BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JANUARY, 1937.

I.—GENERAL; PLANT; MACHINERY.

Integrating method for measurement of the total radiation emitted by domestic heaters. A. R. Bennett and H. Hartley (Inst. Gas Eng., 1936, Comm. 149, 29 pp.).—The integrating radiometer described consists of a balanced pair of receivers mounted back-to-back and interconnected by means of thermocouples, each receiver being composed of six Cu blocks corrugated and blackened on their outer surfaces. The receivers are exposed alternately to the radiating source in successive transits across the hemisphere. The galvanometer reading $\propto$ the amount of heat received during exposure, and by rotating the radiometer at const. speed in the different zones of latitude, all the heat passing through the test hemisphere is obtained by a summation of the galvanometer readings. The theory of the integrating method is also discussed mathematically, with particular reference to the elimination of cooling correction. H. C. M.

Non-aqueous vapours as heat carriers in power and heating service. W. Gumz (Feuerungstech., 1936, **24**, 156—157).—Practical difficulties preventing the use of various hydrocarbons, Ph_2O, Hg, etc. as heat-transfer agents in place of steam are discussed. R. B. C.

Care and maintenance of waste-heat boilers. C. A. Poulson (Gas J., 1936, **216**, 540—544).—The precautions that must be observed if a waste-heat boiler is to operate at max. efficiency are discussed, special reference being made to the importance of correct feed-H_2O treatment. H. C. M.

Reactions of various inorganic and organic salts in preventing scale in steam boilers. F. G. Straub (Univ. Illinois Eng. Expt. Sta., Bull. 283, 1936, 116 pp.).—The SiO_2 content of alkaline Na_2SiO_3 solution containing 200 p.p.m. of SiO_2 was not lowered when solid $CaCO_3$, CaF_2, or $Ca_3(PO_4)_2$ was added. It was reduced to 12 and 6 p.p.m. by solid $CaSO_4$ and $MgCO_3$, respectively, and to 3 p.p.m. by MgO in presence of NaOH and Na aluminate. The effect of temp. and alkalinity on the solubility in H_2O of analcite ($Na_2O,Al_2O_3,4SiO_2,2H_2O$, a typical boiler scale) was investigated. $CaSO_4$ scale could be prevented by the presence of 50 p.p.m. of NaF in solution at temp. up to 243°, even when 2000 p.p.m. of Na_2SO_4 were also present. Pyrogallol and gallic acid prevented the formation of $CaSO_4$, Ca silicate, and Na Al silicate scale. R. B. C.

Water conditioning for steam generation. F. R. Jones (Trans. Inst. Chem. Eng., 1935, **13**, 84—90).—H_2O conditioning with Na_2CO_3, NaOH, and Na_2SO_4, corrosion, and caustic embrittlement are discussed. The effect of small quantities of org. matter on priming and the advantages of continuous blow-down for softening purposes are indicated. D. K. M.

Effect of low-p_H waters on zeolites. A. S. Behrman and H. Gustafson (Ind. Eng. Chem., 1936, **28**, 1279—1295).—H_2O of p_H 4·3—6·9 reduces the exchange capacity of zeolites through the setting up of new equilibrium conditions which, however, are rapidly attained. The exchange capacity is then stabilised at the lower val. without any reduction in the active life of the zeolite. From the appreciable SiO_2 losses and the p_H changes in the brine during regeneration, it is considered that too frequent regeneration is a doubtful economy. C. R. H.

Development of spray drying. T. B. Philip (Trans. Inst. Chem. Eng., 1936, **13**, 107—120).—Spray-drying, methods of recovering the dry product and its properties, and costs, are discussed. The use of tinned steel as a material of construction for spray dryers for the food industry is indicated. D. K. M.

Liquid distribution in packed towers. A. H. Scott (Trans. Inst. Chem. Eng., 1935, **13**, 211—217).—Experiments to determine the flow density of H_2O through towers packed with (*a*) $\frac{1}{2}$-in. Lessing rings, (*b*) $\frac{1}{4}$-in. coke, (*c*) $\frac{1}{2}$-in. coke, showed that the H_2O spreads to the tower walls as the height of the packing increases; this effect is most marked for (*a*) and least for (*b*). Channelling was marked in all cases, but the larger was the packing the more serious it was. With (*a*) a considerable quantity of liquid actually flows down the wall surface. The results of experiments on the flow of Pb shot over a surface on which arc projections are discussed. D. K. M.

Colloid-chemical problems in deep-boring technique. E. Sauer and R. Schneider (Kolloid-Z., 1936, **77**, 252—255).—A lecture. E. S. H.

Liquid–liquid extraction. Exact quantitative relations. K. A. Varteressian and M. R. Fenske (Ind. Eng. Chem., 1936, **28**, 1353—1360).—Various types of extraction are considered mathematically. The equations obtained are applied to the solution of a problem, viz., the reduction, by extraction with H_2O, of the acid concn. in a given mixture of $CHCl_3$, AcOH, and H_2O. C. R. H.

Crystallisation in theory and practice. Anon. (Ind. Chem., 1936, **12**, 498—504).—A review of the mechanism of the process and the plant utilised.

Simplest and most accurate viscosimeter and other instruments with suspended level. L.

Ubbelohde (Oel u. Kohle, 1936, 12, 949—974).—A complete account of the theory and application of the suspended-level viscosimeter (cf. B., 1933, 607) is given. A. B. M.

Efficiency of centrifugal dust extractors. R. Nagel (Arch. Wärmewirts., 1936, 17, 203—206).—Difficulties in formulating performance guarantees of apparatus for pptg. dust from gases, and factors, *e.g.*, gas temp., dust concn., which must be considered are discussed. Determinations of the concn. and fineness of the dust are difficult in practice. The dust concn. does not greatly affect the % of dust pptd., provided its fineness remains const. Tests carried out with old and improved centrifugal separators in order to establish the principles on which guarantees should be based are described. R. B. C.

Preparation of fine and powdered material in a pulsating air current. W. Riebeck (Thesis, Tech. Hochschule, Breslau, 1933, 47 pp.).—Laboratory experiments on the pneumatic and wet jigging of various types and sizes of material (*e.g.*, coal) showed that the differences between the results obtained by the two methods were small and were due to the different terminal speeds of the coal in air and in H_2O. The former method is preferable in certain cases. The application of the results to practical conditions is discussed. R. B. C.

Memorandum by the Committee of the Institution of Mining and Metallurgy on dust-sampling investigations (Bull. Inst. Min. Met., 1936, No. 386, 4 pp.; cf. B., 1935, 81).—A review of the activities of the Committee since its inception in Jan., 1934, and an introduction to the papers of Matthews *et al.* and of Watson (see following abstracts). R. C. M.

Porous solid filters for sampling industrial dusts. (Miss) J. W. Matthews, P. F. Holt, (Miss) P. M. Sanderson, and H. V. A. Briscoe (Bull. Inst. Min. Met., 1936, No. 386, 9 pp.; cf. B., 1935, 81).—" A.R." salicylic acid, sifted through a 40-mesh gauze, is packed to a depth of 4 mm. in a 140-mesh, stainless-steel sieve. The crystals should be of length/breadth = 5·2 and 1% of them >1 mm. long, 20% of 1·0—0·1 mm., 25% of 0·1—0·01 mm., and 55% of 0·01 mm. or less; average length 10 μ. Using an air ejector, 100—150 litres of air per min. are sucked through this filter pad for about 4 hr.; the pad is then dissolved in EtOH, and the dust recovered by centrifuging, washing with Et_2O, and drying at $\ngtr 50°$ (to prevent alteration of crystal form). The efficiency of filtration is very high, even for particles of diam. 0·1—0·2 μ. R. C. M.

System for obtaining from mine air dust samples for physical, chemical, and petrological examination. H. H. Watson (Bull. Inst. Min. Met., 1936, No. 386, 33 pp.; cf. B., 1922, 344; 1923, 579; 1934, 351; etc.).—Previous methods are shown to have low efficiencies (40—60%) and to give non-representative samples. Accurate information may be obtained from 0·5 mg. of dust collected in a thermal precipitator (cf. B., 1935, 81), from which the no. per c.c. and size distribution of the particles are found microscopically (×1500), together with a 50-mg. salicylic acid filter (cf. preceding abstract) sample, from which the chemical and mineralogical nature and the mass per c.c. can be found. The practical application of these two instruments, both of which are nearly 100% efficient, is fully described. R. C. M.

Hydrodynamic theory and semi-fluid friction. G. Vogelpohl (Oel u. Kohle, 1936, 12, 943—947).—Consideration of the relation between load and friction in a lubricated bearing when the temp. rise due to the motion of the oil is taken into account (assuming that all the heat developed remains in the oil) leads to the conclusion that, to a first approximation, β/dc, where c is the sp. heat and β expresses the dependence of η on the temp. [$\eta = \eta_1 e^{-\beta(t - t_1)}$], is a measure of the lubricating val. of the oil. The correlation of this quantity with the results of tests on the Thoma oil-testing machine is, however, not perfect, possibly owing to omission of the thermal-conductivity effect. A. B. M.

Glass-tubing connexions in large-scale chemical apparatus. T. Ziener (Chem.-Ztg., 1936, 60, 883—886).—The use of wide-bore glass tubing for corrosion-resistant piping in technical-scale plant is discussed. The suspension, jointing, and erection of such tubing, and its protection, *e.g.*, from strains initiated by scratches, are reviewed. J. S. A.

Automatic Orsat apparatus.—See II. **Esparto mills.**—See V. **Corrosion of boilers (etc.). Fe alloys for machinery. Condenser tubes.**—See X. **Glycerin recovery.**—See XII. **Chemical engineering in leather industry.**—See XV. **Food-industry equipment.**—See XIX. **Extracting vegetable materials.**—See XX. **Explosives manufacture.**—See XXII.

Patents.

Manufacture of products by subjecting a material to relatively high temperatures. L. R. Campbell (U.S.P. 2,029,307, 4.2.36. Appl., 25.11.32).—A blast furnace for making or melting slag for mineral wool or like corrosive material comprises, in order outwards: a core of fuel standing or floating on a pool of the fused slag, an annular layer of the broken materials being melted, an annular protective layer of solidified slag, the wall of the furnace. B. M. V.

Dryer. D. B. Vincent (U.S.P. 2,026,922, 7.1.36. Appl., 21.11.34).—A shell is divided into compartments each of which is provided with agitators which gradually transfer the material from one compartment to another. Heated air is supplied to a common inlet duct, and moist air withdrawn through a common outlet duct provided with individual dampers to each compartment. B. M. V.

Dryer. H. F. Hebley and K. Prins (U.S.P. 2,027,977, 14.1.36. Appl., 9.8.33).—An apparatus for drying fine coal or granular material after washing comprises perforated buckets arranged longitudinally on the periphery of a drum, the material being first pressed because the rotation is in the opposite direction to the descent in the feed shoot, and is then treated with hot gases under pressure. B. M. V.

Drying and mixing mechanism. E. R. Lockridge and L. W. Meyer (U.S.P. 2,030,645, 11.2.36.

Appl., 22.8.35).—Means for charging a rotating cylinder through a port in its shell at about mid-length is described. B. M. V.

Cooling and/or drying of granular and like solid materials. Co-operative Wholesale Soc., Ltd., and A. J. Sibbald (B.P. 455,277, 12.4.35).—A perforated endless conveyor passes (on one run) through air-trunking provided with depending and upstanding baffles, dividing it into overlapping compartments above and below the conveyor. B. M. V.

Pasteurisation. R. K. Cooney, Assr. to F. J. Keating (U.S.P. 2,029,017, 28.1.36. Appl., 22.3.34). —Flash pasteurisation is effected by injection of thermostatically controlled steam from perforated pipes which are axial to the flow of, *e.g.*, milk. Easy cleaning is provided for. B. M. V.

Sterilising apparatus. J. Caldwell (B.P. 455,287, 16.4.35).—A sheet-metal container is provided with a steamtight door and, at the lowest part, with a tray of H_2O which is boiled by external heat, any condensate running back thereto. B. M. V.

Heat-exchange system. R. E. Olson, Assr. to Taylor Instrument Companies (U.S.P. 2,027,929, 14.1.36. Appl., 20.3.34).—Milk or the like is passed through a heat recuperator and then through a heater operated with const. input of heat. To attain const. conditions in the milk, cooled milk from the recuperator is adjustably mixed with feed milk. B. M. V.

Plate heat exchanger for fluids. C. F. Rosenblad (B.P. 454,964, 12.4.35. Swed., 14.4.34).—In an exchanger comprising a pair of plates rolled up together into a double spiral, the closers and spacers at the ends are channel-shaped, having thick webs and thin, outwardly-extending flanges suitable for welding or soldering to the plates. B. M. V.

Heat-recovery system. D. K. Dean, Assr. to Foster Wheeler Corp. (U.S.P. 2,029,360, 4.2.36. Appl., 23.8.35).—The vapours and/or the pulp are/is blown off from a digester through a cyclone separator, and the clean vapours are then passed through a condenser which generates low-pressure steam. B. M. V.

Apparatus for measuring temperatures. (a, b) P. S. Williams and (a) O. W. Johnson (U.S.P. 2,028,887—8, 28.1.36. Appl., [a] 17.8.32, [b] 9.7.35. Renewed [a] 8.7.35).—The bulb of a thermometer is enclosed in a small vessel which can be moved about with open ports at a desired level in a tank. On operation of a trigger the ports are closed by a spring, a true sample of the oil or the like is drawn to the surface, and its temp. read on the projecting stem of the thermometer. B. M. V.

Temperature indicators. Brit. Thomson-Houston Co., Ltd. (B.P. 455,004, 26.5.36. U.S., 27.5.35).—In oil-filled apparatus (*e.g.*, a transformer), a current-transformer sends a proportional current through a (stainless-steel tubular) resistance immersed in the oil; thermally close to (and within) the resistance is a thermometer bulb (*e.g.*), and a switch is provided to short-circuit the resistance so that the bulb may read either the natural temp. of the bulk of the oil, or the temp. of the small amount of the oil within the resistance, as increased by the load current. B. M. V.

Thermostats. Unity Heating, Ltd., and C. C. Turner (B.P. 455,388, 2.5.35).—The apparatus comprises bimetallic strip operating electric contacts. The claims relate to the adjustment of the desired temp. B. M. V.

Ore mill. A. J. Schlunegger (U.S.P. 2,030,323, 11.2.36. Appl., 11.11.32).—The mill is of the ball-race type; the housing is rotated by flexible means. B. M. V.

Device for milling and separating ores. J. H. Dequer (U.S.P. 2,026,825, 7.1.36. Appl., 19.2.34).—An annular mortar has vertical sides which are extended upwards at increased diam. to form a tank. The bottom slopes inwards and is provided with radial grooves; a sled-type pestle is dragged around inside. B. M. V.

Rotor for hammer mills. H. J. Mankoff (U.S.P. 2,026,790, 7.1.36. Appl., 26.9.33).—Hammers of plate are held rigidly even though only a single pin is used; this is effected by means of polygonal spider plates, which may be all alike and arranged alternately. B. M. V.

Pulverising mill. E. Lundgren (U.S.P. 2,027,782, 14.1.36. Appl., 22.6.31).—Horizontal rolls in a casing incorporating updraught air separation are described. B. M. V.

Grinding mill. J. P. Van Gelder (B.P. 455,666, 29.7.35. Austral., 5.10.34).—A lens-shaped space between grinding discs is partly filled with intercalating rings of teeth. That part of the chamber to which the ground material is deflected is H_2O-cooled. B. M. V.

Grinding mechanism of mills for granular materials. J. M. Font (B.P. 455,263, 1.4.36. Spain, 11.4.35).—The mill comprises a stationary annular member (*A*) with a gap for admission of material and three rotating parts, one within *A* effecting the initial reduction and two discs outside *A* effecting the grinding of, *e.g.*, coffee. B. M. V.

Pulverisation. M. Frisch, Assr. to Foster Wheeler Corp. (U.S.P. 2,029,917, 4.2.36. Appl., 30.3.32).—A dry ball mill (or the like) is provided with pneumatic discharge and classification, the oversize being returned by a screw conveyor backwards through the outlet trunnion. B. M. V.

Pulveriser. F. M. Iler (U.S.P. 2,030,839, 11.2.36. Appl., 6.6.32).—In a disc grinder, the rotating disc is also oscillated slightly in an axial direction. B. M. V.

Mixing machines. Powel & Hill, Ltd., W. S. Powel, and F. Hill (B.P. 455,147, 13.5.35 and 10.3.36).—After a preliminary dry mixing, materials for concrete or the like are continuously wet-mixed and conveyed in a trough having paddles of various inclinations to produce to-and-fro motion with a nett advance. B. M. V.

Mixing machine. E. G. Loomis (U.S.P. 2,027,185, 7.1.36. Appl., 15.6.34).—In a twin-trough type of mixer the paddles or worms are formed on a hollow sleeve which is separate from the driving-shaft and is short enough to be inserted through the open top of the apparatus; the hollow space is utilised for heating/cooling medium. B. M. V.

Means for mixing. E. G. Myers, Assr. to Myers-Sherman Co. (U.S.P. 2,023,644, 10.12.35. Appl., 12.9.33).—Comminuted cattle feed or the like is drawn (fan) in suspension in air through a curved inlet pipe, and molasses or the like, made fluid by heat, is sprayed through an opening in the pipe at the bend just before entering the eye of the fan, the mixing thus taking place at the point of max. vac. and turbulence. B. M. V.

Mixing apparatus. A. W. Rybeck, Assr. to T. L. Smith Co. (U.S.P. 2,029,126, 28.1.36. Appl., 1.3.34).—An inclined drum suitable for mounting on a vehicle for the transport of concrete is provided with internal vanes which deflect the material inwards when mixing and/or travelling, and outwards when rotation is reversed for delivery. B. M. V.

Mills for mixing, grinding, refining, and other processes. H. E. Cox (B.P. 455,244, 29.6.35).—Spring adjustments for twin-roll or roll-and-bar mills are described. B. M. V.

Screen separator. G. H. Fraser (U.S.P. 2,027,375, 14.1.36. Appl., 1.12.31).—A flared-prismatic or conical bolter is secured to a shaft which has spring-mounted bearings and depresses itself slowly by a cam and rises quickly with a jar. Also vibrating with and underneath the bolter are a spreader and a secondary, hopper-shaped screen. B. M. V.

Vibratory screen and method of screening. E. J. Winkleman (B.P. 455,628, 23.4.35).—A substantially horizontal screen deck is supended at each end by flexible members (*F*) which are not much longer than half the length of stroke of horizontal oscillation; they are also of substantial thickness so that at the ends of the arcuate path the screen gives a distinct kick upwards, producing a classifying effect. B. M. V.

Pulsating jig. M. J. Lide (U.S.P. 2,027,597, 14.1.36. Appl., 10.9.32).—The lifting and settling pulsations are independently adjustable, the circulating H_2O is adjustable independently of the pulsations, in multi-stages the vol. over each weir is independent of the others, and the outlets for heavier material are adjusted in accordance with the depth of material. The course of the H_2O is from a pulsation tank (*P*) through larger rotating valves to the hutch and up through the screen, returning from the hutch slowly through a smaller rotary valve to a suction chamber, whence the H_2O is pumped back to *P* by a continuously-operating pump. B. M. V.

Separating apparatus. L. F. Holly (U.S.P. 2,026,834, 7.1.36 Appl., 22.7.32).—A cyclone separator is provided with a filter (*F*) in the clean-gas outlet, *F* being cleaned section by section by a slowly rotating suction device which delivers the dust from *F* to the lower part of the hopper together with the centrifugally separated dust. B. M. V.

Apparatus for separating materials by fluid streams. M. E. Haworth, Assr. to Jeffrey Manufg. Co. (U.S.P. 2,026,633, 7.1.36. Appl., 26.5.31).—In a shaking table with upward currents of air (and dust) drawn into a common hood by a common fan, local variation is effected by obstructions under the deck. The common suction is maintained suitable to the conditions by means of dampers in the conduits and in a by-pass from the outlet back to the inlet of the fan, under control of manometers connected across the fan and between the hood and atm., and thereafter by electrical relays and reversible motors. B. M. V.

Continuous automatic centrifugal separating machines. Amer. Centrifugal Corp. (B.P. 454,799—800, 23.4.35. U.S., 23.4.34).—Apparatus for the separation of liquid from solids comprises an imperforate "basket" (bowl) with sludge ports at the max. diam. closed by a ring operated hydraulically at the full speed. The axis is (a) vertical and the liquid discharged by seepage through holes in hollow radial baffles, or (b) horizontal and the bowl divided into two chambers which are operated alternately or together, the seepage being through the ends. B. M. V.

Separating and washing apparatus. W. C. Menzies and (a) F. H. Blatch, (a) Assr. to Wilmot Eng. Co. (U.S.P. 2,026,903, 7.1.36. Appl., 12.1.32).—In an upward-current hydraulic separator, the amount of heavy material (coal refuse) accumulated on the perforated bottom regulates either an inclined elevator for removing the refuse, or the opening of a gate leading to the elevator. B. M. V.

Formation of dry or wet materials into nodules or porous masses. K. Middelboe (B.P. 454,961, 11.4.35).—Cement slurry or dry powder is placed in a thin layer on a conveyor and subjected to agitation as it travels; early in the progress dry powder or liquid (slurry), respectively, is added to bring the material to the right consistency to form nodules. B. M. V.

Compacting of plastic, granular, and like materials. F. Moser (B.P. 454,816, 5.11.35. Belg., 5.11.34).—A polished surface, plane, curved or obtuse V-shaped, is advanced over the material at a const. angle of inclination while subjected to vibration. B. M. V.

Conversion of solid [plastic] articles into tubular structures. G. A. Cooper, Assr. to Cruver Manufg. Co. (U.S.P. 2,027,152, 7.1.36. Appl., 8.10.32).—A slug of plastic material, *e.g.*, pyroxylin, is progressively forced into a mould containing a rotating mandrel. If a pattern is formed externally on the slug before entering the mould, the pattern will remain on the hollow article. B. M. V.

Filters. F. Titterton (B.P. 454,727, 9.5.35).—Filter plates or leaves are contained within a tank of which one side, top, or bottom can be slid right away for access; an antifriction and boltless joint for this purpose is described. B. M. V.

Filters. Stream-Line Filter Co., Ltd., and T. E. Beacham (B.P. 455,142, 18.4.35).—A portion of the dirty oil or other prefilt is heated in a lower chamber of a vessel just before entering an edge filter, those parts being heat-insulated from the bulk of the dirty oil in an outer and upper annular chamber. B. M. V.

Filters. M. A. Goldman, Assr. to Commercial Filters Corp. (U.S.P. 2,028,061—2, 14.1.36. Appl., [A] 10.3.34, [B] 29.6.34).—Demountable cylindrical strainers are described. B. M. V.

Filter. W. Raisch, Assr. to Municipal Sanitary Service Corp. (U.S.P. 2,027,652, 14.1.36. Appl., 25.4.35).—A transversely-grooved conveyor belt is caused to run very close to a filter drum at the line of discharge; the belt runs in the opposite direction to the drum, and sprays of H_2O or other liquor are directed upwardly into the vacant side of the nip, *i.e.*, in the same direction as the belt. B. M. V.

Filter. W. Raisch and J. H. Fedeler, jun., Assrs. to Underpinning & Foundation Co., Inc. (U.S.P. 2,028,949, 28.1.36. Appl., 28.3.35).—The distributing valve for a rotary-drum filter is arranged so that the arc of each function can be varied, *e.g.*, reduced at times of dry-weather flow of sewage. B. M. V.

Disc[-pile] filter. W. L. Chewning, Assr. to United Engineers & Constructors, Inc. (U.S.P. 2,029,611, 4.2.36. Appl., 10.5.34).—The cleaning scrapers are situated in a quiet zone baffled from the main flow, and the mud drops to a sump. B. M. V.

Continuous filter. R. W. Richardson (U.S.P. 2,030,538, 11.2.36. Appl., 21.3.32).—A continuous, pervious band conveyor is supported at the zone where suction is applied, by a chain-and-slat conveyor. B. M. V.

Centrifugal separators. Bergedorfer Eisenwerk A.-G. Astra-Werke (B.P. 454,840, 4.5.36. Ger., 3.5.35).—A sleeve protecting the bowl spindle from contact with the liquid is described. B. M. V.

Disc for centrifugal separators. O. H. Shenstone, Assr. to Massey-Harris Co., Ltd. (U.S.P. 2,028,955, 28.1.36. Appl., 27.6.34).—A combination of alternate plain and deformed discs is described, the deformations acting as spacers. B. M. V.

Apparatus for removing sediment and scum from settling tanks or reservoirs. C. Davis and W. G. Farrer (B.P. 455,159, 1.7.35).—Scraper arms are attached to a travelling carriage in such a manner that when they are being lifted from the working position they rise vertically. B. M. V.

Sludge-removing apparatus. S. Shafer, jun., Assr. to Chain Belt Co. (U.S.P. 2,028,094, 14.1.36. Appl., 17.4.35).—A scraper–conveyor for removing sludge from a tank bottom is provided with auxiliary scraper arms operated from the chain and sprocket shaft conjointly, which clear the tank corner whether it be rounded or bevelled. B. M. V.

Liquid-trapping device. L. A. Bliss, Assr. to Linde Air Products Co. (U.S.P. 2,029,852, 4.2.36. Appl., 23.12.32).—A trap comprising a ∩ over a ∪ with a visible gauge permits free passage of vapour but hinders and indicates any flow of liquid, and is applied, *e.g.*, to a liquid-air rectifier. B. M. V.

(A) Continuous countercurrent contacting of two liquids. (B) Contacting two materials. (C) Contacting two liquids. (D) Countercurrent contactor. (A—C) R. E. Wison, (D) J. Robinson, Assrs. to Standard Oil Co. (U.S.P. 2,029,687—8 and 2,029,690—1, 4.2.36. Appl., [A] 18.12.31, [B] 3.12.32, [C] 10.7.33, [D] 12.8.33).—(A—D) Inclined cylindrical vessels are divided by transverse baffles into zones of alternate vigorous mechanical agitation and quiescence. (A, B) Separation of, *e.g.*, the paraffinic and naphthenic constituents of oil is effected by a selective solvent, *e.g.*, $(C_2H_4Cl)_2O$. B. M. V.

Effecting contact between incompletely miscible liquids. W. J. Podbielniak (B.P. 454,994, 5.2.36. U.S., 5.2.35).—An apparatus similar to a Frenier pump is rotated to pump from the centre outwards; heavy liquid (H_2SO_4) is admitted to the centre and lighter liquid (oil) forced in from the circumference. One of the end-plates forming the closure of the spiral and the adjacent tank wall may be transparent if irradiation is to be effected. B. M. V.

Fractional distillation. E. W. Gard, Assr. to Union Oil Co. of California (U.S.P. 2,029,528, 4.2.36. Appl., 21.5.32).—Liquid side-cuts are fractionated separately in an auxiliary column having its own vaporiser; the sub-fractions are mainly removed as vapour, and the liquid, except very high-flash distillate, is returned to a lower point in the main column. B. M. V.

Apparatus for low-temperature distillation. A. C. Gronbeck (U.S.P. 2,033,138, 10.3.36. Appl., 23.5.29. Renewed 12.10.33).—A horizontal retort fitted with two pistons is claimed, one adapted to uncover the discharge port and the other to force the charge through the port. An agitator bar is carried by the pistons which rotate, to allow it to sweep the inner surface of the retort and thus stir the charge. D. M. M.

Bubble tray. L. P. Scoville, Assr. to Texas Co. (U.S.P. 2,029,277, 28.1.36. Appl., 23.2.33).—The supporting ring on the shell has an upwardly directed flange and the tray a downwardly directed circumferential flange, this pair acting as a bubbling device in addition to the usual caps. B. M. V.

Concentration of liquids. A. R. Jahn (B.P. 455,581, 8.4.36).—Liquid and vapour rising from the vertical tubes of a main central calandria (*A*) are deflected in an umbrella-shaped stream into an annular space (*B*) around *A*. $\not< 2$ auxiliary calandrias are provided outside *A*, *B*, liquid and vapour from them being admitted tangentially to *B*. Liquid is returned to the calandrias by means of an overflow. B. M. V.

Softening of unpurified water. I. G. Farbenind. A.-G. (B.P. 456,571, 12.6.36. Ger., 15.6.35).—H_2O containing gypsum hardness is softened by treatment with $BaCO_3$, with or without CO_2 to promote the reaction; after separation of the solids, the resultant carbonate hardness is treated by base exchange for $H^{\cdot}$, and finally degasified. Any alkaline-earth chlorides originally present are converted into free HCl and neutralised after degasification. O. M.

Heating of fluids. J. G. Alther, Assr. to Universal Oil Products Co. (U.S.P. 2,029,291—4, 4.2.36. Appl., [A, B] 4.6.32, [C] 10.8.33, [D] 25.7.34. Renewed [B] 7.2.35).—(A) In a convection heater, *e.g.*, for hydrocarbon oils to be cracked, hot combustion gases are positively directed from both sides of a vertical bank of horizontal tubes so as to flow uniformly over each tube. Provision is made for mixing old and new combustion gases, and the supply of heat to each tube, also to each bank of tubes, is individually regulable so that any temp./time curve may be worked to. (B) A similar device utilising radiant and convected heat from both sides is described. (C) The tubes are heated by direct radiation from above and by reflected radiation from the floor, the gases passing to a separate convection zone. (D) The combustion devices are more particularly described. B. M. V.

[Gas-]filtering cartridges. L'Alfa, L., J., and A. Colas (B.P. 454,897, 18.11.35. Fr., 19.11.34).—Sealing rings for insertion in the inlet and outlet passages of a pile filter are described. B. M. V.

Air separator. T. J. Sturtevant, Assr. to Sturtevant Mill Co. (U.S.P. 2,030,612, 11.2.36. Appl., 3.5.34).—In an apparatus comprising a circulating fan and co-axial cones, separation is effected by a " rejector fan " having adjustable blades. B. M. V.

Air separators. C. E. Hermann (B.P. 454,815, 11.10.35).—The apparatus is of the double inverted-conical type having adjustable, closely arranged vanes at the base (top) of the inner cone. B. M. V.

Enclosures for chemical treatments in the gaseous phase by catalysts. Soc. Franç. de Catalyse Généralisée (B.P. 454,806, 24.6.35. Fr., 25.6.34).—Rectangular conduits containing catalyst are formed by the juxtaposition of (1) a smooth wall and (2) a fluted wall of which the other side (3) is smooth All the above may be plane or cylindrical, and the gases are passed in contact with (3) before entering the space (1—2). B. M. V.

Fine distribution of gases in liquids, particularly for fermentation purposes. J. Hanak (B.P. 455,292, 16.4.35).—Liquid is withdrawn from a container and pumped at a speed of $\not<$4 m./sec. past a gas inlet, *i.e.*, at a speed very different from that of the entering gas; the mixture continues at $\not<$1 m./sec. through a long conduit until well emulsified, the emulsion being returned to the lower part of the container. B. M. V.

Fluid-contacting apparatus. H. M. Weir, Assr. to Atlantic Refining Co. (U.S.P. 2,027,410, 14.1.36. Appl., 24.5.32).—Steel wool is claimed as a suitable support for pulverulent treating solids; the inlets or outlets may be peripheral to the wool, *i.e.*, at right-angles to the flow in the treating zone. B. M. V.

Gas-analysis apparatus. M. P. Matuszak, Assr. to Fisher Scientific Co. (U.S.P. 2,026,842, 7.1.36. Appl., 11.10.33).—A framework and unitary interchangeable supports for the units of the apparatus are described. B. M. V.

(A, B) Conditioning air. (C) Dehumidifying air. C. R. Downs, Assr. to Weiss & Downs, Inc. (U.S.P. 2,026,935—6 and 2,027,094, 7.1.36. Appl., [A] 17.8.32, [B] 23.5.33, [C] 6.4.34).—(A) Air is dehumidified by a deliquescent solid, being passed through a liquid stage and several stages of solid; coolers are provided in the later solid stages, and liquid is formed by the drainings from all the solid stages. (B) Liquid is circulated in several pools countercurrent to the air, and the beds of solid are increased in length as dryness increases. (C) The process is as in (B), but slight heat is applied to the passages through which liquid drains from solid, to prevent congelation. B. M. V.

Hygrometric apparatus. A. E. Clawson, Assr. to Taylor Instrument Companies (U.S.P. 2,027,959, 14.1.36. Appl., 10.10.31).—Wet- and dry-bulb thermometers are coupled together to read dry-bulb temp. (D) and R.H. in accordance with: R.H. (fraction) $= 1 - [(D - W)/D]$, W being the wet-bulb temp. B. M. V.

[Hydraulic] brake fluid. F. P. Frey, Assr. to Johnson Oil Refining Co. (U.S.P. 2,020,543, 12.11.35. Appl., 2.1.35).—A 3 : 2 mixture of EtOAc and castor oil is claimed. L. C. M.

Packing [for] fluid seals. W. A. Lazier, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,027,389, 14.1.36. Appl., 19.6.31).—The usual fibrous packing materials for glands etc. are impregnated with a waxy, hydrogenated castor oil (I), m.p. $\not<$70°, that is resistant to solvents. Solvent-resisting softeners are preferably incorporated. *E.g.*, asbestos is steeped in (I) 78, Na stearate 10, and graphite 12% at 200°, drained, and cooled. E. J. B.

Joints between materials having different thermal coefficients of expansion. Aktieb. Hammarbylampan (B.P. 455,482, 24.4.36. Swed., 25.4.35).—A metallic intermediate member of two metals having, respectively, the same coeffs. as the two glasses (*e.g.*) is utilised. [Stat. ref.] B. M. V.

Manufacture of composition friction elements. J. D. Alley, Assr. to Amer. Brakeblok Corp. (U.S.P. 2,026,767, 7.1.36. Appl., 29.7.32).—A semi-flexible lining for brakes etc. is composed of drying vegetable oil 18, S 2·7, pyrobituminous material (coal) 25, and short-fibre asbestos 65 pts. It is cured for 4—5 hr. at 52° and then for 5—6 hr. at 158°. B. M. V.

[Domestic base-exchange] water softener. J. Hawthorn (B.P. 455,072, 2.3.36).

Base-exchange materials from coal.—See II. **Base-exchange material [for H_2O softening].**—See VII. **Colour comparator.**—See XXIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Correlation of coal seams by microspore analysis: seams of Warwickshire. R. F. Paget (Trans. Inst. Min. Eng., 1936, **92**, 59—71).—The characterisation and subsequent correlation of Warwickshire coal seams by microspore analysis, using Raistrick's method (B., 1935, 5), are discussed. Microspore diagrams are given for a no. of Warwickshire seams. H. C. M.

Humification of fossil fuels. R. Binaghi (Atti V Congr. naz. Chim., 1936, 231—251).—A review.

[Coal] ash, slag, and slag deposits. R. Fehling (Feuerungstech., 1936, **24**, 151—155).—The physical and chemical properties of the ash from brown and bituminous coal, the formation of slag, its deposition on heating surfaces and furnace walls, methods for its control, especially in pulverised-coal furnaces, and the probable trend of development towards liquid slagging are discussed. R. B. C.

[Determination of] ash content of coal. M. Vukadinović (Bull. Soc. Chim. Yougoslav., 1936, 7, 35—39).—The temp. of combustion should be $\not>$700—800°. R. T.

Comparative studies with various brown coals, and the effect of particle composition, tension of water content, ash content, and bulk density on compressibility. C. Hiller (Braunkohle, 1936, 35, 401—405, 423—426).—General rules governing the use of various types of coal in briquetting are not possible. Some relationship exists between compressibility, ash content, and bulk *d*. R. B. C.

Determination of the dust content of coal consignments. C. Blacher (Arch. Wärmewirts., 1936, 17, 243—244).—Apparent discrepancies in the slack content of nut coal after transport in 2-ton containers over a rough road were found to be due to the finer coal having segregated to the bottom during transit. R. B. C.

Oxidation of coal at storage temperatures. Effect on carbonising properties. L. D. Schmidt, J. L. Elder, and J. D. Davis (Ind. Eng. Chem., 1936, 28, 1346—1353).—Carbonisation tests were made on 2-kg. samples of a high-volatile Pittsburgh bed coal which had been subjected to mild oxidation in air at 30°, under closely controlled temp. conditions, and for periods up to 4 months. As oxidation progressed there was a gradual increase in the strength of the coke (as determined by tumbler tests), a regular decrease in the tar yield accompanied by an equal increase in the coke yield, and a uniform increase in the vol. of CO_2 evolved during carbonisation. There was also a change in the plastic properties of the coal, characteristic of increased coke strength. The agglutinating val., proximate and ultimate analyses, and calorific val. of the original and oxidised coals were substantially the same. H. C. M.

Theory and method of calculation of the heating of coke ovens by blast-furnace gas. N. N. Norkin (Koks i Chim., 1936, No. 6, 62—72).—Experimental data, methods of calculation, and the theory are given. N. G.

Path of travel of gases in the coke oven. E. M. Dubner (Koks i Chim., 1936, No. 6, 24—29).—A subdivision of the oven into three zones is shown (unchanged coal in the middle, a seam of plastic tar, and coke), and the variation of the fluidity of plastic tar with temp. indicated. It is concluded from the above that the gases generated in the tar zone escape *via* the layer of hot coke. The chemical changes in the gases *en route* are considered in detail, and means available for obtaining the max. yield of thermally uncracked gaseous products from the oven are discussed. Suggestions are made and critically reviewed. N. G.

Coke ovens of the system Koppe-standard with the standard form. A. A. Agroskin (Koks i Chim., 1936, No. 7, 26—29). H. C. P.

Thermal gradient of coking and pyrogenation under reduced pressure of national [Italian] fuels. R. Binaghi (Annali Chim. Appl., 1936, 26, 339—343).—A process for the thermal treatment of coal is carried out under reduced pressure; the products of evaporation are heated directly and then passed over active C, thereby being prevented from falling back on to the residue. Good yields of synthetic combustibles are obtained. L. A. O'N.

High-temperature distillation of combustible national [Italian] fossil coals. R. Binaghi and E. Musitano Guerrera (Annali Chim. Appl., 1936, 26, 331—339).—Curves showing the development of gas, and its calorific power, on combustion of six varieties of coal are given. The relation between the yields of gaseous, liquid, and solid products and the microscopic and petrographic structures of the coals is studied. L. A. O'N.

Problem of low-temperature carbonisation of coals. C. Leclerc (Rev. de l'Ind. min., 1936, No. 376, 897—900).—Progress in this field, and reasons for recent French developments, are discussed. It is considered that the ideal low-temp. coke would be produced by carbonising coal at 500—550° in thin layers in metal retorts. The economics of the process, and the uses of by-products therefrom, are considered. R. B. C.

Manufacture of ferro-coke. J. M. Obuchovski, J. B. Stomachin, and S. A. Dshobadze (Koks i Chim., 1936, No. 7, 29—34).—In order to utilise waste or ore dust, ferro-coke is produced by adding the dust to coal. When 10 wt.-% of the dust has been admixed, the resulting ferro-coke has 9·6% more ash than has ordinary coke, and this contains 44·9% Fe. The composition of coke-oven gas obtained from ferro-coke differs only little from the ordinary coke-oven gas in respect to CO_2, C_mH_n, O_2, CO, H_2, and CH_4, but it contains about 10% less NH_3 and C_6H_6 and about 63% less H_2S than the latter. H. C. P.

Combustion of ferro-coke. I. D. Beininson and M. M. Borschtschevski (Koks i Chim., 1936, No. 7, 34—39).—Ferro-coke was made from coal with addition of 6—10 wt.-% of waste ore dust (Fe_2O_3 57—63, FeO 25—30, SiO_2 7·5—11, Al_2O_3 1·3—16, MnO 0·6—1, CaO 1—1·7, MgO 0·1—0·3, C 3—4·5, moisture 5·5, volatile matter 1·2, ash 96·35%). The Fe and ash contents of the ferro-coke were 3—8% and 15—20%, respectively. A formula is developed for calculating the ash content. The more ore dust is used the less ferro-coke-oven gas is obtained. The gas contains 50% less H_2S, 10—20% less NH_3, and 12—16% less C_6H_6 than ordinary coke-oven gas. H. C. P.

Burning of ferro-coke with subsequent re-smelting in a blast furnace. N. P. Tschishevski, A. P. Vlasov, and P. I. Neverov (Koks i Chim., 1936, No. 6, 30—34).—A study of the addition of Fe ore to coke to give ferro-coke showed that up to 40% of powdered Fe ore may be added. Tables of the mixtures used and analyses of component parts and final products are given. Details are given of tests on a semi-factory and a factory scale, and of coking the mixtures in closed boxes and in the furnace. No spoilage of the furnaces was noted and coking in batteries gave an increased yield of C_6H_6, less NH_3, and a slight improvement in the composition of the gas. Analysis of the Fe ore used is given; its substitution by the Fe-bearing dust (analyses given) collected in metallurgical factories has been found satisfactory. N. G.

Rapidity of lump coke combustion. A. S. Bruk (Koks i Chim., 1936, No. 7, 18—25).—The rate of combustion (R) of lump coke is given by a curve convex to the origin of the co-ordinates, the abscissa representing the combustion time and the ordinate the wt. of the lumps. Provided that the ash is continuously removed from the surface of the lumps as formed, R=the wt. of the combustible material present in the coke pieces × a coeff., which depends on the composition of the coke and the composition and temp. of the gas phase. H. C. P.

Combustion rate of carbon. Study of gas-film structure by micro-sampling. A. S. Parker and H. C. Hottel (Ind. Eng. Chem., 1936, **28**, 1334—1341; cf. B., 1934, 947).—The combustion of brush C in air under closely controlled conditions of temp. and air velocity has been studied by micro-analysis of gas samples (0·1 c.c.) withdrawn from the C surface inside the " film " overlying the C surface and by variation in gas composition through the film. The results indicate that CO formation is negligible at high temp. The $[O_2]$ at the C surface decreased rapidly as the temp. rose and, at any given temp., increased as the velocity of the air past the C was raised. The rate of combustion (R) of brush C in air is a function of the abs. temp. (T) and the surface $[O_2]$ (p), viz., $R = ApT^{-0\cdot5}e^{-E/RT}$. The diffusivities of CO_2 through N_2 and of O_2 through N_2 are shown to be $\propto T^{1\cdot5}$. H. C. M.

Rapid calculations concerning the combustion of coal. IV. Water vapour in gases. R. L. Rees (Ind. Chem., 1936, **12**, 362—363; cf. B., 1936, 482).—A nomogram is given which serves to connect R.H., partial pressure, and wt.- or mol.-concn. of H_2O vapour in the atm. E. H. B.

Activity of cokes towards carbon dioxide. I. E. Adadurov and B. A. Grigoriev (J. Appl. Chem. Russ., 1936, **9**, 1751—1765).—The effect of inorg. impurities on the rate of the reaction $CO_2 + C\ (coke) = 2CO$ was investigated. Coke with 0·14% of ash was prepared from sugar; through it, and its mixtures with salts, CO_2 at 900°, 1000°, and 1100° was conducted; the ratio $CO : CO_2$ in the resulting gas was determined. The activation energy is approx. 36 kg.-cal. and is scarcely affected by salts. The reaction rate increased in presence of $Fe(NO_3)_3$ or KNO_3; $Al(NO_3)_3$, KCl, NH_4 vanadate, etc. decreased it; salts of W, Si, Na, and Ca had no effect. Mixtures of $Fe(NO_3)_3 + KNO_3$ or of $Fe(NO_3)_3 + KNO_3 + Ca(NO_3)_2$ accelerate the reaction even > does $Fe(NO_3)_3$ alone; they alter also the activation energy. The higher is the ratio Fe : Al in the ash of cokes from coal the faster the cokes react with CO_2. J. J. B.

Catalytic reactions of carbon with steam–oxygen mixtures. A. W. Fleer and A. H. White (Ind. Eng. Chem., 1936, **28**, 1301—1309).—Powdered coke containing approx. 5% of Na_2CO_3 as catalyst was treated with steam–O_2 mixtures at 900°, 950°, and 1000°, the contact time varying from 2 to 7 sec. The decomp. of the steam is a first-order reaction and is independent of $[O_2]$. In the temp. range studied it has been calc. that the energy of activation is 26,800 g.-cal. per g.-mol., and that a temp. rise of 75° is necessary to double the reaction rate. C. R. H.

Development of charging and poking devices for gas producers. J. Gwosdz (Brennstoff-Chem., 1936, **17**, 401—408).—Mechanical and automatic devices for charging the fuel into the producer and for maintaining a uniform bed of fuel therein are described. A. B. M.

Generalised theory of gas-producer reactions with suggestions for research and development. W. J. Walker (Trans. Inst. Chem. Eng., 1935, **13**, 121—130).—Details of producer gas made when using steam and exhaust gas as endothermic agents are worked out on a general theoretical basis and discussed. The advantage of the use of exhaust gas is indicated; practical tests showed that the efficiency was greatest when 22% of it was used. Developments indicated are the use of liquid fuel and gas tar in producers, the use of liquid O_2, and the injection of H_2O into internal-combustion engines. D. K. M.

Removal of sulphur compounds from town gas down to 10 grains per 100 cu. ft. Joint Res. Comm. Inst. Gas Eng. and Leeds Univ. (Inst. Gas Eng., 1936, Comm. 146, 10 pp.).—A *résumé* is given of methods for reducing the S content of town gas to about 10 grains per 100 cu. ft. It is considered that practically complete removal of S from town gas could be effected by combining in series the oil-washing or active-C process for benzol extraction, which removes thiophen and some CS_2 from the gas, with the Carpenter–Evans catalytic process, which removes CS_2; or by operating the active C process with a reduced absorption period. H. C. M.

Optimum temperature of condensation of the methane fraction of coal gas. S. I. Savtschuk (J. Chem. Ind. Russ., 1936, **13**, 1047—1050).—The CH_4 content of coal gas falls sharply with falling temp. to −170°, and only very slowly below that temp. In the prep. of H_2 for NH_3 synthesis, cooling at −170° is recommended, and the resulting gas, containing CH_4 2·7, CO 3·4, and O_2 0·5%, is scrubbed with liquid N_2, to yield a final gas mixture containing $\nless$0·5% of CH_4. R. T.

Recovery of benzol from coal gas. V. Schön (Petroleum, 1936, **32**, No. 45, 13—16).—The " Benzorbon " active-C plant at the Budapest gas-works consists of four adsorbers (internal diam. 2·5 m.) each charged with 1900 kg. of C (height of layer about 1·35 m.), capable of dealing with 250,000 cu.m. of gas (containing 30 g. of benzol per cu.m.) per 24 hr. In normal operation not only is the benzol removed from the gas (with 94% efficiency), but also the greater part of the $C_{10}H_8$, the org. S compounds, the HCN, and the NH_3. The crude benzol may be used directly as a motor fuel; if it is to be stored, however, it must be treated with a gum inhibitor. An improved product is obtained by redistillation and refining. A. B. M.

Use of new solvents for removing naphthalene from coke-oven gases. G. V. Kopelevitsch and K. I. Gorschtein (Koks i Chim., 1936, No. 6, 36—41).—A gas-oil fraction (200—300°) and various oxidised oils were tested on a laboratory scale and details are given of the methods of treatment necessary to produce the optimum properties for the absorption of $C_{10}H_8$. The losses in removing $C_{10}H_8$ from gas pipes and the degree of corrosion due to the use of the solvents suggested are given. N. G.

Partial pressures of [gas] solvent vapours. M. I. Tolpina (Koks i Chim., 1936, No. 6, 41—43).—A formula is given for the relation between p and t of xylol solvents, and graphs of variation of p and t are given for xylol and the solvent. The equilibrium curve between xylol and the solvent is hence determined. N. G.

Semi-plant tests on producing high-percentage [calcium] acetate direct from charcoal-oven gases by washing the gases with milk-of-lime. H. Bergström and K. Cederquist (Iva, 1935, No. 3, 52—57).—By continuous washing of oven gases with dil. condensates, tar is effectively removed and $Ca(OAc)_2$ formed in a final milk-of-CaO tower which is practically tar-free, and has only 6—7% of formate. Ch. Abs. (e)

Use of oxygen and high pressure in complete gasification. I. Gasification with oxygen. Rept. 39 of Joint Research Committee, Inst. Gas Eng. and Univ. Leeds. F. J. Dent, W. H. Blackburn, N. H. Williams, and H. C. Millett (Inst. Gas Eng., 1936, Comm. 141, 76 pp.).—Results for the Lurgi plant using lignite are discussed. Cokes from Sharlston and Warrenhouse coals were studied in a laboratory apparatus (described). The Warrenhouse was a more reactive and therefore a better product than the Sharlston coke, giving lower outlet temp., lower O_2 consumption, and less sensible-heat loss and allowing the use of a lower steam : O_2 ratio. Addition of Na_2CO_3 improved the reactivity of Warrenhouse coke. Preheating of steam and O_2 also gave improved results. Use of air–steam mixtures instead of O_2–steam increased the heat losses. The influence on the results of rate of gasification and size of coke was studied. Results are given for gasification, using O_2–N_2 and O_2–CO_2 mixtures. Blowing O_2 instead of air through a heated coke bed reduced CO formation and sensible-heat losses. J. W.

3rd Report of the Gasholder Committee [of the Institution of Gas Engineers] (Inst. Gas. Eng., 1936, Comm. 144, 52 pp.).—Methods of testing for corrosion are described. Regular inspection is recommended and inspection schedules are suggested. Accidents to gasholders in Barrow-in-Furness and Dewsbury are discussed (by F. M. Birks). A report is given on the generation of H_2S in holder-H_2O (cf. B., 1936, 5). J. W.

Formation of nitrogenous gum during the storage and distribution of gas. H. Hollings (Inst. Gas Eng., 1936, Comm. 147, 59 pp.).—Gum formation is due to the interaction of small quantities of NO, O_2, and certain conjugated diolefines (I), such as butadiene and *cyclo*pentadiene. The presence of NO in town gas is due to waste combustion products drawn into the retorts from the heating flues or to air drawn in at the retort mouthpieces burning inside the retorts. Very little NO is removed in the NH_3 plant, but about 50% is abstracted by the oxide purifiers. Most of the gum formation occurs in the gasholders, the gum particles settling at a greatly increased rate where condensation of moisture in the gas is occurring. The mechanisms of the reactions involved have been studied. The rate of reaction in coal gas depends primarily on the concn. of (I), but also on the temp. and $[O_2]$ In most coal gases and in carburetted water-gas the (I) concn. is sufficient to cause rapid reaction. When gas is stripped by active C, this concn. may be reduced to such an extent that reaction in the resulting gas is either extremely sluggish or entirely suspended. In such cases the admixture of unstripped carburetted water-gas is desirable. Methods of measuring NO, and the wt., size, and no. of gum particles in gas are described in detail. It is concluded that the NO content of crude gas may be reduced by increased attention to maintenance of tight retorts, and by pressure control in the retorts. Where gas drying is adopted, the deposition of gum particles in the holder will be accelerated by practising gas drying at the holder outlet instead of at the inlet. H. C. M.

Corrosion from products of combustion of [town's] gas. IV. Tube experiments (contd.). Rept. 38 of Joint Research Committee, Inst. Gas Eng. and Univ. Leeds. J. W. Wood, E. Parrish, and A. H. Eastwood (Inst. Gas Eng., 1936, Comm. 140, 52 pp.; cf. B., 1936, 6).—The products of combustion from gas containing (per 100 cu. ft.) (*a*) 4 grains and (*b*) 0·1 grain of S acted on Pb, a 2 : 1 Sn–Pb solder, Al, brass [(*a*) only], hard Cu, Zn, and black Fe [(*b*) only]. Even at low [S] there was appreciable corrosion due to formation on combustion of N oxides (condensed as HNO_2 and HNO_3). The most resistant metal was solder. J. W.

My recent progress in gas calorimetry. (Sir) C. V. Boys (Proc. Physical Soc., 1936, 48, 881—898).—Guthrie lecture, 1934. N. M. B.

Automatic Orsat apparatus. Weydanz (Arch. Wärmewirts., 1936, 17, 242).—Gas analyses with this apparatus are claimed to be simpler and quicker than when using the standard apparatus. Each absorption bulb has a double inner bowl for facilitating gas absorption. R. B. C.

Chemical equilibria in the gaseous phase. Application to determination of the temperatures of flames b means of direct-reading diagrams. L. Reingold (Chaleur et Ind., 1936, 17, 205—211).—A method of calculating the final state, at a given temp., of a system of substances in equilibrium with their constituents, and influencing each other reciprocally, is derived. The method is applied to the determination, with the aid of diagrams, of the temp. of furnace flames at atm. pressure, account being taken of the simultaneous dissociation of CO_2 and H_2O in the burnt gas. R. B. C.

Comparison of the working of motor wagons using town's gas and liquid fuels. H. Baumann and H. Conrad (Gas- u. Wasserfach, 1936, 79, 855—

858).—Esso and town's gas are compared. Both are equally good fuels, but in some cases the latter may be superior economically. J. W.

Investigations during 1935 of combustibles in manholes in Boston, Mass. G. W. Jones, J. Campbell, F. M. Goodwin, and W. J. Huff (U.S. Bur. Mines Rept. Invest., 1936, No. 3321, 19 pp.).—Analyses are given for manholes studied. Dangers of explosion are much reduced by routine tests for combustible mixtures. J. W.

High-temperature tar of Gdov shale. A. S. Broun, E. M. Zelenina, and T. V. Sukatscheva (Chim. Tverd. Topl., 1934, 5, 771—787).—The constituents of the distillation products are described. Ch. Abs. (*e*)

Light fractions from the tar of Kaschpira shale. Z. I. Vozschinskaja (Chim. Tverd. Topl., 1935, 6, 250—257).—The shale was formed from algæ as well as from higher plants. O–S and S compounds other than thiophens must first be removed in preparing medicinal compounds. Ch. Abs. (*e*)

Producer tar from wood. E. V. Rakovski and E. Voznesenskaja (Chim. Tverd. Topl., 1935, 6, 235—250).—On distillation the tar yields mainly heavy acidic fractions and pitch. A soft pitch is obtained by distillation with superheated steam at 200°. 18% of the oils produced in distillation are phenols, which, after boiling and blowing with steam, yield a crude creosote. Carboxylic acids are 7·5% of the tar. The neutral oil left after extracting acidic compounds may be used as boiler fuel. Ch. Abs. (*e*)

Hydrogenation of low-temperature tar under various conditions. H. Winter, G. Free, and H. Mönnig (Oel u. Kohle, 1936, 12, 934—943; cf. B., 1936, 1028).—Tar obtained by the carbonisation of a bituminous coal at 600° was hydrogenated in a continuously-operating, laboratory-scale plant (cf. B., 1935, 178) at 450—500°/100—350 atm., in presence of an $(NH_4)_2MoO_4$–SiO_2 gel catalyst. The highest yields (about 17%) of light oil boiling up to 200° were obtained at about 480°/200 atm. The yield could be increased by repeated treatment of the residue, until practically complete conversion was effected. The PhOH-free light oil was a good-quality motor spirit. The fraction of b.p. 200—300° was less suitable as a Diesel fuel. A. B. M.

Benzol-recovery plant according to the new Pintsch wash-oil process at Ratibor gasworks. F. Krautwurst (Gas- u. Wasserfach, 1936, 79, 838—840).—The wash oil charged with benzol, preheated by heat interchange with the debenzolised oil, is passed through a steam-heated pipe-still into a vaporiser, two fractionating columns, and a final condenser. The plant yields a motor benzol of good quality that needs little or no refining, and smaller quantities of lighter and heavier fractions. From the latter $C_{10}H_8$ is recovered. The plant operates with high efficiency and needs little attention. A. B. M.

Hydrogenating the neutral kerosene fraction of tar from Gdov bituminous shale. N. A. Kliukvin, V. F. Polozov, and E. E. Feofilov (Chim. Tverd. Topl., 1935, 6, 340—347).—In the hydrogenation of O compounds with a double linking the O-reducing reaction precedes H addition at the double linking. The neutral kerosene fraction should not be treated in the liquid phase. Ch. Abs. (*e*)

Manufacture of straight asphalts. IX. Relation between paraffin content and appearance of asphalt. X. Relation between paraffin content and [asphalt] strength. Y. Ichikawa (J. Soc. Chem. Ind., Japan, 1936, 39, 312B; cf. B., 1936, 1075).—IX. Results are given for various asphalts.

X. The permissible limit for paraffin content is 3%. J. W.

Verification of specifications for asphalt. D. M. Wilson (Contract J. Suppl., 1935, May 1).—Adulteration with limestone increases the rate of deterioration. A natural asphalt rock should contain $\nless$8% of bitumen, which is less effective if not blended with the rock under natural conditions. The appearances of various types of debituminised rock in ultraviolet light are described. When such rock is extracted with dil. HCl the residues may be separated by flotation in $CHBr_3$, or electromagnetically. Fluorite is always absent from commercial asphalt rocks, but many limestones contain it. The bitumen-carrying capacity of various rocks is reviewed. Good-quality mastics from genuine asphalt rocks have a high % of material passing 200-mesh. The reverse applies to limestone aggregates. Most of the bitumens used for enrichment (except fluxed Trinidad Epuré) are dark in colour. Ch. Abs. (*e*)

Bituminous products. Their constitution and analysis. C. L. Ruiz (Ind. y Quim., 1936, 2, 9—18).—A review. L. A. O'N.

Development of distillation processes in the petroleum industry. I. Kimura (J. Fuel Soc. Japan, 1936, 15, 91—92).—An account of progress in Japan with a discussion of the advantages of the pipe still over the shell still.

Determination of critical temperature and pressure of petroleum fractions by a flow method. L. C. Roess (J. Inst. Petroleum Tech., 1936, 22, 665—705).—A method of measuring crit. temp. (T_c) and pressure (P_c) of petroleum fractions having T_c up to 538° is described. The oil under pressure of N_2 and flowing at 35—50 litres per hr. to prevent cracking, after heating in Pb-immersed coils, passes to a quartz observation cylinder and thence through a forged steel, flow-control valve to cooling coils. Pressure is varied rather rapidly up and down through the crit. region while the temp. is slowly raised or lowered. The crit. point is identified by a red colour change which accompanies the appearance of fog in the observation chamber. Data are tabulated on a large no. of fractions obtained by blending eight base stocks of gasoline, kerosene, and gas oil. A correlation of T_c with $d_{15\cdot5}^{15\cdot5}$ and volumetric average b.p. has been developed, and also correlations between P_c, T_c, mol. wt., and the slope of the A.S.T.M. curve. C. C.

Chemical study of the organic mass present in kukkersite [shale]. N. A. Orlov and O. A. Radtschenko (Chim. Tverd. Topl., 1934, 5, 506—509; cf. B., 1935, 484).—A C_6H_6–EtOH extraction yielded 0·6% of a hard bitumen (C 66·28, H 8·77%; acid val. 39, sap. val. 134). Humic acids were absent. Extraction with 5% alkali in aq. NH_3 gave a product containing acids or esters of the type $C_nH_{2n-4}O_2$. The residue of the extraction contained HCO_2H, AcOH, and valeric acid. Ch. Abs. (*e*)

Separation and identification of the aromatic hydrocarbons contained in the xylene fraction of Syukkôkô crude. II. M. Mizuta (J. Soc. Chem. Ind. Japan, 1936, **39**, 311—312B; cf. B., 1936, 1077).—By repeated fractional distillation and crystallisation pure *p*-xylene was obtained. J. W.

Separating acid from acid sludge by electric heating. S. Josifov (Azer. Neft. Choz., 1934, No. 11—12, 97—100).—The separation is effected by heating with movable electrodes. The final products are 65% H_2SO_4 and an org. mass suitable for boiler fuel when mixed with ordinary fuel oil. Ch. Abs. (*e*)

Metal content of petrol coke and [heavy oil] ash. F. Hermann (Metallwirts., 1936, **15**, 1124—1125).—Coke formed in cracking crude oil contained 0·2—0·7% Co, Ni, Sn, and V, whilst ash from oil-burning steamers contained Mo 0·1, Ni 0·5, and V 2·5%. C. E. H.

Determination of sulphur in oils [etc.]. E. A. Wernicke (Chem.-Ztg., 1936, **60**, 975—977).—The weighed sample of oil is vaporised and/or coked in a current of H_2, and the gases and vapours are burned in O_2, the products being passed through wash-bottles containing (1) aq. H_2O_2 and (2) dry sand, the latter to absorb SO_3 fog. The residual coke is then burned in a current of O_2 and the products are similarly washed. The H_2SO_4 formed is determined in the usual manner. A suitable form of apparatus is described. The method is applicable to liquid compounds of any b.p. and also to solids. A. B. M.

Determination of the cloud point of dark oil. W. R. Van Wijk (J. Inst. Petroleum Tech., 1936, **22**, 754—760).—The method depends on the measurement of the transmittancy of the oil to infra-red radiation, a dark oil being far more transparent to radiation of λ 1—3 μ than to visible light. If there is any separation in the oil, the medium diminishes in transmittancy owing to its optical inhomogeneity. The source of radiation used was a small 6-volt, 35-watt electric lamp. An image of the filament was thrown by a lens in the centre of the oil container (usually an A.S.T.M. pour-point glass submerged in a cooling liquid in an unsilvered Dewar vessel). The beam of rays was afterwards conc. by a second lens on a thermopile connected to a galvanometer. For very dark oils the thickness of the layer was reduced to 4 mm. Typical curves show galvanometer deflexion against temp., with in most cases a sharp break at the pour point. One oil containing 2% of asphalt gave a curve indicating separation of asphalt at higher temp., with a break showing separation of wax. On pptg. the asphalt with C_5H_{12}, the curve obtained gave a sharper break at the same temp. as before for wax, showing that removal of asphalt had no effect on pour point. The method allows the entire process of separation to be followed objectively as a function of the temp. H. C. R.

Extinction coefficient and extinction quotient [of mineral oils]. R. Koetschau (Oel u. Kohle, 1936, **12**, 992—994; cf. B., 1935, 133).—Polemical against Siebeneck (B., 1936, 1138). Priority is claimed in the method of measuring the abs. colour vals. of the oils. H. C. R.

Cause of rapid ageing of steam-turbine oils. E. Pyhälä (Petroleum, 1936, **32**, No. 45, Motorenbetr., **9**, 4—5).—The failure of an oil was traced to the presence in it of S compounds formed during H_2SO_4 refining; an oil from a different crude, which needed less refining, was satisfactory. The presence of these compounds in the oil was not shown by the usual tests. A. B. M.

Preparing synthetic acids by oxidising a wide fraction of Surachani fuel oil with air. II. K. P. Likushin, V. J. Masumjan, and N. C. Levkopulo (Azer. Neft. Choz., 1934, No. 11—12, 87—89).—Most favourable operating conditions are reviewed. Ch. Abs. (*e*)

High-anti-knock fuels from lower olefines. S. F. Birch, F. B. Pim, and T. Tait (J.S.C.I., 1936, **55**, 335—337T). Equimol. mixtures of *sec.* and *tert.* Bu and amyl alcohols treated with dil. H_2SO_4 on the water-bath give hydrocarbon condensation products besides normal polymerisation products. From $Bu^{\gamma}OH$ and *tert.*-amyl alcohol (I) is obtained "α-*iso*nonene," b.p. 122·5—129°, $d^{15·5}$ 0·754, $n_D^{15·5}$ 1·4268, octane no. (C.F.R. motor method) 74·8; from *sec.*-BuOH and (I) "β-*iso*nonene," b.p. 132—136°, $d^{15·5}$ 0·759, n_D^{15} 1·4309, octane no. 83·5; and from $Bu^{\gamma}OH$ and *sec.*-BuOH "$\beta\beta\gamma$-trimethylpentene," b.p. 109—111°, $d^{15·5}$ 0·742, $n_D^{15·5}$ 1·4239, octane no. 85·6. On hydrogenation (vapour phase; with supported Ni catalyst) these olefines give the following paraffins respectively: "α-*iso*nonane," $d^{15·5}$ 0·740, $n_D^{15·5}$ 1·4148, octane no. 98·0; "β-*iso*nonane," b.p. 133—134°, $d^{15·5}$ 0·743, $n_D^{15·5}$ 1·4168, octane no. 94·0; "$\beta\beta\gamma$-trimethylpentane," b.p. 110°, $d^{15·5}$ 0·721, n_D^{20} 1·4056, octane no. 100·2. Diamylene obtained during the production of "α- and β-*iso*nonanes" had a boiling range of 147—161°, $d^{15·5}$ 0·778, octane no. 73·6, and on hydrogenation yielded "*iso*decane," $d^{15·5}$ 0·764, octane no. 94·8.

Lead tetraethyl as antiknock agent. Anon. (Chem.-Ztg., 1936, **60**, 945—946).—A review.

Knock ratings. II. [Lead tetra]ethyl effects of alcohol fuel and benzene fuel. III. [Lead tetra]ethyl effects of pure hydrocarbons. R. Kobayasi and S. Kajimoto (J. Soc. Chem. Ind. Japan, 1936, **39**, 304—307B, 307—311B; cf. B., 1936, 179).—II. Increase in the [EtOH] or [C_6H_6] in a fuel decreases the $PbEt_4$ effect. EtOH has a more pronounced anti-knock effect than C_6H_6.

III. The $PbEt_4$ effect decreases in the order paraffins > naphthenes > unsaturated hydrocarbons > aromatic hydrocarbons. There is partial correlation between $PbEt_4$ effect and composition of a gasoline. J. W.

Structure and viscosity of [hydrocarbon] liquids. G. Hugel [with Lerer and Tcherkozov] (Oel u. Kohle, 1936, **12**, 917—920).—The steep η–temp. curves of polycyclic aromatic and hydroaromatic hydrocarbons are attributed to the formation of mol. complexes in which the ring planes lie parallel to one another. This hypothesis is supported by measurements of η for a series of substituted dihydroanthracenes; with increasing chain length in the substituent group, η at first rises and then falls again, the fall being due to inhibition of the mol. association by introduction of the side groups. The η-temp. curve of a hydroaromatic polycyclic oil was improved by addition of a small proportion of a substance of double-condensed-ring structure; the latter apparently inhibits the dissociation of the mol. complexes with rising temp. The above hypothesis is confirmed by experiments in which a fall in η was produced by forcing a mixture of polypranes (cf. A., 1932, 249) with a lubricating oil, or a similar mixture containing also tetralin, through a porous plate, the mol. complexes being thereby broken down mechanically. A. B. M.

Viscosity index determined by passing air bubbles through oils. J. H. Hruska (Oil and Gas J., 1935, **34**, No. 15, 50).—A method based on timing the rate of travel of the bubbles is described. Ch. Abs. (*e*)

Theory of viscosity. I. Orientation effect. A. Bondi (Petroleum, 1936, 32, No. 45, Motorenbetr., 9, 2—4).—The observed decrease in η (Kyropoulos, B., 1934, 915) and in ε (Tausz and Szekely, *ibid.*, 439) of an oil with increasing velocity gradient is attributed to an orientation of the mols. This is confirmed by a quant. comparison of the results on the basis of Umstätter's relationship between η and temp. A. B. M.

Hydrocarbons and sulphur compounds of lubricating oils. I. Selective extraction of Tschusov petroleum with aniline. A. V. Kirsanov and A. F. Novikova (J. Appl. Chem. Russ., 1936, 9, 1638—1648).—The fractions of b.p. 290—345° of Tschusov petroleum may be separated by NH_2Ph extraction into a series of sol. and insol. fractions, differing in *d*, *n*, and S content. R. T.

Hydrocarbons and sulphur compounds of [lubricating] oils. II. Separation of sulphur compounds of Tschusovaja petroleum as mercuric complexes. A. V. Kirsanov and A. F. Novikova (Bull. Soc. chim., 1936, [v], 3, 2107—2112; cf. preceding abstract).—Treatment of the petroleum, whether previously enriched by NH_2Ph or not, with $HgCl_2$ in Et_2O gives complexes with a small proportion of the S compounds; this proportion is increased by the use of $HgCl_2$ in boiling EtOH. $Hg(OAc)_2$ or $Hg(CN)_2$ offers no advantage. The S compounds are recovered by treating the complexes with HCl, provided that mild conditions have been used in their formation, but if the conditions have been drastic complete decomp. is not effected by conc. HCl and the products are resinous and insol. in light petroleum, probably owing to oxidation or polymerisation. H. W.

X-Ray diffraction studies of lubricants. I. Structures of solid and of unimolecular films, and orientation effects of addition agents. II. Molecular regimentation and chemical reactions in liquid oils and blends. III. X-Ray method of rating lubricants in terms of protection against surface wear. G. L. Clark, R. R. Sterrett, and B. H. Lincoln (Ind. Eng. Chem., 1936, 28, 1318—1322, 1322—1325, 1326—1328).—I. *X*-Ray diffraction analysis shows that thin solid films of unsubstituted and chlorinated long-chain acids, *e.g.*, stearic, orient equally well and indicate double-mol. structure. Chlorinated esters of stearic and palmitic acids orient better than the unchlorinated esters. Esters and ring compounds orient best on Fe or Zn surfaces, and chlorinated and unsubstituted stearic acid orient best on Cu. Addition of a chlorinated ester to an oil greatly improves the orientation of the hydrocarbon mols. in the film.

II. When blended with oil, mols. of chlorinated compounds are highly oriented and the strong binding forces between them reduce the tendency of the oil mols. towards a random motion when the temp. is raised. Chlorinated compounds, when heated in contact with a metal, lose Cl, and at the same time a stable solid material appears to attach itself to, and to orient on, the metal surface.

III. The surface wear of lubricated brass pins was observed by *X*-ray diffraction methods, the least wear being with a lubricant containing 1% of "dichloromethyl stearate." C. R. H.

Oxidation of lubricating oils at various temperatures. F. Evers (Oel u. Kohle, 1936, **12**, 920—922).—Three oils were oxidised in presence of a catalyst (cf. B., 1930, 801) at 100—150°. The absorption of O_2 followed a first-order reaction law. The total absorption increased, but the reaction coeff. in most cases fell with rising temp. The *d*, sap. val., and hard asphalt content of the residue were determined. Further experiments, particularly at higher temp., are necessary before useful conclusions can be reached therefrom. A. B. M.

[Lubricating] oil oxidation. Reaction which is apparently retarded by the products. R. W. Dornte, C. V. Fergusson, and C. P. Haskins (Ind. Eng. Chem., 1936, 28, 1342—1345).—Rate of O_2 absorption decreases continuously, on account of decreasing concn. of reacting components, and varies linearly with the partial pressure. H_2O, CO_2, and acids are the principal oxidation products; small amounts of CO, but no peroxides, occur. The catalytic effect of Cu, Fe, Sn, and Pb depends on O_2 pressure and on the ratio of area of metal surface to quantity of oil. Cu and Pb are the most effective. F. C. B. M.

Cutting media. E. E. Halls (Ind. Chem., 1936, **12**, 377—381).—Sol. oils for use, when diluted, as lubricants and cooling media in the machining of steel are discussed. Those containing sulphonated oil (3%) are the most efficient, functioning without separation, objectionable odour, gumminess, or corrosion of the machine parts. E. H. B.

Possible new uses for colloidal graphite as a lubricant. E. H. Kadmer (Chem.-Ztg., 1936, **60**, 943—944).—Uses as a lubricant for motor engines are discussed. J. W.

Measuring radiation of domestic heaters. Preparing powdered material. Semi-fluid

friction.—See I. **Thermal decomp. of C_3H_8 and C_4H_{10}. Solvent absorption.**—See III. **HCl from gas. $AlCl_3$.**—See VII. **Road tar. Roofing felt.**—See IX. **Coke for blast-furnace operations. Firing of steel furnaces. Effect of org. S compounds on metals. Scaling of mild steel in furnaces. Abrasion at high temp. Fuel for welding etc. Steels for engine valves.**—See X. **Hydrolytic agent for fats. Shale oil soap and tar.**—See XII. **Resins from cracked distillates. Bituminous paints. Solvents for oil paints, cellulose lacquers, etc.**—See XIII. **Humic acids of soil types.**—See XVI. **Petroleum products.**—See XX. **Determining C_6H_6 etc. in air.**—See XXIII.

See also A., Dec., 1468, **Explosion limits of H_2–air mixtures.** 1479, **Detecting Co.**

Patents.

Production of disintegrated peat. N. Testrup, T. Gram, P. Hartmann, and Techno-Chem. Labs., Ltd. (B.P. 455,609, 17.4.35).—Air-dried peat is manufactured by an appliance consisting of a rapidly rotating disc which simultaneously excavates a ditch adjacent to the drying bay or area and scatters the peat over the area. The scattered peat is later harrowed and disintegrated, thus mixing all layers from the ditch to a good-quality whole. D. M. M.

Pneumatic apparatus for separating dust from coal and the like. H. Seabrook. From Westfalia-Dinnendahl-Gröppel A.-G. (B.P. 455,219, 11.4.35).—The coal is passed over a vibrating sieve, pressure air is supplied uniformly below the sieve, and above it a no. of depending, slightly tapered conduits dip into the coal and are subjected to suction; the suction and pressure are independently adjustable so that air may enter the bed from above as well as below. B. M. V.

Production and use of base-exchange materials [from coal]. R. Furness, and J. Crosfield & Sons, Ltd. (B.P. 455,374, 14.1.35).—Coal in granular form is treated with a sulphonating agent, *e.g.*, conc. H_2SO_4 or $ClSO_3H$, the latter, if desired, in C_2HCl_3 solution, for 1—3 hr. at 95°, until the granules have expanded but not disintegrated, and is then washed free from excess acid. The product may be used for H_2O softening; it may be repeatedly regenerated by treatment with aq. NaCl. A. B. M.

Production of coke or semi-coke by carbonising coal–oil mixtures. H. P. Stephenson and R. G. Israel (B.P. 455,558, 18.4.35. Cf. B.P. 448,028—9 and 448,622; B., 1936, 776, 819).—A finely-divided, fluid coal–oil mixture is prepared and fed into a tray which is placed in the carbonising retort; a further amount of coal is then added prior to or in the early stage of carbonisation. D. M. M.

Purification of finely-divided carbon black which has been formed on iron-containing contacts by decomposition of carbon monoxide. Bayerische Stickstoff-Werke A.-G. (B.P. 456,252, 28.2.36. Ger., 28.2.35 and 20.1.36).—The C black is freed from Fe and Fe carbide by treating it with Cl_2 or HCl at $>$ 400°. A. B. M.

Preparation of electrode carbon and ash-free coking products from coals. Gewerkschaft M. Stinnes (B.P. 455,255, 15.10.35. Ger., 17.10.34, 11.12.34, and 28.1.35).—Extracts obtained by treating coal with a suitable solvent are carbonised. The extraction may be effected as described in B.P. 293,808 (B., 1930, 314). A. B. M.

Purification of graphite. Brit. Thomson-Houston Co., Ltd. (B.P. 455,185, 6.1.36. Ger., 5.1.35).—The graphite parts of vac. or vapour-electric discharge apparatus are purified from substances which emit electrons or ions by heating them as anodes in a d.-c. circuit in vac. or in a neutral or reducing atm. under vac. Heating may be effected by means of a glow discharge. The current may be conducted to the parts by contact with C powder. A. B. M.

Production of hydrocarbons by treatment with hydrogenating gases of distillable carbonaceous materials. Internat. Hydrogenation Patents Co., Ltd., Assees. of C. L. Brown (B.P. 455,313, 18.5.35. U.S., 14.6.34).—The initial materials, *e.g.*, coal, tar, tar oils, mineral oils, are treated with H_2, usually at 360—550°/>50 atm., in presence of a catalyst made by pptn. of the polysulphides of metals of groups V—VII, from aq. solutions or suspensions of compounds thereof, *e.g.*, MoS_3 prepared by acidifying aq. NH_4 thiomolybdate. The MoS_3 is preferably heated in a non-oxidising atm., *e.g.*, H_2 at 325—600°, whereby it is reduced to a lower sulphide, before use as a catalyst. The production, contingently, of hydrocarbon derivatives, *e.g.*, phenols, is also claimed. A. B. M.

Production of hydrocarbons by destructive hydrogenation of carbonaceous materials. H. E. Potts. From Internat. Hydrogenation Patents Co., Ltd. (B.P. 456,371, 15.5.35).—The reaction vessel of a hydrogenation process and the reactants are heated to the desired temp. by passing a heating material (H_2) through the vessel and in indirect contact with the reactants. This material has itself been heated by indirect contact in a heat exchanger with H_2, in which 2—3% of it is being burned with insufficient O_2 in or adjacent to the heat exchanger. D. M. M.

Gas-making apparatus. J. A. Guyer, F. E. Frey, and W. F. Huppke, Assrs. to Phillips Petroleum Co. (U.S.P. 2,029,317, 4.2.36. Appl., 19.3.32).—Peak-load town's gas (*e.g.*) is manufactured from a hydrocarbon liquid and steam by catalytic, highly endothermic reaction. Primary combustion (of any suitable fuel) takes place on one side of a refractory wall the other side of which radiates heat to the catalyst tubes (*A*); the combustion gases pass next in contact with extensions of *A* and then in contact with convection heating tubes (*B*); lastly they preheat the air for combustion. The hot gases so treated pass through a waste-heat boiler the steam from which is superheated in *B*, and at the junction *B–A* the oil is injected. B. M. V.

Gas generators. Orenstein & Koppel A.-G. (B.P. 456,557, 18.2.36. Ger., 14.10.35).—A producer for use on road vehicles is described. D. M. M.

Gas producers with simultaneous up and down draught. Humboldt-Deutzmotoren A.-G. (B.P. 456,111, 31.3.36. Ger., 11.4.35).—The downward-flowing air is introduced through tubular nozzles extending into the fuel space and uniformly distributed over the cross-section of the producer, but not always at the same vertical level; improved gasification of tarry fuel is claimed. D. M. M.

Gas producers for continuous preparation of water-gas. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 456,671, 4.6.35).—The producer consists of a chamber the lower parts of which are subdivided by separating walls into many narrow elongated cells having a smaller total cross-section than has the upper part. The fuel is fed into the top as usual and the gasifying agent introduced into the small cells through connecting openings from channels in the separating walls, while the gas formed in the gasification zones flows above the separating walls, through the charge, and is withdrawn at a suitable place. Advantage is claimed in better distribution of the gasifying agent and avoidance of channelling. D. M. M.

Manufacture of carburetted water-gas with heavy oil. O. B. Evans, Assr. to United Gas Improvement Co. (U.S.P. 2,026,877, 7.1.36. Appl., 21.1.31).—The process involves the following steps: the fuel bed (*F*) is air-blasted and the gases are burned with secondary air introduced marginally into the upper edge of *F* and are then passed in parallel through two heat-exchange vessels (*H*) in such manner that the relative amount of heat stored in the two *H* can be controlled; steam is then passed up through *F* and the gas formed is carburetted by spraying oil on to the upper edge of *F*, and is then passed through one *H* to fix the oil vapours; finally a back-run is made through *F* with steam preheated in the other *H*. A. B. M.

Production of carburetted water-gas. H. J. Carson (U.S.P. 2,033,511, 10.3.36. Appl., 29.4.32).—The carburetting agent is introduced by pipes into a chamber between two chequer-brick chambers, one above for heating the gas and one below for carburetting. D. M. M.

Cleaning of producer gas or the like. F. Krupp A.-G. (B.P. 456,105, 17.3.36. Ger., 26.3.35).—Producer gas for use in gas engines is purified in several stages. Dust is removed by centrifugal separators, S by contact with masses of Fe hydroxide mixed with soda; both operations are carried out hot. The gas is then cooled and finally passed through a scrubber packed with wood wool wetted with oil to remove last traces of impurities. D. M. M.

Purification of gases from tar and recovery of the dehydrated tar. Soc. pour l'Exploit. des Proc. Ab-Der-Halden (B.P. 455,754, 18.2.36. Fr., 19.2.35).—The gas is washed with a supply of tar circulating in a closed circle, the temp. and composition of the tar being regulated in a conditioning receptacle (I) disposed in the cycle. Thus the tar in (I) may be partly distilled to increase its η, or diluted with oil to decrease its η. Excess of tar is removed from (I) through a const.-level device. A. B. M.

Recovery of ammonia from coal and like gases. Institution of Gas Engineers, and A. Key (B.P. 455,648, 26.4.35).—Ammoniacal liquor is distilled in such manner that all the CO_2 is removed, together with sufficient NH_3 to form NH_4HCO_3; the remaining NH_3 is used to absorb CO_2 from the gas and produce a liquor containing CO_2 and NH_3 in the same ratio as in the original liquor, this liquor then being returned to the process. D. M. M.

Removal of hydrogen sulphide from gases. Gas Light & Coke Co., W. K. Hutchison, and G. Dougill (B.P. 456,661, 8.5.35 and 29.1.36).—H_2S present in small quantities, *i.e.*, a few p.p.m., is removed by treating the gas with a non-aq. liquid, *e.g.*, gas oil, having in colloidal suspension or true solution either a metallic salt of an org. acid ($\nless C_5$) or a metallic co-ordination compound, the metal in either case being capable of forming a sulphide which is not easily decomposed by heat or weak acids. Suitable compounds are oleates, stearates, or palmitates of Zn, Cu, Fe, Co, or Ni, or co-ordination compounds of any of these metals with a diketone or keto-ester, *e.g.*, $CH_2Ac{\cdot}CO_2Me$, CH_2Ac_2, or CH_2BzAc. The liquid may be sprayed into or kept in contact with the gas, and by floating a layer of the liquid on the H_2O in a gasholder the gas is prevented from absorbing H_2S therefrom. D. M. M.

Treating and odorising [combustible] gas. W. W. Odell (U.S.P. 2,032,431, 3.3.36. Appl., 1.8.31).—For odorising purposes addition of a blend of a volatilisable odoriferous org. S compound of the mercaptan or sulphide class with b.p. > that of EtSH, together with a volatisable org. *tert.* NH_2-compound having the property of neutralising acidic properties of the S compounds, preferably dissolved in a paraffinic hydrocarbon of b.p. >30°, is claimed; $C_{10}H_8$ is sometimes added. D. M. M.

Detecting small quantities of carbon monoxide in air or other gas. O. H. Dräger (B.P. 455,409, 23.12.35. Ger., 24.12.34. Cf. B.P. 431,809; B., 1935, 900).—The gas to be tested is drawn through a mass of SiO_2 gel which has been previously impregnated with $PdCl_2$ and activated by heating to 140°. The gel is then moistened with H_2O and the presence of CO shown by the colour change from yellow or brown to grey or black. D. M. M.

Production and use of neutral or approximately neutral gaseous atmospheres, or reducing atmospheres. Brayshaw Furnaces & Tools, Ltd., S. N. Brayshaw, and F. Rushton (B.P. 455,276, 12.4.35 and 6.3.36).—Air is passed through charcoal to produce CO and N_2 and the gas is burned in a separate chamber with additional air to obtain the desired composition. The heat from the producer is usefully employed in a combined apparatus for the heat-treatment of metals (described). B. M. V.

Manufacture of acetylene. Standard Oil Development Co. (B.P. 455,567, 31.10.35. U.S., 29.12.34).—A preheated mixture of powdered carbonaceous fuel, *e.g.*, coke dust, having a H/C ratio of $<0{\cdot}75$ and a normally fluid hydrocarbon is fed directly into an electric arc, the products being immediately quenched with fine H_2O sprays. D. M. M.

Extraction of motor fuels by distillation of crude benzenes. W. H. A. Thiemann. From Carbo-Norit Union Verwaltungs-Ges.m.b.H. (B.P. 456,320, 9.6.36).—Benzol extracted from coal gas etc. by active C, from which it has been driven by steam, is distilled so that the first runnings up to 70° are separated as they contain the malodorous constituents. H_2O is then added to the still, and a gentle steam-distillation carried out at $\ngtr 97°$; a motor fuel is thus driven over, which is stabilised by inhibitors in the usual way and rendered ready for use. The bottoms contain $C_{10}H_8$ and other undesired, high-boiling constituents. D. M. M.

Production of impregnating pitch and product utilising it. I. H. Derby, Assr. to P. C. Reilly (U.S.P. 2,033,885, 10.3.36. Appl., 18.12.31).—Pitch for impregnating cellulosic fibrous material for electrical use is improved by addition of phenolic tar acid. D. M. M.

Treatment of oil wells. H. A. Ambrose and A. J. Teplitz, Assrs. to Gulf Res. & Development Corp. (U.S.P. 2,032,826, 3.3.36. Appl., 12.1.35).—H_2O is selectively shut off from oil wells by forcing into the H_2O-bearing strata at high pressure a solution of a plastic, *e.g.*, paraffin wax, $C_{10}H_8$, or stearic acid, in a H_2O-miscible solvent, *e.g.*, $COMe_2$ or EtOH. D. M. M.

Mud-lining oil and gas wells. C. P. Bowie (U.S.P. 2,033,509, 10.3.36. Appl., 3.12.35).—A drilling mud for use as liner is composed of a liquid vehicle, clay, and a substance sol. in hydrocarbons but insol. in H_2O, *e.g.*, rosin, chicle, asphalts, metallic stearates, etc. D. M. M.

[Petroleum] retort lining. C. L. Newport and H. C. Smith (U.S.P. 2,033,644, 10.3.36. Appl., 15.9.33. Renewed 29.1.36).—A lining for a petroleum processing vessel comprises a mixture of mineral wool and a cementitious binder, a preferred form being Portland cement 50, shredded mineral wool 33, and diatomaceous earth 16·7 wt.-%. D. M. M.

Cracking of mineral oils. Standard Oil Development Co., Assees. of R. K. Stratford (B.P. 456,244, 19.2.36. U.S., 21.2.35).—Spent clay, previously used in treating lubricating oil stock, is mixed with the oil to be cracked, preferably after first passing through the re-run still used to redistil the cracked naphtha, which is stabilised by this action. D. M. M.

Cracking of hydrocarbon compounds. N. V. Nieuwe Octrooi Maats., Assees. of A. P. Sachs (B.P. 455,421, 25.3.36. U.S., 4.4.35).—The vapours of hydrocarbon oils heated at 510—594° are mixed with gas (mainly H_2 and CH_4), heated at $\ngtr 56°$ below the temp. of the oil vapour, in such proportion that the initial reaction temp. is $>482°$. The mass heating effect of the gas reduces both the fall in temp. due to the endothermic cracking and also the partial pressure of the vapour, thereby favouring the formation of dehydrogenated hydrocarbons which are valuable in motor fuels. C. C.

Splitting of hydrocarbons. Gutehoffnungshütte Oberhausen A.-G. (B.P. 455,505, 3.5.35. Ger., 5.5.34).—Heated mineral oil is supplied to a fractionating column and condensates are withdrawn at a no. of levels, each condensate being subjected to cracking in its own tubular heating system under optimum conditions for that condensate. (All heating systems may be in a common heating furnace at that part of the latter giving the required conditions.) The cracked products are returned to the column and the split product is withdrawn from the top of the column. C. C.

Conversion under pressure and in liquid phase of hydrocarbons having high b.p. into hydrocarbons having low b.p. P. Guichard, Assee. of Soc. Techn. de Construction et de Raffinage (S.T.C.R.) (B.P. 456,089, 1.2.35. Fr., 2.2.34).—Oil is continuously passed through two distinct zones under pressure, one a heating and the other a reaction zone. In the latter the oil flows in a series of parallel streams of narrow cross-section relative to their length. The streams may be under different physical conditions to give a no. of products. D. M. M.

(A) **Inhibiting gum in cracked distillates.** (B) **Altering the boiling points of hydrocarbons.** R. E. Burk, Assr. to Standard Oil Co. (U.S.P. 2,033,877—8, 10.3.36. Appl., [A] 11.3.30, [B] 4.10.30).—(A) Gum formation is inhibited by the action of a normally liquid aliphatic mercaptan and an aliphatic amine, the total present being $\ngtr 1\%$. A preferred mixture is n-C_5H_{11}·SH and $NHBu^{a}_2$. (B) Normally gaseous hydrocarbons are cracked at 870—1150°, the temp. is then lowered to 594°, and the products are passed to a zone at 733—955° for polymerising. D. M. M.

Electrical dehydration [of oil]. P. W. Prutzman, Assr. to Socony-Vacuum Corp. (U.S.P. 2,027,615—6, 14.1.36. Appl., 10.10.33).—(A) A shell is divided into upper and lower chambers, and tubular grounded electrodes through the partitions form the sole means of upflow; the live electrodes are thin wires axial to the tubes. Drains are provided for H_2O from the upper to the lower chamber, through which flow of emulsion is prevented. (B) The live electrode is conical with the closed apex downward; the earthed electrode is a wire screen around the cone and is supported by horizontal plates from the shell wall, the plates forming quiescent spaces with the necessary ports for up- and downflow. B. M. V.

Electrical dehydration of oils. M. E. Cerf, Assr. to L. B. Smith (U.S.P. 2,030,198, 11.2.36. Appl., 3.4.33).—To maintain the non-conductivity of oil containing H_2O in disperse form, preferentially H_2O-wettable granules, of $d \nless 2{\cdot}5$, are allowed to fall through horizontal electrostatic fields at a faster rate than the flow of the oil emulsion. These granules are withdrawn from a pool of collected H_2O at the bottom, freed from excess of moisture but not rendered dry, and showered again into the apparatus. B. M. V.

Sweetening of hydrocarbon oils with alkali polysulphides. W. A. Schulze and L. V. Chaney, Assrs. to Phillips Petroleum Co. (U.S.P. 2,034,837, 24.3.36. Appl., 20.6.33).—Sour hydrocarbons are treated with an alkaline solution containing an alkali or alkaline-earth polysulphide, *e.g.*, NaOH in aq. solution (about 225 g. per litre) together with about 180 g. per litre of polysulphide of approx. composition $Na_2S_{4\cdot5}$. D. M. M.

Refining of petroleum oil. J. C. Morrell, Assr. to Universal Oil Products Co. (U.S.P. 2,027,648, 14.1.36. Appl., 31.10.29).—The lighter products from the cracking of petroleum oil are refined by subjecting the oil first to the action of a mixture of HNO_3 and AcOH and then to that of conc. H_2SO_4. $CH_2Cl{\cdot}CO_2H$ and similar acids may also be used in conjunction with inorg. acids such as HCl and H_3PO_4 or HPO_3. The use of these acids before using H_2SO_4 prevents substances being left in the refined oil which are unstable with respect to colour and odour, where the oils are not redistilled. H. C. R.

Refining of petroleum oils. H. G. Smith, Assr. to Gulf Oil Corp. of Pennsylvania (U.S.P. 2,035,349, 24.3.36. Appl., 2.5.32).—Lubricating oils are refined by treatment with H_2SO_4, removal of sludge, removal of acid by heating to 260—316°, and, if necessary, again acid-treating the deacidified oil. D. M. M.

Treatment of hydrocarbons. T. R. Donlan, Assr. to Standard Oil Development Co. (U.S.P. 2,031,939, 25.2.36. Appl., 26.2.32).—Hydrocarbon oils are continuously treated with fuming H_2SO_4 or with SO_3 at $\not<80$—100° in an apparatus which causes violent agitation and intimate mixing at the point of contact. Sludge and treated oil are continuously removed. D. M. M.

Separation of products obtained in the oxidation of hydrocarbons. O. R. Sweeney, F. C. Vilbrandt, H. H. Beeson, and H. A. Montgomery, Assrs. to Hanlon–Buchanan, Inc. (U.S.P. 2,024,954, 17.12.35. Appl., 13.9.33).—Vapours of oxidation products (containing aldehydes) obtained by treating volatile petroleum fractions with air or other oxidising media are treated in vapour phase with phenolic vapours or passed through a solution of PhOH to form a plastic condensation product. Unchanged vapours are separated and may be used as a solvent for the PhOH. C. C.

Hydrocarbon oil treatment. (A) S. W. Ferris, (B) S. S. Kurtz, jun., Assrs. to Atlantic Refining Co. (U.S.P. [A] 2,033,932 and [B] 2,033,942, 17.3.36. Appl., [A] 14.3.33, [B] 28.6.33).—(A) Crude oil is fractionated by distillation, and individual fractions are then extracted with a solvent consisting of an unsaturated aliphatic alcohol (allyl alcohol) or a mixture of such alcohols. Solvent and oil are heated to effect dissolution and cooled. (B) Mineral oil distillates containing a mixture of paraffinic and naphthenic hydrocarbons are extracted by warming with an aliphatic sulphone, *e.g.*, Bu_2SO_2, and cooling. In both (A) and (B) the mixture separates into two layers, of which one is richer in paraffinic and the other in naphthenic constituents. D. M. M.

Treatment of hydrocarbon oils. J. C. Morrell, Assr. to Universal Oil Products Co. (U.S.P. 2,034,197, 17.3.36. Appl., 19.12.31).—Hydrocarbon vapours are treated with alkaline solutions containing salts of oxidising acids, *e.g.*, NaOH or KOH solutions containing chromates, dichromates, perchromates, manganates, permanganates, nitrates, etc. D. M. M.

Treatment of hydrocarbon fuels. H. Reinecke (U.S.P. 2,028,014, 14.1.36. Appl., 8.5.33).—CH_4 and gases, such as natural gas, consisting substantially of CH_4 with small quantities of C_2H_6, C_3H_8, CO_2, H_2O vapour, N_2, etc., are treated, after the usual purification, by passing at sub-atm. pressure through a reaction tube in which a silent electric discharge is maintained, the rate of flow being regulated so that the time of contact of the gas mols. with the discharge is $<0{\cdot}03$ sec. The temp. of the gas is maintained at 100—300°, and the treated gas, which contains higher homologues, is immediately cooled below the lower limit of the reaction temp. D. M. M.

Solvent fractionation [of cracked motor fuel stock]. F. W. Sullivan, jun., Assr. to Standard Oil Co. (U.S.P. 2,034,495, 17.3.36. Appl., 31.8.33).—Motor fuel with a high C_8H_{18} no. is prepared by treating 100 vols. with 50—1000 vols. of liquefied solvent consisting of 1 pt. by vol. of CO_2 and 1—5 pts. by vol. of SO_2, whereby an extract phase and a raffinate phase are formed, the former containing a motor fuel with a higher C_8H_{18} no. and the latter one with a lower C_8H_{18} no. than that of the stock. D. M. M.

Treatment of hydrocarbon oils with selective solvents. Standard Oil Development Co. (B.P. 456,422, 14.5.35. U.S., 14.7.34).—A mixture of solvent, immiscible with H_2O, and oil after dewaxing etc. is distilled and at least the last portion of the solvent is distilled from the oil with steam. The wet distillate is redistilled until no more H_2O passes over, when the dry residue is re-used in the oil-treatment process. D. M. M.

Treating residual oils with a selective solvent. R. K. Stratford and G. W. Gurd, Assrs. to Standard Oil Development Co. (U.S.P. 2,035,102, 24.3.36. Appl., 22.8.34).—Petroleum stock containing asphaltic impurities is treated with a selective solvent in presence of $\not>1\%$ of an acid, *e.g.*, HCl, H_2SO_4, which does not react with the solvent. Org. acids, *e.g.*, picric, AcOH, may be used, but inorg. are preferred. D. M. M.

Solvent extraction of petroleum distillates. D. F. Edwards and J. V. Starr, Assrs. to Standard Oil Development Co. (U.S.P. 2,013,040, 3.9.35. Appl., 6.3.31).—A selective solvent for extracting petroleum oils consists of PhOH containing 2—30% of alkyl derivatives of cyclic compounds, *e.g.*, cyclic alcohols (I) (cresols), polyhydro-derivatives of (I), or cyclic ketones (such as *cyclo*-hexanol or -hexanone). Sufficient (I) is added to render the PhOH liquid at normal temp. C. C.

Nonflammable [dry-]cleaning solvents. M. A. Youtz, Assr. to Standard Oil Co. (Indiana) (U.S.P. 2,031,144—5, 18.2.36. Appl., [A] 14.7.30, [B] 12.6.35). —A mixture of inflammable and non-inflammable solvents of approx. the same volatility is used; examples are mixtures of (A) 70—105° petroleum naphtha (35—40) and CCl_4 (65—60 vol.-%); (B) 140—165° petroleum naphtha and $C_2H_2Cl_4$. D. M. M.

Vapour-phase treatment of unsaturated hydrocarbons. A. S. Ramage, Assr. to M. Wiley and O. L. Smith (U.S.P. 2,035,189, 24.3.36. Appl., 29.8.32).—Unsaturated hydrocarbons are heated in the vapour phase at 538—816° with CO_2 in presence of metallic Fe and steam, whereby they are simultaneously dehydrogenated; the products are oxidised and hydrogenated. D. M. M.

Treatment of oils. C. T. Loughrey, Assr. to Hydrocarbon Foundation, Ltd. (U.S.P. 2,034,818, 24.3.36. Appl., 27.10.30).—Hot, fixed gases are generated in a producer together with metallic Na from interaction of the oxide, carbonate, or hydroxide with the C in the producer, and these gases with Na vapour are passed into the oil to be treated, where nascent H is generated by the action of the H_2O in the oil on the Na. D. M. M.

Production of hydrocarbons rich in hydrogen. H. E. Potts. From Internat. Hydrogenation Patents Co., Ltd. (B.P. 455,453, 1.8.35).—Hydrocarbons rich in H, boiling within the limits of the initial material, are obtained by hydrogenating middle oils or hydrocarbon mixtures of higher b.p., at 380—550° (420—480°)/$>$50 atm., in presence of sulphides of Mo, W, or Re as catalysts and of a basic constituent, *e.g.*, NH_3 or C_5H_5N bases. [Stat. ref.] C. C.

Refining of fixed gases. T. T. Gray, Assr. to Gray Processes Corp. (U.S.P. 2,034,575, 17.3.36. Appl., 24.7.34).—Gaseous unsaturated hydrocarbons are polymerised by passage, in absence of O_2, over solid adsorbent, *e.g.*, fuller's earth, at elevated temp. and pressure. D. M. M.

Manufacture of gasoline. J. K. Roberts and M. T. Carpenter, Assrs. to Standard Oil Co. (U.S.P. 2,032,330, 25.2.36. Appl., 30.3.34).—Gasoline is fractionated to give a C_4H_{10} fraction and a C_5H_{12} fraction, which are separately stored, as is the gasoline free from both fractions. Winter or summer gasoline is blended by mixing the gasoline free from both fractions with requisite quantities of either or both fractions as desired. D. M. M.

Manufacture of high-octane number gasoline. O. P. Cottrell, Assr. to Edeleanu Ges.m.b.H. (U.S.P. 2,028,121, 14.1.36. Appl., 13.5.32).—Gasoline is divided into a low-, *e.g.*, $<$175°, and a high-boiling, *e.g.*, $>$175°, fraction and the latter is treated with a solvent, *e.g.*, liquid SO_2; the resulting raffinate and extract phases are then separated and the solvent is removed. The raffinate is cracked and the cracked raffinate recycled by mixing with fresh stock. The extract is blended with the low-boiling fraction to produce the high-C_8H_{18} no. gasoline. D. M. M.

Desulphurising gasoline. J. M. McGee and R. M. Roe, Assrs. to Standard Oil Co. (Indiana) (U.S.P. 2,032,662, 3.3.36. Appl., 9.1.30).—Cracked gasoline is distilled into a higher-boiling fraction (*A*) rich in S and a lower-boiling fraction (*B*) poor in S but rich in unsaturated hydrocarbons. Fraction *B* is desulphurised by treatment with a small quantity of acid, *e.g.*, 8 lb. of 89—98% H_2SO_4 per 50 (U.S.) gals., and fraction *A* by treatment with larger quantities of acid, *e.g.*, 20 lb. of 93—104½% H_2SO_4 per 50 (U.S.) gals. The fractions are then re-blended. D. M. M.

Motor fuel. L. A. Clarke, Assr. to Texas Co. (U.S.P. 2,034,024, 17.3.36. Appl., 28.1.32).—Cracked gasolines are improved by addition of small quantities, *e.g.*, approx. 0·01 wt.-% of acyl derivatives of the polyhydric phenols, *e.g.*, butyryl- or benzoyl-pyrogallol. D. M. M.

Petroleum distillate product. Le R. G. Story, Assr. to Texas Co. (U.S.P. 2,034,274, 17.3.36. Appl., 27.10.33).—Gasoline is stabilised by adding as inhibitors about 0·01 wt.-% of NH_2- and OH-derivatives of phenones, *e.g.*, *p*-aminoacetophenone. D. M. M.

Stabilisation of mineral hydrocarbon products. F. B. Downing and H. W. Walker, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,025,192, 24.12.35. Appl., 20.1.33).—Gum formation in motor fuel or motor benzol is inhibited by adding 0·001—1% of 1 : 2-, 1 : 4-, or 1 : 5-$C_{10}H_6(OH)_2$. C. C.

Storage of gasoline. H. C. Weber, Assr. to Universal Oil Products Co. (U.S.P. 2,029,748, 4.2.36. Appl., 14.3.32).—Formation of gum and colour is prevented by treatment with nascent H (and provision of an atm. of H_2) generated, *e.g.*, by electrolysis of various materials or by the action of powdered Fe on the S-containing constituents of the petrol, the reagents being suspended in a basket in the lower part of the storage tank. B. M. V.

Production of lubricating oil. E. R. Lederer (U.S.P. 2,027,738, 14.1.36. Appl., 4.5.31).—An oil of 0° F. cold test is produced by mixing a portion of un-dewaxed residuum with the neutral fraction normally produced as part of a paraffin-base long residuum, diluting the mixture with naphtha or other diluent, chilling to $-20°$ to $-60°$ F., removing the diluent, and separating the neutral and residual fractions. The oil obtained is an unblended paraffin-base lubricant commercially free from wax; it has η (Saybolt) 50—200 sec. at 210° F., flows at pressures from 7 to 10 lb. abs. at $-20°$ to $-40°$ F., retains its lubricating properties at higher temp., and there is no tendency for any lighter fractions to distil over. H. C. R.

Treatment of lubricating oil stock. J. D. Fields (U.S.P. 2,027,770, 14.1.36. Appl., 20.10.31).—The stock is thinned with a light petroleum hydrocarbon solvent to a low-η mixture, filtered, dehydrated if necessary, and well mixed with comminuted alkali metal at $\gg$ room temp. until impurities have been coagulated. The oil and impurities are separated from each other before chemical reaction has time to take place between the hydrocarbons and the metal, and the light hydrocarbon is removed by distillation. The gummy layer which forms a skin on the metal is removed by treatment with a mixture of a benzol hydrocarbon with a small proportion of a lower alcohol until the surface becomes bright again. The lubricating oil obtained is stable and free from tendency to gum and from corrosive substances. The refining loss is extremely low. H. C. R.

Solvent fractionation [of lubricating oil]. G. L. Parkhurst, Assr. to Standard Oil Co. (U.S.P. 2,029,689, 4.2.36. Appl., 29.4.33).—Lubricating oil is mixed with liquid SO_2 and simultaneously with vapour-cracked naphtha ($\not<$25% of olefines, b.p. 120—230°). Wide proportions of the materials are claimed and the method of fractionation is described.
B. M. V.

(A) **Separating wax from oil.** (B, C) **Production of lubricating oil.** (D) **Solvent extraction of oils.** U. B. Bray, Assr. to Union Oil Co. of California (U.S.P. 2,031,095—6 and 2,031,204—5, 18.2.36. Appl., [A] 17.5.32, [B] 14.10.33, [C] 6.10.30, [D] 3.4.34).—(A) Improved filtration of wax from oil is claimed by adding about 1% of amorphous material, *e.g.*, asphalt, to the wax-containing oil, diluting with normally gaseous hydrocarbon mixture, mainly C_3H_8, under pressure, chilling, and filtering. (B) Oil containing wax is first extracted with the above mixture, to remove asphalt, after which wax is removed by treatment with chlorinated hydrocarbons, *e.g.*, C_2HCl_3, and the C_3H_8 mixture. (C) Oil containing wax is first treated with C_3H_8 mixture to remove asphalt, then treated with heavy naphtha to remove wax, and may be given an acid treatment at any of the stages after removing asphalt. (D) Oil is separated into paraffinic and non-paraffinic fractions by treatment with a selective solvent followed by treatment of the extract phase with an anti-solvent, *e.g.*, liquid NH_3, subsequently returning the more paraffinic of the two resulting phases to the system at an appropriate point. D. M. M.

(A) **Separating oil from wax cakes.** (B) **Removal of wax from oil.** B. Hopper, Assr. to Union Oil Co. of California (U.S.P. 2,031,107—8, 18.2.36. Appl., [A] 28.5.34, [B] 6.5.35).—(A) Wax is filtered from oil after the usual solvent and chilling processes and the wax cake is washed free from oil by blowing with a condensible gas, *e.g.*, C_3H_8, first at moderate pressure, *e.g.*, 10—20 lb./sq. in., and then under increasing pressure to 50—100 lb./sq. in., whereby a washing action by condensed gas is induced. (B) Filtration of wax from chilled oil, with or without the use of a solvent, is improved by adding 1½% of resin-free asphalt. D. M. M.

Dewaxing of oil. (A) L. Dillon and C. E. Swift, (B) H. F. Fisher, Assrs. to Union Oil Co. of California (U.S.P. 2,031,210 and 2,031,214, 18.2.36. Appl., [A] 19.9.33, [B] 9.10.33).—(A) Wax-bearing oil is diluted with wax-free oil and passed continuously through an apparatus provided with fixed and partly immersed rotating electrodes. A high potential is maintained between them, and the rotating electrode is also cooled and provided with a scraper for removing wax from it out of contact with the oil. (B) The oil is passed through an apparatus containing a no. of flat electrodes generating an electric field, whereby the wax is caused to adhere to the electrodes, from which it may be periodically removed by warming them electrically without removing the oil–wax mixture. D. M. M.

Settling aid [in dewaxing petroleum distillate]. G. F. Chase and J. A. Anderson, Assrs. to Standard Oil Co. (U.S.P. 2,034,175, 17.3.36. Appl., 29.12.32).—The pptn. of wax in chilled oil in a form which settles easily and quickly is aided by adding to the stock, before chilling, about 3% of that part of the oil-sol. asphaltic residues which is pptd. from a light hydrocarbon solvent, *e.g.*, C_3H_8. D. M. M.

Dewaxing of paraffin distillates. A. V. Rhodes, Assr. to Standard Oil Development Co. (U.S.P. 2,035,406, 24.3.36. Appl., 24.5.33).—Filter blankets for separating paraffin wax from petroleum distillate are prepared by coating a canvas blanket with Na silicate, drying the latter on the blanket, and opening the pores of the blanket by bending.
D. M. M.

Removal of wax haze from an oil. R. N. Watts and J. M. Harris, jun., Assrs. to Standard-I.-G. Co. (U.S.P. 2,033,057, 3.3.36. Appl., 27.12.33).—Haze is removed from lubricating oil by heating alone to 120—180° (<150°), treating with an active clay at about 150° for a short time, and then filtering and cooling the oil. D. M. M.

Lubricant. G. Kaufman, Assr. to Texas Co. (U.S.P. 2,024,990, 17.12.35. Appl., 7.12.32).—A solid grease consists of neatsfoot oil, a caustic alkali soap of the oil (>35%), and 30—50% of mineral oil. The mixture is homogeneous and substantially dehydrated. C. C.

Method of lubrication and lubricant therefor. W. D. Hodson (U.S.P. 2,031,368, 18.2.36. Appl., 6.4.36).—For lubricating a hot roll neck a lubricant is prepared by adding a solvent to the normal hard grease in such proportion and of such properties that, while softening the grease for feeding purposes and remaining non-volatile at the temp. of the feeding mechanism, it yet evaporates on contact with the bearing, leaving the desired hard grease there for lubrication. D. M. M.

Apparatus for testing liquids, especially lubricants. J. G. Dintilhac, Assr. to Soc. "L'Huile des Records du Monde S.A.F." (U.S.P. 2,027,903, 14.1.36. Appl., 29.11.33. Belg., 30.11.32).—The oil is circulated through and sheared in the space between a conical rotor and housing, the clearance being adjustable and the surfaces smooth or longitudinally fluted. Measurements of η, adhesiveness, temp., etc. are taken before and after treatment. B. M. V.

[Used] lubricating oil testing apparatus. M. Cornell and C. C. Curtis, Assrs. to C. C. Broadwater (U.S.P. 2,027,518, 14.1.36. Appl., 27.12.32).—The opacity of a film of oil held between glass sheets at a predetermined distance is measured by a standard lamp, photoelectric device, and galvanometer.
B. M. V.

Making [fuel] briquettes. N. V. Maats. tot Exploit. van "ten Bosch Octrooien N. V." (B.P. 456,114, 15.4.36. Ger., 15.4.35).

Asphalt oxidation system. C. P. McNeil and S. A. Montgomery, Assrs. to Standard Oil Co. (Indiana) (U.S.P. 2,032,546, 3.3.36. Appl., 2.1.30).

Oil-cracking still. W. T. Hancock (U.S.P. 2,034,094, 17.3.36. Appl., 5.5.34).

Cracking apparatus [for hydrocarbons] and its operation. D. L. Jacobs and E. M. Dons, Assrs. to Mid-Continent Petroleum Corp. (U.S.P. 2,032,846, 3.3.36. Appl., 10.10.32).

Vapour-phase [hydrocarbon-]cracking apparatus. (a) I. M. Levine, (b) G. M. Pfau and H. H. Pruitt, Assrs. to Texas Pacific Coal & Oil Co. (U.S.P. 2,035,239 and 2,035,275, 24.3.36. Appl., [a] 4.4.33, [b] 25.3.33).

Cracking of hydrocarbons. A. D. Smith (U.S.P. 2,031,336, 18.2.36. Appl., 2.7.34).

Cracking of hydrocarbon oils. J. D. Seguy, Assr. to Universal Oil Products Co. (U.S.P. 2,032,892, 3.3.36. Appl., 31.1.30).

Conversion of hydrocarbons. F. W. Sullivan, jun., Assr. to Standard Oil Co. (Indiana) (U.S.P. 2,031,987, 25.2.36. Appl., 13.9.34). J. P. Daugherty, jun., Assr. to Houdry Process Corp. (U.S.P. 2,031,591, 25.2.36. Appl., 10.2.33).

Conversion of hydrocarbon oil. E. F. Nelson, Assr. to Universal Oil Products Co. (U.S.P. 2,034,526, 17.3.36. Appl., 23.10.33).

Conversion of hydrocarbon (a) liquids and gases, (b) gases and liquids. M. P. Youker, Assr. to Phillips Petroleum Co. (U.S.P. 2,035,036—7, 24.3.36. Appl., [a] 18.6.31, [b] 29.2.32).

Treatment of hydrocarbon oils. P. C. Keith, jun., Assr. to Gasoline Products Co., Inc. (U.S.P. 2,033,472—3, 10.3.36. Appl., [a] 13.6.33, [b] 8.2.34). O. G. Pratt, Assr. to Gasoline Products Co., Inc. (U.S.P. 2,034,989, 24.3.36. Appl., 22.7.32).

Tube still or heater and the like. P. Ostergaard, Assr. to Gulf Oil Corp. of Pennsylvania (U.S.P. 2,035,337, 24.3.36. Appl., 24.5.35).

[Petroleum] distillation process. M. P. Youker, Assr. to Phillips Petroleum Co. (U.S.P. 2,034,789, 24.3.36. Appl., 28.3.31).

Fractionally distilling and desulphurising crude oil. C. L. Smith and W. G. Annable, Assrs. to Pure Oil Co. (U.S.P. 2,032,896, 3.3.36. Appl., 31.12.32).

Fractionation of mineral oil. C. E. Swift, Assr. to Union Oil Co. of California (U.S.P. 2,031,234, 18.2.36. Appl., 9.5.32).

Treatment of petroleum [emulsions]. H. C. Eddy, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,129, 10.3.36. Appl., 7.2.33).

Breaking [oil] emulsions. H. C. Eddy, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,034,285, 17.3.36. Appl., 2.4.32).

[Oil-emulsion] dehydrator with preliminary treatment. H. F. Fisher, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,137, 10.3.36. Appl., 18.12.29).

Electric dehydration [of oil emulsions]. J. T. Worthington, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,567, 10.3.36. Appl., 6.2.33).

Electric-dehydration system [for oil emulsions]. C. H. M. Roberts, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,152, 10.3.36. Appl., 30.1.33).

Electric dehydrator [for oil emulsions]. (a) J. T. Worthington, (b) T. N. St. Hill, Assrs. to Petroleum Rectifying Co. of California (U.S.P. 2,033,167 and 2,033,593, 10.3.36. Appl., [a] 10.10.33, [b] 19.8.32. Renewed [b] 10.7.35).

Electric treater with diverging stream and method [for oil emulsions]. R. L. Pettefer, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,446, 10.3.36. Appl., 7.7.34).

Multiple-electrode treater and method [for oil emulsions]. G. B. Hanson and H. C. Eddy, Assrs. to Petroleum Rectifying Co. of California (U.S.P. 2,033,429, 10.3.36. Appl., 2.4.32).

Electrically treating [oil] emulsions. H. C. Eddy, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,420, 10.3.36. Appl., 17.11.34).

Electric treater for [oil] emulsions. H. C. Eddy, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,418—9, 10.3.36. Appl., [a] 6.4.32, [b] 2.10.34).

Multiple-electrode [oil-emulsion] treater and method. L. E. McDonald, Assr. to Petroleum Rectifying Co. of California (U.S.P. 2,033,143, 10.3.36. Appl., 2.4.32).

Apparatus for reclaiming oil from hydrocarbon oil emulsion. J. M. Jackson, Assr. to Crude Oil Recovery Co. (U.S.P. 2,033,987, 17.3.36. Appl., 14.5.34).

Apparatus for reclaiming packing waste and the oil therefrom. H. E. Smith, Assr. to New York Central Railroad Co. (U.S.P. 2,032,854—5, 3.3.36. Appl., 5.7.34).

[Portable lubricating] oil-testing device. L. L. Davis, Assr. to Continental Oil Co. (U.S.P. 2,031,253, 18.2.36. Appl., 14.11.32).

Conversion of gasoline of low antiknock rating into gasoline of high antiknock rating. C. B. Watson, Assr. to Pure Oil Co. (U.S.P. 2,032,861, 3.3.36. Appl., 23.9.30).

Apparatus for processing [natural] gas. J. C. Swan (U.S.P. 2,032,074, 25.2.36. Appl., 12.6.35).

Production of motor fuel. W. M. Stratford, Assr. to Texas Co. (U.S.P. 2,034,317, 17.3.36. Appl., 20.6.32).

Manufacture of motor fuels. M. P. Youker, Assr. to Phillips Petroleum Co. (U.S.P. 2,035,209, 24.3.36. Appl., 12.2.32).

Dryer [for coal]. Separating and washing apparatus [for coal]. Filters. Contacting liquids. Fractional distillation. Low-temp. still. Bubble tray. Heating fluids.—See I. Polymerised olefines.—See III. Roofing felt.—See V. Treating NaOH solutions. Removal of catalysis inhibitors.—See VII. Road and paving compositions. Bituminous emulsion. Protective coatings.—See IX. Adherent greases.—See XII. Rubber–petroleum resin composition.—See XIV. Wax adhesive.—See XV. Tree dressing. Insecticide.—See XVI.

III.–ORGANIC INTERMEDIATES.

Thermal decomposition of propane. W. Schmieden (Oel u. Kohle, 1936, **12**, 930—934).—C_3H_8 was passed through a tube of "Sicromal" steel at 650—860° with varying times of contact, and the issuing gases were analysed. The highest yields of unsaturated hydrocarbons were obtained in the range 730—790°; thus at 760°, with a contact time of 2 sec., the yield was 72 vol.-%, of which about one third was C_3H_6 and higher olefines. C deposition under these conditions amounted to 1 wt.-% of the initial gas. Good yields of unsaturated hydrocarbons were obtained at lower temp. with longer times of contact, but were accompanied by higher C depositions. A. B. M.

Primary processes in the thermal decomposition of butane. G. R. Schultze and K. L. Müller (Oel u. Kohle, 1936, **12**, 922—930).—A mixture (approx. 1 : 4) of C_4H_{10} and N_2 was passed through a porcelain tube at 680—780°, with times of contact 0·2—1 sec., and the issuing gases were analysed. The reactions occurring were $C_4H_{10} \rightarrow C_3H_6 + CH_4$, $C_4H_{10} \rightarrow C_4H_8 + H_2$, and $C_4H_{10} \rightarrow 2C_2H_4 + H_2$. The reaction velocity coeffs. at 730° were 1·3, 0·6, and 0·24, respectively. The heats of activation corresponding to the temp. ranges 680—730° and 730—780° have also been estimated. A. B. M.

Influence of conditions of absorption on the yield of solvent. V. Rjabuchin (J. Chem. Ind. Russ., 1936, **13**, 992—995).—The efficiency of absorption of EtOH or Et_2O from air by cresol is $\propto$ its *o*-cresol content, and is inversely $\propto$ its temp. and content of tarry products, the rate of flow of the gas, and the solvent content of the gas. R. T.

Preparing allyl alcohol in the plants of "Metil." V. I. Kropotov (Lesochim. Prom., 1935, **4**, No. 5, 17—18).—The technical prep. from MeOH is described. Ch. Abs. (*r*)

Determination of glycerol in distillation residues. A. Tschetaev (Maslob. Shir. Delo, 1935, **11**, 264—265).—An apparatus for distilling a glycerol–H_2O mixture free from org. and inorg. impurities is described. Ch. Abs. (*e*)

Determination of formic acid in commercial acetate of lime. S. D. Sunawala (J. Indian Chem. Soc., 1936, **13**, 545).—Higher fatty acids and pyroligneous matter interfere with the volumetric determination of HCO_2H, and the gravimetric method of Auerbach and Zeglin is to be preferred (cf. B., 1923, 161). C. R. H.

Preparing pure acetone from crude acetone. V. I. Kropotov (Lesochim. Prom., 1935, **4**, No. 5, 16—17).—Rectification against a countercurrent of NaOH solution is described. Ch. Abs. (*r*)

Synthesis of *p*-nitrophenol from *p*-chloronitrobenzene. S. Aoyama and K. Nanai (J. Pharm. Soc. Japan, 1935, **55**, 145—148).—The prep. is described in detail. Ch. Abs. (*r*)

Preparation of naphthenic acids. B. Ruibak and E. Alfimova (Azer. Neft. Choz., 1934, No. 11—12, 100—105).—A discussion of losses. Ch. Abs. (*e*)

Critical comparison of methods for determining furfuraldehyde in commercial products. Z. Volodutzkaja and A. Chovanskaja (Tradui Vniish, 1934, No. 2, 101—112).—A review. Tollens' method gives results which are 1·2—2% too high, but is rapid and convenient. The Powell–Whittaker method (A., 1924, ii, 354) is sensitive and accurate. In Noll's method (A., 1930, 1304) Me_2-yellow should be used as indicator with a 0·4-g. sample and 15 c.c. of 7% NH_2OH solution. The Cannizzaro reaction is unsuitable and Ripper's method inaccurate (A., 1901, ii, 205). Ch. Abs. (*e*)

Liquid–liquid extraction.—See I. **$Ca(OAc)_2$ from gases. $C_{10}H_8$ from gas. Aromatic hydrocarbons in xylene fraction of Syukkôkô crude. Determining S in oils [and other S compounds]. Acids from fuel oil.**—See II. **CH_4 as fuel.**—See X. **Glycerin recovery.**—See XII. **Rectification [of AcOH] by absorbents.**—See XVIII. **p-$NH_2 \cdot C_6H_4 \cdot SO_2 \cdot NH_2$.**—See XX. **Explosion of ethers.**—See XXII.

See also A., Dec., 1487, **Twitchell's reagent for esterification.** 1493, **Prep. of primary amines.** 1494, **Prep. of α-NH_2-acids from alkylcyanoacetic acids.** 1502, **Transformation of the diazo into the azo group.** 1503, **Diaryls and their derivatives.** 1504, **Synthesis of *p*-methoxybenzyl alcohol.** 1560, **BuOH–$COMe_2$ by fermentation.**

Patents.

[**Preparation of pure**] **3:3-**[γγ-]**dimethyl-1-**[α-] **bromobutane.** F. C. Whitmore and W. R. Trent, Assrs. to Mallinckrodt Chem. Works (U.S.P. 2,022,485, 26.11.35. Appl., 17.4.33).—Di*iso*butylene is converted into $CH_2Bu^\gamma \cdot CO_2H$ (cf. U.S.P. 2,004,066; B., 1936, 920), which is esterified, and reduced (Na–EtOH) to $CH_2Bu^\gamma \cdot CH_2 \cdot OH$, from which ($PBr_3$) $CH_2Bu^\gamma \cdot CH_2Br$ is obtained as an oil, b.p. 134—137°/735 mm., n_D^{20} 1·4441—1·4447. K. H. S.

[β-]**Chloro**[-$\Delta^{\alpha\gamma}$-]**butadiene.** G. A. Perkins, Assr. to Carbide & Carbon Chemicals Corp. (U.S.P. 2,027,550, 14.1.36. Appl., 15.8.31).—Addition of HCl to $CH_2{:}CH \cdot C{:}CH$ (I) in presence of a catalyst consisting of about 2·5 pts. each of HCl, $CaCl_2$, and $CuCl_2$ and 3·5 pts. of H_2O yields β-*chloro*-$\Delta^{\alpha\gamma}$-*butadiene* (II), b.p. 56—59°, as a colourless liquid, which undergoes spontaneous polymerisation to an amorphous elastic solid. $CaCl_2$ may be replaced by NH_4Cl or an alkali or alkaline-earth chloride, and (I) may be introduced as gas or by agitation of the catalyst with an inert hydrocarbon (PhMe) solution, (II) being isolated by fractionation. A. H. C.

Polymerisation of olefines. Standard Alcohol Co. (B.P. 456,315, 11.5.36. U.S., 13.6.35).—Mixtures of hydrocarbons containing *iso*olefines are passed with stirring into 55—85% H_2SO_4 at 130—50°/30—100 (50) lb. per sq. in. Unpolymerised gases are led away, and the polymerised olefines that boil in the gasoline range are continuously withdrawn (preferably from a decantation chamber attached to the reaction chamber). *tert.* Olefines yield H_2O-sol. alcohols which may be removed by washing with H_2O.

Apparatus is described and a motor fuel comprising gasoline and the polymerides so produced is claimed. E. J. B.

Conversion of ethers into alcohols. Standard Oil Development Co. (B.P. 456,547, 22.7.35. U.S., 28.12.34).—An ether vapour is passed into a dil. aq. acidic catalyst (H_2SO_4, HCl, H_3PO_4, $AlCl_3$, $ZnCl_2$) at 200—300° (240—260°), *i.e.*, at > the crit. temp. of the ether, and under a pressure sufficiently high to maintain the bulk of the alcohol formed in the liquid phase (225—3000 lb. per sq. in.); concn. of the catalyst and consequent serious formation of olefine, particularly at >250°, are prevented by addition of steam. *E.g.*, Et_2O is pumped into 10% aq. H_2SO_4 at 272° so as to keep the pressure at 2000 lb. per sq. in. for 25 min. A 90% yield of EtOH is obtained. Prolonged reaction causes conversion into C_2H_4. Apparatus is described, batch or continuous operation being possible. E. J. B.

Hydrogenation of aliphatic alcohols and esters. W. A. Lazier, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,027,182, 7.1.36. Appl., 19.2.31).—The unsaturated components of the mixture of alcohols and esters obtained as in U.S.P. 1,708,460 (B., 1929, 661) are hydrogenated in the liquid phase under pressure, using Ni or chromite catalysts. K. H. S.

Electrolytic production of esters. Nitroglycerin Aktieb. (B.P. 455,463, 4.12.35. Swed., 10.12.34).—Gaseous olefines (C_{2-4}) are anodically oxidised in presence of NO_3', the anolyte containing a solvent ($COMe_2$) for the olefine under pressure. The oxidation of C_2H_4, C_3H_6, and C_4H_8 is described in the examples and the production of a safety explosive containing polyglycol nitrate is claimed specifically. S. C.

Manufacture of glycerol monolactate. Howards & Sons, Ltd., and R. H. Lock (B.P. 456,525, 10.4.35).—Glycerol and an ester of lactic acid with an alcohol (I) of b.p. <100°, preferably in equimol. proportions, are heated together at <100°. An esterification catalyst may be used, and the reaction is preferably carried out in a boiling inert solvent of b.p. <100° that will also entrain the (I) as it is formed. *E.g.*, Et lactate 118, glycerol 92, C_6H_6 36 pts., and H_2SO_4 0·25 pt. are boiled and fractionated until EtOH ceases to distil off with the C_6H_6, the latter being continuously returned to the still after washing out the EtOH with H_2O. Glycerol monolactate is obtained in almost quant. yield. E. J. B.

Production of agents for stabilising aqueous suspensions or emulsions, and for increasing the hydrophilic capacity thereof. H. C. Lundsgaard (B.P. 455,540, 17.1.36).—Esters (containing at least one unsubstituted OH) of a polyhydric alcohol and a higher fatty acid that has been polymerised and/or oxidised after or, preferably (with intermediate purification of the acids), before esterification are claimed as emulsifying agents. *E.g.*, air is blown through sunflower-seed oil at 175° until the η has been doubled. The product is saponified, and the acids are separated and heated with a large excess of glycerol and a K soap (catalyst) at 180° for 10 hr., the excess of glycerol being then removed. E. J. B.

[Preparation of] assistants for use in the textile, leather, paper, and like industries. I. G. Farbenind. A.-G. (B.P. 455,310, 18.4.35. Ger., 21.4.34).—The use as textile assistants of higher fatty acids and their derivatives substituted in the α position by a non-acidic hydrophilic group is claimed. Examples are the products from α-chlorolauric acid and $NH_2{\cdot}[CH_2]_2{\cdot}OH$ or C_5H_5N, α-bromolauric acid and $NH(C_2H_4{\cdot}OH)_2$, and the monoglyceride of α-hydroxystearic acid. H. A. P.

Manufacture of unsaturated organic compounds. J. W. C. Crawford, and Imperial Chem. Industries, Ltd. (B.P. 456,147, 3.5.35).—Polymerisation of acrylic acid and its homologues and derivatives during the prep. or heating thereof is inhibited by addition of $\not>1\%$ (0·1%) of an anhyd. metallic halide which is capable of combining with an O-containing org. compound to form an oxonium compound, and is preferably not appreciably more volatile than the unsaturated material, *e.g.*, $SbCl_3$, $SbCl_5$, $AsCl_3$, $AsCl_5$, $AlCl_3$, $SnCl_4$, or $KBiCl_4$. Other known negative catalysts may be used in addition (tannic acid, quinol). E. J. B.

Manufacture of glycollic acid. E. F. Grether and R. B. Du Vall, Assrs. to Dow Chem. Co. (U.S.P. 2,028,064, 14.1.36. Appl., 29.3.35).—To the aq. solution of alkali glycollate and chloride obtained by heating 5—30% aq. $CH_2Cl{\cdot}CO_2H$ with approx. 2 equivs. of aq. alkali (NaOH, $KHCO_3$, etc.) is added, at >70° (>80°), an aq. solution of $\not\geq 1$ equiv. of a Ca salt. At this temp. Ca glycollate is pptd. as anhyd. sandy crystals which are readily filtered off and washed at >40°, and then acidified to yield the pure acid either in H_2O or in an inert solvent. E. J. B.

Manufacture of aliphatic acid anhydrides. C. J. Malm and W. E. Fisher, Assrs. to Eastman Kodak Co. (U.S.P. 2,026,985, 7.1.36. Appl., 27.3.33).—Aliphatic acid anhydrides are prepared continuously by running the acid down a fractionating column countercurrent to Ac_2O vapour in contact with $Mg(ClO_4)_2$; three forms of apparatus are figured and the prep. of $(PrCO)_2O$ and stearic anhydride is described. K. H. S.

Production of saturated and/or unsaturated carboxylic acids, their salts, and/or their ketol-esters. N. V. de Bataafsche Petroleum Maats., Assees. of M. de Simo and S. H. McAllister (B.P. 454,400, 27.9.35. U.S., 8.10.34).—Halogenated ketones, preferably having one halogen α to CO, are heated with alkaline-reacting compounds of the alkalis or alkaline earths and H_2O at 0—100°. Polyhalogenated ketones commonly yield unsaturated products. *E.g.*, $COEt{\cdot}CH_2Cl$ (I) and 3·6*N*-Na_2CO_3 at 95—100° give $Pr^{\beta}CO_2H$ (II) (57% of theory) and some Et ketol (III); $COPr^{\alpha}{\cdot}CH_2Cl$ and $COPr^{\beta}{\cdot}CH_2Cl$, similarly, give $CHMeEt{\cdot}CO_2H$. By limited heating of (I) with 3*N*-aq. $NaHCO_3$ at 100° the ester of (II) with (III) is produced. Interaction of $CH_2Cl{\cdot}CO{\cdot}CH_2{\cdot}CH_2Cl$ with aq. Na_2CO_3 at 90—100° gives crotonic and *iso*crotonic acids (47% of theory). H. A. P.

Preparation of xanthates. (a—c) W. Hirschkind, (b) W. D. Ramage, and H. Bender, Assrs. to

Great Western Electro-Chem. Co. (U.S.P. 2,024,923—5, 17.12.35. Appl., [A] 7.4.32, [B] 25.6.32, [C] 14.9.34).—(A) The yield of xanthate formed from CS_2 and an alkali alkoxide (I) is improved, and the need for working at low temp. (<35°) avoided, by complete exclusion of H_2O; *e.g.*, interaction of CS_2 and NaOEt in EtOH without cooling gives 98% of theory of SNa·CS·OEt. (B) H_2O is removed from the reaction mixture by addition of a dehydrating agent, *e.g.*, CaO; alternatively (I) is extracted from its dried solution in the corresponding alcohol with an inert solvent, in which the interaction with CS_2 is carried out. (C) The above processes are applied to *sec.*, *tert.*, and dihydric alcohols. H. A. P.

Production of ethylenediamine. F. C. Bersworth, Assr. to F. Kottek (F. C. Bersworth Labs.) (U.S.P. 2,028,041, 14.1.36. Appl., 14.8.31).—$C_2H_4Cl_2$ is injected into NH_3 at 100° (pressure) to yield $(CH_2{\cdot}NH_2)_2$ (I) as hydrochloride, from which free (I) is liberated by alkali. Anhyd. (I) is readily obtained by using anhyd. NaOH. A multiple-bomb system and a continuous receiving and recovery plant are described. A. H. C.

Manufacture of nitrogenous polyvinyl derivatives. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 456,530, 10.5.35).—Interaction of a halogenated alkylamine and a polyvinyl alkoxide affords a nitrogenous polyvinyl derivative that imparts to animal fibres etc. the property of being dyed by wool dyes. *E.g.*, powdered $C_2H_4Br{\cdot}NH_2,HBr$ 100 is added to polyvinyl alcohol 40 g. in 20% aq. NaOH 200 c.c. The desired product is pptd. by addition of MeOH after evaporation of the solution. E. J. B.

Continuous nitration of aromatic hydrocarbons. J. Meissner (B.P. 455,570, 6.11.35. Ger., 18.11.34).—After pretreatment with partly spent nitration mixture at the top of the apparatus, the hydrocarbons are mixed with fresh acid introduced at the bottom, the mixture being then forced through an integral cooling system and discharged at the top. Air is finely dispersed in the liquid by paddles on the agitator shaft to enhance contact between the reagents. Apparatus is claimed. E. J. B.

Manufacture of chrysenemonosulphonic acid. I. G. Farbenind. A.-G. (B.P. 455,991, 2.5.35. Ger., 4.5.34).—Interaction of chrysene with $ClSO_3H$ (in a diluent, *e.g.*, $C_2H_2Cl_4$, $PhNO_2$) at $\ngtr$10° (2—5°) gives chrysene-2(?)-sulphonic acid (*Na* salt; *chloride*, m.p. 179—180°). H. A. P.

Preparation of secondary aromatic amines. W. M. Lauter, Assr. to Wingfoot Corp. (U.S.P. 2,028,074, 14.1.36. Appl., 9.6.32).—*sec.* Aromatic amines are prepared in good yield by heating, under reflux at 160—235° and under substantially anhyd. conditions, approx. equimol. amounts of an aromatic compound containing at least one OH attached to the ring, and a primary cyclic amine, in presence of 1/3—2/3 mol. of a stable org. or inorg. dehydrating agent which contains one or more acidic H atoms, *e.g.*, $KHSO_4$, NaH_2PO_4, H_3BO_3, $NaHC_2O_4$, pyrosulphates. The H_2O formed is preferably allowed to distil off. *E.g.*, β-$C_{10}H_7{\cdot}OH$ 1·5, NH_2Ph 1·5, and $KHSO_4$ 0·5 mol. are heated together at 180—190° for 3 hr. A 93% yield of β-$C_{10}H_7{\cdot}NHPh$ is obtained. E. J. B.

Preparation of carbamyl disulphides. [Vulcanisation accelerators.] J. Teppema, Assr. to Wingfoot Corp. (U.S.P. 2,024,613, 17.12.35. Appl., 20.3.34).—A H_2O-sol. salt of a *N*-mono- or -di-substituted dithiocarbamic acid is caused to interact (in aq. solution or suspension or in an org. diluent) with an arylsulphur halide. *E.g.*, 4-nitro-2-benzoylphenylsulphur bromide and $NEt_2{\cdot}CS{\cdot}SNa$ in C_6H_6 give *4-nitro-2-benzoylphenyl diethylcarbamyl disulphide*, 4 : 2-$NO_2{\cdot}C_6H_3Bz{\cdot}S{\cdot}S{\cdot}CS{\cdot}NEt_2$. H. A. P.

Manufacture of 4-hydroxypyrene. I. G. Farbenind. A.-G. (B.P. 455,621, 23.4.35. Ger., 19.4.34).—3-Aminopyrene-4-sulphonic acid is converted by diazotisation etc. into pyrene-4-sulphonic acid; the Na salt of this when fused with KOH at 260—270° gives *4-hydroxypyrene*, m.p. 208°. H. A. P.

Manufacture of surface-active substances. W. J. Tennant. From Henkel & Co. G.m.b.H. (B.P. 455,086, 7.3.35).—*C*-Substituted phenols, naphthols, etc., in which the substituent has $\nless C_4$, are hydrogenated and hydrophilic groups (*e.g.*, SO_3H, $\cdot O{\cdot}SO_3H$, $\cdot S{\cdot}SO_3H$, CO_2H, polyether groups) introduced into the product. *E.g.*, *o*-tolyl *n*-heptyl ketone is hydrogenated (H_2–Ni at 200°/100 atm.) and the *product*, b.p. 176—182°/13 mm., converted into its H sulphate ($ClSO_3H$ in Et_2O), which is claimed to have foaming and wetting properties; a similar product is obtained from *o*-tolyl undecyl ketone (*2-methyl-4-dodecylcyclohexanol*, m.p. 55°, b.p. 215—220°/12 mm.). Other methods of solubilisation exemplified are condensation with $(CH_2)_2O$, dehydration to the *cyclo*hexene and condensation with $SH{\cdot}CH_2{\cdot}CO_2H$, and interaction of the chloroacetate with $NaHSO_3$, $Na_2S_2O_3$, or with $NHPh{\cdot}[CH_2]_2{\cdot}OH$ and subsequent sulphonation. H. A. P.

Manufacture of water-soluble condensation products. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 455,491, 21.2.35).—An aromatic OH-compound which contains in the nucleus an aliphatic radical $>C_4$ is sulphonated by known agents (H_2SO_4, $ClSO_3H$, at 60—150°) and subsequently condensed in an acid medium with an aldehyde to yield materials having good dispersive, detergent, and (in acid media) tanning properties. The sulphonation of *p*-*i*-octylphenol and condensation with CH_2O to produce a tanning agent is described. E. J. B.

Production of hydroquinones [quinols]. Kodak, Ltd. (B.P. 455,692, 25.4.35. U.S., 25.4.34).—A quinone, prepared in known manner, is distilled in steam from the aq. reaction mixture in vac. (125—250 mm.), and the vapours are passed into a circulating liquid at a higher pressure (375—575 mm.) which contains a reducing agent, *e.g.*, Fe dust and/or $FeSO_4$, the temp. of the latter being kept at $\ngtr$95° (60—65°), *e.g.*, by passing it through a vac. chamber in an inert atm. wherein it is also conc. E. J. B.

Manufacture of chlorides of polycarboxylic acids. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 455,668, 12.8.35).—A polycarboxylic acid in which the CO_2H groups are separated by $\nless C_3$ are heated with $CPhCl_3$, BzCl, or their nuclear halogen derivatives (and an acid catalyst). *E.g.*, *m*- or *p*-$C_6H_4(CO_2H)_2$ is heated at the b.p. with $CPhCl_3$ (and a trace of $ZnCl_2$). H. A. P.

Manufacture of ketodicarboxylic acids and their lactones. W. W. Groves. From Monsanto Chem. Co. (B.P. 454,636, 10.4.35).—A dicarboxylic acid anhydride is heated with a decarboxylating catalyst, *e.g.*, $CuO–Cr_2O_3$ or a metallic salt of the corresponding dicarboxylic acid. *E.g.*, *o*-$C_6H_4(CO)_2O$ at 180—190° gives benzophenone-2 : 2′-dicarboxylactone. H. A. P.

Manufacture of salts of acridinium bases. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 454,375, 26.3.35).—The H carbonate of the base is dissolved in the appropriate acid. The prep. of the *H carbonates* and acetates of 2 : 8-diamino-10-methyl- and 2 : 8-dimethoxy-10-methyl-, the *H carbonates*, acetates, lactates, and tartrates of 5-amino-3-ethoxy-10-methyl- and 2 : 8-diamino-3 : 7 : 10-trimethyl-, and the *H carbonate* and lactate of 8-hydroxy-2-methoxy-10-methyl-acridinium is described. H. A. P.

Production of mercaptan–amine derivatives. L. B. Sebrell, Assr. to Wingfoot Corp. (U.S.P. 2,024,606, 17.12.35. Appl., 26.4.33).—The *compounds* (salts) of mercaptobenzthiazole (I) with NH_2Bu^a, m.p. 110—115°, *cyclo*hexylamine, m.p. 155—157°, NH_3, m.p. 140—145° (sealed tube), $NHEt_2$, m.p. 134°, $NHPr_2$, m.p. 127°, $NHBu_2$, m.p. 71°, di*cyclo*hexylamine, m.p. 172°, $(CH_2·NH_2)_2$ [1 mol. (I), m.p. 134°, and 2 mols. (I)], and *p*-$C_6H_4(NH_2)_2$ [1 mol. (I), m.p. 155—157°], of 5-nitro-1-thiolbenzthiazole with NH_2Bu^a, m.p. 113—115°, and of PhSH with $NHEt_2$, m.p. 60°, and $NHBu_2$, m.p. 71°, are described. These are useful accelerators of rubber vulcanisation. H. A. P.

Preparation of dithiazyl disulphides. A. J. Gracia, Assr. to Wingfoot Corp. (U.S.P. 2,024,575, 17.12.35. Appl., 23.11.33).—An alkaline aq. solution of a 1-thiolbenzthiazole (mercaptobenzthiazole) is oxidised with H_2O_2 and H_2SO_4 (equiv. to the alkali used) preferably at 95°. H. A. P.

Production of furoyl-substituted mercaptobenzthiazoles. [Vulcanisation accelerators.] S. M. Evans, Assr. to Rubber Service Labs. Co. (U.S.P. 2,020,051, 5.11.35. Appl., 5.1.33).—The prep. and use of S-*furoyl* derivatives of mercaptobenzthiazole (m.p. 140—143°) and its 5-Me and 5-NO_2-derivatives is described. H. A. P.

Treatment of [aliphatic] hydrocarbons. W. O. Mitscherling (B.P. 456,537, 24.5.35).—See U.S.P. 2,003,898; B., 1936, 584.

β-Chloroethyl β-chloroethoxyethyl ether. Carbide & Carbon Chemicals Corp., Assees. of H. L. Cox (B.B. 456,278, 2.4.35. U.S., 17.4.34).—See U.S.P. 2,017,811; B., 1936, 114.

C_2H_2. Hydrocarbons (etc.) from carbonaceous materials. Dry-cleaning solvents.—See II. **Absorption of CO_2 by amines. CS_2.**—See VII. **Solvents etc. Mixed-ester derivatives of glycols. Hydroaromatic alcohols. Sulphonamide compounds.**—See XIII. **EtOH from worts.**—See XVIII.

IV.—DYESTUFFS.

Influence of position isomerism (structural differences) in azo dyes on their fastness to light and washing. M. E. Griffith and W. R. Brode (Ohio Agric. Exp. Sta. Bull., 1936, No. 565, 19 pp.).—Diazotised sulphonated anilines (I) are coupled with naphtholsulphonic acids. With *o*- and *m*-sulphonated (I) the absorption band lies between 470 and 500 mμ. With unsulphonated (I) the band is a little, and with *p*-sulphonated (I) more definitely, towards the red, with an increase in intensity. Max. transmission in the yellow occurs in α-$C_{10}H_7·OH$ dyes. With the 3-sulphonic acid the band shifts toward the red, more so with the 4-acid, whilst the 8-compound shows max. absorption in the blue. β-$C_{10}H_7·OH$ dyes show greater absorption in the blue than do the α-series. SO_3H in position 6 shifts the band toward the red, and at 7 gives max. absorption in the blue. Disulphonic acids show little difference. Fibre absorption by *o*- and *p*-sulphanilic dyes is > that of the *m*-isomerides. Substitution in the $C_{10}H_8$ ring has little effect.. SO_3H in the diazotised nucleus increases fastness to washing, the position of the group having little influence. Differences due to sulphonation of the $C_{10}H_8$ ring are small. Fastness to light was in the order *o*- > *p*- > *m*-sulphanilic acid > (I) series. β- were faster than α-$C_{10}H_7·OH$ compounds in the mono- and di-sulphonic acid series. A. G. P.

Annatto seed. D. R. Koolhaas and C. van der Koppel (Indische Mercuur, 1935, **58**, 525—526).—The colouring matter is determined by extracting with aq. KOH, acidifying with AcOH, and comparing the colour with standard solutions of $K_2Cr_2O_7 + Co(NO_3)_2$. Ch. Abs. (*e*)

Resistance of dyes to air etc.—See XIII.

See also A., Dec., 1502, **Azo dyes from dihydroxynaphthalenes and polyhydroxydinaphthyls.** 1503, **Sulphonated dinaphthyls.** 1518, **Thioindigoid dye absorption spectra.**

Patents.

Manufacture of cyanine and related dyes. Kodak, Ltd., N. I. Fisher, and F. M. Hamer (B.P. 455,710, 21.3.35).—A 4-cyanoquinolinium salt is condensed with a quaternary heterocyclic NH_4 salt, containing a reactive α- or γ-alkyl, to give a 4′-cyanine, the yield being > that obtainable in a normal *iso*cyanine condensation. So also dyes, which are not cyanines, are obtained by condensing 4-cyanoquinoline methiodide with a base, *e.g.*, 3-ethylrhodanine or 2-ketodihydrothionaphthen, having a reactive cyclic $:CH_2$. The dyes are useful as photographic sensitisers. F. M. H.

Lake colours.—See XIII.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Textile-fibre science. W. Schramek (Kolloid-Z., 1936, 77, 210—213).—A general review. E. S. H.

Lime-soap formation in silk soaking and its treatment. J. M. F. Leaper (Dyer, 1936, 57, 113—115).—Ca-soap scum (Ca oleate 35, Fe oleate 4, free fatty acid 8, neutral fats 43, unsaponifiable matter 3, and nitrogenous matter 7%) was repeatedly found in spent soaking liquors initially prepared with soft H_2O (hardness $\not> 0·5°$) and was traced to the presence of a Ca complex in the sericin (I) (0·2—0·6%, calc. as $CaCO_3$ on the raw silk) which was only partly sol. in H_2O. Part of this Ca is introduced into the (I) during reeling of the raw silk from cocoons, since these are often immersed in $CaO–H_2O$ during that process with a view of improving the silk quality. Na, but not Ca, salts have been found in the fibroin of raw silk. The scum is avoided by adding $NaPO_3$ to the soaking liquor, according to $W = 32 + 22H$, where W = wt. of $NaPO_3$ in oz. per 100 lb. of raw silk, H = degress of hardness ($CaCO_3$ per 10^5) produced in 500 c.c. of H_2O by steeping in it 60 g. of raw silk. Na salts of sulphonated fatty alcohols were less satisfactory. A. J. H.

Reactivity of the sulphur linkage in animal fibres. III. Methods for realising permanent set at low temperatures. J. B. Speakman (J. Soc. Dyers and Col., 1936, 52, 423—429; cf. B., 1936, 1198).—Realisation of permanent set in animal fibres depends on breakdown of ·S·S· linkings, followed by relaxation of mol. strain and subsequent rebuilding of fresh linkings. These conditions are obtained, at low temp., by use of typical reducing agents, *e.g.*, sulphites, which readily induce breakdown of strained ·S·S· linkings, after which rebuilding may occur in three ways. Thus, with a mixture of $0·5M$-$Na_2S_2O_5$ and $0·5M$-Na_2SO_3, p_H 5·95, in which the strain in the ·S·S· linkings is at a max., ·S·NH· linkings are readily formed at 50°, to ensure a permanent set. Formation is slow, however, at <50°, and new methods of rebuilding linkings between peptide chains were sought for lower temp. At 35° and p_H 6 rebuilding was achieved by after-treatment with salts, *e.g.*, $0·25N$-$BaCl_2$, to form ·S·Ba·S linkings, or by using oxidising agents, *e.g.*, $0·25N$-$K_2S_2O_8$, to re-form the reduced ·S·S· linkings. Human hair, treated for 10 min. with $1·5M$-sulphite solution, followed by $0·25N$-$K_2S_2O_8$ for 5 min. at 35°, retained a set of 10·9% after 30 min. release in boiling H_2O. Sulphites are not highly reactive with unstrained ·S·S· linkings, but hydrolysis of these linkings is readily achieved in solutions of high p_H. Solutions of sulphites at p_H 11·0, followed by oxidation with $0·25N$-$K_2S_2O_8$, at 35°, gave a satisfactory retained set. S. G. S.

Mechanical properties of natural and mercerised cellulose fibres. (Mlle.) V. Bossuyt (Bull. Soc. chim., 1936, [v], 3, 1975—1982).—Extension–load curves have been determined for natural and mercerised ramie fibres in dry and moist air, H_2O, $HCO·NH_2$, aq. LiCNS, and aq. NaOH, and for natural cotton, hemp, and flax fibres in dry and moist air. The curves obtained are of the same form except in cases where combination occurs (LiCNS and NaOH). The rapidity with which load–extension cycles attain their final form increases with the degree of perfection of the cryst. orientation in the original fibre, and experiments of this kind can be used to identify different natural fibres. F. L. U.

Report of Fibre Committee. G. S. Moberly *et al.* (Proc. 9th Ann. Congr. S. Afr. Sugar Tech. Assoc., 1935, 61—64).—A crit. review of errors in collecting and grinding sugar-cane samples for fibre determination. A 250-lb. sample is the min. for determining fibre by the indirect method. Ch. Abs. (*e*)

Chemical composition of sucrose-free bagasse. E. P. Hedley and F. W. Hayes (Proc. 9th Ann. Congr. S. Afr. Sugar Tech. Assoc., 1935, 65—71).—Analyses of various samples are given. Hardness in cane is attributed to orientation of cellobiose mols. in the fibre. Ch. Abs. (*e*)

Homogeneity of plant celluloses and their products. I. Cross-section elements and methods of their separation. II. Content of cross-structure elements in plant celluloses. A. Zakoschtschikov and D. Tumarkin (Iskusst. Volok., 1934, 5, 5—15; 1935, 6, 176—182).—I. The presence of cross-section elements in the cellulose material of untreated flax and ramie, mercerised cotton, pulps, nitrocellulose, etc. was shown by treating with 94—95% H_2SO_4. The solutions, diluted with ice-H_2O, filtered, and centrifuged, separated the chemically unchanged cross elements.

II. A method of determining these cross-section elements is based on treatment with H_2SO_4. Vals. were 0·1—0·5% in raw and 0·07—0·16% in refined cotton, 1·3% in unbleached and 0·07—0·09% in bleached spruce pulp. Ch. Abs. (*e*)

Esterification of cellulose and hydrato-cellulose. I. I. Schettle and N. Kljutschkin (J. Appl. Chem. Russ., 1936, 9, 1626—1633).—The % esterification diminishes in the series cotton-wool > hydrato-cellulose from mercerised cotton > hydrato-cellulose from viscose, and AcCl > BzCl > palmityl chloride (I) > stearyl chloride. Except in the case of (I), the degree of esterification rises with increasing H_2O content of the cellulose to a max., at 4—7% H_2O, and then falls. R. T.

Hydroxyethyl ethers of cellulose. III. Hydroxyethyl ethers of a low degree of etherification. P. P. Schorigin and J. A. Rimaschevskaja (J. Appl. Chem. Russ., 1936, 9, 1634—1637).—Cellulose is soaked in 33% NaOH for 20 min., and then in 25% $(CH_2)_2O$ (I) in $COMe_2$ [6 hr. at 30°; 0·45 mol. of (I) per $C_6H_{10}O_5$ unit]. The product is sol. in 8% NaOH at −10°, and is pptd. from the solution by 10% aq. NaCl. Threads prepared from mixtures of the ether with viscose are weaker than those from viscose alone. R. T.

Hydroxybutylcellulose and its mixed ethers. I. Synthesis and properties of hydroxybutylcellulose. S. N. Danilov and V. A. Konkova. **II. Benzylhydroxybutylcellulose.** V. A. Konkova (J. Appl. Chem. Russ., 1936, 9, 1863—1868; 1869—1873).—I. Cellulose is treated by caustic soda, squeezed out, and warmed with βγ-butylene oxide (I) to yield *hydroxybutylcellulose* (II). Best results are obtained by using 20—30% NaOH solution at 75—100°. The product contained more hydroxybutyl radicals (up to 2 per $C_6H_{10}O_5$) when more (I) (up to 12 mols. per mol. of $C_6H_{10}O_5$) was taken and the reaction was allowed to proceed longer (up to 24 hr.). It is sol. in H_2O and aq. C_5H_5N and ppts. by warming the aq. solution (purification method).

II. (II) and CH_2PhCl in aq. NaOH at 100—115° yield *benzylhydroxybutylcelluloses* of various composition, sol. in org. solvents and suitable for making films. J. J. B.

Fine-filament rayon spinning by the viscose process. H. Roche (Silk J., 1935, **12**, No. 134, 22—23; No. 136, 24—25).—Na_2SO_4 in excess gives a flat cross-section and ineffective coagulation. $ZnSO_4$ gives a rounder thread with irregular corrugations and level-dyeing properties. Glucose tends to slow down the spinning process and protects the cellulose from decomp. by acid. It also assists in minimising crystallisation in the spinning bath. $MgSO_4$ improves the mechanical properties of the yarn. Good results are obtained with $[SO_4''] : [H^{\cdot}] = 5 : 3$. A 30—60% solution of polyhydroxy-compounds which are readily miscible with H_2O may be used as a spinning bath. Ch. Abs. (*e*)

[Viscose] staple fibre. Anon. (Hosiery Tr. J., 1936, No. 506, **43**, 62, 64).—The behaviour, in knitting, of wool yarns containing fine or coarse viscose staple fibre is discussed. A. J. H.

Chemical engineering in the pulp and paper industries, with special reference to esparto mills. J. Grant (Inst. Chem. Eng., Advance proof, Dec. 16, 1936, 14 pp.).—Points dealt with are the digestion of esparto pulp, soda recovery, bleaching of rag, wood, and esparto pulps, beating, formation and drying on the paper-machine, finishing processes, effluent disposal (cf. B., 1936, 1072), the evaluation of wood pulps, and paper testing. J. G.

Structure and properties of spruce and other pulp woods. R. Trendelenburg (Papier-Fabr., 1936, **34**, 389—396, 401—407, 411—416, 420—427, 433—435).—The growth, structure, and properties of various coniferous and deciduous pulp woods are described with the aid of photomicrographs. The relation of ring width, spring and summer wood content, *d* of the wood, and growing conditions of the trees, with particular reference to the coniferous woods, are discussed; distribution curves are given to show the influence of these factors on variation in *d* and recent work in this field is surveyed. The importance of determination of *d* for pulp manufacture is stressed, since it indicates variations in wood structure which control pulp yields and strength. The relative vals. of the common European woods for pulp production are discussed. D. A. C.

Use of fir in the production of (mechanical) wood pulp and sulphite pulp suitable for reworking into newsprint at a high paper-machine speed. D. J. Pletschev (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 211—236).—Fir gives considerably lower yields of pulp than does spruce. It is more rapidly cooked, and the pulp contains less resinous matter and pentosans at the same hardness. Satisfactory results were obtained by cooking fir alone, or in various mixtures with spruce, containing 40% of moisture, with acid containing 3—4% of SO_2 and 0·7—0·9% of CaO at an initial temp. of 35—50°. This was followed by heating to 110°, steeping for 1 hr. at 110°, cooking for 7—7·5 hr. at 145°, and steeping at 145° for 1·5 hr. Results of large-scale tests are given. Ch. Abs (*e*)

Production of half-stuffs from the wood and bast of mulberry branches. M. N. Tzuipkina, A. M. Kurennova, and L. V. Egorova (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 67—100).—The branches are treated for 3 hr. with 1% NaOH at 100°, and the wood and bast products separated with H_2O. The wood pulp is reworked for 6—8 hr. in a rod mill, giving 63% of pulp. The bark is separated in the washing (1·7—2·7% yield). It is partly mixed with short-fibre bast and is suitable for the production of felt-like sheets. A 42% yield of bast half-stuff is obtained. Bleached bast pulp (88·6—93·8% of α-cellulose, Cu no. 0·21—0·34, fibre length 2·5—4 mm.) resembles rag half-stuff. Ch. Abs. (*e*)

Manufacture of chemical wood pulp. Investigations in Australia. R. B. Jeffreys (J. Proc. Austral. Chem. Inst., 1936, **3**, 297—313).—Methods of pulping, bleaching, and evaluating chemical wood pulps are discussed. Australian *Pinus radiata* yields a satisfactory kraft pulp, but for the sulphite process the trees must be cut before much heartwood is formed, in order to minimise trouble from wood resins. The age at which heartwood develops varies considerably; trees 15—18 years old were relatively free, whilst others 13 years old contained considerable amounts. The sulphite process is unsuitable for Australian eucalypts owing to the tannin content and the resistance to bleaching, but pulps made by the kraft process are bleachable if derived from wood which is not too dark originally. Although the pulping characteristics vary considerably according to age and locality, kraft eucalypt pulps have a higher yield than those from kraft spruce, the mean fibre length being less and the length : diameter ratio similar. The high strength is due to the presence of binding materials rather than to the inherent strength of the fibre, and max. tearing, bursting, and tensile strengths are developed concurrently, but require wet-beating. J. G.

Cooking process. IX. Pulping wood with alcohols and other organic reagents. S. I. Aronovsky and R. A. Gortner (Ind. Eng. Chem., 1936, **28**, 1270—1276; cf. B., 1930, 1021; 1935, 587).—In presence of H_2O at 10 atm. for 4 hr. the *n*-primary alcohols are better pulping agents for aspen sawdust than the *sec.* or *tert.* alcohols. There are definite relationships between the pulping properties and the solubility of the reagent in H_2O, and also the "ζ-potential" (cf. A., 1930, 1124) of the cellulose–alcohol interface, and an alcohol must have $\nless 4$ C, 3 of which are in a straight chain, in order to produce a satisfactory pulp. $Bu^{\alpha}OH$ (*e.g.*, for 4 hr. at 186°) yielded a pulp from aspen chips comparable in strength with that produced commercially by the soda process. Since the alcohol layer separating from the residual liquor contains most of the org. extractives, including those sol. in H_2O, this pulping process enables the ligneous matter (properties described) to be obtained uncontaminated by inorg. compounds from the original wood. $Bu^{\alpha}OH$–H_2O cooks using jack-pine chips indicated that different pulping conditions apply to coniferous and deciduous woods, probably because of differences in the nature of the resins and lignins present. J. G.

Physico-chemical factors which influence sulphite [pulp] cooking. R. de Montigny and O. Maass (Dept. Int. Can., Forest Serv. Bull. No. 87, 46 pp.).—A forced flow of cooking liquor through the wood increases the rate of delignification. Preliminary evacuation of wood accelerates penetration, as does preliminary repeated application of SO_2 gas under pressure to the wood. The resultant shortened cooking produces pulps of high bursting strengths. Increase in free $[SO_2]$ in the cooking liquor accelerates delignification, provided a sufficient pressure is maintained to hold the gas in solution. The influence of wood structure on cooking results is reviewed. Addition of waste liquor to the cooking liquor decreases rate of delignification, cellulose yield, and pulp strength. Ch. Abs. (*e*)

Effect of high sulphur dioxide concentrations and high pressures in sulphite pulping. J. N. McGovern (Paper Trade J., 1936, **103**, TAPPI Sect., 297—310).—Increase in the total $[SO_2]$ of bisulphite cooking liquor enables a marked reduction in cooking time to be effected, partly because of more rapid penetration of the wood chips, and partly because of more rapid chemical action. Similarly, such increase greatly lowers the cooking temp. necessary to produce a given pulp in a given time. Rise in temp. reduces cooking time at const. total SO_2 content. The application of a hydrostatic pressure far in excess of that developed by the steam and SO_2 in the digester has no noticeable effect on the penetration time, the cooking time, or the quality of the pulp. The woods investigated included western hemlock, white spruce, lowland white fir, and loblolly pine. Numerous data relating to the various cooking conditions and physical and chemical characteristics of the ultimate pulps are given. H. A. H.

Regeneration of sulphurous acid and relief liquor in sulphite pulping. M. Kopantzev (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 116—165).—A review of factors affecting the recovery of SO_2 and blow-off acid. Ch. Abs. (*e*)

Measurement of p_H of sulphite waste liquor with the glass electrode. C. F. Leitz and K. A. Kobe (Pacific Pulp Paper Ind., 1935, **9**, No. 6, 10—13).—A modified valve amplifying circuit is described. On adding CaO to sulphite waste liquor, $CaSO_3$ is pptd. up to p_H 9·6 and org. matter at p_H $>9·6$. p_H 9·6 is the optimum for pptn. of org. matter by NH_3. Ch. Abs. (*e*)

Sulphite spirit. B. Erstad (Tids. Kjemi, 1936, **16**, 140—142).—A review. M. H. M. A.

Soda-pulp [manufacture]. D. F. MacRae (Pulp & Paper Mag. Canada, 1936, **37**, 627—628).—The indirect digestion of poplar, followed by a two-stage bleaching process, of which the first stage is by Cl_2 and the second by $Ca(OCl)_2$ continuously, as well as the chemical recovery processes, are briefly described. H. A. H.

Improved methods of pulp bleaching under the conditions of the Kondrovski paper mill. Z. Gruzdeva (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 193—211).—Bleaching in the cold gives pulp of a poorer whiteness for a given Cl consumption than does hot bleaching. Cold bleaching gives a pulp with a higher α-cellulose content and fibre strength, and a lower ash content and Cu no. Optimum results were obtained at 35° with 0·62 and 32·93 g. of CaO and Cl per litre, respectively. Ch. Abs. (*e*)

Standard method for assessing the mechanical parchmentising ability of pulps. Memo. No. 13 of the Fibre Analysis Committee of the Verein der Zellstoff- u. Papier-Chemiker u. -Ingenieure (Papier-Fabr., 1936, **34**, 397—401).—The parchmentising ability is expressed as the product of wetness (°S.R.) × beating time required therefor in the production of standard laboratory sheets which will blister when held in contact with a metal surface heated at 275±20°. Beating and sheet-making are carried out by the German standard methods (using the Jokro mill and the "Rapid-Köthen" sheet machine). In addition, the fat-penetration (apparatus described) and H_2O-absorption tests may be applied if necessary. In the former, the sheet is considered to be parchmentised if after 1 hr. there is no penetration of Et_2 phthalate at 20°. D. A. C.

Sorption of water vapour by papermaking materials. Effect of physical and chemical processing. C. O. Seborg, F. A. Simmonds, and P. K. Baird (Ind. Eng. Chem., 1936, **28**, 1245—1269; cf. B., 1932, 141).—The equilibrium H_2O contents of well-beaten kraft and sulphite pulps are $>$ those of the unbeaten pulps, the average difference (expressed as % H_2O content of the unbeaten pulps) being 6; this is probably near the max. increase in hygroscopicity (H) obtainable by beating. Pebble-mill processing incorporates mineral matter of low H into the pulp and so lowers its H, partly by dilution, and possibly also by an inhibitive effect. Bleaching lowers the H of spruce and silver-fir sulphite pulps, the relation between degree of bleaching and decrease in H being linear in the latter case. Spruce sap-wood, cuprammonium lignin, and bleached and unbleached spruce sulphite pulps show little difference in H. On adsorption, however, the H of the lignin and pulps tends to be $<$ that of the sap-wood, although at 95% R.H. the equilibrium H_2O contents are the same. This indicates that removal of lignin cannot entirely explain the changes in H. J. G.

Balance of water and fibre in a high-speed paper machine for the production of newsprint. D. J. Peetschev (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 252—255).—By conducting the suction waters (0·4—0·5% of fibre) directly into the storage basin for collecting waste waters, the efficiency of pulp utilisation was increased. Ch. Abs. (*e*)

Mechanical strength of paper in relation to composition, quality, and degree of beating of pulp. N. Solius and N. Laudenbak (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 255—263).—The content of chemical pulp in the paper may be decreased without impairing the mechanical properties, by a more efficient beating of the chemical pulp or by improving the quality of the mechanical pulp. Ch. Abs. (*e*)

Effect of vibration (shake) on the mechanical strength of paper. N. G. Potapova (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 248—251).—Increased frequency and amplitude of vibration of the forming wire, at a speed of the paper machine of 145 m./min., increases the tearing strength in the transverse direction and improves the translucency (optimum, 215 vibrations per min. and 20 mm. amplitude). Increased vibration diminishes the longitudinal tearing strength. Ch. Abs. (*e*)

Dyeing of paper. A. H. Rutt (Proc. Tech. Sect. Papermakers' Assoc., 1936, **17**, 199—207).—A system of dyeing tinted papers, using 5% solutions of only three dyes, is described. H. A. H.

Deformation of paper in printing. Z. V. Ushastkina and V. J. Matveev (Tzent. Nauch.-Issle. Inst. Bumashn. Prom. Mat., 1934, No. 4, 107—115).—The effect of various processing factors on the deforming properties of 50 and 100% linen-rag paper, 100% bleached-stock paper, and 100% refined sulphite paper was studied. Rag paper is least subject to deformation. Ch. Abs. (*e*)

Measurement of [paper] gloss with photo-[electric] cells. A. Klughardt (Papier-Fabr., 1936, **34**, 409—411).—The amount of light reflected from a paper surface is measured with a photo-cell at angles varying between 10° and 45° to the paper. The results are expressed in relation to the reflexion from a standard $BaSO_4$ surface. The method is a development of the author's previous method (cf. B., 1933, 1040; 1936, 909) with a view of eliminating the personal factor. D. A. C.

Pitch and pitch troubles in paper-making. L. E. Fitzgerald (Paper Trade J., 1936, **103**, TAPPI Sect., 266—268).—Causes of pitch troubles in both pulp- and paper-making, and of methods of overcoming them, are summarised. H. A. H.

Control of air in [paper-]machine-room ventilation and drying. H. G. Rappolt (Paper Trade J., 1936, **103**, TAPPI Sect., 277—278).—Equipment is briefly described. H. A. H.

[Nitrocellulose etc.] explosives.—See XXII. **Effect of paper-pulp effluents on river-H_2O.**—See XXIII.

See also A., Dec., 1470, **Kinetics of the sulphite process.**

Patents.

Liberation of fibres. J. A. Manahan (U.S.P. 2,026,584, 7.1.36. Appl., 11.1.35).—Plant fibre is liberated from connective tissue by treatment with 1% soap solution, and then with a hot 1% aq. solution of $Na_3PO_4,12H_2O$. After rinsing with hot H_2O, it is further treated with hot 1% soap solution containing a hygroscopic agent (0·1% of $CaCl_2$) and dried. F. R. E.

Treatment [lubrication] of textile fibres. A. H. Gill, Assr. to Gill Corp. (U.S.P. 2,026,735, 7.1.36. Appl., 10.10.33).—The lubricant consists of a fatty oil (cottonseed, olive) which has been selectively hydrogenated to a stage where the linoleic glycerides have been largely converted into those of oleic acid, and frozen out to separate solid fats (stearates) originally present or formed during hydrogenation. The product has satisfactory fluidity for fibre treatment with no tendency to gum, and may be used as such or emulsified with H_2O. F. R. E.

Treatment [lubrication] of natural and artificial fibres. A. G. Bouhuys, Assr. to Amer. Enka Corp. (U.S.P. 2,025,435, 24.12.35. Appl., 23.3.34).—The materials are treated with a solution containing a mineral oil, a sulphonated product thereof in amount insufficient to inhibit the lubricating properties of the oil, alkali and ethanolamine soaps of oleic acid, and a soap solvent ($OH{\cdot}C_2H_4{\cdot}OMe$), together with oleic acid and an antioxidant (resorcinol, $NHPh_2$) if desired. F. R. E.

Treatment of textile fibres. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 454,559, 27.3.35).—The application to textile fibres of liquid carboxylic acids of the formula $R{\cdot}X(CO_2H)_n$, in which R is a fatty residue of $\not< C_8$ and X an aliphatic or aromatic group containing N, O, S, or P, to textile fibres (wool), optionally in conjunction with other oily substances, is claimed. The use as (spinning, carding, and weaving) lubricants for wool of oleylsarcosine in aq. emulsion, methyldodecyldiglycollamide + mineral oil, and dodecylglycine + dibutylene glycol is described. H. A. P.

Washing of animal fibres. Hansawerke Lürman, Schütte & Co. (B.P. 456,242, 5.2.36. Ger., 18.2.35).—The fibres are treated with an aq. solution of p_H 7—8, containing a substance obtained by neutralising the reaction product of a saturated fatty acid glyceride with 1—3 (1·5—2·5) times its wt. of a sulphonating agent, *e.g.*, sulphonated coconut oil neutralised with NaOH. F. R. E.

Treatment [permanent waving] of fibres or fibrous materials containing keratin. J. B. Speakman (B.P. 456,336, 23.4.35. Cf. B.P. 453,700; B., 1936, 1200).—Wool or hair is treated with an acid sulphite solution at p_H 6 in presence of a thickener, *e.g.*, agar-agar, if desired, formed into waves or curls, and heated at 50—60°. It is subsequently treated with an aq. aldehyde or ketone and/or a mild oxidising agent, *e.g.*, H_2O_2, to remove excess of bisulphite, and finally washed. F. R. E.

Hydrocaoutchouc yarn. T. H. Byron, Assr. to North Amer. Rayon Corp. (U.S.P. 2,025,025, 24.12.35. Appl., 15.9.34).—A soft-lustred, elastic yarn is produced by spinning a solution of viscose or cuprammonium cellulose containing 1—10% (on wt. of cellulose) of a hydrocaoutchouc. F. R. E.

Production of cellulose esters and products of same. W. H. A. Thiemann. From Wolff & Co. Komm.-Ges. auf Akt. (B.P. 455,657, 9.5.35).—

Wood pulp which has been decomposed with alkali and contains $\nless 93\%$ of α-cellulose is formed into board having *d* 0·3—0·4 and absorption-period val. $\ngtr 200$ (30—40) sec. and then esterified. F. R. E.

Production of [stable] esters of cellulose. Brit. Celanese, Ltd. (B.P. 455,344, 24.9.35. U.S., 29.9.34. Cf. B.P. 446,949; B., 1936, 637).—Cellulose is treated with an esterification medium containing $<10\%$ of H_2SO_4 (on wt. of cellulose) and $\nless 2\%$ of a metal halide ($ZnCl_2$, $AlCl_3$) as catalyst aid, in absence of added free H halide. F. R. E.

Preparation of high-viscosity mixed esters of cellulose. C. J. Malm, Assr. to Eastman Kodak Co. (U.S.P. 2,026,986, 7.1.36. Appl., 1.5.35).—Cellulose is pretreated with a mixture of $\nless 20\%$ of AcOH and a fatty acid (C_{3-4}) and then esterified, in presence of a catalyst, with a mixture of a fatty anhydride (C_{3-4}) and $\nless 20\%$ of Ac_2O, the acyl groups (C_{3-4}) used being $\nless 40\%$ of the total acyl. F. R. E.

Manufacture of cellulose derivative. G. W. Rigby, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,025,073, 24.12.35. Appl., 9.1.34).—Cellulose is treated with $H_2S_2O_7$ or a mixture of $ClSO_3H$ and conc. H_2SO_4 at 20—130° in presence of a *tert.* amine (C_5H_5N). F. R. E.

Spinning machine for rayon or other synthetic material. J. Brenzinger, Assr. to Max Ams Chem. Eng. Corp. (U.S.P. 2,028,821, 28.1.36. Appl., 1.10.30).—The apparatus includes expanding V-pulley gear for co-ordinating the speed of the spinning pump to that of the take-up spool, and interlocks for ensuring that an empty spool is started before a full one is stopped. B. M. V.

Increasing the tensile properties of viscose rayon. J. W. Humphrey, Assr. to Viscose Co. (U.S.P. 2,025,868, 31.12.35. Appl., 28.11.33).—1—2% of an alkylated phenol (I), *e.g.*, *o*-, *m*-, or *p*-cresol, thymol, resorcinol Et ether, is added to viscose solution after ageing but before spinning, the major portion of (I) being lost during spinning. F. R. E.

Production of cuprammonium silk. A. Wagner (B.P. 455,534, 13.11.35. Ger., 8.6.35).—A group of cuprammonium cellulose filaments is spun into a freely descending column of pptg. liquid without negative pressure in the spinning-bowl and the resulting filament bundle is further stretched by a column of the same liquid flowing at a higher velocity above or in the upper part of a second bowl, the tension on the bundle being relaxed in the lower part thereof. The finished filaments of crinkled and woolly character are finally cut to staple length. F. R. E.

Manufacture of artificial silk. F. Lappe, Assr. to North Amer. Rayon Corp. (U.S.P. 2,027,047. 7.1.36. Appl., 24.3.33. Ger., 19.10.32).—The extruded filaments are passed to and over the face of a collecting bobbin, thence in an extended path to a guiding device, and back to the bobbin, on which they are finally wound. F. R. E.

Treatment of artificial silk cakes. North Brit. Rayon, Ltd., and W. Hartley (B.P. 456,174, 28.6.35).—To improve the uniformity of the thread, the cakes, after treatment with liquids and before drying, are subjected to substantially even compression by application of inwardly directed radial pressure to the external peripheral surface, the initial annular shape of the cake being maintained. Apparatus is claimed. F. R. E.

Saponification of cellulose ester filaments, threads, ribbons, and like materials. Brit. Celanese, Ltd., H. Dreyfus, and R. W. Moncrieff (B.P. 455,925, 29.4.35).—The materials of tenacity $\nless 2$ g./denier, after shrinking, are treated at 25—75° with an aq. solution containing 0·25—2% of NaOH and 5—15% of NaOAc. F. R. E.

Saponification of materials made from cellulose esters. Aceta Ges.m.b.H. (B.P. 455,622, 23.4.35. Ger., 21.4.34).—The hydrolysis of cellulose acetate with alkali (NaOH, K_2CO_3, Na_3PO_4, Na silicate) is facilitated by adding to the bath an org. base, or a salt of such base, having quinquevalent N, P, Sb, or As, or quadrivalent S, and containing an open or closed chain ($\nless C_4$) capable of being adsorbed by the material from the hydrolysing medium, *e.g.*, $NMe_3(C_{12}H_{25})Br$. S. C.

Production of a [non-fibrous] cellulose product [bulking agent for foodstuffs]. J. Campbell and R. G. Quinn, Assrs. to Internat. Paper Co. (U.S.P. 2,026,865, 7.1.36. Appl., 20.1.34).—Regenerated cellulose is comminuted in presence of H_2O to remove H_2O-sol. impurities, freed from H_2O-insol. impurities by treatment with EtOH or Et_2O, bleached if necessary, and dried at a temp. < that at which cellulose decomp. products are formed. F. R. E.

Production of artificial filaments, yarns, straw, and the like [of reduced lustre]. Brit. Celanese, Ltd. (B.P. 455,930, 3.5.35. U.S., 4.5.34).—A solution of an org. derivative of cellulose is dry-spun and the products are further delustred by treatment with a hot aq. medium (soap solution) at < the b.p. F. R. E.

Manufacture of artificial silk, films, and like products. W. W. Groves. From Aceta Ges.m.b.H. (B.P. 455,849, 25.1.35).—A resin-like polymerisate or other artificial resin not derived from cellulose or a protein substance, which contains as substituent a reactive halogen, alkylene oxide, halogeno-alkyl ether, SO_3H, or sulphuric ester group, together, if desired, with a non-resin-like substance of low mol. wt. containing a reactive alkylene oxide ring, to give it an alkylating function, is incorporated in the spinning solution composed of a cellulose derivative or an artificial resin sol. in org. solvents. The product is treated during or after formation with an amine or an NH_2-derivative by impregnation or as vapour. The finished materials show improved affinity for dyes, particularly acid dyes. F. R. E.

Manufacture of artificial threads or the like. W. W. Groves, and I. G. Farbenind. A.-G. (B.P. 456,061, 28.3.35. Addn. to B.P. 443,971; B., 1936, 637).—Immediately after coagulation of highly ripened viscose (salt point $\ngtr 0·1—0·2$), the product is subjected to tension while immersed in H_2O or a very dil. solution of an electrolyte, the reversion of the viscose to cellulose being completed only after the application of tension. F. R. E.

Manufacture of artificial threads, filaments, and the like [of uniform dyeing properties]. Courtaulds, Ltd., and J. Lander (B.P. 456,137, 3.5.35).—After being drawn through the spinning-bath at a uniform rate, the thread is led to the bobbin or centrifugal box at a progressively and gradually increasing speed during the whole time of collection, so that the tension is continually increased. Apparatus is claimed. F. R. E.

Fibrous cellulose mass and chemical reaction therewith. W. F. Hoffman, Assr. to Cellovis, Inc. (U.S.P. 2,025,283, 24.12.35. Appl., 28.3.32).—Cellulose fibres (wood pulp) are treated with H_2O, a foaming agent (saponin), and an adhesive (cellulose hydrate, nitrate, or acetate), formed into a foam, and dried to a bibulous, distended, porous, fibrous mass suitable for esterification without further mechanical treatment. F. R. E.

Ribbons of foils, films, or the like containing cellulose derivatives, and wires and other articles covered therewith. Celluloid Corp. (B.P. 456,026, 8.8.35. U.S., 8.8.34).—A ribbon of foil made of or containing an org. derivative of cellulose is treated with talc or a similar solid lubricant (Zn stearate) insufficient to prevent adhesion, and wrapped on the electrical conductors. F. R. E.

Preparation of conditioned material [films]. C. E. Coleman, Assr. to Du Pont Cellophane Co., Inc. (U.S.P. 2,025,376, 24.12.35. Appl., 12.4.32).—Tightly-wound film rolls composed of regenerated cellulose, cellulose derivatives, etc. are aged for a predetermined period in an atm. of R.H. 30—70, whereby a large proportion of the internal strains are relieved and distortion is appreciably inhibited. F. R. E.

[Pleated] article and material containing organic derivatives of cellulose. J. H. Brown, Assr. to Celluloid Corp. (U.S.P. 2,025,568, 24.12.35. Appl., 2.5.35).—A sheet composed of an org. derivative of cellulose with 5—30% of a plasticiser (Bu_2 phthalate) is permanently pleated by heat and pressure. The sheet can then be stretched over suitable shapes without loss of its pleated form. F. R. E.

Manufacture of refined pulp from straw of graminaceous plants. K. Kodama (U.S.P. 2,026,900, 7.1.36. Appl., 3.6.35. Jap., 19.10.34).—Straw is digested first in the liquid obtained by adding H_2SO_4 to sea-H_2O or brine to such an extent as to form $NaHSO_4$ and HCl, but to leave no free H_2SO_4, and then in aq. NaOH. B. M. V.

Freeness detector [for paper pulp]. H. D. Wells (U.S.P. 2,027,660, 14.1.36. Appl., 16.7.34).—Pulp is screened, the screen being prevented from choking by vibration of the screen or pulp surrounding it; the H_2O flowing through is exhausted through a vessel with const. outlet so that the level rises with greater freeness of pulp. The level may be caused to initiate regulation of the conditions of manufacture. B. M. V.

Manufacture of slabs from pulp of fibrous material. Verein. Strohstoff-Fabriken (B.P. 455,601, 17.1.35. Ger., 17.1.34).—A sheet-mould is described. D. A. C.

Dispersal of [fibrous] matter in manufactured material. W. W. Carter, Assr. to B. Morton (U.S.P. 2,027,090, 7.1.36. Appl., 30.6.30. Renewed 5.3.34).—Fibres are mixed with a gel-forming liquid and the gel is broken up until the particles are smaller than the length of the fibres. The mixture is then incorporated with the main fibrous material, *e.g.*, paper pulp. The fibres and fibrous material may sometimes be the same. B. M. V.

Manufacture of [roofing] felt. P. Drewsen, Assr. to Barrett Co. (U.S.P. 2,029,310, 4.2.36. Appl., 4.2.26. Renewed 27.1.34).—Felt suitable for tarring is produced from a mixture of pulps of: (*A*) "strength" fibres, (*B*) absorptive fibres, (*C*) cooked cereal fibres. *E.g.*, (*A*) cooked jute or unbleached kraft; (*B*) preferably from wood, but straw not excluded, well beaten; (*C*) straw merely soaked. B. M. V.

Manufacture of paper. D. K. and I. B. Pattiloch (B.P. 455,477, 27.3.36).—At least 1% of Na metasilicate or aluminate is added to the pulp containing about 2% of boiled starch and excess of alum. The addition is made subsequent to the beating operation, sufficient alum being present initially to give a final p_H preferably of 5·5—7·0. D. A. C.

[Thickness control in] manufacture of paper. Portals, Ltd., J. C. Marsden, and J. Knaggs (B.P. 455,606, 20.3.35).—The thickness of the web is controlled at the dry end of the paper machine by means of a photo-cell which operates in conjunction with the vertical movements of two rollers between which the web passes. The cells may start an alarm, or, alternatively, control the stuff or dilution H_2O supply to the head-box. D. A. C.

Apparatus for measuring and/or regulating the moisture content of paper. G. Kent, Ltd., A. Ivanoff, and G. P. E. Howard (B.P. 455,612, 18.4.35).—During manufacture the paper is subjected to a heating medium the rate of loss of heat from which is the sole variable measured; *e.g.*, the steam supplied to earlier rolls is measured as such or as condensed H_2O and caused to control the supply of steam to later rolls. B. M. V.

Manufacture of cigarette paper. E. M. Roschmann (B.P. 455,416, 5.2.36. Ger., 5.2.35).—Paper is impregnated with agar-agar to avoid a caustic taste and odour being noticeable on combustion. B. M. V.

[Paper-]coating composition. J. H. Swan, III, Assr. to Gardner–Richardson Co. (U.S.P. 2,025,788, 31.12.35. Appl., 18.11.31. Can., 21.8.31).—Aq. CH_2O (I) is added, with stirring, to casein (II) in alkaline solution, and the mixture stirred into rubber latex emulsion containing 2% of a polysulphide. The proportions by wt. of the ingredients are (I) : (II) : emulsion = 0·1 : 1 : 4. This composition is coated on paper and dried, and the paper again coated with a 0·1 : 1 : 1 mixture of (I), (II), and glycerin. D. A. C.

Manufacture of coated sheet and web material. Marbo Products Corp. (B.P. 455,641, 25.4.35. U.S., 25.4.34).—Paper, cardboard, or fibre board is made resistant to H_2O, grease, and gas by coating with a prep. containing rubber hydrochloride (20—24% HCl) and a suitable vehicle [resins, gums, waxes, chlorinated paraffin or Ph_2, coumarone, dammar, MeCHO–$C_2H_4(NH_2)_2$, PrCHO–NH_2Ph]. S. C.

Manufacture of glossy surfaces on pliable bases. G. Frenkel (B.P. 454,769, 26.3.36).—A no. of layers of plastic material are applied to a paper or textile base to form smooth conveyor bands, the layers being: (1) a solution of a resin free from oil and H_2O, having γ too high to permit much penetration, (2), possibly the last layer, a cellulose derivative and the resin, (3) the cellulose derivative only. Agents for increasing the γ of (1) are chlorinated rubber, cellulose esters, rubber, or metal salts. B. M. V.

Production of boards of fibrous or pulverulent substances of vegetable origin. H. N. Sköldkvist (B.P. 454,833, 3.3.36).—Lignin (I) is added to pulp deficient in (I), and the pulp pressed to remove H_2O, and cooked at 120° to convert the (I) into a waterproof binder. B. M. V.

Manufacture of [transparent] sheet material. J. R. Sanborn, Assr. to Internat. Paper Co. (U.S.P. 2,026,253, 31.12.35. Appl., 14.3.35).—An aq. suspension of slime-forming micro-organisms, *e.g.*, of the *Oidium* or *Monilia* type, is added to the beater stock. The organisms are grown in potato, groundwood, or waste sulphite-liquor extracts, containing a hydrocarbon. After drying, the paper may be impregnated with glycerin and aq. mineral oil emulsion. Alternatively, the slime may be digested with 60% aq. $ZnCl_2$, shaped, regenerated in H_2O, and dried. D. A. C.

Preparation of leather-like flexible and pliable material from wood sheets. R. O. Herzog and A. Burgeni, Assrs. to Wallwood Corp. (U.S.P. 2,030,819, 11.2.36. Appl., 3.12.30. Ger., 5.12.29).—Wood sheets are swollen, without destruction of grain, by treatment with alkaline solution, and after washing are saturated with glycerol, monoacetin, or a lactate. B. M. V.

[Manufacture of] laminated fabrics. Calico Printers' Assoc., Ltd., L. A. Lantz, and N. J. Hassid (B.P. 455,306, 18.4.35).—A no. of layers of cloth, some or all of which may consist of or contain regenerated cellulose (I), are treated with a swelling agent for (I) and subjected to pressure to cause adhesion of the layers. F. R. E.

Manufacture of cellulose wadding. E. Pashley, and Robinson & Sons, Ltd. (B.P. 456,032, 3.2.36).

Assistants in paper industry.—See III. **Bleaching cellulose.**—See VI. **Laminated glass.**—See VIII. **Artificial fibres etc.**—See XIII. **Adhesive tape. Waterproofing compositions.**—See XV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Hydrogen peroxide as a bleaching agent in the textile industry. H. Riedl (Chim. e Ind. [Brazil], 1935, 3, No. 7, 90).—Cl and chloroamines are completely eliminated after the bleaching of cotton fibre by treatment with alkaline H_2O_2 at 70—90°. Ch. Abs. (*e*)

Electrometric analysis of mordanting baths for the textile industry. L. I. Belenki and I. I. Sokolov (Za Rek. Tekstil. Prom., 1934, 13, No. 11, 35—40).—$Cr^{\cdot\cdot\cdot}$ can be titrated electrometrically in mordanting baths by means of $K_3Fe(CN)_6$ and the glass electrode. $Fe^{\cdot\cdot}$ and $Fe^{\cdot\cdot\cdot}$ can be determined similarly with $KMnO_4$ and $SnCl_2$, respectively. Al is determined with NaF in aq. EtOH solution in presence of excess of NaCl, and with 2 drops of aq. $FeCl_3$ as indicator. Potentiometric titration of SO_4'' in Cr mordanting baths with $Ba(OAc)_2$ does not yield consistent results. Ch. Abs. (*e*)

Stainless steel in the rayon and silk [dyeing] industries. B. L. Hathorne and R. Zametkin (Amer. Dye Rep., 1935, 24, 503—504).—Stainless steel is superior to Ni–Cu alloy and to wood as a material for dye-kettle construction. Ch. Abs. (*e*)

Turbulent dyeing of wool at temperatures below 100°. G. V. Zotov (J. Appl. Chem. Russ., 1936, 9, 1858—1862).—The turbulent dyeing (cf. Rendell and Thomas, B., 1935, 626) gives better results than the ordinary process if applied to wool felt; the dyeing of wool fibres and rabbit furs proceeds in the same way whether with or without air-bubbling. The turbulency promotes the diffusion and gives no other effect. J. J. B.

Influence of naturally occurring admixtures accompanying cellulose on the dyeing properties of cotton fibre. I. P. P. Viktorov and E. O. Vildt (J. Appl. Chem. Russ., 1936, 9, 1649—1660).—Adsorption of Direct Pure Blue FF by cotton is very slightly augmented by defatting, considerably more by removing proteins, and still more by removing pectin substances. The effects are ascribed not only to removal of interfering substances, but also to modification of the structure of the cellulose by the reagents employed. R. T.

Absorption of dyestuffs by viscose. A. M. Patel (Silk J., 1935, 12, No. 135, 19—20).—Dyes with low diffusion rates should never be used with rayon. Wilson's conclusion (J.S.C.I., 1920, 39, 322T) that the evenness of shade at 50° varies with the mol. wt. is not supported. Ch. Abs. (*e*)

Differences in biological activity of the individual Ursols. H. Forker (Arch. Gewerbepath. Gewerbehyg., 1935, 6, 275—303).—A review of the literature suggests that the toxicity of the Ursol dyes, used in fur dyeing, is due to the intermediate quinonoid oxidation products produced during the dyeing action on fur and skin, but gives no indication of the relative toxicities of the different Ursols. On application to the skin, Ursols D, light SB, NZ, P, and Ursol grey DMG produced toxic symptoms, whereas Ursol B had little effect. Ursol P base was much less toxic than Ursol P, for which it is a satisfactory substitute. In a few cases $K_2Cr_2O_7$ used for dipping pelts before dyeing appeared to have a toxic effect. M. A. B.

Obtaining printed effects on fabrics without using printing or steaming apparatus. E.

Koechlin (Sealed Note 2564, 3.3.24. Bull. Soc. Ind. Mulhouse, 1936, **102**, 453—455). Report by Haller (*Ibid.*, 456—457).—A two-colour pattern is produced on fabric dyed with an easily dischargeable colour by suitably folding it and knotting it in parts followed by plunging it into boiling aq. $Na_2S_2O_4$ (I) containing dyes of another colour but stable to (I); no colour change takes place within the knotted parts. The method may be modified to produce multicoloured patterns. Haller confirms the ability of the process, but indicates its limitations, since easily reproducible, clear-cut patterns cannot be obtained, whilst only a limited no. of dyes are satisfactory. A. J. H.

Control of pebble and take-up [in crêping rayon fabrics]. R. Cottrell (Text. World, 1935, **85**, 1845—1846).—The pebble appearance produced by crêping in a hot soap liquor may be made more regular or definitely modified by pre-embossing the fabric after spray-damping or steaming. Viscose-rayon fabric is less amenable to this treatment than acetate rayon. Take-up (shrinkage) is determined by the boiling-off (crêping) process. It is recommended for crêping to immerse the fabric (in skein form) for 1, 2, and 2—3 hr. (for viscose, acetate, and silk fabric, respectively) in 0·5, 0·5—1·0, 1·5, and 2·0—2·5% soap solutions (for viscose, acetate + viscose acetate, and acetate + silk fabrics, respectively) initially at 80° and then raise to 100° within ½ hr. A. J. H.

Application of latex to textiles. R. Gaunt (Textile Mfr., 1935, **61**, 341).—0·01% of Mn or Cu has a deleterious effect on rubber, and should be absent in keeping latex. Waxes should be added to the padding emulsion for shower-proof cloth. The rubber hinders wax removal in dry-cleaning. Ch. Abs. (*e*)

Flame-proofing of fabrics. N. L. Deutsch (Rayon Text. Month., 1936, **17**, 689—690, 747—748).—The inorg. borophosphate Abopon, applied in aq. solution, is a good flame-proofing agent. It does not cause undue stiffening, is neutral (p_H 7·3—7·9), does not become acid, is sol. only in H_2O, and may be repeatedly dry-cleaned. A. G.

Alkalis in the wash wheel. Shale oil soap etc. in textile industry.—See XII.

Patents.

[Bleaching of] cellulose. E. Scheller, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,026,068, 31.12.35. Appl., 22.8.30. Ger., 11.9.29).—Cellulose is partly (½—¾) bleached with Cl_2, treated with hot aq. NaOH, and the bleaching completed with an alkali peroxide in absence or regulated presence of elemental O_2. The material is afterwards acidified and washed with H_2O. F. R. E.

Softening of bleached and dyed ruscus. J. M. Dux (U.S.P. 2,026,873, 7.1.36. Appl., 2.10.34).—The material is treated with a solution of glycerin and vegetable gums emulsified with H_2O-sol., sulphonated vegetable oils at 50—56°. S. G.

Treatment of textile materials. Brit. Celanese, Ltd., G. H. Ellis, and E. W. Kirk (B.P. 455,782, 27.4.35).—The art of producing scroop in artificial silk by means of neutral substances (cf. B.P. 407,449; B., 1934, 449) is extended by the employment of esters of higher saturated aliphatic acids with both lower polyhydric alcohols, *e.g.*, tri-stearin, -laurin, -palmitin, or higher alcohols, *e.g.*, cetyl palmitate. The scrooping agent (about 0·1%) is applied from either a volatile solvent or a dispersion in H_2O. In the example, a bath for dyed fabric is made from beef fat emulsified with glue and Nekal-A. K. H. S.

Production of resists in dyeing with ester salts of leuco-vat dyes. Durand & Huguenin A.-G. (B.P. 455,872, 1.8.35. Ger., 6.8.34).—Cotton or regenerated cellulose fabric is printed with a protein or albuminoid, *e.g.*, glue or gelatin, in aq. solution. The protein is effective if mixed with a thickener, and thus coloured resists may be obtained by using vat- or Rapidogen-type ice colours. (Cf. B.P. 445,224; B., 1936, 638.) K. H. S.

Dyeing of cellulose acetate artificial silk. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 455,285, 15.4.35).—The material is dyed (at 80—85°) with an azo dye derived from the H_2SO_3 ester of 1 : 8-$NH_2{\cdot}C_{10}H_6{\cdot}OH$ as first component in presence of a trace of alkali which hydrolyses the ester group as dyeing proceeds. Examples of coupling components are: α-$C_{10}H_7{\cdot}NH_2$ (ruby), α-$C_{10}H_7{\cdot}NHEt$ (red-violet), 1-phenyl-3-methyl-5-pyrazolone (orange), $NPhMe{\cdot}[CH_2]_2{\cdot}OH$, *m*-$C_6H_4Me{\cdot}N([CH_2]_2{\cdot}OH)_2$, (red), 1 : 2-$NH_2{\cdot}C_{10}H_6{\cdot}OEt$ (violet), 1 : 5-$NH_2{\cdot}C_{10}H_6{\cdot}OH$ (acid-coupled; blue-violet), 3 : 1 : 4-$NH_2{\cdot}C_6H_3Me{\cdot}OMe$ (scarlet). H. A. P.

Production of fast tints on cellulosic fibres. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 455,274, 10.4.35).—Dyeings fast to washing are produced by use of substantive azo dyes which form complex metal compounds sparingly sol. or insol. in H_2O, and after-treating with a compound of an appropriate metal of at. wt. >52 (*e.g.*, Cu, Ni, Co) in the same bath, preferably in a form stable to dil. alkali, *e.g.*, as ammine or sugar derivative. The dyes quoted are SO_3H-free, *e.g.*, *m*-$C_6H_4(OH)_2 \leftarrow 4:4':3:3'$-$(NH_2{\cdot}C_6H_3{\cdot}CO_2H)_2$ (I) $\rightarrow$ 2-$C_{10}H_7{\cdot}NHPh$ (II), or have the min. SO_3H necessary for H_2O-solubility, *e.g.*, $[(II) \leftarrow (I)]_2 \rightrightarrows$ 5 : 5′ - dihydroxy - 2 : 2′ - dinaphthylamine-7 : 7′-disulphonic acid. H. A. P.

Mercerisation of vegetable fibres. I. G. Farbenind. A.-G. (B.P. 455,893, 8.4.36. Ger., 11.4.35).—Mercerising solutions are improved by adding a wetting agent which is a sulphamic acid of the type $NRR'{\cdot}SO_3M$, where R is alkyl, R′ alkyl $\nless C_3$, and M is an alkali metal. In examples, the Na salts of the $Pr^{\alpha}{}_2$- and $Bu^{\beta}{}_2$-acids are employed. K. H. S.

[Enzyme] de-sizing [of goods sized with starch]. Kalle & Co. A.-G. (B.P. 455,804, 20.6.35. Addn. to B.P. 428,827; B., 1935, 722).—In de-sizing with amylase, basic org. compounds (not containing N) having one or more residues of $\nless C_8$, *e.g.*, sulphonium, phosphonium, and arsonium compounds, are added to the prep. *E.g.*, cotton cloth is de-sized in a pancreas-amylase bath, at p_H 6·8/48°, to which is added benzylmethyldodecylsulphonium methosulphate. Similarly, the diethylhexadecyl compound or triphenyldodecylphosphonium bromide is employed. K. H. S.

Manufacture of waterproof products from animal fibrous material. C. Freudenberg G.m.b.H., Assees. of E. Elöd (B.P. 456,726, 7.5.35. Ger., 7.5.34).—Shaped masses of, *e.g.*, hide fibres are immersed in a swelling agent (either a neutral aq. liquid, with subsequent removal of the H_2O by washing in, *e.g.*, $COMe_2$, EtOH, or, in the case of previously hardened products, glycerol, alone or in a non-aq. solvent, with warming if necessary) until in a loosened condition. The swelling agent is (preferably) substantially removed and a H_2O-insol. softening liquid (castor, paraffin, or train oil) is applied. The products may be treated with a tanning agent before or after softening and/or may be lacquered, waterproofed, etc. A permanently soft and elastic material is obtained. E. J. B.

[Production of] stiffening material [for fabrics, leather, etc.]. (A) J. Fausse, (B) E. H. Cameron, and (C) R. Hamilton, Assr. to Celastic Corp. (U.S.P. 2,027,968, 2,027,957, and 2,027,973, 14.1.36. Appl., [A—C] 19.8.33).—(A) Stiffening materials of the type claimed in U.S.P. 1,256,240 (B., 1918, 237A), particularly those in which the colloidal stiffening substance is a cellulose derivative (I), are treated on one side only with a solvent for the latter and then air-dried, when a solvent-resistant layer is formed. This surface does not deteriorate on shaping. (B) Fabric containing powdered (I) is passed through (*a*) a bath of a solvent liquid which dissolves the latter without removing it from the fibres and also possesses pptn.-resisting properties, or which also contains a pptn.-resisting liquid which may or may not be a solvent for (I), and then, without drying, through (*b*) a pptg. bath in which the liquid of (*a*) is not completely miscible, whereby part only of the (I) is pptd. Subsequent drying causes the unpptd. (I) to form a solvent-resistant surface. *E.g.*, (*a*) EtOH 90 + castor oil 10%, or $COMe_2$ 80 + PhMe 20%, (*b*) H_2O. (C) Fabric is impregnated with a solution of (I) in a bath possessing the properties of (*a*) and is then passed without drying into a bath such as (*b*) to produce a similar effect to that in (B). The products may be softened in a solvent, shaped, and hardened in the usual way without deterioration. E. J. B.

Impregnation [weighting] of textile fabrics. S. G. Osborne, Assr. to Hooker Electrochem. Co. (U.S.P. 2,025,072, 24.12.35. Appl., 17.3.33).—Textile fabrics are immersed in a solution of a metallic salt, *e.g.*, of Pb, Sn, or Sb, in an org. solvent, *e.g.*, CCl_4, which is inert to the fabric. After evaporation of the solvent the metal is fixed in the fabric as an insol. compound by hydrolysis with H_2O or steam, with or without an alkali (NH_3), or by reaction with salts. F. R. E.

Heat-hardening of synthetic resins on fabrics. Johnson & Johnson (Gt. Britain), Ltd. (B.P. 455,496, 21.3.35).—Cloth fabric is coated on one side with a condensible synthetic resin and passed through an oven heated at 177—288° at a speed which allows the resin to harden. Apparatus is claimed. S. M.

Impregnating pitch [for cellulose fibre]. Dry-cleaning solvents.—See II. **Assistants in textile industry. Polyvinyl derivatives.**—See III. **Threads etc. [for uniform dyeing]. Artificial silk etc.**—See V. **Ultramarine-blue for laundries. Coloured lacquers etc.**—See XIII.

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

Sulphuric acid clouds in the contact process. A. G. Amelin (J. Chem. Ind. Russ., 1936, **13**, 843—847).—Cooling of the reaction gases with dil. H_2SO_4 leads to formation of highly dispersed droplets of H_2SO_4; this is prevented by running the cooling solutions through metal coils. Residual SO_3 is recovered by introducing steam at 350°, and passing the gas through scrubbers. R. T.

Nomograms for calculating percentage contact oxidation of sulphur dioxide, and the composition of oleum. S. S. Schrajbman and A. V. Baleeva (J. Chem. Ind. Russ., 1936, **13**, 794—795). R. T.

Direct preparation of chemically pure (reagent) hydrochloric acid from sulphate oven gas. M. N. Merlis (J. Chem. Ind. Russ., 1936, **13**, 1043—1044).—The gas, containing HCl, SO_2, SO_3, H_2O, $AsCl_3$, $FeCl_3$, and Cl_2, is bubbled through aq. HCl into which dil. aq. Na_2S is being continuously introduced, when the reactions $2AsCl_3 + 3H_2S \rightarrow As_2S_3 + 6HCl$; $SO_2 + H_2S \rightarrow 3S + 2H_2O$; $Cl_2 + H_2S \rightarrow S + 2HCl$ take place, and at the same time $FeCl_3$ is absorbed. The resulting gas is passed through a series of absorbers containing coke, and then into H_2O. The H_2SO_4 in the aq. HCl so obtained diminishes with time to a min. ($\not< 0.0002\%$ SO_4''), after which it again rises. This effect is ascribed to formation of a film of aq. H_2SO_4 on the C, the concn. of which rises with time to the optimum for SO_3 absorption; at this stage the $[SO_3]$ of the issuing gas is least. Max. yields of chemically pure aq. HCl are obtained by giving the coke a single wash with H_2O whenever the $[SO_4'']$ of the conc. HCl attains 0·002%. R. T.

Extraction of phosphoric acid from Viatka flotational phosphorite, with decantation of pulp and washing of gypsum in concentrators. S. K. Voskresenski and S. K. Milovanova (J. Chem. Ind. Russ., 1936, **13**, 774—779, 850—855).—The phosphorite is extracted (6 hr. at 80°) with 2·5—3 times its vol. of aq. H_2SO_4, of a concn. such that 2 mols. of H_2SO_4 are present per mol. of CaO. Under these conditions, rapidly settling, easily washable gypsum is produced, and acid containing P_2O_5 22, SO_3 3·4, Fe_2O_3 1·78, Al_2O_3 0·82, F 0·95, $Na_2SO_4 + K_2SO_4$ 1, and SiO_2 0·28% is obtained in 94% yield. R. T.

Electrofilter for separation of hydrofluosilicic acid from gases. I. Zaring and G. Popova (J. Chem. Ind. Russ., 1936, **13**, 866—867).—95% of the H_2SiF_6 content of aërosols formed by the action of SiF_4 on H_2O can be collected with the aid of electrofilters, as compared with 60% by other methods. R. T.

Removal of organic sulphur compounds from gas mixtures for ammonia synthesis, by sorption on active charcoal. S. N. Kazarnovski and R. S. Oks (J. Chem. Ind. Russ., 1936, **13**, 835—843).—Org. S compounds are adsorbed on C in absence of H_2O, from N_2–H_2 mixtures at 800 atm. pressure. R. T.

Significance of composition of nitrogen–hydrogen mixture for ammonia synthesis. J. A. Feldman, L. I. Kozlov, and K. N. Ivanov (J. Chem. Ind. Russ., 1936, **13**, 1034—1035).—Optimum conditions of temp. and pressure vary with the activity of the catalyst and the $[N_2]$ of the mixture. R. T.

Loss of platinum in the oxidation of ammonia by a steam–oxygen mixture. I. E. Adadurov, V. I. Atroschenko, and V. I. Konvissor (J. Appl. Chem. Russ., 1936, **9**, 1745—1750; cf. B., 1935, 1042).—A mixture of NH_3 15, O_2 30, and H_2O 55 vol.-% was heated to 100° and conducted through a Pt gauze which, owing to the reaction heat, reached a temp. of about 900°. 90—98% of the NH_3 was oxidised, but the catalyst was strongly corroded (photomicrographs). About 2·4 g. of Pt were lost per ton of HNO_3 formed. J. J. B.

Causes of loss of platinum in the oxidation of ammonia at a platinum gauze. I. E. Adadurov (J. Appl. Chem. Russ., 1936, **9**, 1766—1769).—Objections are raised against Figurovski's results (B., 1936, 452). J. J. B.

History, preparation, and standardisation of precipitated calcium carbonate. W. Meyer, F. O. Stückenberg, and J. Dathe (Chem.-Ztg., 1936, **60**, 993—995).—A review.

Analysis of pietra di Trani [limestone]. B. Tanteri (Annali Chim. Appl., 1936, **26**, 318—321).—Analysis of 21 samples of compact limestone ("pietra di Trani"), consisting essentially of $CaCO_3$, and of one dolomitic limestone are given. L. A. O'N.

Electrolytic preparation of magnesium hydroxide from aqueous magnesium chloride. D. P. Zosimovitsch and O. I. Kiritschenko (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 257—265).—$Mg(OH)_2$ is obtained from aq. $MgCl_2$ in 80% yield, and of high purity, by electrolysis at 25—30° (c.d. 200—1000 amp. per sq. cm., at 3·5 volts). The p_H of the catholyte rises after a few min. from 6·68 to 10·14, thereafter remaining const. Presence of NaCl, $CaCl_2$, or $CaSO_4$ does not interfere. R. T.

Manufacture of sodium and some sodium compounds in Italy. P. Achille (Atti V Congr. naz. Chim., 1936, 607—615).—A review.

Fluorine content in Chinese common salt. F. W. Cheng and C. N. Tsao (J. Chinese Chem. Soc., 1936, **4**, 388—392).—Analysis of 140 samples of NaCl from 16 provinces of China gave, with few exceptions, a low, non-toxic content of F (0·8—3·9 p.p.m. in most cases). The highest amount found was 28·5 p.p.m. D. C. J.

Preparation of sodium nitrate from sodium chloride and ammonium nitrate. G. I. Gorschtein and Z. P. Tkatschenko (J. Chem. Ind. Russ., 1936, **13**, 1045—1047).—It is concluded from solubility data for the system NH_4NO_3–NaCl–H_2O that NH_4Cl and $NaNO_3$ may be obtained by cyclic recrystallisation at 16—100° in 28%, and at 0—100° in 8—10%, yield. R. T.

Production of bromides by action of bromine on bases in presence of formates. V. P. Ilinski, A. I. Tschertok, and S. L. Rahmilevitsch (Kalii, 1934, No. 4, 29—36).—Br is passed into aq. Na_2CO_3, and the $NaBrO_3$ (I) formed is separated by fractional crystallisation. The (I) in the mother-liquor is converted into NaBr by adding Fe filings. $Fe(OH)_3$ is filtered off and the solution evaporated to recover NaBr. The (I) is treated with NaBr and H_2SO_4 and the liberated Br returned to the process. Alternatively, Br is allowed to react at 90° with a solution containing equiv. amounts of NaOH and HCO_2Na. With a slight excess of formate present no (I) is formed. Ch. Abs. (*e*)

Extraction of salts from lake sludge. V. I. Nikolaev and M. A. Frischmut (J. Appl. Chem. Russ., 1936, **9**, 1588—1595).—Aq. extracts of the mud from salt lakes of the Volga delta may be used as sources of NaCl, $MgSO_4$, Na_2SO_4, and $MgCl_2$, but not of K and Br salts. R. T.

Preparation of barium chloride from barite, with partial replacement of hydrochloric acid by sodium chloride. K. M. Goldberg (J. Chem. Ind. Russ., 1936, **13**, 1115—1118).—$BaSO_4$ is reduced to BaS, part of which is extracted with H_2O at 75° to yield aq. BaS, whilst an equal part is treated with HCl. The H_2S evolved is utilised to convert BaS into $Ba(SH)_2$, and this reacts with NaCl to afford $BaCl_2$ and NaSH. $BaCl_2,2H_2O$ crystallises out in 80% yield, without further evaporation of the solution. The mother-liquor is freed from Ba by adding Na_2CO_3 or Na_2SO_4, and the filtrate is boiled, in order to convert NaSH into Na_2S, which is recovered as a by-product. R. T.

Chlorination of glauconite and phosphorite. A. V. Kazakov and E. N. Isakov (J. Chem. Ind. Russ., 1936, **13**, 780—784).—When the minerals are heated at 800° in a stream of Cl_2 the reaction of conversion of Fe_2O_3 and Al_2O_3 into $FeCl_3$ and $AlCl_3$ proceeds energetically during the first 30 min., after which residual M_2O_3 is only very slowly attacked. SiO_2 does not react with Cl_2 under these conditions. 38—65% of the M_2O_3 of different samples of glauconite and 56—85·5% of that of different phosphorites had undergone chlorination after 2 hr. and 30 min., respectively. R. T.

Flotation of Vermont talc–magnesite ores. J. B. Clemmer and S. R. B. Cooke (U.S. Bur. Mines Rept. Invest. No. 3314, Oct., 1936, 12 pp.).—Laboratory tests on the froth flotation of talc from $MgCO_3$ followed by tests in a 6-cell machine working 1-ton lots showed that talc is very easily floated, the problem being rather to depress the $MgCO_3$. Pine oil with paraffin as frother and Na_2CO_3 and Na silicate as depressants proved satisfactory, roughing followed by double-cleaning with return of the middlings giving a 90% recovery containing 92% of talc. The talc content of the $MgCO_3$ tailings is suitable for the production of dead-burnt magnesite, but the Fe content is too high. This Fe is present as carbonate and cannot be separated by magnetic methods. C. I.

Preparation of magnesium chloride from Lake Kujalnitzki saline. J. Fialkov and K. Sigalovski (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 267—276).—The H_2O contains NaCl 3·284, $MgCl_2$ 0·877, $CaCl_2$ 0·205, and $CaSO_4$ 0·1145%. The H_2O is evaporated to saturation, cooled, the mother-liquor separated, and the process repeated until the b.p. attains 120°, when the solution is further conc. to b.p. 134°, cooled to 100°, separated from the crystals forming, and evaporated down until the b.p. is 160°. The final solution crystallises as $MgCl_2,6H_2O$, in 35% yield and containing Mg 13·95, Ca 2·63, Cl 39·6, and SO_4 0·66%. R. T.

Preparation of aluminium oxide, sodium hydroxide, and cement from nepheline. F. N. Strokov, I. L. Talmud, and V. A. Musjakov (J. Chem. Ind. Russ., 1936, **13**, 829—834).—Nepheline concentrate, containing SiO_2 43—44, Al_2O_3 29—30, Na_2O 13—14, and K 6·7%, is mixed with powdered limestone ($CaCO_3 : SiO_2 = 2 : 1$), and the mixture is heated at 1300° to yield a solid solution of β-$2CaO,SiO_2$ and M_2O,Al_2O_3. This is powdered (60—90-mesh), agitated with H_2O at 70—80° (30 min.), and 1 mol. of Na_2CO_3 is added per mol. of Al_2O_3 present. Most of the suspended matter is separated in a classifier (82 wt.-% of the clinker taken for extraction). The solution, containing 90% of the Al_2O_3 content of the nepheline and 86% of its alkali-metal content, has a concn. of Al_2O_3 100, M_2O 120—125, and SiO_2 3·5 g. per litre. The SiO_2 content is reduced to 0·15% by autoclaving (7 atm.) for 2 hr. with 10 g. of CaO per litre, when a ppt. of the approx. composition $CaO,Al_2O_3,2SiO_2,nH_2O$ is obtained. The solution is saturated with CO_2 at 70—75°, filtered, and the ppt. of cryst. $Al(OH)_3$ is washed and calcined, whilst the filtrate is partly returned to the earlier stages of the process, but is mostly used for prep. of NaOH (containing 30% of KOH). The insol. residue from the extraction of the clinker is dried and mixed with $Ca(OH)_2$ and $CaSO_4$ to yield a cement substitute. R. T.

Applications of anhydrous aluminium chloride in the petroleum industry. I. Preparation of anhydrous aluminium chloride from alumina, carbon, and chlorine. II. Preparation of anhydrous aluminium chloride from the spent liquor of activated clay. K. Yamamoto, H. Ishikawa, and K. Machida (J. Soc. Chem. Ind. Japan, 1936, **39**, 312—314b, 314—315b).—I. Mixtures (2 : 1) of metallic oxides and C were chlorinated at various temp. C lowers the chlorination temp. For prep. of $AlCl_3$ by this method Al_2O_3 of high purity is required.

II. After evaporation of free HCl, heating to 400° to remove combined HCl, washing, and drying, the residue is chlorinated (no C) at 900° to remove MgO and Fe_2O_3 and then chlorinated with C at 700—800°, $AlCl_3$ (95·8% pure) being sublimed. J. W.

Differential production of soluble sulphates from mixtures of metallic oxides. C. F. Floe and C. R. Hayward (Amer. Inst. Min. Met. Eng., 1936, Tech. Publ. 735, 23 pp.).—Provided it has not been heated above 850°, Al_2O_3 is readily converted into $Al_2(SO_4)_3$ by heating at 230° with a 10% excess of 60—80% H_2SO_4; uncalcined Fe_2O_3 is similarly sulphated with 40—100% acid, but sulphating of TiO_2 at 240° is extremely slow. No differential sulphation of Fe_2O_3 and Al_2O_3 can be effected by heating the mixture with H_2SO_4, but if the sulphates are heated at 600° >50% of the Fe can be made insol. On heating powdered slate or kaolinite with 60% H_2SO_4 at 230° for 20—25 hr. 87—98% of the Al_2O_3 is dissolved with 64—47% of the Fe_2O_3 and a small proportion of TiO_2. Practically 100% of the Cu in roasted chalcopyrite is rendered sol. with only 20% of the Fe by baking the material with an excess of H_2SO_4 and then heating at 530—540° for 12 hr. Acid baking of roasted ferruginous blende gives a better Zn extraction than does dil. acid leaching, since the higher temp. used decompose the ferrites present. A. R. P.

Purification of solutions in the production of titanium dioxide. A. A. Milinski (J. Chem. Ind. Russ., 1936, **13**, 1098—1101).—Gelatin, glue, or aq. linseed-cake extracts increase the rate of sedimentation of suspended impurities in H_2SO_4 extracts of titanomagnetite. R. T.

Chemistry of titanium. IV. Action of chlorine on titanomagnetite concentrate. V. Action of chlorine on sphene concentrate. A. V. Pamfilov and E. G. Standel (J. Appl. Chem. Russ., 1936, **9**, 1770—1780, 1781—1789; cf. B., 1936, 693).—IV. Mixtures of TiO_2 and soot or wood charcoal react quickly with Cl_2 only above 500°; in presence of 0·2% of MnO_2 the chlorination is almost complete even at 480°. The titanomagnetite concentrate (TiO_2 44, MnO_2 0·7, Fe 36%) gave, when mixed with soot, a high yield of $TiCl_4$ above 600° only; the process is complicated by the sublimation of $FeCl_3$.

V. Mixtures of the concentrate (TiO_2 25, SiO_2 27, CaO 28%) and wood charcoal react quickly with Cl_2 above 800° only. TiO_2 is attacked faster than SiO_2, but more slowly than CaO. J. J. B.

Rapid method for determination of selenium in sulphur. W. C. Hughes and H. N. Wilson (J.S.C.I., 1936, **55**, 359—360t).—Se in S is determined by oxidising with 94% HNO_3, removing the excess of HNO_3 by evaporation, suitably diluting, reducing the H_2SeO_3 to Se by means of KI in presence of a protective colloid, and finally comparing the colour produced against standards.

Determination of fumigants. VII. Determination of sulphur dioxide and sulphur trioxide from burning sulphur. O. F. Lubatti (J.S.C.I., 1936, **55**, 344—346t).—A method for the simultaneous determination of SO_2 and SO_3 is described. A stabiliser for SO_2 is selected. The SO_2 determination is applied to micro quantities. These methods can be used with Page's apparatus (B., 1933, 94; 1936, 77). O. F. L.

Change in carbon dioxide content of gas mixtures in steel containers. Y. Kauko and T. Yli-Uotila (Suomen Kem., 1936, **9**, **B**, 19).—A gradual increase in CO_2 content of CO_2–air mixtures compressed to 100 atm. in steel containers has been observed. This may be due to dissociation of a previously formed layer of Fe carbonate or to diffusional escape of gas when slowly released. R. C. M.

Absorption of carbon dioxide by amines. Di- and tri-ethanolamine and tetramine. [Purification of hydrogen.] L. L. Hirst and I. I. Pinkel (Ind. Eng. Chem., 1936, **28**, 1313—1315).—The CO_2 content (approx. 20%) of commercial H_2 may be reduced to 0·1% on the laboratory scale by scrubbing with 50% solutions of the ethanolamines or with 5, 10, and 25% solutions of tetramine (polyethylene-amines) in columns packed with glass rings. 50% of $NH(C_2H_4{\cdot}OH)_2$ ≡ 10% of tetramine. F. C. B. M.

Electrolytic production of pure hydrogen and oxygen under pressure. H. K. Sen, S. Ghosh, and K. L. Ray (Trans. Inst. Chem. Eng., 1935, **13**, 172—174).—A description of plant together with operating data for the production of H_2 and O_2 by the electrolysis of aq. NaOH or KOH are given. D. K. M.

(A) Electrical precipitation an urgent problem of the phosphate fertiliser industry. N. N. Postnikov. **(B) Experimental electric distillation of phosphorus from Vyatka phosphorites.** N. N. Postnikov and L. P. Belotelov (Min. Udob. i Insektofung., 1935, **1**, No. 1, 42—47; No. 3, 11—19).—(B) Nearly theoretical yields of P were obtained from a mixture of phosphorite (1—2% of moisture) with 10—15% excess of C by electric heating at 500—600° (top layer of the charge) for 2 hr. Ch. Abs. (e)

$Ca(OAc)_2$.—See II and III. **Corrosion of Fe. [Acid-resistant] Fe alloys. H_2 [for] welding. Na compounds in Italy. Corrosion by S and NH_4 salts. Spectral analysis. [K and Al_2O_3 from] alunite.**—See X. **Colloidal ZnO.**—See XIV. **Basiphosphate. Potazot. I in K fertilisers. Hygroscopicity of fertilisers.**—See XVI. **Prep. of Ca lactobionate–$CaBr_2$. Mg trisilicate. Determining Mn in Mn and Fe citrate.**—See XX.

See also A., Dec., 1462, **Thermodynamics of N fixation.** 1478, **Determining traces of SO_2 and H_2S in air.**

Patents.

System for manufacture of nitric acid. F. W. de Jahn, Assr. to F. A. Bower (U.S.P. 2,027,578, 14.1.36. Appl., 2.2.28).—Absorption of N oxides in H_2O is effected at a pressure of several atm., in a no. of absorption chambers, with local circulation concurrent to the gas and with cooling, and with a minor countercurrent flow from chamber to chamber, the acid being withdrawn at the gas-inlet end. B. M. V.

Production of hydrogen halides. A. M. Clifford, Assr. to Wingfoot Corp. (U.S.P. 2,028,087, 14.1.36. Appl., 12.12.33).—A halogen and H_2S in non-equimol. proportions, *e.g.*, in waste gases, are passed up through a mixture of liquid S mono- and di- (or tetra-)halides (I) to yield H halide and S. The proportions of (I) may be varied to compensate for excess of one of the reagents, preferable so that a part only of the S formed dissolves in the S dihalide. The halide is scrubbed with, *e.g.*, xylene and H_2SO_4. Fresh (I) is continuously introduced at the top, and spent (I) withdrawn from the bottom, of the reaction vessel. *E.g.*, a mixture of S_2Cl_2 30 and SCl_2 70% is satisfactory with a $Cl_2 : H_2S$ mol. ratio of 5 : 2—8 : 2 at 50—70°. E. J. B.

Manufacture of derivatives of hydrocyanic acid. Imperial Chem. Industries, Ltd. (B.P. 456,151, 3.5.35. U.S., 3.5.34).—The acid is treated with H_2O at a temp. < its volatilisation point in presence of a suitable catalyst, especially aq. or gaseous NH_3, the [HCN] being kept at <57%. Shining or dull black amorphous solids are produced, possibly polymerisation or decomp. products. W. J. W.

Apparatus for making phosphoric acid. H. A. Curtis, Assr. to Tennessee Valley Authority (U.S.P. 2,026,519, 7.1.36. Appl., 15.5.35).—Vapours from P-forming materials, or P itself starting at a suitably later stage, are/is passed through the following system: an electric reducing furnace, the pressure at the outlet being maintained exactly = atm.; a dust collector; and a burner at the top of one limb of a U-shaped oxidiser–hydrator having aq. sprays part way down the inlet side, air inlets at the bottom, and aq. sprays throughout the rising limb. Additional air inlets are provided at the entrance of a cooling chamber, whence the vapours and mist pass through an electrostatic precipitator. Liquid H_3PO_4 is withdrawn from the hydrator, cooling chamber, and precipitator. B. M. V.

Production of pure phosphoric acid. M. J. Udy, Assr. to Swann Res., Inc. (U.S.P. 2,020,976, 12.11.35. Appl., 11.4.32).—P vapour, produced by smelting phosphate rock with SiO_2 and C in an electric furnace, is treated at 250—300° with a spray of $H_2O + O_2$; the small quantity of H_3PO_4 mist produced removes dust from the gas, which is then burned and the P_2O_5 hydrated. L. C. M.

Treatment of [solutions containing] sodium hydroxide. R. E. Burk and E. C. Hughes, Assrs. to Standard Oil Co. (Ohio) (U.S.P. 2,020,932, 12.11.35. Appl., 20.2.33).—Aq. NaOH containing mercaptides derived from petroleum refining is purified by extraction with a solution of S in naphtha. L. C. M.

Production of coarsely crystalline ammonium sulphate. A. von Kreisler (U.S.P. 2,021,093, 12.11.35. Appl., 26.8.33. Ger., 29.8.32).—A solution containing $(NH_4)_2SO_4$ 100, H_2O 100, H_2SO_4 2—8, and urea is allowed to crystallise. The crystals have <0·5% of urea. L. C. M.

Recovery of potassium and ammonium phosphates or mixed fertilisers containing the same. Kali-Forschungs-Anstalt G.m.b.H. (B.P. 448,808, 22.1.35. Ger., 10.2.34).—Solutions containing NH_4 and K phosphates are treated with NH_3 gas; $(NH_4)_3PO_4,3H_2O$ is separated, and the mother-liquor may then be treated with HNO_3, evaporated, and the solid employed as a mixed fertiliser. L. C. M.

Production of acid alkali pyrophosphates. C. R. McCullough, Assr. to Swann Res., Inc. (U.S.P. 2,021,012, 12.11.35. Appl., 27.10.32).—NaH_2PO_4 is heated at 284—310° in a drum fitted with revolving kneading blades in an atm. containing H_2O at controlled pressure (290—960 mm.). L. C. M.

Recovery of lithium from its ores. W. Rosett and F. R. Bichowsky (U.S.P. 2,020,854, 12.11.35. Appl., 6.10.33).—The ground ore (*e.g.*, lepidolite or spodumene) is mixed with 50 wt.-% of $CaCO_3$ and clinkered at 800—1000°; the calcine is leached with hot H_2O, and Ca removed by carbonating the solution, which is then acidified with an appropriate acid, and the Li salt allowed to crystallise. [Stat. ref.] L. C. M.

Reacting caustic lime with gypsum. C. G. Gilbert, Assr. to P. C. Choate (U.S.P. 2,021,412, 19.11.35. Appl., 2.9.30. Renewed 8.1.35).—A reaction between the constituents of a mixture of coarsely-ground gypsum and CaO is initiated by addition of a small proportion of H_2O. The ground product is employed as a building plaster. L. C. M.

Deodorised calcium chloride. C. R. Downs, Assr. to Weiss & Downs, Inc. (U.S.P. 2,027,093, 7.1.36. Appl., 15.11.33).—Lumps of solid, non-porous $CaCl_2$ are intimately mixed with activated C for use in air conditioning. B. M. V.

Regeneration of [cuprous] absorbent liquids. A. Christensen, Assr. to Chem. Construction Corp. (U.S.P. 2,029,411, 4.2.36. Appl., 12.1.33).—Ammoniacal Cu^I solution, after absorption of CO and CO_2, is boiled with evolution of CO, CO_2, and some NH_3 and the mixed hot gases are scrubbed in counter-current with cold H_2O. This solution is then heated to expel NH_3, which is absorbed into the Cu solution; unabsorbed gases after NH_3 removal are returned to the gases and vapours undergoing scrubbing with H_2O. B. M. V.

Manufacture of zinc oxide. E. H. Bunce, C. J. Lentz, and G. T. Mahler, Assrs. to New Jersey Zinc Co. (U.S.P. 2,021,284, 19.11.35. Appl., 24.3.30).—In the prep. of ZnO by direct oxidation of gases containing Zn generated by the reduction of Zn ore, air is drawn into the reaction chamber by suction through a porous bottom, and the ZnO collected on a dust filter. L. C. M.

Manufacture of magnesium products. W. H. Farnsworth and M. Montgomery, Assrs. to Marine Chemicals Co., Ltd. (U.S.P. 2,021,501, 19.11.35. Appl., 21.5.34).—Sea-H_2O is treated with a small quantity of $Ca(OH)_2$, and filtered from suspended matter and $CaCO_3$; 5% of the filtrate is taken, treated with an excess of $Ca(OH)_2$, and the ppt. of $Ca(OH)_2$ coated with $Mg(OH)_2$ is collected and introduced into the bulk of the H_2O, where the remaining $Mg(OH)_2$ is pptd. in a form which settles rapidly. L. C. M.

Production of pure alumina. W. Fulda, E. Wiedbrauck, and R. R. B. Wittig, Assrs. to Verein. Aluminium-Werke A.-G. and T. Goldschmidt A.-G. (U.S.P. 2,021,546, 19.11.35. Appl., 1.6.34. Ger., 8.6.33).—Calcined kaolin, leucite, etc. is treated with aq. SO_2 at 75°; the solution is filtered from SiO_2, $Fe(OH)_3$, etc. and decomposed by heating at $>95°$ with recovery of SO_2. The crude $Al(OH)_3$ is collected, dried, calcined under reducing conditions at 450—550°, and redissolved in aq. NaOH at 20—60°; the solution is filtered from CrO_3, V_2O_5, TiO_2, etc. and the pure $Al(OH)_3$ repptd. L. C. M.

Reacting chlorine with metal-bearing solids. S. G. Osborne and J. M. Rowland, Assrs. to Hooker Electrochem. Co. (U.S.P. 2,020,431, 12.11.35. Appl., 1.2.33).—$AlCl_3$ or $FeCl_3$ is produced by passing a current of Cl_2 carrying finely-granulated metal through a vertical inverted cone; from the top of the cone (where the velocity is small) the gases pass into a settling chamber, which is followed by a dust filter to remove any remaining solid. L. C. M.

Base-exchanging material for bringing about ion exchanges. S. Møller (B.P. 456,344, 3.5.35).—Grey or black mineral (from the Faroe Islands), consisting of SiO_2, Fe_2O_3, Al_2O_3, CaO, TiO_2, Na_2O, and K_2O, after drying and comminuting, is treated with an alkaline compound or its aq. solution. W. J. W.

Purification of titanium compounds. A. H. Stevens. From C. F. Burgess Labs., Inc. (B.P. 456,314, 2.3.35).—Heavy metals, *e.g.*, Fe, are removed from solutions of Ti compounds by digesting these with 20—50% of a solution of NH_4F, neutralising with NH_3, and then pptg. with $(NH_4)_2S$. W. J. W.

Catalytic composition and its manufacture. R. E. Berthold, Assr. to Cardinal Products, Inc. (U.S.P. 2,021,475, 19.11.35. Appl., 18.7.33).—A composition for use in cigarette lighters utilising MeOH is prepared by soaking cotton webbing in a solution containing H_2PtCl_6, $BaPt(CN)_4$, and Th, Al, and Zr nitrates; the impregnated webbing is dried and burned, and the ash washed successively with aq. H_2SiF_6, H_2O, aq. H_2SO_4, H_2O, aq. KCN, and H_2O, dried, mixed with maize syrup, dried, granulated, and moulded by pressure. L. C. M.

Removal of acid from [hydrogen] peroxide solutions. J. S. Reichert, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,021,384, 19.11.35. Appl., 7.6.33).—100-vol. H_2O_2 obtained by the distillation of aq. $(NH_4)_2S_2O_8$ is treated with $Ba(OH)_2$ to reduce the acidity to p_H 1·7—1·8; colloidal SnO_2 sol (I) (0·2 g./litre) is added, with NaOH or aq. NH_3 to raise the p_H to 2·4—3·5; (I) (0·3 g./litre) is then added and the liquid clarified. L. C. M.

Converter [for carbon dioxide]. E. L. Ragonnet, Assr. to Pure Carbonic Co. of America (U.S.P. 2,026,799, 7.1.36. Appl., 26.2.35).—A closure for a pressure vessel in which solid CO_2 may be converted into liquid or gas is described. B. M. V.

Production of carbon disulphide. M. J. Leahy (U.S.P. 2,026,840, 7.1.36. Appl., 20.3.34).—Air is displaced by liquid CS_2 from a mixture of finely-divided C and S, and the whole is heated in absence of O_2, the vapours being condensed. B. M. V.

Recovery of sulphur dioxide in a highly concentrated form from mixed gas. F. E. Lee, R. Lepsoe, and F. H. Chapman, Assrs. to Consolidated Mining & Smelting Co. of Canada, Ltd. (U.S.P. 2,021,558, 19.11.35. Appl., 10.3.33).—The gas, containing $\nless$0·5% of SO_2, is scrubbed first with a solution containing NH_4HSO_3 900 and $(NH_4)_2SO_3$ 60, then with one containing NH_4HSO_3 400 and $(NH_4)_2SO_3$

60 g. per litre. Pure SO_2 is liberated by withdrawing continuously a portion of the liquor, and treating it with H_2SO_4; NH_3 gas is then passed into the solution, and after removal of $(NH_4)_2SO_4$ the residual aq. NH_3 is returned to the system. L. C. M.

Removal of catalysis inhibitors from aqueous solutions. H. F. JOHNSTONE, Assr. to UNIV. ILLINOIS (U.S.P. 2,027,982, 14.1.36. Appl., 18.8.33). —In, *e.g.*, the use of Fe or Mn sulphate solutions for the oxidation of SO_2 scrubbed from gases, phenolic compounds are removed by simultaneous aëration and d.-c. electrolysis at a min. temp. of 50°, the anodic c.d. and liquid flow being regulated so as just to oxidise them and yet not ppt. peroxides of the catalyst. B. M. V.

Charcoal method of desulphuration of gases. V. T. RUFF (J. Chem. Ind. Russ., 1936, **13**, 791—793). —Active C quantitatively removes S compounds from N_2–H_2 mixtures, the max. [S] in the saturated C being 10% at 80 atm. and 3% at 1 atm. R. T.

Extraction of iodine [from brine]. L. C. CHAMBERLAIN and G. W. HOOKER, Assrs. to DOW CHEM. Co. (U.S.P. 2,028,099, 14.1.36. Appl., 29.12.32).—Natural brine or mother-liquor therefrom is treated with Cl_2 to liberate I, which is blown out with air and adsorbed in active C at > the dew point. The C is extracted with hot alkali (hydroxide) solution, preferably countercurrent in several stages. B. M. V.

Traping device [for liquid air].—See I. **NH_3 and H_2S from gases.**—See II. **Electrolysing H_2O.**—See XI. **ZnS pigment. Lithopone.**—See XIII. **F compounds containing rubber.**—See XIV. **Meat-curing salt.**—See XIX.

VIII.—GLASS; CERAMICS.

Draught control as a means of fuel conservation in kiln firing. H. R. STRAIGHT (J. Amer. Ceram. Soc., 1936, **19**, 318—321).—The correct control of preheated secondary air by means of a draught recorder is discussed. J. A. S.

Electrical conductivity of molten glass at 600—1400°. K. S. ERSTROPIEV (J. Phys. Chem. U.S.S.R., 1935, **6**, 454—468).—The exponential law for the temp. dependence of κ is distorted at 600—1100° by mol. association. The η–κ relationship is $\log \eta = m - n \log \kappa$, where m and n are consts. CH. ABS. (*e*)

Dielectric losses in glasses. N. P. BOGORODITSKI and V. N. MALISCHEV (J. Tech. Phys. U.S.S.R., 1935, **5**, 612—619).—Glasses of B_2O_3 and Na, Ca, Pb, and Ba oxides were studied. Addition of alkali-metal oxides to silicate glasses causes an increase in the angle of dielectric loss with temp. CH. ABS. (*e*)

Solubility characteristics of glasses basically different in composition. W. C. TAYLOR and R. D. SMITH (J. Amer. Ceram. Soc., 1936, **19**, 331—335).—The American Ceramic Society No. 1 powder method, although satisfactory for CaO glasses, did not give correct comparison of the durability of CaO, PbO, and B_2O_3–SiO_2 types of glass. J. A. S.

Strength and physical properties of fine glass fibres and yarns. G. SLAYTER (J. Amer. Ceram. Soc., 1936, **19**, 335—337).—The strength of a fibre rises rapidly as the diam. $<2 \times 10^{-4}$ in., and a val. of $1{\cdot}5 \times 10^6$ lb./sq. in. was recorded for a diam. of 5×10^{-5} in. Factors affecting fibre strength are discussed. J. A. S.

Glass wool. BÜRGEL (Chem.-Ztg., 1936, **60**, 961—964).—A description of manufacture and applications.

Early Chinese glass from pre-Han to T'ang times. C. G. SELIGMAN, P. D. RITCHIE, and H. C. BECK (Nature, 1936, **138**, 721; cf. B., 1934, 757).—Spectroscopic analysis of 32 specimens shows that in passing from pre-Han to T'ang times Chinese glass tends to change from the unique PbO–BaO–SiO_2 type to a PbO–Na_2O–CaO–SiO_2 type and to the more common Na_2O–CaO–SiO_2 type. L. S. T.

Delayed ground-coat blistering. G. H. SPENCER-STRONG and J. J. THEODORE (J. Amer. Ceram. Soc., 1936, **19**, 328—330).—Serious blistering after the second cover coat had been applied was traced to plates blasted with steel grit containing dust, plates pickled in an acid containing particles of asphaltic lining compound, free rosin in the cleaner, and the use of hard H_2O. "Cu flash" accentuated the defects. J. A. S.

Mineral constitution of various ceramic clays. R. E. GRIM and R. H. BRAY (J. Amer. Ceram. Soc., 1936, **19**, 307—315).—The particles $<1\,\mu$ were separated (supercentrifuge) into three fractions which were examined by chemical, optical, and *X*-ray methods. In all the clays examined (with the exception of a diaspore clay) the chief constituents were kaolinite (I), beidellite (II), montmorillonite (III), and a sericite-like mica (IV), with small amounts of quartz, limonite, diasporite, TiO_2, etc. (I) + (IV) and (II) + (III) occur chiefly in the coarsest and finest fractions, respectively. The base-exchange capacity of a constituent increases with decrease in particle size, being greatest in (II) and (III). (II)-clays have a high bonding strength and drying-shrinkage, and owing to base exchange tend to be red-firing and not refractory. (III)-clays (particularly bentonites) have the same properties to a still greater degree and are usually fuller's earths. The kaolinites have the opposite properties. Ball clays are kaolinitic and owe their plasticity to fine particle size and the presence of org. matter together with some (II). Extensive data are recorded. J. A. S.

Investigation of acid-proof natural rocks, ceramic ware, and masses for chemical apparatus. L. N. MURAVLEV (Trans. VI Mendeleev Congr., 1932, **2**, i, 313—314).—The loss in wt. is determined on refluxing for 1 hr. with H_2SO_4 or with 2, 20, or 50% HNO_3. CH. ABS. (*e*)

Manufacture of ceramic decalcomania. G. H. STAPLEFORD (Bull. Amer. Ceram. Soc., 1936, **15**, 383—391).—The process of making ceramic decalcomania (transfers for decorating ware, requiring high temp. to mature the colouring and to render it permanent) is described. Lithographic printing (using stone) is employed, and details of the process, which differs from the usual commercial method in the art work, paper, colour, printing vehicles, and sequence of printing the colours, are given. When printing large sheets a transfer process is used to duplicate designs; the process, materials, and tools employed are described. A. L. R.

Instructions for printing ceramic decalcomania. G. M. Petersen (Bull. Amer. Ceram. Soc., 1936, **15**, 392—396; cf. preceding abstract).—The routine of the printing is outlined and practical details are given. A. L. R.

Heat and ceramics. P. Bremond (Chaleur et Ind., 1936, **17**, 81—88).—Physico-chemical phenomena occurring during the process of firing in the manufacture of refractories are discussed. R. B. C.

Mullite development in super-duty fireclay brick. F. A. Harvey and R. E. Birch (J. Amer. Ceram. Soc., 1936, **19**, 322—327).—*X*-Ray examination of samples of a brick (SiO_2 51·8, Al_2O_3 + other oxides 45·3%) fired at cones 11, 13, and 18 showed that each contained approx. 50% of $3Al_2O_3,2SiO_2$ (I). Petrographic examination showed a distinct (I) development in the cone 18 specimen, but none in the others. The higher firing temp. appears to increase the size of the crystals, but not their amount. J. A. S.

Young's modulus of elasticity, strength, and extensibility of refractories in tension. R. A. Heindl and L. E. Mong (J. Res. Nat. Bur. Stand., 1936, **17**, 463—482).—The modulus, tensile strength, and extensibility have been determined for 22 types of firebrick, comparison being made between the properties in the directions parallel to the 9- and 4½-in. dimensions. J. W. S.

Furnace linings.—See X.

See also A., Dec., 1445, **Fluorescence of rare earths in glasses.** 1464, **System K_2O–PbO–SiO_2.** 1480, **Refractometry and temp. coeffs. for medium flint glass.**

Patents.

[Glass-tank] furnace. C. A. Bowen, Assr. to Corning Glass Works (U.S.P. 2,029,052, 28.1.36. Appl., 10.11.33).—The steel framework is described. The roof and sidewalls above glass level are supported by the steelwork independently of each other and of the lower parts; the latter are composed of blocks adjustably pushed into position by screw jacks. B. M. V.

Lehr. L. J. Houze, sen., Assr. to L. J. Houze Convex Glass Co. (U.S.P. 2,026,737, 7.1.36. Appl., 2.6.34).—The goods are surrounded by muffle walls, the bottom being of high heat-permeability and the sides and roof of low permeability; the flame impinges on the bottom and the gases pass up the sides and over the roof. The construction of the bottom may be a series of alternately arranged, horizontal metallic tubes opening at one end (where there are fuel burners) to atm. and at the other end to flues in the sides. B. M. V.

Vertical glass-annealing lehr. P. L. Geer, Assr. to Amco, Inc. (U.S.P. 2,026,781, 7.1.36. Appl., 1.3.32).—The apparatus receives sheets in a horizontal position, turns them to the vertical, lowers them through a shaft to one zone of which heat is applied, and turns them again horizontal at the bottom. The lehr is arranged abreast of a vertical drawing and rolling apparatus. B. M. V.

Apparatus for tempering glass. F. A. Clemo. From F. C. Gordon (B.P. 455,300, 17.4.35).—The glass is held by lazy tongs or boiler cramps having pointed grips which are prevented from entering too far into the glass, when it softens, by suitable stops on the tongs or relaxation of stress in the cramps. B. M. V.

Fusing [and drawing] of vitreous material. P. K. Devers, Assr. to Gen. Electric Co. (U.S.P. 2,027,155, 7.1.36. Appl., 30.10.34).—"Fused" SiO_2 or other viscous material is drawn through a die which is advanced downwards into the plastic mass as drawing proceeds. B. M. V.

Manufacture of multi-cellular glass. Soc. Anon. des Manuf. des Glaces et Prod. Chim. de St.-Gobain, Chauny & Cirey (B.P. 455,594, 4.6.36. Fr., 5.6.35).—Ordinary CaO–Na_2O glass is melted with exclusion of the usual oxidising agents (Na_2SO_4, $NaNO_3$) but with a higher metallic oxide (TiO_2, CrO_3, or MnO_2) and Al powder. On holding at about the softening point, either by cooling in the mould or reheating the solid, further gas is evolved, giving the glass a cellular structure (apparent *d* 1·30 without vac.; as low as 0·50 with vac.). B. M. V.

Laminated glass. G. B. Watkins, Assr. to Libbey–Owens–Ford Glass Co. (U.S.P. 2,026,717, 7.1.36. Appl., 30.4.28. Renewed 6.11.33).—At least two thermo-plasticisers (*e.g.*, Bu_2 and diamyl phthalates) are combined for use as adhesive, which may be applied a considerable time before pressing. B. M. V.

Manufacture of laminated glass. J. G. McNally, Assr. to Eastman Kodak Co. (U.S.P. 2,029,931, 4.2.36. Appl., 29.7.32).—The adhesive applied to the safety layer is a stable cellulose nitrate (10·8—12·5% N; $\eta \not> 50$ sec.; ash $\not> 0·4\%$) and that to the glass is triacetin; the 7 layers (in all) are united by heat and pressure. B. M. V.

[Adhesive for] laminated glass. J. G. McNally and S. S. Sweet, Assrs. to Eastman Kodak Co. (U.S.P. 2,026,987, 7.1.36. Appl., 11.3.33).—The binding layer consists of cellulose acetate which has been coated with a solution of a mixed ester of a carbohydrate and dicarboxylic acids containing at least 1 free CO_2H, *e.g.*, acid cellulose acetate-succinate. S. M.

Manufacture of compound glass. Röhm & Haas A.-G. (B.P. 455,410, 23.12.35. Ger., 29.12.34).—The safety layer is a mixed polymeride, or mixture of polymerides, of vinyl acetate and Bu and Et and/or Me acrylate. Wide proportions are claimed. B. M. V.

Production of non-shatterable glass. W. Pegler, Assr. to J. L. Pegler (U.S.P. 2,030,607, 11.2.36. Appl., 28.8.35. Austral., 24.4.34).—Hot aq. gelatin with minor proportions of glycerin and formalin is allowed to evaporate in a pool on glass, the pair is dipped in a bath of formalin, dried, and dipped, film side up, in Canada balsam, and dried again. When a second sheet of glass is added it is applied to the wet Canada balsam and the whole dipped in a solvent "to affect the resin"; it is then heated and pressed. B. M. V.

Homogenising of clay. M. F. H. Gouverneur, Assr. to Locke Insulator Corp. (U.S.P. 2,026,782, 7.1.36. Appl., 3.4.31).—Filter-pressed slip is extruded and simultaneously vibrated in the direction of extrusion. B. M. V.

Manufacture [casting] of earthenware. W. B. Flower (U.S.P. 2,026,624, 7.1.36. Appl., 16.10.34).—Slip is centrifugally cast in a porous mould with axial feed, the drained clay being allowed to build up inwards until the central space is eliminated. B. M. V.

Drying of green ceramic wares or like goods. M. Kotterba (B.P. 455,041, 7.3.35).—Hot fresh air and moist returned air are carried in adjacent conduits under the kiln, are mixed just before admission to points distributed over the whole of the floor, and exhausted through similarly distributed ports in the roof. B. M. V.

Manufacture of ceramic object [of alumina]. J. L. Gallup, Assr. to Radio Corp. of America (U.S.P. 2,030,200, 11.2.36. Appl., 30.3.34).—Tubes resistant up to 1600° are formed of particles of pure Al_2O_3 (70—90% of 75—100 μ size, the remainder being 2—8 μ) cast from slip of min. H_2O content and fired at 1450—1600°. B. M. V.

[Lining for] rotary cement and lime kilns. Carborundum Co. (B.P. 454,946, 9.4.35. U.S., 17.4.34).—A lining composed of cast material having scratch hardness $\nless 8$, m.p. $>1800°$, and composed mainly of Al_2O_3 is claimed. B. M. V.

Brick roofs for furnaces and the like. A. C. Combe and W. H. Johnson (B.P. 455,040, 6.3.35).—The construction of a flat roof, especially of SiO_2, is described. B. M. V.

Bond for silica bricks and the like. Pickford, Holland & Co., Ltd., and R. J. Pickford (B.P. 455,526, 15.8.35).—The bond comprises 2% of a Mg silicate as is found in olivine, *e.g.*, SiO_2 41, MgO 50, Fe oxides 6, and Al_2O_3, CaO, alkalis, etc. 3%. B. M. V.

Refractory. W. M. Farnsworth, Assr. to Republic Steel Corp. (U.S.P. 2,033,886, 10.3.36. Appl., 3.10.33).—The product consists of olivine, chrome ore, and magnesite in varying proportions. D. M. M.

(A) Manufacture of chromite material. (B) Chromite refractory materials. G. E. Seil, Assr. to E. J. Lavino & Co. (U.S.P. 2,028,017—8, 14.1.36. Appl., [A] 27.5.31, [B] 28.10.32).—(A) Chromite is recryst. and the gangue disseminated over the crystals by heating at >1700° in a rotary kiln or other agitator. Cooling may be effected by quenching, but it is optional. (B) The process is applied to chromite spinel and Mg silicate, the latter being converted into a thin film of forsterite. (Cf. B.P. 409,130; B., 1934, 579.) B. M. V.

Production of crystalline [refractory] compositions containing chromium oxide. Carborundum Co. (B.P. 448,941—2, 17.12.34. U.S., [A] 18.12.33, [B] 20.12.33).—Chrome-spinel refractory containing (approx.) Al_2O_3 80, Cr_2O_3 10, FeO 6%, and the remainder SiO_2, CaO, and MgO is produced by fusing a mixture of coarsely-ground chrome ore 25 and 95% Al_2O_3 75 pts., or by fusing bauxite under reducing conditions and adding the ore; the melt is poured into moulds and the pieces are annealed. Alternatively, the solid may be ground and bonded refractory articles made from the grit. L. C. M.

Manufacture of basic refractory material. R. L. Lloyd and R. W. Hyde, Assrs. to Dwight & Lloyd Metallurg. Co. (U.S.P. 2,029,627, 4.2.36. Appl., 19.7.32).—Comminuted magnesite or dolomite is mixed with fine flux and bonded into lumps with Mg oxychloride cement. The lumps are comminuted into sizes > the original, then mixed with solid fuel, and burned in a forced draught (sintered) to form clinker. After addition of flux the mixture may contain SiO_2 <6%, Fe + Al 6—15%. B. M. V.

(A) Manufacture of abrasive sheet. (B) Method of coating [a carrier with abrasive]. (C) Manufacture of abrasive articles. (D) Abrasive material. (A) O. S. Buckner, (B—D) E. C. Schacht, Assrs. to Behr-Manning Corp. (U.S.P. 2,027,087 and 2,027,307—9, 7.1.36. Appl., [A] 3.10.28, [B] 30.7.28, [C] 20.11.31, [D] 24.3.32. Renewed [C] 7.1.35).—(A) Magnetically coated, elongated grains of abrasive are caused to stand up from the sheet by placing the adhesive sheet in a magnetic field during the sprinkling process. (B—D) Orientation of particles is controlled by an electrostatic field; in (D) the long axes are perpendicular to the surface. (Cf. B.P. 407,978; B., 1934, 500.) B. M. V.

Manufacture of refractory articles. Carborundum Co. (B.P. 454,947, 9.4.35. U.S., 17.4.34).—See U.S.P. 2,017,056; B., 1936, 1095.

Joints between materials.—See I. **Glass articles [for lamps]. Composite glass containers.**—See XI.

IX.—BUILDING MATERIALS.

Trends in the production of special Portland cements. Hess (Zement, 1936, 25, 757—760).—Cements offered for special purposes may all be grouped as those of high $3CaO,SiO_2$ content (high early strengths) and those of high $2CaO,SiO_2$ content (high stability and low heat evolution on setting). G. H. C.

Structural characteristics of some constituents of Portland cement clinker. H. Insley (J. Res. Nat. Bur. Stand., 1936, **17**, 353—361).—The metallographic method of microscopical examination, using polished and etched specimens, differentiates four major constituents in the clinker, viz., impure $3CaO,SiO_2$, $2CaO,SiO_2$ (I), $4CaO,Al_2O_3,Fe_2O_3$, and a glass. The differences in optical properties of specimens of (I) may be due to crystal-twinning and not to the existence of the α-form at room temp. J. W. S.

Hot cement. L. Krüger (Zement, 1936, **25**, 741—743).—Portland cement used hot (about 70°) straight from a silo gave strengths and setting times differing little from, and in some instances superior to, those obtained after cooling the cement to 20°. G. H. C.

Action of common salt on cement. W. Wittekindt (Tonind.-Ztg., 1936, **60**, 797—798; Road Abs., 1936, **3**, No. 538).—Dil. solutions of NaCl act similarly to H_2O in leaching CaO from Portland cement. The action is more vigorous with high [NaCl] than with H_2O, but the reaction rate decreases with time. A portion of the NaCl is taken up in the cement. T. W. P.

Corrections to be applied in heat of hydration tests [on cement mortars]. C. de Langavant (Cement, 1936, **9**, 236—247).—The Thermos-flask method for the determination of the heat of hydration is inferior in some respects to the adiabatic method, but affords conditions sufficiently similar to those of mass concrete for most purposes. A method and theory are given for correcting for heat losses, when using the flask method. T. W. P.

Light-weight concrete aggregates. F. M. Lea (Dept. Sci. Ind. Res., Building Res., 1936, Bull. 15, 13 pp.).—The uses and physical properties of light-weight concretes, and the sources and production of the available light-weight aggregates, are described. Precautions necessary for their use for screeding and thicknessing work, for precast concrete partition slabs, for the encasement of structural steel, and for external walls are given. T. W. P.

Introduction of admixtures during mixing of concrete. L. Krüger (Zement, 1936, **25**, 760—762).—In tests with Portland cement–trass mixtures, no improvement was noted in the strength or water-tightness of the concrete if the cement and trass were premixed instead of being mixed at the same time as with the aggregate. G. H. C.

Prediction of temperature rise in concrete dams. R. Sandri (Zement, 1936, **25**, 743—747). G. H. C.

Durability of concrete structures in soil. O. Haehnel (Vedag-Buch, 1936, 47—52).—The causes of disintegration and methods for its prevention are discussed. R. B. C.

Protection of concrete structures from corrosive water and soil. H. W. Gonell (Vedag-Buch, 1936, 39—46).—Methods suitable for protecting concrete from corrosive substances, *e.g.*, sulphates, present in ground- and surface-H_2O are discussed. R. B. C.

Age and chemical composition of white fir wood. I. H. Isenberg (J. Amer. Chem. Soc., 1936, **58**, 2231—2233).—The amounts of ash, extractives (cold and hot H_2O, Et_2O, $EtOH-C_6H_6$, 1% NaOH, AcOH), OMe, N, pentosan, lignin, cellulose (I), and pentosan in (I) in the whole wood (160 years old) and five zones (varying ages) are determined. Calc. vals. (from data for zones) for the composition of the sap- and heart-wood agree generally with the data (lit.) for American conifers. H. B.

Decomposition of timber under industrial conditions. IX. Laundry washing machines. E. A. Rudge (J.S.C.I., 1936, **55**, 319—320T).—Sycamore baffles from a rotary washing machine show a considerable lignin depletion, and an inappreciable alteration in cellulose content. The wood was highly impregnated with Ca soaps, which did not influence the decay of the tissue. The use of Na hexametaphosphate as solvent for Ca soaps in the analysis of similar specimens is suggested. E. A. R.

Minimising wood shrinkage and swelling. Treatment with synthetic resin-forming materials. A. J. Stamm and R. M. Seborg (Ind. Eng. Chem., 1936, **28**, 1164—1169).—Shrinkage and swelling are both minimised by treating the wood with resin-forming solutions in such a way that synthetic resins are formed within the fine capillary structure of the wood. Phenol–CH_2O resin solutions appear to be the most efficient, and high anti-shrinkage efficiencies have been obtained when the wood has taken up <50 wt.-% of resin. The efficiency is limited only by the vol. contraction of the resin, and is increased by repeated treatments. It is suggested that the unpolymerised resin-forming mols. combine with the OH groups of the cellulose. Prepolymerisation of the resin-forming mix decreases the efficiency. No loss in efficiency results on cutting the wood. The hardness and strength across the grain of the wood are increased by the treatment. The treated wood can be glued, or glued wood may be treated. L. A. O'N.

Fireproofing of wood. E. Azzarello (Atti V Congr. naz. Chim., 1936, 616—657).—A review and discussion.

Chemical basis of the mode of action of fireproofing materials [for wood]. R. Lepsius (J. pr. Chem., 1936, [ii], **147**, 64—74).—The effects of H_3BO_3 and of salts in protecting wood against ignition include raising the thermal conductivity and sp. heat of the wood. They also evolve H_2O, CO_2, or other non-inflammable gases on heating, which prevent the ignition of the gases evolved by the heating of the wood, and also sinter or melt to form a protective layer over the surface. The effects produced by a no. of materials are indicated. J. W. S.

Binding power and viscosity of road tar. K. Raschig (Asphalt u. Teer, 1936, **36**, 247—251; Road Abs., 1936, **3**, No. 522).—Deficiency in " middle oil " content produces poor binding power unless the initial η is $>$ normal. A case of failure in practice due to this cause is described and details of two tests to study the phenomena are given. T. W. P.

Damage to zinc guttering and plates by bituminous roofing felt. E. Deiss (Vedag-Buch, 1936, 123—135).—Several examples of damage are described. In general, corrosion is most extensive on parts of buildings receiving the most sunlight. It is probable that the combined action of sunlight, H_2O, and atm. CO_2 on bitumen results in the formation of an acidic decomp. product. R. B. C.

Bituminous products.—See II. **Gypsum from phosphorite. Cement from nepheline.**—See VII. **Nitre efflorescences on paint films.**—See XIII.

See also A., Dec., 1465, **System alkali oxide–CaO–Al_2O_3–SiO_2–CO_2. Ca aluminate hydrates.**

Patents.

Cement. A. Hermann (U.S.P. 2,030,002, 4.2.36. Appl., 18.12.34).—An adhesive for general purposes is composed of (*A*) a mixed powder of MgO, $BaSO_4$, and chalk and (*B*) a mixed aq. solution of $MgCl_2$, H_2SO_4, and HCl, in given proportions. *A* and *B* are then mixed as required. B. M. V.

Concrete and hydraulic cement. Dewey & Almy, Ltd. (B.P. 454,944, 9.4.35. U.S., 5.12.34).—Concrete may be prepared with increased strength and/or reduced proportion of cement by addition of a H_2O-sol. alkylolamine or salt or derivative thereof, *e.g.*, $NH(C_2H_4{\cdot}OH)_2$, $N(C_2H_4{\cdot}OH)_3$, $N(CMe_2{\cdot}OH)_3$, or salts thereof. B. M. V.

Manufacture of a hard-surfaced cement. A. L. Smyly (U.S.P. 2,028,956, 28.1.36. Appl., 12.11.32).—Ground Fe for incorporation in Portland cement is rendered non-gas-forming by treatment with alkaline solution which is allowed to dry on the particles. B. M. V.

Manufacture of light, porous, moulded articles from cellulosic material and cement. A. Buys (B.P. 455,571, 8.11.35).—The cellulose is treated with $FeSO_4$ solution to moisten without soaking, equiv. $Ca(OH)_2$ added later to ppt. $Fe(OH)_2$ in the superficial pores, the cement then added, and the final mixture moulded. All three stages of mixing are carried out successively in the same machine. B. M. V.

Mortar for plastering. Henkel & Co. G.m.b.H. (B.P. 455,575, 7.1.35. Ger., 14.9.35).—Trass, CaO, and solid unhydrated water-glass are ground together, and sand is added either during the grinding or with the H_2O just before use. B. M. V.

Preservation of cement, mortar, and concrete. François Cementation Co., Ltd. (B.P. 456,246, 22.2.36. Fr., 5.4.35).—The process consists in injecting into hardened concrete a solution of a salt (*e.g.*, carbonate, phosphate, alkaline silicate) which will react with the free $Ca(OH)_2$ of the concrete, to form an insol. salt. Salts may be used for injecting which produce a ppt. of mol. vol. > that of the $Ca(OH)_2$, in order to fill up existing pores. The process gives protection against the action of pure and saline waters on the hardened concrete. T. W. P.

Manufacture of artificial stone. C. and N. Shaw (B.P. 454,719, 11.11.35).—A hydraulic cement is composed of partly burnt dolomite and a sol. fluosilicate (10% solution used as $\frac{1}{3}$ of the mixing H_2O); addition of fillers of silicious material is optional. B. M. V.

Manufacture of artificial stone. N. V. S. Knibbs and A. P. Pehrson (B.P. 456,780, 13.4.35. Cf. B.P. 455,039; B., 1936, 1208).—A method for increasing the ultimate hardness of steam-treated mixtures of CaO and argillaceous materials by adding a compound of an oxy-acid of S (*e.g.*, $CaSO_4$) is claimed. T. W. P.

Manufacture of highly porous silica–lime stones. J. Albert (B.P. 456,562, 17.3.36).—Slaked CaO and kieselguhr are mixed with a large quantity of H_2O (50—90% of the wet mix) and segregation is prevented by addition of a small fraction of sol. SiO_2 (*e.g.*, water-glass), or of NaOH to dissolve part of the kieselguhr. Thickening agents (*e.g.*, dextrin) and fibrous fillers may also be added. The mix is hardened by steam under pressure. T. W. P.

Manufacture of decoratively coloured [plastic magnesia] articles. A. E. Cleghorn, Assr. to Travatex Products Corp. (U.S.P. 2,027,021, 7.1.36. Appl., 4.2.32).—The articles are cast of a plastic Mg oxychloride composition containing a metal salt (*e.g.*, of Fe or Cu) which will impart the desired colour. B. M. V.

Preserving, waterproofing, and fireproofing stone, brick, wood, and like work. G. S. May (B.P. 455,533, 8.11.35).—The following composition is applied as paint: water-glass in warmed milk, camphor dissolved in a cellulose ester, NH_3, cold milk, dried milk, and creamed latex. B. M. V.

[Sound-]insulating material. N. M. Elias (U.S.P. 2,029,311, 4.2.36. Appl., 26.9.30).—Cellular material of apparent $d < 1$ is combined with a metal, *e.g.*, cast Al, serving as a binder and covering. B. M. V.

Manufacture of road-making material. W. W. Groves. From Wigankow & Sachse, Neuzeitlicher Strassenbau G.m.b.H. (B.P. 455,247, 9.8.35).—Granular material (stone) of varying sizes is coated while hot with bitumen and then conveyed through a drum in which it is cooled by air moving in the direction of motion of the stone in the first section of the drum and in the reverse direction in the second section. The air serves also as a carrier for finely-divided dusty material which adheres to the bitumen and prevents agglomeration of the treated stone during transport and storage. A. B. M.

(A) Road paving. (B) Building of roads. H. Plauson, Assr. to T. R. C. Corp. (U.S.P. 2,026,988—9, 7.1.36. Appl., [A] 1.11.30, [B] 19.1.34. Ger., [A] 5.11.29, [B] 15.8.30).—(A, B) Rolled ballast is bound by powdered CaO, cement, or gypsum, together with bitumen ($\not> 7\%$ of the powder). In (A) the mortar is mixed with the ballast before rolling, and in (B) applied after rolling. B. M. V.

Bituminous macadam surfaces for roads and the like. A. E. Lissaman (B.P. 455,592, 11.5.36).—1 pt. of unrefined gas tar, dehydrated at 121°, is used as flux for 2 pts. of bitumen of known specification. B. M. V.

Bituminous emulsion. J. B. Small, Assr. to Glidden Co. (U.S.P. 2,027,404, 14.1.36. Appl., 26.5.33).—A suitable emulsifying agent is a rosin soap heated at 370—425° for 2 hr. to reduce the sap. val. to $\not> 130$. Aq. emulsions prepared therewith may be frozen without breaking. B. M. V.

Conversion of bituminous substances or of bitumen and filler mixtures into protective coatings by spraying. G. Colmant (B.P. 455,408, 16.12.35. Ger., 14.12.34).—Bitumen of high m.p., with or without fillers, is sprayed on to buildings etc. by first placing the hot bitumen under pressure (by means of a pump or of gas free from free O_2, *e.g.*, N_2 or steam) and then conveying it to a spraying device (nozzle described) by channels which avoid sudden changes in cross-section or bends. D. M. M.

Production of paving mixture. C. N. Forrest, Assr. to Barber Asphalt Co. (U.S.P. 2,025,945, 31.12.35. Appl., 11.7.32).—An aggregate, preferably a natural bituminous rock, is mixed with an aq. emulsion of a soft bitumen until the particles of the aggregate are coated therewith, and the coated aggregate is then mixed with powdered hard bitumen. A. B. M.

Production of paving composition. J. H. Conzelman, Assr. to Alabama Asphaltic Limestone Co. (U.S.P. 2,026,614, 7.1.36. Appl., 8.1.34).—A cold-laid pavement comprises crushed rock asphalt, a solvent only sufficient ($<0{\cdot}8\%$ of the asphalt) to soften and facilitate fluxing with H_2O and external emulsion of asphalt. The solvent may be added after the last-named, if desired. B. M. V.

Preservation of timber. H. D. Elkington. From Rütgerswerke A.-G. (B.P. 456,700, 7.1.36).—Plugs, dowels, etc. made of (hard) wood are introduced into timber. The plugs etc. are first impregnated with sufficient H_2O-sol. preservative to treat the surrounding timber. The use of 15—50% aq. KF solution for this purpose is claimed. T. W. P.

Building blocks, bricks, and the like. A. Knapen (B.P. 454,949, 10.4.35).

Mixing machines. Forming materials into nodules etc.—See I. **Roofing felt.**—See V. **Caustic CaO–gypsum product.**—See VII. **Cement-kiln lining. Basic refractory.**—See VIII. **Floor coverings. Wood filler.**—See XIII.

X.—METALS; METALLURGY, INCLUDING ELECTROMETALLURGY.

Influence of coke quality on blast-furnace operations. W. J. Brooke, H. R. B. Walshaw, and A. W. Lee (Iron & Steel Inst., Sept., 1936, Advance copy, 25 pp.).—In continuation of work done in collaboration with the Midland Coke Research Committee, further investigations have been made into the effect of blending finely-ground coke breeze with coking slacks, sampling of coke, grading of coking slacks, effect of belt transport on breakage of coke, and the improvement in coke resulting from fine grinding of the coking slacks. An attempt is made finally to correlate blast-furnace performance with coke quality. E. H. B.

Constitution of blast-furnace slags in relation to the manufacture of pig iron. T. P. Colclough (Iron & Steel Inst., Sept., 1936, Advance copy, 27 pp.).—No matter what quality of ore and coke is to be smelted, the burden should be arranged so that the slag formed approaches as nearly as possible to that of min. m.p. and η for the Al_2O_3 content; for that purpose the CaO : SiO_2 ratio in the burden should be adjusted according to the Al_2O_3 content of the slag. In this way difficulties in smelting certain British ores containing a high Al_2O_3 : SiO_2 ratio are overcome. E. H. B.

Scientific measurement in the operation of [iron] blast furnaces. Anon. (Stahl u. Eisen, 1936, 56, 809—815).—Modern apparatus for the measurement of gas temp., pressures, and compositions is described and examples are given of the val. of a knowledge of these factors in the correct operation of the furnace. A. R. P.

Firing of open-hearth furnaces in German steel works. F. Wesemann (Iron and Steel Inst., Sept., 1936, Advance copy, 24 pp.).—In 50 open-hearth steel works the usage of fuels is as follows: 10 works use pit-coal producer gas, 8 use brown-coal briquette gas, 7 use mixed blast-furnace and coke-oven gas, 10 use "dreigas" (blast-furnace + coke-oven + producer gas), and 15 use pure coke-oven gas. These fuels are all adequate to meet temp. requirements, but in order to secure adequate flame luminosity for high output and good boiling special preheating conditions or even the artificial addition of "carriers" of luminosity may become necessary. The design of regenerators, ports, and hearths for the various fuels is considered. E. H. B.

Insulation of open-hearth [steel] furnaces. Survey of results obtained and of materials used. E. F. Cone (Met. & Alloys, 1936, 7, 109—118).—Replies to a questionnaire sent to large producers of steel ingots and castings are analysed. E. H. B.

Lining of basic and acid open-hearth furnaces. I. Basic. H. J. Meyer. **II. Acid.** H. Abker (Stahl u. Eisen, 1936, 56, 815—817, 818).—I. Basic linings should be built upon a bed of magnesite brick, using coarsely-ground, burnt magnesite (10 mm.) mixed with 5% of finely-powdered basic slag and fritting each layer before the next is laid down; the lower layers are preferably made of material which has been burned in a shaft furnace, and the upper layers of material burned in a rotary kiln. Instead of fritting, the hearth may be stamped in position, using a mixture of coarse dolomite with 8—10% of tar. Finely-ground mixtures of CaO and SiO_2 may be used as binders instead of basic slag.

II. In building up a basic lining each layer must be heated until the surface is thoroughly glazed before the next is applied. The sand used should contain $>98\%$ of SiO_2 and the min. of clay. A. R. P.

Treatment of domestic [low-grade] chrome ores. J. Koster (U.S. Bur. Mines, Oct., 1936, Rept. Invest. No. 3322, 3—27).—Domestic chromite can be reduced by anthracite to Fe–Cr containing 8—10% C with 80% recovery and without re-treatment of the slag. The Fe–Cr–Cu–S system has been investigated. In smelting with sulphides (FeS and/or Cu_2S) the amount of Cr recovered in the matte increases with the sulphide-S in the charge. The Cr/Fe ratio in the matte decreases with the amount of Cr recovered therein, and is more or less independent of the Cu content. Ca in large excess will remove some of the C from high-C Fe–Cr, as will also Si, but the resulting alloy is then high in Si. Reduction of chromite by Si in a small arc furnace gave an Fe–Cr containing 3·1% C, but in larger-scale operations the C content should be further reduced. J. W. C.

Magnetic concentration of ores. R. S. DEAN and C. W. DAVIS (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 509—537).—A discussion. Results are given for the treatment of Fe and Fe-Cr ores, a ferberite ore, and a Co ore. CH. ABS. (*e*)

Volatilisation of barite sulphur during the agglomeration of iron ores. M. ORTIN (Novo. Tech. Metallurg., 1935, No. 6, 8).—On agglomeration in presence of C and Fe at $<1512°$, 75—80% of the S was volatilised from the barite (I) when the (I) content of the Fe ores was 1—3%. CH. ABS. (*e*)

Use of oxygen in ferrous metallurgy. M. A. PAVLOV (Metallurg, 1935, **10**, No. 2, 7—16).—A blast containing 40—50% of O_2 can be used in producing spiegel and Fe–Mn in blast furnaces. For ordinary pig Fe its use is inadvisable as it decreases the vol. of furnace gases and thereby prevents even distribution of heat. CH. ABS. (*e*)

Reduction of oxides of iron by hydrogen and carbon monoxide in a high-frequency electromagnetic field. V. A. PLOTNIKOV and V. K. RAZUMOV (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 153—158).—Fe_2O_3 is reduced to Fe and Fe_3O_4 by H_2 or H_2–CO at room temp. in a high-frequency electromagnetic field, the temp. rising to 60—80° during the reaction. CO alone does not react with Fe_2O_3 under these conditions. R. T.

Reaction of alumina with iron sulphide in presence of carbon. A. S. MIKULINSKI and M. A. UMOVA (Metallurg, 1934, **9**, No. 10, 34—42).—The reaction $Al_2O_3 + 3FeS \rightleftarrows Al_2S_3 + 3Fe + 3CO$ proceeds to the right at $>1400°$. As a result, Al_2O_3 in blast-furnace slags should help in desulphurising the pig Fe. CH. ABS. (*e*)

Chemical equilibria in melts (matte and slag). A. N. VOLSKI and P. A. AGRATSCHEVA (Tzvet. Met., 1935, No. 3, 92—114).—The relation between the dissociation pressures of Ag_2S and FeS in molten Cu_2S and their concns. was determined. The mass-action const. for the dissociation of sulphides in melts is a function of the concn. in the melt, and decreases as the latter decreases. The relation between the dissociation pressure of FeO and its concn. in molten slags was determined. When two metal oxides in a melt have equal dissociation pressures they will be reduced simultaneously. This explains the reduction of Fe in the reduction-smelting of Cu, Pb, Ni, and Sn ores, although these metals have lower affinities for O than has Fe. CH. ABS. (*e*)

Constitution of the system $SiO_2 + FeO + Fe_2O_3 + CaO(+MgO)$. T. NÉGRESCO and W. J. COOK (Bull. Acad. Sci. Roumaine, 1936, **18**, 67—73).—Synthetic slags have been prepared by fusing SiO_2, Fe_2O_3, and CaO in air at 1650°, when MgO is taken up as an impurity (from the crucibles). Analysis reveals the presence of cristobalite, Fe_2O_3, FeO, magnetite, mono- and bi-ferrites of CaO and MgO, pyroxenes, wollastonite, diopside, Fe^{II} akermanite, fayalite, and olivines of the series shannonite + forsterite. The slags may be classified into 12 groups and are represented on a quasi-quaternary diagram. It is inferred that Fe_2O_3 exists as such in the slags from steel works, and plays the part of an acid more feeble than SiO_2. CaO displaces FeO, and hence most of the slags contain free FeO; the progressive displacement is discussed for slags rich and poor in Fe. R. S. B.

Relation between the composition of slags and their rôle in the formation of steel. T. NÉGRESCO and W. J. COOK (Bull. Acad. Sci. Roumaine, 1936, **18**, 74—78; cf. preceding abstract).—The position of the artificially prepared slags on the tetrahedral quasi-quaternary diagram corresponds with $2Fe_2O_3 + SiO_2 - 4FeO = 0$ (mols.) to within 1·19%. On putting $f = FeO$, $r = Fe_2O_3$, F = total Fe, $c = CaO + MgO$, and $s = SiO_2$, it is found that $2r + s - 4f = 0$, $10r + s - 4F = 0$, and $F + s - 5f = 0$. When $s = 0$, $Fe_2O_3 = 2FeO$, *i.e.*, on heating Fe_2O_3 at 1650° the product has the composition $Fe_2O_3,2FeO$. The practical application of the diagram containing the 12 slags is discussed with reference to the operations in steel works, viz., decarburation, reduction of slag, addition of CaO and SiO_2, removal of P and S, and the influence of Mn. R. S. B.

High-strength cast iron. J. A. RABBITT and T. FUJIWARA (Japan Nickel Inform. Bur. Tech. Inform., B., 7, 48 pp.).—Max.-strength cast Fe was produced by adding Ni to cupola metal and by an interrupted, malleabilising heat-treatment. Comprehensive data are given. CH. ABS. (*e*)

Distortion of iron and molybdenum. E. W. FELL (Nature, 1936, **138**, 760).—The cause of the distortion associated with the marked yield of Fe crystals in Fe and soft steel is discussed (cf. Edwards and Pfeil, B., 1925, 806).

Effect of phosphorus on the magnetic properties of iron. H. KAMURA (Tetsu-to-Hagane, 1935, **21**, 643—655).—Magnetic properties were determined for Fe free from C and containing 0·1—1·0% P. A small [P] improved the Fe. With $>0·5\%$ P no magnetic ageing was observed. The optimum annealing temp. were determined. CH. ABS. (*e*)

Relation between the structure of scale and the speed of oxidation of iron at high temperatures. V. I. ARCHAROV (J. Tech. Phys. U.S.S.R., 1934, **4**, 372—375).—The speed of oxidation of Fe increases discontinuously at a definite temp., which depends on the sample. At this temp. a layer of FeO appears in the scale. The mechanism of oxidation is discussed. CH. ABS. (*e*)

Coating of iron by immersion in molten aluminium. M. M. GRATZIANSKI (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 247—255).—Fe articles are immersed in 1 : 2 : 0·15 $AlCl_3$–NaCl–$CuCl_2$ at 450—500° for 1—2 min., and then in molten Al at 700—720° for 20—40 sec., when an adherent coating of Al, 0·1 mm. thick, is obtained. Sieves made of Al-plated Fe gauze are as resistant to the corrosive action of fruit juices as are Al sieves. The use of Al-plated Fe sheets in place of tinplate in the canning industry is recommended. R. T.

Mechanism of plastic deformation [of iron wires]. A. E. BRIUCHANOV (Metallurg, 1934, **9**, No. 10, 7—12).—Fe wires after drawing and etching showed similar patterns at each end, but they were turned at an angle to one another. They are caused

by formation of a fibrous structure in the centre of the wire during drawing, their turning being due to anisotropic properties of the metallic crystals.
Ch. Abs. (*e*)

Influence of cracks and scratches on corrosion of iron. G. Tammann and H. Warrentrup (Z. anorg. Chem., 1936, **229**, 188—196).—Observations of the localised corrosion of flat plates of Fe in contact with the convex surface of a watch-glass are described. They support the theory according to which cracks and scratches undergo more rapid corrosion owing to the passivation of more exposed parts by dissolved O_2. Aq. solutions of H_2SO_4, HCl, H_3PO_4, and KCl were used.
F. L. U.

Protection against corrosion of iron by brine. L. Idoux (Bull. Assoc. Chim. Sucr., 1936, **53**, 261—266).—Covering the brine in tanks with a layer of oil will afford considerable protection. An additional measure, possible only with NaCl brines, is to dissolve 1—2 kg. of Na_2SO_3 per cu.m. of brine, making sure that the final reaction is slightly alkaline.
J. H. L.

Corrosion of boilers and of high-pressure apparatus. V. V. Ipatiev, jun. (Trans. VI Mendeleev Congr. [1932], 1935, 2, i, 260—264).—A review and discussion.
Ch. Abs. (*e*)

Comparison of the corrosion-resistance of wrought irons made by different processes. O. A. Knight and J. R. Benner (Trans. Amer. Soc. Met., 1935, **23**, 693—700).—The corrosion-resistances of Roe mechanically puddled, hand-puddled, and Aston-process wrought Fe were determined over a 2-year period in dil. HCl, dil. H_2SO_4, dil. NaCl, and tap-H_2O. When mill scale was not removed hand-puddled Fe was best; otherwise Roe Fe was best.
Ch. Abs. (*e*)

Behaviour towards metals of solutions of sulphur and a range of organic sulphur compounds in saturated hydrocarbons. L. G. Gindin, I. I. Torsujev, and V. A. Kasakova (Compt. rend. Acad. Sci. U.R.S.S., 1936, **3**, 219—223; cf. B., 1936, 698).—The rôle of S compounds in the corrosion of metals by fuel oils is discussed. Solutions of S in C_6H_{14} (free from S compounds) had no action on steel and Pb during 16 months at room temp., but formed CuS on Cu.
R. C. M.

Rust prevention. E. Meier (Farben-Ztg., 1936, **41**, 1185—1186).—A general dissertation on the possibilities of replacing Pb_3O_4 in rust-preventive paints by other than Pb pigments.
S. S. W.

Production, heat-treatment, and properties of iron alloys. L. Jordan (U.S. Bur. Stand., 1936, Circ. C 409, 40 pp.).—The reduction of Fe ore, the production and properties of cast Fe, and the production and fabrication of steels are briefly described. The heat-treatment of C- and alloy-steels in relation to the effect of temp. on the rate of decomp. of austenite, below Ar3, is discussed. The equipment used in heat-treatment is also considered.
E. H. B.

Iron alloys for chemical machinery. V. I. Vulifson (Trans. VI Mendeleev Congr. [1932], 1935, 2, i, 264—265).—Cast Fe containing C 3·5, Si 1·5, Mn 0·5, S and P $<0·05\%$, alloyed with Sn 2 and Cu 1·66%, had an optimum resistance to 10% H_2SO_4 and 20% AcOH at room temp. For additions of Sb and Cu the optimum ratio was 0·5 : 1. Addition of 1—1·5% of this mixture increased the resistance to HCl at room temp. Steel containing Sn 0·81 and Cu 5·2% had an increased resistance to 3·6% HCl and to 4·5—62% H_2SO_4. Monel and Ni cast Fe gave optimum results with dil. H_2SO_4.
Ch. Abs. (*e*)

Alloys of copper and iron. K. M. Simpson and R. T. Banister (Met. & Alloys, 1936, **7**, 88—94).—Homogeneous Cu–Fe alloys have been produced and the mechanical and electrical properties studied. Addition of C or Cr to the melt causes segregation into two liquid phases.
E. H. B.

Alloys of copper and iron. Tensile, electrical, and corrosion properties. E. E. Schumacher and A. G. Souden (Met. & Alloys, 1936, **7**, 95—101).—Alloys containing 37·5—75% Cu have been prepared free from segregation and have been hot-rolled. The alloys are duplex in constitution and susceptible to age-hardening. High conductivity and high strength are obtained together in the 50% Cu alloy, which may also be tinned satisfactorily. The corrosion-resistance decreases with Fe content; the alloys are unsatisfactory in marine and industrial atm., but suitable for rural exposure.
E. H. B.

Alloys of iron and manganese. XIII. Constitution of the binary alloys. XIV. Iron–carbon alloys containing 7% of manganese. F. M. Walters, jun., and C. Wells (Trans. Amer. Soc. Met., 1935, **23**, 727—745, 751—760).—Data are summarised and equilibrium diagrams given.
Ch. Abs. (*e*)

Initial stages of the magnetic and austenite transformations in a carbon steel. I. N. Zavarine (Amer. Inst. Min. Met. Eng., 1935, Tech. Publ. 646, 6 pp.).—The initial stages of magnetic transformation in medium- and high-C steels quenched into a hot bath are delayed for a measurable time, depending on the quenching conditions and the C content. The lattice transformation of a eutectoid steel quenched into a hot bath precedes the magnetic transformation.
Ch. Abs. (*e*)

***X*-Ray phenomena in the graphitisation of steel and cast iron.** E. A. Gordon and N. J. Seliakov (J. Tech. Phys. U.S.S.R., 1934, **4**, 1951—1956).—The graphite separating from several steels, containing approx. C 2, Mn 0·35, and Si 1%, has the same *X*-ray structure as has Ceylon graphite.
Ch. Abs. (*e*)

***X*-Ray exposure charts for steel.** H. R. Isenburger (Trans. Amer. Soc. Met., 1935, **23**, 614—618).
Ch. Abs. (*e*)

Scaling of mild steel in sulphur-free and sulphur-containing furnace atmospheres (contd.). Inst. Gas Eng. Gas Research Fellowship Rept., 1935—36. H. C. Millett and J. W. Cobb (Inst. Gas Eng., 1936, Comm. 145, 28 pp.; cf. B., 1936, 22).—The influence of the composition of the furnace atm. on the scaling of mild steel at 1100—1300° has been examined. Scaling in S-free and S-containing atm.

increased rapidly with rise of temp., a rise of 100° approx. doubling the scaling. At 1200° the same additional scaling was induced by a given % SO_2 whatever the composition of the "neutral" atm. to which SO_2 was added. At 1300° the rate of scaling in the atm. containing 0·2% SO_2 was $\propto$ the period of exposure. Addition of free O_2 to the "neutral" atm. produced a marked increase in scaling; further additions of O_2 induced still more scaling, but each increment of O_2 had less effect. Addition of 0·10% NO did not materially influence the scaling, even in the atm. containing both free O_2 and SO_2. In air the scaling reached a max. at 880°, fell to a min. at 900°, again rose to its 880° val. at 930°, and thereafter continued to increase rapidly with rise of temp. By making prolonged periods of exposure (up to 46 hr.) in air at 800°, 900°, and 1000°, it has been demonstrated that the parabolic equation connecting period of exposure and increase in wt. was valid over very extended periods. H. C. M.

Mechanical properties of steels treated by heated hydrogen under pressure. L. Jacqué (Compt. rend., 1936, **203**, 936—938).—Physical changes caused in various samples of steel by heating in H_2 under pressure are described. Varying degrees of decarburisation occur. A. J. E. W.

Thermal expansion of steels from 20° to 900°. J. A. Trotski and E. G. Tschvidkovski (J. Tech. phys. U.S.S.R., 1934, **4**, 1910—1935).—Data for 22 alloy steels containing C, Si, Mn, S, P, W, Cr, Ni, and V are given. Ch. Abs. (*e*)

Second Report of the Steel Castings Research Committee. I. Introduction. II. Properties of steel which affect the quality of steel castings. R. H. Greaves. **III. Fluidity of iron–carbon and other iron alloys.** J. H. Andrew, R. T. Percival, and G. T. C. Bottomley. **IV. Strength and ductility of cast steel during cooling from the liquid state in sand moulds.** H. F. Hall. **V. Work and programme of the Moulding Materials Sub-Committee.** W. J. Rees. **VI. Present position of radiological examination of steel castings.** V. E. Pullin. **Appendix I. Bibliography on the fluidity and viscosity of metals. Appendix II. Present position concerning the pyrometric measurement of topping and casting temperatures.** W. H. Hatfield (Iron & Steel Inst., Spec. Rept. No. 15, 1936, 117 pp.).—The first results are presented of individual and intensitive studies of the various basic factors which enter into the production of steel castings, particularly the fluidity of the molten metal, dimensional changes during solidification, and strength and ductility of the solidifying or solid metal at elevated temp. E. H. B.

Abrasion [of metals] at high temperature. Y. Fujii (Tetsu-to-Hagane, 1935, **21**, 656—660).—Various materials used in Diesel cylinder liners and piston rings were tested in lubricating oil at 200°. With cast Fe the loss in wt. was 50 times that at room temp. The best results were obtained with nitrided steels and with 0·5—0·6% C steel, for which the loss in wt. was 1/10—1/30 that for cast Fe. Ch. Abs. (*e*)

Caustic brittleness. V. V. Ipatiev, jun., and N. M. Ostroumov (Trans. VI Mendeleev Congr. [1932], 1935, 2, i, 266—273).—Samples of Fe and steel were investigated in a high-pressure bomb containing aq. NaOH. At 300° with 30% NaOH solution there are no changes in the samples similar to those attributed to caustic brittleness, provided they are not subjected to load overstrains. This is true in presence or absence of O_2 and H_2. Ch. Abs. (*e*)

Practical importance of the damping capacity of metals, especially steels. O. Föppl (Iron & Steel Inst., Sept., 1936, Advance copy, 31 pp.).—The damping capacity of a metal is a non-dimensional quantity obtained by dividing the area of a hysteresis loop by the strain energy stored at the extreme positions of a cycle of stress, and is thus dependent on the ratio of plastic to elastic deformation. A high val. is desirable, since it confers notch-toughness and obviates dangerous vibrations at crit. speeds. Materials of similar compositions and antecedents may differ greatly in damping capacity. A ductile steel giving high damping at low stress is needed. In an appendix, F. Bacon explains the terminology of damping and fatigue, giving the translation of the usual German terms. E. H. B.

Welding of plain steels of high strength. K. L. Zeyen (Stahl u. Eisen, 1936, **56**, 654—657).—Plain steel welding rods of similar composition to the steel are satisfactory for butt-welding, but for filling wedge-shaped joints in steels with 0·4% C they are useless, as they produce fissures in the surrounding metal due to overheating. Austenitic electrodes with Cr 25 and Ni 20% give excellent joints with a high tensile strength and resistance to impact. A. R. P.

Variation of chemical composition in the gas welding of ordinary steels. A. M. Portevin and A. Leroy (J. Amer. Welding Soc., 1935, **14**, No. 8, 9—11).—Data for the variation of C, Si, and Mn are given. Si exerts a protective effect on the oxidation of C, but does not influence the Mn losses. Ch. Abs. (*e*)

Gases used in the welding of metals. S. J. Miloslavski and D. L. Glizmanenko (Avtogen. Delo U.S.S.R., 1933, 4, No. 7, 10—12; No. 10, 14—17).—A discussion. C_2H_4 and C_3H_8 produced in vapour-phase cracking do not give a sufficiently high flame temp. for all types of welding. Ch. Abs. (*e*)

Hydrogen-welding. A. G. Podeiko and I. F. Golubev (Avtogen. Delo U.S.S.R., 1934, 5, No. 6, 12—14).—An apparatus for producing H_2 from NH_3 is described. Advantages of using H_2 are discussed. Ch. Abs. (*e*)

Methane as fuel in fusion-welding and -cutting. S. J. Miloslavski and D. L. Glizmanenko (Avtogen. Delo U.S.S.R., 1934, 5, No. 10, 14—20).—CH_4 can replace C_2H_2 for cutting purposes. It is suitable for welding Al, but unsatisfactory for Fe. Ch. Abs. (*e*)

Non-metallic inclusions in steel. S. F. Urban and J. Chipman (Trans. Amer. Soc. Met., 1935, **23**, 645—671; cf. B., 1935, 634).—A series of vac.-melted, high-S steels was prepared in which the sonims consisted mainly of sulphides of Fe, Mn, Al, Cr, Ti, and Zr. Red-shortness is due primarily to liquid sulphide at elevated temp. and can be eliminated by Mn, Ti, and Zr. CH. ABS. (e)

Phosphorus in low-carbon, low-alloy steels. R. H. HEYER (Met. & Alloys, 1936, 7, 107—108).—Apparent duplex structures produced in wrought Fe when quenched from 910° are attributed to segregation of P. Regions of low P content consist at 910° of austenite and are surrounded by ferrite into which P tends to diffuse. The outward migration of P produces a sudden change in P content and pseudo-boundaries appear here on etching. $CuCl_2$ attacks the areas within these boundaries and so demonstrates the low P content. E. H. B.

[Phosphorus in low-carbon, low-alloy steel.] C. H. LORIG and D. R. KRAUSE (Met. & Alloys, 1936, 7, 108).—The authors agree with Heyer's views (cf. preceding abstract). E. H. B.

Making nickel alloy steels in acid open-hearth furnaces. T. FUJIWARA (Japan Nickel Inform. Bur., 1934, Tech. Inform. 4 B, 39 pp.).—The lower is the total FeO in the slag, the lower is the free FeO in the slag and the dissolved FeO in the metal. Decrease in FeO increases the SiO_2 in the slag and makes it viscous. CaO or MnO can be substituted for FeO in the slag by adding limestone or Fe–Mn. When the FeO in the slag was <12 or $>15\%$ the forging quality of the steel was poor. Within this range it was good. Data for Ni–Cr steel are recorded. Addition of CaO at the finishing stage expels FeO from the slag and introduces an excess of it into the metal. The surface appearance of samples is classified. CH. ABS. (e)

Impact-resistance of nickel steels at low atmospheric temperatures. D. A. CAMPBELL (Trans. Amer. Soc. Met., 1935, 23, 76—81).—Proper heat-treatment of steels (C 0·10—0·80, Ni 0·5—3·5%) increases the impact-resistance at low temp. The best results were obtained when the Ni was insufficient to destroy the polyhedral grain structure of the C steel. CH. ABS. (e)

Alloys for production of special steels. B. MATUSCHKA and F. CLESS (Stahl u. Eisen, 1936, 56, 757—764).—The prep., properties, and composition of commercial grades of Ni, Co, Mo, Al, Cu, Fe–Ni, Fe–Mo, Fe–Mn, Fe–Si, and Fe–V are discussed. A. R. P.

Influence of vanadium on nickel–chromium and nickel–chromium–molybdenum steels. H. H. ABRAM (Iron & Steel Inst., Sept., 1936, Advance copy, 9 pp.).—Addition of $>0·1\%$ V to mild steel (0·3% C) containing Ni 2, Cr 1, Mn 0·2% or Ni 2·6—2·8, Cr 0·7—0·75, Mn 0·5—0·75, and Mo 0·45—0·75% results in the mechanical properties remaining const. on tempering at 500—650° after air- or oil-quenching from 900°; this is due to the normal softening being counteracted by pptn.-hardening effects caused by the separation of VC from the supersaturated α. The tempered steels have excellent mechanical properties, especially resistance to impact and low sensitivity to notch action. Max. hardening effects are obtained in high-V steels by heating at $>950°$ before quenching, but this is accompanied by a reduction in the limit of proportionality and impact strength; restriction of the V to 0·15—0·25% and quenching from 900° give metal with a uniform sorbitic structure. A. R. P.

Heat-treatment of magnetic materials in a magnetic field. I. Survey of iron–cobalt–nickel alloys. II. Experiments with two alloys. J. F. DILLINGER and R. M. BOZORTH (Physics, 1935, 6, 279—284, 285—291).—I. The effects of annealing in a magnetic field from various temp. and at different rates of cooling were investigated for Fe–Ni and Fe–Co–Ni alloys. The max. effect was observed in Fe–Ni alloys with 65—70% Ni. The initial permeability is greatly increased and the hysteresis loop altered to a rectangular shape. All the alloys having Curie points $>500°$ and no phase transformation show similar changes. The alloys are highly anisotropic.

II. Alloys with Fe 35, Ni 65% and with Fe 20, Co 60, Ni 20% were studied after heat-treatment at $>400°$ and $<$ the Curie point and cooling in a field of 10 oersteds. CH. ABS. (e)

Retained austenite and its decomposition range in a quenched cobalt high-speed steel. C. A. LIEDHOLM (Trans. Amer. Soc. Met., 1935, 23, 672—692).—Quenched high-speed steels contain a constituent corresponding with the martensite of C steels. A considerable amount of austenite is retained after quenching. Martensite and austenite decompose in the same order as in C steels. Some age-hardening may occur simultaneously with decomp. CH. ABS. (e)

Influence of tungsten, nickel, and cobalt on the properties of steel for valves of internal-combustion engines. N. T. GUDTZOV and P. G. KOMIAKOV (Metallurg, 1935, 10, No. 3, 7—26).—Steel containing C 0·45—0·60, Si 0·91—1·88, Mn 0·32—0·56, Cr 13·21—14·39, Ni 5·22—11·68, W 0—2·49, and Co 0—1·40% was examined for hardness, microstructure, and mechanical properties at 800° and for corrosion-resistance (*R*) at higher temp. At 900° this steel gradually pptd. a carbide phase, which increased its hardness. This phase can be destroyed by quenching from 1100—1200°. Increasing the Ni from 6 to 12% decreased the hardness and increased *R*. 1·5% of Co doubles *R* and increases the high-temp. tensile strength (*T*), 2—2·5% of W decreases *R*, but increases *T*. CH. ABS. (e)

Tantalum–iron alloys and tantalum steels. R. GENDERS and R. HARRISON (Iron & Steel Inst., Sept., 1936, Advance copy, 37 pp.).—Thermal and micrographic examination of alloys made from pure Fe and Ta showed that the system contains one compound, Fe_2Ta, which forms eutectics with Fe (20% Ta, about 1450°) and with Ta (about 80% Ta, about 1650°). The solubility of Ta in γ increases from about 0·6% at 900° to 3% at 1220°, at which latter temp. the δ solid solution decomposes into the $\gamma + Fe_2Ta$ eutectoid (4·5% Ta). In δ-Fe the max. solubility of Ta is 6·5% and in α-Fe it increases from $< 0·2\%$ at room temp. to about 1% at 960°. Dissolution of Fe_2Ta in γ- or δ-Fe increases the hardness slightly, and subsequent tempering at $>600°$ still further increases it by pptn. effects. Addition of Ta to steel results in the formation of TaC, which is almost insol. in the solid metal, and with sufficient Ta to combine with all the C the steel behaves like a pure Ta–Fe alloy. The steels rapidly oxidise at $>1000°$, producing a thick adherent scale; they appear to be no more resistant to corrosion than plain steels. Addition of Ta to low-Mn Ni steel has a similar effect to, but is much less marked than, that of Mn, 1·75% Ta being about ≡ 0·5% Mn; it confers no air-hardening properties, reduces the decrease in hardness product by tempering, and appreciably increases the tendency to temper-brittleness. In ordinary steels Ta increases the depth of penetration of N in NH_3 case-hardening, but does not give a high hardness unless Al is also present, in which case vals. of >1000 in the Vickers diamond-hardness no. may be obtained combined with deep penetration. Addition of Ta to molten C steel or pig Fe results in the separation of hard angular crystals of TaC throughout a ferritic mass; if the latter is toughened by addition of W, Cr, or Co the alloy can be ground to a sharp edge and is suitable for cutting tools. When commercial Fe–Ta is carburised in an electric furnace a pasty mass is obtained which is brittle when solid and can be crushed to a powder from which almost pure TaC can be isolated by treatment with 50% HCl. Treatment of C-free Ta–Fe alloys with dil. HCl leaves a residue of Fe_2Ta. A. R. P.

Statistical correlation and metallurgical problems. T. P. Hoar (Metallurgist, 1936, **10**, 134—137).—Several specimens are taken at random, and the property under study is " correlated " with each variable or combination of variables in turn. The application of this procedure to studies of the effect of various elements on the corrosion and hardness of steels is illustrated. C. E. H.

Metallic cementation. IV. Cementation by tin powder. V. Cementation by chromium powder. T. Kase (Kinz. no Kenk., 1935, **11**, 210—219, 257—266, 301—308; 357—370; cf. B., 1936, 327).—IV. Sn powder diffuses into Fe, Cu, and Ni in a current of H_2 at $>230°$, the rate increasing with rise of temp. It changes abruptly at the A3 point of Fe. The increase in wt. due to cementation and the depth of penetration are exponential functions of the abs. temp. The cemented metals had increased resistance to corrosion.

V. The cementation of Fe and Ni by Cr powder at 800—1300° was studied. The rate increases with rise of temp. The exponential relationships hold as in the case of Sn. The surface of Ni cemented with Cr resists oxidation at high temp. and corrosion by HNO_3. Ch. Abs. (*e*)

Analysis of cast and pig irons. Determination of total carbon, graphite, and silicon with the combustion furnace. R. Taylor (Ind. Chem., 1936, **12**, 372—374).—Practical suggestions in the use of the furnace are given, and the apparatus used is shown in photographs. E. H. B.

Determination of beryllium, aluminium, and magnesium in ferrous alloys. R. Gadeau (Rev. Mét., 1935, **32**, 398—400).—The metal is dissolved in HCl or H_2SO_4 and the Fe, Co, and Ni are removed by H_2S from the slightly ammoniacal tartrate solution. The filtrate is acidified with AcOH and the Al pptd. with 8-hydroxyquinoline (I) and NH_4OAc. The acid filtrate is treated with $NaNH_4HPO_4$ and kept until the $BeNH_4PO_4$ crystallises; ignition of the ppt. affords $Be_2P_2O_7$ for weighing. Finally Mg is determined by addition of more (I) and aq. NH_3 in slight excess. A. R. P.

Rapid determination of aluminium in complex irons and steels. E. C. Pigott (Ind. Chem., 1936, **12**, 360—361).—A modification of the phosphate method is described, whereby Al ($<0·5\%$) may be determined in material containing also Fe, C, Si, Mn, S, P, W, Cr, Ni, Co, Mo, V, Ti, Cu, Ta, U, Zr, and As, which are separated. E. H. B.

Determination of non-metallic inclusions in steel and iron. E. W. Colbeck, S. W. Craven, and W. Murray (Iron & Steel Inst., Sept., 1936, Advance copy, 22 pp.).—A detailed description of the use of Cl_2 in isolating and analysing non-metallic inclusions in Fe and steel is followed by a comparison of the I and Cl_2 methods as applied to C steels; results of the Cl_2 method on alloy steels are also given. Chemical and *X*-ray analyses show that MnS is not completely sol. in I, and that Fe_3P in cast Fe is quantitatively retained in residues after I extractions. E. H. B.

Determination of the gases in steel by the hot-extraction method. G. Thanheiser (Iron & Steel Inst., Sept., 1936, Advance copy, 23 pp.).—Recent work of the K.-W. Institut für Eisenforschung is described. A vac. resistance furnace with graphite spiral heater has been found as satisfactory as the induction furnace for heating the specimen. In Mn-rich material the volatilised Mn adsorbs a large vol. of CO; errors due to this are overcome by placing a graphite bell over the crucible to collect the Mn and then lowering this into the heating zone at the end of the test to expel adsorbed gas. The val. of the method in determining slag–metal equilibria in smelting operations is illustrated by several examples. A. R. P.

Milling methods at the concentrator of the Fresnillo Co. W. A. Binsacca (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 751—759).—The production of Pb, Cu, Zn, and Fe concentrates by selective flotation is described in detail. Ch. Abs. (*e*)

Concentrating operations at the Roan Antelope Copper Mines. J. W. Littleford (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 935—951).—The mill feed contained Cu 3·24, SiO_2 54·79, Al_2O_3 17·97, Fe 3·22, S 0·95, CaO 1·30, MgO 4·78, and residue 13·79%. The flow sheet is given and crushing, grinding, flotation, and tailing disposal are discussed. Ch. Abs. (*e*)

Rational preparation of copper smelter charge. G. J. Leizerovitsch (Tzvet. Met., 1935, No. 3, 75—91).—It is advantageous to use finely-ground quartz flux (<1 mm.) and to mix it properly with the charge of Cu concentrates. Ch. Abs. (*e*)

Bright-annealing of non-ferrous metals. W. W. Young (Gas Age-Rec., 1935, **75**, 409—411).—

Practically all non-ferrous metals and alloys which do not contain Zn can be bright-annealed in an atm. of the products of combination of gas. For most brasses and other Zn-bearing alloys only the addition of MeOH vapour is necessary. CH. ABS. (e)

Acid pickling of non-ferrous metal components. P. MABB (Machinery, London, 1935, **46**, 661—663).—The procedures for Cu, brasses, bronzes, Ni, and white-Ni alloys, Al and Mg and their alloys, and Zn-base alloys are described. CH. ABS. (e)

Metal colouring. M. DE K. THOMPSON (Metal Clean. Finish., 1935, **7**, 433—436).—Methods of colouring Cu, steel, and Al are discussed. Cd is coloured with a solution of $KClO_3$ (60 g.) and $CuSO_4$ (25—30 g./litre). A yellowish- to reddish-brown colour on Cd is produced by immersion in a solution of $Cu(NO_3)_2$ (10—15 g.) and $KMnO_4$ (2·5 g./litre). This bath gradually produces a black colour on Cd if not too dil. CH. ABS. (e)

Investigation of the diffusion coefficients of metals by means of evaporation. V. BUGAKOV and V. NESKUTSCHAEV (Tech. Phys. U.S.S.R., 1934, **1**, 329—334; J. Tech. Phys. U.S.S.R., 1934, **4**, 1342—1346).—The losses in wt. of brass cylinders, 1—1·5 mm. in diam., heated in vac. to 600—950° were determined. CH. ABS. (e)

Materials for condenser tubes. Y. FUJII (Tetsu-to-Hagane, 1935, **21**, 568—575).—Cu containing (1) Al 3, Zn 11%, and (2) Zn 27, Sn 1, Fe 0·03% gave good results in corrosion tests with 3% aq. NaCl and sea-H_2O. CH. ABS. (e)

Dilatometric anomalies due to external forces in copper–aluminium alloys with 7—16% of aluminium. A. BOUTILLIER (Compt. rend., 1936, **203**, 512—514).—A method of eliminating anomalies caused by plastic deformation by external forces during dilatometric measurements is described. In the Cu–Al alloys the anomaly due to plasticity is observed during the transformation of the eutectoid into homogeneous solution at 570°, during the dissolution of the α or δ constituents by heating below 570°, or during their pptn. in cooling. H. J. E.

Bronzes in machine construction. J. D. WATSON (Metallurgia, 1936, **14**, 173—174).—Special bronzes for casting are briefly reviewed. E. H. B.

Chemical examination of prehistoric bronzes of Sardinia. F. L. VODRET (Atti V Congr. naz. Chim., 1936, 105—120).—A review.

Copper alloys containing silicon. I. T. TANABE and G. KOISO (Tetsu-to-Hagane, 1935, **21**, 575—584).—Alloys containing Cu 80·5—85, Zn 10—15, Si 3·5—4, and Al 1—2%, together with traces of As and P, are strong and ductile and resist corrosion by sea-H_2O better than alloys of similar composition containing no Al. CH. ABS. (e)

Corrosion of zinc and low-copper zinc alloys. E. V. TZECHNOVITZER (J. Phys. Chem. U.S.S.R., 1934, **5**, 607—615).—Corrosion is measured by the change in κ of the solution. 1% of Cu reduces the resistance of Zn to corrosion by $0{\cdot}01N$- and $0{\cdot}1N$-H_2SO_4. In pure distilled H_2O Zn forms $Zn(OH)_2$, the solubility of which was $1{\cdot}4 \times 10^{-3}$ g./litre at 25°. CH. ABS. (e)

Antimony in copper and brass. J. A. AMSTERDAMSKI, V. O. GAGENTORN, and B. F. GRASCHTSCHENKO (Metallurg, 1934, **9**, No. 8, 107—113).—Up to 0·2% Sb in Cu is not harmful if 0·1% of O is present. The upper limit for Sb in brass varies from 0·004 to 0·02%, depending on the Zn content. CH. ABS. (e)

Inverse segregation and gas solubility in tin bronzes. W. CLAUS and W. BAUER (Metallwirts., 1936, **15**, 587—600).—Bronzes containing 10 and 20% Sn show no inverse segregation with very low rates of cooling, but above a crit. rate it does occur and is accentuated by dissolved gases, particularly H_2, which is fairly sol. in liquid bronze. Addition of 0·2% P reduces the segregation, and Li is also effective; Al and Zn have little effect. C. E. H.

Rapid spectral determination of tin in ores. H. MORITZ and P. SCHNEIDERHÖHN (Metallwirts., 1936, **15**, 466—467).—The method requires very little chemical treatment of the ore before analysis, and is suitable for ores of very low Sn content. The max. deviation from the results of chemical analysis was <10%. C. E. H.

Spectrographic analysis of tin. D. M. SMITH (Tech. Publ. Internat. Tin Res. & Dev. Counc., 1936, **A**, No. 46, 26 pp.).—The application of arc and spark methods to the determination of 0·001—1·0% of Al, Cd, and Zn in Sn is described. Laboratory procedure for the purification of Sn by electrolytic refining is described. E. S. H.

Deoxidation of technical silver alloys. E. RAUB, H. KLAIBER, and H. ROTERS (Metallwirts., 1936, **15**, 765—770, 785—788).—The deoxidising effects of Al, Be, B, Cd, Ca, Li, Mg, Mn, P, Si, Sn, and Zn on an alloy containing 83·5% Ag and 16·5% Cu have been investigated. Li and P alone were entirely satisfactory, Li acting more rapidly than P. Up to 1% Li is not detrimental to the mechanical properties of the Ag alloy, but somewhat decreases its corrosion-resistance. C. E. H.

Milling practice at Buchans mine, Buchans, Newfoundland. G. A. HELLSTRAND and P. W. GEORGE (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 841—860). CH. ABS. (e)

Milling methods of the Porcupine district of northern Ontario. P. D. P. HAMILTON (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 617—645). CH. ABS. (e)

Ore treatment at Beattie Gold Mines, Ltd. W. G. HUBLER and J. F. MARTIN (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 690—703).—Operating conditions are described. The ore is extremely hard and resistant to grinding. CH. ABS. (e)

Ore treatment as a factor in small gold-mining enterprises. E. GAYFORD (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 549—569).—A discussion. CH. ABS. (e)

Economical technique in treatment of gold ores. A. W. ALLEN (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 538—548).—A discussion. CH. ABS. (e)

Milling gold ores at Pioneer. R. Spry and P. Schutz (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 678—689). Ch. Abs. (*e*)

Increasing gold recovery from Noranda's milling ore. C. G. McLachlan (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 570—596).—Treatment of the ore (chalcopyrite 6·8, pyrite 22·1, pyrrhotite 51·5, magnetite 0·5, SiO_2 and silicates 18·3%, Au 0·15, and Ag 0·35 oz. per ton) is described. Ch. Abs. (*e*)

Design and operation of a 4-ton-per-hour gold and silver ore-sampling plant. E. D. Gardner and W. A. Leddell (U.S. Bur. Mines, 1936, Inf. Circ. 6891, 40 pp.).—Detailed plans and bills of material for the sampler and crushing plant and for a mine assay office are given. A. R. P.

Crushing and grinding characteristics [of ores] as determined from screen analyses. F. C. Bond and W. L. Maxson (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 146—160).—A linear relation is obtained between the % wt. retained and the ordinal no. assigned to the screen on the Tyler scale. The line extends to the colloidal-size range. Its slope depends on the character of the ore and the grinding conditions. Equations are given for computing the % of unground fines and the new surface area produced in grinding. Ch. Abs. (*e*)

Chemical theory of flotation. A. F. Taggart, G. R. M. del Giudice, and O. A. Ziehl (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 348—381).—A discussion. Ch. Abs. (*e*)

Principles of flotation. V. Conception of adsorption applied to flotation reagents. I. W. Wark and A. B. Cox (Amer. Inst. Min. Met. Eng., 1936, Tech. Publ. 732, 16 pp.; cf. B., 1935, 25).—Polemical against Taggart *et al.* (cf. preceding abstract). Evidence is given to support the adsorption theory as against the chemical theory of flotation. A. R. P.

Hypothesis of the non-flotation of sulphide minerals of near-colloidal size. A. M. Gaudin and P. Malozemoff (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 303—318).—There is a definite reduction in floatability with reduction in particle size beyond a limit. Very fine particles are often old and have surfaces which are unfloatable because of a surface coating. If the collector is added in the pebble mill and is present during grinding, the poor flotation of fine particles is almost completely avoided. Ch. Abs. (*e*)

Experiments on scorodite flotation. S. M. Jasjukevitsch and G. A. Chan (Tzvet. Met., 1934, No. 7, 26—35).—The ore contained As 2·72, Sb 0·10, PbO 0·17, ZnO 0·91, CuO 0·15, FeO 9·02, Bi 0·01, Al_2O_3 7·85, CaO 1·60, MgO 0·93, SiO_2 69·49, S 0·57%, and 4·3 and 12·0 g. of Au and Ag per ton, respectively. Elutriation gave 64% of sand (3·4 g. of Au per ton and 1·8% As) and 36% of sludge (60 g. of Au per ton and 5·73% As). The scorodite was conc. from the sludge, without grinding, by Na oleate (5 kg./ton) + starch in NaOH (1 kg./ton) + Na silicate (1 kg./ton) + a small amount of pine tar. Ch. Abs. (*e*)

Milling and cyanidation at Pachuca. R. R. Bryan and M. H. Kuryla (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 722—733).—Operating conditions are described. Ch. Abs. (*e*)

Cyanide milling practice of the Fresnillo Co. W. E. Crawford (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 734—750).—The flow sheet is given and discussed. When Ag vals. are locked by MnO_2, cyanidation is difficult. To overcome this the ore is ground with H_2O, the pulp treated with SO_2 to dissolve Mn minerals, and the dissolved Mn pptd. with CaO emulsion. The pulp is aërated and cyanided as usual. Ch. Abs. (*e*)

[Dis]solution of gold and silver in cyanide solutions. G. Barsky, S. J. Swainson, and N. Hedley (Trans. Amer. Inst. Min. Met. Eng., 1934, **112**, 660—677; cf. B., 1935, 500).—The free energies of formation of $Au(CN)_2'$ and of $Ag(CN)_2'$ are 66,382 g.-cal. and 69,063 g.-cal., respectively. The mechanism of dissolution of Au and Ag in cyanide solutions is discussed. The max. rates of dissolution of Au and Ag in 0·01—0·50% aq. NaCN were at 0·05 and 0·10%, respectively. The solubility of O_2 is almost unaffected by the [NaCN]. In alloys the amounts of Au and Ag dissolved $\propto$ the composition of the alloy. The rate of dissolution decreases with increasing alkalinity, CaO having a greater effect than NaOH. Ch. Abs. (*e*)

Effect of lead salts and alkalis in cyanidation [of gold ores]. A. B. Beck and H. W. Gartrell (Proc. Austral. Inst. Min. Met., 1935, 499—509).—The presence of oxidised Pb minerals in Au ores leads to low extraction of the Au by aq. NaCN when the alkalinity of the leach liquor is $p_H > 11$, apparently owing to the formation of insol. Pb compounds on the Au. It is suggested that Au dissolves in aq. NaCN in two stages, Na aurate being formed first and then dissolving in the NaCN, forming $NaAu(CN)_2$ and H_2O_2; in presence of PbO, Pb aurate is deposited on the Au surfaces. A. R. P.

Corrosion of certain materials by sulphur and solutions of ammonium sulphate and neutral and acid ammonium sulphite at high temperatures and pressures. L. L. Kuzmin (J. Chem. Ind. Russ., 1936, **13**, 847—850).—In the reaction $2NH_4HSO_3 + (NH_4)_2SO_3 \rightarrow 2(NH_4)_2SO_4 + S + H_2O$, at 150—250°, of a series of metals only Au is resistant to corrosion by the solution, Pt and Cr are almost entirely so, and Al, Sn, Ag, Ni, and Cd are rapidly corroded. Cr-plated and certain rustless steels, glass, quartz, andesite, and acid-resistant brick are suitable materials for reaction vessels. R. T.

Factors governing the separation of lead and zinc in ore by flotation. R. A. Pallanch (Min. & Met., 1936, **17**, 386—389, 392).—The effects of grinding, classification, pulp *d*, reagent control, depressing and activating reagents, and other factors on the results obtained in differential Zn–Pb flotation are discussed. A. R. P.

Determination of cadmium in zinc concentrates and metallic zinc. Method of inner electrolysis using simple apparatus. J. J. Lurie and M. I. Troitzkaja (Z. anal. Chem., 1936, **107**, 34—41).—The material is dissolved in HNO_3 and fumed down with H_2SO_4. The solution is neutralised, and Cu removed as CuCNS, Mn as MnO_2, and Fe as

Fe(OH)$_3$. The liquid is neutralised and brought to p_H 5·2 by making it 0·1N with respect to AcOH. A Pt-gauze electrode, connected to a pure Zn sheet, is inserted, thereby pptg. Cd on the Pt. J. S. A.

Plasticity of lead on rolling. V. D. Kuznetzov, G. M. Babenko, and D. A. Demidenko (J. Exp. Theor. Phys. U.S.S.R., 1935, 5, 192—201).—The plasticity of Pb at room temp. was studied by the method of double rolling. It cannot be characterised by the coeff. of internal friction. The breaking tension is a plastic characteristic. Ch. Abs. (e)

Failure of lead by creep. J. N. Greenwood (Proc. Austral. Inst. Min. Met., 1935, 477—497).—Pb can fail by intercryst. cracking under a steady load applied for prolonged periods in air even in absence of vibration or corroding liquids. This failure may occur after a less general distortion than that produced by creep at 500 lb. per sq. in. The rate of creep of Pb at lower stresses is considerably affected by its previous thermal and mechanical treatment and is increased by the presence of even very small amounts of Ag, Zn, Bi, Sb, and Te. On the other hand, the rate of creep is also increased by removal of traces of these elements from commercial Pb. A. R. P.

Methods of remelting and the effect of additions on the oxidation of the components of lead babbitts. M. P. Slavinski, A. V. Schaschin, and N. A. Filin (Metallurg, 1935, 10, No. 3, 66—81).—Additions of K, Ba, Mg, Al, Zn, Cd, and Cu to Pb-babbitt (Na 1, Ca 1%) do not improve the quality. Some of these elements improve the mechanical properties, but the alloy corrodes very readily. The Ca- and Na-babbitt without any additions shows the max. ageing effect after 15 days. A carnallite flux prevents loss of alkali metals during remelting better than does any other Cl salt. In certain cases Mg may advantageously be substituted for Ca. Ch. Abs. (e)

Progress reports [of the United States Bureau of Mines], 1935—Metallurgical Division. R. S. Dean (U.S. Bur. Mines, 1936, Rept. Invest. 3306, 39 pp.).—The absorption of H_2S by ground galena suspended in H_2O is directly $\propto$ log particle size, but after removing oxidation products with NH_4OAc it $\propto$ the surface area only, although the amount absorbed per unit area is not a const. Flotation of galena is improved by evacuation of the pulp or by cleaning the surface of the particles; gassing with H_2S has little effect. Talc may be separated from magnesite by flotation with BuOH or with kerosene and emulsol X–I (I). Good extractions of stainierite have been obtained with avirol 100 and $(NH_4)_2S$, using Na silicate as depressant for calcite. Fair recoveries of wulfenite, descloizite, vanadinite, and scheelite have been obtained by flotation with ordinary sulphide flotation reagents. Sylvite and halite may be separated by tabling in saturated brine followed by flotation of the tailings with (I). Some preliminary experiments on the desulphurisation of Fe and on the flotation, cyanidation, and amalgamation of ores containing coated Au are also recorded. A. R. P.

Non-ferrous metals used in aircraft. J. B. Johnson (Metal Progr., 1935, 28, No. 4, 123—130).—A review. Inconel, a high-Ni–Cr alloy containing little Fe, is free from carbide pptn. at red heat and has given good results in elevated-temp. service. Ch. Abs. (e)

Metallurgy of the rare-earth metals. F. Trombe (Ann. Chim., 1936, [xi], 6, 349—458).—Ce, La, Nd, and Pr may be obtained by electrolysis of molten mixtures of the chlorides with 40—60% of KCl or LiCl and 3—5% of CaF_2, using a W or Mo rod as cathode and a graphite tube containing the fused salts as anode, the metal collecting in a quartz crucible at the bottom of the tube. The anhyd. chlorides are obtained by evaporating aq. solutions with NH_4Cl and heating the residue in dry HCl at $<$ m.p. The metals have been refined by heating in a cathode-ray furnace; the pure metals are malleable, have d 6·789 (Ce), 6·180 (La), and 6·96 (Nd), and m.p. 815° (Ce), 885° (La). Pure Sa and Gd can be prepared by electrolysis of fused mixtures of the chlorides with KCl and LiCl, using molten Cd as cathode, and then removing the Cd from the resulting alloy by vac.-distillation in a Mo boat. A. R. P.

Solubility of high-melting metals. M. G. Oknov (Metallurg, 1935, 10, No. 2, 17—30).—Cylinders of Fe, Cu, Ni, and Ag were immersed in a bath of molten Sn, Zn, Cd, or Pb at 50—100° above the m.p. of the bath. On cooling, the boundary between the solidified metals was sharp except in those cases where intermetallic compounds are formed. Ch. Abs. (e)

Hard-facing materials and methods. R. E. Brown (Metal Progr., 1935, 28, No. 4, 136—144).—Various methods and materials for hard-facing metal parts are reviewed. Ch. Abs. (e)

Structure of the surface layer of a polished metal. V. I. Archarov (J. Tech. Phys. U.S.S.R., 1934, 4, 1326—1331).—The surface layer of a polished metal in an amorphous film is in a condition resembling one of extreme compression. Ch. Abs. (e)

Effect of lattice distortion on diffusion in metals. V. G. Mooradian and J. T. Norton (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1935, Tech. Publ. 649, 9 pp.).—The relation between the recovery temp. and the temp. of easy diffusion was investigated by means of X-rays in sheets made up of alternate electrodeposited layers of Cu and Ni, Cu and Au, Ag and Au, and Ni and Co. In every case recovery precedes diffusion, and thus lattice distortion cannot aid diffusion. Ch. Abs. (e)

Properties of large composite [metal] sheets. W. Rädeker and E. Schöne (Z. Ver. deut. Ing., 1936, 80, 1163—1165).—The physical properties of sheets made by rolling two metals together at welding temp. are discussed. R. B. C.

Alloy containers for heat-treating in liquid baths. F. K. Ziegler (Metal Progr., 1935, 28, No. 4, 59—63). Ch. Abs. (e)

Flotation of California magnesites. E. Sinkinson and S. D. Michaelson (Amer. Inst. Min. Met. Eng., 1936, Tech. Publ. 733, 8 pp.).—Magnesite can be separated from silicious gangue and from part at least of accompanying calcite by wet-grinding followed by flotation with oleic acid. Dry-ground material may also be floated similarly if conditioned with CO_2 instead of air. Addition of Na silicate to the pulp tends to retard flotation. A. R. P.

Use of scrap in the aluminium foundry. R. Irmann (Aluminium, 1936, **18**, 416—421).—Care is necessary in mixing scrap of different compositions, since in some cases a very brittle alloy may be produced. A simple bend test, giving results which can be correlated with the standard mechanical tests, is recommended for examining the properties of a sample produced by melting a small amount of the scrap to be utilised. C. E. H.

Weakening of a deformed [aluminium] crystal on relaxing. M. O. Kornfeld (J. Exp. Theor. Phys. U.S.S.R., 1934, **4**, 873—881; cf. B., 1935, 1049).—An Al wire, tempered at 450°, was deformed 3%, then tempered for 2 hr. at 410° and for 2 hr. at up to 600°, and cooled to give Al monocrystals. On straining these crystals it was found that at 550° the limit of plastic flow decreases with rise of tempering temp. The degree of hardening of a deformed crystal changes as a function of the relaxing temp. Ch. Abs. (*e*)

Sources of defects in the casting and forging of aluminium and aluminium-alloy ingots. W. Schnorrenberg (Aluminium, 1936, **18**, 422—427).—Porosity, inclusions, segregation, shrinkage cracks and cavities, entrapped oxide skin, and temp. of forging are briefly discussed. C. E. H.

Cast hydronalium. P. Spitaler (Aluminium, 1936, **18**, 429—432).—The casting, mechanical properties, and applications of the alloy are reviewed. C. E. H.

Aluminium casting alloys resistant to corrosion. R. Sterner-Rainer (Aluminium, 1936, **18**, 408—415).—A review. C. E. H.

Preparation of specimens of aluminium and its alloys for microscopical examination. E. Käpernick (Aluminium, 1936, **18**, 433—435).—Full working instructions are given for mounting, grinding, polishing, and etching. C. E. H.

Effect of high hydrostatic pressures on ageing [of metals and alloys]. L. R. van Wert (Trans. Amer. Soc. Met., 1935, **23**, 633—643).—A pressure of 12,000 atm. decreased the rate of ageing at room temp. of quenched Al and Ca–Pb alloys. The final hardness was not affected by pressure. The effect is attributed to changes in the η of the metastable solid solution. Ch. Abs. (*e*)

Quenching stresses and precipitation reaction in aluminium–magnesium alloys. R. M. Brick, A. Phillips, and A. J. Smith (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1935, Tech. Publ. 650, 16 pp.).—Lattice parameter vals. of quenched rods of Al containing up to 17% of dissolved Mg show that surface stresses up to a max. of 32,000 lb. per sq. in. may develop. With >6% Mg the metal generally cracked. With <6% Mg repeated quenching plastically deformed the surface. The speed of the pptn. reaction was studied in relation to the degree of supersaturation, temp. of reheating, degree of strain, and grain size. Ch. Abs. (*e*)

Enamelling of light-alloy components of the magnesium-base type. E. E. Halls (Metallurgia, 1936, **14**, 157—161).—Castings and sheet of Al–Mn–Mg alloys have been submitted to various finishing treatments and then subjected to three types of corrosion test. For castings it is recommended to (1) clean with C_2HCl_3 followed by mild alkali, (2) treat with aq. chromate, (3) spray with $ZnCrO_4$ synthetic primer and bake, (4) spray one or two thin coats of synthetic surfacer and bake, (5) rub down, and (6) spray a full coat of synthetic finishing enamel and bake. For machined components stages 4 and 5 are omitted and instead two thin coats of synthetic finishing enamel are sprayed on. Two coats of cellulose finishing enamel may be substituted for the coat of storing enamel. E. H. B.

Intermetallic compounds and phases of variable composition in ultra-light bimetals. V. A. Bobrov (Ann. Sect. d'Anal. Physico-Chim., 1936, **9**, 99—127).—Mg alloys cannot be coated satisfactorily with Al by dipping or by rolling at high temp. owing to the production of brittle Al_3Mg_4. The best results are obtained by rolling at low temp. and using Mg alloys with a min. proportion of metals which form solid solutions or combine with Al. R. T.

Analysis of magnesium alloys. W. H. Withey (J.S.C.I., 1936, **55**, 357—359T).—The method depends on the fact that $MgCl_2$ is sol. and $CaSO_4$ is insol. in EtOH. In alloys containing Mn, rare metals (Ce etc.), Co, in addition to Ca, it has been found that, with the exception of the rare metals, the other metals are retained in EtOH solution when a chloride solution is evaporated with enough H_2SO_4 to produce sulphates of the alloying metals. The rare-earth and Ca sulphates are filtered off and dissolved in acid, the rare earths determined as oxides after pptn. in $H_2C_2O_4$ solution, and Ca as oxalate in the neutralised filtrate. The EtOH solution after evaporation to dryness is used for the determination of Co and Mn as sulphates after separation as sulphides in the usual manner. The method has the advantage that the interference of large amounts of Mg in the determination of Ca as oxalate is avoided at the outset.

Application of *X*-rays to metallurgy. I, II. C. H. Plant (Metallurgia, 1936, **14**, 71—73, 101—103).—A short account of the method of *X*-ray crystal analysis is given. W. P. R.

Application of *X*-rays to metallurgy. III. C. H. Plant (Metallurgia, 1936, **14**, 121—122).—Apparatus employed is briefly considered and attention drawn to uses of *X*-rays in analysis and radiology. E. H. B.

Chemical spectral analysis. W. Gerlach and W. Rollwagen (Metallwirts., 1936, **15**, 837—840).—For the analysis of metals and alloys, sensitivity with the flaming arc is usually > with the spark method of excitation, and may be further increased by periodically interrupting the arc. The flaming arc with C electrodes gives a weaker band spectrum in the analysis of salts than the continuous arc. C. E. H.

p_H control of electroplating baths. W. R. Kenny and A. B. Reed (Metal Clean. Finish., 1935, 7, 453—454, 458).—The p_H vals. obtained colorimetrically with bromocresol-purple (p_H 5·2—6·8) and -green (p_H 3·8—5·4) are usually 0·5 unit $>$ the electrometric vals. This is due to the high salt content of the baths. Ch. Abs. (*e*)

Electrodeposition of copper and zinc from solutions of their chlorides. S. A. Pletenev and V. N. Rozov (J. Appl. Chem. Russ., 1936, **9**, 1568—1579).—The optimum conditions for electrodeposition are: of Cu from aq. CuCl–NaCl, $[Cu^{\cdot}]$ 1·7—1·8%, c.d. $\not>$200—250 amp./sq. m., in 10—30% NaCl and 1·5—6% HCl, with vigorous stirring; and of Zn from aq. $ZnCl_2$, $[Zn^{\cdot\cdot}]$ 40%, in 1% HCl, c.d. 400 amp./sq. m., also with stirring. Deposition of Cu from aq. $CuCl_2$ does not take place until reduction of Cu^{II} to Cu^{I} is complete. R. T.

Structure and properties of electrolytic coatings. I. New methods for studying the porous structure of electrolytic coatings. V. I. Archarov and J. B. Fedorov (J. Tech. Phys. U.S.S.R., 1934, **4**, 1318—1325).—The porosity of Cr coated on brass was deduced from the Zn evaporated on heating the specimen in vac. With increase in thickness of the deposit the porosity increased and then decreased. The results agree qualitatively with those obtained by dipping in HNO_3. The Walker method showed a small no. of large pores in the initial stages of plating. At a later stage a large no. of fine pores covered the surface. Ch. Abs. (*e*)

Multiple nickel-plating on zinc. A. E. Anderson (Platers Guide, 1935, **31**, 12—18, 23—24).—In this process an adherent deposit of soft Ni is superimposed on a thin coating of Ni applied with a cold solution. Operating conditions are described. Ch. Abs. (*e*)

Heavy nickel and chromium [electro-]deposition in England. Recovery of excessively worn machine parts. C. F. Bonilla (Trans. Electrochem. Soc., 1936, **71**, Preprint 2, 9—20).—A description of the Fescol process. J. W. C.

Deposition of manganese [in steel] at the mercury cathode. N. J. Chlopin (Z. anal. Chem., 1936, **107**, 104—107).—In the electrolysis of solutions of Mn steels in H_2SO_4 with a Hg cathode, cathodic deposition of Mn is nearly complete. The amount remaining in solution may be reduced by adding $H_3PO_4 + Na_2HPO_4$, and does not then interfere with the pptn. of Al, *e.g.*, with 8-hydroxyquinoline. J. S. A.

Electrolysis of manganese solutions. S. M. Shelton (U.S. Bur. Mines, Oct., 1936, Rept. Invest. 3322, 29—37).—Mn can be deposited from solutions containing $MnSO_4 + (NH_4)_2SO_4$ (or NH_4Cl) provided the [Mn] is $>$15 g. per litre and the ratio of $NH_4^{\cdot}$ to $Mn^{\cdot\cdot}$ is $\not<$1. The tendency to form nodular deposits is least in the p_H range 6—8. Continuous electrolysis is carried out in a closed diaphragm cell provided with an external circulating system. To prevent the formation of hydrated Mn oxides and improve the quality of the deposit SO_2 is passed into the catholyte. Pb anodes are used and the bath is regenerated by adding $MnCO_3$. Operated at 33 amp. per sq. ft. the current efficiency is 55% and power consumption 4·1 kw.-hr. per lb. of Mn deposited. The product has a purity of 99·85%. J. W. C.

Determination of the thermoelectric homogeneity of a platinum wire. A. V. Makarov and I. V. Plastinin (J. Tech. Phys. U.S.S.R., 1934, **4**, 1195—1203).—An electric furnace for heating small lengths of the wire is described. Ch. Abs. (*e*)

Electrically heated hardening furnaces for light metals. H. Farsky (Aluminium, 1935, **17**, 481—483).—Furnaces for the correct heat-treatment of the pptn.-hardening Al–Cu–Mg alloys are described. Ch. Abs. (*e*)

(A) **Electrometallurgy of aluminium.** V. M. Guskov. (B) **A reply.** G. A. Abramov (Metallurg, 1934, **9**, No. 10, 78—87, 87—89).—(A) It is suggested that the discharge of $Al^{\cdot\cdot\cdot}$ and F' from the cryolite is the primary reaction, and that this is followed by the reaction $Al_2O_3 + 3F_2 + 3C \rightarrow 2AlF_3 + 3CO$. Ch. Abs. (*e*)

Electrometallurgical studies on treatment of alunite. R. G. Knickerbocker and J. Koster (U.S. Bur. Mines, Oct., 1936, Rept. Invest. 3322, 39—64).—SiO_2 (as an impurity) in alunite (a hydrated double sulphate of K and Na) is detrimental to its use in the manufacture of Al. SO_3 cannot be effectively eliminated by calcining the ore in the usual way. Digestion with steam at 200 lb. per sq. in. in presence of K_2SO_4 gives either a normal or a dehydrated K alum + SiO_2–Al_2O_3 gel. Digestion at 1 atm. gives K alum + a zeolite. 90% of the Al_2O_3 can be volatilised by treatment with $Cl_2 + C$ at 500—625° and most of the K recovered by leaching the fume and residues. SiO_2 can be volatilised from the ore by treatment with S-bearing substances under reducing conditions at 1200—1500°. Treatment with $FeS_2 + C$ in the arc furnace leads to considerable volatilisation of Al_2O_3 and SiO_2. Resistance-furnace treatment at 1500° gives a volatile SiO_2 fume of very low Al_2O_3 content. J. W. C.

Erratum.—On p. 324, col. 1, line 17, *for* sq. mm. *read* sq. m., and on p. 410, col. 2, line 24 from the bottom, *for* **47** *read* **55**.

Steam generation [and corrosion].—See I. **Fe-coke. Corrosion from products of combustion. Cutting media [for steel].**—See II. **Stainless steel in dyeing industry.**—See VI. **Damage to Zn on roofs.**—See IX. **Shale oil soap in flotation.**—See XII. **Bitumen and pitch. Protective painting.**—See XIII. **Ag from fixing baths.**—See XXI.

See also A., Dec., 1454, **System Zn–Mg.** 1455, **System Fe–Sb. Magnetic stability of Fe alloys. Fe–Cr alloys. Liquid eutectic alloys. Hall effect in Sb–Te and Sb–Ag alloys. Systems Pd–Cr and Pd–Mn.** **χ of binary alloys of Tl. Equilibrium in alloys. Au–Cu, Ag–Cu, and Au–Ag alloys. System Fe–Co–Cu.** 1474, **Theory of corrosion phenomena.** 1479, **Determining Cd and Ni in Zn.** 1562, **Activation of Ag by acids.**

Patents.

Metallurgical furnace of the suspended-arch type. K. A. Lindner, Assr. to Amer. Smelting &

Refining Co. (U.S.P. 2,029,492, 4.2.36. Appl., 31.5.33).—The side walls are anchored by steel brackets, mainly against a tendency to float. B. M. V.

Apparatus for making open-hearth steel. M. J. Conway (U.S.P. 2,027,151, 7.1.36. Appl., 20.6.34).—In a recuperative, reverberatory furnace, automatic means are provided to maintain a pressure balance between the hot air entering and hot gas leaving the furnace in order to prevent leakage in the ceramic section of the recuperator. The cooler sections are of metal. B. M. V.

Immersion tube-type furnace. G. J. Hales, Assr. to Gen. Electric Co. (U.S.P. 2,030,698, 11.2.36. Appl., 12.4.34).—Tubes or rods are annealed by passage through a larger tube (*T*) extending through a bath (*B*) of molten metal or other heat-transmitting fluid. Sealing between *B* and *T* at the inlet end is effected in a non-rigid manner by cooling and congelation of the fluid; at the other end a welded or other rigid joint is provided. B. M. V.

Bell-type annealing furnace. A. N. Otis, Assr. to Gen. Electric Co. (U.S.P. 2,028,106, 14.1.36. Appl., 23.11.34).—Means for making gastight connexions between bell and base and for the electrical and fluid conduits are described. B. M. V.

Furnaces or apparatus for heat-treatment of metals. Birmingham Electric Furnaces, Ltd., A. G. Lobley, and A. G. E. Robiette (B.P. 455,089, 9.4.35).—In an apparatus comprising a bell, a circulating fan, and a work container, when heat-treatment is finished the circulation of the protective gas is put in communication with cooling devices by slightly raising the bell, insufficiently to break the seal to atm. B. M. V.

Heat-treatment of high-speed steel. C. B. Sadtler, Assr. to Barber-Colman Co. (U.S.P. 2,027,065, 7.1.36. Appl., 15.10.30).—A bath of fused B_2O_3 in a container of pure Ni is used; heating by combustion is contemplated. B. M. V.

Roasting sulphide ores. E. P. Fleming, Assr. to Amer. Smelting & Refining Co. (U.S.P. 2,026,621—2, 7.1.36. Appl., [a] 19.7.33, [b] 31.1.34).—(a, b) Ore is injected while in suspension in, and therefore concurrent with, air tangentially into the top of a preheated chamber, in the lower part of which the ore falls countercurrent to air which is rising and the gases are withdrawn at the neutral zone where the con- and counter-current streams meet. (b) A conical central baffle is provided to increase the whirling speed of ore and air as they descend and thus concentrate the ore close to the wall. B. M. V.

Means for separating minerals from ores. P. R. Yewell (U.S.P. 2,029,090, 28.1.36. Appl., 18.9.33).—The pulp travels by centrifugal force from the centre to the circumference of a rotating table, the heavier constituent being caught by riffles and delivered through downflows to similar tables or as finished concentrate. B. M. V.

Recovery of values from ore pulp. M. Kraut (B.P. 448,852, 12.10.34).—Construction of a subaëration flotation machine, equipped with a helical stirrer revolving at 600—900 r.p.m., through which air is introduced, is claimed. L. C. M.

Increasing the carbon content of iron. T. Tafel, jun., Assr. to M. C. Tafel (U.S.P. 2,021,159, 19.11.35. Appl., 29.4.33).—Fe from the cupola is treated with a mixture of flaked graphite with $NaNO_3$ 15—30 wt.-%; the S content is thereby reduced to 0·1% and the C increased to 3—4%. L. C. M.

[Application of] protective coating of carbides [to tools]. J. A. Zublin (U.S.P. 2,021,040, 12.11.35. Appl., 3.12.34).—Tools etc. are electroplated with Ni before the coating of WC is welded on. L. C. M.

Composition [sintered alloy] for steel-cutting tools, drawing dies, etc. P. M. McKenna, Assr. to Vanadium-Alloys Steel Co. (U.S.P. 2,021,576, 19.11.35. Appl., 1.10.31).—The alloy consists of Ta carbide (I), W, and the carbide of one or more metals of a group consisting of Zr and Hf, the (I) forming 20—85 wt.-% of the mass. The Zr and/or Hf must be present initially in stoicheiometric proportion to enable the W metal to be produced from the carbide during the formation of the composition. L. C. M.

Lined metal containers. F. Krupp A.-G. (B.P. 455,595, 15.6.36. Ger., 20.6.35).—In, *e.g.*, a mild-steel tank lined with alloy steel, the lining is made in $\not<2$ pieces welded together; grooves formed in the tank near the welds enable testing fluid applied between it and the lining to spread everywhere. B. M. V.

Pickling of metal sheets. Rasselsteiner Eisenwerks-Ges. A.-G., J. Remy, and F. Hüttemann (B.P. 448,810, 26.3.35).—An apparatus for pickling fine ($\not<0·2$ mm.) metal sheets is claimed. L. C. M.

[Silver–copper–beryllium] alloy. R. H. Leach, Assr. to Handy & Harman (U.S.P. 2,020,949, 12.11.35. Appl., 6.11.34).—Alloys containing Cu with Ag 5—50 (5, 30) and Be 0·5—2·5 (1·2, 1·75)% are claimed. L. C. M.

Brightening of metals electronegative to iron. G. Dubpernell, A. Arbor, and K. G. Soderberg, Assrs. to Udylite Process Co. (U.S.P. 2,021,592, 19.11.35. Appl., 4.8.32).—A high lustre is produced on articles of, or plated with, Zn, Cd, or Mg by immersion for 5—10 sec. in a solution containing CrO_3 150 and H_2SO_4 3·75 g. per litre. L. C. M.

Sound-reproducing or -recording needle. L. E. Turner (U.S.P. 2,026,760, 7.1.36. Appl., 11.3.35).—A point of Ti carbide is fused to a metallic shank. B. M. V.

Heat-treatment of light-metal alloys containing magnesium. I. G. Farbenind. A.-G. (B.P. 448,944, 17.12.34. Ger., 23.12.33).—A fused salt bath containing $Na_2Cr_2O_7$ 75 and $K_2Cr_2O_7$ 25% is employed at 275—540°. L. C. M.

[Aluminium] alloys for bearings. H. C. Hall (B.P. 448,777, 9.11.34. Addn. to B.P. 426,211; B., 1935, 557).—Al alloys containing (approx.) (*a*) Sn 8—19 (15), Ni and/or Mn 0·8—4·8, and Mg 0—1%, and (*b*) Sn 12, Sb 3, Ni 2, Mn 1, and Mg 0·75%, are claimed. The bearings are normalised by heating at 140—170° for 4 hr. before use. L. C. M.

Cutting metals and conditioning the cut surfaces. Linde Air Products Co., Assees. of H. H. Moss and J. R. Dawson (B.P. 448,853, 8.11.34. U.S., 29.11.33).—An O_2–C_2H_2 cutting apparatus is provided with a succession of reheating flames of lower temp. which retard the rate of cooling of the cut surfaces. L. C. M.

Resistance-welding. D. I. Bohn, Assr. to Aluminum Co. of America (U.S.P. 2,021,477, 19.11.35. Appl., 5.8.33).—In the welding of articles of anodised Al, the coating is punctured by the application of a voltage of 1000—5000, the puncture is enlarged by one of 100—220, and finally the weld is made at 5—10 volts. L. C. M.

Electric welding electrodes. Brit. Thomson-Houston Co., Ltd. (B.P. 448,994, 16.12.35. U.S., 24.12.34).—A rod of star-shaped cross-section is employed; the grooves are filled with flux. L. C. M.

Manufacture of welded metal pipe. G. G. Walker, Assr. to Republic Steel Corp. (U.S.P. 2,028,096, 14.1.36. Appl., 28.10.35).—35 claims are made for the manufacture of longitudinally, electrically butt-welded pipe of steel (C 0·18—0·45, Mn 0·80—1·70, P 0·015—0·020%, Si substantially nil) having tensile strength $>$75,000 lb. per sq. in., yield point $>$70% of the breaking stress, and 25% elongation on 2 in. B. M. V.

Corrosion preventive. H. S. Polin, Assr. to Polin, Inc. (U.S.P. 2,021,519, 19.11.35. Appl., 12.12.33).—Pipes, tanks, etc. subjected to the action of electrolytes are provided with electrodes insulated from the walls, and a controlling system of thermionic valves is utilised to nullify stray currents. L. C. M.

Electrodeposition of metals [nickel and cobalt]. L. Weisberg and W. B. Stoddard, jun., Assrs. to Weisberg & Greenwald, Inc. (U.S.P. 2,026,718, 7.1.36. Appl., 30.3.35).—The electrolyte consists of the sulphate or chloride solution of the metal(s), *e.g.*, Ni and/or Co, in presence of an NH_4 salt 0·5—5·0, a formate 20—100, and CH_2O 0·5—7·5 g. per litre. B. M. V.

Erratum.—On p. 1047, col. 1, line 32 of "B" abstracts, 1936, *for* 2,073,364 *read* 2,013,364.

Casting of metals [jewellery]. T. G. Jungersen (B.P. 449,062, 23.9.35. Can., 27.9.34).

Making [slag-wool] products at high temp. Ore mill. Joints between materials.—See I. **Producing neutral or reducing atm.**—See II. **Cellulose-coated wires.**—See V. **Induction furnaces. Welding electrodes.**—See XI.

XI.—ELECTROTECHNICS.

Present-day position of the use of electric heating in chemical industry and related problems. O. Gross (Chem. Fabr., 1936, 9, 489—493).—A review. D. C. J.

Electrical temperature control. H. O. Meyer (Chem. Fabr., 1936, 9, 494—498).—Methods of electrical thermostatic control, as applied in modern chemical industry, are described. D. C. J.

Electrolytic rectifier. H. A. Yü and P. Y. Tien (J. Chinese Chem. Soc., 1936, 4, 380—387).—Amongst common reagents, 0·8N-$NaHCO_3$ is the best rectifying electrolyte. D. C. J.

Electrical properties of the oxide insulation layer on aluminium. S. Gutin (Tech. Phys. U.S.S.R., 1934, 1, 128—141).—The oxide insulation on Al is stable to thermal discharge up to 500° and has a sp. resistance at 250° of 10^{13} ohms/cm. The oxide layers must be properly dehydrated, compounded, the pores filled with org. substances or with N_2 at 14 atm., and kept dry. Layers obtained by electrolysis in $H_2C_2O_4$ show crystals of γ-Al_2O_3. The layers can absorb up to 36% of H_2O. Ch. Abs. (*e*)

Diffusion of water through [electrical] insulating materials. Rubber, synthetic resins, and other organics. R. L. Taylor, D. B. Herrmann, and A. R. Kemp (Ind. Eng. Chem., 1936, 28, 1255—1263).—The diffusion const., D, for H_2O through various org. substances has been calc., assuming that Fick's linear law is applicable. For non-sorbing materials, *e.g.*, polystyrene, D is independent of changes in v.p. or in the thickness of the material. For sorbing materials, *e.g.*, rubber, D is const. for low, but increases for high, relative v.p. At low relative v.p. D is independent of thickness, but at high relative v.p. D increases with thickness. Addition of inorg. salts to rubber reduces its permeability, the salts acting as desiccating agents. D increases with rise of temp. C. R. H.

Silver oxides used in the production of cæsium photoelectric cells. E. V. Gernet and K. K. Diakov (J. Tech. Phys. U.S.S.R., 1934, 4, 1867—1876).—Surface-cathodic oxidation of Ag in air by a silent discharge gives an oxide of the formula Ag_2O, independent of the layer thickness. Thermal decomp. of this Ag_2O occurs at 250—350°. Ag_2O obtained chemically decomposes at 350—420°. Ag_2O_2 decomposes at 170—220° to $2Ag_2O + O_2$. O_2 and Ag do not react at 350° or at −183°. Differences in various Cs–Ag photocells are due to differences in physical structure. Ch. Abs. (*e*)

Time lag of gas-filled photoelectric cells. I. Kvartschava and P. Timofeev (Tech. Phys. U.S.S.R. 1934, 1, 469—478; J. Tech. Phys. U.S.S.R., 1934, 4, 1698—1706).—The lag is due to the time of passage of the positive ions between electrodes. A-filled cells should have a lower time lag than He- or Ne-filled cells. Ch. Abs. (*e*)

Dehydrating oil.—See II. **Measuring p_H of sulphite liquor. Measuring paper gloss.**—See V. **Analysis of mordanting baths.**—See VI. **Electrofilter for H_2SiF_6. Prep. of $Mg(OH)_2$. Phosphate fertilisers. Producing pure H_2 and O_2.**—See VII. **κ of molten glass. Dielectric losses in glass.**—See VIII. **Treating chrome ores. Reducing Fe oxides. Cu–Fe alloys. Magnetic transformations in C steel. Welding plain steels. Welding etc. Heat-treating magnetic alloys. Determining Cd in Zn. Rare-earth metals. *X*-Rays and metallurgy. Spectral analysis. Electroplating baths. Electrodeposition of Cu and Zn. Electrolytic coatings.**

Ni-plating Zn. Ni and Cr electrodeposits. Depositing Mn from steel. Electrolysing Mn solutions. Pt wires. Hardening light metals. Al. Treating alunite.—See X. **Treating fats and oils.**—See XII. **Electrical properties of rubber mixtures. Röntgenography of rubber etc. Caoutchouc as dielectric.**—See XIV. **Measuring soil corrosivity. Determining PO_4''' in soils.**—See XVI. **Action of short waves on fermentation. Electro-katadyne apparatus.**—See XVIII. **Prep. of Ca lactobionate–$CaBr_2$.**—See XX.

See also A., Dec., 1446, **κ of Mo films.** 1455, **Ferromagnetic Fe alloys. κ of Pd–Cr and Pd–Mn alloys. χ of Tl binary alloys.** 1479, **Determining Cd and Ni in Zn. Determining Cu.** 1480, **Film opaque to ultra-violet light. Photo-electric cells for measuring energy. *X*-Ray fluorescent screen.** 1516, **Electrolysis of opianic acid.** 1527, **Anodic oxidation of alkaloids.**

PATENTS.

Induction furnaces. G. Mars and R. Hirsch (B.P. 454,953, 10.4.35).—In a magnetic circuit, part of the core is omitted and its place taken by the crucible. Part of all of the magnetic system is rotated with respect to the crucible. B. M. V.

Electric induction furnaces. L. Russ (B.P. 454,754, 3.2.36. Ger., 1.2.35).—An annular trough for the charge of metal surrounds a core wound with the primary coil. A formula is given to ensure that the c.d. at the inside circumference is ≮40% of that at the outside. B. M. V.

Positive carbons for intensive arcs with the Beck effect. Comp. Lorraine de Charbons pour l'Electricité (B.P. 456,040, 30.12.35. Fr., 25.1.35).—A C anode having a core composed of C together with one or more metals of at. no. 23—28, viz., Fe, Ni, Co, Mn, Cr, V, and, if desired, rare-earth compounds, *e.g.*, Ce fluoride, is claimed. J. S. G. T.

Welding electrodes. Brit. Thomson-Houston Co., Ltd. (B.P. 455,760, 21.3.36. U.S., 21.3.35).—A flux coating composed of TiO_2 12, Na silicate glass 15, Vermont talc 7, asbestos 5, amorphous SiO_2 5, gum arabic 5, Fe–Mn 10, liquid Na silicate 24, and H_2O 17% is claimed. J. S. G. T.

Manufacture of dielectric material. R. H. Hobrock, Assr. to Western Electric Co., Inc. (U.S.P. 2,020,468, 12.11.35. Appl., 30.3.32).—Paper is impregnated with a 9 : 1 mixture of chlorinated $C_{10}H_8$ or chlorinated stearic acid and paraffin wax, m.p. 71—77°. L. C. M.

Solid rectifying element. O. Geisler, Assr. to Western Electric Co., Inc. (U.S.P. 2,030,443, 11.2.36. Appl., 19.7.34. Ger., 15.3.34).—A dry metallic rectifier is composed of Se sandwiched between roughened Al and another metallic layer, *e.g.*, Pb–Bi alloy. The Se preferably contains alkali metal as impurity, and the Al may be coated with a metal of the Fe group. B. M. V.

Precision resistance. P. H. Dike, Assr. to Leeds & Northrup Co. (U.S.P. 2,026,616, 7.1.36. Appl., 27.5.33).—An unsealed resistance of low temp. coeff. ($<5 \times 10^{-4}$), *e.g.*, of manganin coated with enamel, is preserved from changes of insulation resistance due to humidity by a cover of a mixture of $<\frac{1}{2}$ animal and $>\frac{1}{2}$ vegetable fibre, the supports being non-hygroscopic and the whole coated with ceresine or other neutral wax. B. M. V.

Contact device. E. Habann (U.S.P. 2,027,277, 7.1.36. Appl., 27.8.30. Ger., 16.8.29).—TiO_2, Mn_2O_3, ZnO, Cr_2O_3, Fe_2O_3, WO_3, CuO, or SnO_2 is mixed with metallic powder and pressed in a layer ≯1 mm. thick with such force that the contacts between the particles will cause the voltage drop to vary inversely as the current. In lieu of the metal powder, the oxides may be subjected to a potential of gradually increasing intensity until breakdown occurs, when the mass will be found to be permanently conducting as in the first process. B. M. V.

Apparatus for electrolytically decomposing water. Siemens & Halske A.-G. (B.P. 454,915, 8.5.36. Ger., 24.8.35).—The cell operates under pressure and comprises concentric electrodes more widely spaced in progression according to a formula from circumference to centre to reduce the evolution of heat in the inner parts. B. M. V.

Electrolytes for use in electrolytic condensers. F. C. Stephan, and Telegraph Condenser Co., Ltd. (B.P. 448,830, 31.12.35).—Electrolytes containing sorbitol (I)–H_3BO_3 (II) derivatives, prepared, *e.g.*, by heating a mixture of (I) 50 and (II) 100 g. with aq. NH_3 (*d* 0·88) 20 c.c. until the b.p. rises to 115°, are claimed. L. C. M.

Primary electric [dry] cells. W. W. Puffett, and India Rubber, Gutta Percha, & Telegraph Works Co., Ltd. (B.P. 455,992, 2.5.35).—Venting elements formed, *e.g.*, of braided fibrous material treated with hydrocarbon oils, waxes, metallic soaps, etc., extend through the electrolyte from the sides or ends of the cell. J. S. G. T.

Dry cell. A. S. Johnson, Assr. to Nat. Carbon Co., Inc. (U.S.P. 2,034,817, 24.3.36. Appl., 19.5.32).—The space between the depolarising mix of a dry cell and the Zn can, usually occupied only by pasty electrolyte, is supplied with a fibrous separator consisting of a loosely assembled mass of cellulose fibre, *e.g.*, paper wadding or paper felt, sufficiently dispersed to allow free diffusion of the electrolyte. D. M. M.

[Gas-filled] electric-discharge apparatus [with mercury cathode]. W. Lehmann (B.P. 456,031, 23.10.35. Ger., 23.10.34. Addn. to B.P. 426,039).—Means are provided for displacing the rare-gas filling from the neighbourhood of the anodes and replacing it by Hg vapour as the apparatus becomes heated. J. S. G. T.

[Lead-in for] electric-discharge apparatus. W. Lehmann (B.P. 456,482, 2.1.36. Ger., 2.1., 23., and 25.5., and 28.6.35).—A fusible material, *e.g.*, glass or enamel, is provided in annular channels arranged between a ceramic insulator, *e.g.*, steatite, carrying the current lead, and adjacent metal parts. J. S. G. T.

Electric-discharge devices. Brit. Thomson-Houston Co., Ltd. (B.P. 455,376, 19.2.35. U.S., 19.2.34).—The apparatus comprises two electrodes and a grid and is filled with (*a*) a principal discharge-supporting gas (*e.g.*, Ne) and (*b*) an auxiliary gas (0·01—0·1% of A) of which the ionising potential is $<$ the metastable potential of (*a*). A coating of an alkaline substance is given to the electrodes and of finely-divided Al to the grid. B. M. V.

Luminous electric-discharge devices. Gen. Electric Co., Ltd. From Patent-Treuhand Ges. f. elektr. Glühlampen m.b.H. (B.P. 448,887, 3.1.35. Addn. to B.P. 445,187; B., 1936, 606).—Electric-discharge tubes are provided with an outer glass jacket, internally coated with a substance, *e.g.*, Zn silicate, rhodamine, or a fluorescent dye solution, which is rendered luminescent by the radiation from the inner tube. L. C. M.

Electric-discharge devices comprising luminescent materials. Gen. Electric Co., Ltd., and J. T. Randall (B.P. 456,765, 15.5.35).—Luminescent material, *e.g.*, cryst. Zn borate, containing such impurity, *e.g.*, 0·1% Mn, that the spectrum excited by *X*-ray or fast electrons extends from the red to the green, whilst that excited by slow electrons or ultraviolet light is predominantly red, is claimed. J. S. G. T.

Composite glass container [of electric-discharge devices]. N. B. Reynolds, Assr. to Gen. Electric Co. (U.S.P. 2,030,397, 11.2.36. Appl., 17.12.32).—The silicate glass of such devices containing alkali metal is coated internally (by fusion) with a glass of lower m.p. and having a shorter working range but higher chemical resistance, *e.g.*, borosilicate or -phosphate glass. B. M. V.

Luminous electric-discharge lamps. Gen. Electric Co., Ltd. From Patent-Treuhand Ges. f. elektr. Glühlampen m.b.H. (B.P. 456,184, 19.8.35).—A series-resistance formed on the exterior surface of the lamp is covered with an insulating coating. J. S. G. T.

(A, B) Gaseous electric-discharge lamp, and (C, D) manufacture of fabricated glass articles [therefor]. (A, B) A. Rüttenauer and (B) O. Fritze, (C, D) O. Fritze and A. Rüttenauer, Assrs. to Gen. Electric Co. (U.S.P. 2,030,402—3 and 2,030,439—40, 11.2.36. Appl., [A] 7.8.35, [B] 14.8.35, [C] 18.12.34, [D] 20.12.34. Ger., [A] 20.8.34, [B] 25.8.34, [C] 16.3.34, [D] 3.1.34).—(A) The atm. emits visible rays, and also ultra-violet rays which are converted into visible rays by a coating comprising yellow-white Zn silicate 90—97% and CaWO$_4$ 10—3%. (B) To assist in the exciting of rhodamine (I) to emit visible rays, another fluorescent material, *e.g.*, the above coating, is placed between the gaseous discharge and (I), inside the bulb, (I) being outside. (C) For attachment of the coating a covering of enamel of lower softening temp. (*t*) than that (θ) of the bulb is first fused on, then a binder of b.p. $<\theta$, then the coating, and finally the whole is heated to *t*. (D) is the same as (C), but without enamel, the fusion/volatilisation being effected at pressure slightly $>$ atm. B. M. V.

Luminous electric-discharge tubes. Soc. Anon. pour les Appl. de l'Électricité et des Gaz Rares, Établ. Claude-Paz & Silva (B.P. 455,683, 9.3.36. Fr., 7.12.35).—The fluorescent internal coating comprises Zn silicate and a phosphorogenic substance; the filling gas is pure Xe and/or Kr, without Hg. B. M. V.

Luminous electric-discharge tubes. Gen. Electric Co., Ltd. From Patent-Treuhand Ges. f. elektr. Glühlampen m.b.H. (B.P. 456,613, 2.10. and 5.12.35).—Metal, *e.g.*, Hg, from which vapour is to be generated is contained in a hollow electrode closed at one end by a diaphragm having holes so small that only vapour can pass through. J. S. G. T.

Cathode-ray tubes. N. V. Philips' Gloeilampenfabr. (B.P. 456,629, 24.2.36. Ger., 29.5.35).—The inner side of the side wall of the tube is at least partly coated with a conducting black layer consisting of one or more metals, *e.g.*, Ag, Mo, or conducting or semi-conducting inorg. compounds, *e.g.*, MoS$_2$, CuS, PbS, NiO. J. S. G. T.

Fluorescent screens suitable for use in cathode-ray tubes. Marconi's Wireless Telegraph Co., Ltd., Assees. of H. W. Leverenz (B.P. 456,755, 14.5.35. U.S., 23.5.34).—Particles of fluorescent material, *e.g.*, willemite (passing through 400-mesh), are allowed to settle, under gravity, upon a base member in an electrolyte, *e.g.*, a solution of CO$_2$ or (NH$_4$)$_2$CO$_3$, having an ionic dissociation const. $>10^{-10}$. J. S. G. T.

Fluorescent material [for television cathode-ray tubes]. Farnsworth Television (B.P. 456,561, 2.3.36. U.S., 13.3.35).—A screen material composed of unactivated Zn tungstate purified so that impurities affecting fluorescence are reduced to <1 p.p.m. is claimed. J. S. G. T.

Cathode-ray tubes [for television receivers]. W. J. Jarrard, and Baird Television, Ltd. (B.P. 455,973, 30.4.35).—An achromatic lens made of two transparent synthetic resins, *e.g.*, "Trolitul" and "Perspex," is moulded to fit the end face of the tube adjacent to the viewing screen. J. S. G. T.

Photoelectric tube. H. Geffcken and H. Richter, Assrs. to Radio Corp. of America (U.S.P. 2,031,102, 18.2.36. Appl., 20.7.31. Ger., 21.7.30).—Improved sensitivity is claimed for a photoelectric cell made by coating a layer of a heavy-metal, *e.g.*, U, salt on a base-metal support and converting the salt into the oxide by a glow discharge in presence of O$_2$ under reduced pressure. The tube is then evacuated, warmed up, and the alkali metal admitted in small quantity during extended heating to 200—350° with a simultaneous glow discharge. D. M. M.

Manufacture of photoelectric tube. J. H. de Boer, J. Bruynes, and M. C. Teves, Assrs. to Radio Corp. of America (U.S.P. 2,029,414, 4.2.36. Appl., 1.7.33. Ger., 22.7.32).—In a tube embodying a photoelectric electrode containing alkali metal (Cs), a metal (Zn, Cd, or Hg) capable of forming at $<150°$ non-volatile alloy with the excess of Cs is placed within the tube at a point remote from the electrode. B. M. V.

Electric resistance heating elements. Walsall Conduits, Ltd., W. Whalley, and A. E. Read (B.P. 455,507, 18.5.35).

Production of Röntgen rays of great penetrating capacity. S. Erdos and J. Bittera (B.P. 456,268, 5.2.35).

Preparation of the light-sensitive electrode of photoelectric cells. W. Heimann (B.P. 455,899, 16.5.36. Ger., 20.5.35).

[Dry] electrolytic condensers. Hydrawerk A.-G., and G. Nauk (B.P. 456,254, 2.3.36).

Thermostats. Temp. indicators.—See I. **Electrode C. Graphite. C_2H_2. Impregnating pitch. Dehydrating oils. Treating hydrocarbon fuels. Dewaxing oil. Testing used lubricating oil.**—See II. **Esters.**—See III. **Cellulose-coated wires. Controlling the thickness of paper.**—See V. **H_3PO_4. Coating abrasive sheet.**—See VIII. **Coating tools. Welding. Welded metal pipe. Corrosion preventative. Ni- and Co-plate.**—See X. **F compounds containing rubber.**—See XIV. **Treating [plant] materials.**—See XVI. **Photographic exposure processes. Radiograph screens.**—See XXI.

XII.—FATS; OILS; WAXES.

Antioxidants and autoxidation of fats. VII. Classification of inhibitors. H. S. Olcott and H. A. Mattill (J. Amer. Chem. Soc., 1936, **58**, 2204—2208).—Hydrogenated cottonseed oil is treated with EtOH–HCl and the resulting crude esters (freed from H_2O-sol. substances, but containing the original unsaponifiable matter) are used to assay inhibitors by the O_2-absorption method (B., 1935, 731). Active antioxidants are H_2SO_4, H_3PO_4, $H_2C_2O_4$, $AcCO_2H$, malonic, tartaric, citric, malic, and maleic acids, o-$C_6H_4(OH)_2$, pyrogallol, α-$C_{10}H_7$·OH, 1 : 5-$C_{10}H_6(OH)_2$, and kephalin; quinol (I) is slightly effective, but inhibitol concentrates (II) (B., 1936, 1164) and numerous other acids are inactive. The distilled esters (b.p. $<160°/0·1$ mm.), however, are protected by (I) (very active) and (II), but not by the above acids; the activity of (II) is greatly enhanced by admixture with the acids. This synergistic effect of (II) + acid is found with lard, fatty acids (from palm oil), Me oleate, and octadecene, but not with vegetable oils. Inhibitors are classified as (i) acid type, (ii) (I) and (II), (iii) phenolic type [*e.g.*, α-$C_{10}H_7$·OH, o-$C_6H_4(OH)_2$, pyrogallol]. Data are given to show that (II) do not protect the vegetable oils from which they are obtained (cf. *loc. cit.*).

H. B.

Acid tar as a hydrolytic agent for fats. A. Rabinovitsch and V. Muromtzeva (Maslob. Shir. Delo, 1934, **10**, No. 9—10, 6—7).—The tar produced by the acid refining of solar oils by oleum contains H_2O-sol. sulphonic compounds which can emulsify fats. Hydrolysis by acid tar should be carried out in two stages (2·5% of tar and 0·3% of H_2SO_4 for each stage).

Ch. Abs. (*e*)

Modern electrolytic treatment of fats [and oils]. Anon. (Oil and Col. Tr. J., 1936, **90**, 1355—1356).—A process for polymerising oils by the action, on thin films of the oil, of a high-frequency (500—700 ~ /sec.) a.c. is described. In general, mol. wt., η, and content of saturateds increase, I val. decreases, and the sap. val. is not appreciably altered. Products suitable for use in paints and varnishes, and others for use in soap-making, may be obtained according to the voltage, frequency, and raw material employed.

D. R. D.

Determining the fat content of oil seeds and cake by the shaking method. P. Zautschenko, L. Krupitzkaja, and K. Kochova (Trad. VNIIZh, 1934, No. 2, 2—8).—A sample of seeds (1 g.) or press cake (2 g.) is wrapped in filter-paper, covered with light petroleum, and shaken for 1 or 2 hr. Fat is determined in an aliquot portion of the extract.

Ch. Abs. (*e*)

Determination of saturated compounds in fats and oils. D. Nikitin (Trud. VNIIZh, 1934, No. 2, 35—59).—A crit. review. Ch. Abs. (*e*)

Fat and oil microscopy. V. C. Mehlenbacher (Oil & Soap, 1936, **13**, 277—282).—The appearance of the structures obtained by recrystallisation of a no. of common fats, their fatty acids, and K soaps are illustrated by photomicrographs; the structures observed with palm oil, rice-bran and babassu oil fatty acids, and with teaseed oil treated with KOH are especially characteristic. E. L.

Determination of m.p. of fats and waxes. J. A. Scarrow (Canad. Chem. Met., 1936, **20**, 305—306).—A method is described which depends on the movement of the sample at the softening point in an open capillary tube under hydrostatic pressure. Sharp, easily reproducible end-points are claimed.

F. C. B. M.

Manufacture of soap by Bogdanov's continuous process. G. Bogdanov and E. Elisafova (Maslob. Shir. Delo, 1934, **10**, No. 9—10, 3—6).—The best results are obtained by the simultaneous use of powdered Na_2CO_3 and aq. NaOH (d 1·38—1·45). The proportions are such that the excess of alkali in the soap always consists mainly of Na_2CO_3, and not of $NaHCO_3$. Up to 30% of auxiliary materials (rosin, naphthenic soaps, etc.) may be present. It is advisable to add 10—12% of H_2O to render the mass more homogeneous and plastic. Ch. Abs. (*e*)

Separation of unsaponifiable material from solutions of synthetic-acid soaps. V. Varlamov and N. Davidova (Maslob. Shir. Delo, 1934, **10**, No. 9—10, 17).—A method of extraction, using ligroin above 80°, is described. The extracted soap retains 23—25% of ligroin; further purification is required. Ch. Abs. (*e*)

Rapid bleaching of liquid toilet soaps. K. Lukin (Maslob. Shir. Delo, 1934, **10**, No. 9—10).—The soap paste (30—35% of fat acids) is dissolved in 95% EtOH and treated with freshly-pptd. $Al(OH)_3$ (I), free from Na_2SO_4. This aids a rapid sedimentation of impurities. The soap is decanted and the (I) residue similarly treated with 12—15 batches of soap. The (I) is then treated with H_2SO_4.

Ch. Abs. (*e*)

Effect of constitution of soaps on their germicidal properties. M. Bayliss (J. Bact., 1936, **31**, 489—504).—The toxicity towards *Pneumococcus* of hydroxylated and saturated soaps was < that of the corresponding unsaturated soaps. Na lauryl (I) and oleyl sulphate (II) had high germicidal potency. *S. lactis* was more resistant to soaps, but was readily killed by Na myristate, laurate, oleate, linoleate, linolenate, clupanodonate, ricinoleate, and abietate, and also by (I) and (II). Na di-iodosalicylate and undecoate in 1% solution were effective against *E. coli* and *S. aureus* at p_H 8·0. Against the latter organism Na abietate is effective at $p_H > 8\cdot5$. A. G. P.

[Use of] shale oil soap and tar in the textile industry and in flotation. I. R. Kljatschko (J. Appl. Chem. Russ., 1936, **9**, 1596—1604).—Shale oil soap does not form a ppt. with hard H_2O, has a very small content of insol. oils, and strongly depresses σ; the chief objection to its use in the textile industry lies in its dark colour. In the separation of minerals it acts as a depressor, increasing wettability, whilst shale tar (heavy fraction) has the opposite effect. R. T.

Alkalis in the wash wheel. C. E. Lennox and J. S. Sandtner (Oil & Soap, 1936, **13**, 257—261).—The extent of the buffering effect of the soil present in commercial batches of soiled (white) clothes on solutions of a no. of common alkalis is indicated from studies of the change in p_H of the wash liquors with increasing additions of the alkali. E. L.

Eliminating inaccuracies in present official method for [determining] free alkali [in soap]. E. R. Luckow (Oil & Soap, 1936, **13**, 287—288).—An apparatus facilitating the exclusion of CO_2 while the soap sample is being dissolved by intermittent circulation of the EtOH solution is described; in order to avoid the dissolution of salts as well as of free caustic alkali (I) the concn. of the soap in the EtOH should be $\nless 2\cdot5\%$, and the insol. residue should not be washed with fresh EtOH prior to the titration of (I). E. L.

Tall oil fatty acids. F. Kolke (Farben-Ztg., 1936, **41**, 1186).—The esters thereof have very limited possibilities as varnish ingredients owing to disadvantages in colour, drying time, odour, elasticity, and durability. S. S. W.

Recovery of crude glycerin. O. H. Wurster (Oil & Soap, 1936, **13**, 246—253, 283—286).—The purification of spent soap lyes and the design and operation of the Wurster–Sanger single- and double-effect glycerin evaporators are described. E. L.

Method for obtaining vegetable oils. A. I. Skipin (Vseso. Nauch. Issledov. Inst. Shir., 1935, 40 pp.).—The Skipin method is described in detail. Ch. Abs. (*e*)

Properties of linseed oil, heat-bodied in air and vacuum, and its behaviour with pigments, with and without wetting agents. New York Paint & Varnish Production Club (Ann. Conv. Fed. Paint, Var. Prod. Clubs, Chicago, 1936; Nat. Paint, Var. Assoc., 1936, Circ. 523, 409—437 and Suppl., 100 pp.).—Alkali-refined linseed oil was bodied in air and in vac. to a wide range of η at 279°, 302°, and 316°. Samples were withdrawn at intervals and determinations of the following physical and chemical properties made: η, d, n_D, acid, I, sap., peroxide, and Ac vals., % insol. in $COMe_2$, and the Hess–Ives and Gardner colour nos. Pastes were made by grinding 13 pigments with the oil samples, and flow, break time, grinding characteristics, and consistency changes of the paints observed. In some cases comparison was made between Stormer viscosimeter, Consistometer (modified mobilometer), Gamble torsion balance, and Penetrometer consistency data. Changes in colour intensity of the pastes with increasing η were noted when C black and Chinese-blue were used. The effect of wetting agents on flow, dispersion, and consistency of pigment–oil pastes has also been studied, and pigment dispersion has been examined microscopically. Titanox-C and lithopone flat-wall paints and TiO_2–ZnO gloss paints were made with some oil samples and their colour, colour changes, gloss, and consistency measured. Air-bodied oils were found to resemble vac. oils except for the lighter colour and lower acid val. of the latter. That the chemical structure of the oil is profoundly modified during the early stages of bodying (from η 0·4 to 10 poises) is indicated by the rapid alteration during this period of acid val., I val., n_D, d, and solubility in $COMe_2$. Above 10 poises η increases rapidly, but other properties change slowly. F. C. B. M.

Physical properties of oil films. III. Drying time and durability of oil mixtures. F. Scofield (Nat. Paint, Var. Assoc., Nov., 1936, Circ. 522, 295—301; cf. B., 1936, 1165, 1107).—Addition of 20—40% of oiticica or tung oil increases the drying time of the slower-drying oils to that of raw linseed oil, and increases durability. Larger quantities have no added effect on drying time. 50—60% of perilla oil has a similar effect on this property, except with safflower oil, but does not increase durability. Fish oil increases the drying time only of soya-bean oil. F. C. B. M.

Ash content of linseed-oil cake. N. Matveev (Maslob. Shir. Delo, 1934, **10**, No. 9—10, 33—34).—The average ash content of linseed is 3·74%. It is increased by unfavourable conditions which prevent development of the acidity of the oil. Ch. Abs. (*e*)

Oiticica oil. J. Bontebal (Chem. Weekblad, 1936, **33**, 717—718).—A review.

Tung oil. M. J. Hausman (Amer. Paint J., 1936, **14**, No. 9, 17—19, 22).—A general account of the production and uses of tung oil, with special reference to the economic position in America. D. R. D.

Removal of oil from sunflower-seed oil cake. N. Beliaev (Maslob. Shir. Delo, 1934, **10**, No. 9—10, 30—33).—The treatment is best carried out in a neutral medium, as otherwise proteins are rendered sol. The min. amount of H_2O is 4 times the vol. of the oil cake. The best results were obtained by using SO_4'' and SiO_3'', and boiling for 2—4 hr. Cl' gave the poorest results. A max. separation of oil was obtained with 4% of Fe sulphate. Ch. Abs. (*e*)

Refractometric determination of iodine value in flax-seed oils. L. Zeleny and D. A. Coleman (Oil & Soap, 1936, **13**, 253—256).—96 samples of oils, cold-pressed or extracted at room temp. by Et_2O

from freshly-ground samples of flax seed of different varieties from various countries, or districts, including frost-damaged, scabby, and immature specimens, had I val. (Wijs, 1 hr.) 155·4—197·3, n^{25} 1·47582—1·48065. The correlation between I val. and n^{25} was +0·9965 with a standard error of prediction for I val. of ±0·82. The linear relation could be expressed as: I val. = 8584·97n^{25} − 1251·83 (the graph and a convenient table are given), the max. and average errors being 1·8 and 0·6, respectively. The method cannot be applied to mouldy seed, or to commercial (processed) oils, but is valuable to flax-seed crushers as a rapid means to predict the quality of the oil to be expected from given batches of seed. E. L.

Edible oils. H. Jesser and E. Thomae (Angew. Chem., 1936, **49**, 846—847).—Colour reactions with $SbCl_3$, $AsCl_3$, and Ac_2O are recommended for the examination of edible oils, particularly soya-bean and poppy-seed. The reactions in question are due to unsaponifiable constituents, probably sterols. A table of reactions is given. F. L. U.

Inhibited deposition of stearin from chilled olive oil. W. Clayton, S. Back, R. I. Johnson, and J. F. Morse (Nature, 1936, **138**, 801).—After addition of 0·1—0·5% of air-blown cacao butter, olive oil remains liquid and free from deposited stearin on storage at 2—4°. The inhibition is sp. L. S. T.

Hazel-nut oil. S. H. Bertram (Öle, Fette, Wachse, Seife, Kosmetik, 1936, No. 14, 3 pp.).—The oil (54%) extracted by light petroleum from French hazel kernels (*Corylus avellana*, L.) had d_{20}^{20} 0·9144, n_D^{28} 1·4691, n_D^{20} 1·4690, sap. val. 192·0, I val. (Hanus) 86·8, free fatty acids (as oleic) 0·71%, unsaponifiable matter 0·35%. The m.p. and n^{40} of the fatty acids were 19° and 1·4527, respectively; hexabromides 0; carotene reaction positive. The oil contained saturated acids (Bertram) 8·05%, oleic acid (I) 78·2%, linoleic acid (II) 9·1%. *iso*Oleic acids are absent, but owing to the low content of (II) the "solid" acids obtained by the Twitchell separation retain some (I) and show a high I val. (*e.g.*, 68—70). (I) cannot be freed satisfactorily from more unsaturated impurities by recrystallisation of the Li salt from EtOH. E. L.

Liver oil from *Dasyatis akijei*: vitamin contents, physical and chemical constants. T. H. Wang and C. H. Kan (J. Chinese Chem. Soc., 1936, **4**, 393—401).—The liver of the fan fish yields, when pressed, about 40% of oil [m.p. 7—8°, f.p. 8—9°, d_D^{20} 0·8914, n_D^{20} 1·4777, I val. (Hübl) 92·99, sap. val. 194·6, free acid val. 0·04, Ac val. 21·5, unsaponifiable matter 7·98] which affords 92·08% of acid (oleic 8·0—8·26, linoleic 17—18·92, linolenic and *iso*linolenic 1·6—2·46, clupanodonic 4·78, palmitic 18·61, and stearic 44·89) and contains 1000 units of vitamin-*A* and 200 of -*D* per g. R. S. C.

Fish-liver oils and vitamins. F. Unger (Pharm. Ztg., 1936, **81**, 1011—1013).—The fish and livers which serve as starting material for the prep. of cod-liver oil are described. The livers of most kinds of *Gadus* contain 46—54% of oil, and the ratio of vitamin-*A* and -*D* in the oil varies from 6 : 1 to 10 : 1, but in some cases the amount of -*A* may be < that of -*D*. Objectionable properties of the oil which depend on physiological and pathological conditions of the livers and the adulteration of the oil with other liver oils are discussed. J. N. A.

Two new developments in the analysis of sulphonated oils. Report of a Committee [of the Society of Leather Trades Chemists]. D. Burton and G. F. Robertshaw (J. Soc. Leather Trades Chem., 1936, **20**, 495—498).—The xylene method of determining H_2O in NH_3-neutralised oils is inaccurate, since the NH_3 lowers the *d* of the distillate; this should therefore be determined and a correction made. The use of C_7H_{16} is discussed. Other possible errors in the H_2O determination are noted. The authors' method for the determination of the oil content of sulphonated oils (B., 1936, 1106) is recommended. D. W.

Hydrogenation tests [on oils] in presence of nickel formate. V. Jashtschenko (Maslob. Shir. Delo, 1934, **10**, No. 11, 22—23).—50 kg. of $(HCO_2)_2Ni$ (I) are mixed with 500 kg. of oil at 80—120°. H_2 is passed in and the temp. raised gradually to 420°. The (I) is reduced. The resulting catalyst is superior to that normally used. Ch. Abs. (*e*)

Non-fatty oil [liquid wax] from Jojoba seed. R. S. McKinney and G. S. Jamieson (Oil & Soap, 1936, **13**, 289—292; cf. A., 1933, 1093).—Jojoba seeds from Mexican *Simmondsia californica*, Nutt, contained 4·7% of H_2O and 51·2% of a pale liquid wax (extracted by light petroleum) having n^{25} 1·4648, d_{25}^{25} 0·8642, I val. (Hanus) 81·7, acid val. 0·32, sap. val. 92·2, glycerol 0%, unsaponifiable matter [I val. (Rosenmund–Kuhnhenn) 77·2, Ac val. 171·8] 48·3%; the total fatty acids had I val. (Hanus) 76·1 and neutralisation val. 172·0. Fractionation and hydrogenation of the constituents indicated the presence of the following acids (approx. % of wax): saturated (Bertram) 1·64, palmitoleic 0·25, oleic 0·7, eicosenoic 30·3, docosenoic 14·2; and alcohols: eicosenol 14·6, docosenol 33·7, and small amounts of lower (saturated) alcohols and hexacosenol. On heating to 300° the wax becomes colourless. E. L.

Cutting media [for steel]. Lubricants. See II. **Copal oil.**—See XIII. **Butter-fat consts. Fats for frying potato chips. Dietetic val. of palm oil. Vitamin-*A*. Feeding-meals. Soya-bean meal.**—See XIX. **Determining cod-liver oil in malt preps.**—See XX.

See also A., Dec., 1487, **Esterification with Twitchell's reagent. Catalytic hydrogenation of fatty oils.** 1533, **Fats from *Oreocincla dauma*.** 1534, **Oil from male silk-worm butterfly.** 1535, **Minor components of cow-milk fat.** 1566—8, **Vitamins.** 1568, **Antirachitic val. of cod-liver oil.** 1570, **Seed oil of *Digitalis lanata*.**

Patents.

Production of oxidation products of castor oil and the like. M. De Groote and B. Keiser, Assrs. to Tretolite Co. (U.S.P. 2,025,806—9, 31.12.35. Appl., [A—D] 30.1.35).—Castor oil is oxidised by an O_2-containing gas (normally moist air) at 120—150°

(120°)/25—125 (45) lb. per sq. in. in presence of (A) a derivative of $\Delta^{\iota\lambda}$-octadecadienoic acid (dehydrated castor oil), (B) undecenoic acid, (C) α-pinene (American turpentine), and (D) a monocyclic terpene of the formula $C_{10}H_{16}$ (dipentene) (10—20 wt.-% in every case). The product is believed to consist of poly-keto- or -aldehydo-fatty compounds. H. A. P.

Sulphurising fatty oil. K. W. POSNANSKY and C. SANDVOSS (DR. ALEXANDER & POSNANSKY) (B.P. 455,779, 21.3.35. Ger., 26.3.34. Cf. B.P. 453,921; B., 1936, 1221).—Pale, Cl-free factice is prepared by treating fatty oils with polysulphides at $>100°$ (150°) in presence of stabilising substances, *e.g.*, a chlorinated aliphatic hydrocarbon; the product, possibly containing free S, may be further vulcanised with S_2Cl_2 or H_2S, during which process solid or liquid loading materials or mineral oils may be present. E. L.

Manufacture of adherent greases. STANDARD OIL DEVELOPMENT CO. (B.P. 455,735, 22.10.35. U.S., 14.3.35).—Latex, or preferably a dispersion of latex or natural rubber in mineral oil, is incorporated in a Ca soap–lubricating oil grease (to a final content of $\not> 5\%$ of rubber). The ingredients may not be blended simultaneously as in the case of the corresponding Al-soap greases, as only a heavy fluid results. E. L.

Packing fluid seals.—See I. **Lubricants.**—See II. **Agents for stabilising suspensions etc. Assistants in textile etc. industries. Condensation products.**—See III. **Lubricant for fibres.**—See V. **Castor oil derivative.**—See XIII. **Cleaning compound for leather.**—See XV. **Castor oil prep.**—See XX.

XIII.—PLASTICS; RESINS; PAINTS; COATING COMPOSITIONS.

Colloid-chemistry and physics of organic plastics. R. HOUWINK (Kolloid-Z., 1936, **77**, 183—201).—A review of published work. E. S. H.

Methods of testing plastics. G. M. KLINE and B. M. AXILROD (Ind. Eng. Chem., 1936, **28**, 1170—1173).—A simple photometer, called the "hazeometer," is described, which measures the haziness and light transmission of plastics. Scratch-resistance is measured by the Bierbaum "microcharacter," and indentation hardness by a Vickers hardness-testing machine. Correlation between these last two properties is shown by cellulose nitrate, ethylcellulose, and acrylate resin plastics, but not by cellulose acetate, vinyl or styrene resins. L. A. O'N.

Tailoring the long molecule. Plastics. C. ELLIS (Ind. Eng. Chem., 1936, **28**, 1130—1144).—A review of the methods of formation and degradation of macromol. structures. 75 references are given. L. A. O'N.

Purification of rosin. P. RUFIMSKI (Maslob. Shir. Delo, 1934, **10**, No. 9—10, 18).—The rosin is crushed, melted in a kettle, set aside for 30—60 min., decanted into a second kettle, and boiled for 1 hr. with 20% of NaCl solution (*d* 1·06). The NaCl treatment is repeated until the colour is sufficiently light. CH. ABS. (*e*)

Analysis of shellac. F. TARADOIRE (Ann. Chim. Analyt., 1936, [iii], **18**, 285—289).—Methods of determining ash ($\not> 1$), org. impurities ($\not> 2·5$), moisture ($\not> 2$), resin ($\not> 3$), waxes ($\not< 2\%$), and acid val. are described. A good flake lac should have the above % vals. (given in parentheses). F. C. B. M.

Resins. XXIV(I). **Characteristics of shellacs. XXV**(I). **British Guiana copals.** E. STOCK (Farben-Ztg., 1936, **41**, 794—795; cf. B., 1936, 651).—XXIV. Acid and sap. vals. and m.-p. range of 19 samples of various types of shellac are tabulated.

XXV. Two small samples (one fossil, one recent) had acid val. 40·52, 33·3; sap. val. 77·0, 75·6; sinter point 125°, 115°; m.p. 330°, 150°, respectively, and showed differences in appearance and in fluorescence phenomena. S. S. W.

Congo copal resin. II. Copal oil. F. TROST and V. DEBELLI (Annali Chim. Appl., 1936, **26**, 301—305; cf. B., 1935, 641).—From the neutral fraction of copal oil two hydrocarbons, $C_{14}H_{22}$ (I) and $C_{18}H_{28}$ (II), have been isolated. (I) is a tetramethylhexahydronaphthalene with Me at positions 1, 2, 5, and 4 or 9, identical with that obtained from the oil of Brazilian copal. (II) is tricyclic, with two double linkings. (I) and (II) both yield 1 : 2 : 5-$C_{10}H_5Me_3$ on dehydrogenation. The absorption of O_2 by the hydrocarbons has been studied. L. A. O'N.

Hydrogenation of Congo copal. E. MERTENS, L. HELLINCKX, and C. DE HOFFMANN (Bull. Soc. chim. Belg., 1936, **45**, 637—640).—Catalytic hydrogenation of Congo copal, using Ni–quartz catalyst at 350—400° under 100 kg./sq. cm. pressure, effects both hydrogenation and two successive decarboxylations. The main fraction (b.p. $<200°$) of the resulting oil possesses negligible I and acid vals. R. F. P.

Resins from cracked distillates. Dispersing and wetting properties. C. A. THOMAS and F. J. SODAY (Ind. Eng. Chem., 1936, **28**, 1174—1176).—TiO_2 pigment, in solutions of different resins in non-polar solvents, shows greatest flow and least settling in the case of petroleum resin, and this resin is the most effective in reducing the grinding time of TiO_2 and lithopone in linseed oil. The settling increases with increasing unsaturation of the hydrocarbon resin until an I val. of 180 is reached, when it begins to decrease again. L. A. O'N.

Polymerisation of vinyl acetate. K. G. BLAIKIE and R. N. CROZIER (Ind. Eng. Chem., 1936, **28**, 1155—1159).—The manufacture of polyvinyl acetate (I) is described. The η of the product is determined by the % conversion, temp., nature of the solvents, concn. of the catalyst, and the presence of impurities (*e.g.*, MeCHO). The prep. of insol. (I), an insol. copolymeride with divinyl ether, and the secondary polymerisation which takes place on steam-distillation of (I) are discussed. The behaviour of polymerides of different η on degradation by milling, heating in solvents, hydrolysis by conc. acids and dil. alcoholic acids and alkalis is studied. Insol. polymerides may be converted into sol. materials by these methods. (I) may be hydrolysed by alcoholic alkali to the polyalcohol, and reacetylated to a product of lower η, but further hydrolysis and reacetylation do not change the η. It is suggested that (I) may consist of chains of various lengths joined by weak links in a degree $\propto$ its solubility. L. A. O'N.

Polymer[ide] distribution in vinyl ester resins. S. D. DOUGLAS and W. N. STOOPS (Ind. Eng. Chem., 1936, **28**, 1152—1155).—Vinyl chloride–acetate resin has been separated into a series of mol.-wt. bands by fractional pptn. from $COMe_2$ solution, and their mol. wt. and physical properties have been determined. Heat distortion, H_2O absorption, n, and Brinell hardness are practically independent of mol. wt. for fractions of mol. wt. 5000. Tensile and impact strengths, fatigue-resistance, and moduli of rupture and elasticity show a rapid increase between 5000 and 8000, and a gradual increase at $>$8000. L. A. O'N.

Use of polymerised vinyl acetate as an artists' medium. H. E. IVES and W. J. CLARKE (Tech. Stud. Field Fine Arts, 1935, **4**, 36—41).—Various pigments were ground into a vehicle containing polyvinyl acetate (I) 19·6, Bu_2 phthalate 2·0, and Bu lactate 78·4%. Films with an egg-shell surface were obtained. Ordinary canvas was unsatisfactory as a ground, but oil-primed canvas, asbestos-cement composition, or anodically oxidised Al could be used. A solution of (I) in Et lactate may be used as a varnish for paintings. It is permeable to moisture and is not gasproof. CH. ABS. (*e*)

Resin from furfuryl alcohol. I, II. G. ROBERTI and D. DINELLI (Annali Chim. Appl., 1936, **26**, 321—324, 324—330).—I. A soft or a hard resin may be obtained by polymerisation of furfuryl alcohol (I), with I as catalyst, in the cold or at raised temp. Its electrical and mechanical properties are satisfactory, with the exception of the breaking stress, which is low. Addition of 10% of furfuraldehyde to (I) increases this, but lowers the other mechanical properties. The resin in the gummy state is suitable for the manufacture of pressed pieces.

II. The mechanism of the polymerisation is discussed. In the formation of the resin, H_2O, CH_2O, and HCO_2H are eliminated. Fractionation of the resin yields difurfuryl ether, a fraction (b.p. 77—95°/9 mm.) which affords a $HgCl_2$ derivative identical with that from difurylmethane, and a compound $C_{25}H_{22}O_5$, m.p. 94°. L. A. O'N.

Methacrylate resins. E. I. DU PONT DE NEMOURS & Co. (Ind. Eng. Chem., 1936, **28**, 1160—1163).—The effect of temp., light, and O_2 on the polymerisation of methacrylic esters is studied. At $<$100°, O_2 is essential to the reaction. The softening point of the aliphatic esters decreases as the mol. wt. of the alcohol increases. The properties and uses of the resins are described. L. A. O'N.

Terpene–maleic anhydride resins. E. R. LITTMANN (Ind. Eng. Chem., 1936, **28**, 1150—1152).—The chemistry and properties of the resins are discussed. The α-phellandrene–maleic anhydride (I) resin base contains about 10% of polymeride and the α-terpinene–(I) base about 50%. The ratios of (I) to terpene in the polymerides are 4 : 3 or 5 : 4 and 2 : 1 or 3 : 2, respectively. L. A. O'N.

Mechanism of hardening of phenol–aldehyde resins. J. SCHEIBER and R. BARTHEL (J. pr. Chem., 1936, [ii], **147**, 99—109).—" Novolacs " (*i.e.*, phenol–aldehyde condensation products which give insol., hard products only when heated with compounds containing a CO) have the constitution $OH{\cdot}C_6H_4{\cdot}[CH_2{\cdot}C_6H_3(OH)]_n{\cdot}CH_2{\cdot}C_6H_4{\cdot}OH$. " Resols " (*i.e.*, phenol–aldehyde condensation products which become hard and insol. when heated alone) are $OH{\cdot}C_6H_4[CH_2{\cdot}C_6H_3(OH)]_n{\cdot}CH_2{\cdot}C_6H_3(OH){\cdot}CH_2{\cdot}OH$. Compounds $CAr_2{:}CH_2$ do not polymerise readily when heated; thus hardening of novolacs is not due to formation of $CH_2{:}C(C_6H_4{\cdot}OH)_2$; it is also not due to change to $CH_2{:}C(OPh)_2$, since, although $CH_2(OPh)_2$ gives $CH_2(C_6H_4{\cdot}OH)_2$ when heated for several hr. with mineral acid, these conditions are not those used in hardening resins; further, products from *m*-4- and *m*-2-xylenol do not condense with $(CH_2)_6N_4$. Products from *o*- and *p*-cresol, *o*-4- and *p*-xylenol condense with $(CH_2)_6N_4$ to give substances which are not " resites " (hardened resins of the commercial type); resites are, however, formed from the products from PhOH, *m*-cresol, and *m*-xylenol. Thus, phenols must have free 2 : 4 : 6 positions (OH=1) to give with CO compounds products which on further reaction with CO compounds form resites. The novolacs, therefore, form resites by chemical reaction, the resinous nature of the products being due to the large no. of possible isomerides. Resols form resites without addition of CO compounds because the terminal $CH_2{\cdot}OH$ functions as a potential CH_2O. R. S. C.

Analysis of phthalate resins. D. CANNEGIETER (Verfkroniek, 1936, **9**, 332—334).—The author's method for determining o-$C_6H_4(CO_2H)_2$ (B., 1934, 971) gives results in some cases 3% higher than Kappelmeier's (B., 1935, 1151). It is suggested that the author's results cannot be $>$ the true vals., since complete analyses of oil-modified phthalate resins give results adding up to 98·5—99·1%. D. R. D.

Analysis of phthalate resins. C. P. A. KAPPELMEIER (Verfkroniek, 1936, **9**, 334—335; cf. preceding abstract).—The author's method is shown by analyses of known mixtures of pure o-$C_6H_4(CO_2Bu)_2$ and stand oil to give results only 0·1—0·4% $<$ the correct figures. D. R. D.

Water absorption by bituminous paints. H. MALLISON (Vedag-Buch, 1936, 144—146).—The amounts of H_2O absorbed by various bitumens, tar–bitumen mixtures, and coal-tar pitches, applied to glass plates, after immersion in H_2O for 10, 40, and 80 days, respectively, were determined. Absorption increased with increasing ash content and was negligible when $<$0·5% of ash, as in the case of German standard products, was present. No fundamental difference in the behaviour of bitumens and pitches was observed. R. B. C.

Action of light on bituminous paints. H. WALTHER (Vedag-Buch, 1936, 146—156).—Glass slides coated with blown bitumen, high-vac. bitumen, or coal-tar pitch were exposed to light for 420 hr. inside glass tubes, either evacuated, or filled with dry

O_2, or with O_2 or air saturated with H_2O. The changes in appearance and properties, *e.g.*, solubility in C_6H_6, of the materials are discussed. In moist O_2 or air the blown bitumens became friable. Pitch was least affected. R. B. C.

Bitumen and zinc. H. Walther (Vedag-Buch, 1936, 136—143).—Zn plates were coated with various types of bitumen and with coal-tar pitch, untreated strips being left at the top and bottom of each plate. The plates were exposed in an inclined position to the weather for 3 months and the corrosive effects of the atm. (top strip) and of rain-H_2O after washing over the coating (bottom strip) were compared. The alteration in appearance of the coatings was also noted. In general, blown bitumens were much more corrosive than was either high-vac. bitumen or pitch. R. B. C.

Nitre efflorescences on paint films. I. Anon. **II.** F. A. Prelle (Farbe u. Lack, 1936, 535—536, 546).—I. Penetration of alkalis and salts through paint films spread on cement, concrete, etc. and methods of prevention are discussed. Efflorescences containing nitre are stated to occur particularly on new gypsum plaster which has not dried throughout before being coated.

II. Nitre efflorescences appear only rarely, *e.g.*, when the bricks have had previous contact with soil or urine. The use of silicate paints is recommended as a preventative. S. M.

Care of high-quality paints. G. Zeidler (Farben-Ztg., 1936, **41**, 795—797).—Various types of paint-cleansing materials are described, but stress is laid on the " preventive " aspect of choosing appropriate paints for particular requirements, the painting of meat-refrigerating chambers being taken as an example. S. S. W.

Testing paints and varnishes for army supplies. F. J. Peters (Farbe u. Lack, 1936, 581—582, 593—595, 605—606, 619—620).—New German specifications are outlined which, in view of present restrictions on oil imports, provide for products which are oil-free or have low oil content; *e.g.*, synthetic resins and chlorinated rubber varnishes are to be used for coating Fe, and nitrocellulose lacquers for impregnating wood. The usual film tests have been revised so as to facilitate rapid evaluation of hardness, adhesion, flexibility, and resistance to H_2O and to chipping by knocks etc. rather than to ordinary exposure. S. M.

Practical problems of corrosion. IX. Tests of protective painting. Final report. S. C. Britton and U. R. Evans (J.S.C.I., 1936, **55**, 337—341T; cf. B., 1932, 728).—Results of atm. exposure tests over a period of 7 years, mainly with painted steel, are reported. The best foundation for protection by paint is the use of a primer containing an inhibitive pigment on a perfectly clean surface. The inclusion of mill-scale between metal and paint should be particularly avoided; sand-blasting offers the best method of removing it, though pickling, even without great precautions, is satisfactory. Weathering is a useful method but should be sufficiently prolonged to produce complete removal of scale. Red-lead seemed most suitable as a pigment for primers, but $ZnCrO_4$, Zn metal, and pigments based on metallic Pb showed promise of equally good protective power. Sprayed Al metal has given good protection to steel in London for six years and is considered promising for a much longer period.

Applied paint and varnish chemistry for the chemist and the layman. B. Joachim (Amer. Paint J., 1935, **19**, 48—60 [6 pp.]).—A review. Ch. Abs. (*e*).

Thixotropy in paints. Influence on packaging and application properties of flat wall coatings. D. L. Gamble (Ind. Eng. Chem., 1936, **28**, 1204—1210).—The rigidity and thixotropy of paint systems, particularly of the flat wall type, have been studied by means of the Schevedov torsion pendulum, and the correlation between these properties and pigment settling, brushability, and levelling is demonstrated. L. A. O'N.

Relationship of pigment volume to properties of inside enamels. Golden Gate Club (Ann. Conv. Fed. Paint, Var. Prod. Clubs, Chicago, 1936; Nat. Paint, Var. Assoc., 1936, Circ. 523, 385—395).—The relation between vol. of various white pigments and wt. per gal., gloss, gloss retention, flow, sag, overnight dry, cryptometer coverage in sq. ft. per gal., actual dry-coverage rating on brushing out, spreading rate on brushing out, and brushing has been studied. Whilst there is no definite point where all enamels reach a max. desirability, it was found that for all pigments examined, except the higher-covering ones, the optimum characteristics are reached when pigment vol. is 30—35%. F. C. B. M.

Alkyd–phenolic [resin] blends in spar varnishes. Los Angeles Club (Ann. Conv. Fed. Paint, Var. Prod. Clubs, Chicago, 1936; Nat. Paint, Var. Assoc., 1936, Circ. 523, 407—408).—Clear and pigmented varnishes representing kettled and mechanical blends containing progressive amounts of phenolic and alkyd resins were studied with particular reference to H_2O- and alkali-resistance. The latter was good with $>50\%$ of phenol resin, but fell off rapidly below 50%. The varnishes having the greatest proportion of alkyd resin gave the toughest films after boiling-H_2O treatment, had the least H_2O-resistance (as measured by rusting of metal panels coated therewith), and gave the lightest films and least cloudy varnishes. F. C. B. M.

Solvents and diluents for oil paints and oil varnishes. J. Göbel (Verfkroniek, 1936, **9**, 321—325).—The manufacture, properties, and methods of testing the different grades of turpentine, petroleum, and aromatic hydrocarbon diluents are briefly reviewed. D. R. D.

Restrainers and solvents used in cleaning old varnish from pictures. A. P. Laurie (Tech. Stud. Field Fine Arts, 1935, **4**, 34—35).—Portions of an oil painting were exposed to the vapours of MeOH, EtOH, C_6H_6, PhMe, xylene, turpentine (III), and light petroleum (IV) at 18°. The alcohols reduced the paint film to a soft paste in a few hr. The aromatic hydrocarbons required 24—48 hr. (III) softened the film slightly and (IV) had no action.

All of the solvents except (IV) removed traces of white-Pb. Ch. Abs. (e)

Light- and air-resistance of [pigment and dye] colours. E. Kunze (Farbe u. Lack, 1936, 569—572).—76 dyes and pigments were incorporated with $BaSO_4$ in varnish and other media and exposed to sunlight. Their resistances are tabulated and the suitability of each for indoor and outdoor exposure is indicated. Ultramarine was attacked by acidic vehicles. Cr_2O_3-greens underwent colour changes during storage. S. M.

Preparation of black lacquers with artificial resins. F. Ohl (Farbe u. Lack, 1936, 533—534, 547—548).—Suitable resins are given together with the appropriate black, driers, and method of prep. S. M.

Steam-distillation as an aid in lacquer and paint analysis. C. P. A. Kappelmeier (Verfkroniek, 1936, 9, 330—332).—In Oster's apparatus (B., 1933, 77) the solvents are not sufficiently cooled, since the U-tube receiver is connected to the hottest part of the condenser. This difficulty is overcome by bending the latter into a horizontal position and attaching the U-tube to the further end of the condenser. D. R. D.

Permeability of lacquer films to moisture. R. I. Wray and A. R. Van Vorst (Ind. Eng. Chem., 1936, 28, 1268—1269).—Films of commercial clear lacquers vary in permeability to moisture, and, in general, develop improved H_2O-resisting properties with age. Liquid H_2O had no permanent effect on 3-coat films. Such films were less resistant to penetration by liquid H_2O than by a H_2O-saturated atm. as measured by "moisture impedance," defined as (film area × time)/mg. of moisture penetration; the reverse was true of single-coat films. Baking increased H_2O-resistance. F. C. B. M.

Cellulose mixed-ester lacquers. C. R. Fordyce, M. Salo, and G. R. Clarke (Ind. Eng. Chem., 1936, 28, 1310—1313).—The suitability of (cellulose acetate-propionate and -butyrate) mixed esters for lacquer formulation has been studied. Sol. products capable of admixture with resins in sufficient amount to produce adhesion and surface hardness may be obtained. F. C. B. M.

Solvents and diluents for cellulose lacquers. S. L. Langedijk (Verfkroniek, 1936, 9, 325—330).—The methods of testing solvent mixtures for solvent power, evaporation rate, blush-resistance, etc. are reviewed. The importance of each of these factors is stressed and the correct blending of solvents and diluents to secure optimum properties is discussed. D. R. D.

Effect of alkyd resins on solvent requirements of nitrocellulose lacquers. C. R. Sutton (Canad. Chem. Met., 1936, 20, 314—315).—Natural resins do not affect the power of solvents to dissolve nitrocellulose, but alkyd resins often markedly reduce solvent power, thereby increasing η and reducing the flow properties of lacquers. F. C. B. M.

Bituminous products.—See II. **Hydroxybutylcellulose and derivative.**—See V. **Ceramic decalcomania.**—See VIII. **Minimising wood shrinkage and swelling.**—See IX. **Rust prevention. Enamelling light alloys.**—See X. **Diffusion of H_2O through synthetic resins.**—See XI. **Treating fats and oils. Linseed oil. Tall oil fatty acids. Drying time of oil films**—See XII. **Polysulphide rubbers.**—See XIV. **Tannin [for ink].**—See XV. **[Resin in the] *Solidago* plant.**—See XVI. **Photomicrography in paint etc. laboratories.**—See XXI.

Patents.

Production of articles from plastic [vinyl] compositions. L. M. Currie, Assr. to Nat. Carbon Co., Inc. (U.S.P. 2,027,961—2, 14.1.36. Appl., 3.3.33).—A hollow preform, *e.g.*, a tube, of a vinyl ester–vinyl halide resin is compressed while hot (A) within, (B) over, a shaped matrix, *e.g.*, an Fe pipe, and then heat-stabilised. S. M.

Manufacture of urea resin moulding powders. P. B. Watson, Assr. to Amer. Cyanimid Co. (U.S.P. 2,030,192, 11.2.36. Appl., 12.2.31. Renewed 12.10.34).—Uniform products are obtained by preventing the temp. from rising above 40°, preferably 35°, during the grinding of the urea– or $CS(NH_2)_2$–CH_2O resin prior to moulding. S. M.

Manufacture of [resinous] condensation products [from abietinols]. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 457,795, 5.6.35).—An abietinol or hydroabietinol is heated with a polybasic acid, *e.g.*, maleic, or chloride, *e.g.*, *iso*phthaloyl, or amide in such amount that the product contains at least 1 CO_2H, COCl, or $CO{\cdot}NH_2$ per mol. S. M.

Laminated [gramophone] record. B. C. Bren, Assr. to Dupont Viscoloid Co. (U.S.P. 2,030,568, 11.2.36. Appl., 6.12.33).—A thick core composed of cellulose acetate (I), a plasticiser, and a large proportion of filler, *e.g.*, wood flour, is coated with a thin layer of (I) without a filler. S. M.

Phonograph record [from vinyl resin]. R. F. Warren, Assr. to Carbide & Carbon Chemicals Corp. (U.S.P. 2,028,126, 14.1.36. 7.7.30).—A vinyl resin is used for the grooved surface of a fibrous core which is impregnated with a hardened artificial resin. S. M.

Production of plastic materials [containing sulphur]. J. C. Patrick (B.P. 456,351, 7.5.35. U.S., 8.5.34).—An alkaline polysulphide, *e.g.*, Na_2S_4, is caused to react with a compound having the formula $X{\cdot}[CH_2]_n{\cdot}R{\cdot}[CH_2]_m{\cdot}X'$, where X and X′ are univalent negative elements or groups, and R is a bivalent element or group, *e.g.*, $(C_2H_4Br)_2S$. S. M.

Preparation of sulphur-containing plastic. C. Ellis and W. P. ter Horst, Assrs. to Ellis–Foster Co. (U.S.P. 2,026,875, 7.1.36. Appl., 15.10.31).—An alkaline sulphide is caused to react with a chlorohydrin ($\nless C_3$), *e.g.*, glycerol dichlorohydrin. The products are sol. in phenols, $(CH_2{\cdot}OH)_2$, etc. 32 examples are given. S. M.

Manufacture of floor coverings and like [plastic] materials. F. T. Walker, A. C. Hetherington, and Imperial Chem. Industries, Ltd.

(B.P. 456,829, 16.5.35. Addn. to B.P. 424,335; B., 1935, 368).—An intermediate plastic mass (cf. prior patent) containing chlorinated paraffin wax as plasticiser if desired (cf. B.P. 443,645; B., 1936, 560) is incorporated with a filler containing cork dust and $\not>15$ wt.-% (on the final product) of finely-ground fibrous chlorinated rubber ($>60\%$ Cl). S. S. W.

Coating composition [wood filler]. E. D. Flood and J. A. Hannum, Assrs. to Flood Co. (U.S.P. 2,027,095, 7.1.36. Appl., 17.12.31).—Wood-filling compositions comprising finely divided mineral filler (quartz, SiO_2, mica), an aq. vehicle (containing shellac, glue, pentosan colloid, etc. and including H_2O-sol. stainers, if desired), and small amounts of cellulose acetate, rubber latex, drying oil, and Na salicylate (counteracting shrinking tendencies and acting as preservative) are claimed. S. S. W.

Production of plasticised cellulose (A) ester, (B) ether, compositions. Imperial Chem. Industries, Ltd. (B.P. 455,654—5, 26.4.35. U.S., 26.4.34).—Moulding compositions are prepared by kneading a mixture of (A) cellulose acetate, (B) ethylcellulose etc., with a plasticiser and colouring matter, but without solvents, at (A) $\not>85°$, (B) $\not>100$—$105°$ ($\not>85°$), in a masticator mixer until a cellulous, friable mass is formed, which is subsequently ground to a granular powder. S. M.

Manufacture of rosin sizing. W. H. Harding and A. W. Montgomery, Assrs. to Amer. Cyanamid & Chem. Corp. (U.S.P. 2,027,166, 7.1.36. Appl., 24.10.30).—A dispersion of rosin in a solution of an alkali hydroxide or carbonate is subjected suddenly to a relatively high drying temp. (93—260°) in a thin film or spray, whereby gelling and foaming are obviated and saponification is accelerated. S. S. W.

Polymerisation of unsaturated organic compounds. Röhm & Haas A.-G. (B.P. 455,742, 27.11.35. Ger., 31.12.34 and 20.2.35).—Compounds containing the grouping $CH_2\!:\!C\!:$, *e.g.*, acrylic esters, are polymerised while being kept in a state of fine suspension in an aq. medium by vigorous agitation in presence of one or more finely-powdered inorg. substances, *e.g.*, kaolin, $BaSO_4$, $Fe(OH)_3$, $Sn(OH)_4$. It is claimed that by variation in the nature and proportion or inorg. material and speed of stirring the particle size of the polymeride may be varied at will; also that the polymeride does not usually enclose the inorg. agent. H. A. P.

Preparation of odourless synthetic resinous [phenol–aldehyde] products. G. E. Landt, Assr. to Continental-Diamond Fibre Co. (U.S.P. 2,027,988, 14.1.36. Appl., 16.2.34).—After the usual condensation and removal of H_2O the resin is treated with a halogen or an oxy-acid containing halogen, *e.g.*, Br, a hypochlorite or chlorate. S. M.

Production of esters of phenol–aldehyde resins. H. T. Bucherer (B.P. 456,723, 13.4.35. Ger., 13.4.34).—$PhOH$–CH_2O resins are caused to react with a mixture of org. acids ($\not>70$ wt.-% of linoleic acid together with other acids of high mol. wt., *e.g.*, rosin, stearic acid and other fatty acids than those derived from copal and tung oil). S. S. W.

Manufacture of (A) resins, (B) varnish bases, (C) varnish resins, varnishes, and like coating compositions [from phenols and phthalic anhydride]. A. Heck, Assr. to Cook Paint & Varnish Co. (U.S.P. 2,027,337—9, 7.1.36. Appl., [A] 30.3.31, [B, C] 25.6.35).—A phenol (2 mols.) is condensed in presence of $AlCl_3$ with an aromatic dicarboxylic acid, *e.g.*, $o\text{-}C_6H_4(CO)_2O$, (1 mol.) and the product caused to react with (A) an aldehyde (CH_2O) or a polyhydric alcohol (glycerol), the heating being continued until a resin is formed which is sol. in alcohols, esters, and ketones; (B) glycerol and drying oil acids; (C) glycerol and resin acids, *e.g.*, rosin. S. M.

(A) Varnish compositions. (B) Compositions containing synthetic resins. (C) Production of synthetic resins. Bakelite, Ltd. (B.P. 455,974—6, 30.4.35. U.S., [A–C] 22.6.34).—(A) A neutral ester of a phenol and a polybasic carboxylic acid, *e.g.*, a compound made according to (C), is incorporated with a fatty oil, *e.g.*, tung, and an oil-sol. natural or synthetic resin. (B) The susceptibility to fracture of phenol–aldehyde and alkyd resins is reduced and their machining properties are improved by incorporating a neutral ester of a monohydric phenol and a dicarboxylic acid (I), *e.g.*, $o\text{-}C_6H_4(CO_2Ph)_2$. (C) A halide of (I), *e.g.*, $o\text{-}C_6H_4(COCl)_2$, is heated with an alkyl or aralkyl ester of a hydroxycarboxylic acid, *e.g.*, $o\text{-}OH\cdot C_6H_4\cdot CO_2Me$, which may be partly replaced by a phenol. Cu or CuCl is added as catalyst. The products may be incorporated with nitrocellulose lacquers. (Cf. U.S.P. 1,979,559; B., 1935, 940.) S. M.

Manufacture of artificial fibres, threads, fabrics, films, and the like. W. W. Groves. From Aceta Ges. m.b.H. (B.P. 455,602, 18.1.35).—Resins of a basic nature, sol. in org. solvents and capable of combining with acid dyes with which they form "salts," are incorporated (in solution) into cellulose esters, ethers, and artificial resins (polyvinyl esters). The products may be converted into fibres etc. and are readily dyed with acid dyes. Examples include cellulose acetate with $o\text{-}C_6H_4Me\cdot NH_2$–$CH_2O$ resin (dyed with Orange II either directly or after hydrolysis with NH_3); $PhOH$–CH_2O–$NHMe_2$ resin (dyed with Alizarine Direct Blue A directly or with Cyanine B after saponification with NaOH); polyvinyl chloroacetate–piperidine resin (Alizarine Direct Violet ER); resin from $PhOH$–CH_2O–$CH_2Cl\cdot CH_2\cdot NHMe$ treated with HNO_2, the product being denitrosated with $SnCl_2$ and $o\text{-}C_6H_4(OH)\cdot CO_2H$; resin from $SMe\cdot CH_2\cdot C_6H_3Me\cdot SO_2\cdot NH_2$ and CH_2O or $C_6H_4Bu\cdot OH$–CH_2O–$CH_2Br\cdot CH_2\cdot NH_2$ and $CCl_3\cdot CHO$; and ethylcellulose with the chlorinated resin from xylene–CH_2O–morpholine directly or after treatment with MeI. S. C.

Paint-removing composition. J. H. Ryan and T. P. Gibbons (B.P. 455,618, 23.4.35).—Successive layers of dry soda ash (4 lb.) and CaO (4 lb.) are spread on a layer of soft soap (3 lb.) in a vat, boiling H_2O is added, and the whole thoroughly admixed (the formation of insol. Ca soaps being thus avoided) and allowed to set solid by cooling. Aq. NH_3 (d 0·880; 2 oz.) is then added and allowed to soak in, and the paint remover reduced to a paste by further addition of H_2O (to give 3 gals. of mixture). S. S. W.

[Preparation of] solvent, softening, and swelling agents. W. J. TENNANT. From HENKEL & Co. G.M.B.H. (B.P. 455,217, 14.3.35).—The use as solvents etc. for paints and lacquers of esters of fully hydrogenated polynuclear polyhydroxy-aromatic compounds having $\nless C_{10}$ is claimed. Examples are the diacetate and phthalate of hydrogenated 4 : 4′-dihydroxydi-*m*-tolylmethane (I), an adipate of a hydrogenated CH_2O–crude cresol condensation product, and a condensation product of (I) with o-$C_6H_4(CO)_2O$ and linseed oil, which are used as components of cellulose nitrate and acetate lacquers. H. A. P.

[Preparation of] mixed-ester derivatives of glycol[s] and compositions containing the same. CARBIDE & CARBON CHEMICALS CORP., Assees. of H. L. Cox and T. F. CARRUTHERS (B.P. 455,922, 27.4.35. U.S., 8.5.34).—Non-thermohardening waxy or viscous esters, suitable as plasticisers for cellulose esters etc., are prepared by esterifying an aliphatic dicarboxylic acid with a slight excess of a glycol or a polyglycerol under such conditions that a polymeric ester of the type $OH{\cdot}R''{\cdot}O{\cdot}[CO{\cdot}R'{\cdot}CO{\cdot}O{\cdot}R''{\cdot}O]_nH$, n being 2—10, is formed, and finally esterifying the terminal OH by means of a monobasic acid or anhydride. *E.g.*, $(CH_2{\cdot}OH)_2$ (186 pts.) is heated with succinic acid (236 pts.) and H_2SO_4 (0·2 pt.) at 140°/350 mm. until 82 pts. of H_2O are evolved (1 hr.), Ac_2O (435 pts.) is added, and heating continued for 1 hr. at 100—110°. The product is a H_2O-insol. wax of mol. wt. 1340. H. A. P.

[Manufacture of] hydroaromatic alcohols. ROHM & HAAS Co. (B.P. 455,820, 23.9.35. U.S., 27.10.34).—*C-tert.*-Alkylphenols having $\nless C_8$ in the substituent alkyl group are hydrogenated. *E.g.*, (*p*-)ααγγ-tetramethylbutylphenol (from PhOH, di*iso*butylene, and H_2SO_4) is converted by H_2–Ni at 200°/3100 lb. per sq. in. into *4-ααγγ-tetramethylbutyl*cyclo*hexanol* (I), m.p. 56°, b.p. 140—142°/6·5 mm. Other examples describe the prep. of the 2-*Me* and 3-*OH*-derivatives of (I) and of *tert.*-*iso*dodecyl-, b.p. 180—200°/100 mm., and -hexadecyl-*cyclo*hexanols (mixed isomerides). The products are claimed to be plasticisers for PhOH–CH_2O resins, rubber, and nitrocellulose. H. A. P.

[Manufacture of] sulphonamide compounds. BRIT. CELANESE, LTD., and W. H. MOSS (B.P. 455,694, 27.4.35).—Aromatic sulphonamides having $\nless 1$ *N*-hydroxyalkyl group are acylated; the products are used as plasticisers for cellulose esters (acetate) or ethers. Examples are the acetates and (resinous) phthalates of toluene-*p*-sulphon-β-hydroxyethylamide and -bis-β-hydroxyethylamide. H. A. P.

(A) **Composition containing castor oil derivative.** (B) **Oil derivative.** M. M. BRUBAKER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,027,466—7, 14.1.36. Appl., [A] 11.4.32, [B] 29.3.34).—(A) A nitrocellulose composition (*e.g.*, for artificial leather manufacture) includes as softener the oily reaction product obtained by esterifying the free OH groups of hydrogenated castor oil with polybasic acids (or their anhydrides), *e.g.*, phthalic or succinic acid, in substantial absence of free polyhydric alcohols (cf. U.S.P., 2,015,145; B., 1936, 1081). (B) The above reaction product is claimed. E. L.

Zinc sulphide [pigment]. G. F. A. STUTZ and A. J. MYHREN, Assrs. to NEW JERSEY ZINC Co. (U.S.P. 2,020,918, 12.11.35. Appl., 19.5.31).—Aq. $ZnSO_4$ (*d* 1·07) at 60° is sprayed down a packed tower up which H_2S (from a later stage) ascends; the slurry is re-treated with H_2S under pressure, thickened, and aged at 60° for 18 hr.; the ZnS is collected, washed, repulped, neutralised with $Ba(OH)_2$, $Ca(OH)_2$, or BaS, and dried. L. C. M.

Lithopone. G. A. KUMMER, Assr. to NEW JERSEY ZINC. Co. (U.S.P. 2,021,420, 19.11.35. Appl., 19.12.30).—A pigment of high covering power is produced by calcining a mixture of crude normal lithopone with 45 wt.-% of crude pptd. ZnS. L. C. M.

Manufacture of ultramarine-blue [gel for laundry purposes]. H. DOURIF, Assr. to STANDARD ULTRAMARINE Co. (U.S.P. 2,020,539, 12.11.35. Appl., 7.5.31).—A mixture of the pigment, H_2O, Turkey-red oil, and an ethanolamine is emulsified. L. C. M.

Production of lake colours. E. I. DU PONT DE NEMOURS & Co. (B.P. 456,744, 13.5.35. U.S., 11.5.34).—A wet-washed press-cake of pigment obtained by interaction of a basic dye with an inorg. heteropoly-compound (phosphotungstic acid etc.) is intensively ground with a dispersing agent (condensation product of 2-$C_{10}H_7{\cdot}SO_3H$ and CH_2O, Na abietenesulphonate) and a diluent (dextrin for preference, sugar, starch, gums) and dried at $\ngtr 70°$. S. S. W.

Pigments and film-forming compositions containing the same. H. A. GARDNER (B.P. 455,717 and 455,762, [A, B] 29.4.35. U.S., [A, B] 23.5.34 and 4.3.35).—Phthalates of (A) Ti or (B) Pb are used as pigments alone or in conjunction with co-pptd. TiO_2 or pigment containing ZnS. (A) o-$C_6H_4(CO)_2O$ (2 mols.) (in the form of its neutralised aq. solution) is caused to react with TiO_2 (1 mol.) (in the form of a neutralised aq. solution of TiO_2 in H_2SO_4). S. S. W.

Manufacture of coloured lacquers and coating compositions. J. R. GEIGY A.-G. (B.P. 456,029, 3.10.35. Addn. to B.P. 423,892; B., 1935, 367).—The process of the prior patent is extended to other metals than Cr, *e.g.*, Cu, Co, Ni, Fe^{II}. S. M.

Compacting plastic materials. Tubular plastics.—See I. **Artificial silk etc. Flexible material from wood sheets. Glossy surfaces on pliable bases.**—See V. **Stiffening materials for fabrics etc. Resins on fabrics.**—See VI. **Compound, laminated, and non-shattering glass.**—See VIII. **Preserving stone etc.**—See IX. **Resins from gutta-percha etc.**—See XIV. **Tree dressing.**—See XVI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Artificial latex. Aqueous dispersions of rubber. L. G. AKOBJANOV (Caoutchouc et Gutta-Percha, 1936, **33**, 17,681—17,684, 17,713—17,716).—Of the four possible methods for the prep. of aq.

dispersions of rubber only two are practical. Of the latter (which are considered in detail) the process of milling and incorporation of H_2O in presence of suitable protective colloids is the more satisfactory generally; the method of dispersing in H_2O a solution of rubber in an org. solvent and subsequently removing the latter is less convenient and gives products of limited usefulness. D. F. T.

Surface composition of the rubber globules in *Hevea* latex. I. Kemp and D. F. Twiss (Trans. Faraday Soc., 1936, **32**, 890—896).—Comparison of the electrophoretic behaviour of *Hevea* protein, " resin," and rubber hydrocarbon with that of diluted NH_3-preserved latex indicates that the amounts of protein and " resin " adsorbed at the surface of the rubber globule are dependent on the dilution and p_H of the latex. At p_H 8 with latex of $\not<12\%$ of total solids the rubber globules are completely covered with an adsorbed layer the exposed surface of which is entirely of protein character. D. F. T.

Water dispersion of rubber. Preparation of the dispersion and its general properties. B. Dogadkin (J. Rubber Ind. U.S.S.R., 1935, **12**, 209—223).—A mixture of smoked sheet 37, reclaimed rubber 37, Rubberax 6, rosin 10, ZnO 3, oleic acid 2, and wheat flour 5 was milled until very plastic and hydrophilic fillers were added. The product was mixed with 2% aq. KOH at 40—60°, the latter being added gradually. As the H_2O is increased there is a sudden reversal of phases and the rubber becomes the disperse phase. Ch. Abs. (*e*)

Joule effect of rubber. II. Thermal effect with stretched latex vulcanisates. Y. Tanaka and S. Kambara (J. Soc. Chem. Ind. Japan, 1936, **39**, 363—365B; cf. B., 1934, 1071).—Ring-shaped test-pieces of rubber obtained from compounded latex by a dipping process followed by drying and vulcanisation exhibit the Joule effect in a similar manner to ordinary vulcanised rubber. D. F. T.

Deproteinised rubber. I—IV. T. Ohkita (J. Soc. Chem. Ind. Japan, 1936, **39**, 366—372B).—Rubber obtained from letex which has been deproteinised by heating with alkali, after vulcanisation, shows a greater tendency than vulcanised, washed, smoked sheet rubber to oxidation at room temp. and allowance should be made for this in H_2O-absorption tests. The deproteinised rubber, however, when aged by the Geer method loses strength less rapidly than vulcanised, washed, smoke sheet rubber. In resistance to H_2O-absorption the deproteinised rubber is much superior. D. F. T.

Constitution of polysulphide rubbers. S. M. Martin, jun., and J. C. Patrick (Ind. Eng. Chem., 1936, **28**, 1144—1149).—The org. polysulphide (I) formed by interaction of an org. dihalide and an inorg. polysulphide (II) is a long-chain polymeride possessing the grouping $[\cdot CH_2\cdot S(:S)\cdot]_2$. Two S atoms are easily removed, yielding a white, powdery disulphide polymeride (III), which takes up S again to re-form (I). (III) and hence (I) may be synthesised from or degraded to $C_2H_4(SH)_2$. The prep. of (I) is carried out in presence of excess of (II), hence polysulphide terminals, which on acidification yield mercaptan terminals, will be expected. Vulcanisation, *e.g.*, by ZnO, may then increase the chain length by oxidation polymerisation. L. A. O'N.

Activation of the fillers of rubber mixtures. A. Pisarenko and I. Mischustin (J. Rubber Ind. U.S.S.R., 1935, **12**, 529—538).—C black and kaolin were activated with: (1) 0·1—0·5% of natural rubber in C_6H_6; (2) 0·1—0·5% of Na-butadiene rubber in C_6H_6; (3) 0·5—0·6% of stearic acid in C_6H_6; (4) 0·2—0·5% of aq. Na stearate; (5) 1·5% of Zn stearate in turpentine; (6) 5% of aq. K_2HPO_4; (7) combinations of the above. Ch. Abs. (*e*)

Determination of mercaptobenzthiazole in rubber mixtures. Z. Ginzburg and A. Dereganskaja (J. Rubber Ind. U.S.S.R., 1934, **11**, 341—342).—A 10-g. sample is extracted with $COMe_2$, and 50 c.c. of 10% aq. NH_3 are added to the extract, which is then brought to the boil and decanted several times. The decanted solutions are cooled, 15—20 g. of NaCl are added, and the solution is filtered. The mercaptobenzthiazole is pptd. from the diluted filtrate with $AgNO_3$. Enough aq. NH_3 must be present to dissolve AgCl. After 1—2 hr. the ppt. is filtered off, washed with 2% aq. NH_3 and H_2O, and dried at 80—100° to const. wt. Ch. Abs. (*e*)

Electrical properties of technical rubber mixtures. A. J. Wildschut (India-Rubber J., 1936, **92**, No. 18*a*, 19—25).—The *R*, ε, power factor, and breakdown voltage of rubber, Duprene, Thiokol, and Mipolam are discussed. Unlike most of the ordinary compounding ingedients which have little influence on κ, C increases the κ of Thiokol and, to a smaller extent, of Duprene and Mipolam, but up to 15% does not affect the insulating qualities of rubber. Compounding ingredients generally raise the ε of rubber (2·4), which, however, is < that of Thiokol (4·6), Duprene (6·9), or Mipolam (3·42). The power loss of these synthetic products is considerably > that of rubber. Calculation of the electrical properties of materials containing the above plastics is possible only in simple cases. Foreign components (including H_2O), even in small proportions, may have great influence. D. F. T.

Röntgenographic study of macro- and microstructure in the rubber and gutta-percha industry. A. Salmony (Caoutchouc et Gutta-Percha, 1936, **33**, 17,717—17,720).—Forms of apparatus are described, convenient for each of the above purposes. D. F. T.

Dielectric behaviour of caoutchouc. F. H. Müller (Kolloid-Z., 1936, **77**, 260—267).—Published work is discussed. E. S. H.

" Colloidal " zinc oxide. H. A. Curran and T. R. Dawson (J. Res. Assoc. Brit. Rubber Manufrs., 1936, **5**, 117—120).—Two specimens of colloidal ZnO (mean particle diameter 0·15 μ) showed superior reinforcing qualities in a rubber–S mixing, but were no better than ordinary ZnO in activating an org. accelerator of vulcanisation. In pigmenting effect and ease of incorporation they were inferior. D. F. T.

Latex-proofed textiles.—See VI. **Diffusion of H_2O through rubber.**—See XI. **Tailoring the**

long mol.—See XIII. **[Rubber in the]** ***Solidago*** **plant.**—See XVI.

See also A., Dec., 1450, **"Inorg." rubber.** 1451, **Cryst. caoutchouc.** 1497, **Structure of polystyrene.**

PATENTS.

[Adhesive] latex compositions. E. STERN (B.P. 455,538, 2.12.35).—Rubber latex (preferably containing 60% of rubber) is mixed with a conc. (≮50%, preferably 60%) solution of resinous matter (melted rubber, coumarone resin, etc.) in an org. solvent, both ingredients being at 50—70°. $Ca(OH)_2$ may be added to the resinous constituent to effect subsequent pptn. of any casein present in the latex. D. F. T.

Separation of resins from natural gutta-percha and like materials. E. W. FAWCETT, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 456,757, 14.5.35).—The initial material is subjected to short-path (1—5 cm.) high-vac. (10^{-2}—10^{-6} mm. Hg) distillation. Above 150° the duration of heating should be ≯ approx. 5 min. D. F. T.

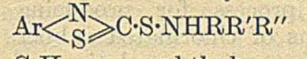
Production of sheets, bands, threads, and the like from rubber latex, or the latices of gutta-percha, balata, synthetic rubber, and the like, and articles produced by this process. F. MÜLLER (B.P. 456,554, 19.12.35. Italy, 22.12.34).—The latex or other emulsion is applied to a band with a surface of Cellophane, viscose, or other H_2O-absorbent material (embossed and on a foundation of fabric, metal foil, etc. if desired). After drying the support and the deposit (by heating), the latter is stripped. D. F. T.

Production of raw rubber with a low content of non-rubber constituents. METALLGES. A.-G. (B.P. 455,674, 30.10.35. Ger., 24.12.34).—Latex is treated with adsorbent media (active C, SiO_2 gel), and after separation from the latter is converted into raw rubber, *e.g.*, crêpe or sheet. [Stat. ref.] D. F. T.

Manufacture of sponge rubber. C. F. FLEMMING, Assr. to ROTH RUBBER CO. (U.S.P. 2,019,489, 5.11.35. Appl., 2.11.32).—The mixture of rubber with blowing and vulcanising agents, after being shaped, is submerged in a heated liquid bath so as to vulcanise the surface rapidly and then to cause blowing and effect completion of vulcanisation, the shape being retained throughout the operations. D. F. T.

Rubber composition containing petroleum resins. P. K. FROLICH, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,031,944, 25.2.36. Appl., 2.9.32).—Resins obtained from cracking-coil tar are used as softeners in rubber compositions, to improve the properties of the rubber. D. M. M.

Vulcanisation of rubber. W. C. CALVERT and H. I. CRAMER, Assrs. to WINGFOOT CORP. (U.S.P. 2,028,086, 14.1.36. Appl., 13.7.32).—Vulcanisation is accelerated by a compound of the formula $NRR'{\cdot}CR''R'''{\cdot}CH_2{\cdot}NH_2$ (where R is a hydrocarbon radical; R', R'', or R''' is H or a hydrocarbon radical), particularly *o*-tolylethylenediamine. D. F. T.

Vulcanisation of rubber. WINGFOOT CORP. (B.P. 455,444, 7.6.35. U.S., 20.10.34).—Vulcanisation is accelerated by a compound of the formula  $Ar<^{N}_{S}>C{\cdot}S{\cdot}NHRR'R''$ (Ar = arylene, especially C_6H_4 or naphthylene, R contains a furan ring, R' and R'' are selected from H, alkyl, alicyclic, aralkyl, or heterocyclic groups, or may jointly form an alkylene chain), *e.g.*, α- or β-furylammonium benzthiazyl sulphide. Such accelerators also can be produced in the rubber, *e.g.*, by incorporating mercaptobenzthiazole and di-α-furylamine. D. F. T.

Vulcanisation of rubber. UNITED STATES RUBBER CO., Assees. of L. MEUSER (B.P. 455,564, 12.7.35. U.S., 14.7.34).—Vulcanisation is accelerated by the reaction product of a furoyl halide and mercaptobenzthiazole, possibly in presence of diphenylguanidine (combined with an org. acid). D. F. T.

[Accelerators for] vulcanising rubber. WINGFOOT CORP. (B.P. 456,894, 12.4.35. U.S., 14.11.34).—The use of 1-arylenethiazyl esters of *sec.* hydrofurfuryldithiocarbamates, prepared by interaction of the 1-halogenothiazole with a salt of the thiocarbamic acid, is claimed; the preferred example is 1-5(?)-*nitrobenzthiazyl bistetrahydro-α-furfuryldithiocarbamate*, m.p. 116—118°. H. A. P.

Preparing old rubber for further use. H. VOSS, R. FROMM, and J. MAU (B.P. 455,597, 30.6.36. Ger., 4.11.35).—Old (vulcanised) rubber is rendered plastic by disintegrating, adding phosphatides (*e.g.*, 2%, mixed with oil or in aq. solution), and heating in steam. D. F. T.

Preservation of rubber. W. SCOTT and H. G. BYERS, Assrs. to RUBBER SERVICE LABS. CO. (U.S.P. 2,027,001, 7.1.36. Appl., 12.5.34).—A condensation product of an aliphatic aldehyde (MeCHO, aldol) and a diarylamine with 2 NH_2-groups (2 : 4-diaminodiphenylamine or its 4'-OH-derivative) is used as antioxidant. D. F. T.

Antioxidant [for rubber]. A. M. CLIFFORD, Assr. to WINGFOOT CORP. (U.S.P. 2,026,517, 7.1.36. Appl., 11.3.32).—Rubber is preserved with the reaction product of an NH_2-derivative of a diphenylene oxide and an aliphatic aldehyde (CH_2O, $CHMe{:}CH{\cdot}CHO$, $CH_2{:}CH{\cdot}CHO$, aldol), the compounds having the dibenzfuran structure in which $\cdot N{:}R$ is at position 6 and H or $\cdot N{:}R$ at 3, R being the aliphatic aldehyde residue. D. F. T.

Manufacture of halogen derivatives of rubber. IMPERIAL CHEM. INDUSTRIES, LTD., and J. G. MOORE (B.P. 455,644, 25.4.35).—HCl, HBr, or HI is passed into a (≮3%) solution of rubber (in C_6H_6), the solvent being insufficient to retain in solution all the hydrohalide formed. After separation the solid may be washed with a lower aliphatic alcohol (MeOH). D. F. T.

(A) **Manufacture of halogen derivatives of rubber.** (B) **Rubber derivatives.** (C) **Manufacture of halogen-containing rubber derivatives.** (A) J. G. MOORE, (B) J. P. BAXTER, and (C) R. C. COOPER, and (A—C) IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 456,148—50, 4.5.36. [B] Addn. to B.P. 416,056; B., 1934, 1024).—(A) A H halide (HCl) is caused to react with rubber in presence of a halogenated C_6H_6 liquid (PhCl), the formed rubber hydrohalide being then pptd. by a lower aliphatic alcohol (MeOH, EtOH). (B) The process for producing solid products from solutions of chlorinated rubber (cf. B.P. 416,056; *loc. cit.*) is applied to solutions of rubber hydrochloride. (C) Freshly prepared solutions of rubber hydrochloride are rendered substantially colourless by treatment with a small quantity of an oxidising agent other than air, *e.g.*, Cl_2, O_2, or a solid substance generating either of these, such as Bz_2O_2 or a compound of the benzenesulphonchloroamide type. D. F. T.

Manufacture of fluorine compounds [containing rubber]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 456,536, 15.5.35).—Rubber or artificial rubber-like masses are treated with F_2 under mild conditions (*e.g.*, at $<0°$ and dilution with air or N_2) so that substitution occurs without the mixture taking fire. The products are used to protect, insulate, and render fluid-tight apparatus for the electrolytic prep. of F_2. D. F. T.

Accelerators.—See III. **Hydrocaoutchouc yarn.**—See V. **Adherent greases. Sulphurised fatty oil.**—See XII. **Floor coverings.**—See XIII. **Tree dressing.**—See XVI.

XV.—LEATHER; GLUE.

Chemical engineering in the leather industry. C. H. SPIERS (Inst. Chem. Eng., Nov. 18, 1936, Preprint, 12 pp.).—Mechanical methods for accelerating diffusion into skins, the drying of wet leather, the hauling and setting of hides in pits, and the prep. of various chemicals for use in chrome and vegetable tanning and fat-liquoring are reviewed. D. W.

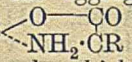
Lactic acid [in tanning]. L. POLLAK (Gerber, 1935, **61**, 61—63).—The advantages of using lactic acid in tanning are discussed. Any anhydride present should be hydrolysed before use. CH. ABS. (*e*)

Chrome tanning. L. CUNALI (Rev. chim. ind., 1935, **4**, 270—271).—Particulars for the prep. of chrome baths are given. CH. ABS. (*e*)

Electronic theory of tanning. IV. Chrome tanning. J. A. WILSON (J. Amer. Leather Chem. Assoc., 1936, **31**, 393—403; cf. B., 1936, 897).—The ordinary one-bath Cr tannage is chiefly the co-ordinated covalent combination of certain N atoms of the protein structure with Cr atoms of the complex Cr cations at p_H 2—4. The two-bath Cr tannage and special forms of one-bath tannage (*e.g.*, sulphites, acetates) may be any one of six possible types of chemical combination between Cr ions and the protein, depending on which acts as donor or acceptor, and on the signs of their electrical charges. These six types are donor Cr cation at $p_H <5$, acceptor Cr cation at $p_H <5$, and donor and acceptor Cr anions, respectively, at $p_H <5$ and >5. D. W.

Theory of mineral tannage. VI. Cause of the leather-like nature of dried chrome-tanned hide. A. KÜNTZEL. **VII. Cause of the resistance of chrome-tanned leather to boiling water. VIII. Theory of chrome tannage.** A. KÜNTZEL and C. RIESS (Collegium, 1936, 625—635, 635—646, 646—667; cf. B., 1936, 1222).—VI. Cr-tanned hide fibres are homogeneous and transparent. Cr-tanned hide dries out like leather because the tissue is hardened by the tannage. The parallel polypeptide chains in the micelles are knit together in true tannages, but in pseudo-tannages the knitting together is the result of the effect of org. solvents or pickling solutions in repressing the swelling and compacting the tissues of hydrated fibres. Loss of hydrophilic properties by the fibre or its surface in consequence of tannage has not been confirmed. Tanned, air-dry fibres exhibit distinct hydrophilic properties when swollen in H_2O. *X*-Ray photographs reveal that the grid-like structure of the collagen fibre is unchanged by tannage.

VII. The rise in the shrinkage temp. of collagen subsequent to tannage is a consequence of the hardening of the grid-like micelle by the deposition of tanning material therein. The shrinkage temp. of leather tanned with basic Cr sulphate is raised to $>100°$, but that of leather tanned with Cr chlorides and nitrates is $<100°$ unless complex ions have been formed by addition of neutral salts, *e.g.*, Na_2SO_4, HCO_2Na, thereto. Leather resistant to the boiling test loses this property after subjection to sufficiently prolonged electrodialysis. The resistance to the boiling test of chrome leathers tanned with sulphates or salts of other acid radicals capable of forming complexes depends on the extent to which these anions tend to enter the Cr co-ordinative sphere. Tanning Cr complexes contain negatively-charged acido-complexes and consequently they lead to some combination of the Cr with the free NH_2-groups in the collagen mol. as well as with the free CO_2H groups.

VIII. Chrome tanning material consists of "isopoly-bases" including mono- and di-hydroxochromi-complexes and the "ol" and "oxo" salts formed therefrom. The Cr aggregates must not be too large to enter the micellar grid. The several Cr atoms constituting one tanning aggregate react with several collagen mols., respectively, forming bridges between them and thus hardening or stiffening the tissue. The Cr atoms on the periphery of the aggregates form complex salts of the type  $Me\begin{smallmatrix}\diagup O—CO\\ \diagdown NH_2\cdot CR\end{smallmatrix}$ with the "salt linking" in the collagen mol., which are much more stable than the latter. Complex-salt formation depends on the ability of the "isopoly-bases" to lose their co-ordinated H_2O, and Cr compounds which do not readily lose their co-ordinated groups, *e.g.*, $[Cr(NH_3)_6]Cl_3$, do not tan. The formation of complex salts and of salts between Cr and CO_2H groups is favoured by increase in p_H. D. W.

Tannin considered from a non-tanning point of view. C. A. MITCHELL (J. Soc. Leather Trades Chem., 1936, **20**, 499—504).—Tanning materials for uses other than in the leather industry, *e.g.*, inks, should be examined by a method adapted to the particular industry and not on their tannin content. Galls for ink-making should be examined colorimetrically to determine the depth of colour given by their infusion with a standard aq. Fe^{II} tartrate. The ink-forming capacity $\propto$ the amount of pyrogallol group present. By this means it has been shown that natural oak-gall tannins consist of mixtures of different digalloylglucoses in various stages of hydrolysis. The gallic acid (I) content of oak galls was determined colorimetrically after pptg. the gallotannic acid with quinine hydrochloride. Defects in some inks have been traced to excessive amounts of (I). D. W.

Colloid-chemistry of vegetable tanning. F. Stather (Kolloid-Z., 1936, 77, 201—204).—A lecture. E. S. H.

Mathematical background of tanning. B. M. Stykan (Kolloid-Beih., 1936, 45, 1—40).—Theoretical. E. S. H.

Currying [of vegetable-tanned leather]. V. Factors which affect the rate of hydrolysis of grease in leather. M. P. Balfe (J. Soc. Leather Trades Chem., 1936, 20, 513—520; B., 1936, 1169).—Glycerides are hydrolysed by mould enzymes more readily in hand- than in drum-stuffed or dipped leathers. Hydrolysis is retarded by soaking the leather, before currying, in H_2O at a $p_H <$ that of its aq. extract. Glycerides of saturated fatty acids are more readily hydrolysed than those of unsaturated acids. D. W.

Sampling of [vegetable-tanned] sole leather. I. Report of British Section Committee [of the Society of Leather Trades Chemists]. D. Burton (J. Soc. Leather Trades Chem., 1936, 20, 492—495).—The official method (Collegium, 1918, 87) is preferred to Lamb's proposal (B., 1935, 601). D. W.

Grain wrinkles [on skins and leather]. W. T. Roddy (J. Amer. Leather Chem. Assoc., 1936, 31, 379—393).—Grain wrinkles are present on skins of unborn calves, but they may also be formed by wrinkling fresh raw skins. They are not caused by the age, sex, season, colour, or breed of the animal. The elastic fibres are thicker and more numerous in the wrinkled portions of the skin. The wrinkles are unaffected by the curing or soaking, reduced by fleshing or cutting the hair before liming, accentuated by liming, most by Na_2S- and least by As_2S_3-limes, and unaffected by the bating process. D. W.

Collagen. W. Grassmann (Kolloid-Z., 1936, 77, 205—209).—Preliminary experiments on the resistance of collagen (I) to enzymic degradation and the swelling of (I) at different temp. support the view that (I) exists in two modifications, which undergo reversible change at a transformation temp. E. S. H.

Ursols.—See VI. **Electro-katadyne apparatus [for tannins etc.].**—See XVIII.

Patents.

Synthetic tanning material. A. O. Jaeger, Assr. to Amer. Cyanamid & Chem. Corp. (U.S.P. 2,029,322, 4.2.36. Appl., 12.3.34).—A tanning agent of the sulphonated diarylmethane type is treated, during at least one step of its manufacture, with a decolorising absorbent; *e.g.*, the aq. solution of the crude tan is neutralised with NH_3, aërated, and treated with Na_2S to ppt. Fe. B. M. V.

(a, d) Improving, (b, c) tanning, hides and skins. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 455,603 and 455,695—7, 21.1.35).—Hides and skins are strengthened and improved by treatment before tanning with compounds, (a, b) $CR_1X{:}NR_2$ ($X = OR_3$, SR_3, or NHR_3) or (c, d) $NR_4R_5{\cdot}CY{:}Z$ ($Y = OR_6$ or NR_6R_7; $Z = O$, S, NH, or NR) in which at least one R contains $\nless C_5$. The substances are applied pure if liquid, or in solution or suspension. Salts and quaternary salts may be used. Examples are the hydrochlorides of (a, d) steardiethylamidine, (a) diethyl- and stearyldiethylaminoethyl-amidine, (b) the amidine obtained from the nitrile of coconut fatty acid, steardihydroglyoxaline, imidoethyl ether, and lauramidine, (c, d) octadecyl β-diethylaminoethyl carbamate, and (c) *N*-β-diethylaminoethyl-*N'*-octadecylcarbamide. R. S. C.

Treatment of leather. A. J. Beford (U.S.P. 2,026,453, 31.12.35. Appl., 11.1.35).—The leather is impregnated with a mixture of paraffin wax (16 oz.), colophony (2), Burgundy pitch (1), neatsfoot oil (1½), wood-alcohol (1), cod oil (1), and 5 drops of wintergreen oil, to render it waterproof. D. W.

Cleaning of leather and cleaning and brightening compound therefor. Compound and apparatus for cleaning leather. A. Szabó (B.P. 456,281, 30.4.35).—A mixture of white ceresine (100 pts.), carnauba and bleached montan waxes (60 pts.), shellac wax and white ozokerite (15 pts.), and colouring matter dissolved in white stearine is cast into a mould with conically tapered apertures. The material is applied to the leather with a special pad of soft material. D. W.

Gelatin and glue extractor. W. V. Knoll (U.S.P. 2,028,935, 28.1.36. Appl., 6.6.32).—A digester comprises two nested vessels the inner of which is perforate, a sloping top with grease dome at the highest point, and a horizontal hollow shaft (ported for supply of fluid) supporting a rhomboidal agitator. B. M. V.

(a) Sticking of bodies [with vinyl resin compositions]. (b) Adhesive tape. E. L. Kallander and G. R. Alden, Assrs. to Dennison Manufg. Co. (U.S.P. 2,027,435—6, 14.1.36. Appl., [a] 15.11.32, [b] 10.1.34).—A composition for (a) attaching paper to Cellophane etc., (b) adhesive tape, consists of a vinyl resin (I), preferably with addition of nitrocellulose (II), dispersed in a suitable solvent mixture, *e.g.*, EtOAc–benzol, to which is added an aliphatic hydrocarbon, *e.g.*, naphtha, or other swelling agent to promote tackiness. (b) Solutions of (I) and (II) are spread on different sides of the tape, the swelling agent being applied subsequently. S. M.

[Petroleum-wax] adhesive and waterproofing compositions and use thereof. C. G. Dreymann (B.P. 456,820, 16.5.35. U.S., 17.5.34).—A coumarone, phenol–aldehyde, or copal resin is heated with petroleum wax (m.p. 38—78°) and ester gum as solvent, with or without paraffin wax. The η, at elevated temp., determines the adhesiveness of the product, which is used for waterproofing, *e.g.*, food cartons, binding sheets of cardboard, etc. S. M.

Condensation products. Assistants in leather industry.—See III. **Leather-like material from wood.**—See V. **Waterproof products. Stiffen-**

ing material for leather.—See VI. **Oil derivative [for artificial leather].**—See XIII. **Adhesive latex compositions.**—See XIV.

XVI.—AGRICULTURE.

Soils. XVII. "Clay" in the agronomic sense. XVIII. Localisation of assimilable reserves, and their augmentation by mechanical action. J. Clarens and J. Lacroix (Bull. Soc. chim., 1936, [v], **3**, 2057—2063, 2063—2068; cf. B., 1935, 917).—XVII. The use of the name "clay" for a soil fraction having particles of a conventional size range is adversely criticised.

XVIII. Data are recorded to show how the quantity of Al extractable from felspar by $0{\cdot}1N$-HCl increases when the particle size is reduced by progressive grinding. F. L. U.

Clay and the colloidal state. M. Ansay (Agricultura, 1935, **38**, 197—205).—A discussion.

Ch. Abs. (*e*)

Humic acids of different soil types. V. V. Tischtschenko and M. D. Ridalevskaja (Compt. rend. Acad. Sci. U.R.S.S., 1936, **4**, 141—144).—The % ash, C, H, N, and O, and the C/N, C/H, and O/H ratios of humic acids prepared from different soil types show gradations which may be correlated with climatic conditions. Acids from northern soils retain more of the carbohydrate character of plant residues and are relatively younger than those of southern soils. The nos. of CO_2H and phenolic OH groups were approx. the same in humic acids from all soils examined, and agree with corresponding vals. for acids from peats and young brown coals. A. G. P.

Base-exchange properties of some typical Texas soils. G. S. Fraps and J. F. Fudge (Texas Agric. Exp. Sta. Bull., 1935, No. 520, 23 pp.).—The methods of Puri (titration) and of Kappen for determining exchange capacity in soils give approx. vals.; absorption of $NH_4^{\cdot}$ from NH_4OAc yielded more accurate results. When measured in this way, differences in exchange capacity of soils of the same type may be as large as those between soils of different series but of similar physical character. Vals. for arid soils were > those of humid soils of similar physical structure. The total N, P, K, Ca, acid-sol. Al and Fe, and basicity of soils increased regularly with the total exchange capacity up to 20 milli-equiv. per 100 g., beyond which stage no relationship was apparent. A. G. P.

Index of texture and classification of Philippine soils. M. M. Alicante and D. Z. Rosell (Philippine J. Sci., 1936, **59**, 505—511).—Hardy's index of texture (B., 1928, 382) has only a limited application to Philippine soils. A. G. P.

Effects on trees of illuminating gas in the soil. C. G. Deuber (Plant Physiol., 1936, **11**, 401—412).—Presence of coke-oven gas in soil causes chlorosis and defoliation of leaves and some root injury. On defoliated stems lower buds are stimulated into activity. The effects, in general, are similar to those produced by C_2H_4. A. G. P.

Electrolytic measurement of the corrosiveness of soils. I. A. Denison (J. Res. Nat. Bur. Stand., 1936, **17**, 363—387).—The corrosion of steel electrodes, immersed in moist soil, when a current is passed between them has been compared with that produced by long-period field tests. It is concluded that such tests may be used to predict the corrosiveness of soils towards Fe and steel, but for the prediction of leaks or estimation of the useful life of a section of pipe it can be applied only when the relations connecting depth of pitting with exposed area and time are known. J. W. S.

Dilatograph with photo-recorder [for soils]. P. I. Andrianov (Kolloid-Z., 1936, **77**, 38—44).—Apparatus and procedure for photographic registration of vol. and temp. changes in soils are described. E. S. H.

Colorimetric determination of the phosphate content of soils by electro-physical methods. D. Fehér (Bodenk. Pflanzenernähr., 1936, **1**, 219—223).—A photoelectric cell is utilised for measuring colour intensity in Zinzadze's method (A., 1930, 725).

A. G. P.

Availability of nitrous nitrogen to plants. G. S. Fraps and A. J. Sterges (Texas Agric. Exp. Sta. Bull., 1935, No. 515, 27 pp.).—In pot cultures small amounts of NO_2' were utilised by plants as effectively as was NO_3'. With larger proportions the relative utilisation of NO_2' declined. In H_2O cultures the proportional growth of plants receiving NO_2' or NO_3' varied with the p_H of the medium. NO_2' is more likely to occur in alkaline soils, in which it is more readily taken up by plants. A. G. P.

Physiological ontogeny in plants and its relation to nutrition. I. Effect of nitrogen supply on growth of the plant and its parts. L. A. T. Ballard and A. H. K. Petrie [with E. A. Cornish]. **II. Effect of phosphorus supply.** R. F. Williams (Austral. J. Exp. Biol., 1936, **14**, 135—163, 165—185).—I. In general, increasing supplies of N cause at first a depression and subsequently an increase in the dry wt. of the whole plant and its vegetative parts. The leaf wt. ratio shows similar variations, although the initial depression is less definite and vals. for the various levels of N supply tend to converge during senescence. The decline in unit leaf rate which extended throughout the growing period was not significantly affected by the treatments given.

II. Low P supplies delay the onset of senescence in oats. In the first half of the life cycle the growth rate, unit leaf rate, and leaf wt. ratio with low P supplies are <, and subsequently become >, those with high P supply. Towards senescence corresponding vals. for different P levels tend to converge. Effects on root, stem, and inflorescence ratios are recorded. The effects of N and P are compared.

A. G. P.

Calcium cyanamide and its decomposition products. Physiological studies. R. M. Smock (Ohio Agric. Exp. Sta. Bull., 1935, No. 555, 46 pp.).—Application of $CaCN_2$ (I) to tomato and peach soils increases the NH_3 and subsequently the NO_3 contents of the roots, the effect appearing the more rapidly in soils containing the larger proportions of colloids or org. matter. Urea derived from (I) is probably not a direct source of N for plants. Utilisation of (I) occurs by way of NH_3 and NO_3. Injurious effects of $CN·NH_2$ (II), dicyanodiamide (III), guanylurea, and guanidine on peach, apple, and tomato are recorded. Addition of NO_3' intensifies injury by (II), but not that by (III). Use of (I) involves risk of injury by (II) and, with heavy treatments on alkaline soils, by (III). In sand–colloid mixtures tomatoes grew successfully with (I) as the source of N. Ca-bentonite is an effective catalyst of the conversion of (II) into urea. Peach and apple produced least growth in soils having p_H 6·0 and 7·0, but after application of (I) the optima were p_H 7·5 and 7·0, respectively. With proper usage, (I) is a suitable N source in orchard practice. A. G. P.

"Basiphosphate" and its cultural effects. H. Chavannes (Bull. Assoc. Chim. Sucr., 1936, **53**, 254—260).—In France the term "basiphosphate" is applied officially to the recent class of fertilisers produced by fusion of natural phosphates with siliceous matter and soda, and containing all their P_2O_5 in a form sol. in alkaline NH_4 citrate. They have p_H about 9·2 and contain P_2O_5 15—29, CaO 35—40, Na_2O 10—15, K_2O 1—2, MgO 1—2, S (as $CaSO_4$) 2—3, SiO_2 (as dissociable silicates) 10—12, and $(Fe,Al)_2O_3$ 2—3%. A survey of recent investigations indicates that their P_2O_5 remains sol. after long periods in the soil; they suit all kinds of soil, of whatever reaction, and improve the reaction of those inclined to acidity. They have given very good results on various types of crops. J. H. L.

Dynamic cycle of nitrogen, potassium, and phosphorus in cultivated soils. D. Fehér and M. Frank (Bodenk. Pflanzenernähr., 1936, **1**, 196—219; cf. B., 1936, 610).—The dominance of the *R* factor (temp. × soil-H_2O content) in controlling the nutrient status of soils is further emphasised. The microbiology of the N cycle of soils is examined. The decrease in citric acid-sol. PO_4''' in soils during the growth season is not entirely accounted for by removal in crops. A fixation of P by micro-organisms is probable. A. G. P.

Reducing the harmful effect of excess of chlorides and ammonium chloride in Potazot. A. V. Sokolov (J. Chem. Ind. Russ., 1936, **13**, 795—798).—The noxious effect on vegetation of excess of Cl' is less in chernozem and argillaceous soils than in podsol and sandy soils. Methods of neutralising the harmful effects of excess of Cl' in $KCl–NH_4Cl$ fertilisers are discussed. R. T.

Transformation of potassium in the soil into the non-exchangeable state. R. Chaminade (Compt. rend., 1936, **203**, 682—684).—This process is called "reversion of K." The "threshold of reversion" is the amount of K per 100 g. of soil below which reversion will always occur, and it is approx. 4% of the soil's capacity of fixation at p_H 7. Glauconite exhibits exchangeable properties similar to soil. Reversion is discussed from the viewpoint of agronomy. J. N. A.

Determining the magnesia requirement and the manurial effect of magnesium in soils by means of *Aspergillus niger*. H. Niklas and H. Poschenrieder (Bodenk. Pflanzenernähr., 1936, **1**, 235—247).—The influence of varying proportions of $CaCO_3$ and $MgCO_3$ on the growth of *A. niger* is examined. The relation between Mg requirements of soils as determined by *A. niger* cultures and the results of Mg manuring trials are discussed. A. G. P.

Action of magnesium [on plants]. F. Berkner (Bodenk. Pflanzenernähr., 1936, **1**, 175—184).—Use of fertilisers containing Mg increased the growth of mustard on acid soils except where CaO was also applied. In field trials Mg increased the yield and starch content of potatoes and also the chlorophyll content of the haulm. A Ca–Mg antagonism is demonstrated and discussed. A. G. P.

Stall manure. W. Sauerlandt (Bodenk. Pflanzernähr., 1936, **1**, 223—235).—Analyses of numerous samples are recorded. Sampling errors are discussed, and the general similarity of composition of manure from various sources is shown. A. G. P.

Iodine content of German potash fertilisers. W. Schreiber (Landw. Versuchs-Stat., 1936, **127**, 57—66).—Most of the samples examined were free from I; some contained 10·6—132 × 10^{-6} g. of I per kg. A. G. P.

Hygroscopicity of fertilisers. N. E. Pestov and T. V. Glazova (J. Chem. Ind. Russ., 1936, **13**, 868).—Hygroscopicity data are recorded for a no. of artificial fertilisers. R. T.

Choice of crops for saline land. T. H. Kearney and C. S. Scofield (U.S. Dept. Agric. Circ., 1936, No. 404, 24 pp.).—The nature of soil salinity and the effects of irrigation are discussed. The suitability of various crops for saline soils is examined. A. G. P.

Effect of leaf rust accompanied by heat on yield, kernel weight, bushel weight, and protein content of hard red spring wheat. L. R. Waldron (J. Agric. Res., 1936, **53**, 399—414).—The protein content of grain of rust-resistant strains was higher in warmer seasons. That of susceptible varieties showed no difference. Decreased yields in dry seasons were more marked in susceptible varieties and were due mainly to differences in grain size. A. G. P.

Effect of copper ions on development and composition of oats. K. Scharrer and W. Schropp (Bodenk. Pflanzenernähr., 1936, **1**, 168—175).—Application of Cu increased grain and straw yields of oats. The proportion of high-grade grain was, however, decreased, and the larger additions of Cu tended to retard flowering. Cu increased the % Ca and Mg in the grain and straw and the abs. amount, but not the %, of protein in the grain. Moderate treatments with Cu improved the utilisation of K, N, and P by the plants. A. G. P.

Factors affecting the development of maize smut, *Ustilago Zeæ* (Beckm.), Unger. J. M. Walker (Minnesota Agric. Exp. Sta. Tech. Bull., 1935, No. 111, 67 pp.).—Effects of growth conditions and mechanical injury are examined. Manurial treatment had no significant influence on the incidence of the disease. A. G. P.

Effect of soil treatment on the mineral composition of exuded maize sap at different stages of development. M. W. Lowry, W. C. Huggins, and L. A. Forrest (Georgia Agric. Exp. Sta. Bull., 1936, No. 193, 28 pp.).—Effects of simple and mixed fertilisers and of CaO on the yield, p_H, N, P, K, Ca, and SiO_2 contents of the sap are recorded. A. G. P.

Changes in oxidation–reduction equilibrium in soils as related to their physical properties and to the growth of rice. M. B. Sturgis (Louisiana Agric. Exp. Sta. Bull., 1936, No. 271, 37 pp.).—The development of a low oxidation–reduction potential in waterlogged soil is largely due to decomp. of active org. matter. Addition of fresh org. matter to these soils rapidly lowers the E_h. In soil depleted of org. matter by cropping with rice the decrease in E_h after waterlogging is relatively small. E_h vals. cannot serve as an indicator of the ability of submerged soil to produce rice. Rice on flooded soil tolerates large amounts of sol. Fe and Mn if adequate amounts of org. matter are present. In absence of easily decomposable org. matter in a deflocculated soil much Fe is pptd. on and around the older roots of plants. Flooding causes small losses of N by denitrification. Development of reducing conditions lowers the solubility of soil P. Applications of S or $CaSO_4$ to improve the permeability of deflocculated soil should not be made immediately before planting since sulphides may be produced. Application of leguminous org. matter increases, but that of artificial fertilisers has no effect on, rice yields. A. G. P.

Effects of lime on rye grass. A. F. R. Nisbet (Scot. J. Agric., 1935, **18**, 349—353).—On acid soils liming increased the no. of surviving seedlings and induced earlier and more abundant tillering. A. G. P.

Fertilisers for early cabbage. A. B. Fite (New Mexico Agric. Exp. Sta. Bull., 1936, No. 235, 21 pp.).—Results of numerous field trials are recorded. A. G. P.

Factors affecting the yield of kraut cabbage in Ohio. C. Wadleigh, H. D. Brown, and R. Young (Ohio Agric. Exp. Sta. Bull., 1936, No. 566, 29 pp.).—Effects of cultural treatment are examined. Excessive NO_3' may depress yields. In alkaline soils cabbage probably utilises $NH_4^{\cdot}$ better than NO_3'. The reverse is true on acid soils. Conditions retarding sugar accumulation during growth (notably K deficiency) impair storage properties. Low-sugar cabbage yields inferior kraut. A. G. P.

Residual effects of some leguminous crops. T. L. Lyon (Cornell Univ. Agric. Exp. Sta. Bull., 1936, No. 645, 17 pp.).—Field trials are recorded. All legumes increased the yield and N content of the succeeding cereal crop. Accumulation of N in soil was not always paralleled by that of the legume crop. A. G. P.

Bordeaux spraying in relation to growth rate and yield of potatoes in Nassau County, Long Island. G. F. MacLeod and W. Dickison (Amer. Potato J., 1936, **13**, 180—184).—Application of Bordeaux mixture (4 : 2 : 50) to potatoes caused an increase in the wt. of haulm which persisted throughout the season. The development of tubers was retarded and the final yields were > or < those from unsprayed plants in different seasons. A. G. P.

Mercuric chloride for prevention of potato sickness. L. R. Johnson (Ann. Appl. Biol., 1936, **23**, 153—164).—Treatment of soil with $HgCl_2$ (I) made 3—6 weeks, but not if made 3—4 months, before planting depresses the early growth of potatoes. Eelworm infestation is reduced by (I) to extents which increase with the proximity of the treatment to the time of planting. Eggs within cysts are not killed. (I) prevents common scab and collar rot in potatoes. A. G. P.

Effects of some environmental factors on growth and colour of carrots. W. C. Barnes (Cornell Univ. Agric. Exp. Sta. Mem., 1936, No. 186, 36 pp.).—Effects of soil-H_2O content, temp., and length of day on the growth and form of roots are recorded. Colour development was optimal at 15·5—21·2°. The carotene (I) content increased steadily until about 100 days after sowing and subsequently remained practically unchanged. It was not appreciably affected (dry-wt. basis) by H_2O content of soil or length of day. The vitamin-*A* activity of carrots was > that indicated by the (I) content, although the respective vals. in different samples were proportional. A source of -*A* other than (I) is indicated. During storage some (I) was converted into -*A*. The % total sugar was practically unchanged throughout, but the ratio sucrose : glucose increased as the season advanced. A. G. P.

Fertilising onions in muck soils. J. E. Knott (Cornell Univ. Agric. Exp. Sta. Bull., 1936, No. 650, 20 pp.).—Field trials are recorded and discussed. A. G. P.

"Raan" or boron deficiency in swedes. D. G. O'Brien and R. W. G. Dennis (Scot. J. Agric., 1935, **18**, 326—334).—Affected roots contained 2% more fibre and 3—4% less carbohydrates than did healthy controls. Application of borax (20 lb. per acre) controlled the disease. A. G. P.

Twenty-five-year test of commercial fertilisers for grapes. F. E. Gladwin (New York State Agric. Exp. Sta. Bull., 1936, No. 671, 24 pp.).—Application of N fertilisers improved the yield and quality of fruit and increased the growth of cane and leaf. K in combination with N and P increased yields and growth of wood. CaO depressed both yield and growth. Maturation and sugar content of fruit are not affected by fertiliser treatment. Green manuring with rye gave satisfactory results. A. G. P.

Effect of time and rate of application of sodium nitrate on yield of cotton. E. B. Reynolds, P. R. Johnson, and B. C. Langley (Texas Agric. Exp. Sta. Bull., 1934, No. 490, 20 pp.).—Application of N fertilisers hastened maturity of cotton, the effect of $(NH_4)_2SO_4$ being > that of $NaNO_3$. The length and % of lint were not affected by $NaNO_3$ given with P and K, but the bolls were larger and more numerous. A. G. P.

Relation of occurrence of cotton root rot to chemical composition of soils. G. S. Fraps and J. F. Fudge (Texas Agric. Exp. Sta. Bull., 1935, No. 522, 21 pp.).—Soil composition is only one of many factors influencing the incidence of root rot. A. G. P.

Chemical study of the *Solidago* plant. N. B. Koialovich (J. Appl. Chem. Russ., 1936, 9, 1886—1892).—Old plants and old leaves contain more rubber than the young ones. Some data on the resin and the essential oil of *Solidago* are given. J. J. B.

Effect of soil in stimulating germination. H. Borriss (Ber. deut. bot. Ges., 1936, 54, 472—486).—Seeds of *Vaccaria pyramidata*, Med., did not germinate on blotting paper in light or in darkness. Germination in soil is attributed, not to the presence of stimulative substances in soil, but to the removal (absorption) of inhibitory matter from the seeds. A. G. P.

Vegetation on the saline soils of Salonika. C. Ganiatsas (Ber. deut. bot. Ges., 1936, 54, 430—444).—The distribution of plant species is examined in relation to the sol. salt content and H_2O supply in these soils. A. G. P.

Nitrogen fixation and *Azotobacter* count on application of sugars to soil. II. N. R. Dhar and E. V. Seshacharyulu (Proc. Nat. Acad. Sci. India, 1936, 6, 244—251; cf. B., 1936, 246).—N fixation in sugar-treated soils is greater in sunlight than in the dark. *Azotobacter* counts and total C contents are smaller in soils exposed to light. In tropical soils chemical fixation of N is considerable. Sugars may be detected in soils long after their application. A. G. P.

Nitrogen nutrition of sugar cane. U. K. Das (Plant Physiol., 1936, 11, 251—317).—Applications of N fertilisers accelerate leaf and joint formation, improve tillering, promote succulent growth, lower the sucrose (I) content of juice, and increase the proportion of reducing sugars (II). Seasonal variations are recorded. Close parallelism exists between (II) content and rates of cane growth. There is a negative correlation between (II) and (I) levels in the dry matter. A positive relation is found between the (II) and total N in the dry leaf section. The total and EtOH-sol. N of the tissue increase with the amount of N fertiliser supplied. In high-N plants there is an excessive accumulation of sol. N, and a relatively lower ratio of total N to EtOH-sol. N than in plants receiving smaller N dressings. The polysaccharide content and p_H of juice are not definitely affected by application of N. Medium amounts of fertiliser give highest yields of dry matter and (I). Applications of N increase the intake of ash constituents and modify the hydration capacity of tissue colloids. A. G. P.

Results of a fertiliser experiment on sugar cane. J. Lintner (Proc. 10th Congr. S. Afr. Sugar Techn. Assoc., 1936, 156—168).—Response to fertilisers was studied on a crop of cane (Uba, POJ 2725, Co 290) on a typical wind-blown sand of marine origin, previously under a volunteer crop of grass. The soil was light sand of good physical qualities, slightly acid, low in N and P, and rather low in K. With POJ and "Co" there was practically no response to superphosphate (I) alone, but (I) with KCl ≡ 75 lb. of K_2O/acre increased the average yield of sugar per acre from 6·5 to 7·5 tons. $(NH_4)_2SO_4$ had little effect, and that sometimes detrimental. Uba gave much lower yields of sugar than the others, POJ being the best. J. H. L.

Is an alkaline reaction in soil a cause of (A) heart- and dry-rot in sugar beet, (B) speck disease in oats? G. Storck (Bodenk. Pflanzenernähr., 1936, 1, 185—195, 247—256).—(A) Heart-rot of beet is characterised by two stages, viz., metabolic disturbance due to abnormal intake of Na, and putrefaction by soil bacteria. Treatment with B prevents the second stage only. Application of a by-product clay from the Solvay soda process (containing SiO_2, Al_2O_3, Fe_2O_3, and $CaCO_3$) corrects the first stage and improves soil texture. The action of the clay prep. is improved by admixture with S.

(B) Metabolic disturbance following high intake of mineral matter from alkaline soils renders the plant more susceptible to infection. The mechanism of the beneficial effects of Mn, B, Fe, Al, etc. is discussed. A. G. P.

Colloids in [sugar] beet in relation to liming of the soil. T. T. Demidenko, A. A. Kulkes, and V. P. Popov (Compt. rend. Acad. Sci. U.R.S.S., 1936, 3, 175—179).—Addition of $Ca^{\cdot\cdot}$ and $Mg^{\cdot\cdot}$ to soil improved the nutrition of the crop. Application of $Fe^{\cdot\cdot\cdot}$ and B increased the sugar yield and lowered the colloid content of the roots. Liming increased the colloid content of roots and the η of the juice. The influence of varying proportions of Ca and Mg salts is examined. A. G. P.

Killing spores of soil bacteria by flowing steam. A. Stuhrk (Zentr. Bakt. Par., 1935, II, 93, 161—198). A. G. P.

Soil nematodes in forest nurseries. S. A. Wilde (Phytopath., 1936, 26, 198—199).—Treatment of infected soil with dil. H_2SO_4 (1 in 50) gave good results. A. G. P.

Distribution of the Argentine ant in the United States; its control or eradication. M. R. Smith (U.S. Dept. Agric. Circ., 1936, No. 387, 39 pp.).—Promising results were obtained with syrup–Na_3AsO_3 baits. A. G. P.

Control of soil fungi by fumigation with chloropicrin. G. H. Godfrey (Phytopath., 1936, 26, 246—256).—Chloropicrin (400 lb. per acre ft) destroyed a no. of plant pathogenic fungi in small-scale tests. A. G. P.

Respiration of insects in relation to heating and fumigation of grain. D. L. Lindgren (Minnesota Agric. Exp. Sta. Tech. Bull., 1935, No. 109, 32 pp.).—Effects of the moisture content and temp. of grain on the respiration of parasitic insects is examined. With insufficient H_2O metabolic rates decrease and death ensues. A direct relationship is shown between respiration rate and susceptibility to chloropicrin, CS_2, and $(CH_2)_2O$ (I) in the case of *Sitophilus granarius* and *S. oryzæ*. *Tribolium confusium* showed the highest respiration rates, but the greatest resistance to CS_2 and (I). Factors other than respiration are concerned in susceptibility. A. G. P.

Methods for inspection of commercial legume inoculants [for soils]. A. W. Hofer (J. Amer. Soc. Agron., 1936, **28**, 655—671). A. G. P.

Downy mildew of peas caused by *Peronospora pisi* (Deb.) Syd. L. Campbell (Res. Stud. State Coll. Wash., 1936, **4**, 88—89).—Protection against infection was given by Bordeaux mixture with Penetrol spreader. Other spreaders were ineffective. A. G. P.

Seed-potato treatment for *Rhizoctonia* control in north-east Maine. W. P. Raleigh and R. Bonde (Phytopath., 1936, **26**, 321—343).—Best results were obtained with the standard $HgCl_2$ treatment. Addition of 1% HCl to the solution involved risk of injury. Yellow HgO (1 in 100) used as a dip gave good control, but was sometimes injurious. A solution containing $HgCl_2$ (1 in 1200) and KI (1 in 400) gave promising results. A. G. P.

Yellow oxide of mercury treatment for seed potatoes on Long Island. H. S. Cunningham (New York State Agric. Exp. Sta. Bull., 1936, No. 668, 14 pp.).—*Rhizoctonia* infection was reduced by treatment of whole or cut seed tubers with HgO (1 lb. in 15 gals. of H_2O). Emergence was delayed and in some cases (especially when cut seed were treated) yields were lowered. A. G. P.

Control of cotton flea hopper. F. L. Thomas (Texas Agric. Exp. Sta. Circ., 1936, No. 77, 8 pp.).—The technique of S dusting is discussed. A. G. P.

Specific effects of zinc applications on leaves and twigs of orange trees affected with mottle-leaf. H. S. Reed and E. R. Parker (J. Agric. Res., 1936, **53**, 395—398).—Improved growth following spraying with $ZnSO_4$–CaO was characterised by larger leaves, longer internodes, and a larger proportion of xylem tissue. A. G. P.

Oriental fruit-moth control in quince plantings. D. M. Daniel and J. A. Cox (New York State Agric. Exp. Sta. Bull., 1936, No. 669, 16 pp.).—Seven fortnightly applications (beginning with a calyx spray) of Pb arsenate–Sticker or with summer oil–nicotine sulphate are recommended. A. G. P.

Seedling wilt of black locust caused by *Phytophthora parasitica*. E. B. Lambert and B. S. Crandall (J. Agric. Res., 1936, **53**, 467—476).—The disease was controlled by acidifying soils to p_H 4·6 by means of $Al_2(SO_4)_3$, or by repeated spraying with Bordeaux mixture. A. G. P.

Improvement of nicotine sprays. K. C. Menzel (Angew. Bot., 1936, **18**, 22—26).—Sulphonic acid and acid amide derivatives of fatty acids improve the wetting properties of nicotine (I) sprays, avoid plant injury, and permit the use of small concns. of (I) without loss of efficiency. A. G. P.

Approximate colorimetric determination of derris extract. T. M. Meijer (Rec. trav. chim., 1936, **55**, 954—958).—Derris root (1 g.) is shaken with $COMe_2$ (10 c.c.) for 5 min. 1 c.c. of the filtered solution is diluted with 25 c.c. of H_2O. To 0·2 c.c. of this mixture are added 5 c.c. of conc. H_2SO_4 containing 0·1 g. of $NaNO_2$ per litre. The resulting coloured solution has an absorption max. at 530 mμ, measurement of the extinction coeff. of which determines the extract content of the root within 2% without being affected by rotenone content. Alternatively, the colour is matched against mixtures of aq. and alcoholic $CoCl_2$. R. S. C.

Arsenic content of bees from plantations sprayed with arsenical insecticides. N. Luzanski (Tids. Kjemi, 1936, **16**, 107).—An As content of 12×10^{-6} g. per 100 poisoned bees was found. M. H. M. A.

Phosphate fertilisers.—See VII. **Durability of concrete in soil.**—See IX. **Evaluation of derris root.**—See XX. **Report of Liquor Effluents etc. Committee. [Fertiliser from] brewery effluent.**—See XXIII.

See also A., Dec., 1514, **Constituents of pyrethrum flowers.** 1562, **Tobacco-mosaic virus.** 1570, **Growth hormones and plant development.**

Patents.

Insecticide. W. C. Parrish (U.S.P. 2,034,152, 17.3.36. Appl., 6.4.32).—A spraying insecticide, fatal to insects but harmless to plants, is compounded of 60—84% of saturated mineral oil, 6—30% of unsaturated hydrocarbons combined with org. fatty acids of fixed oils, 2—3% of univalent alkali soaps of fatty acid, $1\frac{1}{2}$—4% of Et esters of fatty acids, $1\frac{1}{4}$—3% of glycerin, and $1\frac{1}{2}$—3% of sol. starch in aq. solution with its mol. equiv. of univalent alkali. D. M. M.

[Insecticidal] treatment of materials electrostatically. T. J. Headlee, Assr. to Endowment Foundation (U.S.P. 2,027,976, 14.1.36. Appl., 17.3.33).—Plants or the like are passed on a conveyor between electrodes excited at approx. 4000—6000 volts per linear in. of the distance between the electrodes, and at $\nless 10^6$ ~. B. M. V.

Improving the growth of plants. W. B. Doe, Assr. to Hydro-Humus Corp. of America (U.S.P. 2,029,988, 4.2.36. Appl., 10.6.35).—Pieces, shreds, or slivers of palmetto wood are buried in the soil around the roots. The absorbent properties of the palmetto are improved by cutting to expose end-fibres as much as possible and by storage in an aërobic heap before burying. B. M. V.

(A) Tree dressing. (B) Tree cavity filler. C. H. Smith, Assr. to Wingfoot Corp. (U.S.P. 2,033,869—70, 10.3.36. Appl., [A, B] 10.5.34).—A suitable material consists of a mixture of asphalt residue from the distillation of rubber, inert filler, and a solvent. A plasticiser or a disinfectant may be added if required. D. M. M.

Mixed fertilisers.—See VII. **[Soil] fumigant.**—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Physical properties of sugar cane. E. P. Hedley (Proc. 10th Congr. S. Afr. Sugar Techn. Assoc., 1936, 38—47).—The refractory milling quality of Uba cane has led to studies of hardness of different canes, and methods of measuring hardness of pith and rind are described. Irrigated canes have softer rind than non-irrigated, and the pith at nodes is harder than between them. Uba cane owes its "hardness" mainly to its small diameter and short internodular spaces, in consequence of which the proportions of rind to pith and of nodular to internodular pith are $>$ in other canes. Calorific vals. of bagasse from various POJ, Co, and Uba canes grown in S. Africa showed differences only from 8294 to 8487 B.Th.U. per lb. on dry, ash-free basis. The average val. is very close to those reported from other countries. J. H. L.

Milling Uba cane and milling in general. F. B. MacBeth (Proc. 9th Ann. Congr. S. Afr. Sugar Tech. Assoc., 1935, 5—13).—A discussion. Sucrose extraction $>$94·5—95% is not recommended for Uba cane because of increased non-sugars in the juice obtained at higher extraction. Ch. Abs. (*e*)

[Sugar cane] milling results as revealed by individual units control. J. Rault (Proc. 9th Ann. Congr. S. Afr. Sugar Tech. Assoc., 1935, 14—27).—Sucrose is not completely extracted from bagasse by boiling for ½ hr. A 5% increase was observed on boiling for 1¼ hr. Sucrose extraction was increased 92—94% and mill capacity 72·5—109·4 tons per hr. by using a circumferential zig-zag crusher and larger mill rolls. By use of grooved trash plates, divergence of bagasse mat towards the ends of the roller is prevented, and 75% of mill choking is eliminated. Ch. Abs. (*e*)

Washing of carbonatation filter-press cakes with limed water [in beet-sugar factories]. B. Wolschwjansky (Bull. Assoc. Chim. Sucr., 1936, **35**, 222—227).—In the sweetening-off of first-carbonatation cakes there is a progressive fall in purity of the washings owing partly to redissolution of impurities which are insol. at the reaction of the first-carbonatation juice. It is proposed to maintain this reaction throughout sweetening-off, by using suitably limed H_2O for this process, to prevent redissolution of org. impurities in the washings. J. H. L.

Sampling of crusher juice. G. S. Moberly (Proc. 9th Ann. Congr. S. Afr. Sugar Tech. Assoc., 1935, 99—106).—Samples collected in the usual way by the use of a wire extending from a hole in the bottom of the juice plate were compared with composite samples. The average difference in 139 tests was 0·012% of sucrose in cane and 0·031% purity. Ch. Abs. (*e*)

Report of chemical section. [Sulphate, copper, and iron in molasses.] S. J. Saint (Agric. J. [Barbados], 1935, **4**, 66—73).—The natural SO_4'' content of cane juice was 0·20—0·27%. Addition of H_2SO_4 to aid inversion increased the SO_4'' content of the molasses to 0·30—0·37%. The Cu content was correlated with the no. of Cu vessels used in boiling the juice. The Fe content (8—200 p.p.m.) was influenced by the type of boiling apparatus and the acidity of the syrup. Ch. Abs. (*e*)

Adaptation of "sugar and molasses" to the requirements of economy. R. Dutilloy (Bull. Assoc. Chim. Sucr., 1936, **53**, 213—221).—After long experience of the system described by Guilbert (B., 1935, 1064) the author prefers boiling to grain and using horizontal malaxeurs. The latter system saves time, yields better remelt sugars, and need involve no greater production of molasses. J. H. L.

p_H [of sugar solutions] and hydrolytic power. (Mlle.) A. Chaudun (Bull. Assoc. Chim. Sucr., 1936, **53**, 448—463).—The rate of hydrolysis of sucrose solutions by dil. acids cannot be strictly correlated with the electrometric p_H, and the process should not be regarded as a unimol. reaction due only to $[H^\cdot]$. If k' and k are the velocity coeffs. for 40% and 5% sucrose solutions, the ratio k'/k ranges from 1·58 with 0·1*N*-HCl to 0·84 with 0·1*N*-AcOH; with a given acid the ratio is about 1/3 as great at 0·001*N* as at *N* concn. For 5% sucrose solutions the ratio of k with 0·1*N*-acid to that with 0·01*N*-acid is 12·8 for HCl and only 3·4 for AcOH. The effects of addition of neutral salts on the hydrolytic activity of acids cannot be correlated with their effects on the p_H. J. H. L.

Rotatory power of lævulose in different media. (Mlle.) A. Chaudun (Bull. Assoc. Chim. Sucr., 1936, **53**, 338—343).—The $[\alpha]_D$, after mutarotation, in MeOH, $COMe_2$, and C_5H_5N is much lower (*i.e.*, nearer to 0) than in H_2O, but in glacial AcOH and conc. HCl it is higher than in H_2O. In 5% KOH at 18° it is $-67·5°$, and remains unchanged for some hr.; dilution with H_2O does not affect it, but neutralisation restores the val. for pure aq. solutions. The temp. coeff. is the same in MeOH, EtOH, or MeCHO as in H_2O. The rotatory dispersion is the same in C_5H_5N or glacial AcOH as in H_2O. J. H. L.

French sugar scale. F. Bates and F. P. Phelps (J. Res. Nat. Bur. Stand., 1936, **17**, 347—351).—In order to bring the French scale into line with the International scale, the normal wt. for the former should be 16·269±0·002 g. instead of 16·29 g. J. W. S.

Annual summary of chemical laboratory reports from Natal sugar factories, Season 1935—36. H. H. Dodds and W. O. Christianson (Proc. 10th Congr. S. Afr. Sugar Techn. Assoc., 1936, 48—69).—Of the total output of sugar (405,213 short tons) 97·1% was produced in 17 factories. Of the total cane worked about 94% was Uba, but the proportion of other types is increasing; its average content of sucrose was 13·65% and of fibre 15·9%. The average mill extraction was 90·64%, and purity of mixed juice 86·49%. The output of sugar, of average polarisation 98·42, was 10·88 on cane, ≡ 11·16% for 96° basis. J. H. L.

Report of Committee on standardisation of chemical control [of sugar] for the 1934—35 season. H. H. Dodds *et al.* (Proc. 9th Ann. Congr. S. Afr. Sugar Techn. Assoc., 1935, 95—98). Ch. Abs. (*e*)

Pungapung as a source of starch and alcohol. C. G. Reantaso (Philippine Agric., 1935, **24**, 239—248).—Pungapung tubers contain H_2O 74·9, ash 0·74, crude fat 0·40, protein 5·12, fibre 0·63, and carbohydrate 18·2%. The dry starch yield is approx. 4%. Hydrolysis in 1% acid yielded 82·5% of glucose. The optimum EtOH yield was 24·4 vol.-% on the basis of starch consumed. The residue from the starch extraction had N 2·42, P_2O_5 2·83, K_2O 0·60%. Ch. Abs. (*e*)

Proposed analytical method of classifying starches. A. Regnaudin (Bull. Assoc. Chim. Sucr., 1936, **53**, 477—479).—If different starches are solubilised by Baudry's method, the quantity of insol. matter which separates on keeping in the cold ranges from about 0·05% for potato starch, through 0·8—1% for manioc and sago starches, to 9—10% for cereal starches. The η of 1·5% pastes at 30° follows the same sequence in inverse order, ranging from 3·75° Engler for potato starch to 1·2—1·9 for cereal starches. A useful analytical val. is the starch content, as determined by Rossing's chemical method, expressed as % of that determined by Baudry's optical method. For potato starches this val. ranges from 101 to 109%, the lowest figures relating to the best grades of starch. For sago and manioc starches very similar vals. are obtained, but for cereal starches about 112—118%. J. H. L.

Viscosity of corn-starch pastes. W. Gallay and A. C. Bell (Canad. J. Res., 1936, **14**, **B**, 360—372).—Fluidities (F) of corn-starch pastes modified at 50° by HCl increase with the [HCl] used and with the time of action of the acid. F is dependent on the rate of shear in accordance with $F = cP^n$ (P=pressure, c and n are const. for a particular system). Since the measurements were made below the gelatinisation temp. the results are attributed to the resistance to deformation exhibited by the greatly swollen but still discrete granules. F. L. U.

Fibre [in sugar cane]. Sucrose-free bagasse.—See V. **Sugar cane and beet. Sugar-treated soils.**—See XVI. **Electro-katadyne apparatus [for starch solutions etc.].**—See XVIII. **Determining starch in potatoes. Blackstrap molasses for steers.**—See XIX.

See also A., Dec., 1490, **Prep. of xylulose and ribulose. Determining hexoses by fermentation, and of glucose, galactose, and lactose in their mixture.**

XVIII.—FERMENTATION INDUSTRIES.

Production of bakers' yeast by the aëration method. W. Braun and R. Pfundt (Biochem. Z., 1936, **287**, 115—125).—Using the author's conditions, the yeast wt. (g.) up to the end of addition of the wort may be calc. from the expression $160 \times 1{\cdot}2091^x$ and subsequently from $381 + 36x$, where x = hr. of fermentation. Formation of EtOH increases continuously for the first 7 hr. and then falls away. EtOH is probably formed and simultaneously utilised, the rate of utilisation exceeding that of formation from 7—9 hr. It is used for synthesis of glycogen and not of protein. During the period of greatest increase of yeast (4—8 hr.) the N and P_2O_5 absorptions are linear. P. W. C.

Activity of enzymes and p_H. W. Kopaczewski (Bull. Assoc. Chim. Sucr., 1936, **53**, 344—356).—The influence of acids on enzyme activity cannot be defined in terms of $[H^{\cdot}]$ alone; anions have an important effect on biological processes. The optimum reaction for an enzyme depends on the source and purity of the enzyme, the nature and concn. of the substrate, and other factors. It is more correct to speak of an optimum p_H zone than of an optimum p_H val. Many papers by the author and by others are cited. J. H. L.

Action of short and ultra-short Hertzian waves on fermentation organisms and enzymes. P. Liebesny, H. Wertheim, and W. Pollak (Bull. Assoc. Chim. Sucr., 1936, **53**, 464—476).—Exposure of yeasts, lactic bacteria, and organisms used in the amylo-process to radiation of λ 15 m. and 4 m. is considered to have produced significant stimulative effects varying with the type of organism and with λ. No effect on amylase preps. was observed. (Cf. B.P. 417,863; B., 1935, 121.) J. H. L.

[Brewery] mashing [processes]. P. Kolbach (Woch. Brau., 1936, **53**, 369—373, 377—381).—Continental processes are critically reviewed and compared with illustrative experiments; the possibility of simplifying and shortening such processes is discussed. I. A. P.

Turbidities in bright beers due to lactic bacteria and sarcina. I. Janensch (Woch. Brau., 1936, **53**, 389—390).—Samples of infected beers showed deficient saccharification and abnormally high p_H. The importance of wort composition and of biological process-control for the avoidance of infection is stressed. I. A. P.

Vitamin-*B* and -*G* [-B_2] of commercial beer. P. B. Donovan and M. E. Hanke (Proc. Soc. Exp. Biol. Med., 1936, **33**, 538—543).—Five commercial beers contained small amounts of -B_2 and less -B. The -B_2 and -B contents were not altered by pasteurisation or filtration through glass, but filtration through paper removed -B_2. W. McC.

Citric acid content of wines. H. Möhler (Mitt. Lebensm. Hyg., 1936, **27**, 27—40).—Analyses of a large no. and variety of samples confirm that citric acid (I) is a normal constituent of wine, but $>0{\cdot}5$ g. of (I) per litre indicates falsification; Reichard's pentabromoacetone method (B., 1934, 952), with a slight modification, is recommended for the determination. The origin and function of (I) are discussed from the biological viewpoint. J. G.

Determination of citric acid [in wine]. T. von Fellenberg (Mitt. Lebensm. Hyg., 1936, **27**, 157).—A reply to Möhler's assertion (preceding abstract), that the factor 0·52 used by the author for converting pentabromoacetone into citric acid is > the theoretical val. As the yield is only 90%, owing probably to oxidation of some of the acetonedicarboxylic acid produced intermediately, the above factor is more accurate; results illustrating this are cited (cf. B., 1934, 75). J. G.

Bacterium causing "disease" in fortified wines. J. C. M. Fornachon (Austral. J. Exp. Biol., 1936, **14**, 215—222).—Growth characteristics of the organism are described. Optimum activity occurs at p_H 4—5. Growth is retarded at p_H 3·8. The bacterium has a high EtOH-tolerance. A. G. P.

Clarification of fruit wines with Bayer filtration enzyme. A. Widmer (Mitt. Lebensm. Hyg., 1936, **27**, 347—351).—The clarification of pear and apple musts, otherwise difficult to clarify, with the aid of "Filtragol" is described. Its use is also recommended in the determination of tartaric acid in grape juice. E. C. S.

Use of electro-katadyne apparatus for distinguishing various types of "böckser" in wine and fruit wine and in the laboratory. A. Widmer (Mitt. Lebensm. Hyg., 1936, **27**, 352—356).—Taint due to H_2S (S böckser) is rapidly removed by treatment with the electro-katadyne steriliser, whilst that due to org. S (yeast böckser) is not affected. The latter must be treated with highly active adsorbent C. The apparatus may also be used for sterilising starch, tannin, and gelatin solutions, for stopping fermentation in fruit juices, etc. E. C. S.

Constitution and analysis of the bouquet substances of kirschwasser. H. Möhler and W. Hämmerle (Mitt. Lebensm. Hyg., 1936, **27**, 40—41; cf. B., 1935, 824).—The possibility of evaluating the bouquet of kirschwasser from the sap. val. of the bouquet substances (I) is discussed. The presence of a double linking in (I) is indicated by the Br and I consumption, and by hydrogenation at room temp., using a Pt catalyst. An alcohol which cannot be hydrogenated, and an easily hydrogenated fatty acid, $C_{11}H_{22}O_2$ or $C_{12}H_{22}O_2$, m.p. 52—56·5°, were obtained from the residue from the saponification of (I). J. G.

Fermentative micro-organism in the preparation of Awamori. I. *Aspergillus* species. R. Nakazawa, M. Simo, and H. Watanabe (J. Agric. Chem. Soc. Japan., 1936, **12**, 931—974).—Strains concerned are mostly varieties of *A. aureus* and *A. Awamori.* W. O. K.

Varieties of *Aspergillus oryzæ* employed in Shōyu manufacture. I. M. Kibi (J. Agric. Chem. Soc. Japan., 1936, **12**, 885—897; cf. A., 1935, 1540).—Koji employed in the manufacture of Shōyu contains numerous strains of *A. oryzæ.* W. O. K.

Elimination of methyl alcohol from potable spirits. A. Zaharia, E. Angelescu, and D. Motoc (Bull. Assoc. Chim. Sucr., 1936, **53**, 243—248).—Data on the composition of fractions obtained in the distillation of mixtures of H_2O with EtOH containing 1 or 2% of MeOH show that when the vapour phase contains about 40% of EtOH the MeOH : EtOH ratio is the same in the vapour as in the liquid phase. In discontinuous distillations for potable spirits, therefore, practically no elimination of MeOH is possible (cf. B., 1934, 982; 1935, 745). J. H. L.

Rectification by absorbents: preparation of absolute alcohol. C. Mariller (Bull. Assoc. Chim. Sucr., 1936, **53**, 356—359).—The use of liquid absorbents of the constituent to be removed, on the upper plates of rectifying columns (B., 1924, 28), has been applied successfully to the rectification of EtOH and AcOH. For AcOH Suida has employed tar oils and phenols, which absorb AcOH and allow H_2O to pass. For EtOH the author uses "deshydratol," consisting of polyglycerols containing in solution H_2O-absorbing salts. Used on the uppermost 12 plates of a rectifier it enables EtOH of 99·9—100% concn. to be obtained. The absorbent is regenerated by evaporation, finally in vac., and used again. The advantages of this system over azeotropic methods are discussed. The absorbent, being non-volatile, does not contaminate the EtOH, and losses are very slight. Important economies in steam are claimed. J. H. L.

Detection and determination of higher alcohols in imitation absinthe. T. von Fellenberg (Mitt. Lebensm. Hyg., 1936, **27**, 292—302).—Essential oils are removed by treatment with salicylaldehyde and H_2SO_4, the latter being insufficiently conc. to react with the higher alcohols. These are determined, after removal of interfering substances with animal C, by the Komarowsky–von Fellenberg method (cf. *ibid.*, 1910, **1**, 311). E. C. S.

Analyses of genuine cognacs. A. Evéquoz (Mitt. Lebensm. Hyg., 1936, **27**, 260—261).—The analyses of 7 samples are tabulated. Each was distilled in 6 fractions, the characteristics of which are discussed. E. C. S.

Alcohol vinegars. Iodine value. A. V. Sassi, N. Florentino, and J. C. Migliaro (Ind. y Quim., 1936, **2**, 8).—The I val. of 46 samples varied from 22·5 to 59 c.c. of 0·01N-I per 25 c.c. of vinegar. L. A. O'N.

Spirit and yeast from peat.—See II. **Sulphite spirit.**—See V. **EtOH from Pungapung.**—See XVII. **Dried yeast as fodder.**—See XIX. **Brewery effluent.**—See XXIII.

See also A., Dec., 1558, **Yeasts producing alcoholic fermentation at low temp.** 1560, **BuOH–$COMe_2$ fermentation.** 1568, **Antirachitic val. of irradiated yeast.**

Patents.

Preparation of purified alcohol from worts. Usines de Melle, and H. M. Guinot (B.P. 455,947, 3.12.35. Fr., 5.12.34).—The fermented wort is submitted to slight evaporation ($\not>$10%) in a suitable column surmounting the exhaustion column. The resultant vapour from the former, containing EtOH and all the harmful impurities of slight H_2O-solubility, passes to a purifying column for separation of the impurities, the purified EtOH returning to the first column, with or without supplementary intermediate purification, the residual liquor after decanting the impurities being also returned. The EtOH vapours from the purified wort descending to the exhaust column are passed to the rectifier. I. A. P.

Ageing of whisky. C. A. Hochwalt and W. H. Carmody, Assrs. to N. S. Talbott (U.S.P. 2,027,099, 7.1.36. Appl., 30.8.33).—Green whisky is heated under reflux (in presence of air or an inert gas) with a mixture of active wood C and charred wood chips ($\not<$9 : 1) until undesirable materials have been removed and the desired body, odour, and taste have been attained by the whisky. I. A. P.

Artificial ageing of whisky. C. A. Thomas and C. A. Hochwalt, Assrs. to N. S. Talbott (U.S.P. 2,027,129, 7.1.36. Appl., 12.9.34).—In the apparatus described, a mixture of whisky vapour and H_2 is brought in contact at 100° with a finely-divided catalyst (Ni, Pt, etc.) suspended in H_2O. Alternatively, the catalyst is packed with porous material (asbestos, coke, etc.) in a special treatment apparatus for hydrogenation at, preferably, 120°. By either process the ester content of the whisky is increased, and there is a slight formation of aldehydes due to O_2 adsorbed by the catalyst. The condensed hydrogenated whisky may be further treated in charred casks or with activated chars. I. A. P.

Preservation of fermentable liquids. C. Jeanprost (B.P. 456,075, 12.6.35).—Partly fermented or unfermented fruit juices are treated with suitable concns. of mixed or double salts of Fe or Al (*e.g.*, basic phosphates), or other inorg. amphoteric ions, with or without added excipients, whereby the assimilable P and N of the juices are pptd., yielding a sterile stable liquid after separation of the ppt. Sulphited musts may be desulphited before this treatment or simultaneously using a treatment ion stronger than SO_3'' with air or other oxidising agent. I. A. P.

Distributing gases in liquids.—See I. **Desizing starched goods.**—See VI.

XIX.—FOODS.

Gas heating in the food industry; P. Lloyd (Trans. Inst. Chem. Eng., 1935, **13**, 99—106).—The advantages of gas heating for food industries, and particularly for baking, drying, and evaporating, are discussed. D. K. M.

Steam generation in factories connected with the food industry. F. H. Preece (Trans. Inst. Chem. Eng., 1935, **13**, 80—83).—Details of steam-generation returns of a no. of food factories are given and discussed. D. K. M.

Fluid heat transmission in the food industry. J. A. Reavell (Trans. Inst. Chem. Eng., 1935, **13**, 91—98).—Heating by means of steam, electricity, and oil, and the lack of reliability of published heat-transfer coeffs. or those calc. from published data for oil, are discussed. D. K. M.

Heat-exchange and steam equipment in the food industry. L. H. Lampitt (Trans. Inst. Chem. Eng., 1935, **13**, 77—79).—A survey. D. K. M.

Phenol-staining of grains and ears in differentiating Polish wheat varieties. B. and K. Miczyńska (Angew. Bot., 1936, **18**, 1—12).—Staining tests for many varieties are given. A. G. P.

Detection of vegetable flour in wheat flours and pastes. D. Costa and C. Cannella (Annali Chim. Appl., 1936, **26**, 309—317).—Vegetable or rice flour may be detected microscopically in wheat flour, after treatment in aq. glycerin, with a drop of aq. KOH, when the starch particles of rice flour may be observed. The proportion of the latter may be calc. from the lowering of the % of protein sol. in aq. EtOH (7 vol.-%). L. A. O'N.

Determinations of manganese as complementary data for judging the grade of extraction of wheat flours. C. M. Albizzati (Ind. y. Quim., 1936, **2**, 19—21).—Grading of wheat flour by means of its ash content is discussed, and a complementary determination of Mn is suggested. Mn and ash contents of 132 samples have been determined and good correlation is shown. L. A. O'N.

Characteristics of the protein of rye–wheat hybrids. W. L. Kretowitsch (Planta, 1936, **25**, 64—69).—The high N content of grain of the hybrid *secalotrichum* is due to the extensive aleurone layer present. The ratio gliadin (I)/total N is similar to that of rye. The P distribution is intermediate between that of the parent strains. The (I) of wheat is differentiated from that of rye; that of the hybrid is similar to that of wheat. The gluten content of the hybrid is $>$ that of wheat, and the baking quality is intermediate between that of wheat and rye. A. G. P.

Protein, ash, calcium, and phosphorus content of Western Australian cereal grains. E. J. Underwood and L. C. Snook (J. Agric. West. Australia, 1935, **12**, 326—335).—Data for wheat, oats, and barley are given and compared with standard English vals. A. G. P.

Have ultra-violet rays significance for milling? H. Kühl (Mühlenlab., 1936, **6**, 145—150).—Ultra-violet light exerts only a superficial and very incomplete sterilising action on grain, and has not been applied successfully to its analysis. E. A. F.

Relations between sugar formation and gassing power in wheat-flour doughs. E. Berliner (Mühlenlab., 1936, **6**, 161—168).—The results of fermentation tests depend not only on the flour, but also on the quality of the yeast and the effect on its activity of improvers etc. As a measure of the gassing power of flours, maltose determination is both simpler and more accurate. CO_2 production in the third hr. $\propto$ maltose formation in the first hr., which $\propto$ diastatic activity. E. A. F.

Electrical conductivity of doughs. J. Dědek (Bull. Assoc. Chim. Sucr., 1936, **53**, 249—252).—As a possible means of measuring objectively the absorptive capacity of doughs for H_2O, the κ of doughs prepared with various proportions of H_2O, over a period of 40 hr. at const. temp., has been studied, the results being shown in graphs. Their general form shows a steep fall in R in the first few hr., flattening out to an almost const. val. after 4—10 hr. The smaller was the proportion of H_2O present the greater was the initial and final R. With a given proportion of H_2O, much higher vals. of R were obtained with good than with poor flour. The time necessary to obtain const. vals. appeared to be related to the colloidal properties of the gluten. J. H. L.

Importance of flour and bread in meeting vitamin-*B* requirements. A. Scheunert (Ernährung, 1936, **1**, 53—57).—The removal of vitamin-B_1 and -B_2 in milling offals and the val. of flour and bread in supplying -*B* requirements are discussed. A. G. P.

Growth-promoting value of wholemeal bread. W. Pfannenstiel and H. J. Jusatz (Arch. Hyg. Bakteriol., 1936, **115**, 205—220).—The nutritive val. of cereal grains is preserved in the baking of wholemeal bread. The health, growth, and longevity of rats fed on this bread were better than when fed on cereal meals for use as cattle feed. 50-day tests showed the bread to be equal in biological val. to freshly-ground meal. W. L. D.

Advantages of chemical control in molinary and related industries. M. R. Escribens (Bol. Soc. Quím. Peru, 1936, 2, 67—77).—The present state of cereal chemistry, its contribution to industry, and problems still to be solved are discussed. L. A. O'N.

Thickness of bran layers in rice. K. Ramiah (Current Sci., 1936, **5**, 215).—Vals. for 23 varieties are listed. C. W. G.

Analysis of biscuits made from butter and related products. B. Romani and L. Olivari (Annali Chim. Appl., 1936, **26**, 362—365).—The fat extracted from biscuits made from butter and cooked at 120—200° has a higher n and Polenske val., usually a higher I val., but lower Reichert–Meissl val. than the original fresh butter. There is little difference in sap. val. These variations are due partly to the fat contained in the flour. The effect of ageing and the results on substituting margarine for butter are also studied. L. A. O'N.

Examination and evaluation of macaroni and the like. E. Philippe and M. Henzi (Mitt. Lebensm. Hyg., 1936, **27**, 262—291).—By determining the % of Et_2O-sol. matter and of sol. protein it is possible to differentiate macaroni etc. made from fresh and/or dried eggs and to determine whether the dried eggs used contained the correct proportion of white and yolk. In other products, such as those containing cheese, the % of lecithinphosphoric acid must also be determined, but in the normal product this determination is of secondary val. E. C. S.

Determination of rice flour in table mustard. C. Valencien and J. Terrier (Mitt. Lebensm. Hyg., 1936, **27**, 377—379).—15 g. of material are extracted with EtOH and then Et_2O and the residue is dried. 1 g. of the dried substance is extracted with H_2O to remove AcOH and sugars; the starch is dissolved in aq. $CaCl_2$ and determined polarimetrically. The % of rice flour is calc. from the % of starch so determined. E. C. S.

Maintaining freshness of milk. Anon. (Milk Ind., 1936, **17**, No. 5, 45—47).—The preservation of milk and cream by storage under compressed O_2 at room temp. (Hofius process) enables dairy products to maintain their wholesomeness for at least 5½ weeks. Preheating milk to 58° enables milk to withstand longer storage periods. The metal of the container should not catalyse the development of oxidative taints in milk. W. L. D.

Low-temperature pasteurisation [of milk]. II. Heat-resistance of a thermoduric streptococcus grown at different temperatures. E. B. Anderson and L. J. Meanwell (J. Dairy Res., 1936, **7**, 181—191). A. G. P.

Nutritional value of milk and milk products. S. K. Kon (J. Dairy Res., 1936, **7**, 192—210).—A review. A. G. P.

Simplified molecular constant of milks from Lima and Callao. F. Carranza and J. Barcellos (Bol. Soc. Quím. Peru, 1936, **2**, 78—85).—Genuine samples of the milks each have a simplified mol. const. of approx. 74. A provisional lower limit of 70 is suggested. Lactose (I) is determined by the direct method, using the const. 1·465 for hydrated (I). L. A. O'N.

Constants of milk and butter fat in Tanganyika Territory. M. H. French and W. D. Raymond (Analyst, 1936, **61**, 750—751).—Average analyses of 41 clarified butter fats from 5 districts, and of 3153 milks are tabulated. The consts. of the butter fats from native cows (zebu) are usually normal, and exceptions from one district (low protein and acid, sap., Reichert–Meissl, and Polenske vals., and high n and I val.) may be due to the inclusion of particular foodstuffs in the ration. Milk from stock improved by grading-up with European bulls has a high content of butter fat, though the solids-not-fat figures are $<$ those usually found in the tropics. J. G.

Fat content of milk. Anon. (Milk Ind., 1936, **17**, No. 5, 57—59).—The fat content of milk from individual cows in the period April—July is subject to considerable variation. W. L. D.

Simplification of the plate-count method for bacteria in milk. K. J. Demeter, M. Löweneck, and M. Miller (Milch. Forsch., 1936, **18**, 131—149).—Bacterial counts on standard, lactose, and tryptone agar with 2 or 3 days' incubation are treated statistically. The correlation between counts for 2 and 3 days' incubation for the three types of agar is 0·99 for raw milk, and for lactose and tryptone agar with short-time pasteurised milk, but 0·74 with standard agar. W. L. D.

Bacteriology of milk preserved by the Hofius process. J. Müller (Z. Fleisch. Milchhyg., 1936, **46**, 276—277).—*Proteus* spp. inoculated into sterile milk preserved by the Hofius process (8—10 atm. O_2) were completely killed in 14 days. Coliform organisms were not completely destroyed in 60 days, but were reduced in no. W. L. D.

Influence of reaction on peroxidase test in milk products. O. Roemmele (Z. Fleisch. Milchhyg., 1936, **46**, 128—133)—In carrying out peroxidase reactions in milk, creams, and butter at various p_H, the Storch test was doubtful (brown) at $p_H > 7·2$, effective over the range p_H 5·0—7·0, and fading at $p_H < 5·0$. The guaiacum reaction was effective over the range p_H 4·7—7·2, the colour decreasing down to p_H 3·7. The benzidine reaction was strong at p_H 7·2 and in presence of CH_2O (p_H 6·2), but fainter at p_H 5·0—7·0 and still positive but faint down to p_H 3·7. W. L. D.

Phosphatase test and its reliability for detecting pasteurisation [of milk] at low temperatures. C. A. Koppejan (Chem. Weekblad, 1936, **33**, 747).—Phosphatase disappears from milk on heating to 58°, 59°, 60°, 61°, and 62° in accordance with a unimol. reaction: k=0·0145, 0·0304, 0·0558, 0·1031, and 0·3055, respectively. It is removed completely in 20 min. at 62°, in 45 min. at 61°, and in 75 min. at 60°. A positive test is obtained when 0·1% of raw milk is added. The enzyme is least sensitive towards heat at p_H 7·0. Addition of small amounts of NaCl, KCl, KBr, KI, Na_2HPO_4, and Na citrate accelerates destruction, but Na_2SO_4, K_2SO_4, Na lactate, and lactose have no effect. S. C.

Ion equilibria in milk. H. J. C. Tendeloo (Chem. Weekblad, 1936, **33**, 747).—In the potentiometric titration of milk more $Ca(OH)_2$ is required than NaOH to reach the same p_H. When sufficient $K_2C_2O_4$ is added to milk to combine with the Cu present, the casein–phosphate complex behaves like a mixture of two or more weak acids. S. C.

Calculation of the protein content of cows' milk from the nitrogen content as determined by the Kjeldahl [method]. M. van der Waarden (Chem. Weekblad, 1936, **33**, 768—770).—The factor for converting N into protein content is 6·4 and not 7 as given in the official method. The factor for obtaining the pure protein content of milk is 5·44 and for the sum of coagulable protein, albumose, and peptones 6·11. S. C.

Film characteristics. Effect on response of fluid milk to ultra-violet radiation. H. H. Beck and K. G. Weckel (Ind. Eng. Chem., 1936, **28**, 1251—1254).—The thickness, velocity, and travel time of thin-flowing films of milk of various flow capacities have been determined. Gravity acceleration of flow is limited to the films of higher flow capacity and only through the first few in. of flow. Thickness of film is affected by the nature of the metallic surface (matt or polished finish) and the slope of flow. In ultra-violet irradiation of milk films the acquiring of additional antirachitic potency is directly $\propto$ time of exposure, and inversely $\propto$ thickness and rate of flow at higher speeds. W. L. D.

Polarographic studies on milk-protein solutions. W. Mohr and J. Wellm (Milch. Forsch., 1936, **18**, 123—130).—The polarising effect of diluted milk on passing a current through a special solution (ammoniacal 0·2% hexamminecobaltic chloride) is due to casein and albumin. The polarising constituents are pptd. by saturation with Na_2SO_4 but not by AcOH pptn. or boiling the milk. Fat and the ultrafiltrate of milk have no polarising effect. W. L. D.

Determination of proteins by formol titration. J. P. A. Tuenter (Chem. Weekblad, 1936, **33**, 671—672).—Interference with the phenolphthalein (I) end-point in this determination by the brown colour produced from certain butter-milk products is eliminated by adding bromothymol-blue (II) also; equal vols. of indicator solutions are used, but the concn. of (I) (1—2%) should be ten times that of (II). J. G.

Automatic process in powdered milk manufacture. G. P. Lonergan (Ind. Eng. Chem., 1936, **28**, 1264—1265).—Modifications of the Gray–Jensen process are described. Loss of milk powder by entrainment is avoided by using the exhaust of warm air to concentrate partly the liquid milk heated to 72°, this temp. being automatically maintained and observed by remote control. W. L. D.

Swelling of tinned sweetened milk products by beta bacteria. H. Damm and W. Hornbostel (Milch. Forsch., 1936, **18**, 107—110).—Tinned milk fruit jellies showed swelling after 8 days' incubation at 37° owing to the entry of beta bacteria into the fruit juice employed. 30 min. pasteurisation at 70—72° avoided the fault. W. L. D.

Formation of butter aroma. A. I. Virtanen, L. Mansikkala, and J. Tikka (Suomen Kem., 1936, **9**, **B**, 28; cf. B., 1936, 345).—In mixed cultures of the aroma bacteria and lactic acid streptococci the presence of O_2 increases the yield of CHAcMe·OH (I). Numerous starters gave little (I) with thick layers, but a good yield with thin layers of milk, and more (I) is formed by pure cultures of the bacteria with thin than with thick layers of milk. O_2 is as necessary for the formation of (I) as for that of Ac_2. R. S. B.

Salting and cooking of curds in the manufacture of several varieties of cheese. J. C. Marquardt (New York State Agric. Exp. Sta. Bull., 1936, No. 670, 16 pp.).—Salting should be based on the fat content of the milk used. Effects of the method of salting and of cooking on the quality of various cheeses are examined. A. G. P.

Development of the microflora of Wilster Maisch cheese during ripening. O. Boysen (Milch. Forsch., 1936, **18**, 150—168).—*S. lactis* is present in greatest nos. at all stages of ripening. Micrococci are present in large nos. only during the first 2 days. Coliform organisms are responsible for some of the flavour and with *B. lactis aërogenes* for gas holes. *S. lactis* is not responsible for protein breakdown. W. L. D.

Determination of sodium in cheese and neutralised milk products. J. Wille (Milch. Forsch., 1936, **18**, 111—115).—Na is determined by the $NaZn(UO_2)_3(OAc)_9$ method and Cl by the Volhard method on an $(NH_4)_2SO_4$ extract. Subtracting the Na equiv. to Cl from the total Na gives a val. of alkaline Na added to neutralise acidity in the original milk. W. L. D.

Determination of casein [in milk] by formol titration after precipitation with acid. F. H. McDowall and A. K. R. McDowell (Analyst, 1936, **61**, 824—828).—Casein pptd. from 20 ml. of milk by Moir's method (B., 1931, 564), slightly modified, and dissolved in sufficient warm NaOH to produce phenolphthalein neutrality may be titrated with 0·1*N*-NaOH in presence of CH_2O to the same end-point (cf. B., 1936, 810, 952), and determined, using the factor 0·92, with an error of ±0·05%. The result is influenced by the $[CH_2O]$ in the solution and by the vol. and temp., but not by variations in the time allowed for the action of the CH_2O. J. G.

Casein solutions. A. V. Pamfilov and E. N. Rosljakova (J. Appl. Chem. Russ., 1936, **9**, 1664—1674).—Stickiness and η data are recorded for solutions of caseinogen (I) in aq. NaOH, NH_3, borax, Na_2CO_3, and borax–NaOH and $-Na_2CO_3$. The most stable solutions are obtained by dissolving 20 g. of (I) in an amount of solution sufficient to give 100 ml. of the final solution, and containing 3 g. of borax and 1 g. of Na_2CO_3. Stability is increased by preheating the (I) with H_2O for 1 hr. at 110°. R. T.

Efficiency of egg preservatives for infected eggs. M. Knorr and (Frl.) Lippert (Arch. Hyg.

Bakteriol., 1936, **115**, 260—267).—The preservative action of CaO and water-glass on eggs infected with enteritis bacteria from chicken fæces depends on the freshness of the egg when laid down, the thickness of the egg-shell, and the completeness of the closing up of the shell pores. Results with common preserving liquids on infected eggs in as fresh a condition as possible were moderately successful. W. L. D.

Spray residues and their removal from apples. W. S. Hough (Virginia [Blacksburg] Agric. Exp. Sta. Bull., 1936, No. 302, 20 pp.).—Conditions of washing with aq. HCl or Na silicate after use of Pb arsenate, cryolite, with or without oils or wetting agents, or Bordeaux mixture, are examined. (Cf. B., 1936, 247, 392.) A. G. P.

Removal of fluorine spray residue from apples sprayed with natural cryolite. K. Groves, R. E. Marshall, F. L. Overley, and J. L. St. John (Wash. Agric. Exp. Sta. Bull., 1936, No. 329, 15 pp.).—The process of washing with HCl followed by Na silicate is examined. $AlCl_3$ gave very poor results. A. G. P.

Vitamin-*C* content of orange peel and its pharmaceutical preparations. H. C. Hou (Chinese Med. J., 1936, **50**, 1227—1234).—Chemical determination of ascorbic acid in orange peels, and in tinctures and infusions, showed good agreement with biological vals. (0·024—0·179 mg./g.). There is loss on drying of peels and on storage of peels, tinctures, and infusions due to oxidation. G. H. B.

Harvesting grape fruit to retard stem-end rot. J. R. Winston (U.S. Dept. Agric. Circ., 1936, No. 396, 8 pp.).—Borax treatment in packing houses reduces decay from stem-end rot and also the incidence of blue mould. Pulled fruit is less attacked than cut fruit. A. G. P.

Dietetic value of palm oil. T. A. Buckley (Malay. Agric. J., 1936, **24**, 485—488).—Red palm oil contains considerable amounts of carotene (I). Its vitamin-*A* potency is approx. equiv. to that of cod-liver oil. The -*D* content is negligible. Removal of the solid constituents improves the palatability of the oil and the product is richer in (I). Oils of low acidity from unripe fruit usually contain less (I). A. G. P.

Iodine content of Oklahoma vegetables. V. G. Heller, M. Jones, and L. Pursell (Oklahoma Agric. Exp. Sta. Bull., 1935, No. 229, 8 pp.).—The I content of vegetables is dependent more on the place of growth than on species. Vals. are highest in plant organs in which green pigmentation is most intense. A. G. P.

Determination of the starch content and dry matter of potatoes by means of their specific gravity. C. von Schéele, G. Svensson, and J. Rasmusson (Landw. Versuchs-Stat., 1936, **127**, 67—96).—Results of the authors' autoclave method agree well with those obtained polarimetrically after oxidation of pectins with $KMnO_4$. A method of determining the dry matter content is described. Customary methods for calculating starch contents from the *d* of potatoes lead to unduly high vals. Modified methods based on statistical data are discussed. A. G. P.

Potato genetics. II. Variability of protein content in the *S. phureja* × *S. rybinii* interspecific hybrids. A. Schwartz and S. F. Kuzmin (Compt. rend. Acad. Sci. U.R.S.S., 1936, **3**, 181—184; cf. B., 1936, 521).—The total and protein-N contents of hybrids and their change during storage are examined. A. G. P.

Relative value of various lards and other fats for the deep-fat frying of potato chips. F. B. King, R. Loughlin, R. W. Riemenschneider, and N. R. Ellis (J. Agric. Res., 1936, **53**, 369—381).—Absorption of fat by chips was approx. the same for all fats used. In all cases fats deteriorated after 10 cooking periods of 80 min. each at 185°. Free fatty acid (I) contents increased although vals. were not unduly high; peroxide vals. became sufficiently high to indicate unsuitability for further use. The % of (I) in fat extracted from chips was $>$ in that in the frying-pan. For palatability and storage quality chips cooked in peanut, cottonseed (II), or maize oils were generally superior to those cooked in hydrogenated (II), hydrogenated lard, or lards obtained from animals receiving rations composed principally of peanuts, maize, or brewer's rice. A. G. P.

Effect of active soya bean on vitamin-*A*. C. N. Frey, A. S. Schultz, and R. F. Light (Ind. Eng. Chem., 1936, **28**, 1254).—An aq. suspension of ground soya bean bleaches carotene solutions, but heating the beans above 55° prevents this oxidative reaction. At least 99% of the -*A* of cod-liver oil is destroyed by treatment with active soya bean. W. L. D.

Chemistry [and physiology] of phosphatides and their utilisation in industry. E. B. Working (Oil & Soap, 1936, **13**, 261—263).—A brief review. E. L.

Determination of caffeine and aqueous extract in caffeine-free and caffeine-containing coffee. E. Bürgin and M. Streuli (Mitt. Lebensm. Hyg., 1936, **27**, 1—8).—The methods of (*A*) Helberg (B., 1933, 1081) as proposed for official use in Switzerland, (*B*) Pritzker and Jungkunz (B., 1926, 605), modified by using the Kjeldahl method to determine the caffeine, and (*C*) method *A* modified by using $KMnO_4$ purification as in *B*, are compared. For caffeine-free coffees *B* and *C* agree, but the results are approx. 50% $>$ those given by *A*. For other coffees the agreement is better, but *B* gives slightly higher results and is recommended as being quicker and simpler. Variation of the particle size of the sample used for the determination of aq. extract between 0·5 and 1 mm. may produce variations which make it impossible to judge whether the true extract is $>$ or $<$ the min. val. of 20 and 22% specified for caffeine-free and other coffees, respectively. The proposed pyknometric method gives results $>$ those obtained gravimetrically, and introduces similar doubts. J. G.

Determination of formic acid in fruit juices and syrups. T. von Fellenberg (Mitt. Lebensm. Hyg., 1936, **27**, 182—200).—Two methods based on the reduction of $HgCl_2$ are described. Either the

HCO_2H is extracted completely with Et_2O, or a single extraction is carried out and the val. obtained is corr. by means of a distribution coeff. E. C. S.

Determination of zinc in foods. N. D. Sylvester and E. B. Hughes (Analyst, 1936, **61**, 734—742).—A solution of the ash in HCl is buffered to p_H 4·5 with NH_4OAc and extracted with 0·15% diphenylthiocarbazone in $CHCl_3$ (cf. B., 1935, 746) and Zn, Bi, and Cd are removed from the extract with dil. HCl. In absence of Cd and of $>$2·0 mg. of Bi, 0·2—1·0 mg. of Zn may then be determined by micro-titration with $K_4Fe(CN)_6$ in AcOH, using 0·05% diphenylbenzidine and fresh 1% $K_3Fe(CN)_6$ as internal indicators; org. matter should be removed previously by $HClO_4$ and H_2O_2. A more sp. method (for $<$0·3 mg. of Zn) is to add AcOH, NH_4F, HF, and KI–starch, any blue colour being discharged with $Na_2S_2O_3$; $K_3Fe(CN)_6$ is then added, and the mixture titrated with 0·002N-$Na_2S_2O_3$ until the new blue colour disappears. The latter is recommended for foodstuffs and enables accurate recovery of 1 p.p.m. to be obtained on a 50-g. sample. The normal Zn contents of a no. of varied foods are recorded; they range from 0 (white of new-laid egg) to 145 p.p.m. (wheat bran). J. G.

Influence of stunning by electric current on quality of meat of large animals. I. A. Smorodincev, N. N. Krilova, N. V. Nikolaeva, and V. J. Passonina (Z. Fleisch. Milchhyg., 1936, **46**, 253—255).—Analysis of meat from 5—7-year-old cows killed after stunning with an electric current and by other means showed no significant difference in the storage qualities of the meat. In 72 hr. the p_H of meat drops from 6·6 to 5·6, but lactic acid rises from 0·50 to 0·58%, inorg. P from 0·073 to 0·096%, and extractable N from 0·83 to 0·87%, with no significant difference in non-protein-N. W. L. D.

Autoclave splitting of the non-extractable portion of beef by means of an aqueous solution of lithium carbonate. V. S. Sadikov and A. G. Pesina (Compt. rend. Acad. Sci. U.R.S.S., 1936, **3**, 171—174).—A preliminary account of the N distribution before and after autoclaving and after extraction of the product with $CHCl_3$ is given. A. G. P.

Influence of cooking and canning on the vitamin-B_1 and G- [-B_2] content of lean beef and pork. F. W. Christensen, E. Latzke, and T. H. Hopper (J. Agric. Res., 1936, **53**, 415—432).—Cooking at $\not>$90° lowered the -B_1 content of beef $>$ that of pork. Pressure cooking (10 lb.) further lowered the -B_1 in pork and almost completely destroyed that of beef. No loss of -B_2 occurred during either process of cooking. A. G. P.

Detecting the early stages of meat decomposition. W. Walkiewicz (Z. Fleisch. Milchhyg., 1936, **46**, 171—174).—Aq. meat extract (1 pt. of meat, 10 pts. of H_2O) is prepared by filtering a mixture of finely-ground meat and H_2O after 30 min. keeping. Three drops of the extract are pipetted into two test-tubes, one containing 4 ml. of 0·1% $HgCl_2$ and the other 4 ml. of 0·1% $HgCl_2$ containing 0·005% of AcOH. On viewing against a dark background, if the tube containing unacidified $HgCl_2$ develops a cloudiness, the original meat shows incipient decomp. W. L. D.

Electrical conductivity and surface tension of meat extracts. I. A. Smorodincev and N. N. Krilova (J. Biochem. Japan, 1936, **23**, 453—454).—Data are given for κ and σ of aq. extracts of meat stored for periods up to 18 days at 4° and 34° and their significance is discussed. F. O. H.

Buffering action of meat extracts and the coefficient D. I. A. Smorodincev and P. A. Tsiganova (J. Biochem. Japan, 1936, **23**, 449—452).—The buffering action of aq. extracts prepared at intervals from meat kept at 4° or 34° reaches a max. val. when the meat is 24 hr. old and then slowly decreases to an approx. const. level after 3 days. The coeff. D (difference between NaOH-titration vals. of aq. and EtOH extracts) rises to a max. after 24 hr., falls a little, and then rises to a const. val. after 10 days. F. O. H.

Manufacture of blood meal [in Württemberg]. E. Moegle (Z. Fleisch. Milchhyg., 1936, **46**, 400—402).—Calf and pig blood are mostly used for manufacture. The yield is about 22·5% of the fresh blood; the crude protein content averages 80%. Various forms of plant for drying after coagulation of the blood at 65—70° are described. W. L. D.

Determination of volatile-base nitrogen in fish meals. W. Geidel (Z. Fleisch. Milchhyg., 1936, **46**, 215—217).—Steam-distillation of fish meal (2 g.) with MgO (2 g.) for 25 min. and absorbing the volatile base in standard acid gave a range of 0·102 (herring) to 0·355% (shark) of volatile N. Exposure to air in paper bags diminished volatile N by 25%. Aq. extracts of various meals treated with pptg. agents gave such variable results for sol. N that the quality of the meal could not be gauged from this val. W. L. D.

Colour in canned salmon. F. Charnley (Biol. Bd. Canada, Progr. Repts., 1936, No. 29, 12—16).—The intensity of colour, expressed in red and yellow Lovibond units, in the flesh of a large no. of samples of canned sockeye, blueback, cohoe, spring, pink, and chum salmon is recorded. The mean intensity of red decreased, in the order named, from 6·83 to 2·71, and that of yellow from 4·32 in sockeye to 2·72 in pink. The statistical distribution of intensity was widest in the spring variety. E. C. S.

Influence of fats and oils in feeding-meals. H. M. Langton (Fertiliser, Feeding Stuffs, Farm Supplies J., 1936, **21**, 641—644).—A review. A. G. P.

Effect of heat as used in the extraction of soya-bean oil on the nutritive value of the protein of soya-bean meal. J. W. Hayward, H. Steenbock, and G. Bohstedt (J. Nutrition, 1936 **11**, 219—234).—Heating the raw beans as in certain oil-extraction processes increases the nutrient val. of the protein to rats by 12% and its digestibility by 3%. Low-temp. oil extraction has no effect. A. G. P.

Growth and development. XXXVIII. Energetic efficiency of milk production and influence of live weight thereon. XXXIX. Relation be-

tween monetary profit and energetic efficiency of milk production. S. Brody and R. Cunningham (Missouri Agric. Exp. Sta. Res. Bull., 1936, No. 238, 52 pp.; No. 239, 47 pp.).—XXXVIII. The energy efficiency of milk production, *i.e.*, ratio of the energy of milk produced to that of the total digestible nutrients consumed, is approx. 30% and is independent of the live wt. of the cow. The gross efficiency of milk production is similar to that of early prenatal growth. The nett energy efficiency approaches 60%. The law of diminishing returns applies to both gross and nett vals. A. G. P.

Wet feeds *versus* dry feeds for milk production. A. D. Pratt (Virginia [Blacksburg] Agric. Exp. Sta. Bull., 1936, No. 301, 10 pp.).—No consistent differences in milk production or variations in body wt. could be ascribed to wet or dry forms of sugar-beet or maize silage. A. G. P.

Dried yeast as fodder supplement for milch cows. II. T. Baumgärtel (Milch. Zentr., 1936, **65**, 345—355; cf. B., 1936, 1125).—The compositions of a xylose-fermenting yeast (I), used for the manufacture of EtOH from cellulosic products, and brewer's yeast are compared. (I) contains 47% of crude, 42% of true, and 44% of digestible protein (brewer's yeast has 54, 41, and 51%, respectively). Apparatus for the propagation of (I) is described. Digestibility experiments with (I), compared with brewer's yeast and soya-bean meal, show (I) to possess a high digestibility coeff. (88—91%) and to compare favourably with other high-protein foods of 90—93% digestibility. A slight rise in yield of milk is reported on feeding small quantities of (I) as a supplement to the ration of milch cows. W. L. D.

Effect of plane of nutrition of ewes on their wool, lamb, and milk production. M. G. Snell (Louisiana Agric. Exp. Sta. Bull., 1936, No. 269, 23 pp.).—Low-level rations adversely affected all factors examined and in many cases led to shedding of wool in winter. A. G. P.

Control of raw and market milk. Ehrlich (Z. Fleisch. Milchhyg., 1936, **46**, 191—196).—The control consists of veterinary inspection of cows, platform tests for milk, tests for acidity and bacteriological counts, and tests for sediment, catalase, and coliform organisms. W. L. D.

Factors affecting the composition of milk. C. W. Turner (Missouri Agric. Exp. Sta. Bull., 1936, No. 365, 30 pp.).—Influence of nutritional and physiological factors and of the system of milking are discussed. A. G. P.

Mass feeding of sheep with copper sulphate and salt to control gastro-intestinal parasites. J. H. Rietz (West Virginia Agric. Exp. Sta. Bull., 1936, No. 271, 11 pp.).—Feeding $CuSO_4$–NaCl (1 : 30) *ad lib.* (approx. 0·5 lb. per sheep per month) did not control nematode parasites. 1·5% aq. $CuSO_4$ and the same with 1·5% nicotine sulphate, used as drenches, gave equally effective control of nematode and cestode infestation. A. G. P.

Chronic copper poisoning in sheep. I. B. Boughton and W. H. Hardy (Texas Agric. Exp. Sta. Bull., 1934, No. 499, 32 pp.).—"Icterohæmoglobinuria" in sheep is actually a chronic Cu poisoning resulting from prolonged use of $CuSO_4$–NaCl–tobacco dust preps. for controlling internal parasites. Elimination of Cu from the body is slow and death may occur some weeks after cessation of treatment. A. G. P.

Nutritive value of the protein in calf lungs, cow udders, and hog spleens. R. Hoagland and G. C. Snider (J. Agric. Res., 1936, **53**, 349—355).—Vals. as protein sources were in the order beef $>$ calf lung and hog spleen $>$ cow udder. The proteins of the lungs, spleen, udder, and cracklings did not supplement each other appreciably, but those of lungs, spleen, and beef supplemented maize protein to a considerable extent. A. G. P.

Blackstrap molasses and maize–soya-bean silage for fattening steers. M. G. Snell (Louisiana Agric. Exp. Sta. Bull., 1935, No. 266, 22 pp.).—Addition of molasses to dry rations increased the digestibility of the N-free extract and ash, but did not affect that of crude protein, fat, or fibre. N balances were unchanged, but the ash, Mg, and Ca, but not P, balances increased. Addition of silage to dry rations did not alter digestibility vals. except in lowering that of ash. Addition of molasses to a silage ration lowered the digestibility of crude protein, but increased that of crude fat and ash. N balances decreased. Satisfactory use of molasses with concentrates is recorded. A. G. P.

Sex odour of boar's offal. Heydt (Z. Fleisch. Milchhyg., 1936, **46**, 397—400).—The offal of uncastrated boars is often tainted with the strong odour of the male sex. Isolated cases occur in female swine. The degree of taint is periodic, apparently varying with that of excitement of sex functions. In the manufacture of pork products, treatment with live steam diminishes the taint. W. L. D.

Vitamin-*A* requirement of hens for egg production. R. M. Sherwood and G. S. Fraps (Texas Agric. Exp. Sta. Bull., 1935, No. 514, 22 pp.).—Max. egg production and hatchability were obtained with rations rich in -*A*. Eggs produced after moulting had -*A* contents the same as or $<$ those produced previously. For hens producing $>$ 150 eggs annually the daily requirement of -*A* is 600 Sherman units. A. G. P.

Vitamin-*D* requirements of chicken grown in absence of sunlight. J. R. Couch, G. S. Fraps, and R. M. Sherwood (Texas Agric. Exp. Sta. Bull., 1935, No. 521, 31 pp.).—Chicks grown in darkness on a normal ration with adequate Ca and P but without additional -*D* showed no evidence of -*D* deficiency during the first 6 weeks. The -*D* requirement of cockerels is $>$ that of pullets and differs with the factor examined (growth, utilisation of food, rickets, calcification). A. G. P.

Effect of packing-house by-products, in the diet of chickens, on the production and hatchability of eggs. H. W. Titus, T. C. Byerly, N. R. Ellis, and R. B. Nestler (J. Agric. Res., 1936, **53**, 453—465).—Addition to a basal diet of meat by-products increased egg yields to extents $>$ that produced by meat–fish–milk supplements. Liquid stick (liquor obtained during steam-rendering of fat) used alone or in conjunction with blood-meal decreased egg size and increased second-week mortality during incubation. Suitable mixtures of offals for use in chicken feeds are described. A. G. P.

Wheat gray shorts for prevention of slipped tendons in battery brooder chicks. R. M. Sherwood and J. R. Couch (Texas Agric. Exp. Sta. Bull., 1936, No. 525, 25 pp.).—Addition of shorts to chick rations decreased food consumption per unit gain in live wt. and lowered the proportion of slipped tendons. In these respects use of shorts was more effective than adjustment of the Ca and P levels of the ration. The effect of shorts on slipped tendons was influenced by the Ca and P contents of the ration. A. G. P.

Spray drying.—See I. **Al-coated Fe [in canning].**—See X. **Edible oils. Fish-liver oils and vitamins.**—See XII. **Bakers' yeast. Electro-katadyne apparatus [for fruit juices etc.]. Filtration of fruit wines.**—See XVIII.

See also A., Dec., 1479, **Determining Cu [in canned vegetables].** 1535, **Cu, Zn, and Mn of cows' milk. Determining vitamin-*C* in fresh milk. Minor components of cow-milk fat.** 1536, **Variation of fat in milk with time of day.** 1554, **Storch reaction for peroxidase in milk.** 1566—8, **Vitamins.**

Patents.

Improving the baking strength of flour. A./S. Dansk Gærings-Industri (B.P. 455,221, 11.4.36. Denm., 29.3.35).—Ascorbic acid (I) or an alkali ascorbate (II) is used as flour improver in bread-making. 0·0002—0·0005% of (I) or (II) (on the flour wt.) is added, or it may be incorporated in the form of the neutralised juice of a citrus fruit E. B. H.

Manufacture of a stable dry leavenous agent for baking purposes. H. Wögerbauer (U.S.P. 2,023,500, 10.12.35. Appl., 29.9.33. Austr., 4.10.32).—Liquid cultures of lactic bacteria, with or without added leaven bacteria or yeast, are mixed with an excess of flour and allowed to "ferment" until the mixture becomes dry and can be milled. E. B. H

Inhibiting mould growth on baked goods. Standard Brands, Inc. (B.P. 455,846, 23.3.36. U.S., 11.4.35).—The surface of the baked goods is treated with a fatty acid ($\ngtr C_6$) (I) or halogen derivative thereof. (I) may be formed *in situ* by treating a salt of (I) with an acid stronger than (I). Thus (I) may be AcOH (0·1% on the wt. of baked goods), or NaOAc, $Ca(OAc)_2$, etc. may be treated with HCl or H_3PO_4. E. B. H.

Milk-pasteurising and -cooling units. E. Prestage (B.P. 455,616, 23.4.35).—A method of supporting the heat-exchanging units is claimed. B. M. V.

Preservation of milk. G. A. Krause, Assr. to Katadyn, Inc. (U.S.P. 2,028,072, 14.1.36. Appl., 24.2.31. Ger., 24.2.30).—Milk is subjected to the oligodynamic action of silvered clay pellets for periods $\ngtr 5$ min., together with heat-treatment at 63° for a considerably shorter time than the normal pasteurising period. By this means the bacterial count and subsequent growth rate (at a storage temp. of 20°) are considerably reduced, and the milk remains in a fresh condition for several days. E. B. H.

Manufacture of butter. E. Spieker (B.P. 457,751, 22.8.36. Ger., 22.8.35).—The use of *L. bulgaricus* or *L. acidophilus* cultures as starters in cream intended for butter production is claimed to give butter of improved health-giving properties. Details of manufacture are given. E. B. H.

Production of butter and cheese from animal milk. H. Weissenberg (B.P. 455,691, 23.4.35).—Milk, instead of being soured by bacterial action, is coagulated by addition of citric acid (5 g. to 1000 c.c. of milk). Coagulation is complete in 15 min., and the product can then be churned to butter or used in cheesemaking. Skimmed milk or cream can be similarly treated. A considerable saving of time is claimed, and the lactose and albumin of the milk are not affected. E. B. H.

Purification of cream. A. Andersson (B.P. 455,456, 20.9.35).—An apparatus intended for the deodorisation of cream is described, in which the separated cream is heated to 80° by means of a heating coil, subjected to vac. treatment at 70—75°, and subsequently cooled. E. B. H.

Egg product. B. R. Harris and M. C. Reynolds (U.S.P. 2,026,631, 7.1.36. Appl., 11.1.34).—The addition of 5—10% of hydrophilic lipin substances to liquid egg gives improved emulsification to cake mixes in which > the usual proportions of milk and sugar may be added: the cakes stale less rapidly. The substances are prepared, *e.g.*, by heating in an inert atm. (1) glycerol and fatty acids to 220°, or (2) glycerol with NaOH to 250°, or (3) the product from (2) with fatty acids at 220°. E. B. H.

(A) Forming a meat-curing salt product. (B) Meat-curing substances. Griffith Labs., Inc. (B.P. 455,816 and 455,823, [A] 30.8.35, [B] 16.10.35. U.S., [A] 7.11.34, [B] 30.10.34).—To overcome (A) the tendency of mixtures of ground crystals of NaCl, $NaNO_3$, and $NaNO_2$ to separate during packing, shipping, etc., and (B) the different speeds of penetration of these salts into meat, grains of hot NaCl are coated with fused $NaNO_3$ and/or $NaNO_2$ and then cooled rapidly. For use more particularly in dry-curing, 3 : 2 mixtures of $NaNO_2$ and $NaNO_3$, with or without addition of 5·0% of NaCl, are carefully fused, rapidly cooled, and then ground; the resulting material may be used in conjunction with NaCl. E. B. H.

Canning of crab meat. C. R. Fellers (U.S.P. 2,027,270, 7.1.36. Appl., 20.2.35).—Before initial discoloration has set in, the meat is treated with a solution (containing 50—500 p.p.m., calc. as metal) of a salt of Al, Sn, or Zn, then sealed, and sterilised. B. M. V.

Drying of fruit. C. C. Moore, Assr. to Vacuodri Fruit Corp. (U.S.P. 2,023,536, 10.12.35. Appl., 18.9.92. Renewed 22.10.35).—The (dehydrated) fruit is subjected to pressure-heating followed by a period of reduced pressure until the H_2O is removed. The

pressure is removed before the fruit has absorbed sufficient heat to invert the sugars present.
E. B. H.

Preserving fruit and vegetables. W. H. Ewell (U.S.P. 2,028,970, 28.1.36. Appl., 1.12.33. Renewed 29.7.35).—Sliced fruit, especially apples, is immersed in H_2O saturated with CO_2, then drained, and packed tightly in a hermetic container. B. M. V.

Preservation of edible fungi, chiefly mushrooms, and increasing their food value. C. A. Cofman-Nicoresti (B.P. 456,346, 7.5.35).—The fungi are prepared in the form of crisps or a powder by frying in oil, drying at $>50°$, and crushing the friable product. E. B. H.

Treatment of soya beans. L. O. Gill, Assr. to A. E. Staley Manufg. Co. (U.S.P. 2,026,676, 7.1.36. Appl., 22.10.32).—Natural odours and flavours are removed from soya beans by soaking in H_2O at 38° for 15 min. to give a H_2O content of 20%, and heating them for a short time at 163°. The temp. is then lowered and drying continued. E. B. H.

Conservation of roasted coffee. M. Specht (B.P. 455,902, 5.6.36).—Coffee in vac. packings keeps better when roasted only to a chlorogenic acid (I) content = the average of the amounts of (I) in the raw coffee and in the normally, fully-roasted coffee of the same type. E. B. H.

Treatment of coffee. H. K. Wilder, Assr. to Kellogg Co. (U.S.P. 2,027,801, 14.1.36. Appl., 14.12.33).—The flavour of coffee is improved by keeping green coffee, containing 15% of H_2O, in a closed container for 7—15 hr. at 32—77°, to allow enzymic activity to proceed, and by subsequent drying and roasting. E. B. H.

Prevention of oxidation [of foodstuffs]. S. Musher, Assr. to Musher Foundation, Inc. (U.S.P. 2,026,697, 7.1.36. Appl., 28.1.35).—Vegetative substances (oat flour, soya flour, etc.) may be incorporated with, or dusted on the surface of, solid food materials to effect protection against oxidative changes. Thus, unroasted coffee flour may be added to coffee, and unroasted oat flour to roasted oat flakes. Such substances may be added to milk either before or after spray-drying; their extracts also may be used.
E. B. H.

Production of carbonated beverages. United Water Softeners, Ltd. (B.P. 455,465, 27.12.35. U.S., 26.12.34).—In the manufacture of a beverage the constituents are: (*A*) natural or softened H_2O having an alkaline reaction, (*B*) an acid stock syrup, and (*C*) CO_2; *A* is treated with an acid salt (the same as or different from that in *B*) prior to carbonating, to prevent any effect on the flavour of *B*, the basicity of *A* being reduced to 40—90 p.p.m. calc. as $CaCO_3$. B. M. V.

Manufacture of caramel. F. Sornet, A. Kopka, and Chocolat-Magniez-Baussart (B.P. 456,266, 27.3.36. Fr., 28.3.35).—The addition of egg or egg yolk to a confectionery caramel paste is effected by first mixing the egg with about 50 wt.-% of the uncooked mix, this mixture being incorporated with the main batch after completion of the cooking process. E. B. H.

[Machine for] manufacture of sausages and like food products. F. H. Rogers. From Name Corp. (B.P. 456,858, 11.11.35).

Heat-exchange system [for milk]. [Flash] pasteurisation. Grinding mechanism. Mixing [cattle feed etc.].—See I. **Cellulose product for foodstuffs.**—See V.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Colloid-chemistry and pharmacy. R. Dietzel (Kolloid-Z., 1936, **77**, 220—229).—A lecture.
E. S. H.

Uses and standardisation of petroleum products. F. Grégoire (J. Pharm. Chim., 1936, [viii], **24**, 452—461).—The standardisation of petroleum products (*e.g.*, medicinal paraffin, vaseline) used in pharmacy by tests for η, reaction with H_2SO_4, fluorescence, etc. is recommended. F. O. H.

Determination of cod-liver oil in extract of malt with cod-liver oil. C. Gunn and P. F. R. Venables (Quart. J. Pharm., 1936, **9**, 430—433).—Dextrin is pptd. in presence of kaolin by addition of abs. EtOH to give a final concn. of 70—75%. The ppt., after washing with 70% EtOH, is extracted with Et_2O and the extract washed with H_2O, evaporated to dryness, and weighed. The vitamin content of the oil is unaffected. F. O. H.

[Properties of] *p*-aminobenzene- [aniline-*p*-] sulphonamide. N. L. Allport (Quart. J. Pharm., 1936, **9**, 560—566).—$p\text{-}NH_2\cdot C_6H_4\cdot SO_2\cdot NH_2$, m.p. 166·5°, is not readily hydrolysed by boiling dil. acids or alkalis. The solubility in H_2O, colour reactions, and analytical characteristics are described. Assay is afforded by determination of S. Suitable pharmaceutical standards of purity are suggested (cf. Fourneau *et al.*, A., 1936, 1027; Buttle *et al.*, *ibid.*, 1142).
F. O. H.

Preparation and properties of calcium lactobionate–calcium bromide. H. S. Isbell (J. Res. Nat. Bur. Stand., 1936, **17**, 331—335).—This double salt, $Ca(C_{12}H_{21}O_{12})_2,CaBr_2,6H_2O$, is prepared by electrolytic oxidation of lactose as described in U.S.P. 1,980,996 (cf. B., 1935, 939) and has marked advantages as a sedative. The method of prep. of Ca lactobionate is also outlined. J. W. S.

So-called magnesium trisilicate. N. Glass (Quart. J. Pharm., 1936, **9**, 445—454).—Analytical data and physical properties of commercial and laboratory preps. are given. The %-wt. ratios of $MgO : SiO_2$ of the ignited preps. varied from 1 : 4·14 to 1 : 1·93. F. O. H.

Determination of official preparation of iron by means of ceric sulphate. I. Assay of saccharated iron carbonate. C. G. Lyons and F. N. Appleyard (Quart. J. Pharm., 1936, **9**, 462—470).—The prep. (0·5 g.) is heated with 20 ml. of 25% (wt./vol.) H_2SO_4 and the solution cooled and titrated [with ferrous-*o*-phenanthroline sulphate as indicator (A., 1933, 924)] to standardised (approx. 0·1*N*-) $Ce(SO_4)_2$ until the orange colour just disappears.
F. O. H.

Determination of manganese in manganese and iron citrate. G. J. W. Ferrey (Quart. J. Pharm., 1936, 9, 471—479).—In the titration of $KMnO_4$ by As_2O_3, 1 ml. of $0·1N$-As_2O_3 is equiv. to 0·00172 g. Mn. Conditions for the complete oxidation of Mn to $HMnO_4$ by $(NH_4)_2S_2O_8$ are described. Citric acid interferes with the conversion of Mn^{II} salts into $HMnO_4$. A satisfactory modification of the (inaccurate) B.P. Codex method in given. F. O. H.

Assay of saccharated iron compounds. C. Morton and D. C. Harrod (Quart. J. Pharm., 1936, 9, 480—484).—Neither $K_3Fe(CN)_6$ externally nor $NHPh_2$ (Hartley and Linnell, B., 1935, 253) internally is a suitable indicator for the titration by $K_2Cr_2O_7$. The oxidations of $Fe^{··}$ and glucose by $K_2Cr_2O_7$ proceed side by side and not, as was hitherto supposed, in successive isolated stages. An accurate assay is afforded by Heisig's iodate method (A., 1928, 861). F. O. H.

Medicinal and aromatic plants of Sardinia and their active principles. L. Mascarelli (Atti V Congr. naz. Chim., 1936, 70—81).—A lecture.

Extraction of vegetable materials. Factors relating to the preparation of drug extracts and tinctures. W. C. Peck (Quart. J. Pharm., 1936, 9, 401—420).—The extraction of drugs is increased by application of vac. and by circulation of the extracting fluid. The design of large-scale extraction plant employing these principles is described and data indicating its efficiency are given. F. O. H.

Capillary distribution of plant constituents. V. Tinctures from leaves and flowers. VI. Formation and synthesis of the capillary strip. A. Kuhn and G. Schäfer (Pharm. Zentr., 1936, 77, 705—709, 717—721; cf. B., 1936, 812).—V. The application of previously described methods to the examination of tinctures of belladonna, jaborandi, stramonium, senna, cina, and *Datura arborea* is described.

VI. Previous work is summarised. The behaviour of the individual plant constituents and some glucosides is described, and also the prep. of a capillary strip of tincture of cinchona from the components. E. H. S.

Effect of degree of comminution on extraction by percolation of belladonna leaf, ipecacuanha, and stramonium. A. W. Bull (Quart. J. Pharm., 1936, 9, 347—356; cf. B., 1936, 75).—With all three drugs the yield of total extractive (by aq. EtOH) increases as the powder size decreases, whilst, for the sizes examined (22/60, 44/85, 85), the yield of total alkaloid is greatest from 85 with belladonna and stramonium, but from 44/85 with ipecacuanha. Data are given for the alkaloid/total extractive ratios and, with ipecacuanha, for the greater rapidity of extraction of phenolic alkaloids. F. O. H.

Dry extract of stramonium. A. T. Moorhouse (Quart. J. Pharm., 1936, 9, 421—429).—A satisfactory prep. is obtained by percolation of 1 kg. of moderately coarsely-powdered stramonium with 95% EtOH to give 4 litres of percolate which is conc. at $\not> 50°$ to a syrup, mixed with an amount of starch calc. (from the content of total solids and alkaloids) to give a dry product containing 1% of alkaloids, dried at $\not> 70°$, and finally powdered. F. O. H.

Extracts from agrumen pericarps and their correct treatment. H. Breddin (Pharm. Ztg., 1936, 81, 1223—1225).—The prep. and comparison of various extracts of orange peel is discussed. E. H. S.

Surface tension of infusions of medicinal plants. L. I. Weber and L. Legoix (J. Pharm. Chim., 1936, [viii], 24, 441—452).—Vals. of σ (all $<$ that of H_2O) for a no. of infusions of varying concn. are tabulated and discussed. F. O. H.

Adsorption processes with infusions of medicinal plants. L. I. Weber and L. Legoix (J. Pharm. Chim., 1936, [viii], 24, 502—507).—The surface-active constituents in 10 and 5% infusions of various medicinal plants are removed by adsorption on small amounts (0·05—0·5 g. per 25 c.c.) of activated C. F. O. H.

Assay of senna leaves. W. Straub and F. von Bergmann (Arch. exp. Path. Pharm., 1936, 183, 697—699).—The content of difficultly hydrolysable glucoside (I) (A., 1936, 1021, 1554) is determined by hydrolysis with hot 10% HCl and subsequent emulsin hydrolysis, the liberated emodin being determined colorimetrically. Senna leaves contain approx. 0·8% of (I). F. O. H.

Stability of digitalis potency in drugs. L. W. Rowe and H. W. Pfeifle (J. Amer. Pharm. Assoc., 1936, 25, 855—858).—Thoroughly dried, crude digitalis drugs retain their activity for 6 years even in presence of air and light. Defatting appears to improve slightly the stability. The fresh drug loses approx. 25% of its activity on commercial drying. F. O. H.

Detection of cotarnine in cotarnine chloride and other pharmaceutical preparations. D. Barković (Rept. III Congr. Slav. Pharm., 1934, 252—258).—An aq. solution of the cotarnine salt (0·05 g. in 5 c.c.) on warming with 2—3 c.c. of 15% Na_2CO_3 solution for 1 min. became orange and a white amorphous ppt. separated which turned yellow and finally brown. The limit of concn. for the test is 1 : 50,000. F. R.

(A) Anomalous viscosity of mucilage of tragacanth. (B) Standardisation of tragacanth. G. Middleton (Quart. J. Pharm., 1936, 9, 493—505, 506—509).—(A) Anomalies occurring in η determinations (by the dropping-sphere method) of the mucilage are partly due to "stream orientation" of long colloidal particles into the line of flow. Heating the prep. to 100° increases η for the first 15 min., but there is a large fall in η after 1 hr.; the max. val. is attained only after approx. 8 hr. at 70°, but not even after 24 hr. at 50°. Data showing the effect of dilution and temp. on η for different grades of gum are given.

(B) A specification for a standard method of determining the η is suggested. F. O. H.

Santonin in English and Welsh *Artemisias*. J. Coutts (Quart. J. Pharm., 1936, 9, 357—365).—Santonin (I) occurred (up to 1·24%) in all *A. maritima* and *A. gallica* examined from 27 British localities. A seasonal variation in content of (I) (max. during budding) occurred in two English populations examined periodically. Salinity of the soil appears to influence the production of (I). F. O. H.

Preparation of derris root for export. Method of evaluation. C. D. V. Georgi and G. L. Teik (Malay. Agric. J., 1936, **24**, 489—502).—Methods of sampling the root and determining its H_2O, extract (Et_2O), crude (essentially Jones' method) and purified rotenone (I) (Cahn and Boam) are detailed. The need for standard methods is stressed. Fine roots and, particularly, fine derris dust are valuable. The (I) of Kinta-type *D. malaccensis* is revealed only after addition of pure rotenone (cf. Cahn and Boam) to assist crystallisation. The purity of crude (I) varies greatly. Pure, and not crude, (I) should, therefore, be used for evaluation of (I). R. S. C.

Detection of rhapontic rhubarb in galenical rhubarb preparations. S. K. Crews (Quart. J. Pharm., 1936, **9**, 434—444).—" Rhapontic " rhubarb contains a principle (I) adsorbed by cellulose and giving a blue fluorescence on ultra-violet irradiation. The results of the application of this test to pharmacopœial and other preps. of various varieties of rhubarb are tabulated. (I) appears to be identical with rhaponticin (Tschirch, A., 1905, ii, 851), m.p. 238° (corr.), $[\alpha]_{5461}$ −72° in EtOH–$COMe_2$, max. absorption (dil. aq. solution) at 320 mμ. F. O. H.

Determination of strychnine in Easton's syrup. N. Evers and W. Smith (Quart. J. Pharm., 1936, **9**, 397—400).—The B.P. 1932 method is improved (especially for old syrups) by dissolving the crude alkaloid residue from the B.P. method in 10 ml. of *N*-HCl, filtering through a 9-cm. paper (which with the flask is washed with 3 successive 5 ml. of *N*-HCl and finally with 25 ml. of saturated aq. NaCl), and extracting the total filtrate with 5 successive 25 ml. of $CHCl_3$, the B.P. method then being followed. F. O. H.

Solubility and diaminoacridine content of acriflavine. G. F. Hall and A. D. Powell (Quart. J. Pharm., 1936, **9**, 510—518).—Comparative data by the authors' (B., 1935, 253) and Reimers' (*ibid.*, 877) methods are discussed and used in refutation of criticisms by Reimers. F. O. H.

Derivative of theophylline: 1 : 3-dimethylxanthine–ethylenediamine (Tefamin). A. Mossini (Boll. Chim. farm., 1936, **75**, 557—558).—The compound of theophylline with $(CH_2{\cdot}NH_2)_2$ (I) varies in composition with method of prep.; the most sol. product is obtained when (I) (determined volumetrically) is in excess. H_2O is the best solvent for the prep.; it must be removed at low temp. E. W. W.

Determination of proteolytic activity of pancreatic preparations. N. Evers and W. Smith (Quart. J. Pharm., 1936, **9**, 392—396).—Following digestion by the prep. at 55° and (initially) p_H 8·7, standard caseinogen solution is adjusted to p_H 7·0 (using 0·1% neutral-red in 50% EtOH as indicator), CH_2O is added, and the solution titrated (phenolphthalein) to p_H 8·7 by 0·1*N*-NaOH. The method is superior to that of the B.P. 1932. Commercial preps. vary considerably in solubility and proteolytic activity. F. O. H.

Analysis of commercial desiccated hog-stomach preparations. Relationship to clinical activity. K. Bullock (Quart. J. Pharm., 1936, **9**, 381—391).—Data are given for content of H_2O, fat, total and insol. ash, Mn, Cl, total and non-coagulable N, and for acidity, alkalinity of ash, and bacterial contamination of nine preps. of desiccated hog's stomach together with an indication of their probable clinical activity. F. O. H.

" Dwarf pine oil " (oil of *Pinus pumilio*). A. Loesche (J. pr. Chem., 1936, [ii], **147**, 75—77).—The cones and young twigs of *P. pumilio*, growing in the Austrian and Bavarian Alps at about 2000 m., collected during May–June and August–October gave after storage for 4 weeks 0·05 and 0·075%, respectively, of oil. The oils from material collected in May, June, July, August, and September–October had d^{20} 0·875, 0·8718, 0·8707, 0·8700, 0·873; $[\alpha]_D$ −13°, −14° 9′, −8° 5′, −8° 45′, −6° 7′; and ester content 9·24, 7·5, 5·2, 5·2, and 5·28%, respectively. Differences in odour and bactericidal effect were observed. R. S. C.

Essential oils. I. Oil of *Skimmia laureola*. H. Wienhaus and T. C. Rajdhan (J. pr. Chem., 1936, [ii], **147**, 113—123).—This oil from Kashmir and Jammu contains terpene hydrocarbons (13%; *d*-β-phellandrene and some *d*-α-pinene), *l*-linalool (18%) and its acetate (63%), azulene, bergapten, a little AcOH, and (?) traces of other alcohols, aldehydes, or ketones. R. S. C.

Bactericidal properties of essential oils. H. O. Hettche and P. Rosenthal (Arch. Hyg. Bakteriol., 1936, **115**, 303—317).—24 essentials oils tested for bactericidal properties on growths on plates (*Staph. aureus*) showed that 1/2500 dilution of sandalwood, hop, clove, thyme, and quassia oil killed all growth. *B. coli* required a concn. of 1/250. Bactericidal action is increased by the presence of double linkings in the mol., especially with the terpenes. W. L. D.

Fish-liver oils and vitamins.—See XII. **[Oils in the] *Solidago* plant.**—See XVI. **Vitamin-*A*. Vitamin-*C* in orange peel.**—See XIX.

See also A., Dec., 1450, **Crystallographic data of cinchona alkaloids and** (1451) **of sex hormones etc.** 1488, **Structure of lupin alkaloids.** 1501, **Local anæsthetics.** 1503, **Alkylphenols.** 1505, **Prep. of œstrogenic substances from sterols.** 1506, **Sterols and derivatives.** 1508, **Synthesis of substituted phenylacetic acids.** 1514, **Constituents of pyrethrum flowers.** 1516, **Electrolysis of opianic acid.** 1521, **Acridine derivatives. Antimalarials from acridine.** 1526, **Vitamin-B_1.** 1526—7, **Alkaloids.** 1527, **Arsinic acids of the $NHPh_2$ series.** 1529, **Determining vanillin. Sensitive reaction for nitrogenous bases. Determining nicotine.** 1532, **Prep. of true-sp. polysaccharide from pneumococcus type I. Pptn. of diphtheria anatoxin.** 1549, **Therapeutic effects of mineral waters.** 1553, **Seeds of Combrataceæ.** 1557, **Determination of antitrypsin.** 1561, **Sol. sp. substances of pneumococcus type III. Concn. and purification of pneumococcus sp. polysaccharides.** 1562, **Prep. of sol. dysen-**

tery toxin. Tobacco-mosaic virus. 1563, Cryst. substance from ovarian tissue. 1564, Cryst. insulin. Measuring insulin action. 1566—8, Vitamins. 1567, Determining ascorbic acid. 1568, Antirachitic vals. of irradiated yeast and cod-liver oil. 1570, *Digitalis lanata* seeds. 1571, Chinese drug lei-kung-têng.

PATENTS.

Anthelmintic [for livestock]. W. P. ELMSLIE, and P. CALDWELL, Assrs. to MOORMAN MANUFG. Co. (U.S.P. 2,027,967, 14.1.36. Appl., 15.12.34).—A mixture of a laxative and a fluoride, *e.g.*, Na_2SO_4 and 0·08—1·5% of NaF, is added to the feed. E. H. S.

Manufacture of bases for suppositories. CHEM.-PHARM. A.-G. BAD HOMBURG (B.P. 455,732, 27.9.35. Austr., 28.9.34).—Fats melting at body temp. are emulsified with aq. gelatin or mucilage solutions containing glycerol. Examples of emulsifiers are lecithin, cholesterol, and cetyl alcohol. The preps. should be stored at $<5°$. E. H. S.

Manufacture of liquorice extract. Y. ITO (B.P. 457,349, 5.7.35.)—Liquorice root is extracted with H_2O or 0·1% aq. NaOH (15 pts.) at 100° and the extract treated at 90° with a sol. Mg salt in amount sufficient to ppt. only the brown impurities. Filtration and concn. gives a pure glycyrrhizin solution, whence pure glycyrrhizic acid is pptd. by acid. R. S. C.

Castor oil [medicinal] preparation. J. C. BIRD, Assr. to J. WYETH & BRO., INC. (U.S.P. 2,021,044, 12.11.35. Appl., 6.10.32).—A solution of $AlCl_3$ 16 lb. in H_2O 30 gals. (U.S.) is treated at 35° with 10% aq. NH_3 32 lb. in H_2O 15 gals. (U.S.); the $Al(OH)_3$ gel is washed by decantation and a mixture of the gel 8, castor oil 14 pts., H_2O 1 pt., and flavouring material is homogenised. L. C. M.

Production of antirachitic substances. J. WADDELL, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,028,364, 21.1.36. Appl., 16.5.33).—Cholesterol or lipin-containing substances heated with H_2O at $>100°$ for 2½—17 hr. and then irradiated with ultra-violet light yield antirachitically active substances. The activated constituents separated from residual material are 30—50 times as potent as is irradiated ergosterol. A. H. C.

Treatment of tobacco. B. LOEWENTHAL, Assr. to FEDERAL TOBACCO CORP. (U.S.P. 2,029,494, 4.2.36. Appl., 13.2.33).—Gum, oils, nicotine, and mineral matter are removed from the leaf in a bath containing HNO_3 and H_3PO_4 (5—7% HNO_3; 68—85°; 3—10 min.). The tobacco may afterwards be reimpregnated with various alkali salts and esters. B. M. V.

Manufacture of dihydrodeoxymorphine-*D*. F. HOFFMAN-LA ROCHE & Co. A.-G. (B.P. 454,747, 8.1.36. Ger., 6.5.35. Addn. to B.P. 451,203; B., 1936, 1018).—Hydrogenation of dichloromorphine (prepared as in the prior patent) gives mainly dihydrodeoxymorphine-*D* if carried out in sufficiently dil. neutral or acid solution to retain the alkaloid salts in solution, or if a base-metal catalyst (Ni) is used. H. A. P.

Manufacture of *N*[1]-methyl-*CC*[5 : 5]-allyl*iso*propylbarbituric acid [narcotic]. F. HOFFMANN-LA ROCHE & Co. A.-G. (B.P. 454,779, 7.5.36. Switz., 17.5.35).—1-*Methyl-5-allyl-5-*iso*propylbarbituric acid*, m.p. 56—57°, b.p. 176—178°/12 mm. (*Na* salt), is prepared by methylation (Me_2SO_4 and aq. NaOH) of allyl*iso*propylbarbituric acid, by the action of allyl bromide and aq. NaOH on 1-methyl-5-*iso*propylbarbituric acid, and by condensation of Et_2 allyl*iso*propylmalonate with $NH_2{\cdot}CO{\cdot}NHMe$. H. A. P.

Manufacture of salicylic esters of acylglycols [medicinals]. F. HOFFMANN-LA ROCHE & Co., A.-G. (B.P. 456,269, 9.4.36. Ger., 24.5.35).—The interaction of alkali salicylates with β-chloroethyl esters of aliphatic acids is claimed. *E.g.*, *o*-$OH{\cdot}C_6H_4{\cdot}CO_2Na$ is heated at 155—165° with β-chloroethyl formate, acetate, and *iso*valerate to give β-*form-*, m.p. 26°, b.p. 163—165°/11 mm., β-*acet-*, b.p. 170—171°/12 mm., and β-iso*valer-oxyethyl salicylate*, b.p. 201°/12 mm. H. A. P.

Isolation and purification of (A) hormones, (B) the gonad-stimulating hormone. F. L. HISAW and H. L. FEVOLD, Assrs. to WISCONSIN ALUMNI RES. FOUND. (U.S.P. 2,030,209—10, 11.2.36. Appl., 16.11.31. Renewed 15.9.34).—(A) Dried, ground, animal pituitary gland is extracted with aq. C_5H_5N and the H_2O-sol. portion removed from the evaporated extract. The residue has the property of luteinising the follicles and prolonging the life of corpora lutea. (B) The hormone is pptd. from the solution of the H_2O-sol. portion of the aq. C_5H_5N extract by addition of EtOH. E. H. S.

Production of [mono]acyl compounds of polycyclic alcohols of the *cyclo*pentanopolyhydrophenanthrene series. W. P. WILLIAMS, and SCHERING-KAHLBAUM A.-G. (B.P. 454,918, 4.3.35. Addn. to B.P. 452,716; B., 1936, 1178).—The corresponding diacyl compounds are partly hydrolysed; *e.g.*, *cis*-androstane-3 : 17-diol diacetate is converted by KOH (1 equiv.) in EtOH at room temp. to 50° into the 3-acetate. H. A. P.

Manufacture of esters of polycyclic alcohols [sex hormones]. SCHERING-KAHLBAUM A.-G. (B.P. 455,264, 8.4.35. Addn. to B.P. 454,632; B., 1936, 1178).—Further acylation of monoesters of saturated dihydric alcohols of the *cyclo*pentanopolyhydrophenanthrene series is claimed. *E.g.*, the *benzoate* (trans), m.p. 140°, and *o-nitrobenzoate* of androstanediol-3-acetate are prepared by action of the acyl chloride in C_5H_5N. H. A. P.

Preparation of gonad-stimulating hormone. A. E. MEYER, Assr. to CHAPPEL BROS., INC. (U.S.P. 2,027,446, 14.1.36. Appl., 29.1.34).—Animal tissue containing the hormone is extracted with an aq. aliphatic alcohol solution having a low γ, *e.g.*, a 6% solution of $C_5H_{11}{\cdot}OH$ in H_2O. E. H. S.

[Preparation of] (A) thiazoline, (B) oxazoline, compounds. M. ENGELMANN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,027,030—1, 7.1.36. Appl., [A] 22.7.32, [B] 19.8.32).—(A) Phenylthiocarbimides, and (B) phenylcarbimides, containing a non-acidic substituent are condensed with β-halogenoethylamines. The products are claimed to be local anæsthetics. Examples are: 2-p-*toluidino*-, m.p. 131° (*hydrochloride*, m.p. 154°), 2-p-*fluoro*-, m.p. 152—153° (*hydrochloride*, m.p. 134°), 2-o-*butoxy*-, m.p. 68°, and 2-p-*hydroxy-anilino*-, m.p. 154° (*hydrochloride*, m.p. 238—239°), 2-p-*phenetidino*-, m.p. 140°, and 6-*hydroxy*-m-*anisidino-dihydrothiazole*, m.p. 168—169° (*hydrochloride*, m.p. 211°); 2-p-*phenetidino*-, m.p. 151°, and 2-p-n-*butoxyanilino-dihydro-oxazole*, m.p. 130° (*hydrochlorides*, m.p. 147° and 117°). The intermediates N-p-*phenetyl*-, m.p. 135°, and N-p-n-*butoxyphenyl*-N′-β-*bromoethylcarbamide*, m.p. 121°, are described. H. A. P.

Therapeutic agent [for coryza]. H. S. Diehl, Assr. to Board of Regents of Univ. of Minnesota (U.S.P. 2,027,722, 14.1.36. Appl., 4.4.34).—Mixtures of codeine or its salts with papaverine or its salts are specified. E. H. S.

Insulin preparation. H. C. Hagedorn and (Miss) I. Wodstrup-Nielsen (B.P. 456,101, 28.2.36. Denm., 8.4.35).—Insulin (I) hydrochloride is treated with a protamine which does not affect the physiological action of the (I), *e.g.*, clupein. The product is more difficultly sol. in blood-plasma and tissue fluid than is (I). E. H. S.

[Manufacture of a therapeutic] colloidal copper solution. J. Torigian, Assr. to Drug Products Co., Inc. (U.S.P. 2,028,575, 21.1.36. Appl., 11.6.34).—Colloidal $Cu(OH)_2$ solution (1% Cu) for use in anæmia therapy is prepared by treating 26·7 g. of $CuCl_2$ with 18·8 g. of NaOH and 79·6 g. of gluconic acid (or other OH-acid) each in 200 c.c. of twice-distilled, air-free H_2O at 80—85°. The solution is adjusted to p_{H} 6·2—6·8, 2% of $CH_2Ph{\cdot}OH$ added, and the solution filtered after diluting to 1 litre and keeping for 2 days. A. H. C.

Manufacture of [therapeutic] bismuth salts. I. G. Farbenind. A.-G. (B.P. 456,341, 3.5.35. Ger., 4.5.34).—Basic Bi phenylacetate, salicylate, or acetylsalicylate, when heated in oil with an acid (I) which alone gives an oil-sol. Bi salt, gives an oil-sol. mixed Bi salt. Such salts are also obtained by treating, *e.g.*, $Bi(NO)_3$ in aq. glycerol or mannitol with 2 mols. of (I) and 1 mol. of $CH_2Ph{\cdot}CO_2H$, o-$OH{\cdot}C_6H_4{\cdot}CO_2H$ (II), or o-$OAc{\cdot}C_6H_4{\cdot}CO_2H$ (III). Examples are the mixed salts from camphenilanic acid with (II) or (III) or campholytic acid with (III). The oil must be suitable for injection. R. S. C.

Anæsthetic. O. H. Stover and E. H. Brigham, Assrs. to Oleothesin Co., Inc. (U.S.P. 2,027,126, 7.1.36. Appl., 27.10.33).—Salts of procaine and a saturated or unsaturated fatty acid ($>C_8$) are claimed. Some are sol. in oils. R. S. C.

Manufacture of aqueous solutions of addition compounds of alkylacridinium salts with heavy-metal salts. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 456,060, 27.3.35).—10-Alkylacridinium bicarbonate or a derivative thereof (*e.g.*, the 2:8-diamino-10-methyl compound) gives H_2O-sol. salts with org. acids, *e.g.*, HCO_2H, lactic or quinic acid, BzOH, etc. Addition of a H_2O-sol. salt of a heavy metal gives stable mixed solutions. R. S. C.

Cigarette paper.—See V.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Advances in [photographic] emulsion technique. A. Steigmann (Phot. Ind., 1936, **34**, 1191—1192, 1194).—Various examples are given to illustrate the advantageous sensitising properties of "Fesakaptol" and "Fesatinol"; the theory of their action is discussed, but their exact composition is not stated. J. L.

Capri-blue effect and the [photographic] ripening process. Lüppo-Cramer (Z. wiss. Phot., 1936, **35**, 216—228).—The author had previously regarded this effect (sensitisation of unripened AgBr–AgI emulsions by certain desensitisers, especially Capri-blue), and related effects on treatment of emulsions with KI, as the loosening of a shell of AgI around an inner AgBr grain, occurring on dyeing the AgI, thereby rendering the greater intrinsic sensitivity of the AgBr available. It has now been found, however, that unripened pure AgBr emulsions also show the effect; as with the previous emulsions, $NaNO_2$ solution will cause sensitisation in these emulsions also. It is therefore postulated that slow ripening occurring in the emulsion after prep. causes a deposition of a skin of AgBr on the original AgBr grain, but that this skin is photochemically more stable; the same effects would then be found with Capri-blue or $NaNO_2$, not by exposure of more sensitive AgBr, but by rendering the whole grain developable. The pure AgBr emulsions show some sensitisation when only wetted and dried; this is similarly ascribed to disturbance of the AgBr skin by pressure on shrinkage of the gelatin. J. L.

Photographic and chemical foundations of the new colour-film processes. Anon. (Phot. Ind., 1936, **34**, 1221—1223, 1250—1254).—A review of modern subtractive colour processes, particularly in regard to the dyes used and to controlled diffusion technique. J. L.

Hypersensitisation of tricolour mosaic-screen films and regeneration of old or fogged emulsions. L. J. Méker (Bull. Soc. Franç. Phot., 1936, **23**, 183—188, 189—192).—The earlier tricolour emulsions, "Autochrome" and "Filmcolor" (1924), could be hypersensitised by treatment with suitable mixtures in pinaverdol, pinachrome, and pinacyanol in solution in 96% EtOH, for plates, or in 15% EtOH, for films (where collodion varnish is applied over the screen), together with a bath of $AgNO_3$ and NH_3 (*i.e.*, ammoniacal AgOH); various formulæ were tried and the results were very satisfactory. Suitable formulæ are given for treatment of the recent new "Filmcolor" emulsions, but the results obtained are much less in degree, and the speeds are much slower than those of "Agfa Ultracolor" or "Dufaycolor" films. Old or fogged emulsions may be regenerated by destruction of the latent image with a bath of CrO_3 and KBr, followed by washing and hypersensitisation as above. J. L.

Observations on K. Weber's theory of desensitisation. M. Blau and H. Wambacher (Z. wiss. Phot., 1936, **35**, 211—215).—Weber's theory (A., 1936, 808) that desensitisation is only a process of oxidation of sensitisers is refuted on the grounds of various experimental findings, particularly the following: (1) that colloid-free Ag layers, and Ag sols have been desensitised, (2) that desensitisation can take place in the blue and ultra-violet (absorption region peculiar to AgBr), and (3) that the effects of desensitisation are nullified by subsequent treatment of emulsions with 2% $NaNO_2$ solution, which acts against regression of Ag particles to AgBr. Experiments with optically sensitised emulsions (Perutz–Perorto) substantiate (2). The theory of desensitisation as the production of strong regression of nascent Ag, in presence of the desensitiser and O_2, is upheld. J. L.

Fogging caused by photographing through an æsculin filter. H. Bäckström and R. Johansson (Phot. Ind., 1936, **34**, 1189—1191).—Whilst ultra-violet light is effectively absorbed by an æsculin (I) filter, the latter fluoresces bluish-white sufficiently to cause serious fogging of the plate; there is even sufficient ultra-violet in daylight to cause the filter to fluoresce to an undesirable degree. The use of (I) is therefore deprecated. J. L.

Use of wetting agents for glazing photographic prints on gelatin-coated paper. A. Seyewetz (Bull. Soc. Franç. Phot., 1936, **23**, 179—181).—The effect of ox-gall in preventing the adherence of prints to the glass is due to reduction of surface tension; hence it can be replaced by wetting agents, using such substances as will not give a ppt. of Ca salts. Sulphonated fatty alcohols are preferred, in 1% aq. solution. J. L.

Phœnix process for recovery of silver from used [photographic] fixing baths. Finkelstein (Bull. Soc. Franç. Phot., 1936, **23**, 178—179).—Phœnix paper consists of a sheet of paper covered on both sides with a specially prepared layer of pure Cu. On placing this paper in a used fixing bath, the Ag is displaced from solution by the Cu; the method is applicable to small or large amounts of solution. After use, the paper is purchased by the manufacturers according to the Ag content, as indicated by the colour. J. L.

[Photographic] nuclei. K. Schaum (Z. wiss. Phot., 1936, **35**, 238—240).—A brief review is given of the theories of the occurrence of Ag nuclei, and of their action in promoting development. Experiments are in progress to examine the photographic effects produced by fresh surfaces of impure metals; it is suggested that various unexplained effects may be due to the presence of " foreign " particles. J. L.

Warm tone development with "hypo." E. Weyde (Photo Art Month., 1935, **3**, 347—348).—With developers intended for blue-black tones with papers, 0·02—0·05 g. of $Na_2S_2O_3$ per litre inhibits the action of the developer and produces a warm black tone. Ch. Abs. (e)

Theory of photographic developability. J. E. de Langhe (Z. wiss. Phot., 1936, **35**, 201—210).—The surface-charge theory is not in opposition to the Ag-nucleus theory, and the two are combined in a theory that an emulsion grain becomes developable when the negative threshold potential on the surface Ag ions falls below a given val., and when the Ag ions thereby formed in the first moment of development can accumulate to form nuclei of a given min. size. New experiments with Ag sols, and other data, are adduced in support of this view. Explanations are also derived for latent images caused by friction (disturbance of surface grains), by $Sn^{\cdot\cdot}$ (*i.e.*, $SnCl_2$) (owing to its low redox potential), etc. The action of light frees electrons, and forms neutral Br and Ag atoms, the crystal lattice being loosened (displaced) at these points, without breaking the protective charged Br' layer; but AgBr can dissolve at these points, being then reduced by developer, and the Ag crystallises on the Ag nuclei until these are large enough for the whole grain to be reduced. J. L.

So-called photometric constants. J. Eggert and A. Küster (Z. wiss. Phot., 1936, **35**, 233—234).—The so-called photometric " const.", $P=m/S$ (where m is the amount of Ag per 100 sq. cm. of surface layer, and S is the density), is shown to be $\propto$ the mean grain size, and independent of other factors. This has been tested for various densities, emulsions, developers, and development times; it does not, however, hold for coloured images, or with extreme under-development, or with colour developers. It is proposed to measure the Ag content of a developed emulsion by calculation from vals. of S and mean grain size, the latter being determined by means of the Callier effect. J. L.

Recent developments in photomicrography and their significance in paint and varnish laboratories. A. Karsten (Farben-Ztg., 1936, **41**, 1165—1167).—Instruments affording improvements in systems of illumination, and the use of cameras and kinecameras in micrography, are detailed and illustrated. S. S. W.

X-Rays in metallurgy.—See X. **Testing plastics.**—See XIII. **Dilatograph for soils.**—See XVI.

See also A., Dec., 1461, **Physico-chemistry of emulsions.** 1473, **Action of elements and compounds on plates. Latent images below the threshold.** 1480, **Film opaque to ultra-violet light.**

Patents.

Film for colour photography. J. G. Capstaff, Assr. to Eastman Kodak Co. (U.S.P. 2,026,964, 7.1.36. Appl., 8.2.32).—Halation caused by reflexion from the gelatin (emulsion)–air surface of lenticular films is obviated by providing a removable anti-halation layer over the emulsion layer. J. L.

Kinematograph film in natural colours. G. A. Raguin, Assr. to Soc. Lumière (U.S.P. 2,025,671, 24.12.35. Appl., 26.2.35. Fr., 19.1.35).—Films of the type having multicolour irregular screens are provided with marginal portions devoid of colour-screen, for recording the sound track. The films are manufactured by leaving appropriate longitudinal portions of the film unvarnished when applying the bluing varnish. The colour particles will not adhere to the unvarnished sound-track portions; the whole film is then coated with emulsion in the usual manner. J. L.

Photographic elements having yellow screening dyes. Kodak, Ltd. From Eastman Kodak Co. (B.P. 456,279, 5.4.35).—Yellow dyes for screening cyanine-sensitised emulsions comprise azo dyes containing a CO_2H, but free from NO_2, NH_2, or SO_3H; suitable dyes are, *e.g.*, Diamond-yellow G, or azo or disazo dyes with alkoxy, Cl, or Br substituents. These dyes have no colour-desensitising action, and are especially suitable for multilayer material. J. L.

Manufacture of intensifying screens for radiographical purposes. Kali-Chemie A.-G. (B.P. 455,583, 9.4.36. Ger., 10.5.35).—The definition obtained with intensifying foils is greatly increased, without prolonging the time of exposure required, by adding a quantity of very fine-grained $CaWO_4$ (grain-size $\ngtr 1\ \mu$) to the ordinary coarser-grained $CaWO_4$ (4—5 μ) in the proportions of about 1 : 1, or the amount of the former may be 20—25% of the total $CaWO_4$. J. L.

Photographic exposure processes. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 455,218, 10.4.35).—To avoid eye-strain from overbright lighting in making kinema films, subdued lighting composed substantially of ultra-violet, violet, blue, and infra-red rays is used in conjunction with films sensitised to the infra-red. Blue filters, eliminating green to red light, may be used with the light (*e.g.*, crystal-violet filters with metal-filament electric light). The infra-red rays do not harm the eyes. J. L.

Colour photography. Kodak, Ltd. From Eastman Kodak Co. (B.P. 455,128, 1.6.35).—Multicolour photographic material, consisting of three superimposed layers of different colour-sensitivities on the same side of a support, is developed to give a record in minus colours by treatment with a succession of different colour developers, the penetration of each of which is controlled so as to restrict its action to the uppermost undeveloped layer. Controlled fixing will then also be necessary, but may be avoided if the whole film has first been ordinarily developed and fixed, and the images then bleached, when they may be redeveloped by the colour developers as above. J. L.

Production of coloured photographic pictures. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 455,556, 18.4.35).—In the production of Ag halide layers containing a dye component (I) insol. in H_2O, (I) is dispersed in the gelatin solution with the aid of a wetting agent, *e.g.*, Ca glycerophosphate, sulphonated taurine, etc. J. L.

Diazotype printing. H. I. Waterman and T. W. A. Borgesius (B.P. 454,137, 20.3.36).—The light-sensitive layer consists of a film of diazotised casein (containing adhesives, *e.g.*, gelatin, and/or plasticisers, *e.g.*, PhOH) which, after application to the substratum (*e.g.*, glass, paper, cotton), may be hardened (by CH_2O). Development is carried out as usual by coupling with a naphthol, pyrazolone, etc., after exposure. H. A. P.

Accelerated diazo printing. W. M. Hiriman, Assr. to Frederick Post Co. (U.S.P. 2,027,229, 7.1.36. Appl., 8.7.31).—The photosensitive layer contains a diazo compound (I), a multivalent metal compound (II) in a higher valency form (of Fe^{III}, Cr^{III}, Cr^{VII}, Cu^{II}), and an oxidisable org. acid ($H_2C_2O_4$, citric or tartaric acid) or its salt (*e.g.*, with the metal); on exposure to light (II) is reduced to an "ous" compound which accelerates the photodecomp. of (I). The best results are given by Fe^{III} oxalates. H. A. P.

Apparatus for photochemical treatment of strip material. A. C. Banfield, and Baird Television, Ltd. (B.P. 455,238, 15.4.35).—Surface H_2O is removed from a photographic film by submerging to a sufficient depth in Hg; the film passes continuously under a submerged roller and the outlet side of the Hg, to which part of the H_2O will rise, is baffled from the inlet. B. M. V.

Photography in relief, with or without colour. A. H. J. de Lassus St. Genies (B.P. 455,220, 11.4.35. Fr., 14.4. and 31.8.34).

Cyanine etc. dyes.—See IV.

XXII.—EXPLOSIVES; MATCHES.

Chemical engineering in explosives manufacture. W. Macnab (Trans. Inst. Chem. Eng., 1935, **13**, 9—13).—The manufacture of nitrocellulose, nitroglycerin, and $C_6H_2Me(NO_2)_3$ is described. D. K. M.

Testing of permitted explosives. W. Payman (Colliery Eng., 1936, **13**, 364—368).—Practice in Great Britain and foreign countries is summarised. R. B. C.

Explosion hazards from the use of *iso*propyl and other ethers. C. F. Degering (J. Chem. Educ., 1936, **13**, 494). L. S. T.

Critical study and simplified method for carrying out the gold chloride reaction on mustard gas. H. L. Ligtenberg (Pharm. Weekblad, 1936, **73**, 1594—1602).—A simple form of aspirator apparatus is described for detecting mustard gas by the turbidity produced in 0·1% $AuCl_3$ solution. The test is sensitive to 0·012 mg. at a concn. of 4 mg./cu.m. S. C.

Formation of fogs by contact gasification of organic substances. H. Stoltzenberg (Angew. Chem., 1936, **49**, 826—827).—Fogs or smoke signals are made from org. compounds which may be sublimed without decomp., *e.g.*, $C_{10}H_8$, picric acid, or indigo, by burning a cartridge of the material mixed with an oxidising agent and a combustible (*e.g.*, $KClO_3$ + lactose), an inert filler, and some substance such as $H_2C_2O_4$ or urea which decomposes with evolution of a large vol. of gas. J. S. A.

Patents.

Propellent powder. G. C. Hale and D. R. Cameron (U.S.P. 2,026,531, 7.1.36. Appl., 20.3.34).—In nitrocellulose powders the addition of 10—15% of $C_6H_2Me(NO_2)_3$ and 2—10% of triacetin eliminates muzzle flash and at the same time reduces evolution of smoke. W. J. W.

Manufacture of smokeless powders. F. Olsen, G. C. Tibbits, and E. B. W. Kerone, Assrs. to Western Cartridge Co. (U.S.P. 2,027,114, 7.1.36. Appl., 12.3.32).—Nitrocellulose, together with a deterrent and a stabiliser, if desired, is agitated at normal temp. with a solvent (b.p. $<100°$) in presence of excess of an immiscible non-solvent and of a protective colloid, such as starch. The mixture is heated to expel the solvent gradually, and the grains may be surface-treated with a modifying agent, *e.g.*, a deterrent or an accelerator (nitroglycerin), and finally dried. W. J. W.

Esters by electrolysis.—See III.

XXIII.—SANITATION; WATER PURIFICATION.

Germs in the air. M. Bornand (Mitt. Lebensm. Hyg., 1936, **27**, 165—182).—Records of temp., humidity, and nos. of bacteria, moulds, and yeasts taken during three winters are tabulated. E. C. S.

Germicidal action of benzylphenols. Effect of formulation with sulphonated oil. T. S. Carswell and J. A. Doubly (Ind. Eng. Chem., 1936, **28**, 1276—1278).—A linear decrease in germicidal activity is observed when sulphonated oils (I) are used as solubilising agents for benzylphenols. The activity (expressed by extrapolation of the results obtained as a " theoretical phenol coeff.") varies with different organisms; whereas nuclear substitution by Cl or Me effects a decrease towards *B. typhosus*, the Cl-derivatives possess enhanced activity towards *Staph. aureus* in low concns. of (I). The decrease in activity with increasing concns. of (I) is, however, > with the unsubstituted phenol. R. F. P.

Rapid determination of benzene, toluene, or xylene in air. V. G. Gurevitsch, I. B. Kagan, and V. P. Vendt (Koks i Chim., 1936, No. 6, 44—47).—A known vol. (0·5—1·0 litre) of air containing C_6H_6, PhMe, or xylene is shaken with 5 c.c. of a 4 : 1 mixture of HNO_3 (*d* 1·4) and H_2SO_4 (*d* 1·84) for 5 min., 0·5 c.c. of 7·5% H_2O_2 is added, and the whole shaken until copious fumes of NO_2 are evolved. 12 c.c. of 17% NH_3 are added and the liquid is filtered. The colour produced varies with the hydrocarbon present and is matched by standard aq. solutions of $K_2Cr_2O_7$, which have been previously calibrated. The test occupies 10—15 min. N. G.

Short scheme of analyses for detection of poison gases. J. Studinger (Mitt. Lebensm. Hyg., 1936, **27**, 8—23).—Reactions based on the b.p., action of H_2O followed by $AgNO_3$, tests for halogens, N, and S, and Pringsheim's Na_2O_2 test enable samples to be classified into five groups, after which special reactions for each gas (which are described) must be applied. R. Müller describes the odours and irritating effects. J. G.

Toxic gases in dwellings. L. Schwarz, F. Sieke, and W. Deckert (Arch. Hyg. Bakt., 1936, **115**, 351—362).—The atm. in living and sleeping rooms may contain up to 0·2% CO_2 and 0·10—0·15% CO. Sulphurous and H_2S odours accompany the toxic odourless gases. W. L. D.

Damage by fumes and the chemical industries. Witte (Chem.-Ztg., 1936, **60**, 881—883).—A review.

Trioform, a new disinfectant. E. Gottsacker (Arch. Hyg. Bakt., 1936, **115**, 198—204).—Trioform, a mixture of chloro-thymol and -xylenol in oil, in dilutions of 1/100 to 1/3000 is bactericidal for most pathogenes and in most cases superior to more conc. solutions of some org. Hg compounds, *e.g.*, sagrotan. W. L. D.

Industrial toxicology of to-day. D. Hunter (Pharm. J., 1936, **137**, 514—515, 539).—A review.

Lytic principles in activated sludge. G. Sangiorgi (Boll. sez. Ital., 1936, **8**, 35—37).—Active phages of dysentery and paratyphus-*A* and -*B*, but not phages for *B. typhus*, *V. choleræ*, or *B. proteus*, were present both in the activated sludge and effluent of the Foggia sewage works. The activity of the phages diminished in the winter but revived over the summer. A p_H range of 7·0—7·4 is desirable. W. L. D.

Modification in the Blacher method of determining hardness of water. E. G. Barber (J.S.C.I., 1936, **55**, 330—331T).—The badly defined end-point in the Blacher test for Mg is avoided if phenolphthalein is the only indicator used and the CaC_2O_4 ppt. is removed by filtration. The accuracy of the determination is considerably improved.

Purification of the water of the river Vltava. J. Milbauer (Chem. Listy, 1936, **30**, 283—288).—Sedimentation of this H_2O is more rapid with the use of commercial $Al_2(SO_4)_3$ than with the pure salt in consequence of the beneficial action of SiO_2. The process is followed by a photoelectric method. The rate is uniform at $>10°$, but diminishes below this temp. It is a max. at p_H 4·2. Of a no. of substances tested as additions to commercial $Al_2(SO_4)_3$, only wood charcoal, kaolin, and clay had any good effect. After keeping for some time, the H_2O becomes cloudy through biological action. It may be stabilised by shaking with small pieces of Ag. C. I.

Purification of water supplies. F. W. Schübel (Arch. Hyg. Bakt., 1936, **116**, 321—364).—The hygienic condition of the Bamberg H_2O supply depended on the amount of moor-H_2O and drainage of manured fields in the catchment area and the sanitary conditions within that area. The bacterial content was variable throughout the year. The chemical and bacterial control methods are outlined. Elimination of moor-H_2O taste was difficult. Fluorescein tests formed the basis of control of hygienic quality at various dilutions of ground-H_2O with running H_2O. Daily bacterial and 14-day chemical tests were employed. W. L. D.

Effect of filtration on the sanitary quality of water of the metropolitan water district [of Manila]. P. I. de Jesus and J. M. Ramos (Philippine J. Sci., 1936, **59**, 455—471).—Bacteriological effects of rapid sand filtration are recorded. A. G. P.

Hygienic efficiency of chlorination of water for swimming baths. E. Remy (Arch. Hyg. Bakt., 1936, **115**, 181—186).—The quality of swimming-bath H_2O, gauged from the total solids, active Cl, NH_3 content, and $KMnO_4$ consumption val., was investigated for periods of 100—150 days. Total solids and available Cl slowly increased over the 100 days, but NH_3 remained const. No *B. coli* was found at any time. W. L. D.

Absorption of iodine [from water supplies] by copper piping. L. H. L. Kooijmans and K. W. H.

Leeflang (Chem. Weekblad, 1936, **33**, 670—671).—The experiments of Matla (B., 1936, 1182) are discussed. Loss of I′ depends on the experimental conditions, *e.g.*, rate of flow of the H_2O, and age and quality of the Cu; normally, it is not serious. J. G.

Problem of potassium salts in saline waters. B. L. Vanzetti (Atti V Congr. naz. Chim., 1936, 82—89).—A review.

Determination of iodine in drinking and mineral water. F. Sander (Arch. Hyg. Bakt., 1936, **115**, 346—350).—Nitrites are decomposed with urea or NaN_3 previous to extraction of the residue after evaporation. This prevents loss of free I during evaporation and during subsequent operations. The I is determined after liberation with Cl_2 or $Br{-}H_2O$. W. L. D.

Elimination of traces of copper from natural water. V. T. Chuiko (J. Appl. Chem. Russ., 1936, **9**, 1898—1900).—$Al_2(SO_4)_3$ is added to the H_2O and Cu determined in the ppt. colorimetrically as CuS. The method is sensitive to $\nless 2 \times 10^{-5}$ g. Cu per litre. J. J. B.

Detection of nitrous and nitric acids in drinking waters. J. C. Gil (Chem.-Ztg., 1936, **60**, 896—897).—The Griess NO_2' reaction is modified by the use of a solid 3 : 1 mixture of p-$NH_2{\cdot}C_6H_4{\cdot}SO_3H$ and α-$C_{10}H_7{\cdot}NH_2$, which is added directly to the H_2O. For the detection of NO_3' in absence of NO_2', Zn dust is added to the H_2O, reducing NO_3' to NO_2', which is detected with the above mixture. To remove NO_2' if present in quantity, MeOH and AcOH are added, and the H_2O is boiled until MeO·NO thus formed is completely driven off. NO_3' is thereafter tested for as above. J. S. A.

Physicochemical factors in anopheline ecology. I. Nitrogen. P. I. de Jesus (Philippine J. Sci., 1936, **59**, 473—491).—*A. minimus* breeds in H_2O (notably of streams) having low concns. of NH_3, protein-N, NO_2', and NO_3' characteristic of unpolluted natural surface waters. A. G. P.

Stream pollution in New Jersey. Importance of industrial waste. W. Rudolfs (Ind. Eng. Chem., 1936, **28**, 1294—1295).—The sewage pollution of the interstate streams produces annually 900,000 tons of wet sludge and the O_2 required for its stabilisation is $>$750,000 lb. of O_2 daily. It is estimated that 43,651,000 gals. of waste from 1792 industries are also discharged daily and produce 700,000 tons of wet sludge a year. The waste from the different industrial groups varies considerably in O_2 requirements and capability of sludge production; the settleable solids are estimated at 100,000 tons a year as compared with 450,000 tons of sewage sludge under similar conditions. The "population equiv." of all the industries is $\risingdotseq \frac{2}{3}$ of the total domestic sewage discharged by the entire population of the state. C. J.

6th Report of the [Gas] Liquor Effluents and Ammonia Committee [of the Institution of Gas Engineers]. A. Key, W. Etheridge, and A. H. Eastwood (Inst. Gas Eng., 1936, Comm. 142, 87 pp.; cf. B., 1936, 174).—Comparative field trials have been made using $(NH_4)_2CO_3$ (I), conc. liquor, and crude ammoniacal liquor as fertiliser. The results indicate that with all three, if applied under specified conditions, equality of performance with $(NH_4)_2SO_4$ may be expected. The excessive loss of NH_3 from the NH_3 liquor by volatilisation when exposed to air currents may be prevented by burying the liquor under $\nless$0·5 in. of soil. The results by extended field trials at Rothamstead and in Germany are analysed and discussed. The effect of gasworks liquor, crude and spent, on the biochemical O_2 demand of sewage at various stages of purification has been examined, with particular reference to bacteria bed treatment of sewage. It is shown that there may be a tendency, when these liquors are admixed with sewage, to saddle them with responsibilities not their own. An investigation of purification by chemical methods of sewage containing gasworks liquor has demonstrated that, owing partly to colour production and partly to increased resistance to treatment on bacteria beds, chemical treatment is not so successful with sewage–gas liquor mixtures as with sewage alone. The precipitants added were mainly CaO, Fe_2O_3, and mixtures of the two. Experiments have also been made with Cl_2, which could be added in small doses to sewage at various stages of treatment with beneficial results. H. C. M.

Effect of effluents from paper-pulp factories on the water and the organisms in the river Wuoksi (Finland). H. Järnefelt (Suomen Kem., 1936, **9**, **A**, 96—100).—The effluents do not have a serious effect on the O_2 content of the H_2O. The free CO_2, however, decreases somewhat, though the p_H change is small. The H_2O contains two toxic substances in low concn., and considerable amounts of paper pulp. This has had little effect on the animal life on the river bottom, but the plankton has in certain cases increased and in others decreased, with detrimental effect on the salmon fishing. Chlorination of the effluents and flotation of suspended matter by artificial foaming are suggested as preventive measures. A. L.

Practical system of purification of brewery effluent. L. Moreau and A. Aubertin (Bull. Assoc. Chim. Sucr., 1936, **53**, 360—369).—A satisfactory system dealing with 500—600 cu.m. per day is described and illustrated. After subsidence of coarse particles the rather acid effluent is treated with 500 g. of CaO and 350 g. of $FeSO_4$ per cu.m. and delivered to a tall settling tank of 180 cu.m. capacity. The separated sludge, allowed to dry, has about twice the fertiliser val. of farm manure. The clarified effluent from the settling tank passes through coke filters and then to percolation beds, packed with earthenware and clinker, from which it is discharged into a river. The org. matter in the effluent entering the settling tank $\risingdotseq$ an O consumption of 233 mg./litre, which is reduced to 97 before coke filtration, 64 before percolation, and 10 afterwards. The plant works well provided (1) there is a sufficient reserve of effluent to ensure uniformity of composition, (2) it is distinctly alkaline (p_H 10) when delivered to the percolation beds, (3) the supply to these beds is suitably controlled, and (4) aëration of the beds is as intense as possible. J. H. L.

Sampling dusts.—See I. **Absorption of solvents [from air].**—See III. **Paper-industry [effluents].**—See V. **Biological activity of Ursols.**—See VI. **Determination of SO_2 and SO_3.**—See VII. **Protecting concrete in soil and H_2O.**—See IX. **Soaps as germicides.**—See XII. **Bactericidal essential oils.**—See XX.

See also A., Dec., 1478, **Determining traces of SO_2 and H_2S in air. Determining PO_4''' [in sea-H_2O].** 1479, **Detecting CO.** 1503, **Alkylphenols.** 1539, **Paraffin and mineral oil cancer.** 1540, **Eczema in Ni-platers.** 1542, **SiO_2 and Ti in dusts.** 1549, **Action of gases from firedamp pockets.** 1550, **Toxicology of org. solvents (1 : 4-dioxan).** 1554, **Toxicity of propylene glycol. Poisoning by $NaNO_2$.** 1562, **Activation of Ag by acids. Bactericidal power of metals (Zn). Bactericidal action of sea-H_2O.**

PATENTS.

Cleaning and polishing composition [dentifrice]. B. H. JACOBSON, Assr. to KLIPSTEIN CHEM. PROCESSES, INC. (U.S.P. 2,027,535, 14.1.36. Appl., 28.2.33).—Anthraquinone, either dry or as paste, is incorporated with corn starch and soap paste as the polishing abradant of dentifrices. A. H. C.

Mouth-treating composition. O. S. FOWLER (U.S.P. 2,027,374, 14.1.36. Appl., 3.5.32).—A prep. containing live, non-pathogenic *Bacilli alcaligenes* and a carbohydrate or other food for their sustenance is claimed. B. M. V.

[Domestic] air or gas filter unit. H. E. BIRKHOLZ, Assr. to AMER. AIR FILTER CO., INC. (U.S.P. 2,029,406, 4.2.36. Appl., 27.3.33).—An apparatus comprising motor, fan, and filter in a common casing and suitable for insertion in the window of a room is described. B. M. V.

Means for affording protection against toxic gases or the like. C. H. GILL (B.P. 455,593, 12.5.36).—A hut or chamber is provided with means for exhausting the atm. while in use and with detachable means for admitting purified air so arranged as to be changed without danger while the surrounding atm. is toxic. B. M. V.

Disinfecting and deodorising. A. M. CODD (B.P. 455,443, 4.6.35).—A device as described in B.P. 416,112 (a small basket in a tank of H_2O) is filled with H_2O-sol. salts, an oil of d <1, and a disinfectant. B. M. V.

Manufacture of fumigant compositions. J. FERGUSON, H. PIRIE, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 455,605, 23.2.35).—In order to reduce the rate of evaporation of volatile soil fumigants, *e.g.*, CS_2, HCN, they are uniformly incorporated in a mass of gelled and, preferably, hardened gelatin. C. J.

Treatment of sewage. E. D. FLYNN, Assr. to OLIVER UNITED FILTERS, INC. (U.S.P. 2,026,969, 7.1.36. Appl., 13.5.32).—To the sewage-sludge solids a combustible filter aid (coal dust, coke breeze) is added, and after separation by filtration the filter cake is "pelletised," dried, and incinerated continuously, utilising countercurrentwise the hot exhaust gases for drying. O. M.

Apparatus for treating sewage. F. S. CURRIE (U.S.P. 2,027,370, 14.1.36. Appl., 24.1.34).—An annular space surrounding a final clarifying chamber is divided into compartments comprising pump and control room and chambers for aëration and re-aëration; the circulation in these chambers is maintained up the outer wall and down the inner by means of comminuted air. B. M. V.

Disposal of sewage [sludge] and other municipal waste. W. A. DUNDAS and P. HARRINGTON (B.P. 455,604, 21.1.35).—The conditioned sludge is dewatered, mixed, comminuted with dried material from a subsequent stage of the process, and dried in a loose condition in a stream of hot (800°) waste gases resulting from subsequent incineration. The dry sludge is pulverised, a portion being returned to mix with the wet material, and the remainder mixed with a suitable amount of coal or other fuel and incinerated. A form of apparatus, with automatic safety devices, is claimed. C. J.

Water purification. O. M. URBAIN, Assr. to C. H. LEWIS (U.S.P. [A—C] 2,029,959—61, 4.2.36. Appl., 28.7.34).—H_2O is freed from (A) amines, cyclic amides, and OH-compounds by agitation with compounds, RNCO, RNCS, RNSO, RNSeO, at p_H 6·5—7, (B) amines and cyclic amides by agitation with polynitrophenols at p_H 7—7·5, and (C) carboxylic acids by agitation with salts of NH_2-acids (carboxylic or sulphonic) usually at $p_H<7$, followed by sedimentation. R. S. C.

Purification of organically polluted waters. O. M. URBAIN, Assr. to C. H. LEWIS (U.S.P. 2,029,958, 4.2.36. Appl., 28.8.33).—Putrescible org. matter in H_2O is oxidised by diffused air, employing catalysts in the form of salts or hydroxides of a metal having a variable valency of $\nless 2$ (*e.g.*, Cr, Mn, Os, Sn, V, Sb, Bi, Mo, Se). The catalyst is substituted for activated sludge in that plant, or used as an adjunct prior to chemical pptn. Immunity from bacterial poisons is advantageous. O. M.

Water-purifying mechanism. J. S. WALLACE (U.S.P. 2,027,501, 14.1.36. Appl., 23.9.31. Renewed 26.11.34).—Feed-H_2O for boilers is sprayed into steam to render it non-scale-forming. Suitable apparatus is described. B. M. V.

Water reclaimer. V. P. McVOY (U.S.P. 2,027,395, 14.1.36. Appl., 28.11.34).—A large vol. of waste H_2O at approx. 43° is sprayed over a large area in a vac. chamber disposed at $\nless$ barometric height above reservoir level, the abs. pressure being maintained at 1 lb. per sq. in. H_2O vapour about $\frac{1}{3}$ the vol. of circulated H_2O is withdrawn and condensed as pure H_2O. The process is applicable to make use of the waste heat in condenser cooling-H_2O, and also to deodorise and degasify surface H_2O and streams. B. M. V.

Respirators, gas masks, and the like. J. A. SADD (B.P. 455,099, 10.1.35).

Filter.—See I. **Detecting CO in air.**—See II. **Deodorised $CaCl_2$.**—See VII.