, oak bark, gambier, myrobalans, mangrove, sumac, oakwood, chestnut, sulphite-cellulose waste, synthetic tans (except Tannigan L.L.). The corrosion of Al alloys by curried leathers was independent of the grease. Max. corrosion was shown by wet leather free from grease. D. W.

Effect of vegetable-tanned leathers on metallic iron. II. Effect of iron pulleys on curried leather belting. V. Kubelka, V. Němec, and S. Žuravlev (Collegium, 1937, 23—36; cf. B., 1936, 162).—Belts made of vegetable-tanned leather stuffed with stearine, beef tallow, pale and dark fish oils, "Talget," dégras, and "Elain," respectively, were run for 2250 hr. over wood and Fe pulleys and analysed. Fe was picked up by the belts from the Fe pulleys, fat was lost, and the residual fat had been oxidised. Least Fe and change occurred in the stearine-stuffed leather. Most stretch was shown by belts stuffed with unsaturated fats. The tensile strength was unaffected by the type of pulley on which the belt had been run. D. W.

[Fat] spew on glazed kid leather. E. K. Moore (J. Amer. Leather Chem. Assoc., 1937, **32**, 48—68).—A lipin material containing free fatty acids has been isolated in larger amounts from affected than from unaffected portions of finished skins showing a white powdery spew. This lipin was present in the raw, cured skins, and appeared as "callous spots" after liming and as pink, white, or brown spots after chroming. The spewing was not materially reduced by soaking the raw skins in $0{\cdot}1N$-alkali, but was reduced by solvent-degreasing. D. W.

Microscopy of [fat] spew on glazed kid leather. W. T. Roddy, F. O'Flaherty, and E. K. Moore (J. Amer. Leather Chem. Assoc., 1937, **32**, 68—77; cf. preceding abstract).—The white, powdery spew on finished glazed kid appears, under the microscope, as an aggregate of small crystals of lipin material. Lipin is found in the corium of cross-sections through greasy patches on raw skins, but only in the epidermal tissues of clear parts. Most of the lipin is present near the flesh side in greasy skins. The distribution of the lipin in the skins has been followed microscopically through the different processes of manufacture. D. W.

Quality of vegetable-tanned sole leather. IV. Effect of composition. Relation between quality and the composition of the leathers. I. (Miss) D. J. Lloyd and E. W. Merry (J. Soc. Leather Trades Chem., 1937, **21**, 101—123; cf. B., 1935, 197, 370).—Analytical figures have been obtained for each layer of 39 commercial leathers split into layers approx. 1 mm. thick. Oil was max. in the grain and flesh layers and increased approx. as the H_2O-sol. matter. The distribution of moisture follows that of the H_2O-sol. matter. The % of H_2O-sol. matter was max. in the grain, less in the flesh, and min. in the layer below the grain. Hide substance was max. in the middle layers nearer the grain. Fixed tan was not very variable. Degree of tannage was max. in the grain and flesh layers; its min. corresponded with the max. hide substance. No relation was observed between degree of tannage and % of H_2O-sol. matter. D. W.

Patents.

Manufacture of tanning agents containing iron. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 462,026, 26.8.35).—Fe^{III} compounds [$FeCl_3$, $Fe_2(SO_4)_3$] are combined with sol. albuminous substances, *e.g.*, scraps from limed hides and skins suitable for making glue, leather parings, casein, horn, etc., and their sol. degradation products and derivatives, and the latter hydrolysed by means of non-oxidising proteolytic agents or an acid agent. D. W.

Tanning hides and pelts with the aid of iron compounds. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,685, 26.8.35).—The use of sol. Fe^{III} compounds with polycarboxylic compounds containing at least one double linking in the mol., preferably derivatives of o-$C_6H_4(CO_2H)_2$, is claimed. D. W.

[Difficultly combustible] shoe stiffener manufacture. S. P. Lovell, Assr. to Beckwith Manufg. Co. (U.S.P. 2,036,588, 7.4.36. Appl., 5.3.35).—A fibrous base is impregnated with a nitrocellulose solution in which H_3BO_3 is suspended. D. W.

Dyeing of leather. G. R. Pensel (B.P. 461,215, 25.2.36).—The leather after fat-liquoring is treated with a fixative for the dye (HCO_2H, AcOH, lactic, oxalic, citric, tartaric, maleic, malic, or phosphoric acid in MeOH), the dye is then applied (in MeOH), and fixed by further treatment with one of the above acids or with basic Cr sulphate and cream of tartar (this may also be used for the pretreatment in some cases). It is claimed that penetration of the leather by the dye is avoided. H. A. P.

Adhesive [for cellulose derivatives]. J. E. Snyder and T. G. Finzel, Assrs. to Du Pont Cellophane Co., Inc. (U.S.P. 2,037,053, 14.4.36. Appl., 30.11.29).—A cellulose derivative (1 pt.), *e.g.*, nitrocellulose, and a resin ($\nless 0\cdot7$ pt.), *e.g.*, gum dammar, are dissolved or suspended in an org. liquid, *e.g.*, $COMe_2$. The composition may be used for moistureproof regenerated cellulose etc. S. M.

Artificial leather.—See V. **Imitation leather finish.**—See XIII. **Liquid rubber compositions.**—See XIV. **Casein products.**—See XIX.

XVI.—AGRICULTURE.

Composition of [Finnish] clays as shown by density measurements. A. Salminen (Suomen Kem., 1937, **10**, **A**, 3—6).—The d of a no. of Finnish clays have been measured. The high d of H_2O- and humus-free specimens indicates a high % of mica. It is concluded that the clays have been formed by marine weathering of local rock, but have not been weathered much subsequent to grinding. M. H. M. A.

Gyttia soils. B. Aarnio (Bodenk. Pflanzenernähr., 1937, **2**, 186—192).—Chemical and physical characteristics of these Finnish soils are recorded. A. G. P.

Soil of western Morocco. Brown soil formed at the expense of hamri. V. Malychev (Compt. rend., 1936, **203**, 1532—1534).—Analyses are given of the soil and mother-rock from Aguedal to Rabat. The soil is neutral, and poor in humus and sol. substances. Hamri (the local name for the reddish-brown sandy clay) contains free Al_2O_3. J. N. A.

General trends of the desert type of soil formation. C. C. Nikiforov (Soil Sci., 1936, **43**, 105—131).—Three general types are distinguished and are discussed in relation to characteristic vegetation. A. G. P.

[Report on] biochemistry. N. Craig (Mauritius Dept. Agric.; 5th Ann. Rept. Sugar-cane Res. Sta., 1934, 21—39).—In mature soils the clay of more highly laterised types had the lower base-exchange capacity. The capacity of the org. matter was approx. the same in all mature types and averaged 20 times that of clay on a wt. for wt. basis. Vals. for different typical soils are given.

In immature, highly-leached soils in which org. matter was decomposed by heating at 350° for 8 hr., Truog's reagent removed as much P as did 1% aq. citric acid. In unheated soils the latter reagent gave the higher vals., probably through extracting org. and inorg. P, whereas the former removes only inorg. P. In acid soils org. P fixation is high; in neutral types P is associated more with the exchangeable bases.

Admixture of subsoil and surface layers did not affect microbiological activity; nitrification was not suppressed in 1 : 1 mixtures. Ch. Abs. (p)

Water economy of soils and its examination. W. Freckmann and H. Baumann (Bodenk. Pflanzenernähr., 1937, **2**, 127—166).—H_2O relationships of soil and their determination are discussed. The effects of external factors and of cropping on the distribution of H_2O in soil are examined. A. G. P.

Soil reaction and plant growth. J. Hendrick and W. Moore (Trans. Highland and Agric. Soc., 1935, **47**, 34—49).—Optimum p_H ranges of north Scottish soils for a no. of crops are recorded. Ch. Abs. (*p*)

Effect of carbon dioxide on soil reaction and on solubility of phosphorus in soils. F. B. Smith, P. E. Brown, H. C. Millar, and H. L. Bodily (Soil Sci., 1937, **43**, 93—104).—Soil P becomes more sol. in $0.002N$-H_2SO_4 after treatment with CO_2 or H_2CO_3. This occurs independently of any change in the $[H^{\cdot}]$ of the soil solution brought about by dissociation of H_2CO_3. In well-buffered soils and in others treated with rock phosphates $[H^{\cdot}]$ does not increase, and may even decrease as a result of CO_2 treatment. In the latter case the reaction change may be due to hydrolysis of ammonifiable or nitrifiable org. matter. A. G. P.

Organic matter content and carbon : nitrogen ratio of South African soils of the winter-rainfall area. W. E. Isaac (Trans. Roy. Soc. S. Africa, 1935, 205—230).—Determinations of soil org. matter as N % ×20 were unsatisfactory in these soils. A C : N ratio of 15 : 1 is regarded as typical of soils of this area. Subsoils had smaller C and N contents and narrower C : N ratios than surface soils. All vals. were lower in cultivated than in virgin soils. No relation was apparent between the average org. matter contents or C : N ratios of different soil groups and the mean annual rainfall. Ch. Abs. (*p*)

Organic matter content and carbon : nitrogen ratios of semi-arid soils of the Cape province. W. E. Isaac and B. Gershill (Trans. Roy. Soc. S. Africa, 1935, **23**, 245—254).—The average C : N ratio in soils of this type was 11·7 : 1 (range 5·0—13·5 : 1). The org. matter contents were $<$ those of the winter-rainfall area and were lower in subsoils than in surface layers. The soils were neutral or slightly alkaline. Ch. Abs. (*p*)

Improvement of glasshouse soils. W. Corbett (Sci. Hort., 1935, **3**, 148—152).—The decreased productivity of repeatedly used and fertilised tomato soil is ascribed to loss of green residue and fibre which stimulates the activity of soil bacteria. Beneficial effects were obtained by placing straw almost vertically in the soil. Ch. Abs. (*p*)

Nitrification in soil types of northern Puerto Rico. J. A. Bonnet (J. Agric. Univ. Puerto Rico, 1935, **19**, 73—103).—In certain soils $(NH_4)_2SO_4$ was an inefficient N source for crops unless appropriate dressings of CaO were given. Ch. Abs. (*p*)

Variations in the ammonia and nitrate content of soils. G. Várallyay (Bodenk. Pflanzenernähr., 1937, **2**, 192—198).—Changes in the $NH_4^{\cdot} + NO_3'$ content of soil following treatment with stall manure, straw, and CaO are examined. Determinations of N requirement are based on vals. for $NH_4 + NO_3'$ after incubation of soil for 30 days at room temp. or for 14 days at 35°. A. G. P.

Influence of lime on availability of potassium [in soil]. H. C. Harris (Ann. Rept. Delaware Agric. Exp. Sta. [1934], Bull. No. 192, 1935, 18—21).—Liming did not increase the availability of soil as determined by Neubauer tests or as exchangeable K. Continued use of K fertilisers with farmyard manure did not materially increase available K. Ch. Abs. (*p*)

Effect of liming on phosphate status of soil. F. Hardy (Proc. Sugar-Cane Invest. Comm. [Trinidad], 1934, **4**, 336—337).—Ground limestone (containing small amounts of P and 3—6% of $MgCO_3$) increased the available P of soils. Ch. Abs. (*p*)

Mobility of phosphoric acid in soils. O. de Vries and C. W. G. Hetterschij (Bodenk. Pflanzenernähr., 1937, **2**, 178—186).—The high mobility of PO_4''' in humus-rich soils is examined. The ratio of H_2O sol./citric acid-sol. PO_4''' is high. Considerable downward movement of added superphosphate is recorded. A. G. P.

Soils. XX. Determination of lime requirements. J. Clarens and H. Margulis (Bull. Soc. chim., 1937, [v], **4**, 583—587).—The change of p_H on adding acid or alkali is used to evaluate the CaO requirements. Examples are given. E. S. H.

Application of electrometric titration to determination of lime requirement in reference to the physical condition of soils. S. Goy and O. Roos (Bodenk. Pflanzenernähr., 1937, **2**, 166—178).—Variations in CaO requirement and p_H of soils with changes in degree of dispersion are examined. An electrometric titration method for determining CaO requirement, in which the dispersion factor is taken into consideration, is described. A. G. P.

Determination of assimilable nutrients [in soil] by Neubauer's method in comparison with the methods of the Deutsches Kalisyndikat Berlin-Lichterfelde. F. Alten and H. Loofman (Bodenk. Pflanzenernähr., 1937, **2**, 198—211).—Comparison is made of the results of Neubauer tests and determinations of available K and PO_4''' in soils by Vageler's method. The limitations of the former method are discussed. A. G. P.

Determination of manganese in soils. C. R. H. Iyer and R. Rajagopalan (J. Indian Inst. Sci., 1936, **19**, **A**, 57—66).—The bismuthate (I) method gives high results in saline soils owing to liberation of free Cl_2. Addition of HgO to the acid extract of these soils eliminates the interference of NaCl. In humus-rich soils $<$ the usual aliquots are recommended, and the (I) should be added in successive small portions with intermediate heating and partial cooling. Alkali sulphite in an acid medium is the best extractant for soil-Mn. Samples of (I) sometimes contain a sol. substance which reacts with $Fe(NH_4)_2(SO_4)_2$. Successive extractions with H_2O, dil. acid, and sulphites serve as a basis for examining the distribution of Mn in soil. A. G. P.

Spontaneous studies of soils. II. Influence of temperature on micro-organisms. A. Itano and Y. Tsuji (Ber. Ohara Inst. landw. Forsch., 1936, **7**, 409—414; cf. B., 1936, 657).—By the author's method of examination, the p_H of paddy-field soils decreased during incubation at 28°, but dry farm soils were unchanged. Bacterial and fungal nos. reached max. somewhat earlier in incubated dry farm than in paddy-field soils. A. G. P.

Effect of calcium cyanamide on soil microflora, with special reference to certain plant parasites. C. M. Haenseler and T. R. Moyer (Soil Sci., 1937, **43**, 133—151).—Heavy applications of $CaCN_2$ (I) (2000—10,000 lb. per acre) markedly affected the soil microflora, causing, in the case of bacteria and *Actinomyces*, an initial decrease in nos., followed by a marked increase and a subsequent return to normal. These changes are related more closely to alterations in soil-p_H than to the amount of (I) applied. (I) controlled club root in *Brassicæ*, especially in soils having a relatively high p_H (6·4 to neutral). In very acid soils the dosage of (I) necessary for control caused plant injury in some cases. In greenhouse soils (I) gave more effective control than did $Ca(OH)_2$ (II). Under field conditions both (I) and (II) induced development of fibrous roots in healthy and diseased plants and diminished the damage caused by club root. Simultaneous treatment with (I) and (II) was more successful than that with either alone. At the rate of 1000—2000 lb. per acre (I) reduced seed decay and damping-off in cucumbers and root rot in peas. A. G. P.

Associative and antagonistic effects of [soil] micro-organisms. I. Historical review. S. A. Waksman. **II. Antagonistic effects of micro-organisms grown on artificial substrates.** S. A. Waksman and J. W. Foster. **III. Associative and antagonistic relationships in the decomposition of plant residues.** S. A. Waksman and I. J. Hutchings (Soil Sci., 1937, **43**, 51—68, 69—76, 77—92).—II. The inhibitory action of a species of *Actinomyces* on various fungi, bacteria, and other *Actinomyces* was not due to exhaustion of nutrients or to unfavourable changes in p_H, but was sp. in character. Max. amounts of the antagonistic substance occurred in cultures of *Actinomyces* 7—18 days old. Subsequently the substance was slowly destroyed. Heat and aëration rapidly destroyed the substance.

III. Decomp. of lucerne by a *Trichoderma* was accelerated by certain bacteria and fungi, themselves unable to decompose cellulose. Pure cultures of the *Actinomyces* did not decompose maize stems, but did so in presence of certain other organisms or of CaO. *Azotobacter* utilised carbohydrates of oat straw without N fixation, even in presence of cellulose-decomp. fungi. *Azotobacter* utilised the combined N of the straw under these conditions. Decomp. of lignin took place only when *Actinomyces* occurred in the mixed flora. A. G. P.

Microbiology of Australian soils. III. The Rossi–Cholodny method as a quantitative index of the growth of fungi in soil: influence of organic matter on the soil microflora. H. L. Jensen (Proc. Linn. Soc. N. S. Wales, 1935, **60**, 145—154).—Effects of additions of org. matter to soils at various temp. on development of soil micro-organisms are recorded. Microscopical determinations of the density of mycelium and also plate counts of bacteria and *Actinomyces* are correlated with rates of CO_2 production. Ch. Abs. (*p*)

Soil types and growth of algæ in fishponds. D. Z. Rosell and A. S. Argüelles (Philippine J. Sci., 1936, **61**, 1—7).—Algæ are abundant in sub-aq. horizons in which "loss by solution" (mechanical analysis), clay, N, and org. matter contents are high. A. G. P.

[Report on] chemistry. F. E. Hance (Hawaiian Sugar-Cane Planters Assoc., Proc. 54th Ann. Meet. [Comm. Rept.], 1934, 69—90).—Spectrographic examination of virgin soils in areas of crop failure showed absence of B and F. The solubility of native Fe and Mn in alkaline soils was increased by treatment with a 1 : 1 mixture of S and filter-press cake (2 tons/acre). Available Mn and Fe in soils is determined by use of N-NH_4 citrate neutralised to bromothymol-blue.

Small amounts of As normally assimulated by sugar-cane plants (2 p.p.m.) remain in the by-products of refining operations. Ch. Abs. (*p*)

Use and distribution of fertilizers. Theory and technique. S. D. di Delupis (Ann. R. Staz. Chim. Agrar. Sperim., 1935, [ii], **14**, No. 314, 51 pp.).—A lecture. E. P.

Comparative fertiliser investigations with basic slag and Algiers phosphate on a high-moor sand-mixture culture eighty years old. Brüne (Phosphorsäure, 1935, **5**, 537—550).—Equal increases in yields and P and Ca contents of crops were obtained with the two sources of P. Ch. Abs. (*p*)

Evaluation of the potassium and phosphoric acid in stall manure. E. A. Mitscherlich (Bodenk. Pflanzenernähr., 1937, **2**, 211—229).—Methods of field and pot-culture tests are described and results discussed (cf. Sauerlandt, B., 1936, 611). A. G. P.

Use of silica dishes in the official method for determination of potash in fertilisers. H. R. Allen and L. Gault (J. Assoc. Off. Agric. Chem., 1937, **20**, 101—104).—SiO_2 dishes may replace Pt dishes in the official method, but consistently slightly higher results are obtained. No deterioration of the surface is observable after 25 analyses. A larger insol. residue, especially in presence of org. matter, is formed. No significant difference was observed between the results of three methods of ignition. E. C. S.

Determination of urea-nitrogen in fertiliser mixtures. J. Y. Yee and R. O. E. Davis (J. Assoc. Off. Agric. Chem., 1937, **20**, 104—107; cf. A., 1935, 1092).—The method described previously (*loc. cit.*) proved satisfactory when applied to six mixtures of urea with a variety of N carriers and other fertiliser materials. In presence of fish meal better results are obtained by leaching out with H_2O and determining urea in the extract. This procedure is recommended for all fertiliser mixtures. E. C. S.

Ultra-violet light as an aid on the farm, with special reference to fertilisers and feeding-stuffs. J. Grant (Fertiliser, Feeding-Stuffs, Farm Supplies J., 1935, **20**, 674—675).—In ultra-violet light bone meal has a blue colour, superphosphate appears a dull violet, and raw rock phosphate brown or yellow. Basic slag does not fluoresce. 10% of rock phosphate in a mixture may thus be detected. 10% HCl solutions are more sensitive than the solid materials. The distribution of fertilisers in soil may be examined by this means. 0·5% of ZnO (yellow fluorescence) may be detected in flour or cattle foods. Ch. Abs. (*p*)

Research at Rothamsted of importance in agriculture. M. D. Glynne (Sci. Hort., 1935, **3**, 215—221).—Fertiliser and green-manuring trials are recorded. Incorporation of antioxidants (tannic acid, pyrocatechol, resorcinol, quinol, pyrogallol) with talc- or kieselguhr-pyrethrum dusts retards loss of toxicity on exposure to light and air.

Ch. Abs. (*p*)

Absorption by food plants of elements of importance in human nutrition. A. B. Beaumont and E. B. Holland (Ann. Rept. [1934], Massachusetts Agric. Exp. Sta. Bull., 1935, No. 315, 14—15).—On a sandy loam of p_H 4·4, toxic symptoms followed application of $FeSO_4$ at the rate of 1280 lb. for spinach and of 640 lb. per acre for turnips. Corresponding vals. for $Fe_2(SO_4)_3$ were 640 and 320, and for $CuSO_4$ 320 and 160 lb. With soil-p_H 5·4, 5120 lb. of $FeSO_4$ were toxic to spinach, but no concn. examined injured turnips. The toxic threshold for $Fe_2(SO_4)_3$ was 2560 lb. (spinach) and for $CuSO_4$ 1250 lb. (spinach and turnip). KI (16—24 kg. per hectare) increased yields of turnip but not of spinach.

Ch. Abs. (*p*)

Influence of calcium silicate and carbonate on the utilisation [by plants] of different phosphate fertilisers. E. Blanck, H. Schorstein, and R. Themlitz (J. Landw., 1936, **84**, 297—319).—Beneficial effects of supplementary manuring with Ca silicate are due to enhanced dissolution of soil PO_4'''. On acid soils $CaCO_3$ improves the action of superphosphate and $CaHPO_4$, but not that of basic slag. A. G. P.

Application of the law of diffusion to the nutrient intake of plants. J. D'Ans (Angew. Chem., 1937, **50**, 175—179).—The theory of the diffusion of electrolytes through membranes serves to explain the nutrient intake of plants. Recorded observations of many aspects of the mineral nutrition of plants are shown to follow logically from considerations of diffusion velocities of ions and of the rates of translocation or utilisation within the plant.

A. G. P.

Rôle of combined water in the frost-resistance of winter wheat. V. P. Popov (Compt. rend. Acad. Sci. U.R.S.S., 1937, **14**, 49—52).—The roots of winter wheat fertilised with manure contain a greater amount of combined H_2O (cf. A., 1934, 26) and sugars than those of unfertilised, whereas the stems contain less. In conditions of comparative warmth, combined H_2O diminishes (cf. A., 1924, i, 699) and is at its max. concn. during " hardening."

J. L. D.

Salinity of irrigation water and injury to crop plants. F. M. Eaton (Calif. Citrog., 1935, **20**, 302, 322, 324, 326, 334, 362—365).—In irrigation H_2O the ratio of Na : total bases (equivs.) is more important than the total sol. solid content except when this is very high. A ratio of Na : total bases $>$0·7 renders H_2O unfit for irrigation purposes. In nutrient solutions 10 m.-equiv. of NaCl depressed growth of maize and tomatoes. Na_2SO_4 has a similar effect. Salt injury to plants is not accompanied by characteristic symptoms other than reduced growth. There is no threshold concn. below which Cl-sensitive plants are uninjured by NaCl. $[Na_2SO_4]$ supplying $>$ the necessary amount of S for growth cause progressive decreases in yields. Ch. Abs. (*p*)

Evaluation of barley, wheat, soya bean, and rapeseed. M. Kondo, R. Takahashi, and Y. Terasaka (Ber. Ōhara Inst. landw. Forsch., 1936, **7**, 335—358).—Market vals. of these materials are assessed on their general condition, wt. per 1000 grains, hectolitre wt., purity, H_2O content, and germinative power. A. G. P.

Relation between chemical nature of substrate and degree of chlorosis in maize. C. H. Wadleigh, W. R. Robbins, and J. R. Beckenbach (Soil Sci., 1937, **43**, 153—175).—In flowing solution cultures in which NO_3' was the sole source of N, chlorosis developing in maize increased in severity with rising p_H in the range 3—7. No chlorosis appeared at p_H 8·0. With both NO_3' and $NH_4^{\cdot}$ in the nutrient no chlorosis appeared with media of p_H 5—7, but was moderately severe at p_H 3·0 and 8·0. Chlorosis of plants in media with high $[K^{\cdot}]$ tended to be slight, with high $[Ca^{\cdot\cdot}]$ or $[Mg^{\cdot\cdot}]$ moderate, and with high $[PO_4''']$ or $[NO_3']$ severe. High $[SO_4'']$ prevented chlorosis. High titratable acidity in media is associated with high $[PO_4''']$ in the expressed sap of plants, and serves to explain pptn. of Fe and chlorosis under these conditions. The amount of NO_3' in plants and the severity of chlorosis are closely related. The presence of NH_4 in media favours high $[PO_4''']$, but a lower p_H in the sap than when N is supplied as NO_3'. A. G. P.

[Report on] botany research. H. Evans (Mauritius Dept. Agric. 5th Ann. Rept. Sugar Cane Res. Sta., 1934, 40—48).—Arrowing in sugar cane did not occur on soils heavily fertilised with P or NO_3', and was markedly reduced by heavy liming.

Soaking sets in aq. $Ca(OH)_2$ alone or with addition of $MgSO_4$ (1 lb. per 50 gals.) improved the rate of germination of sets $>$ soaking in complete nutrients or in H_2O alone. All treatments increased yields of cane. Hydrolysis of glucose during soaking was not marked. Absorption of nutrients was extremely small. Beneficial effect of soaking in aq. CaOH)$_2$ is ascribed to the increased absorption of H_2O by the cutting. Borer larvæ were completely eradicated.

Ch. Abs. (*p*)

[Sugar] cane ecology. F. Hardy (Proc. Sugar-Cane Invest. Comm. [Trinidad], 1934, **4**, 352—353).—In sand-cultured sugar cane, absence of N or P lowered the yield to 5% of normal, whereas in absence of K 50% yield was obtained. Growth was unaffected by absence of Ca or Mg. Highest % of sucrose in cane occurred in plants lacking N. The glucose ratio was lowest in cultures lacking N or P, but was high in absence of K. Ch. Abs. (*p*)

Soil conditions determining response [of sugar cane] to fertilisation with potassium. P. E. Turner (Proc. Sugar-Cane Invest. Comm. [Trinidad], 1934, **4**, 364—366).—Soils containing $<$0·005—0·008% of exchangeable K_2O gave significant response to K fertilisers in presence of 2—3 cwt. of

$(NH_4)_2SO_4$ per acre. In K-deficient soils which did not respond to K fertilisers, >50% of the added K was fixed in an unavailable form at 40°, but practically none was fixed at 30°. In Trinidad a temp. of 40° in the surface layers of soil is not unusual.

Ch. Abs. (*p*)

Effect of fertiliser treatment on germination of sugar cane under field conditions. P. E. Turner (Proc. Sugar-Cane Invest. Comm. [Trinidad], 1934, 4, 404—416).—$(NH_4)_2SO_4$ (I) applied at planting adversely affected germination in some cases, the effect being minimised by liming. When applied 3 weeks after planting (I) had no ill effect. Rapid nitrification of (I) may induce a high [H˙] in the soil solution in contact with the sets. Superphosphate and K_2SO_4 also affect germination adversely.

Ch. Abs. (*p*)

Effects of liming soil on the composition of sugar cane. G. Rodriguez (Proc. Sugar-Cane Invest. Comm. [Trinidad], 1934, 4, 389—394).—On a heavy acid clay liming increased the mineral intake (notably of P) of sugar cane, and the total ash, glucose, and P of the juice, but decreased the sucrose content. The relative amount of P fixed in the cellulosic framework was greater in the unlimed cane. The Ca + Mg and P contents were positively correlated.

Ch. Abs. (*p*)

Factors influencing the mineral composition of [sugar] cane. A. Ayres (Repts. Assoc. Hawaiian Sugar Tech., 1936, 29—41; Internat. Sugar J., 1936, **37**, 111).—Factors are discussed which should be taken into consideration in interpreting the results of the rapid soil tests being used in different countries. *E.g.*, different varieties have different mineral characteristics. Cane grown under favourable climatic conditions will contain less mineral matter than that grown in a less suitable location. If the amount of one soil constituent is changed, the relative proportions of the others also change. J. P. O.

Refractometric studies with a view of distinguishing fodder- and sugar-beets at the young seedling stage. E. W. Schmidt and W. Maier (Z. Wirts. Zuckerind., 1936, **86**, 785—825).—Seeds of fodder- and sugar-beets cannot be distinguished by any known test. A technique is described by which the refractometric dry-substance content of plant juices can be accurately determined on very small specimens of leaf or other material, and vals. obtained with leaves of various plants are tabulated. At all stages of growth juices of sugar-beet leaves or other organs give higher average vals. than those of the corresponding parts of fodder-beets grown for the same time under identical conditions. This applies to cotyledon and hypocotl juices of young seedlings; with both types of beets there is a pronounced fall in the dry substance content of these juices during the first week of growth, and later a steady rise. After 3 weeks' growth under identical conditions, sugar- and fodder-beets can be clearly distinguished, their hypocotl or cotyledon juices giving average vals. differing by 20—30%. If in parallel with authentic seed samples of the two types a suspected mixed sample is thus germinated, and after 3 weeks 50 or 100 seedlings from each sample are tested separately, the results being plotted to show % distribution, comparison of the graphs will show if the suspected sample is a mixture and the approx. proportions of the two types in it. The period of growth should be terminated in the early morning, because during the daytime variable assimilation of CO_2 leads to irregular results.

J. H. L.

Maintenance of adequate nitrogen for citrus [trees]. W. G. Babcock (Calif. Citrog., 1935, **20**, 212, 218—220).—Seasonal variations in NO_3' content of well-fertilised citrus soils are recorded. Max. vals. correspond with min. activity of the trees. N fertilisers for summer application must be H_2O-sol., immediately available, and capable of rapid penetration to the root zone. Ch. Abs. (*p*)

[Cultivation of] pineapples. G. D. P. Olds (Malay. Agric. J., 1937, **25**, 38—57; cf. B., 1934, 34). —Effects of manuring, spacing, and time of planting are examined. A. G. P.

Asparagus investigations. R. E. Young (Massachusetts Agric. Exp. Sta. Ann. Rept. [1934] Bull., 1935, No. 315, 62—64).—Fertiliser trials are recorded. $NaNO_3$ was the best source of N and KCl was preferable to other K salts. Substitution of NaCl for KCl reduced yields. Addition of NaCl to complete fertilisers did not increase the yield. Liming increased the crop on acid soils. Powdered and granular forms of $CaCN_2$ gave good weed control.

Ch. Abs. (*p*)

Effect of fertiliser on quality and chemical composition of canning peas. F. L. Musbach and O. E. Sell (J. Agric. Res., 1936, **53**, 869—879).— Complete fertilisers decreased the Ca˙˙ and increased the PO_4''' content of the seed-coats. The Ca˙˙ content of the coat was unrelated to the quality of the tinned peas. The skins of large peas contained more Ca˙˙ and less PO_4''' and total N than did those of smaller peas. Quality in tinned peas was not explained by the amounts of starch and sugar in the fresh sample. A. G. P.

Microbiology of tea. I. Determination of micro-organisms on fresh tea leaves and those in different stages of manufacture. A. Itano and Y. Tsuji (Ber. Ōhara Inst. landw. Forsch., 1936, **7**, 403—408).—Distribution of bacteria, fungi, and yeasts is examined. A. G. P.

Fertilisation of bulbs. G. W. Gibson (Sci. Hort., 1935, **3**, 174—183).—Typical bulb-growing soils have high sand and low clay fractions. Fertilisers are normally applied to the preceding crops. CaO, basic slag, or bone meal is beneficial to tulips. Deep cultivation favours narcissus: the soil may be acid or slightly alkaline. Seaweed compost gives good results as a top dressing. Flower colour is improved by presence of Fe and much K. Ch. Abs. (*p*)

Effect of plant nutrients, soil reaction, and light on gardenias. H. E. White (Ann. Rept. [1934] Mass. Agric. Exp. Sta. Bull., 1935, No. 315, 58—59).—N and P increased vegetative growth; K had little effect. Low N supplies caused uniform chlorosis and dwarfing. Interveinal chlorosis was severe in plants receiving $Ca(NO_3)_2$ (I) as the sole source of N; spraying with $FeSO_4$ was beneficial.

$(NH_4)_2SO_4$ induced less chlorosis than did (I). Interveinal chlorosis is not closely related to soil-p_H. Gardenias are very sensitive to Fe deficiency and have a larger Fe requirement than many ornamental plants. Ch. Abs. (*p*)

Sensitivity of flax to lime. W. Scholz (Bodenk. Pflanzenernähr., 1937, 2, 230—245).—CaO-chlorosis in flax is associated with the fixation of PO_4''' by Fe (cf. B., 1934, 901). A. G. P.

Weedkillers. R. M. Woodman (Hort. Educ. Assoc. Yearbook, 1933, 2, 77—83).—$NaClO_3$ (I) (200 lb. per acre) applied in autumn effectively cleared weedy land of bent grasses, crowfoot, and shallow-rooted perennial weeds, but did not seriously affect deep-rooted species. $NaAsO_2$ (2—5%) gave good results in autumn clearing of weeds. Four applications of a mixture of $(NH_4)_2SO_4$ 150, calcined $FeSO_4$ 50 lb., with 0·5 ton of soil per acre, eradicated white clover, daisy, mousear, etc. from old lawn turf. NH_4 has a selective toxic action on weeds. $CaCN_2$ (800 lb. per acre) applied immediately before the active growth of the lawn kills most weeds. Aq. As_2O_5 (1 lb. per 8 gals.) at the rate of 240 gals. per acre controlled all weeds except yarrow, dandelion, dock, and sorrel as effectively as did the same vol. of 2·5% aq. (I). Wheat may be safely grown on soil treated with 1% (I) solution. Ch. Abs. (*p*)

Eradicating roadside weeds. J. D. Smith (Eng. Contract Rec., 1935, 49, 848—850).—$NaClO_3$ at the rate of 0·5—1·0 lb. per gal. destroyed annual and biennial weeds. 1·0—1·5 lb. per gal. was necessary for perennials. Addition of 0·6—1·0 lb. of $CaCl_2$ per lb. of $NaClO_3$ reduced the fire risk. Ch. Abs. (*p*)

Physical and chemical investigations of sesamé leaf extracts. B. Grebenchtschikov (Plant Protection U.S.S.R., 1935, No. 2, 116—120).—γ and η of leaf extracts are examined. Use of extracts to improve covering capacity of insecticides is discussed. Ch. Abs. (*p*)

Optical rotatory power of extracts of derris and cubé roots. H. A. Jones (J. Agric. Res., 1936, 53, 831—839).—The toxicity of derris and cubé roots is more closely related to determinations of "rotenone (I) equiv." calc. from the combined rotatory powers of $COMe_2$ and C_6H_6 extracts than from that of either extract alone. Optically active substances other than (I) and deguelin probably occur in the roots. A. G. P.

Enforcement of the arsenical spray law. Report of the chemist. L. Longfield-Smith (Florida Quart. Bull., 1933, 42, No. 2, 27—33).—The As contents of numerous fruits, vegetables, soils, and fertilisers are recorded. Ch. Abs. (*p*)

Relative amounts of arsenic found on the surface and in the tissues of celery plants sprayed with lead arsenate and other arsenical poisons. L. Longfield-Smith (Florida Quart. Bull., 1933, 42, No. 2, 48—52).—For extraction of As residues from plant material 5% (vol.) H_2SO_4 was preferable to 3% HCl. Heating facilitates extraction but boiling acid extracts much org. matter, and the subsequent evolution of AsH_3 during analysis is retarded; a 3-hr. period should be allowed before matching the strips. After acid washing, a further quantity (often 50—60%) may be obtained from the plant tissues by digestion with H_2SO_4–HNO_3. Ch. Abs. (*p*)

[Arsenic and lead on sprayed citrus fruits.] Field inspection report. G. Singleton (Florida Quart. Bull., 1933, 42, No. 2, 11—26).—The acidity of the fruit was lowered by spraying. In some cases As applied as dust was undetectable on foliage 3—4 weeks later, but was detected in the rind of the fruit. When applied with CaO–S, As was present on leaves for several months. If residues of Bordeaux mixture remained on foliage when As was sprayed, As persisted as long as leaves remained on the trees. Application of Cu preps. to trees retaining As fixed the As and prevented any further action on fruit or on the trees. Ch. Abs. (*p*)

Earthworm control without the aid of water. R. B. Dawson and R. B. Ferro (J. Bd. Greenkeeping Res., 1935, 4, 58—72).—Solid Pb arsenate (I) (4·0—5·3 cwt. per acre) effectively controlled earthworms in turf on medium and medium-heavy soils, but not on those covered with a peaty mat. Marked reduction in worm activity was usually apparent in 11—28 days, but full benefit is not seen until after one growing season. On medium soils (I) was effective for about 4 years. Heavy applications (16—32 cwt. per acre) were not detrimental to turf. Ch. Abs. (*p*)

Control of potato blight in Jersey. T. Small (J. Min. Agric., 1937, 43, 1162—1168).—Contamination during lifting is prevented by spraying with Bordeaux or Burgundy mixture at fortnightly intervals beginning when plants are 8—10 in. high. When a good crop of early tubers is formed the haulms are cut or scorched with $CuSO_4$ or, preferably, H_2SO_4 (3 gals. of B.O.V., *d* 1·70, in 37 gals. of H_2O). Spread of infection in diseased crops during storage is minimised by dipping tubers in aq. CH_2O (commercial formalin diluted 1 : 100). A. G. P.

[Report on] entomology. C. E. Pemberton (Hawaiian Sugar Planters Assoc. Proc. 54th Ann. Meet., 1934, 19—26).—*Anomala orientalis* was controlled by applying to the soil a mixture of mud press-cake and As_2O_3. Incorporation of As_2O_3 with Oliver filter mud which was subsequently spread in irrigation H_2O was ineffective since As was fixed at the soil surface and retained there. Cane from untreated soil or from that receiving 1890 lb. of As_2O_3 per acre contained 2 p.p.m. of As in the dry matter. Ch. Abs. (*p*)

Control of bacterial wilt disease of tobacco, pepper, and Irish potato. R. F. Poole (46th Ann. Rept. N. Carolina Agric. Exp. Sta., 1933, 24—25).—Use of S (200—600 lb. per acre) to control wilt lowered the soil-p_H sufficiently to injure plants, even when soils were limed before replanting. Ch. Abs. (*p*)

Insect and allied pests of cultivated mushrooms. M. D. Austin and S. G. Jary (J. South-East. Agric. Coll. Wye, 1935, No. 36, 107—110).—Nicotine spray or fumigation controlled adults of *Sciara fenestralis*, but was less satisfactory with larvæ and ineffective against eggs. An oil emulsion lightly sprayed on growing mushrooms checked injury by *Tyroglyphid* mites, and if used at 40° caused no injury to mushrooms. CH. ABS. (*p*)

A mealy bug (*Pseudococcus brevipes*, Ckll.) new to Egypt on roots of *Phoenix* spp.; control by application of chemicals to soil. M. HOSNI and M. SHAFIK (Min. Agric. Egypt. Tech. Sci. Serv. Bull., 1935, No. 159, 8 pp.).—The insect was controlled by treating soil around the trees with *o*- or *p*-$C_6H_4Cl_2$ (2—10 c.c.; 2—10 g.), $C_{10}H_8$ (2—10 g.), or Hg_2Cl_2 (0·5 oz. per gal. of H_2O). Hg_2Cl_2 did not affect trees and killed the insect more rapidly than did the other compounds. CH. ABS. (*p*)

Relative toxic action of phenol and phenylmercaptan, with goldfish as the test animal. W. A. GERSDORFF (J. Agric. Res., 1936, **53**, 841—847).—The threshold concn. of toxicity of rotenone (I) was 0·04 and that of PhSH (II) 0·4 mg. per litre. PhOH has a much more rapid action than (I). Its threshold concn. cannot be evaluated, but it is $>$ that of (II). Quant. comparison of these substances is possible only in the region of their max. toxic power (as measured by min. vals. of concn. $\times$ survival time). On this basis the relative toxicities are (I) $>$ (II) $>$ PhOH. A. G. P.

Plant-parasiticide industry and the four-year plan. E. RIEHM (Angew. Chem., 1937, **50**, 173—175).—A review of the present position and of current problems. A. G. P.

Flax plants. Oil-palm fruits.—See XII.

See also A., I, 206, **Mecklenburg soils.** 147, **Tobacco-mosaic virus.** III, 157 and 159, **Sugar beet.** 160, **Plant-growth substances. Determining NO_2' in green plants etc.**

PATENTS.

Treatment of plants to expedite bud development. W. A. WENDT, Assr. to HAWAIIAN PINEAPPLE CO., LTD. (U.S.P. 2,037,203, 14.4.36. Appl., 29.7.35).—Solid CaC_2 is applied to the growing plant. E. H. S.

Composition for cultivation of mushrooms and its preparation. Y. FUJII (B.P. 462,316, 6.9.35).—A 70 : 30 mixture of fine sawdust or fine straw and bran is moistened with rice-powder H_2O or H_2O in which rice grains have been soaked, and sterilised by steam; after cooling, mushroom spawn is introduced into a hole previously bored in the composition and a cottonwool plug inserted above it. E. B. H.

Manufacture of fertilisers and compositions. W. H. KNISKERN and L. V. ROHNER, Assrs. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 2,036,481, 7.4.36. Appl., 1.3.34).—Superphosphate is treated with an ammoniacal solution of NH_4NO_3 and $Ca(NO_3)_2$ saturated at $-30°$ to 30°. W. J. W.

Production of phosphatic fertilisers. RÖCHLING'SCHE EISEN- U. STAHLWERKE G.M.B.H. (B.P. 461,869, 25.8.36. Ger., 28.3.36).—Mineral phosphate is melted in a rotary furnace with an equal amount of soda slag, derived from the treatment of crude Fe with Na_2CO_3 and containing Na_2O 35, SiO_2 30—40, and S 4—15%. The product contains about 95% of citric acid-sol. P_2O_5. W. J. W.

Production of organic fertiliser having fungicidal, germicidal, and insecticidal properties. V. MARGULES and J. TRUMMER (B.P. 461,464, 24.2.36).—A fertiliser is prepared from rudimentary stunted mushrooms and residues from mushroom cultivation beds, with or without fertilising salts. P. G. C.

Manufacture of an insecticide. C. SGONINA (U.S.P. 2,037,276, 14.4.36. Appl., 7.7.33).—Tobacco extract which has been mixed with sufficient H_2SO_4 to convert all or most of the nicotine into the sulphate is conc. and mixed with a fatty acid. E. H. S.

Cyanic etc. anhydrides.—See III. **Treating irrigation-H_2O.**—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Transformation of carbohydrates during storage and secondary sprouting of sugar beetroots. A. I. OPARIN and E. O. SCHAPIRO (Biochimia, 1936, **1**, 35—48).—The reducing substances of sugar beet consist of glucose and fructose, in the ratio 1 : 1 at planting and 3 : 1 at full growth. Maltose is absent before sprouting, after which small amounts appear. Starch is absent at all stages of growth. The sucrose content, determined polarimetrically, is $>$ by Bertrand's method; the excess of dextrorotatory substances is due to an unidentified sugar, not maltose. R. T.

Balance of sugar in beets and sugar in diffusion juice plus determined losses. J. ZAMARON (Bull. Assoc. Chim. Sucr., 1936, **53**, 982—988).—Careful controls for 6 and 9 days in a sugar-beet distillery showed agreement to within 0·014 and 0·02% (on beets) between the sugar in the beets and that in the diffusion juice, exhausted slices, and waste waters. J. H. L.

Buffering capacity of various [beet] sugar-factory products. O. SPENGLER, F. TÖDT, and S. BÖTTGER (Z. Wirts. Zuckerind., 1936, **86**, 826—840).—Changes in p_H and κ vals. during titration with H_2SO_4 and NaOH were studied on the following products, at 12° Brix: raw juices from beets differing in ripeness, the corresponding first-carbonatation juices and thick juices, and some molasses and sugars. Between different classes of products there was the expected inverse relation of buffer capacity to purity. No generic difference was observed between molasses from raw-sugar factories, white-sugar factories, and refineries. Raw juices from beets differing in ripeness (mid-Sept.—late Jan.) showed little difference, but after first carbonatation those from unripe beets were much more buffered than those from normally ripe beets, and those from over-ripe beets were intermediate. At the thick juice stage these differences had largely disappeared, indicating a considerable removal of buffer substances from juices from unripe or over-ripe beets during second carbonatation and/or evaporation (*e.g.*, loss of NH_3). J. H. L.

Use of indicator papers in beet-sugar manufacture. O. SPENGLER, F. TÖDT, and S. BÖTTGER (Z. Wirts. Zuckerind., 1936, **86**, 891—900).—The correct end-point of first carbonatation is p_H 10·9 measured at 20°, and is indicated when the hot juice (at 80°) turns thymolphthalein (I) paper pale blue; the same juice will give a dark blue colour at 20°. The range of (I) in solution is p_H 9·3—10·5, but on test-paper it is p_H 10·5—11·5; thymol-blue (II) shows a similar difference, in solution p_H 8—9 and on paper p_H 9—10. Second carbonatation may be controlled with (II) paper, but the precise tint to aim at depends on the character of the juice and should be ascertained on a portion of the juice known to be at the correct point (B., 1933, 405). In thin juice final sulphitation, cresol-red (III) paper, p_H 8—9·5, may be used, but the tint to aim at may differ in different factories, and depends on the alkalinity desired in the thick juice (B., 1934, 730). (III) paper is useful also at later stages to ascertain that syrups are still on the alkaline side of p_H 8·2, as shown by a faint red colour. The optimum end-point in preliming raw juice is the same as that of first carbonatation; the juice when heated to 85° should give a pale blue colour with (I) paper, or it may be tested at 40° with a new "preliming test paper" which should turn pale blue at this temp. In using all these test papers the colour should be observed immediately after immersion, for the colouring matters are sol. and prolonged immersion may give misleading indications. Consequences of deviation from the correct end-points of the various operations mentioned are briefly discussed. J. H. L.

Microbial population of the [sugar-juice] diffusion battery. G. Mezzadroli and L. Scarzi (Ind. Sacc. Ital., 1936, 29, 372—377; Internat. Sugar J., 1937, 39, 112).—Comparatively few bacilli are found in diffusion juice at low temp. and at low *d*, but there are a rather large no. of other micro-organisms, particularly cocci. As *d* increases, the character of the microflora changes so that in the middle of the battery roll-shaped bacteria predominate. In the succeeding cells of the battery the no. of bacilli diminishes, though the total no. of micro-organisms remains about the same. J. P. O.

Alteration of raw beet juice by micro-organisms. G. Mezzadroli and L. Scarzi (Ind. Sacc. Ital., 1936, 29, 427—431; Internat. Sugar J., 1937, 39, 113).—Samples of juice were taken from the pulp catcher, measuring tank, raw juice supply tank, and after passing the juice heater, being analysed and bacterial counts made on them. The results pointed to the measuring and raw juice supply tanks as the chief centres of infection. Foam produced in these two receptacles was found to offer a particularly favourable medium for the development of micro-organisms. Foam formation in these tanks should, therefore, be prevented, so far as is possible. J. P. O.

Araban and pectic acid in [beet-]sugar manufacture. M. I. Nakhmanovitsch and S. L. Berman (Bull. Assoc. Chim. Sucr., 1936, 53, 966—974; cf. B., 1936, 662).—The araban of beet pectin is not appreciably hydrolysed under the conditions of the diffusion process. Any which dissolves in the juice (cf. Colin, B., 1935, 648) remains in almost undiminished quantity after liming and carbonatation, but any Ca Mg pectate present is completely removed in the carbonatation cake. J. H. L.

Interrelationship of calcium sulphite and phosphate in the clarification of sugar-cane juices. J. G. Davies, C. O. Lai-Fook, and M. Moinuddin (Internat. Sugar J., 1937, 39, 103—104).—In cane-juice clarification, the most efficient use of chemicals is obtained when the initial [P_2O_5] is 0·025—0·03 and [SO_2] is 0·2—0·25 g. per 100 ml. These levels are determined by consideration of such practical factors as purity rise, colloid elimination, mud vol., rate of mud filtration, etc. J. P. O.

Use of chlorine for clarification of cane juice in the manufacture of plantation white sugar. K. Suzuki and T. Tanabe (Rept. Govt. Exp. Sta., Tainan, 1936, 74—75; Internat. Sugar J., 1937, 39, 119).—Cl_2 is passed into the juice to p_H about 2·2—2·4, milk-of-CaO is added to p_H 7·5, the liquor filtered while hot, 0·25—0·30% of activated C added, and the whole filtered and evaporated. J. P. O.

[Report on] sugar technology. [Clarification of refractory juices.] W. L. McCleery (Hawaiian Sugar Planters Assoc. Proc. 54th Ann. Meet., 1934, 91—105).—Use of Na aluminate did not improve clarification. ZnS_2O_3 aided clarification, but the juice darkened subsequently; best results were obtained in conjunction with double superphosphate. Promising results were given by use of excessive amounts of CaO followed by carbonatation and also SO_2 treatment. NH_4 phosphates were superior to double superphosphate. Ch. Abs. (*p*)

Keeping qualities of sugar-cane molasses. C. A. Browne (Internat. Sugar J., 1937, 39, 105—108).—Periodic analyses were made from 1914 to 1935 of two samples of cane molasses which were undergoing deterioration with gradual loss of sucrose and increase of invert sugar and with a slight evolution of CO_2. This was due, not to a biological cause, but to so-called "froth fermentation," probably explicable by the Maillard reaction between reducing sugars and NH_2-compounds. It is capable of proceeding at room temp. In view of the liability of cane molasses to undergo this decomp., the structural strength of tanks containing it should probably exceed 90 lb. per cu. ft. Other mechanical precautions regarding the tanks are outlined. J. P. O.

Massecuite circulation and vacuum-pan design. L. A. Tromp (Internat. Sugar J., 1937, 39, 11—14, 60—65, 98—102).—Ascending and descending currents of massecuite should not be hindered by any avoidable obstructions, and the ratio between min. and max. velocities should be $\not>$1—3. Streamflow design will aid in reducing flow friction; this will not only give a better natural circulation, but will provide forced circulation at a lower power input. Intake liquors should be properly distributed below the heating elements, and at as high a temp. as is attainable. Finally, a streamflow vac. pan for boiling sugar-factory or refinery massecuites, as designed by the author, is depicted and described. J. P. O.

Viscous character of [sugar] massecuites. O. Spengler and E. Horn (Z. Wirts. Zuckerind., 1936, 86, 878—890).—Sucrose syrups saturated at different temp. were mixed with sugar crystals, and their "viscous character" was measured in terms of the electrical power required to revolve a bladed stirrer at a standard rate (67 r.p.m.). The stirrer running free required 60 watts. In saturated syrups, free from crystals, at 20°, 40°, 60°, and 80°, it required 97, 82, 81, and 80 watts, respectively, in syrup–crystal mixtures containing 35% of crystals it required 115, 93, 92, and 88 watts, and in mixtures containing 55% of crystals 361, 300, 250, and 129 watts, respectively. Lowering the standard r.p.m. had much the same effect as working at higher temp.

J. H. L.

Dissolution time of pressed and cast refined sugars. K. Šandera and A. Mircev (Z. Zuckerind. Czechoslov., 1936, **61**, 25—28; Internat. Sugar J., 1936, **39**, 113).—The rate of solubility of sugar cubes is affected by the conditions under which they have been dried. Hot drying, *e.g.*, shortens the time required for dissolution by about one third, and even 10 min. at about 104° has a very perceptible effect. In fact, the more rapid is the drying at and near 100°, the more rapid is the rate of dissolution of the cube.

J. P. O.

Movement of oxalogenic substances in [beet-sugar] manufacture. M. Kminek (Z. Zuckerind. Czechoslov., 1936, **61**, 84—88; Internat. Sugar J., 1937, **39**, 113).—Both allantoin (I) and oxamic acid (II) are sources of $H_2C_2O_4$, which, as CaC_2O_4 (III), is one of the principal constituents of the evaporator scale. As means of diminishing the amounts of (I) and (II) reaching the evaporator, it is recommended that liming and carbonatating should be done at a higher alkalinity, and " boiling-up " of the juice at a higher temp. and for a longer time. In a 30-day campaign it is calc. that enough of (I) and (II) will be hydrolysed to deposit 535 kg. of (III) scale on the heating surfaces.

J. P. O.

Conversion of wood into carbohydrates and problems in the industrial use of hydrochloric acid. F. Bergius (Ind. Eng. Chem., 1937, **29**, 247—253).—Cellulose is completely dissolved in 40% HCl at room temp. In the process developed by Bergius and Koch, using wood waste, the wood is shredded, dried to 8% H_2O, and treated in a battery of Fe diffusers with conc. HCl, the vessels having " special linings." The final product contains 32% of reducing sugars. Undissolved lignin remains in the diffusers, and after washing is used as fuel. The acid sugar solution is distilled in vac. at 36°, the evaporator having tubes of ceramic material. The solution, from which 80% of the HCl has been removed, passes to a spray dryer. The product is a mixture of tetrameric sugars containing some HCl. After neutralisation with CaO it can be used as fodder. Fermentable sugars are obtained if the raw solution is diluted and heated to 120°, and from 1 ton of wood 85—90 gals. of EtOH are obtained. Unfermentable sugars are conc. in the process and finally used as fodder. A by-product of the process is AcOH, obtained in similar proportions to those in wood distillation; if desired, pure glucose can be separated.

C. I.

Starches.—See V. **Botany research. Sugar beet and cane.**—See XVI. **Yeast from sugar solutions. $COMe_2$–EtOH and –BuOH by fermentation. Glycerin from cane juice.**—See XVIII. **Determining sugar in waste waters.**—See XXIII.

See also A., I, 181, **Action of pectin on sugars.** 183, **Gelation of the system pectin, sugar, and acid.** II, 136, **Determining fructose.** III, 157 and 159, **Sugar beet.**

Patents.

Manufacture of sugar products [fructose]. R. F. Jackson (U.S.P. 2,007,971, 16.7.35. Appl., 29.11.26. Renewed 19.9.32).—Fructose (I) is cryst. from pure aq. syrups in compact " cuboid " crystals, which can be easily centrifuged and when dry form a free-flowing, granular product not hygroscopic in air of normal humidity. The (I) syrup, conc. in vac. to 87—93%, is seeded with crystals of the same type, and cryst. by slow controlled cooling or by controlled evaporation, *e.g.*, by means of an air current. Details are given of the conditions for satisfactory crystallisation and for the prep. of (I) syrups of high purity from extracts of artichokes etc. or from beet molasses, by way of Ca fructosate.

J. H. L.

Nitration of sugars.—See XXII.

XVIII.—FERMENTATION INDUSTRIES.

Water for brewing. H. Lüers (Angew. Chem., 1937, **50**, 184—186).—The influence of the composition, especially the reaction, of H_2O on the process of brewing and the quality of beer is discussed.

A. G. P.

Maximum yields of yeast practically obtainable from sugar solutions. H. Claassen (Z. Wirts. Zuckerind., 1936, **86**, 873—877).—Fink's data for the growth of *Torula utilis* in wood-sugar worts (B., 1935, 747; 1936, 251, 857) confirm Claassen's assumptions regarding max. yields (B., 1935, 40). In Fink's experiments the production of 100 kg. of yeast dry substance required 23 kg. of fermentable sugar > the min. (200 kg.) required by Claassen's assumptions, and in Fink's check experiments with glucose worts the excess requirement was 16 kg.

J. H. L.

Vitality of beer yeasts. F. Stockhausen and R. Koch (Woch. Brau., 1937, **54**, 73—75, 83—85, 93—96).—The vitality of numerous samples of (bottom) yeasts has been determined by (*a*) plate culture, (*b*) droplet culture, and (*c*) methylene-blue (1 : 10,000). Results of (*a*) and (*b*) are, in general, in good agreement, though there is a tendency for (*b*) to give somewhat the lower results; both methods give lower, often much lower, results than (*c*), though the differences are minimised with the youngest, most active samples. It appears that an individual cell may belong to one of the following classes: *A*, capable of immediate development; *B*, capable of development after treatment in wort for several hr., sugar being apparently an effective agent in the recovery; *C*, belonging to neither of these groups yet, as in *A* and *B*, not stained by the dye; *D*, stained by methylene-blue, and therefore considered dead. The changes in cell vitality during primary and secondary fermenta-

tion have been followed. The technological implications of the various findings are briefly discussed.
I. A. P.

Biochemical characteristics of [brewing] barleys of the Soviet Union. N. N. IVANOV (Bull. Appl. Bot. U.S.S.R. Ser. III, 1935, No. 7, 1—174).—Analytical data are recorded and considered in relation to brewing. High-protein barley contains starch which is more readily sol. and more easily saccharified by diastase. The amylase is more active than that of low-protein varieties. High-protein may be as satisfactory as low-protein barleys for brewing. CH. ABS. (*p*)

Malting naked barleys for distilleries. V. ALMENDINGER (Mitt. Hochsch. f. Bodenkultur in Brünn, 1936, C 31; Woch. Brau., 1937, **54**, 78—79).—In comparative maltings of two naked and two normal barleys, absorption of H_2O was slower and the steep loss smaller, notably of mineral matter, in the former. Important differences in behaviour on the floor were not observed, but naked barley showed a smaller flooring loss, whilst the green malts from these were richer in starch and diastase than the normal. Mould development on the naked variety was not observed. The green malt from naked barleys gave excellent saccharification in the mash, and throughout mashing and fermentation the diastase concn. was $>$ when normal malt was used.
I. A. P.

Determination of diastatic power of malt in degrees Lintner by means of a ferricyanide reagent. J. A. ANDERSON and H. R. SALLANS (Canad. J. Res., 1937, **15**, **C**, 70—77).—Deficiencies, as a routine method, are shown in the Official Method of the American Society of Brewing Chemists for determining the diastatic power of malt. A modification is proposed, allowing the use of the Blish and Sandstedt ferricyanide titration method (A.O.A.C., 1935, 218), and details of application of this are discussed. Discrepancies between the results of this and the Official methods appear to be due to the inaccuracy of the latter method, which apparently tends to give high results for malts of low, and low with malts of high, diastatic power when a standard factor is taken from the middle of each Lintner range for calculation by the Blish–Sandstedt method.
I. A. P.

Relation between staining properties of bacteria and their reaction towards hop antiseptic. J. L. SHIMWELL (J. Inst. Brew., 1937, **43**, 111—118).—Bacteria the growth of which under the experimental conditions employed was prevented or strongly inhibited by hop antiseptic were Gram-positive, whilst those which were unaffected or stimulated by hops were Gram-negative. Using increased concn. of hop antiseptic, differences of reaction towards the antiseptics could be shown in the individual groups of Gram-positive and -negative forms. It is suggested that a relation exists between the mol. configuration of humulon and its inhibiting effect on the Gram-positive bacteria, whilst the greater toxicity of lupulon towards *L. bulgaricus* may be due to the presence of the additional side-chain.
I. A. P.

Determination of final attenuation [of wort]. G. KAUERT (Pet. J. Brass., 1936, 599; Woch. Brau., 1937, **54**, 71—72).—Likely errors, and precautions necessary in determination of the attenuation limit of wort, are critically discussed. In a recommended method, fermentation is carried out in presence of pumice; by observing the necessary precautions, an exact determination is possible at 25° in approx. 30 hr. I. A. P.

Composition of last runnings of wort using sparge waters with differing temporary hardness values. K. SCHREDER, R. BRUNNER, and R. HAMPE (Woch. Brau., 1937, **54**, 81—83).—Comparison of the composition of last runnings and first wort shows that the extract of the former is relatively poorer in reducing sugars but richer in nitrogenous compounds (especially higher-mol. compounds) and ash (especially SiO_2 and PO_4'''). Use of a partly decarbonated liquor (addition of HCl) for sparging decreases the p_H difference between the liquors, and accordingly increases relatively the proportion of reducing sugar, and decreases the proportion of ash and of nitrogenous material, though the proteolysis of this last has proceeded further. Accordingly, partial decarbonatation has the effect of reducing the differences in composition between the extracts of first wort and last runnings. I. A. P.

Turbidity in wort and beer. II. Composition and sedimentation of brewery sludge. C. ENDERS and A. SPIEGL (Woch. Brau., 1937, **54**, 97—100, 105—110; cf. B., 1936, 901).—Mechanical and chemical analysis of hot (coarse) sediment of pale and dark lager and export beer worts is described, characteristic differences in protein (I) content being found between the sediments of export and lager worts, and also between those of pale and dark worts. For pale and dark worts the % of total sediment (I) sol. in alkali are, respectively, approx. 33 and 18; 52—71% of the alkali-sol. (I) can be repptd. by acid. Characteristic differences in ash content and ash composition are found between dark and pale worts. The average particle size of the wet sludge is 30—80 μ, but the kinetic method is unsuitable for studying velocity of sedimentation. Measured photoelectrically, sedimentation is more rapid in sugar solutions than in wort, and in lager more than in export. Sedimentation velocity is also affected by the mashing process; further, this velocity is increased by decreasing concn. of the medium, by rising temp., and by decreasing p_H. I. A. P.

Measurement of turbidity in worts and beers. J. DE CLERCK (Bull. Ecole sup. Brass. Louvain, 1936, **36**, 165—180; Woch. Brau., 1937, **54**, 85—86).—The methods available for turbidity measurement are critically discussed, such methods falling into 3 groups, viz., those employing (*a*) comparison with standards, (*b*) light absorption, and (*c*) nephelometric methods. Type (*c*) is preferred, but the results so obtained are influenced by light absorption, though within the limit of colour range of bright beers this influence is insignificant. I. A. P.

Influence of various process factors on the low-temperature stability of beer. E. EMSLANDER

(Woch. Brau., 1937, **54**, 65—68).—Presence of air after racking or at drawing of beer increases cold-sensitivity (I) and coloration, whilst (I) is also increased by movement during transport. The cause of (I) cannot be explained by the concn. of coagulable N present in the beer. A strong after-fermentation increases stability, but (I) is increased by the action of light on filtered beer and by unnecessarily high cask pressures. I. A. P.

Iron content of grapes and wine. J. Byrne, L. G. Saywell, and W. V. Cruess (Ind. Eng. Chem. [Anal.], 1937, **9**, 83—84).—The Fe content of the juice of California grapes varies from 1·5 to 23 p.p.m., depending on the degree of contamination with dust or soil, and decreases from 9·0 to 1·8 p.p.m. during fermentation. The average Fe content of commercial wines is approx. 3 times that of wines made in glass vessels. E. S. H.

Comparison of several physical methods for determination of the alcohol content of wine. M. A. Joslyn, G. L. Marsh, and J. Fessler (J. Assoc. Off. Agric. Chem., 1937, **20**, 116—130).—The errors involved in the direct determination of EtOH in sweet wines by the ebullioscopic method are indicated, and the necessity of a preliminary distillation is illustrated. Newton and Munro's indirect method (Canad. Chem. Met., 1933, **17**, 119) is trustworthy with red, but not with white, wines. The results of collaborative analyses on dry and sweet wines by a variety of methods are tabulated, and indicate that with suitable precautions EtOH may be determined to within ±0·1% with the pyknometer and ±0·2% with the ebullioscope. E. C. S.

Determination of $\beta\gamma$-butylene glycol, acetylmethylcarbinol, and diacetyl in wine and other fermentation products. I. Methods. L. C. E. Kniphorst and C. C. Kruisheer (Z. Unters. Lebensm., 1937, **73**, 1—19).—Ac$_2$ is determined almost quantitatively as Ni dimethylglyoxime by the Schmalfuss–Rethorn method (A., 1936, 55). If separated from interfering substances by distillation, a mean loss of 3% is unavoidable. CHAcMe·OH (I) is oxidised with $FeSO_4$ and $FeCl_3$ to Ac$_2$ and determined as such, yields of 96—97% being obtained. The loss during oxidation is, therefore, $<1\%$. $\beta\gamma$-Butylene glycol (II) is determined by first oxidising to (I) by heating at 70—80° for 20 min. with a 10-fold excess of Br, and subsequently to Ac$_2$ as above, the final max. yield being 93%. A procedure for the determination of (II) in wine is described. E. C. S.

Volatile acid formation in muscat fermentations, season 1936. W. V. Cruess (Fruit Prod. J., 1937, **16**, 198—200, 215, 219).—Tests were made during this season to prevent the high volatile acidity in muscat fermentation. This was due to lactic bacteria and could be retarded by adding SO_2 to the grapes, using pure wine yeast as starters, and adding citric acid to the fresh must. E. B. H.

Alcoholic fermentation of the liquid obtained by hydrolysis of the seeds of the "Dum" palm. G. Turco (Atti V Congr. Naz. Chim., 1936, **14**, 928—931).—Hydrolysis of the seeds yields up to 48% of mannose, from which 40—42% yields of EtOH are obtainable by fermentation with selected cultures of *Sacc. ellipsoideus* or *cerevisiæ*. L. A. O'N.

Chemical control in distilleries operating on apples. F. Boinot (Bull. Assoc. Chim. Sucr., 1936, **53**, 993—999).—The main causes of uncertainty are imperfect sampling of the raw material, lack of uniformity in analytical methods, and disregard of the formation of EtOH during extraction of the apples; 4—8% of the total EtOH obtained may be formed at this stage. J. H. L.

Rum of "grand arôme" type. D. Kervegant (Bull. Assoc. Chim. Sucr., 1936, **53**, 1000—1003).—This type of rum [Jamaica-type] is obtained from Jamaica and Martinique, and is used chiefly for blending with less flavoured types. On the ground that it lends itself to adulteration with neutral spirit, a suggestion has been made that its importation should be prevented by imposing a max. limit of 500 [g./hl. of EtOH] for total impurities. This would exclude many rums which are not of this type, and is considered undesirable on other grounds. Full analytical results for 10 brands of rum are tabulated; the total impurities range from 433 to 1153. J. H. L.

Preparation of alcohol from wood hydrolysates. S. R. Zubkova, N. B. Kotschukova, and M. R. Zatz (Biochimia, 1936, **1**, 49—62).—The yields of EtOH obtained from wood hydrolysates (0·5% H_2SO_4 at 175°) vary with the strain of yeast used and with conditions of fermentation. R. T.

Influence of nitrogenous nutrients on acetone–ethyl alcohol fermentation. V. C. Paziuk (Biochimia, 1936, **1**, 583—596).—A new bacillus, *B. acetoethylicum*, B, produces COMe$_2$ and EtOH from starch or sucrose media, with NH_3 or NH$_2$-acids as sources of N. The highest yields are obtained with potato starch in presence of potato extract. The extract, apart from serving as a source of N, contains activating substances, partly extractable with Et$_2$O. R. T.

Influence of salts in [ethyl alcohol] distillation. Mariller and Desse (Bull. Assoc. Chim. Sucr., 1936, **53**, 989—992).—Mixtures of EtOH and H_2O, containing 0·5—1% of volatile impurity (EtOAc, BuOAc, C_5H_{11}·OAc, or ill-flavoured ester fractions from EtOH rectification), were distilled without and with 20% of $CaCl_2$. In all cases the presence of $CaCl_2$ increased the % of the impurity in the vapour phase, whether calc. on the whole vapour or on the EtOH in it. Vals. of the Barbet coeff. of enrichment are tabulated. J. H. L.

Utilisation of waste products of potato-starch factories for acetone–butyl alcohol fermentation. A. M. Simskaja (Biochimia, 1936, **1**, 603—616).—Max. yields of COMe$_2$, BuOH, and EtOH are obtained by fermentation of a suspension of the solid residues from potato-starch extraction in dil. potato juice, or in the effluent H_2O from washing the potato flakes. The wash-H_2O serves, not only as a source of N, but also as an activator of fermentation in general. R. T.

Fermentation process for production of glycerin from cane juice. Y. Iwata (Rept. Govt. Exp. Sta., Tainan, 1936, 91—92; Internat. Sugar J., 1937, 39, 119).—By fermenting cane juice or molasses wash with *Sacc. formonensis*, nov. sp., in presence of alkali sulphites or bisulphites at p_H 7—8·5 and 25—31° yields of glycerin (I) 17·9—27·5% on the sugar fermented were obtained. A mixture of EtOH and CCl_4 was best for extracting the (I) from the distilled and conc. wash. (I) of a purity of about 84% was produced. J. P. O.

Enzymes of milk, and the phosphatase test. Carotene concentrates. Citron fermentation. Fodder-protein.—See XIX.

Patents.

Manufacture of distilled alcoholic liquors. E. E. Cox, Assr. to Industrial Labs., Ltd. (U.S.P. 2,036,167, 31.3.36. Appl., 25.4.35).—Raw liquor is passed into a drum (D_1) containing beechwood shavings packed on perforated shelves, and after absorption of aromatic flavouring (" congeneric ") substances (A) on the shavings has taken place, the liquor is passed into a second similar drum (D_2). A slow current of air heated to 37·8° is passed up through the shavings to effect oxidation of A; the escaping air is passed through a condenser, and the small amount of condensate, rich in fusel oil and flavouring constituents, is returned to the liquor. After return of the liquor from D_2 to D_1, similar oxidation is carried out in D_2, whilst in D_1 interchange takes place between liquor and shavings. The process is repeated 3—5 times and results in increase in the I and acid vals. of A. The final liquor, after suitable storage for 90 days, resembles a liquor normally aged for 4 years. I. A. P.

Apparatus for ageing whisky or other alcoholic beverages. J. Mancini and N. D. Archangel (U.S.P. 2,040,264, 12.5.36. Appl., 25.1.34).—The whisky is irradiated by ultra-violet rays which pass axially down inside quartz rods which dip into the whisky. B. M. V.

Production of citric acid [by fermentation]. J. Zender (B.P. 462,350, 17.3.36. U.S., 4.4.35).—After mould fermentation of a suitable carbohydrate solution to give a concn. of citric acid (I) of 12—15 wt.-%, the filtered liquor is freed from residual fermentable carbohydrates by yeast fermentation in presence of suitable added nutrients; further, 0·1—1% of an alkaline or neutral Ca compound is added as catalyst, readjustment of p_H prior to fermentation being then unnecessary. After subsequent filtration, colloids and colouring matters are removed by activated C treatment, preferably with prior concn. of the filtrate. The colourless liquor is treated with $H_2C_2O_4$ to remove $Ca^{\cdot\cdot}$, and after separation of the ppt. the solution is conc. in an evaporator and cooled for crystallisation of the (I); the crystals are separated at the centrifuge, and the mother-liquor is preferably returned to the evaporator. I. A. P.

Cleansing metal articles.—See X.

XIX.—FOODS.

Quality of wheat varieties and of mixtures. H. Jahns (J. Landw., 1936, 84, 257—296).—The diastatic activity is not a satisfactory criterion of varietal differences. The time of max. fermentation is not paralleled by the gas-producing capacity, and both vals. are necessary for assessing baking quality. Characteristic properties of flour and offals from mixed varieties are examined. A. G. P.

Applicability of "mass weight" determinations to evaluation of rye and wheat. H. Loft (Mühlenlab., 1937, 7, 7—14, 17—28).—The wt. of a given vol. of grain depends on its composition, H_2O content, purity, and air spaces between grains. Figures are given for the relation between H_2O content and " mass wt." by various methods, for wheat and rye. The results are not very reliable and are subject particularly to packing errors. E. A. F.

Storage of rice. XV. Comparison of calcium oxide and calcium chloride as desiccating agents for rice stored in tin containers. M. Kondō and Y. Terasaka (Ber. Ōhara Inst. landw. Forsch., 1936, 7, 329—334; cf. B., 1936, 664).—For drying hulled rice in storage the relative efficiency of CaO and $CaCl_2$ was 1 : 3. CaO absorbed H_2O the more rapidly. Such desiccation did not affect the quality or flavour of rice, but markedly lowered germinative capacity. A. G. P.

Flour types. V. Moucka and R. Müller (Österr. Chem.-Ztg., 1937, 40, 81—88).—The type no. of a flour indicates its degree of extraction. Of various methods of determining the latter, that of ash content is the most reliable. This is confirmed by comparing the ash content of a large no. of wheat and rye flours with the " bran val." determined by counting bran particles under the microscope. E. A. F.

Composition and nutritive value of cereal germ. Production of nutritive flours. H. Kühl (Mühlenlab., 1937, 7, 3—8).—Cereal germ is of high food val., being rich in high-quality protein, vitamin-E, and minerals. It is largely wasted because free fatty acids present cause rancidity if O_2 is not excluded and prevent the separation of bran by ordinary sifting processes. Both these drawbacks are removed by extracting the fatty acids with dil. EtOH, which does not affect the other valuable constituents, or with $COMe_2$, which also removes part of the -E. E. A. F.

Desiccator for ashing flour. W. Kranz (Mühlenlab., 1937, 7, 1—2).—A desiccator for use when making flour ash determinations has a wide-mouthed lower chamber to expose the max. drying surface. Pressure is relieved through a side-tube which reaches to the bottom of the apparatus, so that entering air passes through the whole drying layer. A thermometer is attached to the vertical portion of this tube. E. A. F.

Taste of natural salts in bread. H. Deutschrenner (Mühlenlab., 1937, 7, 27—32).—NaCl has a purely salty taste; other salts have mixed tastes, which have been partly studied by addition of salts to butter. Salts in the very low concn. naturally present in white bread may cause a sweet taste. E. A. F.

Discoloration of macaroni during manufacture. A. I. Ostrovski and Z. I. Drevol (Biochimia, 1936, 1, 21—34).—Darkening of macaroni is due to

the action of tyrosinase on tyrosine liberated from wheat protein by proteinase during the drying process.
R. T.

Determination of albumin in macaroni and the like. A. Schwicker (Z. Unters. Lebensm., 1937, **73**, 33—34).—The rate of formation of a ppt. in the aq. extract treated with 2-$C_{10}H_7 \cdot SO_3H$ at 80°, and the vol. of the ppt. when treated with Esbach's reagent at room temp., afford some indication of the albumin content (cf. Schmid, Chem.-Ztg., 1912, **36**, 796).
E. C. S.

Transferring milk yield to energy equivalent. A. E. Perkins (J. Dairy Sci., 1937, **20**, 129—132).—Gaines' formula for ascertaining the energy val. of milk of 4% fat (milk energy = 0·4 × wt. of milk + 15 × wt. of fat) is modified by a simple procedure to apply to milk containing varying % of fat. Each deviation of 1 from the 4% standard causes a 15% change in energy val.
W. L. D.

Soluble protein fraction of milk. S. J. Rowland (J. Dairy Res., 1937, **8**, 6—14).—Max. heat-coagulation of the proteins in a casein-free filtrate of milk occurs at p_H 4·75—4·80, at which no hydrolysis occurs. Pptns. with various concns. of $CCl_3 \cdot CO_2H$ show partition of sol. proteins and suggest the presence of proteose–peptone substances. Pptn. of denatured milk albumin and globulin with casein at p_H 4·7 shows that the former two proteins account for 76% of the total N of casein-free filtrate.
W. L. D.

Milk phosphatides. B. Rewald (Lait, 1937, **17**, 225—229).—Dried whole milk was extracted with EtOH–C_6H_6 (4 : 1). The lecithins in the extract were pptd. by $COMe_2$ from C_6H_6 solution (yield 0·24%, corresponding to 0·0314% in fresh milk). The phosphatides were fractionated into lecithin (EtOH-sol., pasty, 0·0183%) and kephalin (EtOH-insol., powdery solid, 0·0131% of fresh milk).
W. L. D.

Mercuric chloride as a milk preservative. H. C. Troy and F. F. Sharp (J. Dairy Sci., 1937, **20**, 77—81).—Milk samples held for determination of lactic acid can be preserved satisfactorily by adding $\not<$0·5% of $HgCl_2$, heating at 80° for 5 min., and keeping at $<$20° in the dark.
W. L. D.

Milk coagulation with rennet. Slow-renneting and softened milks. F. H. McDowall, R. M. Dolby, and A. K. R. McDowell (J. Dairy Res., 1937, **8**, 31—52).—Two types of soft-curd milk occur: (*a*) milk from cows which persistently give soft-curd milk; such milk responds to addition of acid (in rennet coagulation) and is not considered abnormal; (*b*) milk from cows which normally give milk which coagulates normally and then suddenly becomes rennet-resistant; these milks will coagulate only with large additions of acid. Ayrshire cows give milk with longer renneting times than Friesian, which again have longer renneting times than Jersey cows. Little variation in curd firmness occurs in the lactation period, Friesian and Ayrshire milk curds being softer than that of the Jersey. Little change in curd-firmness occurs in Jersey milk by increasing the fat content, but an increase of firmness with rising fat content occurs in Ayrshire and Friesian milk. Soft curd occurs mostly with slowly-coagulating milk. Dilution with H_2O does not greatly affect coagulation but concn. gives a firmer curd. Hard-curd milk has a greater effect on the curd firmness when mixed with soft-curd milk than that calc. from the mixture law.
W. L. D.

Relation of oxidation–reduction potential of milk to oxidised flavour. R. E. Webb and J. L. Hileman (J. Dairy Sci., 1937, **20**, 47—57).—The development of an oxidised flavour in milk by the addition of Cu is accompanied by an increase in the oxidation–reduction potential sufficient to bring about a change in some constituent of milk. Summer milk contains constituents which tend to resist this change. Mixed milk from a large no. of herds will rarely develop an oxidised flavour unless contaminated with Cu. Some milks from individual cows develop oxidised flavour at low potential. If this is caused by oleinase, then the mechanism of the catalysis by Cu differs from that by this enzyme.
W. L. D.

Oxidised flavour in milk. IV. Feed of cow and oxidised flavour. W. C. Brown, L. M. Thurston, and R. B. Dustman (J. Dairy Sci., 1937, **20**, 133—145).—Considerable variation occurs in the milk of individual cows with reference to the development of oxidised flavour. Feeding on dry foods increases, whilst grazing on pasture decreases, the tendency for off-flavour to develop. The feeding of tomato or lemon juice to cows on dry food reduces the development of the flavour, and it is considered that it is the vitamin-*C* in the ration which causes the elimination of the tendency to development of oxidised flavour.
W. L. D.

Cause of off-flavours in market milk. W. H. Chilson (Milk Plant Month., 1935, **24**, No. 11, 24—28).—Off-flavours were intensified by pasteurising at 61·7° for 30 min., but were prevented by heating at 76·7° for 10 min., probably by destruction of an oxidising enzyme. Oxidised flavour did not appear in skim milk unless the fat content was relatively too high, and was more common in cream of low than in that of high fat content owing to the greater proportion of enzyme-containing skim milk in the former. Addition of $CuSO_4$ to sweet cream caused the off-flavour to develop.
Ch. Abs. (*p*)

Methods used in controlling the bacteriological condition of market milk. R. S. Breed (Milk Plant Month., 1937, **26**, No. 1, 44—46).—The agar plate, direct microscopic, and methylene-blue reduction methods are discussed. Each method has its own special field of application.
W. L. D.

Formate–ricinoleate broth in controlling ropy milk epidemics. L. R. Curtis (J. Dairy Sci., 1937, **20**, 147—150).—The val. of formate–ricinoleate broth in detecting ropy-milk bacteria and faulty milk plant sanitation is pointed out. Samples of milk which cause gas evolution in such a medium may develop ropiness, but samples showing no gas will seldom, if ever, develop the fault.
W. L. D.

Ministry of Health. Bacteriological tests for graded milk. Anon. (Memo. 139/Food [Jan., 1937]; Analyst, 1937, **62**, 126).—Tuberculin-Tested Milk (including "Certified" and "Accredited" grades) must not decolorise methylene-blue in 4·5 hr.

if sampled between May 1 and Oct. 31 (or 5·5 hr. for Nov. 1 to April 30); no coliform bacillus should be present in 0·01 ml. Tuberculin-Tested (Pasteurised) and Pasteurised Milks must not contain $>30,000$ and 100,000 bacteria/ml., respectively. Sampling, transport, and storage of samples and technique of the test are dealt with. J. G.

Colon organisms and bacteriophages in milk. I. Lipska (Lait, 1937, **17**, 236—241).—The colon organisms in both summer and winter milk showed biochemical properties intermediate between those of *B. coli* and *B. lactis aërogenes* but filtrates from summer milk were more active than those from winter milk. An analogy between the filtrates of *coli*-containing milk and typhoid and paratyphoid organisms was observed. W. L. D.

Tests for *coli–aërogenes* in milk. M. A. Farrell (J. Dairy Sci., 1937, **20**, 67—75).—Methylene-blue–bromocresol-purple broth, brilliant-green–lactose–bile broth, and fuchsin–lactose broth were found equally efficient for detecting organisms of the *Escherichia–Aërobacter* group in milk. Seven other suggested media were less efficient. W. L. D.

Culture of mastitis streptococci of milk. I. Heat reactions. M. Klimmer and G. Weiske (Milch. Forsch., 1936, **18**, 215—220).—Heating milk samples containing a mixed distribution of organisms to 55—65° does not facilitate the separation of mastitis streptococci. Growth on alkaline serum-albumin–sucrose–bromocresol-purple–agar at 40—42° causes partial suppression of the usual milk bacteria. W. L. D.

Detection and significance of *Escherichia–Aërobacter* in milk. III. Total bacterial count and presence of *coli–aërogenes* group. M. T. Bartram and L. A. Black (J. Dairy Sci., 1937, **20**, 105—112).—Colon-positive raw milk samples showed 2·9 times the total count of colon-negative on standard agar but 12 times the count on tryptone–glucose–milk–agar. In the latter medium, 93·5% of cases with count $<10,000$ were colon-negative. The presence of colon organisms in raw milk of high count is of little significance, but with low count milk the presence of *coli* in 1 ml. in 70—80% of samples indicates contamination. The presence of *coli* in 1 ml. in 10—20% of pasteurised milk is sufficient to indicate contamination, which would not be apparent in the total bacterial count. A more satisfactory test for *coli* content is desirable. W. L. D.

Automatic methods for measuring the p_H of milk and meat products. A. Karsten (Z. Fleisch-Milchhyg., 1937, **47**, 195—198).—Various apparatus, incorporating the use of thermionic valves, for measuring the p_H of foods are described. Quinhydrone and Sb electrodes and colorimetric p_H comparators are also discussed. W. L. D.

Determination of chlorides in Tonkin milk. F. Guichard and N. K. Kinh (Ann. Falsif., 1936, **29**, 547—548).—The Massot–Lestrat method (B., 1936, 216), when applied to milk of abnormally high fat content, and preserved with $K_2Cr_2O_7$, gives results which agree with those given by $KMnO_4$ oxidation. E. C. S.

Colorimetric determination of lactic acid in milk and milk products. F. Hillig (J. Assoc. Offic. Agric. Chem., 1937, **20**, 130—140).—Proteins are removed with phosphotungstic acid and H_2SO_4. The filtrate is extracted with Et_2O in the liquid-extraction apparatus described previously (B., 1933, 936), H_2O is added to the extract, and the Et_2O removed. Citric acid is removed by pptn. with $Ba(OH)_2$ in EtOH, the filtrate clarified with C, and lactic acid determined colorimetrically with $FeCl_3$. 10 p.p.m. may be so determined. E. C. S.

Enzymes of milk. I. Kay and Graham's phosphatase test. E. B. Anderson, Z. Herschdörfer, and F. K. Neave (Analyst, 1937, **62**, 86—93).—The extents to which variations in the reagents and methods of incubation, cooling, filtration, boiling, and concn. affect this test (B., 1936, 120) have been examined; if satisfactory results are to be obtained the original details must be followed closely (cf. following abstract). J. G.

Phosphatase test [for milk]. F. W. Edwards and H. R. Nanji (Analyst, 1937, **62**, 121—122).—The conclusions of Anderson *et al.* (preceding abstract) are confirmed. The test will detect small errors in pasteurisation technique, but it does not enable a bacteriological test to be dispensed with, since bacterial contamination may occur after pasteurisation. J. G.

Comparator for use with Kay and Graham's phosphatase test [for milk]. Z. Herschdörfer and F. K. Neave (J.S.C.I., 1937, **56**, 78T).—A convenient, inexpensive, box-type comparator, for use in Kay and Graham's phosphatase test for efficiency of pasteurisation, is described.

Rapid determination of casein and albumin content of milk. R. Turnau (Z. Unters. Lebensm., 1937, **73**, 26—30).—Tables are given for the calculation of albumin and casein content from the *n* of the tetrasera I and II (cf. Pfyl and Turnau, A., 1914, ii, 690). E. C. S.

Rapid determination of total protein in milk. A. M. Leroy (Lait, 1937, **17**, 230—235).—Two 10-ml. samples of milk are neutralised (phenolphthalein) and to each is added 1 ml. of neutral CH_2O followed by 10 ml. of aq. NaOH containing respectively 0·625 and 0·745 g./litre (equiv. to 2·9 and 3·5% of milk protein). The depth of pink colour produced in each tube is compared with that of a colour scale (not given) from which the total milk protein is read off. W. L. D.

Rate of change of vitamin-*A* content of milk. W. C. Loy, J. H. Hilton, J. W. Wilbur, and S. M. Hauge (J. Dairy Sci., 1937, **20**, 31—36).—When cows were changed from a high- to a low-vitamin-*A* ration carotene and -*A* contents of the milk fat declined rapidly until an equilibrium was reached with the ration in 11 days. On changing from low- to high-*A* rations, the carotene and -*A* rose rapidly and attained equilibrium in 10 days. The effect of change in diet on the -*A* content of milk fat can be ascertained by relatively short feeding trials. W. L. D.

Assay of vitamin-*D* milk. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 78—79)—Directions for collection and preservation of samples and the procedure for assay based on the U.S.P. XI method for -*D* in cod-liver oil are described. E. C. S.

Determination of metals in milk and its products. II. Determination of copper. III. Discoloration of Harz cheese. G. Schwarz and O. Fischer (Milch. Forsch., 1936, **18**, 196—204, 205—214; cf. B., 1936, 567).—II. Cu was determined by the dithizone method using a step-photometer for measuring the colour. The amounts of Cu found were: in milk 0·059—0·138, condensed milk 0·32, dried milk 0·55—1·99, cream 0·19, butter 0·48—0·93, and lactose 0·022—0·60 p.p.m. A rapid method for determining Cu in lactose, using the depth of blue colour produced with guaiacum reagent and KCNS, is described.

III. The determination of Cu and Fe in cheese and curd is described. The discoloration of cheese due to metallic contamination is not due to Fe, as originally thought, but to Cu. The Cu content, however, must exceed 2 p.p.m.; 18 p.p.m. of Cu gives an intense discoloration. Fe does not make the effect of Cu more pronounced. A test for minimal injurious amounts of Cu in cheese is given. W. L. D.

Hygienic examination of buttermilk. E. L. K. Dagneaux (Chem. Weekblad, 1937, **34**, 192—194).—West Brabant buttermilk always contains $<10^6$ *B. coli*/c.c. The trypaflavine–agar test is preferred to the indole test for determining the *B. coli* content of butter milk, but since the bacteria rapidly die in this medium, the AcOH content, which should be <1 mg./c.c., is a much more satisfactory test for contamination of the original milk by *B. coli*. S. C.

Determination of fat in buttermilk with three Minnesota reagents. E. W. Bird and D. F. Breazeale (J. Dairy Sci., 1937, **20**, 1—7).—Three reagents (alcohol–alkaline tartrate mixtures) used for the alkaline method of determining fat in buttermilk were found to give different vals., 5·2, 8·6, and 16·7% of the fat being saponified, respectively. Differences in manipulative procedure account for most of the divergencies in the results. W. L. D.

Rapid determination of acetic acid in buttermilk. E. L. K. Dagneaux (Chem. Weekblad, 1937, **34**, 194—195).—100 c.c. of buttermilk are acidified with H_2SO_4 (Congo paper), distilled in a Polenske apparatus, and the acid in 70 c.c. of distillate is determined by titration with 0·1*N*-NaOH. The titre × 12 = mg. of AcOH in 100 c.c. of sample. Only AcOH is present in the distillate. S. C.

Diacetyl in cold-stored butters. II. C. R. Barnicoat (J. Dairy Res., 1937, **8**, 15—30; cf. B., 1936, 391).—Neutralisation and pasteurisation of cream partly destroys CHAcMe·OH (I) but has no effect on Ac_2. (I) and Ac_2 are retained in butter in the buttermilk fraction. Sweet-cream butter contains 0·05 p.p.m. of Ac_2, mild-starter butter 0·3—0·4 p.p.m., and high-acid cream butter 1·5 p.p.m. The content of Ac_2 remains const. over a period of 3½ months' storage. Ac_2 does not affect the keeping quality or the vitamin-*A* content of butter. The amount of Ac_2 in butter tends to increase on keeping at 4—5° for several days after manufacture; this is due not to oxidation with air, but to the dehydrogenase activity of starter organisms or their enzymes. W. L. D.

Factor in soya beans affecting vitamin-*A* value of butter. S. M. Hague, J. W. Wilbur, and J. H. Hilton (J. Dairy Sci., 1937, **20**, 87—91).—The factor in soya beans which interferes with the transfer of vitamin-*A* from the food of the cow to the butter fat is distributed between the oil (separated either by solvents or by the expeller process) and the meal. The factor is not completely removed from the meal by exhaustive extraction first with Et_2O and then EtOH; it is not sol. in EtOH. W. L. D.

Churn-cleaning methods. H. A. Bendixen (J. Dairy Sci., 1937, **20**, 15—25).—Methods of churn-cleaning in relation to the yeast and mould counts of butter were studied. Low counts followed the use of ample quantities of wash-H_2O of high temp. (82—93°), use of 0·1—0·2% of washing powder, rinsing with hypochlorite of 50 p.p.m. of available Cl, and keeping hot H_2O in contact with the revolving churn for 15 min. Keeping the inner surface of the churn dry when not in use lowered the microbiological count. W. L. D.

Cream in paper milk containers. T. Durfee, W. S. Arnott, and P. R. Nelson (Milk Dealer, 1935, **25**, No. 2, 40—42).—The cream layer forms less readily on milk in paper than in glass containers, especially after pasteurisation. Differences are ascribed to effects of electrostatic charges on the container and those induced on fat particles. Ch. Abs. (*p*)

Determination of moulds in cream or butter. J. D. Wildman (J. Assoc. Off. Agric. Chem., 1937, **20**, 93—100).—A small sample of butter is diluted with warm 0·75% aq. carob bean or tragacanth gum and stirred until the fat globules are 0·1—0·2 mm. in diameter. A portion is mounted on the counting slide and mould determined by the Howard method (A.O.A.C. Methods of Analysis, 1935, 500). Mould counts in cream are made indirectly, after churning, in the butter; or, macroscopically, by diluting with warm aq. methylene-blue–borax, agglutinating the mould hyphæ by gentle shaking, and measuring (by one of two methods described) the approx. size of the clot. E. C. S.

Factors affecting variation in the fat content of ice cream mix and the finished product. J. J. Johnson and J. I. Ormond (J. Dairy Sci., 1937, **20**, 159—164).—Improper handling of ice cream samples causing separation of fat from the solids-not-fat, thus making it difficult to obtain a proper sample for analysis, is the greatest factor. Agitation of the mix results in a stratification of the fat and the foam should be well incorporated into the cream before sampling. Condensation of H_2O during freezing, especially at high R.H., causes a reduction in fat. Addition of flavouring and colouring material causes a reduction in fat which can be calc. W. L. D.

Detection of artificial egg-yolk pigments bleached by acidification in ice cream. K. Brohm and E. Frohwein (Z. Unters. Lebensm., 1937, 73, 30—32).—Azo dyes bleached by reduction of the ·N:N· group to NH_2 are detected by diazotising and coupling with the Na salt of R acid. In presence of reduced azo dyes a reddish-brown or orange-red solution is obtained; bright green or yellow tints are regarded as negative. E. C. S.

Cheddar cheese. V. Effect of chemical substances on the ripening process. W. L. Davies, J. G. Davis, D. V. Dearden, and A. T. R. Mattick (J. Dairy Res., 1937, 8, 92—104; cf. B., 1934, 648).—Substances stimulating or inhibiting the growth of lactic acid organisms, affecting the p_H of cheese, and others possibly affecting flavour, have been incorporated into cheese curd at salting. The effect on the ripening process in most cases was insignificant. It is concluded that cheese is a remarkably stable system, the chief factors in the rate of chemical ripening being the concn. of rennet, salt, and free H_2O. W. L. D.

Cheddar cheese making. V. Factors influencing acidity and mineral content of cheese. VI. Factors influencing relation between lactic acid and titratable acidity of whey. R. M. Dolby, F. H. McDowall, and A. K. R. McDowell (J. Dairy Res., 1937, 8, 74—85, 86—91; cf. B., 1936, 759).—V. High acidity at the whey-running stage causes increased mineral losses in whey, a lowering of the mineral content of cheese, and a detrimental effect on the " body " of the cheese. Acidity at running controls the acidity of the cheese. The acidity of whey at later stages has little effect on cheese acidity. The amount of lactose in the cheese affects the acidity at maturity whether the lactose is added as such or incorporated in the whey left in cheese. Some unfermented lactose remains in cheese at 4 months after manufacture.

VI. A close correlation exists between titratable acidity and lactose acid concn. in wheys obtained under various conditions of cheesemaking, and variations in the rate of acid development or in the lactose content of milk have no effect on this relationship. Curds with a low mineral content cause a less complete neutralisation of lactic acid and the wheys show a higher titratable acidity for the same lactate content. These small differences affect the wheys which come off late in the cheese-making process. W. L. D.

Use of hydrogen-ion determinations on young cheese in predicting acid development in Cheddar cheese during storage. D. W. Spicer and L. H. Burgwald (Nat. Butter Cheese J., 1935, 26, No. 21, 14—15).—Changes in acidity during manufacture of cheese are not indicated more accurately by p_H than by titration. Acidity developing in storage is closely related to the titratable acidity at the time of milling. In American cheese, acidity developing during 6 weeks can be predicted from the p_H at 3—10 days. Cheese having $p_H \not< 5·07$ does not develop acidity in storage. Ch. Abs. (p)

Effect of metallic contaminants on Cheddar cheese. C. R. Barnicoat (J. Dairy Res., 1937, 8, 53—60).—Traces of Cu, Fe, Pb, Zn, Al, and Mn, added at the rate of 3—7 p.p.m. to milk used for Cheddar cheese making, caused flavour and colour defects in the ripened cheese. No indication of these defects was found in the 14-day old cheese. All the Cu but only two thirds of the Fe appeared in the curd. The discoloration observed for the Cu- and Fe-contaminated cheese is due not to the formation of sulphides but to the atm. oxidation of the colourless metal proteinate. W. L. D.

Properties of annatto as a cheese colour. C. R. Barnicoat (J. Dairy Res., 1937, 8, 61—73).—Annatto (I) solutions do not obey Beer's law strictly but the divergence over the range of colour depth added in cheese making is of no significance. Acidity increases the red tint of (I). MeOH efficiently extracts (I) from cheese curd. Cheese enzymes and bacteria show no bleaching effect on (I) but atm. oxidation at $p_H > 7·0$ causes bleaching, and discoloration of the cheese. The colour of commercial (I) should be standardised with 1 : 10,000 dilutions with 0·1*N*-NaOH. A standard (Lovibond units) of 4·0 Y, 0·4 R, 0·1 neutral tint for the above dilution is suggested. W. L. D.

Determination of fat, moisture, and salt in hard cheese. G. H. Wilster, W. V. Price, A. J. Morris, E. F. Goss, and G. P. Saunders (J. Dairy Sci., 1937, 20, 27—30).—Methods of sampling cheese for analysis are given. Fat is determined by the Babcock method, moisture by drying at 100° for 24 hr. in air or 10 hr. in a vac. oven, and salt by an open-Carius method (Volhard method) using HNO_3 and $KMnO_4$ to dissolve org. matter. For determinations of moisture in factory work, heating for 24 hr. at 104—110° is recommended. W. L. D.

Decomposition of nitrogenous substances [cheese etc.]. L. Pazzaglia (Atti V Congr. Naz. Chim., 1936, 14, 828—830).—Determinations of the coeff. of maturation and decomp. of cheese (from sheep milk) over a period of 5 years indicate that two forms of decomp. of the nitrogenous matter take place, one rapid and one slow, and a final equilibrium is reached between the insol. nitrogeneous compounds and those in the various states derived from degradation and liquefaction of the casein. The relation between these results and those of Parisi and De Vito (A., 1934, 1384) are pointed out. L. A. O'N.

Evaluation and preservation of hen eggs. L. Jirak (Österr. Chem.-Ztg., 1937, 40, 117—123).—Methods of determining storage properties of eggs are examined. Results of various preservative treatments are recorded. A. G. P.

Vitamin-*A* in eggs and food. W. C. Russell and M. W. Taylor (New Jersey Agric., 1935, 17, No. 4, 3).—Eggs from hens receiving no pigmented foods contained less vitamin-*A* than from those receiving yellow maize and lucerne, cod-liver oil being given in both cases. Egg-yolk colour is not a reliable index of -*A* content. With pigmented foods a greater proportion of the -*A* intake appeared in the eggs. Ch. Abs. (p)

Chemistry of turkey eggs. J. S. Hepburn and P. R. Miraglia (J. Franklin Inst., 1937, 223, 375—377).—Tables summarise the total solids, H_2O, crude fat and protein, ash, and glucose contents, and the calorific vals. of the whole egg, white, and yolk of the domestic turkey and the consts. of the yolk fat. The % of lipin extracted varied with the solvent, being greatest with light petroleum and least with Et_2O. P. W. C.

Infection of foodstuffs by birds. M. Lerche (Chem.-Ztg., 1937, 61, 188).—Ducks' eggs are frequently infected, chiefly superficially, with *Bact. enteritidis*, Gärtner. The spores survive $\nless$15 days, and penetrate to the interior when conditions are favourable, as, *e.g.*, when the eggs are kept in aq. $Ca(OH)_2$. Disinfection by immersion in boiling 5% aq. Na_2CO_3 is recommended. E. C. S.

Physico-chemical determination of moisture in dairy products. L. K. Lapinski (Kolloid. Shurn., 1935, 1, 437—446).—Dolch's method (B., 1931, 97) is applied. J. J. B.

Value of meat in national nutrition and health. Lerche (Z. Fleisch- Milchhyg., 1937, 47, 153—157, 180—185).—A review, giving comparisons of the calorific vals. of fish, poultry, and mammalian meat and the incidence of meat poisoning for 1923—34. W. L. D.

Removal of "boar odour" in the pickling process. H. Keller (Z. Fleisch- Milchhyg., 1937, 47, 174—176).—The "boar" (or sex) odour of male pig flesh can be largely removed in the pickling process by using greater concns. (1 in 500, instead of 1 in 1000) of $NaNO_3$ in 10% NaCl solution. The odour is strongly conc. in the salivary glands of the lower jaw. W. L. D.

Arresting the formation of nitrite in pickling brine. J. Lenfeld and J. Hökl (Z. Fleisch- Milchhyg., 1937, 47, 193—195).—Biological changes cause appreciable increases in the $NaNO_2$ content of pickling brine, with a tendency to considerable alkalinity with age. The $NaNO_2$ content can be kept reasonably low by adding 1·5% of $MgCO_3$ and/or 1% of $MgCl_2$ to brine. Bacterial counts of brines are discussed. W. L. D.

Bone content of fish and meat meals. Claussen (Z. Fleisch- Milchhyg., 1937, 47, 157—159).—Vahlkampf's modification of the Gröningen test (wt. of sediment from 10 g. of meal in $CHCl_3$; cf. B., 1937, 182) has been tested on 36 samples and found to be inaccurate. W. L. D.

Biochemical properties of fresh and tainted fish. A. J. J. van de Velde (Natuurwetensch. Tijds., 1937, 19, 41—48).—Tests on cod, haddock, plaice, and greater weever fish (*Trachinus draco*) show that, on keeping, changes occur in the flesh which have very marked effects on the reductase test in sterile milk, especially with methylene-blue and azurufin, the bacterial count after dispersion in sterile milk, and on the fluorescent properties of $COMe_2$ extracts of the flesh when irradiated with ultra-violet light. The methods of carrying out the tests are described in detail. S. C.

Comparison by volumetric methods of the ascorbic acid (vitamin-*C*) content of freshly lifted and one-year-old potatoes. T. Lalin and G. Göthlin (Z. Unters. Lebensm., 1937, 73, 43—47).—Titrimetric determination showed a mean ratio of ascorbic acid content in freshly-lifted potatoes, as compared with the same varieties kept for 1 year under the best conditions, of 3·3 : 1. E. C. S.

Preparation of [potato] flakes by the Koeniger process. F. Beck (Z. Spiritusind., 1937, 60, 53).—In the process claimed, whereby sediment from the expressed potato juice is recombined with the pressed material for drying, there appears to be some loss in protein and ash content of the final product, and the digestibility of the protein is, apparently, lowered. I. A. P.

Preparation of carotene concentrates and carotene from carrots. A. S. Vetscher (Biochimia, 1936, 1, 567—578).—The washed carrots are pulped and the pulp is pressed, affording 56% of juice. Citric (or other) acid is added to p_H 4·0—4·5, and the sediment collected after 12 hr. at 0—4°. The dry sediment contains $>$1% of carotene (I), and may be used as a basis for prep. of pure (I), or added, as a (I) concentrate, to foods. The clarified juice may be disposed of as a fermented or unfermented beverage. The residue after expression of juice contains about 50% of H_2O and about half of the initial (I) content of the carrots, and may also be utilised for (I) production. R. T.

Influence of nutrition on the carotene and ascorbic acid contents of vegetables and fodder plants. C. Pfaff and G. Pfützer (Angew. Chem., 1937, 50, 179—184).—Carotene (I), chlorophyll (II), and ascorbic acid (III) contents are greater in well-nourished than in deficient plants. High (I) and (II) contents are associated particularly with generous supplies of soil-N and -Mg. Deficiency of light prior to cutting lowers the proportion of (I), (II), and (III) in spinach. Outdoor (late) tomatoes contain more vitamin-*C* than earlier glasshouse varieties. The (I)/(II) ratio was unaffected by manurial treatment. Liming lowered the (I) and (II) content of spinach, the effect being partly corr. by application of Mg salts. A relation between the amounts of sugar and (III) in differently manured vegetables is established. A. G. P.

Ripening of green peas. G. S. Sidappa and W. B. Adam (Ann. Rept. Fruit Veg. Preserv. Res. Sta. Campden, 1934—5, 74—100).—Ripening occurs in two stages: during the first, starch, sugar, protein, and mineral content remain fairly const.; during the second (rapid) stage, starch and higher carbohydrates increase and sugar decreases, the quality deteriorating. Development is discussed in relation to canning quality. E. C. S.

Canning trials of green pea varieties; 1925—35. F. Hirst and W. B. Adam (Ann. Rept. Fruit Veg. Preserv. Res. Sta. Campden, 1934—5, 29—43).—The characteristics of the seed, haulm, pods, and peas, and the canning properties of the last-named of a large no. of varieties of green pea are tabulated. E. C. S.

"Flat-sour" spoilage in canned peas. N. B. McMaster (Ann. Rept. Fruit Veg. Preserv. Res. Sta. Campden, 1934—5, 58—64).—Facultative thermophiles only were found in the sugar and blancher H_2O used in the prep. To prevent spoilage, cleanliness, especially in the blanchers, is essential. E. C. S.

Gases in canned foods. G. Horner (Ann. Rept. Fruit Veg. Preserv. Res. Sta. Campden, 1934—5, 44—50; cf. B., 1937, 283).—The vol. of CO_2, O_2, and N_2 in fresh and dried peas and beans and in carrots, before and after blanching, is tabulated. The headspace gas of sound cans of vegetables normally contains more CO_2 and less O_2 than does air. On storage, O_2 decreases and H_2 is slowly formed. The amount of the latter formed in lacquered cans after several years' storage may be sufficient to cause the formation of H_2 swells. Unsound cans of vegetables usually contain excessive CO_2, causing the can to become blown. Hydrocarbons have not been found in the headspace of spoiled cans. E. C. S.

Unusual adulterant for pepper. J. T. Dunn and H. C. L. Bloxam (Analyst, 1937, 62, 121).—Two samples (described as "white pepper" and "pepper") contained 7 and 8% of $MgCO_3$, respectively. This improves the appearance of pepper, and as it is difficult to detect microscopically the ash should be recarbonated. J. G.

Ginger; its processing and sophistication. P. H. Jones (Food, 1937, 6, 233—237).—Possible adulterants are an excess of mineral matter (due to intentional addition as in "limed" ginger, or to inadequate cleaning), and "spent ginger" (the residue from the prep. of ginger extracts). Chemical and microscopical methods, respectively, are described for their detection. Proposed limits are: ash ≯5, H_2O-sol. ash ≮1·5, cold-H_2O extract ≮10, and 90% EtOH extract ≮5%. The B.P. figure for matter insol. in dil. HCl is too high, and 1% is preferred. J. G.

Garden fruit products. Determination of the principal organic acids. E. Bottini (Atti V Congr. Naz. Chim., 1936, 14, 686—703).—Methods for the separation and determination of vegetable acids are critically reviewed and a new scheme is proposed. The acids are separated either directly from the juice obtained from the fruit by pressure, or indirectly from the aq. extract of the pulp. Tartaric acid is then pptd. and determined as K H salt, $H_2C_2O_4$ as CaC_2O_4,H_2O, and succinic acid as the Ag salt; citric acid is oxidised to $COMe_2$ and determined as CHI_3; malic acid is transformed into fumaric acid and determined as the Hg salt. L. A. O'N.

Composition and fermentation of citron. C. R. Fellers and E. G. Smith (J. Agric. Res., 1936, 53, 859—867).—The fruit has high H_2O, medium sugar, ash, and fat, and low fibre contents. In unripe fruit the vitamin-*C* potency is high: little is retained by brine-fermented fruit or candied peel. Two yeasts are isolated from fermenting fruit in brine. Flavour and aroma develop largely during fermentation. Preserved peel is best prepared with sucrose containing 35% of glucose. A. G. P.

Control of spoilage of processed fruit by *Byssochlamys fulva* (contd.). R. Hull (Ann. Rept. Fruit Veg. Preserv. Res. Sta. Campden, 1934—5, 65—73; cf. B., 1937, 283).—Heavily inoculated cans required heating to 88—93° but the natural infection on the fruit was destroyed in most cans heated to ≯82°. In practice, ≮88° (91°) in the centre of the can should be aimed at. E. C. S.

Presence of yeasts in fruit juices sold for beverages. J. M. Brannon and R. J. Pollitt (Milk Dealer, 1935, 25, No. 2, 35).—Yeasts occur in orange and grape-fruit juices, which, however, remain in good condition if stored cold. Ch. Abs. (*p*)

Stability towards storage of vitamin-*C* in fruit juice. O. Rygh (Tids. Kjemi, 1937, 17, 21—22).—Unlike that of other fruit, the juice of black-currants and hips retains its -*C* on storage. M. H. M. A.

Determination of total chlorides in tomato juice. Anon. (J. Assoc. Off. Agric. Chem., 1937, 20, 78).—A tentative method based on titration with NH_4CNS or KCNS is described. E. C. S.

Determination of copper in tomato purée. G. Horner (Ann. Rept. Fruit Veg. Preserv. Res. Sta. Campden, 1934—5, 51—57).—Biazzo's method (B., 1926, 382) gave trustworthy results in presence of Fe and Sn. E. C. S.

Staling *versus* rancidity in roasted coffee. L. W. Elder, jun. (Ind. Eng. Chem., 1937, 29, 267—269).—Oxidation-induction periods of the fats from ground roasted coffee stored (*a*) in air and (*b*) in vac. were found to remain unchanged over a period of 91 days, although the cup flavour of (*a*) deteriorated, indicating that staling of coffee is not due to rancidity of the coffee oil. E. B. H.

Phosphatide content of cacao powder and cacao butter and determination of lecithin substitutes in cacao products. K. Braunsdorf (Z. Unters. Lebensm., 1937, 73, 38—43).—The phosphatide extracted with EtOH from six unadulterated cacao powders amounted to 0·389—0·980% of the fat-free dry substance; that extracted with Et_2O varied from 0·053 to 0·55% of the total fat. In view of this wide variation it is not feasible to detect the presence of lecithin substitutes by determination of phosphatide-P. E. C. S.

Refractometric determination of fat in chocolate. J. Stanley (Ind. Eng. Chem. [Anal.], 1937, 9, 132—135).—Chocolate dissolved in warm $(C_6H_4Me)_3PO_4$, Bu_2 (or Et_2) phthalate when filtered affords a clear filtrate the *n* of which gives a direct measure of the fat content when this val. is compared with a standard series of curves. Lecithin, when present in small amounts, does not affect the accuracy of the results. J. L. D.

Detection and determination of glycerol in marzipan and persipan. H. Kluge (Z. Unters. Lebensm., 1937, 73, 34—38).—Glycerol (I) is detected by extracting with $COMe_2$, evaporating the extract, and heating the residue with $KHSO_4$, whereby acraldehyde is formed (detected by means of piperidine–Na nitroprusside). (I) cannot be determined by the $Pr^{\beta}I$ method (B., 1903, 1211) directly in the aq. extract since interfering substances are present, but methods of removing these are described. Almonds and apricot kernels contain no detectable (I). ≮0·1% of (I) can be detected by the method described. E. C. S.

Changes in composition [of foods] due to industrial treatment, especially the effect of refining on lipin content. G. Wolff (Ann. Falsif., 1936, 29, 537—538).—Vals. are given for the % of lecithin in crude soya, linseed, maize, and arachis oils and pork fat, and in the filtered or centrifuged and neutralised oils. The losses due to refining are considerable. E. C. S.

Bromometric determination of nitrogen in food analysis. Bláha and Láska (Chem. Listy, 1937, 31, 82—84).—The sample is burned (Kjeldahl procedure), excess of ZnO is added to the H_2SO_4, and NH_3 determined bromometrically, by known methods. R. T.

Necessity of investigating the effect of antiseptics in human diet. G. Wolff (Ann. Falsif., 1936, 29, 533—536).—The further restriction of the use of antiseptics and artificial pigments is advocated. E. C. S.

Starch equivalent of sugar beet. G. Fingerling (Landw. Versuchs-Stat., 1937, 127, 235—356).—Digestibility of the N-free extractives for pigs and oxen is high and vals. are the same for fresh and dried material. For all nutrients except fat, digestibility coeffs. for pigs are > for ruminants, differences being very marked in the case of crude fibre. Mean starch equivs. for fresh and dried beet were 56·0 and 54·7 for cattle and 72·4 and 76·4, respectively, for pigs. A. G. P.

Molasses hay silage. C. B. Bender (New Jersey Agric., 1935, 17, No. 5, 3—4).—Green lucerne–grass mixtures averaging 66% of H_2O were mixed with 40% solution of molasses at the rate of 100 lb. of molasses per ton. The temp. in the silo rarely exceeded 37·8° and the product was green and succulent. Its composition compared favourably with that of the fresh material. If the green matter was allowed to dry to 44% of H_2O, the temp. in the silo rose to 71·1° and the product was useless. Ch. Abs. (*p*)

Stability of provitamin-*A* in lucerne and in silage. M. M. Taylor (New Jersey Agric., 1934, 16, No. 6, 3).—Machine-dried lucerne lost 50—60% of its carotene (I) content during barn storage for 3—7 months. During ensilage (I) remained stable. Ch. Abs. (*p*)

Metabolism of draught horses. III. Composition and digestibility of hay–oats and hay–oats–sugar-beet press–molasses diets. S. E. Borshkovski, M. F. Guli, V. O. Smoljar, and M. K. Netschitailo (Ukrain. Biochem. J., 1936, 9, 1109—1137).—Fæcal analyses indicate that the digestibility of proteins and carbohydrates is not lowered by replacing 1·5 kg. of oats in the daily ration by 1·5 kg. of dry beet press and 0·5 kg. of molasses, on condition that the remaining oats are ground before inclusion in the ration. The digestibility of fats is lower by 13% on this diet than on a hay–oats diet. R. T.

Fodder-protein production in agricultural distilleries in the framework of the four-years' plan. H. Fink [with R. Lechner] (Z. Spiritusind., 1937, 60, 57—58, 60—61).—The utility of spent wash from potato distilleries as a source of fodder protein is discussed, the protein therein having become more highly digestible and, relatively to the non-protein, more conc. than in the original potatoes. Further, the biological production of protein by yeast cultivation is outlined. In the new "protein-wash" process, weakly fermenting but actively multiplying yeast (*e.g.*, *Torula utilis*) is developed in diluted aërated mashes in presence of nutrient salts, producing a high yield of fodder protein with but little EtOH. The process may be combined with the usual distillery process, giving increased yields of EtOH and decreased protein as compared with the "protein-wash" process itself. The use of the yeast-containing wash, fresh or dried, as fodder material is discussed, as are the possible large-scale application of such processes and the necessary scale to meet German needs for feed-protein produced from home sources. I. A. P.

Feeding vitamin-*A* and -*D* concentrate in cod-liver oil to calves. A. C. Dahlberg and L. A. Maynard (J. Dairy Sci., 1937, 20, 59—61).—The feeding of vitamin-*A* and -*D* concentrate in cod-liver oil to calves fed liberally on partly skimmed milk and good lucerne hay did not increase the rate of growth over a 40-week period, but caused a slight improvement in general health. W. L. D.

Locust meal as poultry feed. F. M. Fronda (Philippine Agric., 1935, 24, 425—427).—The meal contains H_2O 7·23, fat 17·27, ash 9·87, protein 30·7, fibre 16·32, carbohydrates 18·59%. Ch. Abs. (*p*)

Menhaden fish oil as a source of vitamin-*D* for growing chicks. J. O. Halverson and R. S. Dearystyne (North Carolina Agric. Exp. Sta. 46th Ann. Rept., 1933, 62).—Effects on bone ash and growth were comparable with those of cod-liver oil. Ch. Abs. (*p*)

Steel alloys, Ni and its alloys, in food manufacture.—See X. **Determining oils etc. in org. material. Passion fruit.**—See XII. **Casein plastics. Glass from potato meal.**—See XIII. **Canning peas. As in sprayed plants, vegetables, etc. Fodder beet. Ultra-violet light [test] and feeding-stuffs.**—See XVI. **[By-products from] wood conversion.**—See XVII. **Fe in grapes.**—See XVIII. **Purifying dairy wastes.**—See XXIII.

See also A., I, 181, **Action of pectin on sugars.** 183, **Gelation of the system pectin, sugar, and acid.** III, 190, **Determining lipase in milk.** 152, **Nutritive val. of yeast for infants.** 153—6, **Vitamins.** 153, **Carotene of milk fat.**

Patents.

Bread-leavening composition. M. Bonotto, Assr. to Amer. Soya Products Corp. (U.S.P. 2,035,586, 31.3.36. Appl., 14.10.30).—A mixture of 90% of vegetable Na proteinate, prepared from processed soya beans, with 10% of mineral salts, comprising Na and Ca diphosphate and Ca lactate, increases gas production and yield of loaves when added to bread doughs as a substitute for milk in the proportion of 5% of the flour wt. E. B. H.

Comminuted shortening. G. H. Kraft, Assr. to Kraft–Phenix Cheese Corp. (U.S.P. 2,035,899, 31.3.36. Appl., 5.5.34. Renewed 16.8.35).—By spray-drying an emulsion of fat (*e.g.*, hydrogenated vegetable oil) in liquid whey, a dry, siftable shortening is obtained which contains $\nless 50\%$ of fat. The fat is quickly released (*e.g.*, in prepared bakery products) on addition of H_2O. E. B. H.

Production of bread and other alimentary products. R. Schuler (B.P. 461,433, 16.8.35. Fr., 19.3.35).—Dough is fermented to raise it, and the oven is immediately placed under vac. which is maintained until the crust and crumb are firm enough and is then gradually reduced. The vac. is preferably created by a centrifugal pump with variable-speed motor. B. M. V.

Production of baked cereal products. E. I. Du Pont de Nemours & Co. (B.P. 461,269, 14.8.35. U.S., 14.8.34).—The decomp., by naturally occurring catalases, of H_2O_2 used for aërating flour doughs or cake batters is (*a*) retarded or (*b*) accelerated by addition of very small quantities of (*a*) maleic acid, $NaClO_3$, $NaClO_4$, etc., or (*b*) $NaHCO_3$ or Na_2CO_3. E. B. H.

Manufacture of a gluten-like product. M. Bienenstock, L. Csáki, J. Pless, A. Sági, and E. Sági (U.S.P. 2,038,633, 28.4.36. Appl., 15.8.32. Hung., 31.8.31).—The germ is separated from seeds of *Ceratonia siliqua* or other members of the Cæsalpiniaceæ and Mimosaceæ, milled into a flour, made into a paste with H_2O, and kneaded. The wet gluten is washed with more H_2O until free from cellulose, and dried at $<50°$. E. B. H.

Obtaining alimentary substances from earth-nuts and other edible oleaginous grains or seeds. P. Ammann (B.P. 461,760, 13.9.35. Fr., 14.9.34).—The nuts after decortication are desiccated (to about 2% H_2O) and pressed to remove 40—70% of the oil. The cake consists of flattened kernels of which the cells are unopened, and is readily disintegrated. The skins are easily removed by rubbing and fanning, and the kernels may be ground to flour, with or without prior roasting. (Cf. B.P. 416,818; B., 1934, 1035.) E. B. H.

Hypo-allergic milk. W. O. Frohring, Assr. to S. M. A. Corp. (U.S.P. 2,036,404, 7.4.36. Appl., 14.1.33).—Milk which has been subjected to a more prolonged heat-treatment than is ordinarily employed for sterilisation (*e.g.*, 2 hr. at 116°) is claimed to have reduced allergic properties for individuals normally sensitive to the untreated product. E. B. H.

Apparatus for determination and/or regulation of the fat content in milk. Bergedorfer Eisenwerk A.-G. Astra-Werke (B.P. 460,006, 3.7.36. Ger., 5.7.35).—An apparatus of the balance type, dependent on differences in *d*, is used for the rapid determination of fat in milk or cream delivered from a separator. E. B. H.

Tempering of cream. J. Willmann (U.S.P. 2,037,405, 14.4.36. Appl., 29.6.34).—An apparatus is described in which cream, after pasteurising, homogenising, and cooling to 4°, is heated gradually to 18—35° and again cooled. The second heat-treatment at moderate temp. is claimed to increase the η and restore the whipping properties without risk of formation of cream-plug (butter fat separation). E. B. H.

Manufacture of a beverage from whey. H. Himmelsbach (B.P. 461,184, 2.8.35).—Whey produced by the souring of milk or by rennet treatment is heated at 80—90° with addition of active wood C, to effect sterilisation, ppt. coagulable protein, and remove distasteful compounds. After cooling to 30° for sedimentation, a controlled fermentation is carried out with, *e.g.*, yeast. Sugar or honey may be added before or after fermentation to give a product with or without substantial amounts of EtOH present, or to sweeten it. After clarification of the fermented liquor by pressure-filtration, flavouring materials may be added and the liquor charged with CO_2. After bottling, the beverage may be pasteurised without affecting its odour or flavour. [Stat. ref.] I. A. P.

Manufacture of casein products. Albright & Wilson, Ltd. (B.P. 462,114, 26.7.35. U.S., 28.9.34).—The consistency and stability of casein solutions or emulsions intended for use in the paper, paint, and glue industries are improved by addition of an alkali metaphosphate (*e.g.*, $NaPO_3$ or $Na_6P_6O_{18}$) or NH_4PO_3. In glue preps. a proportion of a solubilising agent [$Ca(OH)_2$, NaOH], mineral matter (pptd. $CaCO_3$), and a heavy-metal salt other than an Fe salt (*e.g.*, $CuSO_4$) is included. E. B. H.

Production of margarine. H. Schou (B.P. 461,615, 17.7.35).—By sufficiently fine distribution of the aq. phase the margarine emulsion has $\eta_{50} \nless 36$ centipoises, and is $\nless 15\% >$ that of the molten fatty constituents. The finished margarine is claimed to have a taste corresponding with that of fresh butter. E. B. H.

Egg treatment and product. F. Y. Chuck (U.S.P. 2,038,540, 28.4.36. Appl., 11.6.34).—Shell eggs are coated with an emulsion containing H_2O, mineral oil, and a Ca compound that will readily form carbonate by exposure to CO_2 from air or evolved from the egg. An emulsifying agent and also lactic acid as a preservative may be added. E. B. H.

Production of fish meal and oil. L. T. Hopkinson (B.P. 461,343 and 461,411, 10.5.35).—Full yields of (*a*) uncontaminated oil and (*b*) meal of low oil content are obtained by treating uncrushed fish waste with CH_2O or MeCHO before the usual cooking, pressing, and drying operations. E. B. H.

Manufacture of soup concentrate. A. Verhaeghe (B.P. 460,116, 2.6.36. Belg., 1.6.35).—Cleaned chopped vegetables are cooked in juice extracted from meat, and fat and the required seasoning are added. The mixture is conc. by prolonged boiling at about 105°. E. B. H.

Treatment of fruit juices. F. W. Robison, Assr. to H. J. Porter and G. D. Elmer (U.S.P. 2,035,619, 31.3.36. Appl., 20.4.34).—A method is claimed for extracting fruit juices out of contact with air, replacing the O_2 normally present in the juice by a non-oxidising gas, and finally homogenising and gradually freezing the product so that uneven crystallisation is prevented. A figured diagram is given.

E. B. H.

Preparation of pectin. GEN. FOODS CORP., Assees. of A. G. OLSEN and R. STUEWER (B.P. 461,200, 28.8.35. U.S., 28.8.34).—Pomace is " pickled " with HCl at $p_{H} < 1{\cdot}0$ for approx. 36 hr. at 40—50°; the modified pectin is extracted and pptd. by Ca.

E. B. H.

Manufacture of pectous product. H. T. LEO (U.S.P. 2,038,582, 28.4.36. Appl., 22.7.32).—In the prep. of a pectous material free from arsenates or other mineral impurities (from spraying), pomace is extracted with 35—60% EtOH acidified with 0·5—5·0% HCl. The residue is dried after neutralisation of the acid, and the jelly strength is standardised.

E. B. H.

Production of semi-soluble and dispersable calcium pectate. GEN. FOODS CORP., Assees. of N. M. BEACH (B.P. 462,028, 28.8.35. U.S., 28.8.34).—Powdered pectin (I) is rendered more easily dispersible in H_2O by treating it with a sol. Ca salt in such quantities that the (I) is not rendered completely insol. The readily dispersible, semi-sol. " Ca pectinate " (II) may also be prepared by washing insol. (II) with acidified EtOH to remove part of the Ca.

E. B. H.

[Making of] chocolates [with underside projections]. C. KUNZLE (B.P. 461,867, 19.8.36).

Cleansing metal articles.—See X. **Chewing gum.**—See XIII. **Vitamins.**—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Stability of anæsthetic ether. Formation of aldehydes and peroxides in stored ether. J. E. AURELIUS, E. S. HERLONG, and F. W. NITARDY (J. Amer. Pharm. Assoc., 1937, 26, 45—46).—Aldehydes and peroxides develop in Et_2O kept in cans or drums which are not sealed or tightly closed, to an extent varying with the type of container.

F. O. H.

Stabilised antidote applicable in poisonings with heavy metals. C. STRYZOWSKI (Scient. Pharm., 1935, 6, 94—97).—Dil. aq. NaOH is saturated with H_2S and added to a solution of $MgCl_2 + NaHCO_3$. The final concn. is such that 100 c.c. are sufficient to convert 4 g. of $HgCl_2$ into HgS.

CH. ABS. (*p*)

Examination of stannoxyl tablets and similar preparations. Determination of tin, stannous oxide, and stannic oxide in tablets. H. J. VAN GIFFEN (Pharm. Weekblad, 1937, 74, 250—258).—Total Sn (as SnO_2) and other constituents are determined together by ignition with HNO_3. All the Sn is then extracted from the ash as Na_2SnS_3 by fusion with Na_2CO_3 and S, pptd. as SnS, and ignited to SnO_2. Sn and SnO are extracted together with HCl and NH_4Cl and determined gravimetrically as SnO_2; finally, metallic Sn is taken into solution with $CuCl_2$ and NH_4Cl under prescribed conditions and SnO, SnO_2, and other constituents are determined in the residue by ignition with HNO_3.

S. C.

Hydrargyrum cum creta (grey powder). Preparation and effects of storage. I. ROBERTS (Quart. J. Pharm., 1936, 9, 684—692).—B.P. preps. slowly oxidise on keeping; addition of glucose (to retard oxidation) and storage in airtight containers (to avoid volatilisation of Hg) in a cool place are recommended. A modification of the B.P. method of determining $HgCl_2$ for the assay of HgO is given and the stability of some pharmaceutical preps. of grey powder is discussed.

F. O. H.

Drug extraction. X. Swelling of powdered drugs in liquids. W. J. HUSA and G. R. JONES (J. Amer. Pharm. Assoc., 1937, 26, 20—23; cf. B., 1936, 858).—The swelling (as indicated by the vol. after centrifugation) of 18 powdered drugs in $EtOH-H_2O$ mixtures indicates that swelling generally occurs in EtOH, but increases with increasing $[H_2O]$. The greater part of the swelling occurs in the first 10 min.

F. O. H.

Azochloroamide. ANON. (J. Amer. Med. Assoc., 1935, 105, 1191).—Physical and chemical characteristics of the prep. " azochloroamide in triacetin " (Amer. Med. Assoc.) are recorded together with tests for p_{H} and H_2O content.

CH. ABS. (*p*)

Spontaneous decomposition, and that due to sterilisation, of solutions of hexamethylenetetramine for injection. G. TONI (Boll. Chim.-Farm., 1937, 76, 61—64).—Liberation of CH_2O with a parallel increase in p_{H} occur in 25 and 40% solutions on storage and, to increasing extents, on sterilisation by tyndallisation, steam, and autoclaving at 110°. Presence of 2% of hydrolysed gelatin retards the decomp.

F. O. H.

Determination of phenolphthalein in mineral oil[-agar] emulsions. C. F. BICKFORD and R. E. SCHOETZOW (J. Amer. Pharm. Assoc., 1936, 25, 1128—1129).—The prep. [equiv. to 0·05—0·10 g. of phenolphthalein (I)] is treated with $Et_2O-EtOH$ (3 : 1) and the pptd. agar separated, dissolved in H_2O, and repptd. with $Et_2O-EtOH$. The combined $Et_2O-EtOH$ is extracted with $0{\cdot}04N$-NaOH and (I) pptd. from the extract by $0{\cdot}1N$-H_2SO_4. The ppt. is dissolved in Et_2O, re-extracted with NaOH, repptd. with H_2SO_4, and finally washed, dried, and weighed. A correction for the solubility of (I) in H_2O is applied.

F. O. H.

Tests in the Dispensatorium Danicum, 1934. F. REIMERS (Dansk Tidsskr. Farm., 1937, 11, 49—61).—An improved prep. of acetkarbromal [$CEt_2Br\cdot CO\cdot NH\cdot CO\cdot NH\cdot COMe$ (I)] is described, and purity tests for (I), crystal-violet, and $NaAuCl_4$ are given. Solubilities have been determined.

M. H. M. A.

Drop-capillary analysis. New method of identifying pharmaceutical drugs. C. A. ROJAHN *et al.* (Pharm. Zentr., 1937, 78, 81—90, 127—131, 146—152).—The reactions of the extracts of about 270 drugs are given. 1—2 drops of the extract are placed on filter paper and are then separately treated with drops of dil. H_2SO_4 and NaOH, $Al_2(SO_4)_3$, and borax solutions. The colour reactions in ordinary and in ultra-violet light are examined; it is claimed that most drugs can be identified with certainty.

E. H. S.

Determination of cinchophen in presence of sodium bicarbonate. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 83).—The sample is dissolved in NaOH, acidified with HCl, and extracted to exhaustion with EtOH–Et_2O–$CHCl_3$ (25 : 25 : 50 vol.-%). The extract, washed with H_2O, is evaporated to dryness, and the residue, in 60% EtOH, titrated with NaOH (to phenolphthalein). E. C. S.

Identification of amytal, barbital, phenobarbital, and ethylhydrocupreine. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 80—81).—Microchemical reactions are described. E. C. S.

Antiseptics. Comparative laboratory and practical tests. G. F. Reddish (J. Amer. Pharm. Assoc., 1936, **25**, 1117—1122).—The normal methods of laboratory testing on *Staphylococcus aureus* of liquor antisepticus, N.F. IV, are described and the relation of the results thus obtained to the efficacy of the prep. in oral hygiene is discussed. F. O. H.

Preparation of tobacco extracts of high nicotine content. D. A. Souza (Chem.-Ztg., 1937, **61**, 198).—The dil. acid (H_2SO_4) extract of the comminuted tobacco is conc. and mixed with 4 vols. of 98% EtOH. The mixture is filtered and evaporated, giving an extract containing 18—21% of nicotine (I). Without EtOH treatment only 11% of (I) is present. E. H. S.

Strychnine. VII. Toxicity of *Nux vomica* preparations. J. C. Munch, J. C. Ward, and F. E. Garlough (J. Amer. Pharm. Assoc., 1937, **26**, 29—31; cf. A., 1936, 1295).—Commercial *Nux vomica* preps. vary considerably in biological activity. Total alkaloids determined by the U.S.P. X method do not agree with the biological activity; the U.S.P. XI method for strychnine gives better agreement only with a few of the samples examined. F. O. H.

Sterilisation of tutocaine in aqueous and adrenaline-containing media. G. Barattini (Annali Chim. Appl., 1936, **26**, 558—560).—Sterilisation at 100° for 1 hr. in presence of 0·15% of BzOH and 0·2% of $NaHSO_3$ gives a more stable product than does heating alone. F. O. H.

Identification of *apo*morphine, hydrastine, and theophylline. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 79—80).—The characteristic forms of the cryst. ppts. given by *apo*morphine (1 : 50) with KI, hydrastine (1 : 100) with HCl and $K_4Fe(CN)_6$, and theophylline (1 : 200) with aq. NH_3–AgCl and (1 : 150) with $HgCl_2$ are described. E. C. S.

Assay of theophylline. Anon. (J. Assoc. Off. Agric. Chem., 1937, **20**, 82).—The sample is dissolved in NaOH, acidified, and extracted 7 times with $CHCl_3$–$Pr^{\beta}OH$. The extract is evaporated to dryness and the residue weighed. The seventh extract is separately evaporated to ensure exhaustion. E. C. S.

Production of essential oils. T. Hinko (Öle, Fette, Wachse, 1937, **2**, No. 2, 14—21).—A general account, descriptive mainly of commercial-scale plant. F. C. B. M.

New method of production of terpeneless oils. W. J. D. van Dijck and A. H. Ruys (Perf. Ess. Oil Rec., 1937, **28**, 91—94).—A two-solvent process is described. *E.g.*, the oil is introduced into the middle of a slightly inclined cylindrical tube, and EtOH led in at the upper end runs in countercurrent to a stream of C_5H_{12} forced in at the lower end under slight pressure. At regular intervals gauzes separate the tube into a no. of mixing spaces, where the two phases are mixed by stirrers, and settling spaces. The products obtained are a C_5H_{12} solution of the terpenes and an EtOH solution of the oxygenated compounds. Properties of the products obtained from lemon, orange, and ginger oils are given. E. H. S.

Utilisation of residues from terpeneless essential oils. M. Brambilla (Annali Chim. Appl., 1936, **26**, 572—580).—Vaporisation of residues containing limonene, α-pinene, or cineole at 200—400° over activated C in a current of N_2 or H_2 yields cymol and menthane. F. O. H.

Vetiver oil from Jamaica. Anon. (Bull. Imp. Inst., 1937, **35**, 24—27).—A specimen prepared in Jamaica had $d_{15\cdot5}^{15\cdot5}$ 0·9970, $[\alpha]_D^{19}$ +17·8°, n^{20} 1·5243, acid val. 15·5, ester val. 10·6 (after acetylation, 117·9); the odour was not so good nor so strong as oil distilled in Europe, but is regarded (by commercial referees) as rather superior to the Java or Réunion (Bourbon) products. Notes on the distillation, yield, and uses of the oil are appended. E. L.

Volatile oil of Piperaceæ. K. Kafuku and R. Kato (J. Chem. Soc. Japan, 1935, **56**, 1150—1154).—Steam-distillation of leaves of *Piper betle*, Linn., gives 0·62% of an oil having d_4^{30} 1·024, n_D^{30} 1·5035, $\alpha_D^{16\cdot5}$ +1·00°, acid val. 50·95, ester val. 145·69. The oil contains chavibetol and allylpyrocatechol. Ch. Abs. (*p*)

Essential oil of *Torilis anthriscus*, Gmel. T. Kariyone and A. Majima (J. Pharm. Soc. Japan, 1935, **55**, 887—893).—Fruits yielded an oil having d_{22}^{22} 0·8974, $[\alpha]_D^{22}$ −95·04°, n_D^{28} 1·5343, acid val. 0, ester val. 8·23, I val. 70·7, OMe val. 0. Fractional distillation produced cadinene and *torilene* (*sulphate*, m.p. 145°). Hydrolysis of the oil gave petroselic acid and an amide, $C_{18}H_{35}ON$, m.p. 76·5°. Oleic and linoleic acids were also present. Ch. Abs. (*p*)

Species of the genus *Monarda*. I. Volatile oils. B. V. Christensen and R. S. Justice (J. Amer. Pharm. Assoc., 1937, **26**, 11—16).—Analytical data are given for the oils from *M. fistulosa*, *M. menthæfolia*, *M. pectinata*, and *M. punctata*, var. *leucantha*. F. O. H.

Resin and volatile oil in cubebs. J. F. Clevenger (J. Assoc. Off. Agric. Chem., 1937, **20**, 140—141).—Authentic cubebs had resin 6·4—8·5%, and volatile oil 12·5—20·0 vol.-% having d_{25}^{25} 0·911—0·919, α^{25} −19·7° to −46·0°, n^{20} 1·492—1·498, acid val. 0·4—1·0, and ester val. 1·0—10·7. Adulterated samples had low volatile oil content having d_{25}^{25} 0·879—0·910, α^{25} −17·3° to +22·5°, n^{25} 1·476—1·492, acid val. 0·5—1·8, and ester val. 3·6—5·4. E. C. S.

Anethole. V. A. Vuishenski (Bull. Appl. Bot. U.S.S.R., Ser. A, 1934, No. 14, 173—176).—The essential oil of *Heracleum lehmannianum*, Bge., contains 80% of anethole. The extracted plant residues may be used in the prep. of silage. Ch. Abs. (*p*)

Change in refractive index [of essential oils] with temperature variation. L. W. Bosart (Perf. Ess. Oil Rec., 1937, 28, 95—100).—Determinations of *n* at temp. between 20° and 40° of a large no. of essential oils and synthetics and the mean corrections per °C. are tabulated. E. H. S.

Determining hexylresorcinol.—See III. **Perfumes in soap. Fish-liver oils and vitamins.**—See XII. **Storage of vitamin-*C* in fruit juice. Prep. of carotene concentrates.**—See XIX.

See also A., II, 134, **Malonic and barbituric acid derivatives.** 137, **Action of $(CH_2)_6N_4$ on alkyl halides in presence of monophenols.** 145, **Determining thymol and carvacrol.** 146, **Synthesis of drugs containing the phenanthrene nucleus.** 158, **Sciadopitene from oil of *Sciadopitys verticcilata*.** 171—2, **Alkaloids.** III, 122, **Prep. of pollen extracts. Isolation of anti-anæmic principle of liver. Prep. of extract of human liver.** 125, **Purification and concn. of scarlet fever toxin.** 136, **Anti-toxic and -allergic org. prep. (Torantil) from intestinal mucous membrane.** 138, **Alkaloids of curare.** 149, **Bio-assays of adrenal preps., cortical and corticotropic hormones.** 151, **Assay of male hormone preps. Œstrogenic action of products from petroleum refining.** 153—6, **Vitamins.** 153, **Carotene of milk fat.**

Patents.

Alkyl ethers of 4-chlororesorcinol. R. R. Read, Assr. to Lambert Pharmacal Co. (U.S.P. 2,036,827, 7.4.36. Appl., 23.11.33).—Monoalkyl ethers of 4-chlororesorcinol, prepared by heating with NaOEt and alkyl halide or by other methods, are claimed as germicides. The *Bu*, b.p. 128—130°/1 mm., and n-*hexyl ether*, b.p. 152—162°/2 mm., are specifically named. R. S. C.

Manufacture of compounds of the ætio- and ætio*allo*-cholenone series. Soc. Chem. Ind. in Basle (B.P. 461,322, 12.8.35. Switz., 18.6. and 30.7.35).—Compounds of the ætio- and *allo*ætiocholanone series are converted into the corresponding Δ^4-cholenone compounds by halogenation (Br) and elimination of HHal by a hot *tert.* amine. Thus are obtained Δ^4-androstene-3 : 17-dione and -3-on-17-ol acetate. R. S. C.

Manufacture of polynuclear cyclic hydroxyketones [of the sterol series] and esters thereof. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 461,335, 19.8., 12.10., 28.11., and 18.12.35).—Compounds of the androstene series having CO at 3 and OH at 17 are obtained by partial saponification of the 3 : 17-diol di-ester to the 17-ester of the diol, oxidation (CrO_3, CuO) or dehydrogenation (S, Se, Cu, Pd, Pt, Ni, etc. alone or with a H-acceptor, *e.g.*, $C_{10}H_8$, $COPh_2$, etc.) to the 3-on-17-ol ester, and finally saponification. Preferably the OH at 3 is esterified by AcOH or HCO_2H, whilst that at 17 is combined with a more difficultly removable acid, *e.g.*, $BuCO_2H$, $NH_2{\cdot}CO_2H$, BzOH, $C_6H_{11}{\cdot}CO_2H$. Androstenediols may be similarly used after protection of the ethylenic linking by halogen. The products are isolated as semicarbazones etc. Androstane-3 : 17-diol diacetate thus affords (0·01*N*-KOH–MeOH) the 17-monoacetate and thence (CrO_3 or Pd–$CHPh{:}CH{\cdot}CO_2H$ in warm AcOH) *androstan-3-on-17-ol*, m.p. 182°. $\Delta^{5:6}$-Androstenediol, m.p. 165—166°, affords (0·045% KOH–MeOH) 17-*acetoxy*-$\Delta^{5:6}$-*androsten-3-ol*, m.p. 146—148° (also obtained by partial esterification), and thence (Br–CrO_3–Zn dust) $\Delta^{4:5}$-*androsten-3-on-17-ol*, m.p. 155° [*acetate*, m.p. 141°; the *benzoate* (I), m.p. 198—200°, *propionate*, m.p. 121—123°, n-, m.p. 111—113°, and iso-*butyrate*, m.p. 131—133°, *valerate*, m.p. 109—110°, *hexoate*, m.p. 55—57°, *palmitate*, m.p. 72—74°, and *stearate*, m.p. 79—80°, are similarly obtained from the corresponding di-esters]. $\Delta^{5:6}$-Androstene-3-*trans*-17-*cis*-diol gives similarly $\Delta^{4:5}$-*androsten-3-on*-17-cis-*ol* (II), m.p. 220—221° (*acetate*, m.p. 115°). $\Delta^{5:6}$-*Androstene*-trans-trans-3 : 17-*diol* 17-*benzoate* 3-*acetate*, m.p. 178—180°, gives the 17-*benzoate*, m.p. 222—223°, and thence (CrO_3) (I); the *benzoate*, m.p. 135—136°, of (II) is similarly obtained. cis- or trans-*Androstanediol* 17-*benzoate* 3-*acetate*, m.p. 198—199°, gives the 17-*benzoate*, m.p. 202—203°, and thence *androstan-3-on-17-ol*, m.p. 182° (*benzoate*, m.p. 203—204°). Partial esterification of androstane-3 : 17-diol, m.p. 223°, gives the 17-*acetate*, m.p. 192°, separable from the 3-acetate. CrO_3-oxidation of the diol or the corresponding 17-ester gives 17-*methyl*-, m.p. 192° [*semicarbazone*, m.p. 235° (decomp.)], and 17-*ethyl-androstan-3-on-17-ol*, m.p. 137°, 17-*methyl*-$\Delta^{4:5}$-*androsten-3-on-17-ol*, m.p. 161—162°, and *androstan-3-on-17*-trans-*ol hexahydrobenzoate*, m.p. 165—166°. *Androstane*-3 : 17-trans-trans-*diol* 3-*acetate* 17-*hexahydrobenzoate* (from the $\Delta^{5:6}$-compound), m.p. 133—134°, gives (cold 0·1*N*-KOH–MeOH) the 17-*hexahydrobenzoate*, m.p. 167—168°, also obtained from the $\Delta^{5:6}$-compound. Similarly are prepared *androstane*-3-trans-17-cis-*diol* 3-*acetate* 17-*hexahydrobenzoate*, an oil, and 17-*hexahydrobenzoate*, m.p. 206—208°, and *androstan-3-on*-17-cis-*ol*, m.p. 179—181·5° (*hexahydrobenzoate*, m.p. 136—137°). R. S. C.

Manufacture of compounds of the *cyclo*pentanopolyhydrophenanthrene series. Schering-Kahlbaum A.-G. (B.P. 461,895—6, 22.8.35. Ger., [A] 22. and [B] 23.8.34).—(A) Pregnen-3-ol-20-one and MgMeI give a diol, dehydrated by distillation to a dienol, the acetate of which adds Br only at the cyclic ethylenic linking and thus affords by oxidation (*e.g.*, O_3), dehalogenation, and hydrolysis 3-*hydroxyætio*allo*cholen-17-one*, m.p. 148° (? polymorphous form, m.p. 137°; *acetate*, m.p. 168°). (B) *allo*Pregnan-3-ol-20-one and MgMeI give a diol, which with an excess of MgMeI or when heated in vac. gives the dienol; oxidation then affords the keto-alcohol $C_{19}H_{30}O_2$, m.p. 170°. Hydrogenation (Pt) of the ozonide gives the corresponding *diol*. (A, B) Similar reactions are also claimed. R. S. C.

Parasiticide. F. F. Lindstaedt, Assr. to G. D. Turnbow (U.S.P. 2,036,638, 7.4.36. Appl., 15.6.29).—The toxicity of alkaloids (preferably nicotine) is so reduced by admixture with an org. colloid (preferably kamala, about 12 pts.) that 70—80 mg. can be administered to chickens in a gelatin capsule as a vermifuge for roundworms. R. S. C.

[Preparation of] cinchona alkaloid derivatives [β-hydroxyethyl*apo*quinine]. L. H. Cretcher, W. L. Nelson, C. L. Butler, and A. G. Renfrew (B.P. 461,373, 27.11.35).—*apo*Quinine is treated with standard hydroxyethylating agents ($CH_2Cl\cdot CH_2\cdot OH$ and the Na or K derivative in EtOH); the *p*-hydroxyethyl derivative produced forms a *dihydrochloride*, m.p. 228° (decomp.).
H. A. P.

Mixture and method of admixing sodium morrhuate and quinine solution. F. R. Greenbaum, Assr. to Nat. Drug Co. (U.S.P. 2,037,196, 14.4.36. Appl., 25.4.34).—A mixture of Na morrhuate, quinine, and $CH_2Ph\cdot OH$ is specified.
E. H. S.

Substituted barbituric acids. F. Boedecker, H. Gruber, and J. D. Riedel–E. De Haen A.-G. (B.P. 462,573, 24.1.36).—Stable aq. solutions of the Na 3-methyl- or -ethyl-5-alkyl- or -*cyclo*alkyl-5-β-halogenoallylbarbiturates or similar salts are obtained by mixing the pure salts with a sol. pyrazolone [1-phenyl-2 : 3-dimethyl-5-pyrazolone (I) or its 4-OMe-derivative]. Neutral barbiturates are prepared by adding alkali to a mixture of acid and glycerol and filtering off excess of acid. *E.g.*, 3-methyl-5-*iso*propyl-5-β-bromoallylbarbituric acid (220), glycerol (200), *N*-NaOH (600), and H_2O (200) are shaken for 2 hr., filtered into a solution of (I) (200) in H_2O (200 g.), and then diluted to 2 litres. *iso*-Propylbarbituric acid (340), *N*-NaOH (2000), and $CH_2Br\cdot CBr\colon CHMe$ (470 g.) at 85° give 5-iso*propyl-5-β-bromocrotonylbarbituric acid* (55%), m.p. 202—203°, which with Me_2SO_4–NaOH gives *3-methyl-5-*iso*propyl-5-β-bromocrotonylbarbituric acid*, m.p. 113°; the Na salt (200 g.) is dissolved in 1 litre of 20% aq. (I) and diluted to 2 litres. R. S. C.

Cigarette. A. H. Low, Assr. to C. Whitehead and A. L. Vogl (U.S.P. 2,028,552, 21.1.36. Appl., 15.10.32).—The use of paper impregnated with aq. Na silicate (*d* 1·03) containing KNO_3 3% is claimed to improve burning and prevent flaking of the ash.
L. C. M.

Extraction and concentration of vitamins. Aarhus Oliefabrik A./S., and C. E. Christensen (B.P. 461,202, 8.10.35).—Oils or fats, mixed with a purified hydrocarbon and/or $COMe_2$, are saponified with alkali. The solvent extract is separated and the vitamin isolated by evaporation. E. H. S.

Production of vaccine lymph. K. Sukegawa (B.P. 461,000, 1.7.35).—Smallpox virus is cultivated in a medium prepared from a neutralised mixture of meat juice, salt, sugar, and a degraded albumin, *e.g.*, peptone, to which are added a suitable hormone and, if desired, the active elements of a bird's ovum obtained during the process of its hatching.
E. H. S.

Preventive inoculation, more particularly for peritonitis. B. Steinberg, Assr. to Toledo Hospital (U.S.P. 2,039,940, 5.5.36. Appl., 25.4.34).—The injection comprises killed colon bacilli in an aq. suspension of gum tragacanth. B. M. V.

Improvement in biological process [detection and standardisation of toxins and antitoxins]. G. Shwartzman (U.S.P. 2,036,649, 7.4.36. Appl., 19.3.32).—The nature of toxins and antitoxins is detected by the Shwartzman phenomenon, which is also used to find the amount of toxin required to neutralise an antitoxin of known strength or *vice versa* and thus to standardise the toxin or antitoxin.
R. S. C.

Derivatives of *o*-nitroanilines etc. Imidazole dihydrides.—See III. **Perfume-emitting soaps.**—See XII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

General indications for the preparation of photographic emulsions. A. Steigmann (Chem.-Ztg., 1937, **61**, 173—175).—A brief review is given of the theories relating to the properties of photographic emulsions, and an attempt is made to formulate approx. general rules for the effects to be expected by variations in the prep. of the emulsions, *e.g.*, the time of ripening, temp. effects of excess of salts, addition of iodide, etc. J. L.

Change of sensitivity and latent image of some photographic emulsions in the course of time. A. van Kreveld and J. C. Scheffer (Physica, 1937, **4**, 76—80).—Tests with various emulsions showed no systematic change in the sensitivity, the latent image, or the fogging of unexposed parts of the negatives during 14 months. H. J. E.

Combination of developers of phenolic function with those of amine function. New combination of *o*-phenylenediamine and pyrocatechol. A. Seyewetz (Bull. Soc. Franç. Phot., 1936, **23**, 253—256).—A new developing *compound* is formed from an equimol. combination of pyrocatechol and *o*-$C_6H_4(NH_2)_2$; it has m.p. 53°, solubility in H_2O 2·5% at 15° and 25% at 100°, and is stable. It forms a satisfactory developer with Na_2SO_3, Na_2SO_4, and KBr, giving no better results than the component substances, except that it produces a finer grain, approaching that of the special fine-grain developers. If made up with NaOH, the development time is reduced, but the grain is coarser. J. L.

Tests with the selenium toning bath. E. van Beugen (Focus, 1935, **22**, 221—222).—A bath formed by dissolving Se in an alkali sulphite solution gave a suitable coloration when acting directly on fine-grain images (chloride or chlorobromide), but not on coarser (bromide) images. The coarser grain are favourable to a good colour and image quality when a bleach is used before the Se bath (to which Na_2S has been added). Ch. Abs. (*e*)

Formation of chemical fogging by the presence of small quantities of metallic salts in photographic developers. A. Seyewetz (Bull. Soc. Franç. Phot., 1936, **23**, 256—258).—The presence of 1 pt. of Cu (as $CuSO_4$ or other salt) in 4×10^6 pts. of developer will cause appreciable fogging. This concn. is not detected by Werner's reaction. The fogging is increased with increase of [Cu], up to 0·1 g. per litre, after which the fogging again decreases, that with 3 g. per litre of Cu being = that with 0·01 g. Other metallic salts (Pb, Hg, Fe, Ce, Cr, Ni, Co, Mn, Zn, Al, Sn) do not cause fogging. J. L.

Possible causes of [photographic] graininess. D. A. Spencer (Phot. J., 1937, **77**, 161—163).—The wash-H_2O employed when making fine-grain pictures should be at the same temp. as the developing and fixing baths; running H_2O will thus be impracticable, but several changes of H_2O, keeping the film moving, are quite sufficient, and need not take $>$ 2 or 3 min. Hardening baths should shorten the washing time. J. L.

[Photographic] image reversal by diffuse after-exposure. Lüppo-Cramer (Phot. Ind., 1937, **35**, 280—281).—A plate desensitised with a dye + KBr and exposed under a wedge shows traces of reversal points, corresponding to original fog; if diffusely after-exposed, a completely reversed image is obtained, due to fogging of the background after destruction of the original ripening nuclei. This reversal may be imitated chemically, after washing out the dye as far as possible, by fogging with $AgNO_3$ solution (other agents, *e.g.*, H_2O_2, are not effective); the mechanism is thus proved, but has no practical application, as spotting is easily produced. J. L.

Bromoil prints on ordinary enlargement paper. F. L. English (Amer. Phot., 1935, **29**, 290—296).—Operating details are given. Ch. Abs. (*e*)

Rôle of protective colloids in photography. Lüppo-Cramer (Kolloid-Z., 1937, **78**, 344—348; cf. B., 1937, 394).—Fogging produced by the action of alkaline developers on AgBr collodion emulsions is diminished by preliminary soaking in 0·5% solutions of the following, in the order of effectiveness given: peptone $>$ albumin $>$ gelatin $>$ gum arabic. AgBr plates free from binding material have also been examined with respect to fogging and the action of desensitising dyes. F. L. U.

Colour reproduction in photography with neon light. J. A. M. van Liempt and P. Leydens (Rec. trav. chim., 1937, **56**, 26—28).—Reproduction is good on orthochromatic plates. Panchromatic plates require addition of Hg light; reproduction is deficient in the yellow. A. J. E. W.

Present position of colour kinematography. H. Socher and E. von Oven (Angew. Chem., 1937, **50**, 209—212).—A review.

See also A., I, 201, **Taking *X*-ray photographs [of steels etc.]**.

Patents.

Photographic emulsion. O. C. Morrison (U.S.P. 2,038,307, 21.4.36. Appl., 15.8.34).—An emulsion claimed to be particularly sensitive to light of different colours is prepared by adding to a AgBr emulsion small amounts (about $\frac{1}{4}$ of the amount of Ag) of Cr^{II} alum (for purple), CsBr (for blue), TlOH (for green), $Cr(OH)_2$ (for yellow), and RbBr (for red), in the order given. Exact proportions are given. J. L.

Light-sensitive material for colour photography. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 461,559, 13.7.35).—The different layers of a multi-layer film are separated by a layer which remains impermeable to treating liquids until suitable reagents have rendered it permeable. Thus the top emulsion may be developed and dyed and the lower layer treated subsequently. The intermediate layer consists of gelatin with (*a*) acetylcellulose, which is impermeable until saponified with alcoholic KOH, or (*b*) a substance impermeable to acid but dissolving in alkali, *e.g.*, maleic anhydride–colophony condensation product, or (*c*) a substance impermeable to alkali but permeable to acid, *e.g.*, diphenylguanidine. The practical use of such films is described. J. L.

Application of silver halide colloid layers without distortion of future printing forms. L. N. Reddie. From N. V. Nederl. Lab. de Spaarnestad (B.P. 460,141, 18.6.35).—The emulsion layer is mounted on a carrier of porous, unsized paper, *e.g.*, blotting paper. After exposure, the emulsion is applied to the metal printing form in a substantially dry state, *i.e.*, moistened only superficially, enough to cause adherence. The moistening is done with H_2O, or, preferably, the alkaline part of the developer, *i.e.*, aq. KOH. The emulsion is then developed and hardened selectively, in one or two stages, as desired; the developer will easily penetrate the paper. The printing form is then etched in the usual manner, or the gelatin relief is used for imbibition printing. J. L.

Non-halation photographic film. A. D. Slack, Assr. to Eastman Kodak Co. (U.S.P. 2,036,440, 7.4.36. Appl., 18.2.31).—The film is coated with an antihalation backing comprising a carrier, permeable to but insol. in H_2O, carrying a layer of dye predominantly on the outer surface. The dye should be insol. in H_2O or developing solutions, but sol. in solvents attacking the film support. The carrier material is a protein sol. in alkaline baths, *e.g.*, casein, gliadin, glutenin, or mixtures of these. The dye may be applied only on the outside, or may partly be made to penetrate the carrier by adding a little H_2O to the solvent. On processing the film, the carrier dissolves and the dye separates off in fine particles, without staining the film or base. J. L.

Quickproof process film. L. G. Simjian, Assr. to Noel Associates, Inc. (U.S.P. 2,036,369, 7.4.36. Appl., 30.10.31).—A transparent base is coated on one side with a fast emulsion and on the other with a print-out emulsion; the latter may be covered with a waterproof coating. After exposure of the fast emulsion, development, and fixing, the film is exposed to a bright light, thus forming a print on the under layer, which can then be stripped off for inspection. If the intermediate base is semi-transparent (opal) the print can be seen from the back without stripping. J. L.

Light filters. I. G. Farbenind. A.-G. (B.P. 462,249, 4.9.35. Ger., 4.9.34).—Highly transparent infra-red filters, with sharply defined absorption limits, are obtained by the use of di-, tri-, tetra-, and penta-carbocyanines, used in colloid layers. Gelatin is especially advantageous, because it increases the stability of these dyes to light. Other filter dyes, either in the same or in a different layer, may be used in conjunction with them. F. M. H.

Stripping and transferring photographic films. Paper Patents Co. (B.P. 462,286, 4.6.35. U.S., 23.11.34).—The film is coated first with a rubber solution and then with collodion. When these have dried, the film is soaked in H_2O and fixed in a registering device. A thin celluloid transfer sheet is squeegeed on to the film in register, and the sheet and film are stripped off together; they are then squeegeed down in register on the new support, and the transfer sheet is peeled off. The method is applied to the assembling of several films on a large glass plate for combined printing. J. L.

Photographic developers. E. Fournes and H. Diamant-Eerde (B.P. 459,908, 12.12.35. Austr., 31.12.34).—The keeping properties of one-solution conc. developers are greatly improved when the latter contain caustic alkali and a sugar (glucose etc.), which protects the developing compounds from oxidation by absorption of atm. O_2. Single developing and fixing solutions may also be prepared thus, a high [NaOH] being used together with the sugar, when development can occur rapidly, before the $Na_2S_2O_3$ in the solution begins to act. J. L.

Photographic desensitisers. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 461,890, 20.8.35).—A desensitiser which is colourless, not flocculated by antihalation dye, and decolorises this dye is formed from a solution of a H_2O-sol. anthraquinone derivative with $\nless 2\%$ of Na_2SO_3 (calc. as anhyd. salt). Sp. mixtures claimed are 40 g. of Na_2SO_3 with 1 litre of H_2O and (*a*) 1 g. of Na 1-nitroanthraquinone-7-sulphonate, (*b*) 0·5 g. of Na anthraquinone-2-sulphonate, (*c*) 0·5 g. of Na 1-chloroanthraquinone-2-carboxylate, or (*d*) 0·5 g. of Na anthraquinone-2-carboxylate. Desensitising power = that of pinacryptol-green etc. is claimed. J. L.

Manufacture of ferroprussiate paper and production of prints therefrom. L. R. Harper and D. W. Powell (B.P. 461,893, 22.8.35. Addn. to B.P. 427,746; B., 1935, 702).—H_3PO_4, HPO_3, or $H_4P_2O_7$ is added to either the sensitiser or the developer described in the prior patent; improved stability of the unexposed blue background and improved clarity of the lines are obtained. Use of an oxidising agent (dichromate) in the developer is advantageous. Mg, Sr, or Al salts may be used in place of Ca salts, but the latter are preferred alone or in admixture with Mg salts. J. L.

Taking of photographic pictures on lenticular element films. Opticolor A.-G. (B.P. 459,634, 22.4.36. Ger., 26.4.35).—A film protected against halation is used in conjunction with a multiple-zone filter in which small, transverse, less coloured or uncoloured portions are located near the centre of the zones. J. L.

Treatment of photographic images and materials for use therein. P. H. Jameson (B.P. 461,891, 21.8.35. U.S., 19.9.34).—Prints are retouched, unwanted blackened areas being removed or reduced, by application of a non-aq. I solution to the dry print, reaction occurring on immersing the latter in H_2O or by steaming, followed by fixing or redeveloping to a warm tone etc. Alternatively, the print may be totally immersed in a control medium, and the I solution applied afterwards, as required (*e.g.*, in stages). This solution is a complex mixture of I, iodides, alcohols, rape-seed oil, etc. in alcohols; the control medium is a complex mixture of $Na_2S_2O_3$, $CS(NH_2)_2$, H_3BO_3, alcohols, a little H_2O, and modifying agents. A vitiating solution [*e.g.*, $CS(NH_2)_2$, BuOH, with other ingredients) may be employed to counteract the I solution when necessary; thinning medium may also be used. The procedures and precautions are described in detail. J. L.

Colour photography. D. K. Allison (B.P. 462,232, 27.8.35).—Colour-separation negatives are prepared by means of a bi-pack comprising an orthochromatic film (*O*), recording blue and green, and a panchromatic film (*P*), recording green, yellow, and red. Positive prints are made from these on double-coated film and suitably dyed or toned red and blue, respectively. A third, yellow, print is then added by (*a*) preparing a duplicate negative of *O*, etching this to yield a positive relief matrix, from which a yellow print is photomechanically printed on top of the red image, or (*b*) a positive is printed from *P*, and before development a further image is printed on it from the uncoloured double-coated film; the combined images are developed and reverse-etched as before, and the matrix is used for making the yellow print. The second method excludes any record of greys and blacks from the yellow image. J. L.

Colour photography. A. B. Clark, Assr. to Technicolor, Inc. (U.S.P. 2,032,401, 3.3.36. Appl., 4.9.31).—Correction of colour vals. is obtained by adding to each partial-colour record auxiliary records of the higher densities only in the colours of the other partial-records. This is accomplished by preparing the final picture from three imbibition matrices which have been dyed each with the correct fast principal dye and also with small amounts of easily washed-out dyes of the other two colours; on washing these matrices, the auxiliary dyes will be removed from all except the higher densities. Alternatively, very light prints (*i.e.*, recording only high densities) may be prepared from each colour-separation negative in the colours of the other two main positives, and these auxiliary prints are then incorporated together with the three usual positives. The auxiliary prints may alternatively be in black. The extent of the corrections is related to the characteristic curves required for each colour. J. L.

Production of coloured pictures, particularly in natural colours on paper, films, and the like. F. Lierg (U.S.P. 2,036,945, 7.4.36. Appl., 15.3.34. Austr., 15.10.32).—Printing paper or film with a colloid surface containing reagents [*e.g.*, $Fe_2(SO_4)_3$, $PbBr_2$, and dimethylglyoxime] which yield coloured ppts. with suitable electrolytes [*e.g.*, $K_4Fe(CN)_6$, K_2CrO_4, and a Ni salt, respectively] is brought in contact in the required order with colloid printing matrices (partial-colour records) charged with the requisite electrolyte. The electrolyte is transferred to these matrices from a colloid layer on an endless celluloid band which dips into a suitable bath during part of its journey around suitable rollers; other rollers lead the matrices in contact with this band and afterwards in contact with the printing paper etc. The apparatus is designed to print consecutively the three colours required. J. L.

Production of coloured photographic pictures. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 461,006, 5.7.35).—A multi-layer film for colour photography comprises three emulsion layers with intermediate filter layers of inert dyes. After exposure, development, and fixing, the Ag images are reconverted into Ag halide. The top (blue-sensitive) emulsion is exposed by blue light and colour-developed to a yellow image; the bottom (red-sensitive) emulsion is exposed through the back by blue light and developed to a blue-green image. The filter dyes are then dissolved out with, *e.g.*, $Na_2S_2O_4$, the middle layer is toned or developed to a red image, and the Ag removed from all layers. A fully coloured negative is thus obtained, from which correctly coloured positives may be prepared by the same process. J. L.

Production or reproduction of pictures in colours. B. Bubnoff (B.P. 459,749, 15.4.35).—The picture to be reproduced is scanned by reflected or transmitted light, which then falls on a photoelectric cell for controlling the jet of colouring material delivered from a compressed-air atomiser on to a suitable paper base. The colouring matter is pre-atomised at a desired pressure in a separate chamber, from which the jet is directed. Several copies, enlarged or reduced as required, may be produced simultaneously; by use of partial-colour records of a multicolour picture, with suitable filters, multi-colour copies may be produced. Suitable optical and atomising apparatus is described. J. L.

Colour kinematography. W. W. Triggs. From W. T. Crespinel (B.P. 462,353, 4.6.35. Cf. B.P. 459,234; B., 1937, 294).—Two colour-separation negatives are printed on to film bearing two emulsions on one side, these emulsions being separated by a gelatin layer. The bottom emulsion may be dyed yellow; one negative is printed through the base of the positive film. The top emulsion only is then bleached and mordanted with a solution of KI_3, KI, and AcOH, and the film immediately rinsed and passed through a stop-bath of, *e.g.*, $KHSO_3$, and then thoroughly washed. This bleached image is then dyed with, *e.g.*, safranine and/or chrysoidine Y. The bottom image is then toned blue with a Fe^{III} toner (preferably containing AcOH in place of the usual HCl). The sound record on the film, printed on to both emulsions, will appear substantially black, as it combines both red and blue images. J. L.

Manufacture of a stencil. M. C. Beebe, Assr. to Scovill Manufg. Co. (U.S.P. 2,038,339, 21.4.36. Appl., 11.7.34).—A thin metal plate is coated with a dichromated gelatin layer bearing a light-hardened design; this plate is secured at the back, by glue, to fabric. The glue is protected by a coating of, *e.g.*, asphaltum on the back of the fabric. The non-design part of the plate is etched away; the front of the plate and fabric is coated with a heat-hardening synthetic resin, and the whole dried at nearly 100°; the asphaltum coating is dissolved away, and the stencil baked for 1 hr. at about 135°. When the resin has hardened, the film under the design portion of the plate is removed with sandpaper, the gelatin layer also being removed; the metal is then removed by etching. The stencil (in hardened resin) is finally secured in a suitable frame, and is ready for use. J. L.

Planographic printing plate and process. A. W. Stephenson, Assr. to Lenzart Co. (U.S.P. 2,031,185, 18.2.36. Appl., 30.3.31).—The image from a half-tone screen-positive plate is printed on to a Cu plate coated with dichromated fish-glue enamel, which is developed, baked, treated with aq. AcOH or KCN, and washed. The unenamelled portions of the image are then electro-plated with Ni to approx. half the enamel thickness, and the enamel is removed by an abrasive; the exposed Cu is silvered by rubbing with aq. $AgNO_3$ containing KCN, and finally the silvered portions are amalgamated by rubbing with a mixture of Hg and $CaCO_3$. L. C. M.

Graining and surfacing of metal photolithographic and offset press plates. J. G. Goedike (U.S.P. 2,037,716, 21.4.36. Appl., 9.3.35).—The metal plate is freed from grease by washing with, *e.g.*, C_6H_6, and dried. One surface is coated with a solution of gum arabic and HF. The dry plates are piled in the grainer, and the marbles and abrasive worked after pouring over more coating solution. After graining, the plates are washed, and before drying another coat of the solution is applied, and, after drying, the plates can be stored. For photolithographic use, the plates are washed, re-coated with gum–HF and then with dichromated albumin. The method is designed to obviate any trace of grease settling on the plate at any stage. J. L.

XXII.—EXPLOSIVES; MATCHES.

Heat of combustion of smokeless powder. P. de Pauw (Z. ges. Schiess- u. Sprengstoffw., 1937, **32**, 10—12, 36—37, 60—63).—A simpler method than the usual one for determining the apparent heat of combustion of smokeless powders is described, taking into account the temp. at which the water-gas reaction is frozen. In ascertaining the effect of added substances [$COMe_2$, EtOH, $C_6H_3Me(NO_2)_2$, diphenylurea, vaseline, etc.], a method is shown for determining their characteristics, these being the differences in the heat effects of powders burnt alone or when mixed with 1% of the substance. Vals. for these characteristics are given. Heats of combustion of mixtures of various nitroglycerin (I)–nitrocellulose compositions and these substances, as well as of pure (I), are tabulated. W. J. W.

Theory of detonation. G. Schweikert (Z. ges. Schiess- u. Sprengstoffw., 1937, **32**, 63—65).—Polemical against Schmidt and Becker (cf. B., 1935, 607, 1086; 1936, 1181). W. J. W.

Specific detection of yperite [ββ′-dichlorodiethyl sulphide, mustard gas] in air. H. Eichler (Österr. Chem.-Ztg., 1937, **40**, 81).—Yperite (I), as the only poison gas containing S, is detected by oxidation to SO_4''. Air ($\nless$1 litre) is bubbled through

5 c.c. of H_2O. S'' and SO_4'', if present, are pptd. by adding $CuCl_2$ and $BaCl_2$. (I) is then oxidised by $KMnO_4$, whereby $BaSO_4$ is pptd. Limiting concn., 0·07 mg. of (I) per litre. J. S. A.

Industrial chemical-defence preparations. A. J. der Weduwen (Chem. Weekblad, 1937, **34**, 179—180).—The possibility of manufacturing sufficient quantities of war chemicals in Holland is discussed. S. C.

Scheme for air defence and protection. Active protection regulations. A. J. Maas (Chem. Weekblad, 1937, **34**, 115—118).—An account is given of the anti-gas organisation in Holland. S. C.

Possibility of protecting large industrial concerns with high concrete buildings against attacks from the air. J. H. de Boer (Chem. Weekblad, 1937, **34**, 175—177).—The best methods of making such buildings invisible are discussed. S. C.

Nitrocellulose.—See V.

See also A., I, 191, **Velocities of explosion waves.**

Patents.

Priming mixture. J. E. Burns, Assr. to Remington Arms Co., Inc. (U.S.P. 2,038,097, 21.4.36. Appl., 1.7.31).—Zr powder may be used as a fuel. A suitable composition contains tetrazene 3, Pb trinitroresorcinate 27, $Pb(NO_3)_2$ 40, Zr 7, Sb_2S_3 14, $Pb(CNS)_2$ 9%. W. J. W.

Combustion-train elements and fuses for blasting and pyrotechnic and like purposes. J. S. B. Fleming, R. C. Payn, and Imperial Chem. Industries, Ltd. (B.P. 461,648, 21.8.35).—Black powder or other fuse material is suspended in H_2O saturated with the sol. material (*S*) of the powder and to the suspension is added 5—20%, calc. on the total dry product, of fibrillated cellulose; the suspension is drained to form a felt and dried. A neutral, volatile, H_2O-sol. agent to reduce the solubility of *S* may be present. B. M. V.

Delay-action detonators and fuses and delay compositions for use therein. C. E. Sosson, and Imperial Chem. Industries, Ltd. (B.P. 462,000, 29.8.35).—The delay element consists of a mixture of Sb and $KMnO_4$ to which 5—25% of Zn is added, to facilitate ignition, and a small amount of an inorg. inert substance ($PbCrO_4$, ZnO), to modify the burning speed. The composition is compressed into a Pb tube. W. J. W.

[Nitrocellulose] propellent powder. G. C. Hale and D. R. Cameron (U.S.P. 2,035,471, 31.3.36. Appl., 18.9.35).—2—10% of triacetin is mixed with the nitrocellulose as a muzzle flash-reducing agent. W. J. W.

Production of explosives. B. Parodi-Delfino (B.P. 461,564, 16.8.35. It., 18.8.34).—Pentaerythritol tetra-acetate may be used in propellent explosives as a gelatinising or cooling agent, and in bursting charges, in admixture with pentaerythritol tetranitrate and/or aromatic NO_2-compounds and inorg. nitrates, to lower the m.p. and reduce hygroscopicity, and as a phlegmatising agent. W. J. W.

Production of acetylated alkyltrimethylolmethanes and their use [in explosives]. B. Parodi-Delfino (B.P. 461,623, 17.8.35. It., 17.8.34). Triacetates, $CR(CH_2{\cdot}OAc)_3$ (prepared by means of Ac_2O), particularly the *compound*, R = Me, b.p. about 400°/760 mm., 200°/8 mm., are mixed (*e.g.*, 2—8%) with explosives to phlegmatise them. Such mixtures can be rolled or drawn without a solvent. R. S. C.

(a, b) Nitration of sugars (b) and their glucosides. J. S. Wyler, Assr. to Trojan Powder Co. (U.S.P. 2,039,045—6, 28.4.36. Appl., 25.5.34).—Sugars, *e.g.*, sucrose, glucose, fructose, lactose, or a glucoside thereof, when nitrated by H_2SO_4 and a nitrating acid gave (a) in presence of an org. liquid of low η and which is substantially insol. in the spent acid, *e.g.*, EtOH, $EtNO_3$, PrOH, $PrNO_3$, Bu_2O, $(C_2H_4Cl)_2O$, $C_2H_4Cl_2$, $C_2H_2Cl_4$, higher yields of a nitrated product which is more readily separated from the reaction mixture; and (b) in absence of any solvent, a viscous plastic nitrated material which is obtained in a state suitable for further use, *e.g.*, in explosives, by treatment with a suitable org. solvent which is insol. in H_2O, combustible, O-deficient, and uneffected by spent acid, *e.g.*, $PhNO_2$, $C_6H_4Me{\cdot}NO_2$, alkyl nitrates, aliphatic ethers and Cl-derivatives thereof, chlorinated paraffins, alkyl carbonates, nitrated esters of OH-acids. N. H. H.

Detecting the presence of mustard gas. O. H. Dräger (B.P. 462,822, 12.8.35. Addn. to B.P. 431,809; B., 1935, 900).—Mustard gas $[(CH_2Cl{\cdot}CH_2)_2S]$ is detected by aspirating a stream of contaminated gas or air through a test-tube packed with SiO_2 gel impregnated with a salt of Au, Pt, Pd, or Cu^I, preferably an aq. solution of $AuCl_3$. Excess of the metal salt solution is destroyed by means of a reducing agent. D. M. M.

Shot-gun cartridges. H. A. Roberts and W. Dickson (B.P. 461,253, 12.8.35).

[Electrical] cartridge fuses. E. Whiteley, jun., and Wo-Bar Manufg. Co., Ltd. (B.P. 461,233, 3.9.36).

Pentaerythritol tetranitrate.—See III.

XXIII.—SANITATION; WATER PURIFICATION.

Dust disasters. Consequences, causes, and control of dust explosions. D. J. Price (Food Ind., 1935, **7**, 529).—A discussion. Ch. Abs. (*e*)

Magnesium and calcium chlorides as dust preventives. P. Höfer (Chem.-Ztg., 1937, **61**, 255—257).—From a calculation of the v.p. of saturated solutions $CaCl_2$ is 9—14% more efficient as a dust preventive than $MgCl_2$, wt. for wt. On the other hand, the solution of $MgCl_2$ is more dil. and will therefore hold more dust, which also sinks in it more readily. It is claimed that the wetting power of $MgCl_2$ is the greater. C. I.

Determination of fumigants. VIII. Sampling from small spaces. A. B. P. Page and O. F. Lubatti (J.S.C.I., 1937, **56**, 54—61t; cf. B., 1937, 34).—Different types of small spaces in ships and houses and their penetration by fumigant are described. Vols. of intergranular spaces in goods and in glass beads are determined and compared. An expression for the permissible vol. of a gas sample is developed and tested. Sampling from various goods by different methods is described.

Prevention of disease in industry. D. HUNTER (Inst. Chem. Eng., Mar., 1937. Advance proof, 10 pp.).—A lecture. S. M.

Air protection in industry. L. H. SAUTER (Chem. Weekblad, 1937, **34**, 171—175).—An account of protective measures to be taken in the mining area of South Limburg. S. C.

Regulations against air attack in dwelling houses. A. BURGDORFFER (Chem. Weekblad, 1937, **34**, 167—171).—A discussion on the provision of suitable shelters against air attack. S. C.

Protecting the individual from gas. A. J. DER WEDUWEN (Chem. Weekblad, 1937, **34**, 118—124).—An account is given of the development and uses of various types of gas mask. S. C.

Decontamination. C. W. VAN HOOGSTRATEN (Chem. Weekblad, 1937, **34**, 177—179).—Methods in use against the various gases are discussed. Decontamination with large quantities of running H_2O, supplemented by alkaline liver-of-S solution and/or bleaching powder, is usually effective. S. C.

Examination and storage of rubber parts for gas masks. D. J. VAN WIJK (Chem. Weekblad, 1937, **34**, 163—167).—Details of various methods of testing rubber parts of gas masks used at the Netherlands Govt. Rubber Inst., including determinations of elasticity, elongation at the breaking point, degree of attachment to fibre and rubber, Cu, Mn, and oxidation products contents, are described. The durability is measured by the amount of oxidised products before and after carrying out Geer–Evans and Bierer–Davis accelerated-ageing tests. Rubber parts are best stored in N_2, but, if this is impracticable, storage in cool, moist (R.H. 75%) air is recommended. Storage in an atm. saturated with paraffin vapour is less satisfactory. S. C.

Determination of carbon dioxide in air. Hand-operated apparatus. J. G. WAUGH (Ind. Eng. Chem. [Anal.], 1937, **9**, 96—100).—Apparatus and technique are described, by means of which CO_2 in a 2·5-litre sample of air can be determined with an average error of 1%. E. S. H.

Phenol coefficient as a measure of the practical value of disinfectants. J. C. VARLEY and G. F. REDDISH (J. Bact., 1936, **32**, 215—225).—The PhOH coeff. is a satisfactory measure of bactericidal efficiency if the factor 20 × coeff. is adopted as the basis of calculation of dilution in practice. A. G. P.

Mosquito suppression in Canada, 1934. A. GIBSON (Proc. 22nd Ann. Meet. New Jersey Mosquito Exterm. Assoc., 1935, 77—91).—Use of emulsions of various oils is described. Effects of supplementary admixture of S, derris, and nicotine on pupæ and larvæ are examined. Derris–infusorial earth dusts with which oil is incorporated gave excellent results. CH. ABS. (*p*)

Larvicides: temporary protection from adult mosquitoes in limited areas. J. M. GINSBURG (Proc. 22nd Ann. Meet. New Jersey Mosquito Exterm. Assoc., 1935, 147—151).—A pyrethrum–kerosene–wool fat prep. is described. It is effective against pupæ and temporarily controls adult mosquitoes. CH. ABS. (*p*)

Efficacy of insecticidal sprays in destruction of adult mosquitoes. J. A. SINTON and R. C. WATS (Rec. Malaria Survey India, 1935, **5**, 275—306).—A pyrethrum–oil prep. containing oil of citronella, sassafras, or pine gave satisfactory control. The efficiency of the spray increased with rising temp. and decreased with rising R.H., and was greater against anophelines than against culicines. CH. ABS. (*p*)

Use of copper and chloroamines in water purification. A. E. GRIFFIN (Amer. J. Publ. Health, 1937, **27**, 226—232).—When using NH_3 and Cl_2 for H_2O treatment, either can be added first, and to obtain the best results with different conditions their ratio varies widely. The success of $CuSO_4$ for control of resistant algal growths depends on its close adjustment to both the NH_3 and Cl_2 feeds. O. M.

Water softening by permutit process with reference to hygienic conditions of household use of softened water. H. F. KUISEL (Monats-Bull. schweiz. Ver. Gas- u. Wasserfach., 1935, **15**, 37—43; Chem. Zentr., 1935, ii, 1760).—A comparative review of the use of various commercial base-exchange H_2O softeners. H_2O of 1·7—2·8° hardness is recommended for domestic use rather than completely softened H_2O. J. S. A.

Ozone solves colour, odour, and taste problem in Hobart (Ind.) plant. T. A. FERKINHOFF (Amer. City, 1935, **50**, No. 11, 47—48).—Ozonisation of H_2O after filtration removes vegetable flavour and odour, reduces the colour index, and has an appreciable germicidal effect. CH. ABS. (*p*)

Permanent chlorine standards [for water]. F. E. DANIELS (Public Works, 1935, **66**, No. 11, 26).—Prep. of $K_2Cr_2O_7$–$CuSO_4$ standards for the tolidine (I) test is described. In checking standards (I) must be added to the dilution H_2O prior to addition of the titrated Cl_2 solution. CH. ABS. (*p*)

Standards for residual chlorine tests [of water]. R. D. SCOTT (Water Works, Sewerage, 1935, **82**, 399—400).—Buffered CrO_4''–Cr_2O_7'' solutions are preferred to the customary $K_2Cr_2O_7$–$CuSO_4$ standards, on the ground of greater flexibility and broader range (0·01—3·0 p.p.m. of Cl_2). Stability of standards is max. at p_H 6·3—6·7 (6 weeks in sunlight). CH. ABS. (*p*)

Sources of error in detection of ammonia in drinking water by means of Nessler's reagent. A. REUSS (Z. Unters. Lebensm., 1937, **73**, 50—51).—Moderate amounts of Fe and small amounts of H_2S in the H_2O cause apparent positive reactions. K Na tartrate will inhibit the reaction when traces of NH_3 are present. KOH and NaOH are with difficulty freed from traces of NH_3; a procedure for removing such traces is described. E. C. S.

Safe-handling of chlorine and ammonia in water-works plants. H. H. Gerstein (J. Amer. Water Works Assoc., 1937, **29**, 188—193).—Additional to routine recommendations for storage and handling of Cl_2 and NH_3, and the use of gasmasks, first-aid, etc., warning is given of some unusual dangers, *i.e.*, production of $COCl_2$ and NCl_3 under some conditions, the inflammability of 1 : 5 NH_3–air mixtures, etc. O. M.

Colorimetric determination of traces of phenol in water. G. U. Houghton and R. G. Pelly (Analyst, 1937, **62**, 117—120).—The phenol is converted into an indophenol (I) by a bleaching powder–Na_2CO_3 mixture, in presence of dimethyl-*p*-phenylenediamine, (I) being then extracted in CCl_4 and matched colorimetrically against a standard (cf. Gibbs, A., 1927, 688). If the p_H is 7·0—8·5 (buffered with $NaHCO_3$) the sensitiveness is 0·01 p.p.m. Advantages are the rapidity and the fact that one of several colours is obtained according to the phenol present. $C_6H_2Cl_3 \cdot OH$ and *p*-cresol do not react; primary aromatic amines give coloured indamines, but interfere only if >1 p.p.m. is present. J. G.

Detection of sewage in drinking water by the Griess reaction. A. Reuss (Z. Unters. Lebensm., 1937, **73**, 47—49).—The reaction is considered positive only when the coloration is already present immediately after mixing. A coloration appearing first after mixing is regarded as weakly positive or doubtful, according to the rate of its intensification. E. C. S.

Bacteria in stored sea-water. (Miss) B. Lloyd (J. Roy. Tech. Coll., **4**, 173—177).—The bacterial content increases rapidly to a peak and then decreases. The val. of the peak is dependent on the glass surface of the storing vessel, but independent of the area of H_2O exposed to the air. A. Li.

Basis of determination of corroding power (aggressivity) of water. R. Strohecker, K. Schilling, and E. Budenbender (Z. Unters. Lebensm., 1936, **72**, 299—307).—The p_H vals. of H_2O, calc. from Tillmans' formula, differ from the observed vals. More nearly correct vals. are derived from the relation $[H^{\cdot}] = \sqrt{(K_w K_1/[HCO_3'])}$, where K_w and K_1 are the dissociation consts. of H_2O and H_2CO_3, respectively, provided that the true dissociation const. ($K_1 = 5 \times 10^{-4}$; cf. A., 1916, ii, 522) is used. Since the corroding effect is mainly governed by $[H^{\cdot}]$, direct determination of the latter is the most useful index of aggressivity, and with the Me-orange titration will give all data necessary to calculate free CO_2, $[HCO_3']$, and $[CO_3'']$. E. C. S.

Home-produced [German] materials for water-pipe construction. R. Schemel and S. Clodius (Gas- u. Wasserfach, 1937, **80**, 151—157, 187—191).—Progress in the substitution of Al in various forms for Pb as jointing material etc. is described, and suggested specifications for this and other materials of German origin are given. A. R. Pe.

Deterioration of [water-]pipe and its prevention. W. R. Conard (J. Amer. Water Works Assoc., 1937, **29**, 231—233).—Causes of scale formation and its prevention by cleaning and relining the pipes with cement or bituminous coating are discussed. O. M.

Protection of distribution systems by correction of water quality. H. S. Hutton (J. Amer. Water Works Assoc., 1937, **25**, 234—239).—Protection of pipes from tuberculation by $CaCO_3$ coating, adjustment of the p_H to 8·1—9·6, and sterilisation by Cl_2–NH_3, where the cause is biological (*e.g.*, crenothrix), are discussed. O. M.

Experiments with sub-surface [water] filters at Toledo, Ohio. R. W. Furman (J. Amer. Water Works Assoc., 1937, **29**, 194—200).—Extra filter capacity for seasonal high-consumption periods, and improved filter washing at all times of the year, are claimed. O. M.

Observations in the Toronto [water-]filtration laboratories during the past 25 years. N. J. Howard (J. Amer. Water Works Assoc., 1937, **29**, 173—187).—A review is made of bacteriological and chemical research work carried out at the laboratories, and a list of papers published therefrom is given. O. M.

Organisation of [the utilisation or disposal of] industrial waste products. G. A. Schröter (Chem.-Ztg., 1937, **61**, 135).—The importance of the systematic investigation of methods of utilising all types of industrial waste products is emphasised, and some examples are indicated. A. B. M.

Detection and determination of sulphite [cellulose] waste liquor. F. Roll (Giesserei, 1935, **22**, 628—630; Chem. Zentr., 1936, i, 2000).—Suitable methods are described. The material is used for binding foundry cores. H. N. R.

Determination of traces of sugar in drain and waste waters. Anon. (Internat. Sugar J., 1937, **39**, 108—109).—Details are given of a method of applying the α-$C_{10}H_7 \cdot OH$ test for traces of sugar in condensates and the like while using the Hellige comparator and a special disc for recording the colour developed. The disc used has 9 colour-glasses ranging from 10 to 100 p.p.m. J. P. O.

Laboratory and large-scale experiments on purification of dairy wastes [milk wash-liquor]. S. H. Jenkins (Inst. Sewage Purif., Mar., 1937).—Using 1% milk solution to represent milk washings, (*i.e.*, liquor from washing churns, road tanks, storage vats, etc.) laboratory experiments indicated that after dilution it could be treated either by "double filtration" or by the activated-sludge process. Storage for 24 hr. at room temp. caused the breaking down to simpler compounds by fermentation, rendering the liquor more amenable to treatment. On the large scale, crude milk washings were treated successfully both by both the above processes. For filtration, the stored settled waste, diluted with purified effluent to obtain a liquor biochemical O_2 demand of 20—30 pts. per 10^5 (= 0·25% milk solution), was treated on two percolating filters operating in series, and worked alternately as primary and secondary (being changed every 3 weeks) at a rate of 160 gals. per day per cu. yd. A high-quality, well oxygenated effluent containing nitrate was obtained, and the filters showed no sign of choking. The activated-sludge process gave better results without dilution. The double-filtration plant gave satisfactory results continuously under varying conditions and could withstand occasional conc. liquor, whilst the activated-sludge plant required more careful control and was more severely affected by conc. liquor, and recovered less rapidly. O. M.

Chemical sewage treatment at Liberty, N.Y. W. A. Hardenbergh (Public Works, 1935, **66**, No. 10, 31—32).—" Up-stream " applications of chemicals to effect mixing and coagulation are described. Direct application of activated C to the digesters increased digestive activity and gas production, removed odour, and yielded a quicker-drying sludge. Ch. Abs. (*p*)

Chemical treatment of sewage evaluated in A.P.H.A. Committee report. L. Pearse (Water Works, Sewerage, 1935, **82**, 392—393).—A general review. Ch. Abs. (*p*)

Nitrifying micro-flora of Paris activated sludge. H. Winogradsky (Ann. Inst. Pasteur, 1937, **58**, 326—340)—The isolation from activated sludge and description of a no. of strains of nitroso- and nitro-bacteria are given. P. W. C.

Refrigeration [in air-conditioning].—See I. **Toxicity of MeOH.**—See III. **Algal growth in fishponds.**—See XVI. **H_2O for brewing.**—See XVIII. **Antiseptics.**—See XX. **Detecting yperite in air.**—See XXII.

See also A., I, 197, **Determining Br in mineral waters and NH_3 in waters.** 198, **Determining CO_2 in closed atm., and Li in sea-H_2O.**

PATENTS.

Optical apparatus for measuring the quantity of dust in air or for like purposes. E. Leitz Ges.m.b.H., and W. Schäfer (B.P. 461,628, 19.8.35).—The polluted atm. is contained in a chamber having completely dark walls, and the light reflected from the suspended particles is observed along a line oblique to the incident ray. A comparison ray is split off the incident ray before it enters the dirty atm., and this ray is provided with calibrated light-weakening means. B. M. V.

Filters and purifiers employed for conditioning air, *e.g.*, for respiration, by freeing it from poisonous gases and other injurious or undesired substances. Soc. Ital. Pirelli (B.P. 462,514, 7.7.36. Ital., 20.7.35. Addn. to B.P. 445,457; B., 1936, 622).—The hygroscopic substance is of such nature that it will evolve fume irritating to the mucous membrane or change colour when moist and simultaneously subjected to externally applied electricity; these signals may act instead of or in addition to those claimed in the prior patent. In an example, the hygroscopic substance is $MgCl_2$ and NaI. B. M. V.

Pest extermination. Deuts. Ges. f. Schädlings-Bekämpfung. m.b.H. (B.P. 459,721, 10.7.35. Ger., 25.7.34 and 6.3.35).—A gas (*e.g.*, air) is circulated by a compression pump through a volatile toxic substance [*e.g.*, HCN, $(CH_2)_2O$] and a fumigating chamber under considerably reduced pressure. Between the pump and chamber compression occurs, so that expansion on entry to the chamber (through a regulatable constriction) produces a rise of temp. sufficient to counteract the cooling by evaporation of the toxic substance. Apparatus is claimed. O. M.

[Dosing apparatus for] purification of water. F. P. Candy (B.P. 461,196, 14.8.35).—A dosing measure is filled by a piston pump of greater capacity (the excess being run back to storage) and both are operated by a H_2O-motor preferably of the tilting-bucket type. B. M. V.

Water-chlorination apparatus. F. Howles and B. M. Hills (B.P. 458,874, 11.10.35).—An apparatus by means of which Cl_2 gas is absorbed by H_2O at a measured but adjustable rate is combined with a vessel into which the Cl_2–H_2O is delivered from which it is discharged intermittently by siphonic action. Means are provided for varying the rate of H_2O delivery to the Cl_2 absorber and/or for delivering H_2O directly to the vessel for altering its rate of filling. O. M.

Treatment of [irrigation] water. L. Rosenstein, Assr. to Shell Development Co. (U.S.P. 2,038,316, 21.4.36. Appl., 30.8.35).—Deposition of $CaCO_3$ on addition of NH_3 is prevented by adding 0·5—1·0 p.p.m. of a sol. metaphosphate (NH_4, K, Na). W. J. W.

Separating sand and other heavy solids from crude sewage. J. Mills & Co. (Engineers), Ltd., and M. W. Mills (B.P. 461,287, 11.9.35).—The conduit upstream of a standing wave weir is shaped as a segment of a circle in cross-section, and the solids are removed through suction nozzles or in buckets on the ends of rotating or oscillating arms. B. M. V.

Treatment of sewage and like sludge. W. W. Triggs. From Dorr Co., Inc. (B.P. 462,094, 27.5.36).—A self-contained sludge-conditioning and filtering apparatus, comprising a mixing chamber, filter, and means for supplying controlling and agitating sludge and chemical reagents, is claimed. The sludge is raised by elevators fitted with buckets of special design. The sludge and reagents are fed to the mixing chamber automatically as long as the sludge level is below a predetermined height. O. M.

Treatment and incineration of sewage sludge or the like waste material. Nichols Eng. & Res. Corp. (B.P. 461,507, 16.8.35. U.S., 17.8.34. Addn. to B.P. 432,198; B., 1935, 928).—The scheme of the prior patent is simplified by concurrent (downward) flow in the roaster; the exhaust gases heat the ingoing air in an external heat exchanger and the whole supply of air is admitted to the top hearth. B. M. V.

Erratum :—In " B " abstracts, 1936, p. 958, col. 1, line 26 from bottom, *for* U.S.P. 2,015,050 *read* U.S.P. 2,015,050—2.

Phenolic soap.—See XII.