BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

NOV. 10 and 17, 1933.*

I.-GENERAL; PLANT; MACHINERY.

Temperature measurements with tungstenmolybdenum thermocouples. B. OSANN, JUN., and E. SCHRÖDER (Arch. Eisenhüttenw., 1933—4, 7, 89—94). —The standardisation curve of W-Mo thermocouples is a parabola symmetrical about the 600° line, at which point the e.m.f. reaches a max. of 1.55 mv. At 1250° the e.m.f. falls to zero and thereafter is negative and almost linear, reaching 4 mv. at 1870°. To prevent oxidation protection tubes of narrow bore should be used, the open end being packed with asbestos. Sintered corundum or sillimanite tubes protected at the lower end by a silite tube can be used for taking the temp. of steel baths, but these rarely survive 3 measurements.

A. R. P.

Measurement of true gas temperatures. S. UCHIDA (J. Fuel Soc. Japan, 1933, 12, 97-98).—The use of the high-velocity thermocouple is indicated. The blackness and diam. of the couples should be small and the ratio of temp. of inner wall of the suction pipe to true gas temp. should be nearly unity. The min. gas velocities under two sets of conditions are given.

D. K. M.

Theory of heat conductivity. B. BRUZS (Z. Physik, 1933, 83, 543—553).—The thermodynamical treatment of stationary states is discussed with special reference to heat conduction. A. B. D. C.

Conduction of heat in powders. W. G. KANNULUIK and L. H. MARTIN (Proc. Roy. Soc., 1933, A, 141, 144—158).—The thermal conductivities (k) of powders (glass spheres, NHPh₂, MgO, and a series of graded carborundum powders) have been measured in air, H₂, CO₂, and He, at pressures p = 0.5 cm. to 76 cm. The data satisfy the relation p/k = ap + b. The conception of mol. conduction is introduced to explain the departures from this relation observed for some of the finer powders, and for all powders at low pressures. L. L. B.

Thermal conductivity of water. L. H. MARTIN and K. C. LANG (Proc. Physical Soc., 1933, 45, 523— 529).—Using the parallel-plate method, data for the range 7—60° are obtained. N. M. B.

Measurement of the thermal conductivity of gases. M. TRAUTZ and A. ZÜNDEL (Ann. Physik, 1933, [v], 17, 345–375).—A modification of Eucken's method is shown to give results reproducible to $\pm 1\%$. Vals. for CO₂, CO, CH₄, and A are compared with previous data. W. R. A.

Effective heat exchange in the lower zones of regenerators. W. B. MITCHELL and H. D. BENNIE (J. Soc. Glass Tech., 1933, 17, 102-117 T).-By using

special filler bricks the velocities of gases in the lower zones of regenerators is maintained, and turbulence is set up, giving increased effectiveness of heat exchange. A. L. R.

Refrigeration-plant chemistry. C. B. HILL (Refrigerating Eng., 1933, 25, 216, 224).—Brine prepared with pure NaCl and CaCl₂ is less corrosive than that from impure salts. The optimum $p_{\rm H}$ to prevent corrosion of galvanised equipment is $8\cdot 2$ — $8\cdot 5$. Addition of chromate or Na silicate reduces corrosion.

CH. ABS.

Hazards of gas leakage as affected by ventilation. J. B. CHURCHILL and E. T. WILLIAMS (Refrigerating Eng., 1933, 25, 256-259).—Practically no hazard attends the use of MeCl in refrigerating systems in the ratio of 2 lb. per 1000 cu. ft. of space cooled.

CH. ABS.

a

Treatment of water for ice manufacture. II. D. BURKS, JUN. (Univ. III. Eng. Exp. Sta. Bull., 1933, No. 253, 34 pp.; cf. B., 1932, 659).—With air agitation sufficient to prevent localised concn. of dissolved salts, and with removal of unfrozen H_2O whenever opacity tends to develop, the allowable limit of salt concn. for marketable ice at -9° can be extended to 1300 p.p.m. Prior to freezing, CO_3'' and HCO_3' should be neutralised to Cl'. CH. ABS.

Production of manufactured ice at low brine temperatures. D. BURKS, JUN. (Univ. Ill. Eng. Exp. Sta. Bull., 1933, No. 254, 66 pp.).—Optimum conditions are specified. Friability is reduced by addition of NH₄ salts, or by annealing. CH. Abs.

Determination of the size of loose particles. M. SPINDEL (Assoc. Int. Essai Mat. Congr. Zurich, 1931, ii, 473—475; Chem. Zentr., 1933, i, 1482).— A discussion. A. A. E.

Brewery-plant refrigeration.-See XVIII.

PATENTS.

Annealing furnaces. C. E. FRAZIER (B.P. 397,729, 25.11.32).—An elongated annealing chamber is provided with a fire-box above, downtake flues at the sides of the entrance end of the kiln, and an outlet flue longitudinally under the bottom. B. M. V.

Furnaces and the like and conveyance of goods therethrough. A. SMALLWOOD and J. FALLON (B.P. 397,610, 3.5.32).—Methods are described of supporting the beams of a walking-beam furnace bed of the type in which one set of beams reciprocates vertically and the other horizontally. B. M. V.

Smelting process for solid substances with high m.p. Soc. OXYTHERMIQUE, Assees. of M. FRANKL (B.P.

^{*} The remainder of this set of Abstracts will appear in next week's issue,

396,698, 3.2.32. Ger., 4.2.31).-Substances of high m.p. are melted, in some cases simultaneously with their formation from other materials, by the circulation of combustion gases around a self-sustaining column (A)of the material, A being supported on a cooled hearth but not confined between walls in the lower melting zone, at which place the gases are adjusted to contain a min. of CO₂ to enable SiC linings to be used in the combustion chamber. The gases leave through the material in the unsintered upper part of A, and combustion is completed by additional air and/or O₂ forced in through tuyères, thus preheating the charge. Adjacent to A are two shafts (B) containing coke, which serves principally as reversible regenerative material for a circulated quantity of gas additional to that passing through A, the gases being brought to a max. temp. and min. CO2 content by combustion of O2 in the base of the coke columns, though the actual consumption of coke is substantially prevented by the injection of cheaper powdered coal. B. M. V.

Working fusion and reduction furnaces [for making calcium carbide or carborundum]. Soc. OXYTHERMIQUE, Assees. of M. FRANKL (B.P. 397,744, 22.12.32. Ger., 31.12.31. Addn. to B.P. 396,698; cf. preceding abstract).—The reacting components are intimately mixed and formed into long, rectangular briquettes which are built up in rectangular furnaces in such a way that the briquettes in alternate rows are at right angles to one another. A. R. P.

Roasting or calcination of pulverulent matters. E. C. ST.-JACQUES (U.S.P. 1,893,913, 10.1.33. Appl., 2.4.32. Fr., 26.2.31).—The pulverised material, together with fuel and air, is admitted tangentially to a chamber with conical ends to form a gyrating flame; the products are withdrawn through the apex of the upper cone and passed into a supplementary chamber with additional air. B. M. V.

Heat-treatment of comminuted material. NAT. ELECTRIC HEATING Co., INC. (B.P. 397,666, 5.8.32. U.S., 16.4.32).—The material is suspended in a fluid and passed through one or more straight tubes of narrow bore, the walls of which form electrical resisters, the object being quick heating for a short time (<10 sec.) and at $\geq 673^{\circ}$. The heating tubes may have walls of varying thickness to give various temp., and may be followed by tubes which are cooled, *e.g.*, by the ingoing fluids; a catalyst may be present in suspension. The electric current may be controlled by a thermostat and/or by cessation of flow of the current of material. B. M. V.

Drying apparatus. S. BATES, and MICKLEY COAL Co., LTD. (B.P. 397,297, 5.8.32).—An apparatus for drying discrete material comprises a tower having a no. of level floors pierced with apertures that are not on the same vertical line, the material being progressed by rotating spreaders. The drying air enters at both ends of the tower and leaves at an intermediate point.

B. M. V.

Apparatus for drying, conditioning, or otherwise treating leather and other materials. W. BRIDGES (B.P. 396,824, 18.2.32).—The goods, *e.g.*, hides, are carried by continuous conveyors in succession through the upper and lower stories of an elongated housing in which the atm. is circulated and conditioned under control of automatic psychrometric apparatus. B. M. V.

Heat-exchange device. H. FELDMEIER, R. J WIGHTMAN, and R. B. STEVES, ASST. to CHERRY-BURRELL CORP. (U.S.P. 1,893,135, 3.1.33. Appl., 11.8.30).—A no. of sections of a heat exchanger are connected by flexible, quickly detachable conduits, and baffles are provided for leading any leakage from the joints to an innocuous place. B. M. V.

Heat-exchange apparatus. G. C. DERRY, Assr. to B. F. STURTEVANT Co. (U.S.P. 1,894,026, 10.1.33. Appl., 26.9.29).—Air- and H_2O -tubes are interspersed across a flue conveying gases from which heat is to be withdrawn. B. M. V.

Plate heat-exchange apparatus for liquids. HOL-STEIN & KAPPERT MASCHINENFABR. "PHÖNIX "G.M.B.H. (B.P. 397,706, 31.10.32. Ger., 7.1.32).—The passages for the flow of the liquids are punched out of sheets of resilient material, which are then sandwiched between metal plates. B. M. V.

Heat-exchange tubes for use in steam boilers, superheaters, economisers, oil stills, or other heat exchangers. SUPERHEATER Co., LTD. From R. S. BROWN (B.P. 397,664, 4.8.32).—Adjacent vertical rows of horizontal tubes are staggered and the tubes are provided with vertically tapered longitudinal fins so that the vertical passages for the outer fluid are sinuous and of substantially const. cross-section.

B. M. V.

Composition for preventing boiler priming or frothing. E. F. SPELLMEYER (U.S.P. 1,892,857, 3.1.33. Appl., 15.12.31).—The addition of a fatty acid amide (stearamide) to the H₂O is claimed. B. M. V.

 Refrigerant.
 E. E. SORENSEN, ASST. to P. F. SCHOLBE

 (U.S.P. 1,892,741, 3.1.33.
 Appl., 24.8.28.
 Renewed

 29.6.31).
 The use of EtNO₂ 15 and EtOH 85% (approx.)
 is claimed.
 B. M. V.

Anti-freezing solution. P. ATTKISS (U.S.P. 1,893,835, 10.1.33. Appl., 18.7.30).—CaCl₂ is used in conjunction with an inhibitor comprising a solution of $Ca(OH)_2$ (about 0.25% of the CaCl₂) in glycerin. B. M. V.

[Copper alloy for] articles or apparatus subject to low temperatures. LINDE AIR PRODUCTS Co., Assees. of G. H. ZENNER (B.P. 397,697, 26.10.32. U.S., 13.11.31).—Containers for liquid O₂ capable of withstanding 100 lb. per sq. in. and moderate shock and vibration at $< -180^{\circ}$ are made of an alloy containing Cu 92.5—96.5 (94.5), Si 3—6.5 (4.5), and Mn 0.5—1.5 (1)%. A. R. P.

Protecting metallic surfaces of refrigerators from sulphur compounds. I. KITSÉE, Assr. to MINERALITE CORP. (U.S.P. 1,896,141, 7.2.33. Appl., 28.3.30).—The surfaces are coated with Na₂SiO₃ to protect them from the S in mineral wool. L. A. C.

Temperature measurement. F. S. MARCELLUS, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,894,109, 10.1.33. Appl., 19.11.30).—The power of fused SiO_2 to convey radiation is utilised. A quartz rod is covered by a refractory cap at the hot end and the radiation received at the other end outside the furnace is measured by a thermocouple in a ventilated cap, or by visual comparison with a colour standard. B. M. V.

Temperature indicators. BRIT. CELANESE, LTD., G. H. ELLIS, and A. J. WESSON (B.P. 397,520, 25.2.32).— A substance of suitable m.p. is made up with fillers into a block or "pencil," which leaves a mark on the heated surface of an iron or calender at temp. above the m.p. A composition containing anthracene (m.p. 216°; 15 pts.), CaCO₃ (15 pts.), and carnauba wax (0.28 pt.) leaves a faint mark at 210° and a heavy mark at >220°. The marks are readily wiped off. C. H.

Control of temperature. G. L. SIMPSON, Assr. to PITTSBURGH RESEARCH CORP. (U.S.P. 1,893,847, 10.1.33. Appl., 1.6.31).—In a heat-treating furnace the rate of heating up is not controlled on a time basis, but is carried out so that the difference in temp. between two points, one well within the charge and the other outside in about the hottest part of the heating jacket, does not exceed a given amount. A suitable primary device comprises two thermocouples connected to two moving coils on the same pivoted shaft. B. M. V.

Crushing or pulverising machine. E. E. ELZE-MEYER and H. GRIESEDIECK, ASSTS. to AMER. PULVERIZER Co. (U.S.P. 1,892,697, 3.1.33. Appl., 20.12.30).— Hammers and links for a disintegrator are described. B. M. V.

Crushing and mixing machine. O. J. LEHRACK (U.S.P. 1,894,106, 10.1.33. Appl., 29.4.29).—A ferromagnetic ball is caused to travel around a non-magnetic mortar by means of a no. of radial electromagnets energised in succession. B. M. V.

Conservation of granular materials. F. BARTLING (U.S.P. 1,894,149, 10.1.33. Appl., 14.7.30. Ger., 19.7.29).—An unstable article (e.g., granules of $\mathrm{NH}_4\mathrm{HCO}_3$) is coated with the condensed vapour of $\mathrm{NH}_4\mathrm{Cl}$, with or without other substances, e.g., urea, $(\mathrm{NH}_4)_2\mathrm{SO}_4$. B, M. V.

Apparatus for collecting and conveying dusts. P. P. NUNGESSER (U.S.P. 1,893,505, 10.1.33. Appl., 6.2.31).—An air-operated ejector system for the collection of, *e.g.*, metallic (bronze) dusts from the mortars in which they are made is described. B. M. V.

Means for measuring and controlling the density of suspensions of solids in liquids. H. HOWARD (U.S.P. 1,892,839, 3.1.33. Appl., 16.2.31).—In a control device comprising one float (A) suspended in slurry and another suspended in clear diluent, A is provided with means for keeping it in rotation to prevent accumulation of solids and errors due to viscosity.

B. M. V

Atomisation of materials. E. ROTHEIM (U.S.P. 1,892,750, 3.1.33. Appl., 12.11.28. Norw., 23.11.27).— A liquid or solid substance (e.g., linseed oil) is dissolved in (or vice versâ) a condensible gas (e.g., Me_2O) and shipped in a pressure-resisting can having a spraying head comprising a valve, expansion chamber, and nozzle. B. M. V.

Filter. W. G. ZERZOW (U.S.P. 1,896,655, 7.2.33. Appl., 23.4.30).—A centrifugal filter having a horizontal shaft and closed casing is provided with a stationary "accumulator box" (A) within the basket, accumulated

residue being scraped into A on slow rotation by a blade which, during rapid rotation for filtration, is lowered to form a lid for the entry slot of A. Clean-out openings are also provided in the end cover of the casing and in A. B. M. V.

Filters. SVENSKA ACKUMULATOR AKTIEB. JUNGNER, and T. F. MANDAHL (B.P. 396,840, 26.2.32).—The coiled ribbon forming the filter medium is shaped with thicker edges on the prefilt side and is provided with notches of special form. B. M. V.

Automatic filter-wash control. W. J. HUGHES, Assr. to GEN. ZEOLITE Co. (U.S.P. 1,892,951, 3.1.33. Appl., 29.8.31).—The upward-current wash of a sand filter is controlled by a float at the upper sand level so that the expansion of the bed governs the rate of $H_{2}O$ supply. B. M. V.

Centrifugal separator bowl. G. J. STREZYNSKI, Assr. to DE LAVAL SEPARATOR CO. (U.S.P. 1,893,005, 3.1.33. Appl., 1.8.30).—A preliminary separation is effected in a central feed chamber and the fractions are passed separately into the main bowl. B. M. V.

Centrifugal hydro-extractors and the like. E. L. CLAPHAM (B.P. 396,863, 11.4.32).—A bolt for the cover (A) cannot be withdrawn while the machine (B) is in motion, and B cannot be started until A is locked.

B. M. V.

Distilling apparatus. P. SCHLUMBOHM, Assr. to AMER. THERMOS BOTTLE Co. (U.S.P. 1,893,340, 3.1.33. Appl., 12.6.31).—An apparatus for distilling very small quantities of a liquid comprises a glass cylinder bent inwardly back on itself at each end, forming deep cups, the upper one containing a cooling liquid and the lower (inverted) one a heater. The condensate is collected by an S-pipe passing through the wall. B. M. V.

Condenser: F. T. HARDING (U.S.P. 1,893,366, 3.1.33, Appl., 12.3.31).—A spray-cooled surface condenser is described. B. M. V.

Viscosity apparatus. P. E. KLOPSTEC, ASST. to CENTRAL SCIENTIFIC CO. (U.S.P. 1,893,749, 10.1.33. Appl., 27.9.29).—A vertical cylindrical vessel contains a co-axial hollow cylinder which is rotated by a wt. and string and is adjusted so that it approx. floats in the liquid under test, thereby avoiding pivot friction. B. M. V.

Crystallisers. MIRRLEES WATSON CO., LTD. From R. PITCAIRN (B.P. 397,432, 27.4.33).—A crystallising trough is provided with two helical stirrers of opposite hand and widely different diam. on the same shaft.

B. M. V.

Process and apparatus for catalytic gaseous reactions. J. L. BRILL, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,893,492, 10.1.33. Appl., 31.12.28).—A main catalyst (M) for an exothermic reaction at high temp. and pressure is preheated by means of an auxiliary catalyst (A) which will initiate an exothermic reaction (not necessarily the desired one) at a lower temp., the heat being transferred from A to M both by conduction and the passage of the gases from one to the other. B. M. V.

Assisting chemical reaction between gases and liquids. P. LETOURNEUR (B.P. 396,744, 29.1.32. Fr.,

British Chemical Abstracts-B.

898

11.2.31).—The gases and liquids are introduced separately into a preliminary chamber (A) affording a passage of alternately enlarged and restricted bore by which means the gases become finely divided. The pressures of the fluids are adjusted so that their velocities through the main reaction chamber (B) are equal. Claim is made for the maintenance of the mixture at optimum temp. and for the use of several stages to obtain complete exhaustion of both fluids. One form of B comprises a coil in a liquid bath. B. M. V.

Apparatus for determining the moisture content of gases. R. G. GUTHRIE and O. J. WILBOR, ASSIS. to PEOPLES GAS BY-PRODUCTS CORP. (U.S.P. 1,894,172, 10.1.33. Appl., 12.11.30).—A stream of gas is passed in turn through a heat-exchanging coil, a tube containing a dry-bulb thermometer, and a tube containing an initially dry wet-bulb thermometer, the whole being immersed in a comparatively large mass of H₂O that may be adjusted to a convenient temp. B. M. V.

Separation of gases from liquids. ANGLO-PERSIAN OIL CO., LTD., and A. C. HARTLEY (B.P. 397,540, 26.2.32).—Liquid containing minute bubbles of gas in suspension, e.g., oil from a well after release of pressure, is caused to flow in thin, non-turbulent layers by subdividing the conduit with closely-spaced sheets or tubes. B. M. V.

Apparatus for recovery by adsorption of gases, vapours, or liquids. E. R. SUTCLIFFE (B.P. 397,128, 8.12.31).—A form of container for a solid adsorbent is described. B. M. V.

[Air-]filtering material. H. E. BIRKHOLZ, ASST. to AMER. AIR FILTER CO., INC. (U.S.P. 1,893,048, 3.1.33. Appl., 10.8.27).—A medium is formed of paper or other fibrous material having a structure becoming progressively denser from one side to the other. B. M. V.

Preventing or extinguishing fires in confined or semi-confined spaces. SPARKLETS, LTD., and G. E. HEVL (B.P. 397,380, 28.1.33).—Bulbs of liquid CO₂ are provided with Cu jets the apertures of which are sealed with fusible wire. B. M. V.

Manufacture of caulking and packing material for use in making pipe and other joints. E. V. HAYES-GRATZE (B.P. 397,219, 12.3. and 12.5.32).—The basis of the packing is composed of unspun fibres treated as in B.P. 363,651 (B., 1932, 256) and carded into a loose mass before impregnating with the usual lubricants and/or binders. B. M. V.

Colour analyser. C. W. STONE, ASST. to GEN. ELECTRIC Co. (U.S.P. 1,894,132, 10.1.33. Appl., 10.8.31). —A beam of light passes through a rocking const.deviation prism (A) and a splitting prism, the two beams falling on to a sample and standard surface, respectively. Each of the reflected beams passes through a rotatable polariser and a fixed analyser, finally entering alternately (by the rotation of the polarisers) the same photo-electric device, which controls a motor operating a pencil longitudinally of a chart rotated in unison with a crank effecting rocking of A. B. M. V.

Laboratory support. E. L. HARRINGTON, Assr. to CENTRAL SCIENTIFIC CO. (U.S.P. 1,893,799, 10.1.33. Appl., 21.11.30).—An A-shaped piece of metal has the cross-bar raised above the limbs and pierced with a tapped hole to receive a standard or other device.

B. M. V. Packing material.—See I. Si-Mo steel [for mill rolls].—See X.

II.—FUEL; GAS; TAR; MINERAL OILS.

Metamorphosis of coal and the problem of artificial coalification. H. STACH (Braunkohle, 1932, 31, 912—917; Chem. Zentr., 1933, i, 1547).—The view that temp. is the principal factor is criticised. The rôle of pressure is discussed. A. A. E.

Artificial anthracite. K. H. STORKS (Bell Labs. Rec., 1933, 11, 279–282).—Wood (C 71–89, H 3.9-3.2%) submitted to high temp. at high pressure afforded C having a resistance < that of transmitter C and a low modulating efficiency. CH. ABS.

Laboratory apparatus for mechanical sampling of coal. The "Cascade" sampler. A. DAWE and N. M. POTTER (Fuel, 1933, 12, 313—319).—The apparatus is so designed that the coal is delivered from a hopper on to a conical surface from the lower edge of which it falls into a cylindrical bin divided by means of vertical, radial plates into 3 pairs of compartments, the angles of which are 30°, 60°, and 90°, respectively ; during sampling the bin is rotated at 40—60 r.p.m. For sampling coal up to $\frac{3}{8}$ -in. mesh the hopper has a capacity of 12 kg. and the bin of 25 kg. Tests have shown that the sampler will remove a 50, 25, 33 $\frac{1}{3}$, 16 $\frac{2}{3}$, or an $8\frac{1}{3}$ % sample accurately, and that each sample is representative of the whole, even with coals of high ash content and high "size-wt." ratio. A. B. M.

What is the actual gas content of coal? Seamgas content and the outgassing of coal. F. FISCHER and K. PETERS (Brennstoff-Chem., 1933, 14, 333—334). —To avoid confusion between the gas actually present as such in the coal and that produced on thermal decomp. it is proposed to call the former the "seam-gas content" ("Flözgasgehalt"), the process of freeing the coal from this gas being referred to as "outgassing" ("Ausgasen"). A. B. M.

Determination of nitrogen in coal by the Kjeldahl process. J. H. G. CARLILE (J.S.C.I., 1933, 52, 306-308 r).-It has been stated that in the Gunning-Wilfarth modification of the Kjeldahl method for the determination of N in org. substances the val. normally obtained may represent only 60% of the total N present in the sample, the remainder being liberated with the gases evolved during the digestion (cf. B., 1932, 326). The coal was therefore digested in an atm. of CO₂, the gases evolved being collected in a nitrometer over aq. KOH. Various possibilities of error are considered and a method of obviating this is described. 3 coal samples were examined and the amount of N_2 evolved was only of the order of 0.3 c.c. The highest val. was 0.46 c.c., equiv. to 0.06% on the coal. The N₂ collected was due mainly to N adsorbed on the coal, which was liberated during the digestion. It appears that the present method for the determination of combined N in coal is satisfactory.

Combustion. XV. "A" and "C" layers of the Tandjoeng-Enim coal deposits. D. J. W. KREULEN (Chem. Weekblad, 1933, **30**, 606–610; cf. B., 1933, 848).—The rates of oxidation in air at 105°, initial temp., humic acid formation curves, and rates of oxidation in air at 600° of the cokes produced by carbonisation at 950° have been determined for a no. of samples. The humic acid determination has been modified, to eliminate errors due to the different densities of the samples, by working always with 1 c.c. in place of 0.5 g., and a new form of humic acid factor, H, has been developed which is independent of the max. temp. to which the sample can be heated before ignition occurs. H ranges between 0 and 360 according to the type of coal and is of val. for classifying coals (with a few exceptions) according to their coking properties. H. F. G.

Relation between volatile matter and elementary composition of coal. C. A. SEYLER (J.S.C.I., 1933, 52, 304-306 r).-The "isovols" or lines of equal volatile matter (V) on the author's "fuel chart" can be represented by an equation similar to Dulong's formula for calorific val. (I), viz., V = 10.593 H - 1.227 C + 83.54or V = 11.82H + 1.2270 - 37.93, where V, H, C, and O are the % of V and of the elements expressed on Parr's "unit coal" basis. By combination with Dulong's formula (the heat of combustion of C being taken as 8140) equations connecting the H and C with the gross (I) (Q_g) and V (both on Parr's basis) are obtained. In simplified form they are $H = 0.069(0.01Q_g + V) - 2.87$, $C = 0.59(0.01Q_g - 1.1V/3) + 43.25$. The H and C are thus rectilinear functions of the W of the the "H index," $0.01Q_g + V$, and the "C index," $0.01Q_g - 1.1V/3$. By this means the limits of any classification (like Parr's) based on (I) and V may be made to coincide (within the limits of accuracy of the relation) with one, like Seyler's, based on elementary composition. A chart is given of Seyler's classification in which scales of the H and C indices are placed beside those of H and C. A preliminary survey indicates that for normal coals the accuracy to be expected is on the average about ± 0.15 for the H and ± 0.5 for the C, with max. deviations of 0.2% and 1% respectively. The relations do not hold good for anthracites or coals with much < 10% of V.

Distillation of coal under very low pressures. V. STONE and M. W. TRAVERS (Chem. & Ind., 1933, 686-687).—The coal (washed Staveley nuts: H₂O 2·7, volatiles $36\cdot8$, fixed C $54\cdot8$, ash $5\cdot7\%$) was dried and distilled under pressures of $0\cdot01-0\cdot001$ mm. Hg in an electrically-heated retort, the volatile products being condensed in tubes immersed in liquid O₂. The yield of volatile products after 6 days at 350° was approx. 10%, or after 1 day at $365^\circ 13\cdot2\%$. About one half of this consisted of a soft, reddish-brown pitch, about one quarter of liquid hydrocarbons, and the remainder of H₂O and gases. Fine-grinding of the coal had little effect on the yield. The mechanism of the decomp., assuming Bone's hypothesis of a continuous hexamethylene structure in the coal, is very briefly discussed.

A. B. M. Effect on oxidisability of the heat treatment (partial distillation) of fine and lump coal. G. COLES and J. I. GRAHAM (Fuel, 1933, 12, 304—312; cf. B., 1928, 113).—The absorption of O₂ at 100° by a

Cumberland coal increased with rise of temp. of preheating in N_2 from 200° to a max. at 350-450° and fell again at 500°. In general, the results of preheating this coal confirm those obtained previously with other coals. From experiments on the absorption of O_2 , N_2 , and CO_2 at 30° by lump and fine coal, respectively, before and after preheating at 300°, it is concluded that the greater oxidisability of the preheated fine coals is due almost entirely to increased chemical reactivity of the coal, whereas the greater relative increase in oxidisability and absorption capacity of the lump coals indicates that the physical structure has been modified by heat in such a manner as to render the material more permeable to gases. A. B. M.

Low-temperature distillation of Bayac brown coal. V. CHARRIN (Mat. grasses, 1932, 24, 9674–9675; Chem. Zentr., 1933, i, 2024).—The coal (20% H₂O) affords 15% of tar and benzine ($30\% < 160^{\circ}$). The semi-coke is briquetted with 10% of pitch. A. A. E.

Low-temperature carbonisation of coal in presence of Japanese acid clay. III. Mechanism of the process. K. KOBAYASHI, K. YAMAMOTO, and H. ISHIKAWA (J. Soc. Chem. Ind., Japan, 1933, 36, 447-448 B) .- From previous work on the dry distillation of oils, fats, resins, etc. with Japanese acid clay and on the composition of Korean dull brown coal, it is concluded that during the low-temp. carbonisation of this coal with acid clay the fossil resin present melts, is absorbed by the acid clay at 150°, and is catalytically decomposed above 200° into light petroleum hydrocarbons, the reaction ceasing above 400°. Kerogen decomposes at a higher temp. into light petroleum Lignin decomposes above 400° into hydrocarbons. phenols and free C. The presence of acid clay prevents local overheating and lowers the decomp. temp.

V. P. P.

Economics of low-temperature carbonisation at collieries. Anon. (Inst. Min. Eng., Sept., 1933, Mem. 12, 7 pp.).

VIII. Sheffield laboratory Coke formation. coking test. R. G. DAVIES and R. A. MOTT (Fuel, 1933, 12, 294-303; cf. B., 1933, 849).-The apparatus consists of a flat-bottomed SiO2 tube of 1.6 cm. internal diam., held vertically within an electrically-heated tube furnace ; a plunger, consisting of a SiO2 rod flattened at the lower end and attached at the upper end to a tube which can be suitably weighted with Pb shot, is supported within the outer tube by a thread which passes over a pulley and has a counterweight attached to the other end. A pointer attached to the thread registers any movement of the plunger on a vertical scale. A preliminary study of the effect of varying the experimental conditions led to the adoption of the following procedure. A charge of coal (6 g., through 60-mesh) is lightly tapped into the tube, the plunger is rested gently on the surface of the coal, the load having been adjusted to 100 g., and the tube is heated rapidly to 250° and thereafter at a rate giving a temp. rise of 1°/min. The temp. of initial contraction (A) (softening point), initial and final expansions, and % contraction and/or expansion are recorded for a series of representative British coals. The swelling power (B; % expansion) is a good index of

the val. of a coal for coke-making and other purposes. For coals of H > 5.25% B increases with the C content; coals of H < 5.25% are non-swelling. The relation of A and the expansion temp. to composition is discussed. There is no direct relationship between A of a coal and its val. for coking. A. B. M.

Improving the coking performance of weaklycaking coals. R. A. Morr and R. V. WHEELER (Iron & Steel Inst., Sept., 1933. Advance copy, 17 pp.).— The quality of coke obtained from poor coking coals (Derbyshire and Yorkshire) may be improved by topcharging the ovens and also by adding about 3% of fusain (I) or coke dust to the charge. When this is not effective, mixing with 20-30% of a strongly swelling coal together with about 3% of (I) yielded a strong coke. The incorporation of 3-4% of coke-oven tar with the charge also yields a better coke. C. A. K.

Elimination of sulphur from metallurgical coke. III. I. V. SCHMANENKOV and A. N. BLASHENNOVA (J. Chem. Ind. Russ., 1933, No. 6, 31—36).—Coking in presence of NaCl diminishes the S content of the product from 1.9 to 1.5%; MgO and MgCO₃ exert a similar but much feebler effect, whilst dolomite, CaCO₃, CaO, and Fe₂O₃ have the opposite effect. R. T.

Methods proposed for testing the adsorptive value of active carbons. G. Rossi and A. MARESCOTTI (Annali Chim. Appl., 1933, 23, 335—341).—Experiments with Congo-red, indigo-carmine, night-blue, and methylene-blue and different preps. of activated carbons show that methods suggested for measuring the adsorptive capacity of such carbons are valueless, as they take no account of the specificity of the adsorption and give results which vary with the conditions. Adsorbent carbons should, therefore, be compared under the conditions in which they are to be used (cf. A., 1926, 1091).

T. H. P.

Griffin-Sutton combustion bomb for fuels. T. CARLTON-SUTTON (J. Sci. Instr., 1933, 10, 286–288). —The bomb can be sealed by hand-pressure, and has an accuracy of 0.1% on calorific vals. and of 0.05 and 0.1%, respectively, on C and S contents. C. W. G.

Biological method of rendering coal gas nonpoisonous, and production of town's gas from water-gas. F. FISCHER, R. LIESKE, and K. WINZER (Brennstoff-Chem., 1933, 14, 301-306, 328-333; cf. B., 1931, 186) .- By reducing the H₂O content of the effluent sludge and by systematic treatment thereof, e.g., by working for a time alternately at atm. and at reduced pressure, the activity of the bacteria has been greatly increased. The reaction was not accelerated by increasing the pressure. The reduction of the CO proceeded more slowly than that of the CO2. The presence of C₂H₄ or C₆H₆ vapour checked the reaction. By converting the CO of coal gas (with the addition of the necessary H₂O) catalytically into CO₂ and H₂, and then converting the CO2 biologically into CH4, the gas was rendered non-poisonous without affecting ts val. as a technical fuel; the conversion of 1 cu. m. of coke-oven gas per day required only 1/400 cu. m. of effluent sludge. By the same process water-gas could be converted into a gas mixture suitable for use as

town's gas. The active sludge is not poisoned by S compounds. A, B, M.

Determination of air in high-percentage acetylene. C. ASSMANN (Azetylen Wiss., 1932, 35, 184–186; Chem. Zentr., 1933, i, 1484).—Konschak's method is troublesome, but gives accurate results. A. A. E.

Laboratory apparatus for fractional distillation of road tars. J. MALETTE (Chim. et Ind., 1933, 29, Spec. No., 851—852).—An apparatus for a specification distillation test is described in detail. J. A. S.

Oxidation of balkhashite and Barzas sapropelites. D. A. SHVEDOV and A. I. ANDREEVA (Gorno-Obogat. Delo, 1932, No. 10, 51–52).—The product of oxidation with HNO_3 , $C_{20}H_{30}O_5$, had acid val. 192.0, sap. val. 258.9, Ac val. 213.9, mol. wt. 250.8, and m.p. 60–70°. CH. ABS.

Distillation of Würtemberg oil shale. F. WACLAW (Petroleum, 1933, 29, No. 32, 4-7).—The Thyssen rotary retort has proved very suitable for the distillation of the oil shale (cf. Fleischmann, B., 1926, 939). The oils obtained, however, are high in S, e.g., 3-4%, and in unsaturated compounds, and have at present little commercial val. The possibility of finding new applications for these oils, e.g., in the prep. of sulphonated oils to replace Turkey-red oil, or in the production of plastic masses by polymerisation, etc. is briefly discussed. A. B. M.

Cracking process [for oils]. E. BERL and W. DIENST (Petroleum, 1933, 29, No. 32, 1-4).—The yields of benzine and gas obtained by cracking a gas oil in the liquid phase at 400°/18 atm., and with reaction times of 70, 90, and 310 min., were 2.2, 5.9, and 8.5%, respectively; the corresponding yields at 425°/24 atm. were 10.2, 25.4, and 32.6%. The benzine consisted of unsaturated hydrocarbons 15—20, aromatics (A) 13—20, naphthenes (B) 0—8, and paraffins 58—62%. The presence of A is attributed to the dehydrogenation of B present in the original oil. The yields obtained over the first 2-3 hr. correspond approx. with a reaction of the first order, but later fall below those expected on this hypothesis. A. B. M.

Isolation of benzene from Shukkökö crude oil and its identification by comparing its properties with those of pure benzene. M. MIZUTA (J. Soc. Chem. Ind., Japan, 1933, 36, 448–450 B).—C₆H₆ and gasoline form on distillation an azeotropic mixture containing 90% of C₆H₆. Separation of pure C₆H₆ from Shukkōkō crude oil consisting of 0.13% of unsaturated and 49.22% of aromatic compounds was effected by (a) repeated fractionation, (b) separation of solid C₆H₆ from fractions containing > 50% of C₆H₆ cooled to -15° and -25°, (c) repeated fractionation and crystallisation of the crude C₆H₆ obtained in (b). V. P. P.

Relation between constitution and anti-knock value of hydrocarbons. III. F. HOFMANN, K. BERLIN, and A. W. SCHMIDT (Brennstoff-Chem., 1933, 14, 326—328; cf. B., 1933, 419).—The following C_8H_{18} nos. have been determined : butadiene 83/84; dibutadiene (I) 60/61; dicyclohexene (II) 53/54 (cf. cyclohexene 70/71); cyclohexadiene 79/80; polymeride of C_2H_4 of b.p. 140—210° 50/51; polymeride of C_2H_4 of

h.p. $210-265^{\circ}$ 47/48; tetrahydronaphthalene 65; decahydronaphthalene 50; EtOH 83; methyl*cyclo*pentane (val. corr.) 59/60 (cf. *cyclo*pentane 59/60). The vals. for (I) and (II) did not appreciably decline on storage of these hydrocarbons. A. B. M.

Condensation of the hydrocarbons in illuminating oil. I. CIOCHINA (Petroleum, 1933, 29, No. 33, 1-8).—By treatment of an illuminating oil (a) with Al and HOl at the b.p. (reduction), (b) by chlorination followed by dechlorination with NaOEt, Na, or, preferably, CaC_2 , (c) by refluxing with H_2O or H_2SO_4 (oxidation), or (d) with C_2H_2 at 400-450°, the relative proportion of the higher-boiling fractions was increased. In some cases small quantities of lower-boiling hydrocarbons were also produced. The products from (b) and (d) resembled commercial "middle oils" in their chemical and physical properties. A. B. M.

Hydrogenation of petroleum. C. E. N. DE ARAUJO, JUN. (Chimica, 1933, 1, 174-176).-A brief review. E. L.

Technical practicability of the production of liquid fuels in gasworks and coke-oven plants. F. SCHUSTER (Chem.-Ztg., 1933, 57, 661-662).—The various methods for converting coal into liquid products by way of gasification and hydrogenation are brought together into a single flow-sheet. The table shows the temp., pressure, and catalysts necessary, and the suitability of the different methods for use in gasworks and coke ovens is discussed. H. J. H.

Evaluation of waste products from the acid refining of mineral oils. G. J. L. PAGANINI (Petroleum, 1933, 29, No. 34, 6-8).—The properties of acid tar (T) and of used fuller's earth (E) are briefly discussed. One method of utilising these materials consists in mixing them with coal or coke (e.g., coal 55-60%, neutralised T 35-30%, used E 10%) and firing the mixture under a boiler. In another method the T is passed through a retort in the first zone of which it is raised to the optimum temp. for further oil separation, in the second zone it is distilled with partial combustion, whilst in the third it is carbonised. Part of the oil recovered can be worked up for lubricating oil stock, and the remainder is used as fuel. The coke formed in the third zone forms suitable decolorising C. A. B. M.

Ethyl alcohol as motor fuel. K. R. DIETRICH (Z. Spiritusind., 1933, 56, 213-214).-A lecture.

Rapid determination of iodine value as an aid to evaluation of motor benzols. E. GALLE and R. KLATT (Brennstoff-Chem., 1933, 14, 321-326; cf. B., 1932, 1016).—Five benzols were refined by eight different methods and the process was followed in each case by determining the I val. of the product by the "rapid" method, *i.e.*, by means of I dissolved in aq. EtOH. This method proved to be suitable for the determination of the unsaturated hydrocarbons in these benzols and therefore for following the course of the refining processes. The decrease in the I val. could not always be correlated with the changes in colour or with the results of the acid test on the benzols.

A. B. M.

Measurement of vapour tension of gasoline and heavy oils. Y. ASAKAWA (J. Soc. Mech. Eng. Japan, 1933, 36, 398—401).—The inner portion, containing the sample, of a Pyrex double tube forms a Bourdon tube at the top; the deflexion of the needle is measured optically. CH. ABS.

901

Oxidation of paraffin under pressure. V. VARLAMOV (Masloboino-Zhir. Delo, 1932, No. 4–5, 41–45).—Grozny paraffin, m.p. 52° (100–200 g.), and 2N-Na₂CO₃ (500–1000 c.c.) were oxidised at 160–180°/ 15–30 atm. for 3–6 hr. with air at 200–400 litres per hr. The rate of oxidation is proportional to the pressure ; 20–74% of the paraffin reacts. The insol. fatty acids are 53–78, sol. acids 7–8, and OH-acids 10% of the oxidised paraffin. The fatty acids had acid val. 172– 210 and the OH-acids had ester val. 66. The volatile reaction products contained alcohols of low mol. wt., aldehydes, and ketones. CH. Abs.

Water-soluble carboxylic acids obtained by oxidation of paraffin. A. DAVANOV (Masloboino-Zhir. Delo, 1932, No. 7, 43—48).—Grozny paraffin oxidised at $160-170^{\circ}$ by air at 60-80 cu. m. per hr. for $2 \cdot 5$ hr. afforded products having acid val. 45—50 and containing about 10% of H₂O-sol. acids. Dry distillation of the Ca salts afforded ketones, b.p. $65-100^{\circ}$. CH, Abs.

Separation of unsaponifiable matter from the oxidation products of paraffin. V. VARLAMOV (Masloboino-Zhir. Delo, 1932, No. 7, 39–43).—The oxidation products (400 g.) dissolved in benzine (b.p. $120-160^{\circ}, 2\cdot7$ litres) were treated with the calc. quantity of NaOH (1:5). The oxidation products consisted of solid insol. acids $19\cdot2$, OH-acids $18\cdot1$, liquid insol. acids $19\cdot2$, OH-acids $18\cdot1$, liquid insol. acids $19\cdot2$, OH-acids $18\cdot1$, liquid insol. acids $19\cdot1$, sol. acids and volatile compounds $27\cdot1$, and unsaponifiable matter $16\cdot5\%$. CH. ABS.

Emulsified oils for the lubrication of cylinders of hot steam locomotives. J. VINCENT (Compt. rend. Congr. Graissage, 1931, 442-448; Chem. Zentr., 1933, i, 2025-2026).

Errata.—On p. 790, col. 2, lines 11 and 32 from the top of "B" Abstracts, 1932, for 1929 read 1928.

Thermal conductivity of gases.—See I. Cokefired reheating furnace. Utilising blast-furnace gas. Oxidised paraffins as flotation reagents.— See X. Resins from low-temp. tar.—See XIII. Coal as manure.—See XVI.

PATENTS.

Low-temperature carbonisation of coal. W. A. CAUNT (B.P. 397,072, 18.4.33).—Bituminous coal is carbonised in a slightly-inclined rotary retort (A), under conditions of temp. $(480-700^{\circ})$ and speed of rotation etc. that carbonise the material to form a coherent core of coked and partly-coked material extending throughout a substantial portion of the length of A. The tendency to adhere to the walls of A is thereby overcome. Means are provided for continuously feeding coal into A and for breaking off and discharging coke therefrom. A. B. M.

Chamber ovens for production of coke and gas. C. STILL (B.P. 397,050, 13.3.33. Ger., 23.3.32).— Vertical ducts are formed in the charge of fuel, e.g., by means of rods which can be inserted therein through ducts in the roof of the chamber (A), and the top of A, which forms the gas-collecting space, is made narrower

than the remainder of A, being so designed that it remains comparatively cool and the volatile products of distillation withdrawn from the interior of the charge through the ducts therein undergo little or no cracking as they leave the chamber. A, B, M.

Removal of carbon [deposits from internalcombustion engines]. P. GEANEAS (U.S.P. 1,895,413, 24.1.33. Appl., 23.6.28).—Charcoal is impregnated with sea-H₂O or a salt solution and the dried product is burned in such a manner that the volatile products of combustion are drawn into the cylinder of the engine during the normal running thereof. C deposits in the engine are thereby loosened and disintegrated, and further deposition is prevented. A. B. M.

Revivification of carbons. P. ZURCHER, ASST. to CONTINENTAL OIL CO. (U.S.P. 1,895,062, 24.1.33. Appl., 13.8.28).—Activated C made from petroleum coke and utilised for the vapour-phase refining of motor spirits, and especially for the removal of S therefrom, is revivified by treatment with steam at $\leq 560^{\circ}$.

A. B. M.

Destructive hydrogenation of carbonaceous materials. J. M. JENNINGS, Assr. to STANDARD-I.G. Co. (U.S.P. 1,894,770, 17.1.33. Appl., 21.12.28).—Crude oils, cracked residues, tars, suspensions of pulverised coal, etc. are heated in the presence of H_2 at 430—520°/ 200 atm., and the vapours formed are continuously removed. A catalyst not susceptible to S poisoning, e.g., MoO₃, is suspended in the oil, coke formation being avoided by maintaining the ratio of asphalt to catalyst in the oil at < 1.5, or preferably < 0.5. Heating is preferably effected by constantly recirculating part of the oil from the reaction vessel through a heating coil.

A. B. M.

[Fuel] briquette. G. KOMAREK, G. MACPHAIL, and C. CORYELL (U.S.P. 1,893,417, 3.1.33. Appl., 16.7.26).— A smokeless briquette containing higher volatile matter (v. m.) than usual is formed from comminuted bituminous coal (v.m. 34—38%) and anthracite (v.m. 10%); these are mixed and calcined so that the outer shell contains 6% and the core 12% of v.m., preferably in two stages and with addition of sulphite liquor as binder.

B. M. V.

Dispersions of coal in oil. CUNARD STEAM SHIP Co., LTD., R. A. ADAM, F. C. V. HOLMES, and A. W. PERRINS (B.P. 396,432, 2.11.31 and 11.3.32).—Coal pulverised so that 100% passes about 180-mesh, or preferably 200-mesh, is mixed with a cracked fuel oil having a "fixed C" content (A) (*i.e.*, C residue on heating to 900° in a SiO₂ crucible) of < 5%, or preferably < 6%. Other oils, *e.g.*, straight-run oils, may be used if their A val. is increased to the requisite amount by the addition of a cracked oil, coal tar, etc. A. B. M.

Continuously operating vertical gas-generating chamber. DR. C. OTTO & CO., G.M.B.H. (B.P. 397,082, 12.5.33. Ger., 21.5.32).—The chamber oven has two gas outlets at widely-separated parts of the chamber wall and in a temp. zone of \lt 700°, the outlets being so designed that they can serve alternately for the discharge of gas and for the introduction of steam, tar, etc. for production of water-gas or carburetted water-gas.

A. B. M.

Apparatus for manufacture of water-gas. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 396,718, 8.2.32).—The producer is fed with a granular fuel which during the hot-blast period is blasted with air, preferably enriched with O_2 , from below, in such amount and at such a speed that the fuel is well mixed but that no "boiling" movement takes place, and is simultaneously blasted with air from above so that part of the fuel is burned with almost exclusive formation of CO_2 .

Ã. B. M.

Gas analysis. J. S. BEEKLEY, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,893,490, 10.1.33. Appl., 23.4.28).—The amount of CO in a gas stream containing $H_2 + CO$ is automatically ascertained by testing the heat conductivity before and after converting the CO into CO₂ and H₂ by catalysis with steam, the CO₂ being removed by NaOH–CaO. B. M. V.

Manufacture of bituminous material [for road construction]. H. C. NEUBERGER, Assr. to NEUBERGER CHEM. CORP. (U.S.P. 1,894,630, 17.1.33. Appl., 6.8.29). —A resilient, cold-laid paving material is made by incorporating a hard, siliceous mineral aggregate (A) with a bituminous binder (B) consisting of a mixture of bitumen and heavy petroleum oil. B is first mixed with a hydrocarbon solvent, e.g., benzol, to facilitate the incorporation of A, and the solvent is subsequently removed by heating the mixture to 30—40° under reduced pressure. A, B, M.

[Hydrocarbon] cracking process. P. ZURCHER, Assr. to CONTINENTAL OIL CO. (U.S.P. 1,895,063, 24.1.33. Appl., 7.5.29).—Hydrocarbon vapours under approx. 1 atm. are subjected to the catalytic action of C (from petroleum coke) at 300—510° and previously activated by the combined action of steam and H_3PO_4 . H. S. G.

Cracking hydrocarbons. G. Egloff, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,896,226 and 1,896,228, 7.2.33. Appl., [A] 21.12.25, [B] 6.1.28).-(A) A hydrocarbon oil is raised to cracking temp. under pressure and the evolved vapours are separated and superheated a further 166° under a pressure substantially < that of the first stage. The vapours are thereafter dephlegmated to produce a substantial quantity of reflux condensate, portions of which are continuously united with the vapours prior to their superheating treatment. (B) Water-gas heated to a temp. > that to which the oil is initially raised and air in amounts insufficient to form an explosive mixture are injected into the reaction (superheating) zone, which is maintained at $> 537^{\circ}$. H. S. G.

Treatment of petroleum. W. W. GARY, Assr. to C. O. MIDDLETON (U.S.P. 1,893,138, 3.1.33. Appl., 16.7.28).—Impurities are separated in a form filterable without filter-aids by means of SO_3 diluted with liquid CO_2 . B. M. V.

Removal of acid sludge from viscous hydrocarbon oil. C. O. HOOVER (U.S.P. 1,896,583, 7.2.33. Appl., 28.10.29).—To a mixture of oil and H_2SO_4 formed during a refining operation, prior to substantial removal of acid sludge or the addition of H_2O , is added a substantially dry mixture of an absorbent earth and CaCO₃ in such amount as only partly to neutralise acidic substances, thereby coagulating the sludge. H. S. G.

Brilleh Chemical Abstracts-B

support to journal of the bouldy of chemical industry. 101110, 100

British Chemical Abstracts-B.

903

Purification of [hydrocarbon] oils. R. C. OSTER-STROM, ASST. to PURE OIL CO. (U.S.P. 1,894,323, 17.1.33. Appl., 15.2.30).—A mixture of oil and finely-divided fuller's earth (I) is continuously heated at a temp. above that of vaporisation under a pressure sufficient to prevent such vaporisation. It is then passed to a treating and separating zone, from the top of which the purified oils are discharged and from the bottom of which the (I) and accumulated heavy oils are separately discharged to be returned together with fresh (I) to a stream of untreated oil prior to its introduction into the system. H. S. G.

Refining of gasoline with beryllium salts. F. E. KIMBALL (U.S.P. 1,895,223, 24.1.33. Appl., 16.7.32).—Hot gasoline vapours are brought into intimate contact with a mixture the composition of which is maintained at 30-40% H₂O, 55-65% BeCl₂, and 4-6% NH₄Cl, at $165-176^\circ$, then separated, and partly condensed to form a gum-containing liquid from which the remaining vapours are subsequently separated and condensed. H. S. G.

Reactivation of catalyst used for hydrogenation of hydrocarbon oils. E. B. PECK, Assr. to STANDARD-I. G. Co. (U.S.P. 1,894,785, 17.1.33. Appl., 13.11.29).— The catalyst is separated from the bulk of the oil and subjected for 2—12 hr. at $\Rightarrow 371^{\circ} > 50$ atm. to the action of a gas comprising free H₂ substantially free from hydrocarbons, *e.g.*, vapours derived from the hydrogenating retort that have been scrubbed with oil under pressure. H. S. G.

Apparatus for manufacture of benzol and byproducts from a gas containing either butane, propane, or ethane, or portions of each. F. PORTER, Assr. to CONTINENTAL OIL CO. (U.S.P. 1,895,086, 24.1.33. Appl., 18.1.30).—The apparatus consists of a no. of furnaces adapted to be alternately heated, with pipes for leading the gas to the furnaces and means for cooling the gas on its discharge. A compressor is connected to a tar extractor interposed in the discharge line from the furnaces, and means are provided for cooling the gas discharged from the compressor and for collecting the benzol produced. H. S. G.

Generating useful products from hydrocarbon mixtures containing olefines. B. T. BROOKS, ASST. to PETROLEUM CHEM. CORP. (U.S.P. 1,894,661, 17.1.33. Appl., 5.3.30).—A fraction, the olefine content consisting predominantly of butadiene and butylene, is separated from a mixture of cracked hydrocarbons containing mono- and di-olefines and is treated in the liquid phase at 21—26.6° with H₂SO₄ (70—80%). Polymerised hydrocarbons are recovered from the hydrocarbons that remain undissolved, and are separated into a distillate, b.p. $< 200^{\circ}$, and a residue. H. S. G.

Liquid-phase polymerisation of hydrocarbon oils. C. B. WATSON, ASST. to PURE OIL CO. (U.S.P. 1,894,331, 17.1.33. Appl., 18.3.30).—A mixture of cracked petroleum oil and solid adsorbent (I) is heated under pressure to a temp. in excess of the normal vaporisation temp. and passed through a separating zone under a lower temp. and pressure where the (I) is removed. The pressure on the oil is then further reduced to effect vaporisation without reheating, and the vapours are fractionated to remove high-boiling polymerides. H. S. G.

Non-detonating fuel. P. S. DANNER, Assr. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,893,021, 3.1.33. Appl., 1.3.28. Renewed 21.12.31).—A mineral hydrocarbon oil is mixed with 0.1-1.0% of Fe(CO)₄. B. M. V.

Manufacture of lubricating oil. R. A. HALLORAN and M. L. CHAPPELL, Assrs. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,893,774, 10.1.33. Appl., 8.11.26). —Unsaturated hydrocarbons, e.g., from the SO₂ treatment of oils, are polymerised to form oils of higher b.p. by the action of AlCl₃ at 232°. B. M. V.

Manufacture of stable low-pour-point lubricating oils. H. T. BENNETT and LE R. G. STORY, Assrs. to MID-CONTINENT PETROLEUM CORP. (U.S.P. 1,896,342, 7.2.33. Appl., 23.7.28. Renewed 17.4.31).— A lubricating distillate, which may contain 2—10% of animal or vegetable oil, is heated to 149—176° and admixed with 0.05—0.3% of a soap, e.g., Al stearate. H. S. G.

Heat-exchange tubes for oil stills. Separating gases from liquids. Gas analysis.—See I. HCO_2H . Isolating *p*-xylenol. Acetylation of olefines. Partial oxidation products [of oils]. Salts of ketonic acids. Esters from petroleum hydrocarbons. Technical $C_{10}H_8$. Mol. association of org. compounds. Softening etc. agents.—See III. Reactions with CO.—See VII. Insulating compound.—See XI. Separating terpene compounds from gasoline. Coumarone-indene resins. Resins from tar and petroleum.—See XIII. Fertiliser from peat.—See XVI.

III.—ORGANIC INTERMEDIATES.

Analysis of mixtures of Schaeffer and F acids. Effect of these acids in depressing the phenolwater critical solution temperature. D. G. KERR (J.S.C.I., 1933, 52, 336–338 r).—Schaeffer acid (β -naphthol-6-sulphonic acid) and F acid (the β -7-acid) depress the crit. solution temp. of PhOH and H₂O, and to a different extent. By making use of this difference the one acid has been determined in presence of the other.

Conversion of crude anthracene into pitch. K. FREY (Asphalt u. Teer, 1933, 33, 26–27; Chem. Zentr., 1933, i, 2026).—Anthracene (25%) and S $(2\cdot5\%)$ were heated for several hr. at a high temp. with pitch, the product having physical and chemical properties similar to those of the original pitch. A. A. E.

Oxidation [products] of paraffin. C_6H_6 from crude oil.—See II. Et₂O for narcosis.—See XX.

PATENTS.

Oxidation of olefines. H. DREYFUS (B.P. 397,161, 3.12.31).—An olefine $\langle C_6$ is treated with free O_2 under pressure in presence of H_2O or steam, with or without catalysts or O_2 carriers (Ag, Cu, Ag₂O, CuO, Cr₂O₃, CoO, Fe₂O₃, V₂O₅). Reaction may be effected in aq. or AcOH solution of CrO₃, or Mn or Cr acetate below the b.p. C. H.

Hydration of olefines. H. DREYFUS (B.P. 396,107 and 397,187, [A] 22.12.31, [B] 20.2.32).—(A) CaCl₂, ZnCl₂, MgCl₂, or other chloride of a metal at least as electro-positive as Ni and having affinity for H₂O, is used either molten or in conc. aq. solution, with or without inert material, at \ll 150—350° under pressure, e.g., 20 atm. (B) Olefines are absorbed at high temp. and pressures in dil. acids weaker than H₂SO₄, e.g., H₃PO₄ at 250— 300°/50—100 atm. For C₂H₄ the concn. is 40—80%, for C₃H₆ 40—75%, and for higher olefines 40—60%.

C. H.

Acetylation of olefines. B. T. BROOKS, ASST. to PETROLEUM CHEM. CORP. (U.S.P. 1,894,662, 17.1.33. Appl., 6.5.30).—In order to generate Bu^{β} and amyl acetates from a mixture of hydrocarbons produced by cracking petroleum oil, a fraction, consisting predominantly of *sec.*, *tert.*, and di-olefines of the same no. of C atoms to the mol. corresponding to the acetate to be produced, is separated by distillation from the cracked oil, the *tert.* olefines and unpolymerised diolefines are selectively removed, and the *sec.* olefines are esterified with free AcOH and a catalyst. H. S. G.

Treatment of complex liquid partial-oxidation products and articles produced thereby. J. H. JAMES, ASST. to C. P. BYRNES (U.S.P. 1,894,352, 17.1.33. Appl., 13.7.20. Renewed 7.12.21).—Intermediate oxidation products obtained from mineral oils by partial combustion are fractionated and the aldehyde-fatty acids so obtained are saponified, *e.g.*, with KOH, and then reliberated and resinified, *e.g.*, with 4% HCl. The resins are used in varnishes etc. (Cf. U.S.P. 1,697,653; B., 1929, 425.) S. S. W.

Synthesis of formic acid. H. DREYFUS (B.P. 396,375, 1.12.31).—CO and H_2O are caused to interact in presence of an acidic substance, *e.g.*, AcOH, HCl, or acidic oxides, and of an absorbent for CO, *e.g.*, CuCl or AgCl, preferably at 100—350° under pressure. As an example, a 1:1 mixture by vol. of CO and H_2O is led through anhyd. AcOH containing 10% of CuCl at 220°/15 atm. H. A. P.

Preparation of formic acid. W. E. VAIL, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,895,238, 24.1.33. Appl., 31.12.31).—B phosphate, preferably on active C, is used as catalyst for the prep. of HCO_2H from CO and H_2O at 100—400°/100—1000 atm. (325°/700 atm.). H. A. P.

Manufacture of aliphatic [acetic] anhydrides. H. DREYFUS (B.P. 397,472, 22.2.32).—The thermal anhydrisation of AcOH etc. is catalysed by vanadates and/or molybdates (excluding phospho-salts), *e.g.*, Ba molybdate and pyrovanadate at 750°. C. H.

Manufacture of anhydrides of fatty acids. C. F. BOEHRINGER & SÖHNE G.M.B.H. (B.P. 396,276, 20.12.32. Ger., 21.12.31).—The catalysts of B.P. 362,462 and 369,283 (B., 1932, 332, 670) are used for the conversion of ethylidene di-esters into acid anhydrides, *e.g.*, CHMe(OAc)₂ into Ac₂O, CHMe(O·COEt)₂ into (EtCO)₂O. C. H.

Production of maleic anhydride. E. B. PUNNETT, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P.1,895,522, 31.1.33. Appl., 2.8.28).—As catalysts for the airoxidation of C_6H_6 are used mixed oxides of groups V and VI (V-Mo) activated by Al, Mg, or Mn, or their oxides, and supported on alundum, at $475-550^{\circ}$. The maleic anhydride is absorbed from the gas stream by a volatile solvent (1-C₁₀H₇Cl). H. A. P.

Manufacture of polyhydric alcohols. H. A. LEWIS, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,895,517, 31.1.33. Appl., 21.7.26).—Aq. $CH_2CI \cdot CH_2 \cdot OH$ is treated with Na₂CO₃ in a series of stages from room temp. to b.p./1 atm., any C_2H_4O formed being separated from CO₂ and returned to the reaction mixture.

H. A. P.

Purification of organic acid chlorides. W. W. GROVES. From MONSANTO CHEM. WORKS (B.P. 397,775, 21.2.33).—The crude acid chloride is freed from acid impurities by agitation with metal oxides, hydroxides, or carbonates (CaO, MgO, CuO, ZnO, PbO, Al₂O₃). especially with such as are thereby converted into dehydrating salts. C. H.

(A) Hydration, (B) preparation of polymeride, of vinylacetylene. (A, B) A. S. CARTER and (B) F. B. DOWNING, ASSTS. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,896,161-2, 7.2.33. Appl., [A] 11.11.30, [B] 19.12.30).—(A) CH₂:CH-CiCH is converted into CH₂:CHAc by hydration in acid media (30-50% H₂SO₄; halogen acids excluded) in presence of Hg, Cu. Ag, Cd, or Zn salts. (B) CH₂:CH-CiCH is polymerised by heating in presence of a catalyst other than an ammoniacal Cu^I salt (O₂, peroxides, per-salts), or slowly by heat alone, to products which still have CiCH groups and on exposure to air behave similarly to drying oils. H. A. P.

(A) Sulphur chloride[-divinylacetylene] reaction product. (B) Halogenating acetylene polymerides. (c) Halogenation [of acetylene polymerides]. W.S. CALCOTT and A. S. CARTER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,896,157 and 1,896,159-60, 7.2.33. Appl.; [A] 1.6.29, [B] 11.1.30, [C] 7.3.30. Renewed [A] 23.4.32) .- (A) Non-benzenoid polymerides of C₂H₂, e.g., divinylacetylene and its polymerides, are treated with S₂Cl₂, if necessary in an inert solvent. (B) Addition of Cl., Br, or I to non-benzenoid polymerides of C2H2, e.g., divinylacetylene (I), gives products of higher b.p. and η and which polymerise less readily than the starting materials. In the case of (I) the reaction with Cl_2 is essentially one of addition $< 20^{\circ}$, but at higher temp. simultaneous polymerisation occurs and may become vigorous. The products in some cases have the properties of drying oils. (c) Chlorination of non-benzenoid polymerides of C2H2 is effected with SO₂Cl₂, if necessary in presence of an inert solvent and catalysts, e.g., AlCl₃, FeCl₃, or ZnCl₂. With SO, Cl, at 30-35° divinylacetylene gives (?) γδ-dichloro- $\Delta^{\alpha\gamma*}$ -hexatriene, b.p. 58°/7 mm., removal of Cl from which by bases is accompanied by polymerisation. H. A. P.

Manufacture of vinyl esters. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 395,478, 23.4. and 20.7.32).—Carboxylic acids $> C_4$ are treated in liquid phase with C_2H_2 in presence of org. Zn or Cd salts, preferably at 160—185°/5—25 atm. The resulting vinyl esters are substantially free from :CHMe compounds and may be polymerised, alone or with addition

of 0.5-20% of other polymerisable substances. The following are described (b.p. in parentheses) : vinyl n-valerate (134°), hexoate (165-167°), octoate (94°/12 mm.), laurate (123°/4 mm.), myristate (150°/3 mm.), palmitate (165°/2 mm.), stearate (167°/2 mm.), oleate (173°/2 mm.), linoleate (170-200°/6 mm.), benzoate (72-74°/3 mm.), phenylacetate (88-90°/4 mm.), α-naphthoate (145-155°/5 mm.), β-naphthoate (153°/4 mm.), Et phthalate, acetylsalicylate (145-150°/3 mm.), C. H. abietate (200-225°/6-7 mm.).

Manufacture of mixed polymerisation products [from vinyl compounds]. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 396,186, 7.5.32).-A polymerised mixture of vinyl compounds, \lt 1 being an ester, is hydrolysed and the resulting hydroxylated polymeride is condensed with an aldehyde or ketone or other compound capable of introducing a new group into the OH. Preferably 2 vinyl esters are polymerised together and > 1 ester group is hydrolysed. Examples are : polyvinyl acetate-oleate boiled with alcoholic H2SO4 and PrCHO; polyvinyl acetate-chloride, deacetylated, boiled with CH2PhCl in C6H6 and C5H5N; polyvinyl acetate-methylacrylate, boiled with alcoholic H2SO4 and MeCHO to give a cellulose-like mass; polyvinyl chloroacetate-styrene boiled with C6H6, C5H5N, C. H. and olevl chloride.

Manufacture of vinyl-substituted aromatic compounds [styrenes]. I. G. FARBENIND. A.-G. (B.P. 396,079, 28.1.32. Ger., 28.1.31).-Styrenes are obtained smoothly by heating an *α*-chloroethylbenzene at 150-200° with > 10% of an org. base or a salt or double salt thereof, e.g., quinoline, C5H5N, or C5H5N,ZnCl2.

C. H.

Catalytic molecular association of organic compounds. A. O. JAEGER, ASSF. to SELDEN Co. (U.S.P. 1,896,240, 7.2.33. Appl., 23.3.28).-Catalytic methods of bringing about polymerisation and condensation of org. compounds, the water-gas reactions, etc. are claimed. Base-exchange materials, e.g., artificial zeolites, are used as substrata for contact catalysts which may be united chemically with the substrate in a non-exchangeable form. Examples are given, e.g., of the manufacture of H2 from CO and H2O in contact with Na + Cr + Th zincate-aluminate, in which the Na may be replaced by H or by other metals; the conversion of MeCHO into aldol or CHMe.CH.CHO; and the esterification H. A. P. of org. acids over similar catalysts.

Treatment of partial oxidation products [of mineral oils]. J. H. JAMES, ASST. to C. P. BYRNES (U.S.P. 1,895,799, 31.1.33. Appl., 19.6.29).-Products from the catalytic oxidation of mineral oils (cf. U.S.P. 1,721,959; B., 1929, 972) are fractionated and selected fractions oxidised (e.g., by CrO3, HOCl, or catalytically by air) to convert aldehydes into carboxylic acids.

Preparation of esters derived from petroleum hydrocarbons. H. A. BRUSON, ASST. to RESINOUS PRODUCTS & CHEM. Co., INC. (U.S.P. 1,896,608, 7.2.33. Appl., 10.12.29. Renewed 16.12.32) .- Acids derived from non-aromatic hydrocarbons by condensation with polycarboxylic acid anhydrides (phthalic anhydride) and AlCla are converted into resinous esters by heating

with pinene, turpentine, or camphene in presence or absence of a dehydrating catalyst (ZnCl₂, B₂O₃). H. A. P.

Production of ketens by pyrolysis. STANDARD OIL DEVELOPMENT Co., Assees. of P. J. WIEZEVICH and P. K. FROLICH (B.P. 396,568, 9.9.32. U.S., 17.10.31).-A ketone or a sec.-alcohol is passed through a column of molten material, e.g., Pb or an inorg. salt, at 600 -900° in a vessel preferably lined with non-catalytic material, e.g., fireclay. The molten material is maintained at the required temp. by const. circulation of part A. B. M. of it through a heating coil.

Catalytic hydrogenation process. W. A. LAZIER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,895,515, 31.1.33. Appl., 18.5.28) .- In the hydrogenation of ketones to sec.-alcohols over oxide catalysts (e.g., ZnO, Zn chromite) simultaneous dehydration of the product is avoided by addition to the catalyst of an alkaline-reacting compound of a metal of the alkali or H. A. P. alkaline-earth groups.

Catalytic production of ketones. W. A. LAZIER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,895,516, 31.1.33. Appl., 9.1.30) .- sec. - Alcohols are dehydrogenated over catalysts composed of a difficultly reducible oxide of a dehydrogenating metal and an oxide of group VI (e.g., Zn, Cu, and Cd chromites). Concurrent dehydration of the alcohol is avoided by addition to the catalyst of alkali-metal compounds (< 5%) (cf. U.S.P. 1,895,528; see following abstract). Admixture of air with the alcohol vapour gives rise to an exothermic H. A. P. reaction.

Catalytic dehydration and dehydrogenation process. H. S. TAYLOR and W. A. LAZIER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,895,528, 31.1.33. Appl., 24.6.26) .- The dehydrating effect of difficultly reducible metallic oxides used as dehydrogenating catalysts (e.g., ZnO, U oxide) is repressed by addition of an alkali-metal compound having an alkaline reaction. H. A. P.

Catalytic dehydration process. H. S. TAYLOR and W. A. LAZIER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,895,529, 31.1.33. Appl., 28.7.27).-Addition to an oxide or mixture of oxides, having a mixed dehydrating and dehydrogenating effect, of a markedly more acidic oxide suppresses the latter effect. Thus ZnO (from ZnC_2O_4) + 7% ZnSO₄ gives 99% conversion of Pr⁸OH into COMe₂ at 400°, but ZnO alone gives only 95% of COMe2 and 5% of CHMe:CH2.

H. A. P.

Preparation of salts of ketonic acids derived from petroleum. H. A. BRUSON, Assr. to RESINOUS PROD-UCTS & CHEM. Co., INC. (U.S.P. 1,894,460, 17.1.33. Appl., 26.10.29) .- The acids of U.S.P. 1,882,762 (B., 1933, 822) are converted into their heavy-metal salts by double decomp. These are sol. in org. solvents and drying oils and (particularly those of Co, Pb, Fe, Mn, H. A. P. and V) act as driers.

E. L. Separation of ketoses from mixtures. HELWIG, ASST. to RÖHM & HAAS Co. (U.S.P. 1,895,414, 24.1.33. Appl., 30.3.31).-Mixtures containing ketoses and aldoses are electrolysed in presence of a small amount of a bromide or iodide and a base [Ca(OH)2, CaCO3, etc.]

H. A. P.

until the aldose is completely converted into the salt of the corresponding carboxylic acid, which is then removed, the ketose remaining being isolated by standard methods. H. A. P.

Production of methylated cycloheptanones and cyclooctanones. Soc. ANON. M. NAEF & Co. (B.P. 396,576, 7.10.32. Switz., 30.10.31).—Salts of $\alpha\beta$ dimethylated suberic or azelaic acids with metals of the 3rd or 4th group, or UO₂, or mixtures of the acids with the hydroxides or oxides of the metals, are heated at 300—400°. Examples include the prep. of 2:2:3trimethylcycloheptanone, b.p. 80—83°/12 mm., and 2:2:3-trimethylcyclooctanone, b.p. 97—100°/12 mm.

Munufacture of 3-methylal-3-oxy- [γ -aldehydo- γ -hydroxy methyl-n-pentane. Dr. A. WACKER GES. F. ELECTROCHEM. IND. G.M.B.H. (B.P. 396,658, 21.3.33. Ger., 13.4.32).— γ -Aldehydo- γ -hydroxymethyl-n-pentane, b.p. 96°/14 mm., is prepared by condensation of CHEt₂·CHO with CH₂O, preferably in the mol. ratio of 2:1 at 8—12°, in presence of a known catalyst for aldol condensation. H. A. P.

Manufacture of high-molecular organic thiosulphates. HENKEL & Co. G.M.B.H. (B.P. 397,445, 20.12.32. Ger., 4.1.32).—An ester or thioester derived from an org. OH or SH compound $> C_5$ and a halogenocarboxylic acid, e.g., $C_{12}H_{25}$ chloroacetate, is treated with a dry thiosulphate (Na₂S₂O₃). C. H.

Production and use of organic persulphocompounds. FLESCH-WERKE A.-G. F. GERBSTOFF-FABRIKATION U. CHEM. PRODUKTE (B.P. 396,395, 27.11.31. Cf. B.P. 394,989; cf. B., 1933, 857).—Derivatives, other than the chlorides, of org. sulphonic acids are treated with H_2O_2 or peroxides in the cold and, if necessary, in presence of stabilisers. H. A. P.

Manufacture of metal-organic complex compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 395,003-4, 7.1.32).-(A) An alkaline aq. solution of an aliphatic polyhydroxy-compound is treated with a salt or hydroxide of Fe", Al, Cr", or Bi, and the complex is pptd. by adding an alkaline-earth metal salt or hydroxide. Examples of polyhydroxy-compounds are mannitol (I), sorbitol (II), glycerol (III), erythritol (IV), gluconic and mucic acids. Sol. salts are obtained (a) by double decomp. of the insol. product with a suitable salt of an alkali metal, Mg, NH4, or amine, (b) if a neutral complex-forming component is present by action of a strong base [NaOH, NMe4. OH, C2H4(NH2)2]; (c) by action of a weak base (NH₃, monoamines) if the component is acidic; or (d), if a polyhydroxy-acid has been used, by treatment with the free acid. (B) Sb salts, oxides, or hydroxides give sol. complexes, in presence of alkali or alkaline-earth metal hydroxide, with aliphatic polyhydric alcohols, e.g., compounds (I)-(IV), xylitol, or dulcitol. The alkaline-earth compounds give sol. alkali-metal, tetra-alkylammonium, and alkylenediamine compounds by double decomp. with suitable salts. C. H.

Dehydrating or wetting aqueous substances [cellulose nitrates] with organic liquids. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 397,309, 12.9.32. Holl., 23.10.31).—The substances to be treated are heated with an org. entraining liquid which may also be a wetting agent for the subsequent dissolution in org. solvents (such as petroleum, b.p. 140–220°, CCl₄, C_2HCl_3 , sec.- or tert.- C_5H_{11} ·OH, and xylene), or may be merely entrainers (C_6H_{14} , C_6H_6 , PhMe, $C_2H_4Cl_2$, tert.- C_5H_{11} Cl), excess of which must be removed by distillation, pressing, or displacement. Cellulose nitrates, nitrated starch, or tetryl may be so treated. C. H.

Manufacture of softening and gelatinising agents. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 395,340, 4.1.32) .- Carboxylic acids, preferably of acid val. > 400, obtained by oxidation of paraffins with HNO_3 or N oxides at $> 110^\circ$, are completely esterified with monohydric alcohols or phenols or with 1 OH of polyhydric alcohols or their OH-containing ethers. Esters described (b.p. in parentheses) are : Bu^{β} (170-230°/1-2 mm.), Bu^a (190-230°/6-7 mm.), C₂H₄·OEt (190-230°/1-2 mm.), 4-methylcyclohexyl (216-245°/ 1-2 mm., w-hydroxy-n-hexyl (220-260°/3 mm.), and Ph (m.p. 40°) esters of oxidised paraffin wax ; Prª ester of oxidised animal fat (165-215°/4-5 mm.); ·C₂H₄·OMe ester of oxidised train oil fatty acids (180-250°/2 mm.); cyclohexyl ester of oxidised "split S olive oil" (200-260°/2 mm.). C.H.

Production of hexamethylenetetramine. H. O. DERING, M. D. KELLY, and SUPERFINE CHEMICALS, LTD. (B.P. 396,467, 22.2.32).— $(NH_4)_2SO_4$, aq CH_2O , and the oxide, hydroxide, or carbonate of an alkaline-earth metal are allowed to interact. If Ca derivatives are used the CaSO₄ is removed by $(NH_4)_2HPO_4$ or BaHCO₃ at the b.p. H. A. P.

Manufacture of condensation products [anthyridines] from 2:6-diaminopyridine and its derivatives. SCHERING-KAHLBAUM A.-G. (B.P. 395,119, 20.4.32. Ger., 13.5.31).—2:6-Diaminopyridine or an N-mono- or NN'-di-alkyl derivative is condensed with an aq. aldehyde in 80% HCO₂H to give diaminoanthyridines (analogues of diaminoacridine). 3:7-Diamino-4:5:6-anthyridine, decomp. 250°, and its 10-Me derivative are obtained from 2:6-diamino- or -diacetamido-pyridine and CH₂O and MeCHO, respectively.

C. H.

Manufacture of hydroquinone [quinol]. H. VON BRAMER and J. W. ZABRISKIE, ASSIS. to EASTMAN KODAK CO. (U.S.P. 1,880,534, 4.10.32. Appl., 17.5.29). —A solution or reaction mixture containing *p*-benzoquinone is distilled by passage through a packed tower in countercurrent to steam, and the condensed vapours are reduced at 100° by an aq. suspension of Fe dust. Rapid volatilisation of the quinone is essential. Suitable apparatus is claimed. H. A. P.

Manufacture of aromatic aldehydes. IMPERIAL CHEM. INDUSTRIES, LTD., and L. E. HINKEL (B.P. 397,124, 15.2.32).—In the synthesis of aromatic aldehydes from hydrocarbons or phenol ethers and HCN (or metal cyanide), HCl, and AlCl₃, higher yields are obtained, and C_6H_6 itself reacts, if > 0.5 mol. of AlCl₃ per CN group is used. The temp. is preferably $> 60^\circ$. C. H.

Preparation of aldehyde-amines. W. L. SEMON and A. W. SLOAN, Assrs. to B. F. GOODRICH CO. (U.S.P. 1,895,945, 31.1.33. Appl., 20.12.28).—Plant is described in which the aldehyde [(MeCHO)₃,

H. A. P.

 $OH \cdot CHMe \cdot CH_2 \cdot CHO$, etc.] and amine $(\alpha - C_{10}H_7 \cdot NH_2)$, to one of which is added the necessary acid catalyst, are mixed to equiv. proportions in a heated tube. Condensation occurs either during passage through the tube or on keeping the mixture. H. A. P.

[Catalysts for] condensation reactions [between carboxylic acids and hydrocarbons, amines, or phenols]. A. CARPMAEL. From SCHERING-KAHLBAUM A.-G. (B.P. 397,505, 19.2.32).—Surface catalysts, e.g., bleaching earths ("tonsil"), active C, SiO₂ gel, are used at 100—350°. Examples are : β -C₁₀H₇·COPh, m.p. 82°, from C₁₀H₈ and BzOH ; 4-hydroxy-4'-methoxy-3-methylbenzophenone, m.p. 143°, and o-tolyl anisate, m.p. 73°, b.p. 216°/15 mm., from o-cresol and anisic acid; 4-hydroxy-3-methylbenzophenone, m.p. 172°, and o-tolyl benzoate ; Ph salicylate ; Ph and tolyl naphthenates, b.p. 190—220°/12 mm.; Ph 1-hydroxy- β -naphthyl ketone, m.p. 65°; phenolphthalein; α -C₁₀H₇·NHBz, m.p. 160°, and Ph 1-amino- β -naphthyl ketone, m.p. 86°; Ph succinate, m.p. 118°. C. H.

Manufacture of reaction products of an amine salt of an alkyldithiocarbonic acid [amine alkyldithiocarbamates] with benzthiazyl chlorothiocarbonate [-formate]. [Vulcanisation accelerators.] W. P. TER HORST, ASST. to RUBBER SERVICE LABS. Co. (U.S.P. 1,880,300, 4.10.32. Appl., 23.6.28).—Benzthiazyl chlorothioformate (Na mercaptobenzthiazole and CSCl₂) and the product of reaction of CS₂ with a primary or sec. amine are allowed to interact alone or in an inert solvent. H. A. P.

Manufacture of disulphides from mercapto[aryl]thiazoles. A. M. CLIFFORD, Assr. to GOODYEAR TIRE & RUBBER CO. (U.S.P. 1,880,421, 4.10.32. Appl., 19.11.30). —Mercaptothiazoles (e.g., mercaptobenzthiazole) are oxidised by dil. HNO₃ (<40%) in aq. solution or suspension. H. A. P.

Isolation of p-xylenol from phenolic mixtures. G. T. MORGAN and A. E. J. PETTET (B.P. 397,148, 18.2.32).—A phenolic oil, e.g., b.p. 210—212°, is treated with H₂SO₄ < sufficient to monosulphonate the xylenol content (0·2 pt. of H₂SO₄ at 40° for 5 hr.), and after neutralisation (with NH₃) the sulphonates are fractionally crystallised ; p-xylenol is obtained by hydrolysis. C. H.

Manufacture of racemic compounds of 1-hydroxyphenyl-2-aminopropanoI-1 [β -amino- α -hydroxyphenylpropan- α -ol] series. W. W. GROVES, Assee. of I. G. FARBENIND. A.-G. (B.P. 396,551, 25.7.32. Ger., 25.7.31. Addn. to B.P. 365,535; cf. B., 1932, 496).— The reduction is carried out at a raised temp. and, if desired, in presence of a metal of the Ni group.

H. A. P.

Manufacture of 2-alkylaminobenzene-1-carboxylic acid-4-sulphonic [4-sulpho-*N*-alkylanthranilic] acids. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 396,100, 30.1.32).—2-Chloro-4-sulphobenzoic acid is heated, *e.g.*, at 110—130°, preferably in presence of a Cu catalyst, with aq. alkylamines, *e.g.*, NH₂Me, NH₂Et, or NH₂Bu. C. H.

Production of benzoylbenzoic acid and anthraquinone derivatives. IMPERIAL CHEM. INDUSTRIES, LTD., C. SHAW, G. C. SEMPLE, and R. F. THOMSON (B.P. 389,507, 17.9.31).—o-Benzoylbenzoic acid, or a halogenated derivative, is halogenated in H_2SO_4 , oleum, or $ClSO_3H$; the products may be cyclised. C. H.

[Manufacture of] heavy-metal ketobenzoates. H. A. BRUSON, ASST. to ROHM & HAAS CO. (U.S.P. 1,880,759, 4.10.32. Appl., 13.7.29).—The heavy-metal salts (Co, Mn, Pb) of alkyl, aryl, or aralkyl Ph keto-carboxylic acids, prepared by double decomp., or by melting together the acid and metallic hydroxide etc., are used as driers in oils, paints, and varnishes. Examples are mainly of $o-C_6H_4Bz$ -CO₂H and its derivatives. H. A. P.

Manufacture of optically active menthols. Howards & Sons, LTD., J. READ, and W. J. GRUBB (B.P. 397,212, 4.3.32).—dl-Menthyl esters of d- or lmenthyloxyacetic acid are fractionally crystallised. The mother-liquor may be hydrolysed, the menthol esterified with l- or d-acid, and the new esters fractionated. With l-acid and dl-menthol, the d-M,l-A ester is first obtained from MeOH and gives on hydrolysis d-menthol, m.p. $42-43^{\circ}$, b.p. $90^{\circ}/12.5$ mm., $[\alpha]_{\rm D} + 49.95^{\circ}$; the mother-liquor gives, via the l-M,d-A ester, pure l-menthol, $[\alpha]_{\rm D} - 49.0^{\circ}$. C. H.

[Manufacture of 4:6-]dinitro-o-cyclohexylphenol [insecticide]. E. C. BRITTON and L. E. MILLS, ASSIS. to Dow CHEM. Co. (U.S.P. 1,880,404, 4.10.32. Appl., 29.9.30).—o-cycloHexylphenol is sulphonated (H_2SO_4 , $d \ 1.665$, at 60—70°) and the product treated with dil. HNO₃ (85—90°); the 4:6-(NO₂)₂-derivative, m.p. 106°, thus produced is claimed to be an insecticide.

H. A. P.

Production of diphenyl. T. J. Scott, Assr. to SWANN RESEARCH, INC. (U.S.P. 1,894,283, 17.1.33. Appl., 2.6.28).—Vaporised C_6H_6 is bubbled through molten metal (Pb) in a preheater at 600—650°, at which temp. no Ph₂ is formed, and then through a similar vessel at 750—800°, and the resulting gases are rapidly cooled. H. A. P.

Diaryl-containing wax-like solid. C. B. DURGIN and R. L. JENKINS, ASSIS. to SWANN RESEARCH, INC. (U.S.P. 1,894,266, 17.1.33. Appl., 27.9.29).—The process of U.S.P. 1,894,283 (cf. preceding abstract) is modified by use of higher temp. ($800-850^{\circ}$) and (if desired) technical benzol in order to produce in addition to Ph₂ hydrocarbons b.p. > 270°. The total product, b.p. > 200°, gives on chlorination non-cryst. waxes with good electrical properties. H. A. P.

[Manufacture of] derivatives of 2-hydroxydiphenyl. C. ARNOLD. From Dow CHEM. Co. (B.P. 396,251, 27.10.32).—2-Hydroxydiphenyl is monochlorinated to give the 3-Cl- (I) (m.p. 11°, b.p. 319°/745 mm. or 178°/15 mm.) and 5-Cl- (II) (m.p. 72°, b.p. 312°/745 mm. or 172°/15 mm.) derivatives, which may be separated by fractional crystallisation or distillation in vac.; or the Na salt of (I) may be separated by crystallisation ($+4H_2O$, m.p. 84—85°) and (II) distilled from the acidified solution. The products are germicidal, disinfectant, etc. C. H.

Manufacture of 2-halogeno-4-aminodiphenyl ethers. E. F. GRETHER, Assr. to Dow CHEM. Co. (U.S.P. 1,881,074, 4.10.32. Appl., 13.2.31).—Interaction of NaOPh or KOH and $1:2:4-C_6H_3Cl_2\cdot NO_2$ (PhOH as diluent) gives 2-chloro-4-nitrodiphenyl ether, b.p. $180^\circ/5$ mm., reduced by Fe and H_2O (+HCl) to 2-chloro-4-aminodiphenyl ether, m.p. $29-30^\circ$, b.p. $180-182^\circ/5$ mm. (hydrochloride, m.p. $195-199^\circ$; 2-hydroxy-3-naphthoyl derivative, m.p. $210-212^\circ$). The method is equally applicable to nuclear-substituted derivatives.

H. A. P.

Protective agent for metastyrene. H. J. BARRETT and E. F. IZARD, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,896,504, 7.2.33. Appl., 13.9.30).—Addition of $\leq 1\%$ of NH₂- or substituted NH₂-compounds (ditolylguanidine) or of 1:2-NO·C₁₀H₆·OH to lacquers etc. containing metastyrene improves the durability of derived films, H. A. P.

Production of hydrogenated naphthalenes from technical naphthalene. H. BROCHE and H. SCHMITZ (U.S.P. 1,896,282, 7.2.33. Appl., 24.6.30. Ger., 27.6.29). —SiO₂ gel is used as carrier for the Ni catalyst in hydrogenation of $C_{10}H_8$. H. A. P.

Manufacture of a peroxide from tetrahydronaphthalene. Soc. CHEM. IND. IN BASLE (B.P. 396,351, 28.4.33. Switz., 29.4.32).—1:2:3:4-Tetrahydronaphthalene is treated with O_2 or air at $< 100^\circ$, or, if a catalyst (Fe filings) is used, $< 60^\circ$, to give the 1peroxide, $C_{10}H_{11}$ ·O·OH, m.p. 53—54°. C. H.

Manufacture of [2:7-]dihydroxynaphthalene-[3:6-]dicarboxylic acid. I. G. FARBENIND. A.-G. (B.P. 395,365, 12.1.32. Ger., 12.1.31).—2:7-Dihydroxynaphthalene is dicarboxylated at 250—350° to an acid, decomp. 300°, also obtainable from 2:7-dihydroxy-3naphthoic acid. C. H.

Purification of R acid [β -naphthol-3:6-disulphonic acid]. B. M. HELFAER, ASST. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,880,442, 4.10.32. Appl., 12.12.29).—The crude product of sulphonation of β -C₁₀H₇·OH is dissolved in H₂O, a Na salt (NaCl) added at 60—90° (80—85°), and the liquid cooled rapidly (> 1°/hr.), avoiding undue stirring. The pptd. R salt is filtered off before any appreciable separation of Schaeffer salt (I) has occurred. Apparently the process depends on the ready formation of supersaturated solutions of (I). H. A. P.

Manufacture of arylamino-1-hydroxynaphthalenecarboxylic [naphthoic] acids. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 396,320, 27,2,33. Ger., 27,2,32. Addn. to B.P. 382,449 ; B., 1933, 140).— A 5-, 6-, 7-, or 8-arylamino-1-naphthol is carboxylated with CO₂ and alkali. 2-Carboxylic acids from 7- (m.p. 199°), 6- (m.p. 185°), 5- (m.p. 198°), and 8- (m.p. 185°) -anilino- and 7- (m.p. 203°), 6- (m.p. 190°), and 5- (m.p. 188°) -p-toluidino- α -naphthols are described. C. H.

Manufacture of anthraquinones. L. C. DANIELS, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,895,788, 31.1.33. Appl., 21.11.23).—Compounds of AlCl₃ with o-C₆H₄Bz·CO₂H or its substitution products are converted into anthraquinone and its derivatives by action of 70% H₂SO₄—15% oleum at 90—180° (98— 100% H₂SO₄ at 130—140°). H. A.P.

Preparation of 2:6-diaminoanthraquinone sulphides. W. L. RINTELMAN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,894,790, 17.1.33. Appl., 20.4.31).—1 : 5-Dichloro-2 : 6-diaminoanthraquinone is heated with Na₂S and S in EtOH at 105—110°, and the resulting solution of dithiol (I) oxidised (air). (I) is re-formed by vatting with Na₂S₂O₄. H. A. P.

Manufacture of aminoanthraquinonesulpho[nyl] chlorides. I. G. FARBENIND. A.-G. (B.P. 397,190, 22.2.33. Ger., 22.2.32).—The sulphonic acid or salt is treated with PCl₅, preferably in presence of POCl₃ and a diluent (PhCl) and, in the case of the free acids, NaCl. Examples are the 2-sulphonyl chlorides of 3-amino-(m.p. 207—208°), 4-bromo-1-amino- (m.p. 209—210°; sulphonanilide, m.p. 220°; sulphon- β -hydroxyethyl-amide, m.p. 206—207°), and 1-amino- (m.p. 220—222°; sulphon- β -hydroxyethylamide, m.p. 227—228°) -anthraquinones. C. H.

Manufacture of 1-amino-4-methylaminoanthraquinone. Soc. CHEM. IND. IN BASLE (B.P. 396,662, 29.3.33. Switz., 2.4.32).—1-Amino-4-methoxyanthraquinone is heated with NH₂Me in EtOH until the \cdot OMe group only has been completely replaced by \cdot NHMe. The conditions given are 5 pts. by wt. of 15% NH₂Me at 130° for 3¹/₂ hr. A particularly pure product is claimed. H. A. P.

Production of benzanthrone. A. J. WUERTZ, ASST. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,896,147, 7.2.33. Appl., 19.8.27).—Fe (Cu or Al) and glycerin are added simultaneously to a suspension of anthraquinone in 80—83% H₂SO₄ at 110—120°. H. A. P.

[Manufacture of] indophenols and sulphur dyes. IMPERIAL CHEM. INDUSTRIES, LTD., and M. WYLER (B.P. 396,393, 1.2.32).—Arylglycine-nitriles or -amides, unsubstituted or substituted with alkyl or aryl groups in the α -position, are converted by standard methods into indophenols which, when fused with polysulphides, give blue to greenish-blue dyes. Examples are: NHPh·CH₂·CO·NH₂ or o-NH·C₆H₄Me·CHMe·CN + p-NO·C₆H₄·OH (blue), NHPh·CHPh·CN + O:C₆H₄·NCl (greenish - blue), and α -C₁₀H₇·NH·CHMe·CN + p-NO·C₆H₄·OH (bluish-green). H. A. P.

Manufacture of isatins and indigoid dyes derived therefrom. I. G. FARBENIND. A.-G. (B.P. 396,636, 6.2.33. Ger., 26.11.32) .- Aminoalkoxyxylenes or their halogeno-derivatives with a free position ortho to the NH-group are subjected to a known isatin synthesis, and the resulting isatins or their reactive a-derivatives condensed with hydroxythionaphthens. The products or intermediates may be (further) halogenated if desired. Good fastness to boiling alkali and H_2O dropping is claimed. Thus 5-amino-4-methoxy-*m*-xylene gives (Sandmeyer) 7-methoxy-4 : 6-dimethylisatin, m.p. 210—212°, which with Cl_2 in AcOH gives a 5-Cl-, m.p. 268—270°, and with Br in AcOH a 5-Br-derivative, m.p. 274—276°. The former with 5-chloro-3-hydroxy-4 : 7-dimethylthionaphthen (I) gives a reddish-blue cotton dye fast to Cl2 and boiling. Other examples are : 6-chloro-5-methoxy-4 : 7-dimethylisatin, m.p. 238-240°, + 5:6:7-trichloro-3-hydroxythionaphthen (II) (bluish-violet) ; 5-methoxy-6 : 7-dimethylisatin, m.p. 281-283° (4-Cl-derivative, m.p. 264-268°), + 2:1-naphthoxythiophen (olive-brown), + (II) (violet); 7-bromo-5-methoxy-4:6-dimethylisatin, m.p. 227-228°,

+ (I) (bluish-violet). 2-Chloro-5-amino-3-methoxy-pxylene with $CO(CO_2Et)_2$ gives 5-chloro-6-methoxy-4 : 7-dimethylisatin, m.p. 259-261°, which with (II) gives a violet dye. H. A. P.

Refrigerant.—See I. Products from hydrocarbon mixtures.—See II. Dye intermediates.—See IV. Reaction with CO. Separating CuCl and NH₄Cl [from prep. of arylamines].—See VII. Gluconic acid.—See XVIII. Insecticides etc. H₂O disinfectant.—See XXIII.

IV.—DYESTUFFS.

PATENTS.

Manufacture of readily soluble [salts of] basic dyes. I. G. FARBENIND. A.-G. (B.P. 396,177, 26.4.32. Ger., 6.6.31).—Basic dyes are made more sol. by conversion into phosphates. Examples are : Victoriablue R, methylene-blue, and dyes from Michler's ketone and $\alpha\beta$ -NH(C₁₀H₇)₂, PhCHO and NHPh·C₂H₄·OBu, or β -C₁₀H₇·NHPh and NO·C₆H₄·NEt·CH₂Ph. C. H.

Manufacture of halogenoaminoanthraquinonesulphonic acids [wool dyes]. I. G. FARBENIND. A.-G. (B.P. 396,077, 28,1.32. Ger., 29,1.31).—A 2:3-dihalogeno-1:4-diaminoanthraquinone is sulphonated, preferably in presence of H_3BO_3 , e.g., with oleum or CISO₃H at 120—125°, to give violet wool dyes. C. H.

Manufacture of stable reduction products of dyes of the indigo series. I. G. FARBENIND. A.-G. (B.P. 395,183, 2.9.32. Ger., 18.9.31).-The free leucocompounds (A) of halogenated indigos and indirubins are heated at 50-100° in aq. dispersion, preferably weakly acid and, if desired, with addition of other solvents. The products are almost colourless, stable in air, insol. in cold aq. NaOH, and dissolve in hot aq. NaOH or cold alcoholic NaOH with reversion to ordinary A. The products may be prepared in one operation from the vat dyes by reduction in absence of alkali or with a deficiency of alkali and heating without isolation of A. Suitable starting materials are 5:5':7:7'-tetrabromo-, 5:5'-dibromo-, 5:5'-dibromo-7:7'-dimethyl-, 4:4'-dichloro-, 4:4'-dichloro-5:5'-dibromo-indigos and tribromoindirubin, either as vat dyes, leuco-compounds, C. H. or dehydro-compounds.

Manufacture of azo dyes and coloration of textile materials. BRT. CELANESE, LTD., G. H. ELLIS, and E. W. KIRK (B.P. 396,412, 26.10.31).—Anthraquinones containing "external" diazotisable NH₂-groups are used as diazo components (other than for ice colours). Examples are : 4-*p*-aminoanilino-1-methylaminoanthraquinone \rightarrow PhOH (green on acetate silk); 4-*p*-aminoanilino-1-hydroxyanthraquinone \rightarrow bisacetoacetyltolidine (green) or 2: 3-hydroxynaphthoic *o*-toluidide (blue). C. H.

Manufacture of [acid] azo dyes. I. G. FARBENIND. A.-G. (B.P. 395,026, 9.1.32. Ger., 10.1.31).—Diazo compounds containing, ortho to the N, a chromable group are coupled with amino- or hydroxy-carbazoles; or tetrazo compounds containing $\ll 1$ such group are coupled with 2 mols. of the carbazole, or with 1 mol. of the carbazole and 1 mol. of another coupling component; in each case a solubilising group must be present. The products may be converted in substance or on the fibre into heavy-metal complexes. Examples include: 6-chloro-o-aminophenol-4-sulphonic acid \rightarrow 2-amino-3-hydroxycarbazole (yellow-brown on wool; + Cr, brown-violet); benzidine-3:3'-dicarboxylic acid \rightarrow 3hydroxycarbazole (1 mol.) and resorcinol (+ Cu, redbrown on cotton); 4:4'-diaminodiphenylurea-3:3'dicarboxylic acid \rightarrow 4-hydroxycarbazole-2:8-disulphonic acid (1 mol.) and 1-4':8'-disulpho-2'-naphthyl-3methyl-5-pyrazolone (+ Cu, brown on cotton). C. H.

Manufacture of monoazo [acid] dyes. W. W. GROVES. From J. R. GEIGY A.-G. (B.P. 397,693,17.10.32). —2-Aryloxyaniline-5-sulphonamides are diazotised and coupled with an N-arylsulphonyl or N-Bz derivative of a 1:8-aminonaphtholdisulphonic acid to give red dyes for wool or silk. Examples are : 2-phenoxyaniline-5-sulphonethylanilide (m.p. 112°), or its 4'-Cl-derivative, or the methylbenzylamide, or the benzylanilide, $\rightarrow N$ -p-toluenesulphonyl-H acid. C. H.

Manufacture of dyes and intermediate products therefor, and of sensitised photographic emulsions. I. G. FARBENIND. A.-G. (B.P. 396,217, 11.7.32. Ger., 11.7.31).-Thiocarbocyanines derived from a 2-methylthiazole containing a fused anthracene, phenanthrene, acenaphthene, fluorene, chrysene, carbazole, or diphenylene oxide residue are sensitisers for red. The thiazoles are made from suitable NHAc derivatives, which are converted by P_2S_5 into NH-CSMe compounds and oxidised with $K_3Fe(CN)_6$. The thiazole quaternary salts are condensed with ortho-esters. The ethiodide of 2methyl-B-anthrathiazole (m.p. 138°, obtained from acetyl-x-anthramine) gives with CEt(OEt), in C5H5N at 130° a thiocarbocyanine which sensitises to 520-720 mµ. The thiazole, m.p. 280°, from 2-amino-5-benzoylcarbazole, m.p. 148-150°, is hydrolysed to 2-amino-3thiolcarbazole, which is converted by Ac₂O into the 2-methylthiazole, m.p. 165°. A 2-methylthiazole, m.p. 162°, is obtained from 3-aminodiphenylene oxide.

C. H.

Manufacture of [direct] azo dyes. I. G. FARBEN-IND. A.-G. (B.P. 396,078, 28.1.32. Ger., 9.2.31).— Insol. disazo dyes of the type : benzidine (etc.) or 4:4'diaminodiphenylureadicarboxylic acid \rightarrow acetoacetic arylamide (1 mol.) and a pyrazolone (1 mol.) are sulphonated, e.g., with 100% H₂SO₄ at 5°, to give direct dyes for after-coppering. Examples are: 4:4'diaminodiphenylurea-3:3'-dicarboxylic or benzidine-3:3'-dicarboxylic acid \rightarrow acetoacetic o-anisidide and 1-m-aminophenyl-3-methyl-5-pyrazolone (+ Cu, orange and brown, respectively). C. H.

Manufacture of [dis]azo dyes [containing copper]. I. G. FARBENIND. A.-G. (B.P. 395,027, 9.1.32. Ger., 9.1.31).—A tetrazo compound carrying alkoxyl ortho to each N₂ group is coupled with 2 mols. of 2:5:1:7aminonaphtholdisulphonic acid (I) or its N-acyl derivative, or with 1 mol. of (I) or its N-acyl derivative and 1 mol. of a naphtholsulphonic acid, and the product is coppered under such conditions as to dealkylate the alkoxyl groups. The symmetrical dyes from tetrazotised diaminodiarylureas may also be prepared by phosgenation of suitable monoazo dyes. Examples are : dianisidine $\rightarrow 2$ mols. of N-Ac derivative of (I), heated at 75—80° with ammoniacal CuSO_4 solution (red-blue), or 1 mol. of the N-Ac derivative and 1 mol. of N.W.-acid, coppered (red-blue); 4:4'-diamino-3:3'-dimethoxydiphenylurea \rightarrow 2 mols. of the N-Ac derivative, coppered (blue-violet). C. H.

Disazo dyes [for cellulose ethers and esters] and their application. IMPERIAL CHEM. INDUSTRIES, LTD., and A. H. KNIGHT (B.P. 395,005—6, 30.9.31).—Dyes of the type : $\mathrm{NH}_2\mathrm{R} \longrightarrow 2:5$ -dialkoxyaniline \longrightarrow amine of the C₆H₆ or C₁₀H₈ series, free from OH, SO₃H, or CO₂H groups, NH₂R being (A) a nitro-amine, or (B) a non-nitrated amine, of the C₆H₆ or C₁₀H₈ series, give blue to violet shades, especially on acetate silk. Examples include : (A) o- or p-NO₂·C₆H₄·NH₂, 4-chloro-o-nitroaniline, or 4- or 5-nitro-α-naphthylamine $\longrightarrow 2:5$ dimethyoxyaniline $\longrightarrow m$ -C₆H₄(NH₂)₂, 4-chloro-right, or phenylenediamine, m-NH₂·C₆H₄·NMe₂, α -C₁₀H₇·NH₂; (B) o- or p-C₆H₄Cl·NH₂, 5-chloro-o-toluidine, α - or β -C₁₀H₇·NH₂, $\longrightarrow 2:5$ -dimethoxyaniline $\longrightarrow m$ -C₆H₄(NH₂)₂, α -C₁₀H₇·NHEt, α -C₁₀H₇·NH₂. C. H.

S and thioindigoid dyes.-See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Electrical conductivity of textile fibres. R. TSUNOKAE and G. ENOMOTO (J. Agric. Chem. Soc. Japan, 1933, 9, 361—368).—Vals. for silk were unchanged after 2 years; they are decreased by degumming, especially by scouring with soap or enzyme, and increased by weighting with Sn. The conductivity of artificial silk is generally > that of silk; acetate silk has the smallest conductivity. Ch. Abs.

Physical properties of raw silk. III. Specific heat of cocoons, raw silk, fibroin, and sericin. J. KUBOTA and S. KOZAKI (Bull. Sericult., 1933, 6, 1–2; cf. B., 1932, 976). E. S. H.

Determination of oxidised fatty acids in threads and crêpes. G. BARONI (Boll. Uff. R. Staz. Sperim. Seta, 1932, 2, 100—103; Chem. Zentr., 1933, i, 2020).— Oxidation of linseed oil on threads is fairly rapid at room temp.; max. oxidation is reached after 1 hr. at 110°. For the determination of OH-acids the fibres are boiled for 1 hr. with a solution of neutral Marseilles soap.

A. A. E.

Solubility in alcohol of nitrocelluloses. H. JELINEK (Farbe u. Lack, 1933, 415—416).—The dilution ratio for benzol of many nitrocellulose products decreases with increasing solubility in EtOH; the effect on lacquer formulation is discussed. S. M.

Tensile strength of nitrocellulose films. G. G. JONES and F. D. MILES (J.S.C.I., 1933, 52, 251-264 T).— The distribution of the observed vals. of the tensile strength (I) obeys the Gauss error law, and to obtain a representative val. it is necessary to know the min. no. of tests which must be carried out. The % elongation is also subject to the error law and shows a much greater standard deviation than (I). The (I) of films of the same nitrocellulose (II), free from solvent and not containing any added substance, vary with the solvent from which the films are made, showing that they vary in structure. The degree of variation of (I) with viscosity and N content of the (II) depends on the nature of the

solvent, being least when COMe, is used, more for films from Et₂O-EtOH mixtures, and greatest in films for MeOH. Added substances, with the exception of (C₆H₄Me)₃PO₄ and H₂O, reduced the (I) of the films. The action of added substances as shown by the changes in (I) and % elongation may be of three kinds, and is not obviously related to the chemical properties of the compound added. The soda-solubility, baryta-solubility, and Cu no. of celluloses regenerated from industrial (11) increase uniformly with the viscosity. The statement that a rapid deterioration in the quality of the (II) films is marked by a sudden increase of the baryta-solubility of the regenerated cellulose is not true of the pure (II) films. A tentative explanation of the (I) of pure (II) films and of the mixtures examined can be based on the possibility of different degrees of organisation or alinement of the (II) mols. and is in accord with the observed facts.

Beating [of pulp] in the hollander and Jokro mill. K. G. JONAS (Papier-Fabr., 1933, 31, 473-483). -Sigurd Smith's (" Rational Theory of the Hollander, 1922) equations are used to analyse and compare the action of the Wolff-Mallickh hollander (I) with the Jokro mill (II). Since the sp. crushing (A) and cutting (B)capacities of (II) are altered in the same ratio with increase in beating pressure, the relation of fibre length to wetness (the characteristic of the stock) is not altered, whereas, on the contrary, with (I), with increase in pressure from 0 to 4.07 kg./cm. A hardly increases but B rises sharply. Thus wide variations in the characteristic of the stock will occur with different beating pressures. B of (I) is $1 \cdot 2$ —4 times that of (II), and A 50-90% smaller at any pressure. Hence (II) will form a larger proportion of gelatinous fibre mucilage giving rise to a higher sheet strength (the breaking length is always 1500-2000 m. more), higher turbidity measurements, and greater parchmentising abilities. D. A. C.

Alkaline process for obtaining high yields of pulp from aspen wood. R. L. DAVIS (Paper Trade J., 1933, 97; T.A.P.P.I. Sect., 89-102) .- In cooking aspen on a semi-large scale with a low % of dil. NaOH, followed by treatment with Cl₂, then an alkaline wash, and finally bleaching with NaOCl, a 53-56% yield is obtained, which is appreciably > that customary in the commercial soda process. The use of conc. NaOH and a shorter cooking period, however, reduces the yield. Black liquor can be employed to supplement the cooking liquor. NaOH and Na2S (2:1) show no advantage over NaOH alone. The NaOCl consumption is much higher, the chemical tests are about the same, and the physical strength after beating is better, than for commercial soda pulps. The opacity vals. are equal for the unbeaten pulps, but, on beating, the commercial pulps hydrate less rapidly and therefore maintain a higher opacity. Relative costs are given. H. A. H.

Action of potassium permanganate solutions of graded hydrogen-ion concentration on cotton cellulose. C. DORÉE and A. C. HEALEY (J. Soc. Dyers and Col., 1933, 49, 290-295).—Cotton cloth was immersed in 0.04N-KMnO₄ at 25° over the $p_{\rm H}$ range 1—13. The rate of reduction of KMnO₄, and the Cu no., fluidity, methylene-blue absorption, solubility in

10—2N-NaOH, and tensile strength of the modified cellulose were determined. The rate of reduction is a min. at $p_{\rm H}$ 9. Below $p_{\rm H}$ 9 there is a tendency for the Cu no. to be relatively high and the other properties relatively low, and the reverse is true above $p_{\rm H}$ 9; all these properties have a min. val. at $p_{\rm H}$ 9 for a const. time of treatment. A. G.

Factors influencing the strength and stability of experimental papers made from two different sulphite pulps. R. H. RASCH, M. B. SHAW, and G. W. BICKING (Bur. Stand. J. Res., 1933, 11, 7-23).-The effects of beating and sizing on the papermaking properties of two sulphite pulps are studied. To accelerated ageing tests they show a moderate stability, which bears a close relation to their moderate chemical purity (z-cellulose content and Cu no.). Rosin-sized papers in every case show a greater stability than unsized papers, whereas the addition of alum above 0.6% lowers their stability. Gelatin sizing improves the tensile strength in a rough proportion to the amount of size taken up by the paper and also decreases the difference between machine and cross directions from 40% to 12%. D. A. C.

"Safety" papers. J. STRACHAN (Paper-Maker, 1933, 86, TS 161—162).—The various chemical and other devices commonly employed in making cheque and currency papers proof against forgery are briefly described. H. A. H.

Preservation of printed materials and manuscripts. M. E. WHALLEY (Paper-Maker, 1933, 86, 18 171-175).—A Committee report prepared for the League of Nations. Recommendations from various countries are reviewed, and a scheme of fibrous furnishes suited for every degree of permanence is given. The use of only the best Fe tannate inks and of typing materials coloured with C black is advocated.

Sludge digestion.—See XXIII.

PATENTS.

H. A. H.

Carbonising woollen fabrics. P. KELLER, Assr. to M. R. JAHR (U.S.P. 1,895,263, 24.1.33. Appl., 27.12.29. Ger., 29.12.28).—Air is forced through the carbonising chamber in the same direction as that of the travelling wool, so that it attains its max. temp. where it leaves the chamber; volatilisation of fatty substances from the wool and their subsequent condensation and deposition on the wool is thereby avoided. A. J. H.

Esterification of cellulose. G. JAYME (B.P. 397,638, 16.6.32. Can., 30.6.31).—After pretreatment of wood cellulose (bleached sulphite, soda, or sulphate pulp) with a fatty acid, e.g., AcOH, and an esterification catalyst (H_2SO_4), the liquor is removed and the pulp washed with more fatty acid and esterified, e.g., with Ac₂O, AcOH, and H₂SO₄. F. R. E.

Production of cellulose phosphates. W. L. TANNER, ASST. to NAT. CHEM. & MANUFG. CO., INC. (U.S.P. 1,896,725, 7.2.33. Appl., 12.6.31).—Cellulose (I) is introduced into a cooled anhyd. mixture of conc. H_2SO_4 , H_3PO_4 (II), and a relatively small quantity of a weak acid catalyst (glacial AcOH), the proportions of (I) and (II) being adjusted to produce an ester of the desired phosphate content; on completion of the reaction the mixture is poured into cold H_2O and the ester filtered off and washed. F. R. E.

Hydrolysis of cellulose esters using neutral salts as inhibitors. C. J. STAUD and J. T. FUESS, ASSTS. to EASTMAN KODAK CO. (U.S.P. 1,895,351, 24.1.33. Appl., 10.10.29).-5-20% of Na(K)NO₃ dissolved in AcOH is added to the hydrolysing bath, when the cellulose ester has reached approx. the desired composition, to inhibit further action. F. R. E.

Production of artificial filaments or like extruded materials. BRIT. CELANESE, LTD., and W. I. TAVLOR (B.P. 397,509, 18.2.32).—Dry-spun filaments of org. derivatives of cellulose, after lubrication, are subjected to tension, e.g., by deflection by means of rods, while they contain $\lt 50\%$ of solvent, the tension being applied first at a point remote from and subsequently closer to the extrusion orifice; the more remote tensioning devices may remain in operation or not, as desired, after the closer ones have been applied. F. R. E.

Manufacture of artificial filaments and the like. BRIT. CELANESE, LTD., E. KINSELLA, and R. H. J. RILEY (B.P. 397,114, 10.2.32).—In addition to the main body of evaporative medium (I) traversing the spinning cell, one or more independent, flat, fan-like streams, which may be heated if desired, are introduced at the side of the spinning jet and close to the group of filaments through pipes which are pivotally mounted within the cell and are adapted to swing away from the jet, leaving free access thereto and at the same time shutting off the supply of (I). F. R. E.

Production of [uniform] artificial silk [thread]. H. W. K. JENNINGS. From GLANZSTOFF-COURTAULDS, GES.M.B.H. (B.P. 397,253, 2.5.32).—The inner and middle layers, corresponding to the approx. horizontal portion of the shrinkage curve, of spinning cakes or other bobbinless thread windings, which have been wet-treated, preferably with loosening of the thread layers as in B.P. 344,279 (B., 1931, 437), and then dried, are wound off separately from the outer layers. F. R. E.

Manufacture of artificial sausage casings. KALLE & Co. A.-G. (B.P. 397,390, 24.2.33. Ger., 24.2.32).— The inner wall (A) of a tube of regenerated cellulose or of a H₂O-sensitive cellulose derivative is coated with a layer of tasteless material (B), e.g., gelatin, capable of swelling with H₂O and of setting with A and with the sausage meat; if desired, B may be hardened with CH₂O, tannin, etc. F. R. E.

Manufacture of Verdol papers [for loom-weaving of patterns and designs]. R. V. NEHER A.-G. (B.P. 397,378, 23.1.33. Ger., 28.9.32).—The perforated paper bands are coated on one or each side with metal foil, *e.g.*, Al, to minimise surface changes due to variations in atm. moisture. F. R. E.

Grease-resistant [glassine] paper. T. F. BRADLEY (U.S.P. 1,896,215, 7.2.33. Appl., 31.8.27).—Paper is coated with a mixture of low-viscosity nitrocellulose, a polyhydric alcohol-polybasic acid (glyptal) resin, and a plasticiser, e.g., tritolyl phosphate, in a volatile solvent mixture (EtOAc- C_6H_6), if desired, together with an amount of a mineral wax (paraffin, ceresin) sufficient

to reduce the volatility of the solvents but insufficient to cause substantial blemishing of the coating; the coating is afterwards hot-calendered. F. R. E.

Grease-resisting box board. C. ELLIS, ASST. to ELLIS-FOSTER Co. (U.S.P. 1,892,939, 3.1.33. Appl., 22.8.27).—Paper for manufacture of box boards is treated with nitrocellulose and a synthetic resin of the polybasic acid-polyhydric alcohol type; the usual softeners and/or solvents may be used and, preferably, a hot calender.

B. M. V.

Production of plates of wood pulp or other fibrous materials. E. SIEMPELKAMP (B.P. 397,735, 8.12.32. Ger., 8.12.31).—Fibrous material mixed with a binder is dried below the softening or polymerisation temp. of the latter under pressure sufficient to compress the plate to the desired ultimate thickness, and is subsequently heated to cause the binder to become effective while retaining the pressure. F. R. E.

[Manufacture of] moulded composite sheets. BRIT. THOMSON-HOUSTON CO., LTD., G. R. R. BRAY, and R. I. MARTIN (B.P. 397,243, 13.4.32).—Layers of synthetic resin-bonded fibrous material are hot-pressed with $\ll 1$ intermediate layer of non-impregnated felt or asbestos. F. R. E.

Production of artificial leather. J. VOTTELER'S NACHFOLGER G.M.B.H. (B.P. 397,741, 16.12.32. Ger., 19.12.31).—Fibrous material (cotton wool, wood pulp) is placed between two strainer surfaces and passed through an impregnating medium (A) containing an adhesive (B), e.g., rubber latex with or without S and accelerator; after sufficient treatment the excess of Ais squeezed out between the strainers, which are then removed, and the treated pulp is placed in a precipitant, e.g., Al(OAc)₃, to coagulate B, squeezed out, and dried. F. R. E.

Wood-pulp digester with internal-circulation conduit. E. MORTERUD (U.S.P. 1,895,266, 24.1.33. Appl., 16.7.32. Ger., 14.7.31).—A circulation pipe (A)having an upper and lower section separated by a transverse wall and with sieves at its free ends is fixed co-axially in the digester (B). A circulation pump mounted on the interior wall of B has its suction and pressure pipes leading to opposite sides of the transverse wall in A, while a steam supply-pipe passes through the pressure pipe to the liquor in A. F. R. E.

Manufacture of pulp etc. L. BRADLEY and E. P. McKEEFE, Assrs. to BRADLEY-McKEEFE CORP. (U.S.P. 1,896,038, 31.1.33. Appl., 4.4.24).—Wood is digested at elevated temp. and pressure (a) with a liquor free from alkali hydroxide and containing a substantial amount of Na₂SO₃ and a smaller amount of Na₂S₂O₃, and subsequently (b) with a solution of Na₂S and Na₂CO₃. The residual liquor from (a) is evaporated and the solids are furnaced under reducing conditions to produce a mixture of Na₂S and Na₂CO₃, which is dissolved in H₂O, part being used for (b) and part sulphited for (a). F. R. E.

Manufacture of wood pulp in multiple stages. H. K. BENSON (U.S.P. 1,896,344, 7.2.33. Appl., 22.6.31). —In stage (1) cold wood chips in an evacuated digester are heated with nearly spent cooking liquor from stage (2), in which they are mechanically abraded and heated with lesser spent liquor from stage (3), where the hot pulp is treated with cold, fresh liquor. F. R. E.

Treatment of pulp-mill waste cooking liquors. G. H. TOMLINSON (B.P. 397,787, 13.3.33).—The waste liquor is projected across the upper region of a hot recovery chamber (A) in the form of a coarse spray, and the dried particles containing substantially all the carbonaceous matter, impinging on the side wall, coalesce to a plastic, spongy mass which gradually drops off on to the hearth below, where it is burned in a reducing atm. by regulated admission of air. The heat of combustion ascending through the drying zone, which is at a relatively low temp. compared with that of the combustion zone, serves to evaporate the spray, and the surplus is utilised for steam generation in a boiler at the upper end of A. F. R. E.

Air-filtering material.—See I. Dehydrating (etc.) cellulose nitrates.—See III. Products from cellulose derivatives. Flexible films.—See XIII. Rubber oil. Rubber-coated articles.—See XIV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Crêping rayon fabrics. ANON. (Silk J., 1933, 9, No. 107, 28, No. 108, 27—28).—Characteristics after various treatments are recorded. Treatment with NaOH is unnecessary. Сн. Авs.

Textile waste liquors.-See XXIII.

PATENTS.

Bleaching composition and process. E. H. MANAHAN and A. C. JOHANN (U.S.P. 1,894,277, 17.1.33. Appl., 28.7.28).—Furs and textile materials are bleached with a $1\frac{1}{2}$ % aq. alkaline solution of H_2O_2 made more reactive by the addition of $Na_4P_2O_7$ ($1\frac{1}{4}$ %) and a persulphate ($1\frac{1}{4}$ %). A. J. H.

(A, C) Coloration, (B) dyeing, of textile materials [with ice colours]. BRIT. CELANESE, LTD., G. H. ELLIS, and E. W. KIRK (B.P. 396,429-31, 26.10.31; cf. B.P. 396,412; B., 1933, 909 .- In colouring textiles, especially acetate silk, with ice colours there are used as diazo components (A, B) anthraquinones carrying an "external" diazotisable NH2 group (except 1:4aminohydroxyanthraquinone derivatives), or (c) aaminoanthraquinones carrying in position 4 a mono- or di-substituted NH_2 group free from external NH_2 groups. Examples are: (A) 1-amino-4-m- or -paminoanilinoanthraquinone \rightarrow Naphthol AS/BS, AS/OL, AS/LT, AS/D, or AS/LB (blue-violet, blue, or grey); (B) 1-amino(or -methylamino)-4-m- or -p-aminoanilinoanthraquinone > Naphthol AS/G, PhOH, 1-phenyl-3methyl 5-pyrazolone, $m - C_6 H_4(\dot{N}H_2)_2$, $\beta - \dot{C}_{10}H_7 \cdot OH$, or 2: $3 - C_{10}H_6(OH) \cdot CO_2 H$ (green, blue, or violet); (c) couplings of diazotised α -aminoanthraquinones having as 4-substituent : p-MeC6H4 ·NH · (with Naphthol AS/BS, violet; AS/G, green; PhOH, puce; 1-phenyl-3-methyl-5-pyrazolone, olive; β -C₁₀H₇·OH, violet), p-MeO·C₆H₄·NH• (with AS/BS, blue-violet), or NHPh• (with m-OH C6H4 NHPh, nigger-brown); also of diazotised 1:5-diamino-4:8-dianilinoanthraquinone with Naphthol AS/BS (grey-violet) or 1-amino-4-anilino-5hydroxyanthraquinone with m-OH·C6H4·NHPh (nigger-C. H. brown).

British Chemical Abstracts-B.

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

Production of colorations [effects] on textile materials made of or containing cellulose esters. BRIT. CELANESE, LTD., and G. H. ELLIS (B.P. 397,470, 10.2.32).—Discharge of ground colours on acetate silk etc. is facilitated by partial hydrolysis. The dyed material may be padded with 15% Na₂CO₃ or 8% NaOH, steamed, aged and dried, and printed with a discharge paste, to give a white pattern on a coloured ground. Suitable ground colours are : 4-nitro-o-anisidine \rightarrow NPhMe₂ (red); 3-nitro-p-toluidine \rightarrow p-xylidine (red). C. H.

Production of colorations on materials made of or containing organic derivatives of cellulose. BRIT. CELANESE, LTD., H. C. OLPIN, and G. H. ELLIS (B.P. 397,534, 17.2.32).—Acetate silk etc. is dyed in yellow shades by o-nitroaminodiaryls, e.g., 3-nitro-4aminodiphenyl or its 4'-Cl- or 2 : 2'-Me₂ derivatives. C. H.

Sizing of textile fibres. A. F. GALVIN (B.P. 396,952, 20.9.32. Fr., 21.9.31).—Linseed oil sizes prepared with much less C_6H_6 or H_2O (for emulsification) than usual are applied to silk and rayon fibres at 35—80° so that their viscosity is then equal to that of the usual linseed oil sizes when applied at the usual lower temp.

A. J. H.

Manufacture of metal-coated [fabric] products. M. GROSSMAN (U.S.P. 1,893,939, 10.1.33. Appl., 8.7.29). —An adhesive solution for attaching thin metal flakes to fabrics comprises rubber and mineral oil boiled together for $\frac{1}{2}$ hr. at 150° and used hot. B. M. V.

Manufacture of rubberised and like textile articles. B. D. PORRITT, J. R. SCOTT, and RESEARCH ASSOC. OF BRIT. RUBBER MANUFRS. (B.P. 397,506, 22.2.32).—Cellulose acetate (etc.) materials are protected against attack by sea-H₂O by impregnation with unvulcanised rubber (e.g., latex). A. J. H.

Temp. indicator.—See I. Disazo dyes. Coloration of textiles.—See IV. Rubber oil. Colouring rubber. Rubber-coated fabrics etc.—See XIV.

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

Manufacture of phosphoric acid. C. HEINRICH (Chem.-Ztg., 1933, 57, 701-704).—The thermic process has the following advantages over the H_2SO_4 process : Fe and Al are not so detrimental, no evaporation is involved and cone. acid is obtained directly, impurities are of a different type but less in quantity and more easily removed. In the single-stage thermic process corrosion due to hot P_2O_5 creates great difficulties. The two-stage process allows the use of the CO produced as fuel and is the better where pure P, and not H_3PO_4 , is desired. With the use of a blast furnace in place of an electric furnace it is the only possible one. C. I.

Preparation of sodium chloride from sylvinite waste. B. F. PULLAEV (Gorno-Obogat. Delo, 1932, No. 1, 20–22).—The residue after removal of KCl contains NaCl 90–94, KCl $1\cdot 2-2\cdot 45$, CaCl₂ $0\cdot 8-1\cdot 5$, CaSO₄ $0\cdot 9-1\cdot 7$, insol. matter $1\cdot 8-3\cdot 0\%$. Flotation of the powdered material, using oleic acid and soap solution, afforded a product containing NaCl $98\cdot 9-$ 99·73, KCl 0·04—0·1, CaO 0·09—0·2, SO₃ 0·09—0·2, and H₂O 0·1—0·5%. CH. Abs.

Continuous preparation of superphosphate. B. A. Sokolovski and E. N. Shutschkov (J. Chem. Ind. Russ., 1933, No. 6, 62—70).—A continuous process is described for conversion of fluorapatite into superphosphate containing 13—14% P₂O₅, of which 93—96% is assimilable. R. T.

Preparation of double and enriched superphosphates from Khibin apatite. L. BERLIN and V. MIKEROV (J. Chem. Ind. Russ., 1933, No. 6, 55—62). —Good yields of $CaH_4(PO_4)_2$, H_2O are given by apatite concentrates and a mixture of H_2SO_4 and H_3PO_4 , obtained by the action of H_2SO_4 on phosphorite. R. T.

Gypsum and "phosphogypsum." S. I. VOLF-KOVICH (Min. Suir., 1932, 7, No. 11-12, 44-49).--Experiments on the utilisation of gypsum and $CaSO_4$ from H_3PO_4 manufacture in the production of $(NH_4)_2SO_4$, H_2SO_4 , cement, etc. are described.

CH. ABS.

Concentration of nephelite tailings from the flotation of apatite-nephelite rocks of Khibin origin. G. A. STEPANYANTZ (Gorno-Obogat. Delo, 1932, No. 10, 10-15).—Flotation + magnetic separation gave the best result, but is costly; the method using concentrating tables + flotation is recommended. CH. ABS.

Concentration of Ural bauxite. I. MASLENITZKI (Gorno-Obogat. Delo, 1932, No. 11, 23-34).—Tikhvin bauxite has been studied and its concn. attempted by dry and wet methods. CH. ABS.

Determination of sulphur in sphalerite and other minerals. M. HEGEDÜS (Z. anal. Chem., 1933, 94, 101-111).—Treatment of the mineral with $HNO_3 + Br$, in place of $HNO_3 + HCl$, expedites quant. dissolution and decreases losses from volatilisation of S compounds. Winkler's semimicro-procedure is then generally applicable to sulphide minerals. J. S. A.

Electrolysis of Al_2O_3 .—See X. $Na_2S_2O_3$ as neutralising agent.—See XV. H_3PO_4 and fertilisers.—See XVI.

PATENTS.

Apparatus for obtaining sodium chloride. G. B. BURNHAM (U.S.P. 1,892,760, 3.1.33. Appl., 5.9.28).— Brine is pumped from an evaporating pan upwards through a funnel-shaped vessel having a perforated diaphragm upon which a bed of crystals is supported, or rather localised. Only crystals above a certain size fall through the perforations against the rising liquid and are removed; the remainder either dwell and grow or overflow back to the pan. B. M. V.

Treating brines [to separate bromine and iodine]. C. W. JONES, ASST. to JONES CHEM. Co. (U.S.P. 1,893,744, 10.1.33. Appl., 20.3.31).—Oil-well brine is first purified from oily and other org. matter by suitable adsorbents (named), then the halogen is liberated by oxidation and adsorbed by fresh adsorbent. B. M. V.

Elimination of iron from sulphate solutions [containing alums]. KALUNITE Co., Assees. of A. FLEISCHER (B.P. 397,412, 21.3.33. U.S., 22.4.32).— Neutral K alum solutions are treated with powdered

alunite which has been calcined at 450-600°, whereby base exchange occurs between the Fe" in solution and the K in the alunite. A. R. P.

Manufacture of (A) aluminium sulphate, (B, D) basic alum, (c, E) alumina. KALUNITE Co., Assees. of (A, B, D) K. STEUART and (C, E) L. D. SANDERS (B.P. 397,407-11, 21.3.33. U.S., [A] 23.4.32, [B-E] 22.4.32). -(A) Kaolin is roasted at 600° to expel H₂O, cooled to 200°, and quenched in 14% H2SO4 containing 6.3% (NH₄)₂SO₄ (A), whereby most of the Al₂O₃ dissolves. The solution is treated with BaS to reduce Fe" to Fe" and filtered, the filtrate is cooled in spray-coolers, the crystals of alum (I) are separated, and about one third of the mother-liquor (II) is cooled to 0° to separate the remaining (I), the remainder of (II) being returned to A. (I) is dissolved by condensing steam to make an 80% solution, which is autoclaved at 200° to ppt. a basic alum (III) containing (approx.) Al₂O₃ 33.5, NH₃ 3.6, SO_3 43, H_2O 16.9%. (III) is heated at 600° to expel (NH₄)₂SO₄, which is collected in a portion of the mother-liquor and returned to A; the basic $Al_2(SO_4)_3$ (IV) formed is converted into normal salt by stirring with H_2SO_4 (d 1.25), whereby a vigorous exothermic reaction occurs and a solid hydrated mass is obtained. (B) (III) is made by injecting steam under pressure into a vessel filled with alum crystals to raise the temp. rapidly to $> 145^{\circ}$ (185–200°). A similar compound can be obtained with K alum. (c) Basic K alum is heated at 750-1000° to expel H₂O and SO₃, leaving a residue of Al₂O₃ and K₂SO₄, the latter being removed by leaching. (D) The alum solution is run continuously into an autoclave containing high-pressure steam and mother-liquor containing (III) in suspension. (E) In the process described in (A) (IV) is further heated at 700-1000° to produce Al₂O₃ and SO₃, the latter being collected in (II) and returned to A. A. R. P.

Manufacture of ammonium sulphate-nitrate. GEWERKSCHAFT VICTOR (B.P. 397,532, 28.1.32. Ger., 5.2.31).-NH₃ is passed into a mixture of H₂SO₄ and HNO3 diluted with mother-liquor from the subsequent crystallisation stage, the operation being conducted under pressure to conserve the heat of reaction and prevent evaporation. The resulting supersaturated neutral solution passes into an evaporating vessel surrounding the saturator and maintained at atm. pressure, whereby the H₂O formed in the process is evaporated and crystals of the double salt separate.

A. R. P.

Purification of calcium chlorate. S. B. HEATH, Assr. to Dow CHEM. Co. (U.S.P. 1,893,740, 10.1.33. Appl., 6.3.30).-A1:1 mixture of CaCl₂ (I) and Ca(ClO₃)₂ (II) or preferably one with a proportion of (I), obtained as described in U.S.P. 1,887,809 (B., 1933, 828), is melted, or dissolved in a limited quantity of H₂O, so that the solution is unsaturated with respect to $CaCl_2, 2H_2O$ but saturated with (II); the (II) is then crystallised out at $> 60-67^{\circ}$ and separated while hot. On cooling to room temp., the formation of Ca(ClO3)2,2H2O absorbs all the moisture on the crystals. B. M. V.

Manufacture of refined magnesia product from mineral sources of magnesia. H. N. BARRETT, Assr. to DOLOMITE, INC. (U.S.P. 1,893,047, 3.1.33.

Appl., 31.3.30) .- Magnesian limestone is heated at $600-750^{\circ}$ with an NH₄ halide to yield a light, spongy MgO uniformly dispersed in crystals of, e.g., anhyd. CaCl₂; the CaCl₂ is leached out and the NH₄Cl is recovered. B. M. V.

Separation of cuprous and ammonium chlorides. W. C. STOESSER, Assr. to Dow CHEM. Co. (U.S.P. 1,893,969, 10.1.33. Appl., 23.5.30) .- To recover CuCl (I) and NH₄Cl (II) from the aq. solution resulting from the reaction between a chlorinated aromatic hydrocarbon and NH₃, H₂O is distilled off under non-oxidising conditions together with NH_3 , PhOH, and any arylamine that may be present. The (II) is then sublimed at $340-450^\circ$ and the (I) removed in molten condition from the still. (Cf. U.S.P. 1,814,822; B., 1932, 465.)

B. M. V.

Manufacture of (A) y-ferric oxide hydrate, and (B) γ-ferric oxide. O. BAUDISCH (U.S.P. 1,894,749-50, 17.1.33. Appl., 18.9.29. Ger., 17.5.29).-(A) Pure Fe from Fe(CO)₅ is dissolved in HCl until the solution is neutral (Congo-red) and the solution is treated with C_5H_5N or NH_2Ph and a current of O_2 until the Fe is completely pptd. as γ -Fe₂O₃,H₂O. (B) The ppt. is dehydrated at 150-280° until it becomes ferromagnetic. A. R. P.

Preparation of plural gels. W. A. PATRICK and E. H. BARCLAY, Assrs. to SILICA GEL CORP. (U.S.P. 1,896,055, 31.1.33. Appl., 21.1.31).-Two or more sols capable of yielding highly porous gels, e.g., SiO₂, SnO₂, TiO2, WO3, are mixed and the jelly formed is broken up, washed, and dried, e.g., at 75-120° and then at 300-400°, until the product contains 5-15% H2O. L. A. C.

Preparation of metal phosphides. W. C. LILLIEN-DAHL and F. H. DRIGGS, Assrs. to WESTINGHOUSE LAMP Co. (U.S.P. 1,893,296, 3.1.33. Appl., 27.11.29).-Metal powder, e.g., Zr, Th, U, Ti, is heated with a large excess of P in a sealed container to approx. the temp. of combination of the elements, i.e., to 600-1000° in the case of Zr. B. M. V.

Preparation of chromates and dichromates. BOZEL-MALÉTRA SOC. INDUSTR. DE PRODUITS CHIMIQUES (B.P. 397,434-5, 27.4.33. Fr., 26.5.32. [A] Addn. to B.P. 364,361; B., 1932, 260).-(A) Finely-powdered Cr or ferrochromium is agitated with aq. Na2SO4, K2SO4, NaClO₃, or K₃PO₄ and CaCO₃ at 280-300° in an autoclave through which a current of compressed air or O₂ is passed. (B) Finely-divided Cr(OH)₃, Cr₂O₃, or a substance containing Cr₂O₃ is used in the process described in (A). A. R. P.

Carrying out of chemical reactions with carbon monoxide. E. I. DU PONT DE NEMOURS & Co. (B.P. 397,852, 29.2.32. U.S., 28.2.31) .- Reactions with CO (other than its decomp. to C and O) are effected in presence of small quantities of halogens, H or alkyl halides, or N oxides, as well as solid catalysts. E.g., a mixture of CO and NH3 containing 0.5% NO is passed over a ThO2 catalyst at 200-750° to yield HCN. The method may be applied in the prep. of various acids (AcOH), esters (MeOAc), amines, etc., and of CO₂ and H₂ from CO and steam. L. A. C.

Furnaces for CaC2. Apparatus subject to low Conserving granular materials .- See I. temp.

British Chemical Abstracts-B.

Mol. association of org. compounds.—See III. Treating dolomite.—See IX. Gas generator. Electrolysers for Cl₂ etc.—See XI. Detergent.— See XII. Pigments.—See XIII. Fertilisers.—See XVI. Fumigant.—See XXIII.

VIII.—GLASS; CERAMICS.

Economy and capacity of glass tanks. W. TRINKS (Ind. Eng. Chem., 1933, 25, 865—870).—Increasing the rate of production is concluded to be the most promising means of reducing fuel costs of glass tanks. Deeper penetration of heat into the glass and increased rate of production are obtained by using luminous flames; a tentative explanation of this effect is offered. Designs of burners and ports for producing luminous flames, and the effect of the refractories and of insulation on the capacity and economy of the tank, are considered. Possible future developments, *e.g.*, improved methods of feeding the batch and stirring the molten glass, are discussed. The effect of the cracking of CH_4 on flame temp. and luminosity, and the adsorption of radiant heat by glass, are considered mathematically. A. L. R.

Methods of melting glass. S. R. SCHOLES (Ind. Eng. Chem., 1933, 25, 870—872).—Details are given, and the operation is described, of various American glass-melting tanks; their efficiencies, merits, defects, and recent developments are discussed. Temp. and their measurement are considered in relation to effectiveness and control, and the mechanism of melting of the glass batch is described. A. L. R.

Volatilisation from potassium oxide-silica glasses. E. PRESTON and W. E. S. TURNER (J. Soc. Glass Tech., 1933, 17, 122-144 T; cf. B., 1932, 982; 1933, 106).--Results are given of measurements of the volatilisation of K20 from K20-SiO2 glasses (SiO2 $89 \cdot 88 = 50 \cdot 68$, $K_2O = 10 \cdot 12 = 49 \cdot 32\%$) on continued heating at 1100 = 1450°, within which temp. range the SiO_2 was non-volatile. As with Na₂O = SiO₂ glasses, the set of a location in since by $L_2O = 10^{-10}$ the rate of volatilisation is given by $\log[(A - 2x)/A] =$ -kt, where A = amount of K₂O initially present, and x = loss after t hr.; the relation between log (initial rate of loss) and 1/T (abs.) is linear, similar to that between v.p. and temp., and shows that the initial rates of volatilisation are proportional to the v.p. of the volatile constituent (K2O); this was confirmed by determining, by the dynamical method, the v.p. of K₂O from 2 glasses at 1150-1400°. The heat of volatilisation of K₂O is calc. to be -37,000 g.-cal. per g.-mol., and the volatility of PbO, Na₂O, and K₂O from glasses is compared. Evidence of the existence in the molten glasses of K20,4SiO2 is supplied by the curves of total volatilisation loss at different times plotted against K_2O content, and confirmed by other relationships described, which also indicate the possible presence of K₂O,2SiO₂ at the appropriate concn. A. L. R.

Dependence of crystallisation velocity of the devitrification products of English lead glass on potash content. W. HIRSCH (Glastech. Ber., 1932, 10, 625-634; Chem. Zentr., 1933, i, 830).—The crystallisation velocity of the devitrification products of five synthetic K-Pb glasses have been investigated. All melts show only one kind of crystal, probably cristobalite, which is confined to the glass-air interface. The equilibrium temp. (crystal-glass), the temp. of max. crystallisation, and the velocity of crystallisation fall when K_2O is > 11.6%, and the glass is improved with respect to devitrification. With < 11.6% K_2O devitrification increases. Viscosity is also affected by K_2O content. L. S. T.

Toughened plate glass. J. MEIKLE (J. Soc. Glass Tech., 1933, 17, 149—168 r).—The principles involved and methods employed when making toughened plate glass (A) are outlined; present limits of size, and a theory of the structure, of A are discussed. The results of various physical tests on A and on ordinary plate glass are compared. A. L. R.

[Light-]diffusing glasses for illumination. H. H. BLAU (Ind. Eng. Chem., 1933, 25, 848-853).-Glasses which diffuse light by means of their internal structure (i.e., inclusions within the glasses) are compared with those which diffuse light as a result of surface irregularities (etching and sand-blasting); the former have greater mechanical and thermal resistance than the latter, and permit a greater range of degrees and types of light diffusion to be obtained. Factors influencing the scattering of light are discussed; the no. per unit vol. and the dimensions of the inclusions are concluded to be important factors in determining the properties of internal diffusing glasses. Spontaneous formation of crystallites during the cooling of common opal glasses is considered, and methods of controlled crystallisation, resulting from definite time-temp. schedules, are described, by which opal glasses of uniform and predetermined properties may be obtained. The applications of the methods of controlled crystallisation are discussed. A. L. R.

Chemical analysis of glass. G. E. F. LUNDELL (Ind. Eng. Chem., 1933, 25, 853-856).-Modern developments of the old methods of, and new procedures in, the analysis of glass are described. The use of 8-hydroxyquinoline in removing ordinary constituents from solution previous to determining the alkalis, in the determination of Mg, and in the separation of Fe (from Al, Zn, etc.) is described. The sampling of glass is considered; a source of error in analyses is the fixation of H₂O and CO₂ by the powdered glass during grinding, sieving, and storage of samples. The accuracy attainable in present-day analytical methods is discussed. A. L. R.

Molecular and atomic volumes. XL. Calculation of the density of glasses. W. BILTZ and F. WEIBKE; W. BILTZ (Glastech. Ber., 1932, 10, 577-592, 593; Chem. Zentr., 1933, i, 1563).-Examples are given, and the dependence of the mol. vol. of Na glasses in their composition is illustrated graphically. A. A. E.

Viscosity of optical glass. W. H. WADLEIGH (Bur. Stand. J. Res., 1933, 11, 65–78).—The variation of η with temp. over the range 900—1400° has been determined for light Ba crown, borosilicate crown, sodalime, and dense, medium, and Ba flint glasses, using Searle's modification of Margules' concentric-cylinder viscosimeter. The sources of error are considered in detail. D. R. D.

Utilisation of pyrophyllite in porcelain and faience. L. V. OMININ and V. T. POPOVA (Keram. i Steklo, 1933, 9, No. 2, 20–23).—Pyrophyllite lowers translucence and plasticity, reduces firing shrinkage, and, except in bodies with 6–8% porosity, does not affect the coeff. of linear expansion or thermal stability of fully vitrified bodies. CH. ABS.

Classification of porcelains. A. GRANGER (Chim. et Ind., 1933, 29, Spec. No., 853-854).—The system proposed is based on the nature of the flux and the glaze. J. A. S.

Erratum.-On p. 786, col. 2, line 19, for TUKAMI read FUKAMI.

Refractories for the manufacture of glass. F. S. THOMPSON and H. M. KRANER (Ind. Eng. Chem., 1933, 25, 856-864).-The chemical aspects of the manufacture of refractories for, and their use in, glass-melting furnaces are discussed ; dense, hard-fired aluminous products, of high mullite content, are desirable, their refractoriness. resistance to thermal shock and to attack by glass being > for siliceous and fireclay refractories. Phase-diagram studies indicate that at the temp. of the glass-melting furnace most commercial glasses are unsaturated, and dissolve any refractory with which they are in contact ; such refractories should therefore be made from selected minerals having min. rate of dissolution in the glass, and should be hard-fired and of low porosity. The manufacture and application of the following constructional materials for glass tank furnaces are discussed : flux-blocks of clay and of cryst. Al silicates (natural and electric-furnace products) bonded with clay or other binders; electro-cast tank blocks, and, for use above the glass contact line, SiO2, fireclay, cyanite, Indian sillimanite, and alusite, and electric-cast refractories.

A. L. R.

Refractories used in ladles and in ingot casting. J. E. PRIESTLEY and W. J. REES (J.S.C.I., 1933, 52, 297-304 T).-Chemical analyses, gradings, methods of manufacture, etc. for the raw clays and for the unburned products have been examined. The moisture content of extruded runners and plug-and-flask-moulded sleeve bricks varies across the section as well as longitudinally, being less at the extremities. Prepared test-pieces have been subjected to laboratory firings at 900°, 1000°, 1100°, 1200°, 1300°, and 1400° and in a commercial firebrick kiln. Linear firing contraction, apparent and true sp. gr., proportion of sealed pores, etc. for materials fired in the above range show definite changes. Through 900-1100°, the true porosity (I) is decreasing and contraction (II) increasing. Through 1200° (II) decreases whilst (I), owing to a premature bloating, increases. Subsequently (II) increases as the true (I) diminishes until definite bloating occurs with a consequent expansion and increase in true (I). The underload refractoriness of this fireclay material increases with rise in firing temp. up to 1300°; thereafter the underload strength is less. Max. vals. for total reversible thermal expansion are obtained on firing at 1100°. There is agreement between the properties of laboratory and commercially fired material.

Thorium oxide, a high-temperature refractory. O. O. FRITSCHE, H. B. WAHLIN, and J. F. OESTERLE (Trans. Electrochem. Soc., 1933, 64, 281–291).—ThO₂ prepared from the nitrate can be fused in an electric furnace of the smothered-arc type without contamination from furnace walls or formation of carbide by the C electrodes. The fused ThO₂ is ground, mixed with aq. ThCl₄ solution to suitable consistency, moulded, and fired at 1600° in a high-frequency induction furnace. Crucibles made in this way are heated to 1000° in a muffle furnace to ensure removal of traces of carbide. Uses of such crucibles are discussed. H. J. T. E.

Cast refractory blocks. V. ŠKOLA (Chim. et Ind., 1933, 29, Spec. No., 825—829).—The history, manufacture, properties, and uses of "electro-cast" $SiO_2-Al_2O_3$ refractories are described. The classification of such material is discussed in connexion with the patent literature, customs declaration, etc.

J. A. S. Crushing strength-linear deformation and the Jourdain cohesion. V. ŠKOLA (Chim. et Ind., 1933, 29, Spec. No., 830-850) .- A large no. of crushing tests were carried out on a variety of refractory materials and sand-cement mixtures, in order to study the effect of interposing pieces of rubber between the thrust blocks and the test-piece (the Jourdain test for "cohesion "). The vals. obtained by using rubber pads are lower, and the ratio between the "cohesion" and the ordinary crushing strength may vary from 1.08 to 4.4, depending on the material. Although the abs. mean error of the cohesion test is less, the relative accuracies of the two methods are almost equal. The deformation behaviour of a test-piece under repeated test is not reversible or reproducible, and the val. of the "cohesion" may be very greatly reduced. The Jourdain test cannot replace the ordinary crushing test, but it will serve to classify ceramic and other materials of con-J. A. S. struction.

Burning of magnesite bricks. I. J. H. CHESTERS and C. W. PARMELEE (Trans. Ceram. Soc., 1933, 32, 349-370).-The properties, changes occurring during burning, and modern practice in the burning of magnesite bricks are reviewed. An alundum expansion apparatus, heated by a Mo-wire furnace, is described, by which the shrinkage of magnesite test-pieces, rammed at 10,000 lb./sq. in., was continuously observed during burning to 1400°, 1450°, and 1500°. The shrinkage of Austrian magnesites $[(1)7 \cdot 0, (2)4 \cdot 0\% \text{ Fe}_2O_3]$ commenced at 1000°, increased rapidly with rise of temp., and attained max. rate a few min. before and after the max. burning temp. was reached, decreasing to about 0.05 of max. rate after 2 hr. at max. temp. Shrinkage on burning at 1400° was much < that at 1500°. Porosity and sp. gr. measurements on burned and unburned test-pieces showed that the increase in sp. gr. of MgO on burning is small; the main shrinkage is due to a decrease in porosity, and occurs when the glassy bond softens and draws the grains together. The magnetic susceptibility of (1) was doubled, and of (2) unaltered, on burning. Shrinkage tests on electrically-fused magnesite and on a commercial unburned brick are described. Souring the batch reduced the burning shrinkage of test-pieces rammed under high pressure, but greatly increased that of hand-rammed specimens. The initial rate of after-shrinkage on reburning a testpiece was == the final rate of burning shrinkage.

A. L. R.

Permeability of refractory materials to gases. A. E. J. VICKERS (J. Soc. Glass Tech., 1933, 17, 93-101 T).-An apparatus for measuring the permeability of refractory materials to gases at normal and at high temp. is described, and results are given of porosity and permeability measurements at normal temp. on a no. of commercial bricks (A), and at normal and high temp. (to 500°) on special test-pieces of graded SiC bonded with various amounts of clay + felspar. The porosity of A was no guide to their permeability. An approx. relationship between these properties existed, however, for the SiC materials, for which the permeability decreased with rise in temp. and with increase in the amount of bond; the decrease in permeability with rise in temp. was the greater the higher was the original porosity. The permeability decrease at high temp. is suggested to be due to the increased kinetic A. L. R. energy of the gas.

Anhydrous system : silica, alumina, titanic oxide. V. ŠKOLA (Chim. et Ind., 1933, 29, Spec. No., 822—823).—In the analysis of refractories it is a common practice to return $Al_2O_3 + TiO_2$ as "alumina." The author's tests indicate that in no case does TiO_2 improve the refractory power and when the proportion is > 2% it is definitely detrimental. The above practice should therefore be discontinued. C. I.

Metals for the ceramic industry.—See X. Metallised-glass H electrodes.—See XI.

PATENTS.

[Bauxite] refractory. P. G. WILLETTS, ASST. to HARTFORD-EMPIRE Co. (U.S.P. 1,893,313, 3.1.33. Appl., 21.7.28).—A mixture of bauxitic material, non-plastic kaolin, and plastic clay having the characteristics of the Georgian raw materials white bauxite, Klondike kaolin, and G¹ clay is described; it has a maturing temp. as low as 1565° and contains (SiO₂ + Al₂O₃) \leq 96, Al₂O₃ > 56, Fe and other oxides \geq 1%. B. M. V.

Manufacture of [abrasive] articles of resinbonded granular material. D. E. WEBSTER and B. SANFORD, ASSTS. to NORTON CO. (U.S.P. 1,893,117, 3.1.33. Appl., 28.2.30).—A plastic is formed of the following, moulded and hardened by heat: (1) abrasive grains, (2) resinoid powder, (3) a neutral non-aq. liquid (e.g., xylol) which will mix with (4), wet (1), and cause (2) to adhere without chemical reaction, and (4) a plasticiser, preferably sprayed in while the other components are agitated. B. M. V.

Furnaces for carborundum. Annealing furnaces.—See I. Removing enamel from metal.— See X.

IX.-BUILDING MATERIALS.

Effect of carbon dioxide on the strength of some building materials. G. E. BESSEY (J.S.C.I., 1933, 52, 287—293 T).—The effect of storage of CaO, CaOpuzzuolana, cement and cement-puzzuolana mortars, and of sand-CaO bricks, in a CO_2 atm. at various humidities is studied. The degree of carbonation (I) and the constituents attacked were observed by means of determinations of CO_2 and free CaO, and the effect of (I) on strength was examined. It is concluded that (I) occurs least rapidly in a saturated atm. and most rapidly in a relatively dry atm. Free CaO is carbonated preferentially in all the materials studied, but the other hydrated Ca compounds (silicates and aluminates) are also readily carbonated. In general (I) gives an increase in strength in the material.

Elementary sulphur as cause of deterioration of concrete. H. KLUGE and A. ZITEK (Gesundheitsing., 1932, 55, 616; Chem. Zentr., 1933, i, 1988).—Slime of vegetable origin contains S which, with the aid of *Thiobacillus thio-oxidans* B, may form compounds which attack concrete. A. A. E.

Ohms of resistance measure concrete curing. S. B. SLACK (Eng. News-Rec., 1933, 111, 169—170).— Resistance measurements were taken as a possible method of determining the curing of concrete. Galvanised Fe electrodes set 3 ft. apart in the concrete were not satisfactory, but 4×4 -in. wooden blocks covered on one end with Cu foil which in turn was covered with cheese-cloth gave more interesting possibilities.

C. A. K.

Decomposition of timber under industrial conditions. I. Greenheart. E. A. RUDGE (J.S.C.I., 1933, 52, 283—285 r).—An inorg. examination of the decay of greenheart piles embedded for 40 years has been made. The decay is accompanied by the infiltration of Ca and Al compounds, and the production of abnormally low $p_{\rm H}$ val. A sharp line of demarcation separates the sound from the decayed wood, across which exist marked differences in mechanical strength, ash content, and inorg. composition.

House fungi and timber preservation. S. I. VANINE, I. E. ANDREEV, and (MME.) N. N. VLADIMIRSKA (Leningrad Branch Pan-Soviet Inst. Building Pamph., 1932, 1-80).—The external mycelium of *Merulius lachrymans* and *Coniophora cerebella* is killed in 24 hr. by 0.0052 g. AcOH or 0.033 g. Cl₂, or in 1 hr. by 0.1 g. chloropicrin, per litre of air. SO₂, CH₂O, CS₂, C₆H₆, benzine, and Et₂O are less effective. All these substances diffuse very slightly in a radial direction in dry timber, only AcOH and CH₂O penetrating to 3 mm.

CH. ABS.

Distilling road tars.—See II. Gypsum and "phosphogypsum."—See VII. Crushing strength. —See VIII.

PATENTS.

Manufacture of cement. C. B. OLIVER and V. E. VALLET, ASSTS. to OLIVER UNITED FILTERS, INC. (U.S.P. 1,893,522, 10.1.33. Appl., 27.8.27).—Materials for cement slurry are ground together, in closed circuit, and diluted to such an extent that hydraulic classification is effective, the thickened pulp is given a final correction in agitators and then filtered, and the slurry cake is calcined. All processes are continuous and the thickener overflow is used as dilution-H₂O. B. M. V.

Manufacture of Portland cement. J. H. COLTON, Assr. to PACIFIC PORTLAND CEMENT Co., CONSOL. (U.S.P. 1,893,696, 10.1.33. Appl., 20.5.29; cf. U.S.P. 1,791,800; B., 1931, 974).—The prior process is modified, whereby the cement may be made at a lower temp. and yields a

quicker-hardening product than usual. The raw cement mix including Al_2O_3 , CaO, and SiO₂ is burned to a clinker, which is ground and recalcined to form fresh clinker. B. M. V.

Asbestos cement building material. W. J. MOELLER, ASST. to PHILIP CAREY MANUFG. CO. (U.S.P. 1,893,783, 10.1.33. Appl., 25.6.28).—In a sheet formed from laminations of asbestos cement, the outer lamination is irregularly studded with particles of a contrasting material (e.g., slate) embedded to such a depth that they, as a rule, stand slightly above the surface of the cement, and thus prevent a film of CaO compounds, due to weathering, forming over them. B. M. V.

Manufacture of hydraulic cements or binders. A. A. THORNTON. From Soc. ANON. ITAL. PER LA PRODUZIONE CALCI E CEMENTI DI SEGNI (B.P. 398,028, 17.9.32).—Natural or artificial puzzuolana, CaO or Ca(OH)₂, and CaSO₄ are ground together in proportions such as to yield a product having $(SiO_2 + Al_2O_3)/CaO > 1$ but ≥ 2.5 . L. A. C.

Treatment of dolomitic stone. C. C. LOOMIS (U.S.P. 1,894,184, 10.1.33. Appl., 10.11.30).—A mixture of MgO and $CaCO_3$ is obtained from dolomite by burning lumps at a temp. rather < that in a lime-kiln and removing the outer layer of MgO and CaO by H_2O -sprays. B. M. V.

Plastic wall coating [for producing textured finishes]. W. H. ALTON, ASST. to R. T. VANDERBILT Co. (U.S.P. 1,897,016, 7.2.33. Appl., 21.12.28).—The material, which is worked up with H_2O for use, comprises a powdered mineral filler the particles of which are in platelet form (e.g., pyrophyllite) and the residue from cereal flour after starch and gluten have been removed.

L. A. C.

Composition of matter. [Plaster.] J. A. MORT-LAND and H. L. SMITH (U.S.P. 1,894,628, 17.1.33. Appl., 14.1.31).—A plaster suitable for building construction and for wallboards consists of a mixture of Portland cement 675, ground stone 1090, and vegetable fibre (of the sugar-cane group) 235 lb. C. A. K.

Material for roads.—See II. Extracting rosin from wood. Stain [for wood].—See XIII. Wood preservatives.—See XXIII.

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

Some factors leading to greater production from a steel furnace. A. ROBINSON (Iron & Steel Inst., Sept., 1933. Advance copy, 11 pp.).—Regular control of the process includes the systematic fettling of the furnace to preserve the original lines with H_2O -cooling at salient points, the checking of air leakage in regenerators, and the chemical and mechanical control of the charging and melting processes. C. A. K.

Manganese ore as a substitute for steel scrap in the basic open-hearth furnace charge. ANON. (Arch. Eisenhüttenw., 1933—4, 7, 81—87).—The addition of Mn ore (pyrolusite) to the basic open-hearth furnace charge yields a metal bath containing the same Mn content as that obtained with the usual steel scrap

charge provided that the amount of C added is sufficient to reduce the Mn ore; the heat consumption is, however, increased and the output of the furnace correspondingly decreased, but the amount of Fe-Mn alloy for deoxidation is diminished. Comparative cost data of the two procedures are given. A. R. P.

Coke-fired reheating furnace [for steel]. F. LLOYD and R. V. WHEELER (Iron & Steel Inst., Sept., 1933. Advance copy, 11 pp.).—As a development of the type of furnace in which coal gas is passed through a bed of broken refractory material, the latter is replaced by broken coke. It was found that such a bed consumed the smoke of a second "finishing" furnace and could be worked without the use of fuel gas, as the excess air combined with the coke. C. A. K.

Utilisation of blast-furnace gas. W. B. BAXTER (Iron & Steel Inst., Sept., 1933. Advance copy, 31 pp.). —The gas after passing through a cleaner of the Halberg-Beth type is distributed to various plants at the Appleby and the Frodingham Works, always maintaining a safety margin in the gasholder. Results of tests under normal practice on gas engines, slab, normalising, bloom, and billet furnaces, and H_2O -tube boilers are given. The consumption of raw coal in one works has been reduced to 4.61 cwt. per ton of ingots produced.

C. A. K.

Electrolytic extraction of slag from iron and carbon steel. R. TREJE and C. BENEDICKS (Iron & Steel Inst., Sept., 1933. Advance copy, 26 pp.).—The electrolyte solution of Fe is conducted in a vessel divided by a diaphragm. The Fe, surrounded by a collodion bag for collecting the slag, forms the anode in a bromide solution containing Na citrate; the cathode is a Cu plate in $CuSO_4$ solution. The arrangement avoids any attack of the slag residue, which is collected by centrifuging. The microscopical examination forms a valuable complement to the examination of the polished surface, and in Armco Fe well-cryst. octahedra of Fe aluminate (spinel) have been discovered. Residues from high-C steels contain cementite which may be removed by a suitable electromagnet. C. A. K.

Growth of alloyed cast iron. T. MEHERLING (Arch. Eisenhüttenw., 1933–4, 7, 141–143).—Grey cast Fe containing C $3\cdot1$, Si $1\cdot4$, Mn $1\cdot1$, Cr $0\cdot6$, Ni $0\cdot6$, and Mo $1\cdot1\%$ has a tensile strength of $29\cdot9$ kg. per sq. mm. at 20° and $20\cdot5$ kg. per sq. mm. at 625° after heating for 100 hr. It shows practically no growth and no change in combined C content after prolonged heating at 625° or after repeated heating to 900° . A. R. P.

Resistance to wear of nitrogen-hardened cast iron. J. E. HURST (Iron & Steel Inst., Sept., 1933. Advance copy, 13 pp.).—Flanged engine-cylinder liners of standard design have been centrifugally cast from ordinary cast Fe (A) and Fe alloyed with (B) 0.4% Cr, (C) 0.5% Cr + 1.2% Ni, and (D) 1% Cr + 1-2% Al. D was hardened in NH₃. Wear tests carried out in a stationary petrol engine and also in two vehicles indicate that less wear occurs in D than in A, B, or C, whether the latter are as cast or hardened and tempered. The actual amount of wear for a "run" of 40,000 miles does not differ greatly with any of the materials. Light alloy pistons and Fe piston rings of standard design and composition were employed throughout the investigation. E. H. B.

Thermal conductivity of wrought iron, steel, malleable cast iron, and cast iron. J. W. DONALDSON (Iron & Steel Inst., Sept., 1933. Advance copy, 20 pp.) .--Determinations for 16 ranges of temp. between 80° and 450° of the thermal conductivity of wrought Fe, 5 C steels with 0.1-1.09% C, white- and black-heart malleable Fe, 5 special cast-Fe materials (including Silal and Nicrosilal), and 3 cast-Fe materials of varying P content indicate that in each instance conductivity decreases slightly with rising temp. At 100° the following vals. (cal./cm./sec.) were obtained : wrought Fe 0.175, 0.1% C steel 0.160, 1.09% C steel 0.117, black-heart malleable 0.150, white-heart malleable 0.115. In the special Fe alloys conductivity decreases with Si content. The experimental results are considered in relation to structure, and in the instance of steel agreed closely with vals. obtained from the formulæ of Benedicks and of Masumoto. E. H. B.

Calculations for soaking pits [for steel] II. W. HEILIGENSTAEDT (Arch. Eisenhüttenw., 1933—4, 7, 103—112).—Mathematical expressions are deduced for calculating the rate of heating of the ingots with various throughputs, the temp. of the flue gases, and the rate of heat transfer from the outside to the inside of the ingots. A. R. P.

Tensile strength and reduction in area of cast steel at 650-1450°. E. PIVOVARSKY, B. Božić, and E. Söhnchen (Arch. Eisenhüttenw., 1933-4, 7, 127-130). —The tensile strength (S) and reduction in area (R) have been determined at different temp. (T) and in (A)and perpendicular to (B) the direction of transcrystallisation for cast steel (0.2-0.4% C) made in the electric furnace, the basic and acid open-hearth furnaces, and the Bessemer converter. In all cases S decreased with rising T in a similar way, a slight retardation in the rate of decrease occurring in the $\alpha-\gamma$ transformation range. S is greater in direction B than in A. R reaches a very pronounced max. in all cases at 1250°, except in direction A in electric-furnace steel, and is generally A. R. P. greater in direction B than in A.

Some properties of cold-worked sorbitic and austenitic alloy-steel wire. S. H. REES (Iron & Steel Inst., Sept., 1933. Advance copy, 14 pp).—The elasticity at room temp. of cold-drawn Cr-Mo steel wire (Cr 1·1, Mo 0·27, C 0·34, Si 0·18, Mn 0·54%) is restored by annealing at 250°, but 400° must be reached to secure good elastic behaviour under stress at high temp. The upper and lower limits of the usual range of reheating temp. which induces liability to intercryst. corrosion in 16:10 Cr-Ni steel wire (500—900°) are lowered by cold-work to < 400° and 650°, respectively; the elastic properties of this steel are restored by reheating at 250°, but 500° is necessary to secure the best behaviour of the wire under varying conditions of stress and temp. Reheating raises the d by a max. of 0.76% at 650°; this is due in part to a reversion of the α -Fe formed by cold-work to γ -Fe and is accompanied by an increase of 0.16% in length. A. R. P.

Effects of pickling on the properties of carbon steels. I. G. SLATER (Iron & Steel Inst., Sept., 1933. Advance copy, 16 pp.).—Rapid embrittlement ensues immediately steel wire is immersed in acid, and the rate of deterioration increases with increase in concn. and rise in temp. Inhibitors, particularly a mixture of flour paste and SnCl₂, reduce the effect, which is, however, usually only of a temporary nature. Notched-bar tests indicated a toughening (30-60%) after pickling the steels in H₂SO₄ or electrolytically (as cathode), but such toughening or embrittlement is removed at room temp. or more quickly by immersion in H₂O at 100°.

C. A. K.

Effect on various steels of hydrogen at high pressures and temperatures. N. P. INGLIS and W. ANDREWS (Iron & Steel Inst., Sept., 1933. Advance copy, 15 pp.).-The temp. at which steels are attacked by H₂ is considerably reduced by increasing the pressure ; in the first stage of the attack H₂ is absorbed and the steel becomes brittle, but no decarburisation or disintegration occurs, and in the second stage C is removed, fissures appear, and the strength and ductility are seriously reduced. The degree of attack is determined by temp., pressure, stress, and composition and structure of the steel; for any given steel the attack is least when the grain size is small, *i.e.*, in the hardened and tempered condition. Large vessels of mild steel are attacked at $> 150^{\circ}$, but smaller vessels will withstand 200°. Properly heat-treated alloy steels containing Cr and Ni, Mo, or V will withstand 300-350° at 250 atm. Welded parts must be heat-treated after welding, otherwise attack will commence around the weld under conditions in which the rest of the metal is unattacked. Addition of Cr increases the resistance of steel to attack; with 3% Cr the steel is resistant under 250 atm. up to 400°, but is attacked at 450°, and with 6% Cr the steel is resistant up to 500°. Cr-Ni austenitic steels absorb a large vol. of H₂ at 450° and become very brittle, but their ductility can be restored by heat-treatment to expel the H₂; they also undergo boundary carbide pptn. under these conditions. A. R. P.

Effect of tin as an impurity in mild steels. J. H. ANDREW and J. B. PEILE (Iron & Steel Inst., Sept., 1933. Advance copy, 9 pp.).—The tensile strength, elongation, and reduction in area are little altered by additions of < 0.63% Sn to mild steel. The impact strength is lowered by 0.05% Sn, and with > 0.2% Sn the steels are definitely brittle, especially after heat-treatment involving low-temp. tempering or slow cooling through the range 400—200°. Attempts have been made to ascertain the cause of brittleness by microscopical examination and thermal analysis. Methods for gravimetric and volumetric determination of small amounts of Sn are put forward. E. H. B.

Influence of beryllium on steel. J. H. S. DICKENSON and W. H. HATFIELD (Iron & Steel Inst., Sept., 1933. Advance copy, 23 pp.).—Additions of 1% of Be to steels resulted in the following Be contents : 0.46% in 0.2% C steel (Be added partly in lump, partly in Fe tubes);

0.32% in 13% Cr steel (Be added in heavy Fe box); 1.02% in 18% Cr, 8% Ni steel (I) (Be added as powder simultaneously with slow stream of steel running into ladle); 0.90% in 3.6% Ni steel (method as above); 0.99% in 3.5% Ni, 0.8% Cr steel (as above). These Be steels have been compared with ingots of similar composition to which no Be was added. The Be steels were all stiff in forging. The macrostructure was generally unaffected, microstructure little altered except in the case of (I) (which was rendered duplex by Be), and thermal transformations were little affected except in the case of (I), the Be alloy showing arrests on cooling at 1040°, 915°, 878°, and 630°. The corrosion-resistance of this steel was also seriously reduced by Be addition. After normalising or quenching followed by tempering, all the steels containing Be were harder and possessed lower elongation and impact strength than those without Be. E. H. B.

Determination of zirconium in iron, steel, and ferro-alloys by means of phenylarsinic acid. P. KLINGER and O. SCHLIESSMANN (Arch. Eisenhüttenw., 1933-4, 7, 113-115).-The metal (5 g.) is dissolved in 1:1 HCl, the Fe oxidised with HNO₂ and removed by shaking with Et₂O, the filtrate boiled to expel Et₂O, diluted to 500 c.c., and treated with 50 c.c. of HCl and 50 c.c. of 3% H₂O₂ (to oxidise Ti), and the Zr pptd. with 10 c.c. of 2.5% aq. phenylarsinic acid. After boiling to coagulate the ppt. it is collected, washed with 1% HCl, ignited to ZrO_2 , and treated with HF to remove SiO₂. If any insol. is present after the Et₂O treatment it is collected and fused with Na₂CO₃, the residue of ZrO2 etc. being dissolved by fusion with KHSO4. A. R. P.

Effect of composition and pretreatment of steels on the life of protective coatings. K. DAEVES (Trans. Electrochem. Soc., 1933, 64, 161—172).—Largely a review of published work. The life of a paint coating depends on the composition of the steel base. The order of merit of various types of Fe and steel with respect to corrosion is also altered by hot-galvanising; e.g., ingot Fe, which was the most readily corroded before galvanising, was afterwards less corroded than ordinary steel and was nearly as good as Cu steels. The good behaviour of painted Fe of earlier times may be due partly to methods then used for cleaning the surface and burning-in red lead and partly to the quality of the Fe. Time and conditions of weathering and methods of brushing greatly affect the efficiency of removal of mill-scale, which has a particularly bad effect on paint coatings. H. J. T. E.

Protection of pipes against soil action. K. H. LOGAN (Trans. Electrochem. Soc., 1933, 64, 137—148).— The general features of pipe-line corrosion are reviewed. Among possible protective methods are : use of a metal or alloy the corrosion products of which inhibit further attack ; use of coatings of metals such as Pb, Zn, or Al, of inorg. materials such as cement, or of org. materials such as bitumen ; application of a p.d. to keep the pipe-line cathodic. Methods of testing protective coatings are discussed. H. J. T. E.

Protection of iron in aërated salt solutions by cathodic deposits. E. HERZOG (Trans. Electrochem. Soc., 1933, 64, 325-336) .- Fe or Cu is cathodically polarised in 0.5N-NaCl using a current too small to produce H₂ evolution, and when the cathode potential has become steady O2 is introduced and measurements are made of the resulting increase in current and change in cathode potential. When the metal has been precoated with films of hydrated oxides of Ba, Ca, Cr, or Al, with pptd. Fe₂O₃ or Fe₃O₄, or certain other insol. compounds, the depolarising action of O_2 is notably decreased, indicating that such films can exert a protective effect; Fe₃O₄ formed on Fe by heating in air has a small effect in the opposite direction. Similar experiments were made using \hat{H}_2O_2 instead of O_2 . The protective effect of certain alloying metals on Fe may be due to formation of such oxide films which retard the oxidation of H₂ formed by local action at cathodic H. J. T. E. areas.

Rôle of the corrosion product in the atmospheric corrosion of iron. W. H. J. VERNON (Trans. Electrochem. Soc., 1933, 64, 309-318).-Largely a review of published work. The primary (invisible) oxide film (I) on Fe is protective if formed under screened conditions so that solid particles in the atm. are intercepted. In the absence of a continuous (I) formation of secondary rust (II) occurs readily at humidities well below dew point through deposition from the air of hygroscopic particles, the most active constituent of which under inland conditions is probably (NH₄)₂SO₄. Below 65% R.H. rusting decreases with time as the available metal surface is used up, but when this crit. humidity is exceeded rusting is enormously accelerated. The effect of addition of other elements to Fe in decreasing corrosion may be due to stabilisation of the (I) or to the (II) being rendered less hygroscopic. H. J. T. E.

Flotation properties of pine oils. N. A. ALEINIKOV (Tzvet. Met., 1932, 299—319).

Physical chemistry of solid oxidised paraffin as a flotation reagent. V. M. E. LIPETZ, P. A. RHEBINDER, and M. M. RIMSKAYA (Tzvet. Met., 1932, 288-298; cf. B., 1933, 193).—The solid higher fatty acids obtained by oxidising paraffin with atm. O₂ at 160° is an active selective flotation agent, particularly for oxidised ores. CH. ABS.

Production of high-grade concentrate from Butte copper ores. B. S. MORROW and G. G. GRISWOLD, JUN. (Contrib. Amer. Inst. Min. Met. Eng., 1933, No. 27, 11 pp.).—Yields afforded by various flotation agents are recorded. CH. ABS.

Concentration tests on Degtyar copper-iron ore deposits. K. A. RAZUMOV (Gorno-Obogat. Delo, 1932, No. 7-8, 48-59).—The ore contained Cu $2 \cdot 50$ — $3 \cdot 00$, Fe $43 \cdot 49$ — $44 \cdot 10$, S $49 \cdot 08$ — $49 \cdot 24$, SiO₂ $1 \cdot 42$ — $1 \cdot 28$, CaO 0-0 \cdot 43, BaSO₄ $2 \cdot 41$ — $2 \cdot 50\%$; Au $0 \cdot 37$ — $0 \cdot 44$, Ag $17 \cdot 5$ —21 g. per ton; Pb and Zn traces. By the use of CaO, xanthates, and pine oil 80—87% of the Cu was recovered in the concentrate (10—22%; 12—19%Cu). CH. ABS.

Composition and distribution of mineral compounds in complex copper ores. V. V. DOLIVO-DOBROVOLSKI (Gorno-Obogat. Delo, 1932, No. 12, 11— 18).—The finely-powdered ore is treated with (a) dil. H₂SO₄ and H₂SO₃ at 60—80°, (b) KCN solution followed by dil. H_2SO_4 and H_2SO_3 . The distribution of Cu between solutions and residues gives a complete mineralogical picture of the ore, whence the limits of concn. of an ore by flotation, at a given particle size, can be determined. CH. ABS.

Suitability of oxidised copper ores for concentration. V. V. DOLIVO-DOBROVOLSKI (Gorno-Obogat. Delo, 1932, No. 7-8, 32-47).—Differences in the results of flotation of apparently similar batches of oxidised Cu ores are due to differences in the ratio of the Cu in the form of free minerals with free surfaces to the Ca combined with the gangue as highly dispersed small grains or in chemical combination with it. The free Cu mineral can be determined by dissolution with KCN.

CH. ABS.

Rational limits of concentration of Ural copperzinc ores. I. I. KRASILNIKOV and V. N. NIKIFOROV (Gorno-Obogat. Delo, 1932, No. 7-8, 17-31).—Concn. curves indicate the best ratio of concentrate to tailings for the optimum concn. of Cu and Zn. CH. Abs.

Forms of copper found in reverberatory slags. R. B. JACKMAN and C. R. HAYWARD (Amer. Inst. Min. Met. Eng., 1933, No. 6, 9 pp.).—Most of the Cu is present as CuS pellets; CuS separates from solution on cooling. Metallic Cu is a minor constituent; Cu silicates are absent. One of the most important sources of Cu in the slag is the dust which settles on the surface. Removal of Cu from the slag by agitation with pyrite is due more to physical and mechanical than to chemical action.

CH. ABS.

Soldering with copper in an atmosphere of hydrogen. Anon. (Schmelzschweissg., 1932, 11, 259–260; Chem. Zentr., 1933, i, 1506).—C- and certain alloy steels can be soldered with Cu at $> 1100^{\circ}$ in an atm. of H₂; low-Cr steel needs a flux, and high-Cr steel cannot be so treated. A. A. E.

Green patina on copper. Examples from Elan Valley (Wales) and Dundalk (Ireland). W. H. J. VERNON (Inst. Metals, Sept., 1933. Advance copy, 4 pp.).—The patina from a Cu dome in the Elan Valley (30 miles E. from the sea) after 30 years' exposure contained 20.75% of $CuCl_2,2Cu(OH)_2$ and 73.5% of $CuSO_4,2Cu(OH)_2$, whilst that from a Cu spire in Dundalk $(2\frac{1}{2}$ miles W. from the sea) after 150 years' exposure contained 85.25% of $CuSO_4,3Cu(OH)_2$ and only 8.15%of $CuCl_2,3Cu(OH)_2$. The difference is attributed to the effect of prevailing westerly winds. In the first case sufficient time has not elapsed for the basic salts to reach max, basicity. A. R. P.

Properties of some temper-hardening copper alloys containing additions of nickel and aluminium. H. W. BROWNSDON, M. COOK, and H. J. MILLER (Inst. Metels, Sept., 1933. Advance copy, 32 pp.).— Pptn-hardening of Cu and commercial Cu alloys containing Zn, Sn, and Mn can be produced by additions of Ni and Al in a ratio < 4:1 provided that the Al is < 0.5%. The max. effect is obtained by quenching from about 900° and subsequently ageing for < 2 hr. at 400—600°. The extent to which hardening occurs under these conditions depends on the Ni: Al ratio, the amount of Ni + Al present, and the nature and amount of any other alloying element. Zn reduces slightly the

extent of hardening but induces hardening with less Ni + Al than is required for Cu alone, Sn increases the hardening effect, and Mn retards the pptn. of the hardening constituent, but tends to induce retention of the hardness to higher temp. on re-annealing below the tempering temp. The properties of numerous alloys after varying heat- and mechanical treatments are given in a series of 21 tables. A. R. P.

Precipitation-hardening nickel-copper alloys containing aluminium. D. G. JONES, L. B. PFEIL, and W. T. GRIFFITHS (Inst. Metals, Sept., 1933. Advance copy, 14 pp.).-The min. Al content required to produce pptn.-hardening in Ni-Cu alloys is 0.45, 0.60, 0.90, and 2.25% for 10, 20, 30, and 45% Ni, respectively; the corresponding amounts required to produce max. hardening are 2, 2.5, 3, and 4%. Alloys with the min. Al content are fully softened by quenching from 700°, and those with more Al by quenching from 800°. Allovs capable of pronounced pptn.-hardening harden considerably on air-cooling from 850°, whereas those with a min. Al content remain soft at all rates of cooling. The best tempering temp. to obtain max. hardening is 500-600°; alloys with 30-45% Ni retain their temper-hardness almost indefinitely at 500°. Tables showing the mechanical properties of various alloys after different heat-A. R. P. and mechanical treatments are given.

Alloy for corrosive service. W. L. COCKRELL (Refiner Nat. Gas. Mfr., 1933, 12, 156-159).—The properties of "illium" (Ni 58.40, Cr 21.80, Cu 7.95, Mo 3.52, W 2.38, Mn 1.72, Si 0.70, Fe 3.10, C 0.32%) are described. CH. ABS.

Heat-resisting metals and their use in the ceramic industry. J. F. KAYSER (Trans. Ceram. Soc., 1933, 32, 381-401).—The properties and factors influencing the durability of heat-resisting alloys at high temp. are discussed. Scaling temp. in air of, resistance to S attack and strength at high temp. of, and the effect on these properties of adding C, W, and Al to, Ni-Cr-Fe alloys, and the composition and properties of typical heat-resisting cast Fe are described. The application of heat-resisting alloys to apparatus and furnace parts (including recuperators) employed in the vitreous enamelling and glass-making industries is discussed.

A. L. R.

Utilisation of pyrite cinders. I. MASLENITZKI (Gorno-Obogat. Delo, 1932, No. 4-5, 21-26).

CH. ABS.

Metallurgy of lead. F. M. LOSKUTOV (Tzvet. Met., 1932, 162–176).—In the roasting of rich Pb concentrate granulated slag from Pb-smelting furnaces is substituted for fluxes, leading to better elimination of S and better sintering. Repeated use of the same slag eliminates loss of Pb in the slag. CH. ABS.

Preparation of lead and lead alloys for microscopic examination. B. JONES (Inst. Metals, Sept., 1933. Advance copy, 3 pp.).—The specimen is polished first on progressively finer grades of well-used emery paper, using a saturated solution of paraffin wax as lubricant, and then on Selvyt cloth (A). The surface is freed from grease and the surface layer of metal removed by careful treatment with the (NH₄)₂MoO₄ solution used for determination of P with intermediate

treatment on A; it is then ready for low-power examination. For examination under high power the specimen is again polished on A and etched in a 4:1:1 mixture of glycerin, AcOH, and conc. HNO₃. A. R. P.

Metallurgy of zinc. G. V. RUIKOV (Tzvet. Met., 1932, 176-182).—Loss of Zn in the distillation and electrolytic processes is due largely to the presence of ZnS and Zn silicates and ferrites. Fe, SiO_2 , and Al_2O_3 are also undesirable. These can be removed from the concentrates, and the roasting process improved, by gaseous reduction combined with roasting in a suspended state.

CH. ABS.

Segregation [inmetals]. G. MASING and E. SCHERRER (Z. Metallk., 1933, 25, 173—178).—Recent work on segregation phenomena during the solidification of metals and alloys is reviewed and the results are discussed with reference to theories of inverse segregation. A. R. P.

Flotation of tailings from Bellevue Mine, Mt. Sir Samuel, W. Australia. W. G. CLARKE and B. H. MOORE (Kalgoorlie Bull., Sch. Mines W. Australia, 1932, No. 7, 3-6).—Au is not contained in the Cu minerals, and no satisfactory concn. of Au or Cu results from classification into sand and slime. Of the Au, 43% was recovered by amalgamation. CH. Abs.

Flotation tests on a sample of tailings from Maldon, Victoria. W. G. CLARKE and B. H. MOORE (Kalgoorlie Bull., Sch. Mines W. Australia, 1932, No. 7, 20-21).—Unprofitable results were obtained with tailings containing 0.82 dwt. Au per 2000 lb., and 0.24% total S. CH. Abs.

Liquation "points" in forgings from large ingots. S. A. KAZEEV (Rep. Inst. Met., Leningrad, 1933, No. 13, 34-40).—Segregation of S in large spots or groups of "points" was observed in defective forgings. The C content around the inclusions was low. An explanation is offered. CH. ABS.

So-called induction period in the age-hardening of duralumin. I. W. FRAENKEL and R. HAHN (Z. Metallk., 1933, 25, 185—188). II. H. BOHNER (*Ibid.*, 188—189).—I. An induction period (*P*) in the ageing of duralumin can be observed when precautions are taken to ensure the absence of nuclei which induce pptn., *i.e.*, when the alloy is annealed for a long time at $> 480^{\circ}$ and effectively quenched. Very pure alloys have a small tendency and alloys with a coarse grain a greater tendency to show *P*; increasing the Fe content together with a long anneal at 500° also produces *P*.

II. P is a function of the annealing and ageing temp. ; this is illustrated by curves showing the change of tensile strength and elongation of Al alloys with (a) 4% Cu and 2% Si and (b) 6% Cu during ageing at $85-175^{\circ}$. A. R. P.

Aluminium-manganese alloys rich in aluminium. M. BOSSHARD (Alluminio, 1932, 1, 361-367; Chem. Zentr., 1933, i, 1676).—The strength, electrical conductivity, resistance to corrosion, electrochemical potential, and structure of Al-Mn alloys containing 0.5-3.5% Mn have been studied. Stability towards HCl of alloys containing 0.5-1.0% Mn falls with rise of the pretreatment temp., but rises rapidly with increase in Mn content, although the val. does not reach that of pure Al. The electrochemical potential depends on the Mn content, with an inflexion at 1.4%, and on thermal treatment. A. A. E.

Alumilite process for decorating and protecting aluminium products. H. BENGSTON and R. E. PETTIT (Amer. Machinist, 1933, 77, 76—79).—The coating formed in H_2SO_4 solution by anodic oxidation is chieffy Al_2O_3 , more or less hydrated and containing SO_4 . CH. ABS.

Adhesion of electrodeposited coatings to steel. A. W. HOTHERSALL (Trans. Electrochem. Soc., 1933, 64, 83-97).-The nature of such adhesion is discussed and various types of tests for adhesion are reviewed. Causes of poor adhesion (with special reference to Ni deposits on steel) may include : (1) weak or embrittled surface layers of the basis metal (A); (2) films of foreign matter at the surface of A; (3) poor mechanical strength of the initial layer of deposit. Removal of H embrittlement of steel by low-temp. heat-treatment greatly improves the adhesion of subsequently deposited Ni. Methods of removing or minimising the formation of films of oxide, greasy or colloidal matter, and insol. matter formed on etching (e.g., C or carbides) are described and discussed. Some causes of defective initial deposits are indicated. H. J. T. E.

Electrodeposition of iron-copper-nickel alloys. III. Deposition from sulphate-boro-citrate baths. L. E. STOUT and C. L. FAUST (Trans. Electrochem. Soc., 1933, 64, 111-122; cf. B., 1932, 109).--Fe-Cu-Ni alloys of a wide range of composition can be electrodeposited on a Pt cathode by using a Cu anode of equal area in a solution made up from FeSO₄, NiSO₄, $(NH_4)_2SO_4$, H_3BO_3 , citric acid, and excess of aq. NH_3 . With increase of c.d. the Cu content of the deposit falls, while the Fe content rises, rapidly at first, but soon approaches an almost const. val.; the Ni content also increases, but not so rapidly as that of Fe. H. J. T. E.

Electroplating copper on manganin. C. R. COSENS (J. Sci. Instr., 1933, 10, 256–258).—Surface "demanganisation" by making the wire alternately anode and cathode in conc. aq. NaOH, followed by treatment in H_2SO_4 , allows an adherent Cu plating suitable for soft-soldering to be deposited subsequently. N. M. B.

New bath for direct nickeling of zinc. G. W. NICHOLS (Trans. Electrochem. Soc., 1933, 64, 149—154). —Determinations of the variation of single potential with time show that the chemical displacement of Ni from NiSO₄ solution by Zn is retarded by MeOH, EtOH, glucose, and certain OH-acids, notably lactic. Good electrodeposits of Ni can be obtained direct on Zn from ordinary Ni baths to which NH₄ lactate has been added and the $p_{\rm H}$ adjusted to $3 \cdot 7 - 4 \cdot 3$. More acid baths tend to cause streaking; more basic baths give less adherent deposits. The ratio of lactate to Ni in the bath must be increased if the latter is raised. The deposits are not yellowish as from citrate baths.

H. J. T. E.

Throwing power and current efficiency of the nickel-plating solution at low and at high $p_{\rm H}$. R. HARR (Trans. Electrochem. Soc., 1933, 64, 203—217). —The current efficiency of Ni deposition from high- $p_{\rm H}$

baths (A) of the NiSO₄, NiCl₂, H₃BO₃ type approximates to 100% over a wide range of Ni concn., temp., and c.d., whereas with low- $p_{\rm H}$ baths (B) of otherwise similar composition current efficiencies are dependent on the above factors and may be much lower. A have a better throwing power (T) than B at all temp. and c.d. Rise of temp. always improves T, but especially with B, the T of which is very poor at room temp. Increase of c.d. improves the T of B but decreases that of A; increase of Ni concn. has a small effect in the same directions. Fe" has no effect on T, but Fe" (sol. only in low- $p_{\rm H}$ solutions) decreases T markedly. ${\rm H_2O_2}$ decomposes rapidly at high $p_{\rm H}$, but in low- $p_{\rm H}$ solutions it may decrease T notably owing to formation of Fe". In the determination of T by the Haring and Blum method, more reproducible results were obtained by the use of a small wire cathode instead of a plate.

H. J. T. E.

Chromium plating from ammonium-chromatesulphate baths. R. R. ROGERS and J. F. CONLON (Trans. Electrochem. Soc., 1933, 64, 319–324).—The range of composition of baths made up from CrO_3 , H_2SO_4 , aq. NH_3 , and the corresponding NH_4 salts which yield bright electrodeposits of Cr has been investigated, and results are shown on a ternary diagram using CrO_4 , SO_4 , and NH_4 as variables. Conditions for obtaining the best-looking deposits from typical baths within the bright-deposition range were determined, and for each of these baths the current efficiency, throwing power, and continuity of deposit under the optimum conditions were examined. H. J. T. E.

Detection and significance of porosity in electrodeposited cadmium coatings. S. G. CLARKE (J. Electrodepositors' Tech. Soc., 1933, 8, No. 12, 20 pp.).— Porosity is tested by immersing for > 10 min. in H₂O containing 1 vol.-% of HCl (d 1.18) and noting the formation of bubbles at the pores. With bright annealed mild sheet steel as base, change in c.d. (3.5—30 amp. per sq. ft.), change in cleaning processes prior to plating, or plating on dried instead of etched and washed steel had no effect on the porosity. Cd from the usual CN' solutions on rolled steel is sub-stantially non-porous. On machined cast steel deposits were porous.

Thickness of protective cadmium coatings. S. G. CLARKE (J. Electrodepositors' Tech. Soc., 1933, 8, No. 11, 10 pp.).—Methods for determining the thickness of Cd coatings on steel depend on observing the no. of drops of a solution of I in aq. KI necessary to penetrate it, or the loss in wt., change in dimensions, or time of gassing in a solution of Sb_2O_3 in HCl. Cd may also be removed by freshly prepared 5% aq. $(NH_4)_2S_2O_8$ treated with 10 vol.-% of conc. aq. NH₃.

Electrodeposition of lead from dithionate baths. R. L. BATEMAN and F. C. MATHERS (Trans. Electrochem, Soc., 1933, 64, 301–308).—Good cathode deposits of Pb were obtained at approx. 100% current efficiency from a bath containing 4.6% of PbS₂O₆, 1.7% of H₂S₂O₆, and 0.005% each of glue and β -C₁₀H₇·OH at 1 amp. per sq. dm. Gradual decrease of [H₂S₂O₆] and a corresponding increase of [PbS₂O₆] occurs during operation with Pb anodes. Only the greater cost of prep. of H₂S₂O₆ is against the use of this bath instead of the fluosilicate bath for refining Pb. Experiments with tetrathionate baths were unsuccessful. H. J. T. E.

Electrodeposition of magnesium. D. M. OVERCASH and F. C. MATHERS (Trans. Electrochem. Soc., 1933, 64, 131—136).—Attempts to deposit Mg from solutions of its simple salts in org. solvents were unsuccessful, but cathodic deposits of Mg were obtained from Et_2O solutions of Grignard reagents. The whitest, most adherent, and most finely-cryst. deposits were obtained from an Et_2O solution of MgEtI with addition of NPhEt₂, at 0.5—1 amp. per sq. dm. The current efficiency at the cathode may exceed 80%, but no anodic dissolution of Mg occurs and the bath deteriorates rapidly on continued use. H. J. T. E.

Electrodeposition of bismuth from perchloric acid solutions. M. HARBAUGH and F. C. MATHERS (Trans. Electrochem. Soc., 1933, 64, 155—160).—Smooth, finely-cryst. electrodeposits of Bi are obtained at current efficiencies approaching 100% from Bi(ClO₄)₃ solutions containing free HClO₄ at room temp. using 3·1 amp. per sq. dm. The decomp. voltage of the bath is 1·62 volts and the throwing power 7—9%. Addition agents are hardly needed, but glue and cresol can be used to obtain the best deposits. The deposited Bi contains traces of ClO₄', probably owing to a complex Bi salt acting as addition agent. Alloys of Bi with Cu, Pb, or As can be electrodeposited from this type of bath.

H. J. T. E.

Electrolytic refining of mercury. E. NEWBERY and S. M. NAUDE (Trans. Electrochem. Soc., 1933, 64, 57–68). —Crude Hg used as anode in HgClO₄ solution yields very pure Hg at the cathode. Spectroscopically pure Hg can be prepared in this way. Forms of electrolysis cell for small- or large-scale operation are described. Stainless Fe or Pt may be used initially as cathode, the pure Hg so obtained forming the cathode for the main operation. H. J. T. E.

Depolarisation by graphite anodes in the electrolysis of aluminium oxide. M. DEK. THOMPSON and R. G. SEYL (Trans. Electrochem. Soc., 1933, **64**, 123— 129).—The decomp. voltage of Al_2O_3 in molten cryolite decreases linearly with temp. between 971° and 1231° both with Pt (P) and with graphite (G) anodes, the vals. with G being always 0.87 volt lower than with P. Assuming the reaction with G to be : $Al_2O_3 + 3C = 2Al + 3CO$, the calc. depolarisation is 1.15 volts at 1000° and 1.28 volts at 1300°. Thus, depolarisation is notably incomplete in this temp. range. At 1000° the observed decomp. voltage with P is in good agreement with the calc. val., but at 1300° there is a notable discrepancy.

H. J. T. E.

W-Mo thermocouples.—See I. Metallurgical coke.—See II. ThO₂ as refractory. Refractories for ladles and ingot casting.—See VIII. Metallised-glass H electrodes.—See XI. Pb pigments and rust. —See XIII.

BATENTS.

[Basic lining for] metallurgical apparatus. M. G. FOWLER, ASST. to UNITED VERDE COPPER CO. (U.S.P. 1,893,023, 3.1.33. Appl., 8.3.30).—Substantially monolithic basic linings for converters etc. are composed of bonded particles of which 12—22% pass 100-mesh and most of the remainder are too large to pass 20-mesh. The lining consists of magnesite and, if desired, bauxite; molasses may be used as binder and the mass is plasticised by the action of $\gg 0.5\%$ H₂SO₄. B. M. V.

Metals reduced from their oxides without melting. W. H. SMITH, Assr. to GEN. REDUCTION CORP. (U.S.P. 1,892,740, 3.1.33. Appl., 22.10.29).—In the production of sponge Fe, enough FeO is left unreduced, or a further quantity is added, to oxidise all the C. The Fe, FeO, and gangue mixture is briquetted with Na₂CO₃ (considerably $\leq \frac{1}{2}$ the wt. of the gangue) and the briquette heated to \leq the m.p. of Fe until the C has been removed and the P combined with the flux, after which the temp. may be maintained or raised to melt the slag. The main effect of briquetting is to reduce the quantity of Na₂CO₃ necessary. B. M. V.

Treatment of [molten] metals. W. R. JEAVONS and M. J. RENTSCHLER (U.S.P. 1,893,499, 10.1.33. Appl., 14.11.30).—A molten metal, e.g., steel, is purified by oxidation by means of BaO_2 dropped beneath the surface. The BaO_2 is moistened and compressed and the naturally occurring proportion (5—10%) of BaO hydrates and forms a cement, thus enabling the material to be charged into cartridges before use. B. M. V.

Application of protective coatings to metals [steel]. PYRENE Co., LTD. (B.P. 397,179, 19.2.32. U.S., 21.2.31).—Steel is sprayed with a hot acid phosphate solution containing 0.002-0.004% Cu together with phosphate of Mn, Fe, or Zn, the ratio total PO₄^{'''}: free PO₄^{'''} being 10-15:1. A. R. P.

Production of coated malleable iron castings. L. H. MARSHALL, Assr. to TECHNIMET Co. (U.S.P. 1,893,782, 10.1.33. Appl., 2.1.30).—The white Fe is packed in the annealing box with a compound of Cr, Si, Zn, Al, or Sb together with a halogen compound which will evolve non-oxidising and etching gas at a temp. < the max. of the usual annealing process. A recommended packing is Fe-Cr (Cr 70, C 0 · 1%) 97 and CaOCl₂ 3%. After the usual heat-treatment the articles are washed with H₂O and aq. NaHCO₃. B. M. V.

Manufacture of sand core for casting metal. B. F. WALLACE (U.S.P. 1,889,007, 29.11.32. Appl., 26.2.31).—A binder for foundry sand comprises Na silicate with the alkali increased until it contains only 2.75 or 2.0 pts. of SiO₂ per 1 pt. of Na₂O, but still retains its adhesiveness, and is gelatinised by Na₂CO₃ or other alkali salt; the cores etc. are composed of > 90% of sand and are desiccated without decomp. of the silicate, so as to be self-sustaining. B. M. V.

Corrosion-resisting iron alloys. COMP. DES FORGES DE CHATILLON, COMMENTRY, & NEUVES-MAISONS (B.P. 397,373, 19.1.33. Fr., 29.12.32).—Claim is made for an austenitic steel containing C 0.05—1 (0.05—0.25), Cr 0.5—30 (12—20), Ni 2—40 (6—15), As 0.1—0.75%, and ≥ 8 (2)% of any of the following : Si, Mn, Mo, W, Co, V, Cu, Ti, Al, Zr. The addition of As improves the machining qualities. A. R. P.

Improving the resistance of [ferro-]alloy articles to corrosion. C. G. FINK, ASST. to ALLEGHENY STEEL Co. (U.S.P. 1,893,821, 10.1.33. Appl., 26.6.30).—Ferroalloys are dipped in hot dil. H_2SO_4 7% and CrO_3 60%. The CrO_3 is recovered when the bath liquor contains 80 g. Fe per litre, by running the old solution into 50% H_2SO_4 , whereby the CrO_3 alone is pptd. B. M. V.

Silico-molybdenum steel and article made therefrom. W. R. SHIMER and F. C. T. DANIELS, ASSTS. to BETHLEHEM STEEL CO. (U.S.P. 1,893,004, 3.1.33. Appl., 17.3.27).—A steel having high tensile strength at high temp., suitable, *e.g.*, for mill rolls, contains C 0.10-1.25, Si approx. 2, Mo approx. 0.50, Cr 0.5-2.0%.

B. M. V.

Removal of enamel from a metal base. C. S. HOUPT (U.S.P. 1,892,950, 3.1.33. Appl., 5.3.31).— Porcelain or glass enamels are removed from Fe by treatment with aq. NaOH at the b.p. (160°), with continuous separation of the sludge in a centrifuge.

B. M. V.

Separation of minerals by flotation. A. M. GAUDIN (U.S.P. 1,893,517, 10.1.33. Appl., 19.8.30).— A process of separation of Zn and Cu minerals comprises the following steps: (1) ZnS, CuS, Cu₂S, Cu₂FeS_y, and FeS₂, are floated together from an alkaline pulp as one concentrate; (2) after oxidising the concentrate, ZnS, CuS, and Cu₂S are floated from the Fe sulphides; (3) the CuS and Cu₂S are floated from the ZnS; (4) the ZnS is floated. In (2) the oxidising agent may be CaOCl₂ and in (3) the modifying agent NaCN with aëration.

B. M. V.

Metallurgy of complex ores. M. G. FOWLER, C. R. KUZELL, and O. C. RALSTON, ASSTS. to UNITED VERDE COPPER CO. (U.S.P. 1,893,798, 10.1.33. Appl., 14.1.29).—Cu and Zn sulphide ores are smelted in a bath of matte which is blown to white metal (75—80% Cu) at a temp. $> 1150^{\circ}$ with evolution of Zn fume. The remaining Zn may be expected in the slag, which is poured off and reblown with a reducing agent, e.g., C suspended in steam, liquid or gaseous hydrocarbon, or producer gas, at the same min. temp. and the Zn vapour is condensed, or oxidised to fume. A matte containing Zn and FeO may be treated similarly.

B. M. V.

[Copper] alloy. M. G. CORSON, ASST. to ELECTRO METALLURG. Co. (U.S.P. 1,893,984, 10.1.33. Appl., 20.10.26).—The alloy contains Cu together with Be 0.3-2.0 (0.3)% and Ni 0.1-40 (4)%. B. M. V.

[Lead-copper bearing] metal alloy. H. K. HERSCHMAN and J. L. BASIL (U.S.P. 1,895,261, 24.1.33. Appl., 17.8.32).—The alloy consists of Cu 60 and Pb 38% with 0.2—0.6 (0.4)% S and 0.2—2.5 (1.5)% of a 60 : 40 Zr-Si alloy to assist in a homogeneous distribution of the Pb. A. R. P.

Coating of articles [wire with rubber]. T. K. Cox, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,894,671, 17.1.33. Appl., 8.6.29).—Tinned Cu wire is coated first with CH_2O , AcOH, palmitic acid, or, preferably, oleic acid, then with a rubber-S mix in a plastic state, and vulcanised in the usual way. A. R. P.

Core or mould binder, coating or paste. C. M. SAEGER, JUN. (U.S.P. 1,893,683-4, 10.1.33. Appl., 17.2.30).—Rubber is mixed with 0.25% of (A) *m*-tolylenediamine or (B) benzidine and with (A, B) S if desired. B. M. V.

Metallic catalyst. O. G. BENNETT, Assr. to CATALYST RESEARCH CORP. and J. C. W. FRAZER (U.S.P. 1,893,879, 10.1.33. Appl., 28.1.31).—Ni or other metal is amalgamated and the Hg distilled off in the absence of poisonous or reacting gases, preferably in a very high vac. The catalyst, in the form of a loose or slightly coherent powder, may be bonded by pressure alone without destroying its activity, which quality, in the case of Ni, is such that formation of Ni(CO)₄ or pyrophoric oxidation takes place at room temp.

B. M. V.

Sintered hard-metal alloy. J. W. GENUIT, Assr. to STOODY Co. (U.S.P. 1,893,078, 3.1.33. Appl., 28.5.30). —The alloy comprises carbides of W 90—97, of Mo 0.5-5.0, and of Ta 2.0-9.5 wt.-%. B. M. V.

Casting of magnesium and its alloys. J. A. GANN and J. B. REID, Assrs. to Dow CHEM. Co. (U.S.P. 1,896,045, 31.1.33. Appl., 4.5.32).—The moulding sand is mixed with 2—6% of $Al_2(SiF_6)_3$, $PbSiF_6$, $MgSiF_6$, or Na_2SiF_6 , or the finished sand mould is dressed internally with a solution or paste containing one or more of these compounds, A. R. P.

Magnesium-base alloys. W. J. TENNANT. From Dow CHEM. Co. (B.P. 397,427, 8.4.33).—Claim is made for Mg alloys containing 0.5—18 (6—14)% Cd and 0.5—2 (1.5)% Mn. A. R. P.

Preparation of aluminium or aluminium-alloy anodes for electrolytic condensers and rectifiers. BRIT. ALUMINIUM Co., LTD., A. G. C. GWYER, and A. N. D. PULLEN (B.P. 397,538, 20.2.32).—The metal is provided with a uniform, adherent, comparatively thick, porous film of Al_2O_3 by immersion in aq. Na_2CO_3 or $NaHCO_3$ at 95°, or by anodic oxidation in a CrO₃, $H_2C_2O_4$, or H_2SO_4 bath, and then with a dielectric thin oxide coating by anodic treatment in a borate bath.

A. R. P.

Cadmium-plating composition. G. B. HOGABOOM and M. B. DIGGIN, ASSTS. to HANSON-VAN WINKLE-MUNNING CO. (U.S.P. 1,893,368, 3.1.33. Appl., 21.7.32). —Cyanide Cd baths containing an "oxyheterocyclic" ring of 5—6 members, e.g., alkali furoate 80% and caustic alkali-furfuraldehyde resin 20%, in the combined proportion of 2—15 g./litre, the Cd being 15—20 g./litre, are claimed. B. M. V.

Smelting process. Annealing furnaces. Alloy for low-temp. apparatus. Protecting refrigerator surfaces. Collecting [metallic] dusts.—See I. Metal-coated fabrics.—See VI. Magnetic alloys.— See XI.

XI.—ELECTROTECHNICS.

Expansion as a controlling factor in positiveplate paste composition for lead storage batteries. O. W. BROWN, R. L. SHELLEY, and E. W. KANNING (Trans. Electrochem. Soc., 1933, 64, 187–202).— Defining "expansion" (E) as the % saving in oxide mixture (50% red lead, 50% PbO) in the paste required to fill a given grid as compared with that in a paste made by mixing 75 c.c. of H_2O with 600 g. of dry oxide mixture, it is found that E is directly proportional to the vol. of pasting liquid (I) (aq. H_2SO_4) per unit wt. of oxides. With a given vol. of (I) the mechanical properties of the

paste may be varied by using H₂SO₄ of different concn. If the oxides be first mixed with H2SO4 sufficiently conc. to cause immediate setting and then with H_2O or dil. H_2SO_4 to give proper consistency, E is still determined by the total vol. of (I). The time required for the battery acid to penetrate such plates varies inversely as E. Tests on batteries built up with positive plates containing pastes of different E show that the original capacity at a given discharge rate increases with Eowing to increased porosity, but, if the discharge rate is not too high, reaches a max. and then decreases owing to the decrease in amount of active material (oxides) in the plate. In general, the life of positive plates is proportional to the amount of active material in the plates (inversely proportional to E), but if E is too low blistering and buckling are likely. For best all-round performance each lb. of oxide mixture should be mixed with 75.6 c.c. of aq. H_2SO_4 of suitable d to produce a good workable paste (depends on the quality of the oxides); E is then about 7%. For severe service where life is the most important factor pastes with lower Eshould be used. H. J. T. E.

Six-inch paper-lined dry cell. R. A. CLAUSSEN (Trans. Electrochem. Soc., 1933, 64, 69—81).—The composition and desirable characteristics of materials used in the construction of dry cells are reviewed, and operations involved in the manufacture of such cells are described. H. J. T. E.

Metallised-glass hydrogen electrodes. E. New-BERY (Trans. Electrochem. Soc., 1933, 64, 99-110).-Smooth deposits of Pt, Pd, and Au on glass were obtained by dipping repeatedly into alcoholic solutions of the corresponding chlorides and igniting. Such deposits were then platinised or palladised electrolytically and their behaviour as H electrodes was compared. Platinised Au or Pt films are most satisfactory for general purposes. With platinised Pd films or palladised films of other metals the potential remains almost const. for a time at a val. notably <the true equilibrium val. before rising eventually to the latter. Palladised electrodes retain their H potential long after the H₂ supply is stopped, and for approx. determinations of $p_{\rm H}$ may be cathodically charged with H instead of using an external H₂ supply. A smooth Pd coating on glass may be used as a H electrode in solutions where Pt- or Pd-black produces undesired catalytic action, but Pd films tend to disintegrate after long use. Platinised or palladised Ag films are not reliable as H electrodes, but may be useful as O or air electrodes in alkaline solutions. Ag films, after anodic treatment in HCl, form good AgCl electrodes. All the above H electrodes reach equilibrium more slowly in alkaline than in acid solutions. H. J. T. E.

Measurement of resistance of technical electrolyte baths. F. Wöhr (Z. Elektrochem., 1933, 39, 756—758).—The a.-c. resistance of the electrolyte during d.-c. operation is measured in a superposed a.-c. circuit. A method of deducing the d.-c. resistance is described. An accuracy of 1% with d.c. up to 13,000 amp. is obtained. H. J. E.

Artificial anthracite.—See II. Conductivity of textile fibres.—See V. ThO₂.—See VIII. Measure

of concrete curing.—See IX. Extracting slag from Fe etc. Electrodes for steel welding. Protecting Fe cathodically. Al-Mn alloys. Protecting Al. Adhesion of coatings to steel. Fe-Cu-Ni alloys. Cu-plate on manganin. Pb. Bi. Mg. Ni-, Cr-, Cd-, Mg-, and Bi-plate. Hg refining.—See X. Conductivity of soap solution. Dielectric const. of tung oil.—See XII. Electrodialysis of soils.— See XVI. Conductivity of flour.—See XIX. Photoelectric cell in densitometry.—See XXI.

PATENTS.

Electrically fusing non-conducting materials. R. R. RIDGWAY, ASST. to NORTON CO. (U.S.P. 1,893,106, 3.1.33. Appl., 14.5.30).—The current is passed from C electrode to electrode through a loose mass of granular C, upon which the charge $(e.g., H_3BO_3)$ is placed and through which it trickles, first as the molten hydrated and later in anhyd. form, the latter forming a film on the C granules which protects them from steam.

B. M. V.

(A) Coating composition for dry cells. (B) Dry cell. J. G. ZIMMERMAN, ASST. to BURGESS BATTERY Co. (U.S.P. 1,892,691-2, 3.1.33. Appl., [A] 19.4.29, [B] 2.5.32).—A coating in substitution for fabric wrapping of MnO_2 cores of dry cells comprises case in dissolved in dil. org. acid (e.g., citric), preferably combined with the known suspension of starch in gelatinised starch solution. NH_4Cl may be added to reduce viscosity so that the composition may be applied by dipping. B. M. V.

Luminous tube. S. J. JOHNSON, ASST. to NEON PROCESS, INC. (U.S.P. 1,893,085, 3.1.33. Appl., 27.9.28). —The electrodes of a Ne or other luminous tube are surrounded, except at the ends, by a mass of anhyd. Na₂SiO₃, with the double object of cooling the electrodes and absorbing harmful gases. B. M. V.

Oxide-coated thermionic cathodes. M.-O. VALVE Co., LTD., M. BENJAMIN, C. E. RANSLEY, and C. J. SMITHELLS (B.P. 397,132, 16.2.32).—A core for an oxidecoated thermionic cathode consists of an alloy of Ni with $\gg 5\%$ Ti or Al (2% Al). A, R. P.

Highly-emissive cathode. O. EMERSLEBEN (U.S.P. 1,893,935, 10.1.33. Appl., 22.6.31. Ger., 25.6.30).— The cathode base (A) is coated with a sulphide or sulphate of a highly-emissive metal and then subjected to the vapour of an emissive metal. *E.g.*, A may be dipped in KHSO₄ and after assembly in the bulb the coating is converted into K₂SO₄ and Ba is volatilised (aluminothermically) in the neighbourhood thereof; the final coating is presumed to consist of K₂S, BaS, BaO, K₂O, and excess of Ba. B. M. V.

Production of electron emitters. F. RUFFLEY, Assr. to DE FOREST RADIO CO. (U.S.P. 1,894,059, 10.1.33. Appl., 8.4.27).—A Pt–Ni or other filament is coated with MgO and Ba esters and/or salts in H_2O ; e.g., MgO 1 pt., BaI₂ 2 pts., and Ba(OAc)₂ 1 pt. by wt. form a suitable mixture. B. M. V.

Electrode cleaning process. H. S. WOODWARD, Assr. to PHELPS DODGE CORP. (U.S.P. 1,893,817, 10.1.33. Appl., 27.10.31).—A Pb electrode which has become coated with oxides is cleaned with aq. NaS, followed by brushing. B. M. V. Conditioning of magnetic materials [alloys]. ELECTRICAL RESEARCH PRODUCTS, INC., Assees. of V. E. LEGG (B.P. 397,134, 16.2.32. U.S., 2.3.31).—Magnetic material containing Fe, Ni, and Co is subjected to an intense magnetic field and then heated for ≤ 8 hr. at 400—600°. J. S. G. T.

Apparatus [electrode] for electrometric determination of hydrogen-ion concentration. F. Lux (B.P. 397,303, 12.8.32).—An electrode, *e.g.*, of Pd, Rh, Ir, or their alloys, charged with H by being made a cathode in an electrolytic cell, is used as a H electrode. Other details as to mounting, use, etc. of such electrodes are claimed. J. S. G. T.

Electrolysers for manufacture of chlorine and alkaline hydrates. C. POUYAUD (B.P. 397,300, 9.8.33. Fr., 11.8.31).—Anode (\mathcal{A}) and cathode (\mathcal{C}) compartments are arranged in the form of a filter-press; the capacity of \mathcal{A} is > that of \mathcal{C} . Electrolyte passes first through \mathcal{A} and then through \mathcal{C} , and the temp. of the anode liquor is maintained above that of the cathode liquor. J. S. G. T.

Electrolytic gas generator. L. MELLERSH-JACK-SON. From SIEMENS & HALSKE A.-G. (B.P. 398,021, 23.8.32).—U-shaped frames formed of channel-Fe with the flanges facing outwards and with an intermediate layer of soft rubber containing fillers, making it resistant to hot alkali and acid, are bound together to form a cell body. J. S. G. T.

Dielectric materials. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of F. M. CLARK (B.P. 397,333, 31.10.32. U.S., 2.11.31).—An aryl or alkyl phosphate, *e.g.*, tritolyl phosphate (80—50 pts.), is mixed with phenolic material, *e.g.*, cresol (20—50 pts.), without heat-treatment. J. S. G. T.

Insulating compound particularly for use with electric cables. DERBY CABLES, LTD., and R. JOHN-STON (B.P. 397,263, 19.5.32).—Coloured pigments, e.g., ultramarine, or dyes, are added to insulating material containing mineral rubber and/or vulcanised bitumen. J. S. G. T.

Temp. measurement. Crushing etc. machine. Colour analyser.—See I. Separation of ketoses.— See III. Cd-plate. Anodes for condensers etc.— See X. Cellulose coatings for cables.—See XIII. Contrast media in X-ray photography.—See XXI.

XII.—FATS; OILS; WAXES.

Application of fish oils as soap-making material. V. Electrical conductivity of the soap solution of polymerised oils. S. UENO and T. YUKIMORI (J. SOC. Chem. Ind., Japan, 1933, 36, 456–457 B).—The conductivities of aq. solutions of pure soaps prepared from polymerised sardine oils (cf. B., 1933, 797), hardened sardine oil, cottonseed oil, or tallow, respectively, by saponifying, extracting the unsaponifiable matter, acidifying, and neutralising the liberated fatty acids, are of the same order. E. L.

Washing and cleaning preparations containing carbohydrates. N. SOKOLOV and T. BLVOVA (Masloboino-Zhir. Delo, 1932, No. 8, 22-26).—Addition of starch to soap and Na₂CO₃ solutions considerably increases the emulsifying power. CH. ABS. Avoidance of emulsification in defatting operations. A. E. RHEINECK and O. GISVOLD (Science, 1933, 78, 215—216).—An apparatus and method for defatting without permanent emulsification aq.-EtOH extracts of plant products by means of light petroleum is described. L. S. T.

Extraction of olive oil. A. MANGINI (L'Ind. Chimica, 1933, 8, 852-854, 982-986).—As practised in Apulia the process involves double-pressing. Laboratory and semi-industrial scale tests show that a third pressing is economically advantageous. Third and fourth extractions reduce the oil content of the residue from e.g., 13% to 8% and $5 \cdot 2\%$, respectively. Desiccation of the residue reduces the yield of oil obtained in the subsequent extractions. The economic aspect is discussed. H. F. G.

Alcohol and sugar contents of olive press-water. III. A. MANGINI (Annali Chim. Appl., 1933, 23, 342-345; cf. B., 1932, 1111; A., 1933, 104).—For the 1928—9 (1932—3) season, this H₂O contained 2.43 (1.10)% EtOH and 6.03 (2.74)% of total sugars. T. H. P.

Climate and the chemical nature of [olive] oil. G. PARIS (L'Ind. Chimica, 1933, 8, 987-989).—A discussion. H. F. G.

Determination of mol. wt. of linseed oil and its polymerides. P. J. GAY (Chem. & Ind., 1933, 703— 705).—It is suggested that the degree of association of the solvent, and hence its cryoscopic const. (K), vary with the concn. of the oily solute. E.g., $(C_6H_6)_n$ mols. are dissociated by the oil; lower vals. for K and mol. wt. are therefore obtained. cycloHexane (m.p. $5 \cdot 5^\circ$) is inert, molecularly unstrained, a good solvent for oils, and has high K (212 · 5), which is unaffected by the concn. of solute. Dry linseed oil gave mean mol. wt. 880 at 2 · 35% and 876 at 4 · 7%; undried, 867 · 5. The method is applicable to polymerised oils having mean mol. wts. up to 4320. S. M.

Dielectric constant of tung oil. C. T. KWEI and S. C. TAO (Lingnan Sci. J., 1933, 12, Suppl., 93-100). —The dielectric const. of fresh tung oil is 3.455 at 14.2° and 2.812 at 88.3°; that of oil heated at 88.3° was 3.241 at 8.5° and 2.696 at 99.2°. CH. ABS.

Hempseed oil. M. BAUMAN (Vsesoy. Akad. Selsk. Nauk. Lenin. Inst. Novogo Lubyan. Suir., 1932, 2, 113—124).—The oil contains 74.9% of unsaturated acids (oleic 51, linolenic 0.5%) and 20% of saturated acids. Owing to the high acidity the oil is difficult to hydrogenate without previous refining. It has good emulsifying properties. CH. ABS.

Hop oil. G. LOUVEAU (Rev. Marques Parfum. Savonn., 1932, 10, 420—421, 456—458; Chem. Zentr., 1933, i, 2008).—The steam-distillate afforded an insol. and a sol. oil; characteristics of oils from Bavarian, Bohemian, and Burgundian hops are recorded. For Bavarian hops (insol. and sol. oils, respectively) the oils have: d^{15} 0.8617, 0.9101; $n_{\rm D}$ 1.4850, 1.4910; $\alpha_{\rm D}$ +0° 18', —; acid val. 9.1, 25.6; ester val. 21.0, 45.5. A. A. E.

Czechoslovakian hop oil and its practical use. NEBOVIDSKÝ and J. HOREL (Chim. et. Ind., 1933, 29, Spec. No., 1208—1213).—Physical and chemical characteristics are recorded and the possible uses of the oil in brewing, perfumery, and soap-making discussed. A. G. P.

[Products from] oil shale. Oxidation of paraffin, and of balkhashite etc.—See II. Determining fat in milk.—See XIX.

PATENTS.

Detergent composition. M. C. TAYLOR, ASST. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,894,207, 10.1.33. Appl., 24.10.29).—Na silicate, phosphate, or other H_2O -sol. detergent (D) is mixed with Ca(OCI)₂ or other bactericide (B), the acid radical of D and the base of B forming an insol. compound, B being in minor proportion and fairly stable. B. M. V.

Marine [cod-liver] oil product and its manufacture. H. O. NOLAN, Assr. to ELLIS-FOSTER CO. (U.S.P. 1,896,185, 7.2.33. Appl., 4.8.27).—By partly hydrogenating cod-liver oil at 80° in the presence of a Pd, Pt, or Ni catalyst, a palatable deodorised oil of unimpaired vitamin activity and still retaining glycerides of highly unsaturated acids is obtained. E. L.

Lubricating oils.—See II. Halogenated C_2H_2 polymerides. Vinyl esters. Wax-like solid. Softening etc. agents.—See III. Grease-resistant paper and board.—See V. Rubber oil—See XIV. Emulsions of solid in fat.—See XIX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Turpentine as thinner. H. WOLFF and G. ZEIDLER (Farbe u. Lack, 1933, 413—414).—Comparison of Congo copal varnishes thinned with (a) two samples of turpentine, obtained presumably either by direct distillation of pine wood or from cellulose by-products, and (b) American resin-distilled turpentine shows that a samples have greater hardness than b and approx. equal dilution ratio, drying time, and η ; films which were dried at 40° in ultra-violet light also compared favourably.

S. M.

Accelerated weathering of paints and varnishes. V. G. JOLLY (J.S.C.I., 1933, 52, 329—336 T).—A general discussion is given of the factors to be considered in formulating an accelerated weathering cycle. The importance of the light source is stressed. A simple apparatus and cycle are described together with results which are compared with natural exposures. Agreement between natural and artificial tests is satisfactory for oil paints and varnishes, but less so for nitrocellulose products. The cycle described classifies paints and varnishes satisfactorily as regards time of breakdown and provides useful methods for evaluating such products provided fine differences are not sought.

Protective action of lead pigments against rust. M. RAGG (Trans. Electrochem. Soc., 1933, 64, 293—300.) —Products of reaction between PbO (I) or red lead (II) and drying oils include Pb linoleate and stearate, complex compounds of (I) with triglycerides, and basic Pb soaps. The good properties of paint films containing basic Pb pigments are mainly due to the presence of Pb compounds of high mol. wt. which cement the particles of pigment together and render the film strong and watertight. Whereas (II) films may contain 75% of such compounds, white-Pb films contain only 8-10%. The

protective action of (II) resulting from its passivating effect on Fe is considered to be of lesser importance. H. J. T. E.

Extraction of definite resin constituents. W. NAGEL (Angew. Chem., 1933, 46, 576-577).-The use of conc. solution of KOH instead of the customary solvents results in a cleaner separation of groups of constituents. A. G. P.

Application of low-temperature tar in the production of phenol-formaldehyde resins. II. G. T. MORGAN, N. J. L. MEGSON, and (in part) E. L. HOLMES (J.S.C.I., 1933, 52, 277-280 T).-Modifications of a previous method (B., 1931, 685) for prep. of PhOH-CH.O resins from low-temp. tar include replacement of paraformaldehyde by aq. CH_2O , C_6H_6 by other washing media (CCl₄, light oils, hot H₂O), C₅H₅N by other bases as catalysts, and omission of industrial spirit during vac. distillation. Breakdown voltages are not appreciably altered thereby, but in certain cases such as hot-H_oO washing rate of heat-hardening is reduced. Mechanical properties (plastic yield, moduli of rupture and of elasticity, resistance to impact, effects of drying and of moisture) and electrical tests (power-loss factor, surface resistivity) are given for a resin purified by C_6H_6 washing and vac. distillation. A method of purification depending on steam-distillation in vac. has been extended to a semi-scale plant and yields resins suitable for cheap impregnation. The nature of the catalyst has little effect on the breakdown voltage of PhOH resins, provided the latter be suitably washed with C_eH_e.

Quick-drying Canada balsam. H. COOMBS (Science, 1933, 78, 193—194).—A quick-drying balsam can be prepared by heating ordinary Canada balsam for several hr. until it has a decided orange colour and becomes brittle when cold; the product is dissolved to saturation in xylol. L. S. T.

Erratum.—On p. 799, col. 2, line 19, for FRAISE read FREISE.

Plastics—cellulose esters and ethers and their uses. W. J. JENKINS (Chem. & Ind., 1933, 705—708).— A lecture.

[Products from] oil shale.—See II. EtOH-solubility of nitrocellulose.—See V. Protective coatings for steel.—See X.

PATENTS.

Separation of terpene compounds from gasoline used for extracting rosin from wood. A. C. JOHN-STON, ASST. to HERCULES POWDER CO. (U.S.P. 1,896,793, 7.2.33. Appl., 19.6.28).—The terpenes present are converted into terpineol by saturating the gasoline solution with HCl gas and steam-distilling from aq. NaOH; the terpineol distillate is then fractionated.

Composition for use in forming a glazing-solution. H. H. EDWARDS (U.S.P. 1,892,980, 3.1.33. Appl., 11.6.31. N. Zealand, 2.8.30).—Casein 100, borax 7—15, Na₃PO₄ 7—15, and $(CH_2)_6N_4$ 0.5—8 lb. are ground dry and sprayed with sassafras oil 1 oz. and a non-drying oil 1—5 oz.; the whole is diluted with H₂O. B. M. V. [Non-drying] stain [for wood]. D. A. BRODEUR (U.S.P. 1,896,662, 7.2.33. Appl., 6.10.31).—The pigment is ground into about $\frac{1}{2}$ of its wt. of a drying oil, naphtha ($\gg 1$ pt.) is added, and the mixture stirred into a paraffin oil (12 pts.) at 60° having distillation range 250—300° and *d* approx. 0.86. S. M.

Manufacture of pigments by wet precipitation. W. C. HOOEY, Assr. to NEW JERSEY ZINC CO. (U.S.P. 1,896,312, 7.2.33. Appl., 21.1.29).—In order to control the amounts of hydroxide and hydrosulphide radicals present after the pptn. and, hence, the properties of the lithopone produced (cf. B.P. 263,119; B., 1928, 341), part of the BaS liquor is hydrolysed with live steam and ZnO (particle size $> 0.15 \ \mu$) and added to the crude pulp. ZnS pigments may also be made in this manner. S. M.

Production of pigment. W. J. O'BRIEN, Assr. to GLIDDEN CO. (U.S.P. 1,894,931, 17.1.33. Appl., 10.4.30). —Se is dissolved in a 14% BaS solution (with or without a porportion of Na₂S) and a solution of CdSO₄, containing 10-15% Cd, is added, giving a dirty brown ppt. of CdSSe_x, BaSO₄ which on calcination at 500-650° gives pigments ranging from bright red to deep purple, according to Se content. S. S. W.

Preparation of titanium pigments. J. BLUMEN-FELD and M. MAYER, Assrs. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,892,693, 3.1.33. Appl., 15.5.30).— Various methods of preparing pptd. TiO₂ together with filler material are described. The claims relate only to the incorporation with the moist ppt. of 0.5-20%of a Na or K compound (0.5-5%) if the carbonate is employed) in presence of SO₄" ions and calcination at > 800°. B. M. V.

[Rosin] varnish. C. C. KESLER, ASST. to PINE INST. OF AMERICA, INC. (U.S.P. 1,894,374, 17.1.33. Appl., 6.9.29).—Rosin is isomerised, e.g., by maintaining at 300° or passing HCl gas through the molten rosin, then dissolved in a solvent (EtOH, MeOH), and 40% aq. NaOH (‡ of the equiv. wt. of the rosin) is added. The resulting ppt. is separated and the resene, free from abietic acid components, is recovered from the filtrate as a neutral gum of enhanced drying properties for use in varnish. S. S. W.

Production of varnish-like material. J. P. A. McCov (U.S.P. 1,894,626, 17.1.33. Appl., 24.9.20. Renewed 26.6.30).—Varnishes comprising substantial proportions of tung oil and the usual resins, driers, and thinners, together with a non-oxidisable, greasy substance (about 10% of the whole), *e.g.*, a mineral oil or non-drying vegetable oil, are claimed. They dry rapidly through polymerisation of the tung oil and expel the greasy material, which is subsequently wiped off. S. S. W.

Cellulose ester composition. H. M. WEBER, Assr. to ELLIS-FOSTER CO. (U.S.P. 1,897,015, 7.2.33. Appl., 28.4.25. Renewed 15.12.32. Cf. B.P. 327,095; B., 1930, 570).—The cellulose ester is incorporated with a resin of low acid val. made by heating a mixture of a monobasic (I), e.g., benzoic, and a dibasic (II) org. non-resin acid, e.g., phthalic anhydride, with glycerol at 290°. Decrease in the proportion of (I) increases the softening point of the resin and decreases its solubility

S. M.

in common org. solvents. (II) may also be substituted S. M. by rosin.

Cellulose acetate composition [for production of flexible films]. C. J. STAUD and C. S. WEBBER, Assrs. to Eastman Kodak Co. (U.S.P. 1,896,145, 7.2.33. Appl., 17.5.29).-Cellulose acetate (30-35% Ac) is dissolved in a mixture of 3 pts. of C2H4Cl2 and 1 pt. of a monohydric aliphatic alcohol below C6, e.g., MeOH. F. R. E.

Benzylcellulose compositions. L. LIGHT (B.P. 397,773, 16.2.33) .- Mixed isomerides obtained by chlorin-S. M. ation of Ph₂ are used as plasticisers.

[Cellulose] coating compositions [for electric cables]. E. I. DU PONT DE NEMOURS & Co. (B.P. 397,554, 26.2.32. U.S., 27.2.31) .- Sufficient relatively incompatible, non-volatile mineral oil, e.g., liquid paraffin, is incorporated with a cellulose lacquer so as to be exuded as a thin top layer when the film is spread. The preferred softener, e.g., tolyl phosphate, is a solvent for the cellulose derivative, but is immiscible with the oil. The coating dries rapidly and is not thermoplastic. S. M.

Manufacture of products [plastic masses, moulding powders, etc.] containing cellulose derivatives. H. DREYFUS (B.P. 397,191, 19.11.31) .- Plasticisers or other materials are incorporated with cellulose derivatives, e.g., the acetate (< 56% Ac), by means of media containing methylene ethylene ether. (Cf. B.P. 354,860 F. R. E. -1; B., 1931, 936.)

Production of [plasticiser] composition of matter. O. A. CHERRY and F. KURATH, Assrs. to ECONOMY FUSE & MANUFG. Co. (U.S.P. 1,896,069, 7.2.33. Appl., 16.8.29) .- Furfuraldehyde or CH2O is heated with the reaction product of stearic or other org. acid and NH2Ph or other primary amine ; the wax or resin formed can be used as a plasticiser for reactive phenolic resins.

S. M.

Refining of rosin. J. N. BORGLIN, Assr. to HERCULES POWDER Co. (U.S.P. 1,894,975, 24.1.33. Appl., 11.11.30). -In order to remove visible and latent colour compounds a solution of rosin in, e.g., gasoline is shaken with a solution of a metal halide, e.g., SnCl4, in EtOH; the solvents are chosen so that separation ensues on keeping or cooling. The rosin layer is washed with EtOH and S. M. evaporated.

Reaction product of rosin, aromatic amines, and furfuraldehyde. O. A. CHERRY and F. KURATH, Asses. to Economy Fuse & Manufg. Co. (U.S.P. 1,894,580, 17.1.33. Appl., 16.8.29) .- Rosin is caused to react with one or more aromatic amines, e.g., NH2Ph, C10H7 NH2, and the reaction product is caused to react with furfuraldehyde. This is claimed as a special case of the general reaction between acids, amines, and aldehydes. S. S. W.

Manufacture of resinous products by condensing aldehydes with other compounds such as urea or phenol. I. FEINMANN (B.P. 397,909, 2.3.32).-The resin is divided into fractions, according to their affinities for H₂O, by first treating the hot resin with the min. quantity of H2O (25-75%) necessary for separation into layers at 15° ; more H_2O is then added to the upper, more aq., layer until pptn. ceases and 2 layers again result. The properties of the end-product are controlled by using suitable proportions of each fraction. S. M.

Manufacture of urea-acetaldehyde-formaldehyde resin. G. BARSKY and H. P. WOHNSIEDLER, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,896,276, 7.2.33. Appl., 12.8.29) .- Ethylideneurea is made by heating aq. urea and MeCHO in the presence of acid at 20-30° for several days, washing the product, and then heating it with formalin until dissolution occurs. The sol. resin thus produced becomes insol. when heated at 70°. Alternatively, the urea, CH2O, and MeCHO are heated S. M. in an inert solvent, e.g., MeOH.

Manufacture of artificial resins and resinous products [from petroleum tar]. STANDARD OIL DEVELOPMENT Co. (B.P. 397,699, 28.10.32. U.S., 30.10.31).-Petroleum tar is agitated at 100-180° with 1-10% of anhyd. AlCla for about 2 hr.; reactive constituents are thereby condensed or polymerised and the yield of stable resin, after removal of sludge and oil, is increased by adding unsaturated hydrocarbons. Oily matter is previously removed from the tar by distillation at $150-350^{\circ}/1$ mm. (i) The resin thus left is purified either by extraction with a selective solvent or by treating its solution in a hydrocarbon solvent with conc. H.SO. and evaporating the solvent after neutralising. (ii) The distilled oil thus obtained is also converted into a nonreactive resin by chlorination at $> 65^{\circ}$ to 10-15% wt.-increase followed by distillation up to 350°. Alternatively, the chlorinated product is condensed with $AlCl_3$ at $\gg 100^\circ$, hydrolysed, and distilled; addition of aromatic or naphthenic hydrocarbons gives a superior S. M. product.

Production of resinous compounds [from petroleum]. G. Egloff, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,896,227, 7.2.33. Appl., 24.3.27).-Cracked pressure distillates or pressure-distillate bottoms are heated with 5-10% of S or a S compound at 260° and 50 lb./sq. in. for about 6 hr., the more volatile vapours being continuously removed.

Production of resins of the coumarone-indene type. J. M. WEISS (U.S.P. 1,894,934, 17.1.33. Appl., 10.7.29) .- A mixture of an absorbent earth (fuller's earth) and an acid ferric sulphate is used as polymerising agent for coal-tar naphtha fractions (b.p. range 150-200°) containing coumarone and indene constituents. S. S. W.

Production of artificial resin from resite masses containing a cellulose filling material. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 397,690, 11.10.32. Ger., 12.10.31) .- Insol. resite masses containing, e.g., wood meal are rendered sol. by heating in an autoclave with a phenol and a substance which hydrolyses the cellulose, e.g., 10% aq. HCl. The product is rinsed with H₂O and may be converted into a mouldable resin by treatment with an aldehyde and $\rm NH_3$ or $\rm (CH_2)_6N_4$.

Manufacture of coated objects or coatings of artificial resin. INTERNAT. GEN. ELECTRIC Co., LTD., Assees. of Allgem. Elektricitäts Ges. (B.P. 398,070, 14.12.32. Ger., 24.12.31) .- An amine-aldehyde resin of low softening point is sprayed upon the article.

S. M.

Partial-oxidation products.—See II. Vinyl esters. [Resinous] esters from petroleum. Salts of ketonic acid. Softening etc. agents. Ketobenzoates. [Compositions containing] metastyrene.—See III. Moulded sheets. Glassine paper.—See V. Resinbonded granules.—See VIII. Rubber oil.—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Stability of hard rubber [ebonite] towards corrosive liquids. S. REINER (Chem. Fabr., 1933, 6, 375—376).—The results are tabulated of the behaviour of 6 commercial samples of ebonite when immersed in aq. solutions of a no. of inorg. acids and oxidising agents, and in cresol, for 8 weeks at room temp. or for 8 hr. at 70°. Similar results are also given for 2 samples of soft rubber. D. F. T.

Volumetric determination of free sulphur in rubber. J. A. ROBERTSON and J. YOUNG (J.S.C.I., 1933, 52, 296 T).—The method involves using Na rhodizonate after oxidation of the COMe₂ extract with HNO₃ and HClO₄.

PATENTS.

Coagulation of [rubber] latex. S. B. NEILEY, Assr. to DEWEY & ALMY CHEM. Co. (U.S.P. 1,896,054, 31.1.33. Appl., 14.9.31).—Solutions of complex ammino-Zn ions, obtained, e.g., by the action of excess of aq. NH_3 or amine on a sol. Zn salt, are substantially without action on a colloidal dispersion of rubber, but effect thorough coagulation if the temp. is raised above a crit. val. D. F. T.

Production of rubber thread. INTERNAT. LATEX PROCESSES, LTD., Assees. of E. J. JOSS (B.P. 397,419, 31.3.33. U.S., 16.4.32).—Unvulcanised rubber thread produced, *e.g.*, by streaming latex through a nozzle is stretched so that its cross-sectional dimensions are reduced without substantial alteration in shape, the stresses being then partly or wholly relieved, *e.g.*, by heat, while the thread is still extended. It is thereby possible to obtain a variety of sizes of thread from a single nozzle. D.F.T.

Coloured rubber product and colouring of rubber. B. S. TAYLOR, Assr. to B. F. GOODRICH CO. (U.S.P. 1,895,088, 24.1.33. Appl., 28.3.30).—Dyes are applied to the surface of rubber, which may contain 5—50 vol.-% of inert pigment of medium covering power, before or after vulcanisation, but after the rubber has been formed to approx. its final shape. In a varicoloured article migration of the colour may be retarded by a layer of suitable rubber compound. A flexible, protective film, e.g., of nitrocellulose, may be finally applied. D. F. T.

[Manufacture of] oils obtained from rubber. H. PLAUSON (B.P. 397,136, 9.11.31. Ger., 8.11.30).— Oils for use in the prep. of paints etc. and impregnation purposes are obtained by hydrogenation of rubber, e.g., at $200-250^{\circ}$ for 4 hr., in the presence of a catalyst (AlCl₃, ZnCl₂) and of a solvent, e.g., a petroleum fraction, b.p. 120-210°. D. F. T.

Production of [rubber-]coated articles. DUNLOP RUBBER Co., LTD., ANODE RUBBER Co., LTD., and G.W. TROBRIDGE (B.P. 397,277, 21.6.32).—Aq. dispersions of rubber (I) etc. are applied to a backing of fibrous material such as felt, paper, or fabric; the material is then subjected to heat and pressure, e.g., in a "day-light-press," a sheet or sheets of heat-conducting material such as Al being first placed against the layer of (I) and removed subsequently. Coagulation, drying, and

vulcanisation occur almost simultaneously. D. F. T. **Rubber-coated articles and process.** P. H. WATKINS, ASST. to NAUGATUCK CHEM. Co. (U.S.P. 1,896,263, 7.2.33. Appl., 19.9.28. Renewed 13.8.31).— The articles are given a coating of ebonite, then a layer of an intermediate rubber compound, and finally a coating of rubber is applied in the form of an aq. dispersion; the whole is dried and vulcanised. D. F. T.

Production of goods of or containing rubber [rubber-coated fabrics]. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., E. A. MURPHY, and D. N. SIMMONS (B.P. 397,997, 21.6.32).—The tendency of aq. dispersions of rubber to penetrate to the other side of fabric to which they are applied for proofing purposes is reduced by first converting them into the flocculent ppt. form. D. F. T.

Provision of [rubber] articles with a smooth matt finish. DUNLOP RUBBER Co., LTD., ANODE RUBBER Co., LTD., E. A. MURPHY, and D. N. SIMMONS (B.P. 397,270, 28.5.32).—The surface of the articles is coated with a mixture of flocculent rubber ppt. and starch powder, the prep. of which may be effected by the flocculation of latex before or after the addition of the starch. D. F. T.

(A) Composition of matter [for treating rubber].
(B) Treatment of rubber. (A, B) A. F. BIGGER and
(B) A. C. SQUIRES, ASSTS. to RUBBER PROCESS CORP.
(U.S.P. 1,896,659-60, 7.2.33. Appl., [A] 27.1.23,
[B] 29.1.23. Renewed [A, B] 14.7.32).-(A) The quality of rubber, especially vulcanised rubber, is improved by surface treatment with a solution of a mixture of NaHCO₃ (4 pts.) and gum acacia (1 pt.), possibly together with sea-salt (1 pt.). (B) Rubber to be reclaimed is heated with a mixture of NaHCO₃ and gum acacia.

D. F. T. **Rubber composition [containing lead silicate]**. A. E. Boss, Assr. to B. F. GOODRICH Co. (U.S.P. 1,895,910, 31.1.33. Appl., 25.5.32).—Finely-divided (pptd.) Pb silicate aids vulcanisation and is superior to PbO in fineness and uniformity. D. F. T.

Resilient rubber-like compositions. B. F. GOOD-RICH CO., Assees. of W. L. SEMON (B.P. 398,091, 30.1.33. U.S., 17.9.32).—By dissolving a polymerised vinyl halide in a heated solvent mixture, e.g., of o-nitrodiphenyl ether (2 pts.), $C_6H_4(NO_2)_2$ (1 pt.), and $C_6H_3Me(NO_2)_2$ (1 pt.), in suitable proportion (e.g., $1: \frac{1}{2} - 4$) and then cooling, a stiff resilient gel is obtained. D. F. T.

Vulcanisation of rubber. SCHERING-KAHLBAUM A.-G. (B.P. 398,118, 20.3.33. Ger., 22.3.32).—The excessive activity of piperidine pentamethylenedithiocarbamate as an accelerator of vulcanisation is obviated by the use of an accelerator of the formula NR'R''-CS₂H,NHR'''R'''', where R' and R'' are cyclic radicals which are different from the cyclic radicals R''' and R'''', e.g., cyclohexylamine pentamethylenedithiocarbamate. D. F. T. Vulcanisation of rubber. O. BEHREND, ASST. to RUBBER SERVICE LABS. Co. (U.S.P. 1,896,535, 7.2.33. Appl., 18.2.30).—Vulcanisation is accelerated by the reaction product of an aldehyde-arylamine, e.g., $C_{6}H_{13}$ ·CHO-NH₂Ph, and a PhMe derivative containing \lt 1 halogen atom in the side-chain, e.g., CPhCl₃.

D. F. T.

Antioxidant for vulcanised rubber products. J. R. INGRAM, ASST. to RUBBER SERVICE LABS. Co. (U.S.P. 1,896,544, 7.2.33. Appl., 18.2.31).—Rubber is vulcanised in the presence of a reaction product of a diarylamine, e.g., β -C₁₀H₇·NHPh, and a S chloride, of the structure NR₂·S·NR₂. D. F. T.

Manufacture of articles [football bladders] of or containing rubber and the like. DUNLOP RUBBER Co., LTD., and G. LIVINGS (B.P. 397,237, 31.3.32).

Vulcanisation accelerators.—See III. Artificial leather.—See V. Rubberised textiles.—See VI. Coating wire with rubber.—See X. Insulating compound.—See XI. Leather-like composition.— See XV.

XV.-LEATHER; GLUE.

Bacteriology of salt-stained French calfskins. W. HAUSAM (Collegium, 1933, 495–502).—The following organisms were isolated: Micrococcus pyogenes a aureus, M. crémoides, M. bicolor, M. aurantiacus, M. pyogenes β citreus, M. luteus, M. roseus, Bacterium brunificans, B. mesentericus, B. latericium, Adametz, B. megatherium, Sarcina luteus, and one unidentified. Gelatin (I) was liquefied by most of the cocci only in presence of atm. O₂. Standard bouillon–(I) was not liquefied by many of the cocci, which, however, liquefied (I) prepared from the salted calfskins. It has not been established whether salt stains are caused by a particular type of organism or by a large physiological group of micro-organisms. No apparent difference in the organisms on French and German salt-stained calfskins has been established. D. W.

Effect of various additions to marine salt used as a cure for hides and skins. II. A. GUTHRIE and M. A. SASTRY (J. Soc. Leather Trades' Chem., 1933, 17, 500—503; cf. B., 1933, 320).—Skins which had been salted by means of NaCl and either NaHSO₄ or NaHSO₃ showed an alkaline reaction after 25 weeks' storage. No such change was observed on skins treated with NaCl and either Na₂SiF₆ or H₂C₂O₄, but a dullness was formed by NaCl and Na₂SiF₆ which rendered the skins thus treated unsuitable for avaram bark tannage but not for chrome tannage. D. W.

Chrome tanning. XVI. Behaviour of sodium thiosulphate as neutralising agent. E. STIASNY and F. PRAKKE (Collegium, 1933, 465–494; cf. B., 1933, 159).—Na₂S₂O₃ (I) is completely converted into H₂SO₃ and S by excess acid at $p_{\rm H}$ 1·6, but only 76·5% of the (I) is thus converted after contact for 24 hr. with excess acid at $p_{\rm H}$ 3·0; the residue of the (I) is converted into Na₂S₅O₆. (I) is not decomposed by acid at $p_{\rm H}$ 4·0–4·8, but is changed into Na₂S₅O₆. The neutralising effect of (I) is affected by the ionisation of H₂SO₃ into HSO₃' at $p_{\rm H} < 3\cdot3$ and into SO₃'' at $p_{\rm H} > 3\cdot3$. SO₂ can escape from the solution at $p_{\rm H} < 3\cdot3$ only; 100% of the H_2SO_3 formed escapes as SO_2 into the air after 24 hr. at $p_H 0.3$, 98% at $p_H 1.6$, 23% at $p_H 3.0$, and none at $p_H 4.0$. The p_H vals. attained by neutralising acid solutions with N-, 0.1N-, and 0.01N-(I), respectively, are 7, 6, and 5. The degree of neutralisation is greater as the time allowed is increased and with agitation of the solutions. The amount of unneutralised acid is greater with weaker acids. 50% AcOH remains unneutralised in contact with a 6% solution of (I). Sulphito-chrome complexes are formed by the neutralisation of some of the acid in chrome alum solutions, and most of the SO₃ radicals formed are present in the complex. In chrome alum solutions of $p_H 3.0$ only 9% of the (I) is decomposed into H_2SO_3 . A better chrome liquor is obtained by neutralising chrome alum solutions with (I) in the cold than in the hot. D. W.

Methods for sampling [vegetable] tanning materials [for tannin analysis]. Report of Pan-European Commission. F. MÜLLER and R. O. PHILLIPS (J. Soc. Leather Trades' Chem., 1933, 17, 529-531).—A supplement to the official method (cf. B., 1931, 986; 1932, 359). D. W.

Report of the Pan-European Commission on quantitative tannin analysis. E. STIASNY and J. G. PARKER (J. Soc. Leather Trades' Chem., 1933, 17, 517—528; cf. B., 1932, 394).—The Riess method of filtration (B., 1929, 569) is recommended for adoption, but no change in the determination of the non-tans. Satisfactory dry chromed hide powder has not yet been prepared. D. W.

Direct use of hide powder for detamisation [in tannin analysis]. A. JAMET (J. Soc. Leather Trades' Chem., 1933, 17, 503—510).—Hide powder (H) can be used direct for detamisation if the filtrates are subsequently freed from the sol. matter derived from H, by treatment with kaolin. Details are given, also comparative results by the new and official methods, respectively. D. W.

Influence of magnesium sulphate on the moisture content of tanning extracts. A. DOHOGNE (Cuir tech., 1932, 21, 344—345; Chem. Zentr., 1933, i, 1719). —The H_2O of crystallisation of MgSO₄ or Al₂(SO₄)₃ evolved from extracts at 40—100° should not be calc. as moisture. A. A. E.

Effect of chromates and dichromates on vegetable-tanned leather. D. WOODROFFE (J. Soc. Leather Trades' Chem., 1933, 17, 531-535).—The breaking strength of sumac-tanned skiver pieces was not immediately affected by treating them with dil. aq. $K_2Cr_2O_7$, but was diminished after the treated pieces had been set aside for 3 months. An immediate weakening effect was detected in skiver pieces which had been treated with acidified solutions of $K_2Cr_2O_7$. D. W.

Effects of atmospheric moisture on physical properties of vegetable- and chrome-tanned calf leathers. W. D. EVANS and C. L. CRITCHFIELD (Bur. Stand. J. Res., 1933, 11, 147—162).—The physical properties of chrome-tanned leather (I) are more sensitive to changes in R.H. than those of vegetable-tanned leather (II); the reason for this is ascribed to the looser A. A. E.

structure and higher content of protein material of (I). In absence of stretching or flexing (I) shows very large hysteresis effects in its change of area with changes in R.H. The ability of leather to adsorb H_2O depends principally on the amount of hide substance present. The probable mechanism of the effect of adsorbed H_2O on leather strength is discussed. D. A. C.

Prevention of deterioration of vegetable-tanned leathers. D. McCANDLISH and W. R. ATKIN (J. Soc. Leather Trades' Chem., 1933, 17, 510-517).—The leather is impregnated with 5% solutions of Na salts of org. acids *e.g.*, HCO₂Na, NaOAc, to increase the content of non-tans and buffer the H₂SO₄ absorbed by the leather from the atm. D. W.

Determination of moisture in leather. V. KUB-ELKA, V. NĚMEC, and S. ŽURAVLEV (Chem. Obzor, 1932, 7, 219—223; Chem. Zentr., 1933, i, 1558).—Drying of finely-divided leather (I) at 100° is preferred when the fat content is $\geq 2\%$; when this is $\geq 2\%$, 10 g. of (I) are dried at 100° for 1 hr. and then extracted with light petroleum. The H₂O content (%) = 100[A - (B + C)]/A, where A is the wt. of leather, B that of defatted dry leather, and C that of fat.

PATENTS.

Tanning of animal hides. J. R. GEIGY A.-G. (B.P. 397,672, 24.8.32. Ger., 5.9.31).—Skins are treated with a condensation product of non-sulphonated dihydroxydiphenylsulphone, an aromatic sulphonic acid, and CH₂O or S₂Cl₂, which product (cf. B.P. 375,160; B., 1932, 951) is either H₂O-sol. or has been subsequently rendered so. D. W.

Manufacture of an artificial leather-like composition [from rubber latex]. P. MEYERSBERG and G. WOLF (B.P. 397,676, 7.9.32).—Waste leather mixed with rubber latex, after pre-drying, is concurrently dried more completely and disintegrated by heating near 100°, preferably on friction rolls, whereby intimate union is effected. Ordinary rubber (or reclaim) and odorisers may also be introduced. D. F. T.

Manufacture of [vegetable] glue. H. V. DUNHAM (U.S.P. 1,895,979, 31.1.33. Appl., 16.4.31).—Powdered ivory nut is added to glues comprising, *e.g.*, casein, CaO, Na₂CO₃, Na₃PO₄, and NaF. L. A. C.

Preparation of glue products. E. F. CHRISTOPHER and F. L. DE BEUKELAER, ASSTS. to SWIFT & CO. (U.S.P. 1,895,446-7, 31.1.33. Appl., 13.7.31).—(A) Boneglue or gelatin solutions are adjusted by the addition of acids or acid salts to $p_{\rm H} > 5$ so that org. material present in colloidal suspension flocculates out and can be removed; the solution after filtration is conc. to a viscous fluid or to dryness. (B) Glue or gelatin rendered insol. by the action of CH₂O is again rendered sol. by treatment with urea. L. A. C.

Improving the water-resistance of casein glues. L. BRADSHAW (U.S.P. 1,895,433, 24.1.33. Appl., 21.6.29).—An aldehyde or a polymeride of an aldehyde having C > 1, e.g., MeCHO, PhCHO, aldol, together, if desired, with a retarder (an aromatic sulphonic acid or a sol. Cu, Ni, or Ca salt) is added to the wet glue base. L. A. C. Treating leather.—See I. Artificial leather.— See V. Bleaching [of furs].—See VI.

XVI.—AGRICULTURE.

Physics in agronomy. A. F. Joffe (Chem. Social. Agric., 1932, No. 9-10, 25-27).

Rôle of ionic radii in soil science. A. FERSMAN (Chem. Social. Agric., 1932, No. 9–10, 19–24).—A discussion on the relation of ionic radii to cation exchange. CH. ABS.

Soil absorbing complex as the colloidal fraction of the soil and its relation to plants. K. K. GEDROIZ (Chem. Social. Agric., 1932, No. 9—10, 15—18).—The properties of the absorbing complex are discussed and data illustrating the effect of Ca on the exchangeable cations in relation to the yield of flax are recorded.

CH. ABS. Relation between physical properties and the nature of absorbed bases in the soil. L. KOTZMANN (Mezög.-Kutat., 1932, 5, 427–437; Chem. Zentr., 1933, i, 1990).—The effect of various cations on the physical properties of Ca- or Na-soils has been studied. A. A. E.

Comparison of methods of treatment of soil samples before mechanical analysis. V. Novák and P. HRUBEŠ (Věstn. Českoslov. Akad. Zeměd., 1933, 9, 19—25; Chem. Zentr., 1933, i, 1991).

Laws of soil colloidal behaviour. XI. Electrodialysis in relation to soil processes. S. MATTSON (Soil Sci., 1933, 36, 149-163; cf. B., 1932, 162).-During the electrodialysis of a soil, after the removal of a considerable proportion of the exchangeable cations, there is a movement of Fe and Al (and some associated SiO₂) towards the cathode. A sesquioxide layer is later built up next to the cathode membrane. This layer is similar to the B horizon of a podsol and by virtue of its high ultimate $p_{\rm H}$ finally prevents further passage of Fe and Al. Reversion of the polarity of the cell causes the re-formation of the layer in the new cathode chamber. Passage of Fe and Al to the cathode may be entirely prevented by the interposition of a layer of Al(OH)₃. If the soil is maintained in a saturated condition by continuous additions of alkali, SiO2 and humus pass to the anode but there is no movement of Al and Fe. This process is identical with laterisation. The low displaceability of Mg from soil is attributed to the stability of its silicates. Among bivalent silicates the order of displaceability by NH_4Cl is Ba > Ca > Mg. A. G. P.

Humic acid as the cause of electrochemical activity in soil. J. KUBEŠ (Chim. et Ind., 1933, 29, Spec. No., 1205—1207).—The favourable influence of humus materials in soil on the growth of plants is due, not to any sp. action of humic acid on the plants but to the improved physical and nutritional condition, obtaining in the soil. A. G. P.

Fixation of silica by colloidal clay. A. DEMOLON and E. BASTISSE (Ann. Agron., 1933, 3, 83-90).--Under conditions precluding pptn. of SiO₂ in the gel form clay colloids can fix SiO₂ from the K salt. Fixation of SiO₂ and that of K are independent processes. The extent of SiO₂ fixation varies with the nature of the clay, being high for soil clay and low for kaolin. With Behaviour of soil under reforestation. C. E. MILLAR (Soil Sci., 1933, 36, 97—99).—In a previously cultivated soil resown to forest trees approx. 70 years ago, practically no "mould" layer occurred immediately beneath the litter covering, and the underlying soil retained its "plough-soil" structure and showed no evidence of podsolisation. A. G. P.

Comparison of cropped and virgin soils. C. DORMAN (Soil Sci., 1933, 36, 101-119).—Differences in analytical vals. for cropped (A) and virgin (B) soils varied considerably with the soil type. In light-soil areas the P content was decreased, and in heavy areas increased, by cropping. In general, the ratio available P: total P was higher in B. Cropping induced little or no change in $p_{\rm H}$ or exchangeable H contents. The ratio of exchangeable bases to total bases increased with the heaviness of the soils. With increasing fineness of texture there was a decrease in the proportion of Ca in the total bases and in the total exchangeable cations. Ca^{**} was held more firmly in the adsorbing complex of B. A. G. P.

Value and application of [plant-]growth curves to field-plot experiments. K. H. W. KLAGES (J. Amer. Soc. Agron., 1933, 25, 453-464).—The straightline trend of growth curves representing the increasing height of plants with time are calc. by the method of least squares. The slope of the line is an index of seasonal conditions during growth and is approx. the same for plants of similar nature of growth, *e.g.*, all spring-sown cereals. A. G. P.

Three years' results with an intensively managed pasture. D. S. FINK, G. B. MORTIMER, and E. TRUOG (J. Amer. Soc. Agron., 1933, 25, 441–453).—In comparison with completely fertilised pasture, omission of N [as $CaCN_2$ (I)] reduced the yield of herbage by 35%in the first year and by 50% in the second. Where annual dressings of (I) were maintained there were a closer sward, fewer weeds, and a marked reduction in the acidity of the surface soil. A. G. P.

Test of plant material as an aid in determining the potassium needs [of soils]. S. F. THORNTON (J. Amer. Soc. Agron., 1933, 25, 473–481).—The sol. K content of appropriate plant organs is determined by a modified cobaltinitrite method. Data obtained are utilised as an index of the K-supplying power of the soil. A. G. P.

Influence of a mulch on soil nitrates. A. B. BEAUMONT and G. C. CROOKS (Soil Sci., 1933, 36, 121— 123).—In apple orchard soils mulched with waste hay and straw without incorporation with soil, accumulation of NO_3' was small during the first 3 years but increased in the fourth. Nitrification probably occurs in the lower humified layer of the mulch which touches the soil, and accumulation of NO_3' begins only when the C: N ratio has been narrowed by a process of decay. Phosphoric acid and phosphatic fertiliser industries. H. SIEBENEICHER (Angew. Chem., 1933, 46, 596-610).—A review.

Rational utilisation of phosphoric acid in the growth of plants. A. The (Chim. et Ind., 1933, 29, Spec. No., 1245—1246).—Phosphatic fertilisers applied to arable soils are utilised by plants only to the extent of approx. 15%. Addition of very finely-powdered quartz sand considerably increases the amount of P assimilated. A. G. P.

Response of oats to phosphate fertiliser. N. I. ALIAMOVSKI (Chem. Social. Agric., 1932, No. 8, 35–46). —Analytical technique is described. Citric acid-sol. P_2O_5 decreases with advance of the growing season.

CH. ABS.

Potash fertilisers for potatoes. A. NĚMEC (Chim. et Ind., 1933, 29, Spec. No., 1247-1250).—The advisability of using K fertilisers containing SO₄" rather than Cl' is discussed. A. G. P.

Influence of increased applications of ammonium nitrate, superphosphate, and phosphates in general on the yield of oats. I. G. ROZHDESTVENSKI (Chem. Social. Agric., 1932, No. 8, 57–65).—Increase of $\rm NH_4NO_3$ (I) affected more negatively the chernozem soil. In combination with superphosphate (II) the negative effects were eliminated. (II) alone was more effective on loess soil; with (I) the effect of (II) was not so pronounced on loess as on chernozem. Increase in (I) and (II) increased the acidity. The quantity of H₂O-sol. Ca increased with the higher applications of (I). More $\rm NH_4$ was absorbed by loess than by chernozem. Ch. Abs.

Lysimeter experiments with ammonium sulphate and sodium nitrate. T. L. Lyon and J. A. BIZZELL (J. Agric. Res., 1933, 47, 53—63).—Soils receiving NaNO₃ (I) produced heavier crops of lower Ca content than those to which $(NH_4)_2SO_4$ (II) was applied. A steady increase in soil acidity resulted from the repeated use of (II). Losses of N in drainage H₂O were greater from the use of (I) dressings, and those of Ca from (II) treatments. The latter effect was apparent when the two series of soils were similar in p_H val. and also when the (II)-treated soil had become more acid. The total N removed from soils in crops and in drainage was greater where (I) was used. A. G. P.

Use of coal as a manure. A. D. KISSEL (Chim. et Ind., 1933, 29, Spec. No., 705–720).—Use of peats, lignites, etc. of low calorific val. and of humus preps. from these as diluents for artificial fertilisers is discussed. Effects of humus materials on the physical and nutritional properties of soil are described. A. G. P.

Single or mixed fertilisers ? R. TRNKA (Chim. et Ind., 1933, 29, Spec. No., 1242—1244).—The use of mixed fertilisers of standardised types and prepared in accordance with modern views of plant-nutrient requirements (e.g., Mitscherlich factors) is advocated.

A. G. P.

Mixed fertilisers containing nitrogen. E. GALLE (Chim. et Ind., 1933, 29, Spec. No., 721-724).—The nature and prep. of Nitrophoska are described.

Present and the

montanini to (antos (01 teo .co i) . . . A. G. P. ate

A.G.P. ge

Salt tolerance by cotton. M. T. RUIZHENKOVA (Chem. Social. Agric., 1932, No. 8, 47—56).—Up to 9% is not injurious. Na and Mg sulphates are as injurious as the chlorides. 0.4% CaSO₄ does not depress the growth of the plant, but reduces the yield. Egyptian is more sensitive than American cotton. CH. Abs.

Action of chlorate, bromate, and iodate on plant growth. M. HESSENLAND, F. FROMM, and L. SAALMANN (Angew. Chem., 1933, 46, 577-579).—Plants were injured more rapidly by spraying with NaBrO₃ solutions (I) than with NaClO₃, but, in general, recovered more rapidly and in greater numbers. The action of NaIO₃ was much weaker. Up to 3% (I) caused rapid corrosion of Zn, but had little action on Cu or (except in the case of 0.5%) on steel. A. G. P.

Comparison of the Neubauer method with results of cultural trials in Moravia, 1926—1931. O. KYAS (Chim. et Ind., 1933, 29, Spec. No., 1217—1241). —There was good general agreement between Neubauer vals. and cropping trials in these soils. For effective use in fertiliser control the limiting vals. assigned by Neubauer (especially for K) must be raised for application to Moravian soils. A. G. P.

Hawaiian pineapple field-soil temperatures in relation to the nematode *Heterodera radicicola* (Greef), Müller. H. R. HAGAN (Soil Sci., 1933, 36, 83—95).—Records of temp. variations in cropped, fallow, and paper-mulched soils are given. At $\frac{1}{4}$ in. in unshaded, and at 3 in. depth in paper-mulched soils, temp. may exceed the lethal figure for the nematode for some months each year. A. G. P.

Lime-sulphur injury accentuated by casein spreader. R. H. SMITH (J. Econ. Entom., 1933, 26, 730-731).—Records indicate that use of casein with CaO-S-Pb arsenate sprays intensifies injury by CaO-S rather than that by As. A. G. P.

Chemical relationship between certain insecticidal species of fabaceous plants. R. C. ROARK (J. Econ. Entom., 1933, 26, 587—594).—The distribution and relative toxicity of rotenone, toxicarol, deguelin, and tephrosin in this species of plants are discussed.

A. G. P.

New development in the fixation of nicotine [for insecticides]. W. MOORE (J. Econ. Entom., 1933, 26, 723-726).—An insol. nicotine (I) compound is prepared by heating an aq. solution of (I), resorcinol, and CH_2O . The product has 22% of (I) and the saturated solution contains 0.004 g. (I) per 100 c.c. The toxicity to codling moth is equal to that of (I) tannate. Incorporation with oil yields a suitably adhesive material for insecticidal purposes. A. G. P.

Determining approximately the evaporation of petroleum spray oils under field conditions. L. H. DAWSEY (J. Econ. Entom., 1933, 26, 735–736).—About 0.2 g. of oil is dropped on to an annular disc of filter paper placed on plain glass, and heated in an oven for 24 hr. at 37.8°. The filter paper must be dried at this temp. for several days before use. For all spray oils tested evaporation ranged from 1 to 2%. A. G. P.

Compatibility of oil emulsion-cresylic acid sprays with fungicides. J. M. GINSBURG (J. Econ. Entom., 1933, 26, 566—572).—Freshly prepared Bordeaux mixture (4–6–50) forms a stable combination with oil emulsions containing 0.5% of cresylic acid (I). CaO–S is not compatible with (I), but by addition of skim-milk powder forms a stable spray mixture with colloidal (I) (prepared by incorporating 10—20% of soap). No loss of toxicity of (I) or oil to eggs of aphis and red mite results from admixture with the above fungicides. A. G. P.

Growth of the cotton root-rot fungus in synthetic media, and the toxic effect of ammonia on the fungus. D. C. NEAL, R. E. WESTER, and K. C. GUNN (J. Agric. Res., 1933, 47, 107—118).—The fungus grew rapidly in media containing N as nitrates (of K, Na, or Ca), but much less satisfactorily when $(NH_4)_2SO_4$ or NH_4NO_3 was used. In NO_3' media the p_H of the substrate increased with growth. Brief exposure to aq. NH_3 inhibited the development of mycelium. In field tests, applications of 6% aq. NH_3 to soil around infected plants killed the mycelium in most cases, but plants were somewhat injured. A, G. P.

Copper sprays and $p_{\rm H}$. R. ENGEL (Rev. Viticult., 1933, 78, 73—78; Chem. Zentr., 1933, i, 1991).—At the commencement of growth the CaO content of the Cu spray should be low. The last sprays may advantageously be acid. A. A. E.

Laboratory tests with various fumigants on codling-moth larvæ. J. M. GINSBURG (J. Agric. Res., 1933, 46, 1131—1136).—Among a no. of org. fumigants examined, liquid HCN and ethylene chlorohydrin were the most toxic. The order of toxicity of the fumigants was similar for naked larvæ and larvæ in hibernacula, the min. doses for the latter being considerably the higher. The observed % kill decreased markedly with falling temp. A. G. P.

Vapour heat treatment for the control of bulb pests and its effect on the growth of narcissus bulbs. F. J. SPRULJT and F. S. BLANTON (J. Econ. Entom., 1933, 26, 613—620).—The recognised method for the control of *Eumerus* may be adapted to the destruction of nematodes. No growth injury resulted from treatment at 120°, and some stimulation is indicated when slightly lower temp. was used. A. G. P.

Field control of the gladiolus thrips (*Taeniothrlps* gladioli, M. and S.). H. H. RICHARDSON and R. H. NELSON (J. ECON. Entom., 1933, 26, 546-554).-Of a no. of insecticides examined, a Paris Green-brown sugar spray was the most effective. Nicotine-soap and -pinetar preps. injured the plants. Treatment with $C_{10}H_{g}$ and $p-C_{6}H_{4}Cl_{2}$ retarded the growth of plants and reduced corm and flower production. A. G. P.

Control of gladiolus thrips on corms in storage. F. F. SMITH and H. H. RICHARDSON (J. Econ. Entom., 1933, 26, 536-545).—Fumigation with $Ca(CN)_2$ dust kills all stages of the insect except eggs. 3 treatments (5 oz. per 1000 cu. ft. at 10-day intervals) are necessary. A mixture of $C_2H_4Cl_2$ and CCl_4 (3:1 by vol.) at the rate of 14 lb. per 1000 cu. ft. killed all stages. H_2O -vapour treatment (4 hr. at 43° and 95% R.H.) and immersion for 20 min. at 43-45° was effective for small lots. Fumigation with $C_{10}H_8$ (1 oz. per 100 corms) or immersion in

British Chemical Abstracts-B.

935

1:50 semesan (I) gave 100% kill and afforded protection for a considerable period. Heat-treatments and $C_2H_4Cl_2$ -CCl₄ mixture accelerated and HgCl₂ and (I) retarded the breaking of dormancy, but no permanent effect on the growth or flowering of the plants was apparent. A. G. P.

Greenhouse and field tests for the control of gladiolus thrips. C. C. HAMILTON (J. Econ. Entom., 1933, 26, 555—565).—For control on foliage pyrethrum or rotenone dusts gave the best results. A. G. P.

Gladiolus thrips in the United States. C. A. WEIGEL and F. F. SMITH (J. Econ. Entom., 1933, 26, 523-528).—Growers' observations on the effectiveness of various control measures are recorded. A. G. P.

Ethylene oxide as fumigant. A. HASE (Arb. biol. Reichsanst. Land- u. Forstwirt., 1932, 20, 101–110; Chem. Zentr., 1933, i, 1991).— C_2H_4O has high penetrability. 60 g. per cu. m. is toxic to insect eggs in 24, but not in 8, hr. (Cf. B., 1932, 318.) A. A. E.

Distribution of organic matter in the sea bottom and the chemical nature and origin of marine humus. S. A. WAKSMAN (Soil Sci., 1933, 36, 125— 147).—Analysis and fractionation of a no. of samples of marine humus (A) is recorded. The humus of marine mud has a C:N ratio of 8—12:1, narrower ratios corresponding with higher humus contents. A is more resistant to decomp. than are fresh plant and animal residues. A. G. P.

Superphosphate.—See VII. Protecting pipes from soil action.—See X. Determining Se in soils. Removing spray residues from apples.—See XIX.

PATENTS.

Production of phosphatic fertilisers. B. OBER, W. W. PAGON, G. L. PRUETT, and W. W. TROXELL, Assrs. to OBERPHOS CO. (U.S.P. 1,893,437, 3.1.33. Appl., 20.9.29).—An annular jet of acid is caused to entrain finely-divided phosphate rock and convey it to a digester, where the mixture is maintained in uncaked condition and prevented from evaporating by air pressure.

B. M. V.

Manufacture of fertiliser [from peat]. H. L. HARTENSTEIN (U.S.P. 1,894,587, 17.1.33. Appl., 18.10.26).—Moist peat is mixed with finely-divided Fe and AIN, then with gypsum, and the product is dried.

Insecticide.-See III.

A. R. P.

XVII.—SUGARS; STARCHES; GUMS.

Photomicrographic study of gelatinised wheat starch. S. WOODRUFF and L. R. WEBBER (J. Agric. Res., 1933, 46, 1099—1108).—Data are given showing the effect on the gelation of starch suspensions of concn., final temp. of heating, and the rate at which this temp. is attained. No significant differences in gels of hard and soft wheat starches were apparent. A. G. P.

Cleaning preps. Sugars in olive press-H₂O.— See XII. Saccharogenic power of flour.—See XIX.

PATENTS.

Separation of ketoses.—See III. Gluconic acid.— See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Dextrin-fermenting yeasts. STAIGER and GLAUB-ITZ (Z. Spiritusind., 1933, 56, 190).—The so-called dextrin-fermenting yeasts will not ferment artificial dextrin, rye-mash dextrins, or dextrins isolated from beer. R. H. H.

Trihexosan and dextrinose in beer. J. ŠATAVA and P. ŘACH (Chim. et Ind., 1933, 29, Spec. No., 1173— 1176).—A dextrin identical with Pringsheim's trihexosan is isolated from beer and unhopped wort by repeated pptn. with EtOH after removal of proteins with tannin and basic Pb acetate and sugars by alkaline oxidation, dialysis, and fermentation. It gives no coloration with I, has $[\alpha]_D$ +163·3°, a reducing power of 0·82, and mol. wt. 486. Beer contains 1—1·5% of the trihexosan, but the greater part of the real extract is dextrinose or isomaltose. R. H. H.

Colour of beer. T. HAJEK (Z. ges. Brauwes., 1932, 55, 115—118; Chem. Zentr., 1933, i, 2011).—The effect of differences in the H₂O, hops, and malt, and of treatment, on the colour of beer has been studied.

A. A. E.

Conditions of production and composition of fermentation slop from Czech distilleries. V. VILIKOVSKÝ (Chim. et Ind., 1933, 29, Spec. No., 1196— 1199).—Using potato mash (I), the fermentation slop contains less dry matter but more protein and fat than that from German distilleries; the slop from maize (II), on the other hand, has only one half the amount of dry matter and one third the protein. Addition of (II) to (I) increases dry matter, protein, fat, and cellulose, but reduces the ash content. Addition of molasses (III) augments dry matter and ash, but diminishes fat and protein. Addition of (II) to (I) increases, and of (III) to (I) decreases, the Al, Fe, and P in the H₂O-sol. ash. R. H. H.

Effect of refrigerants on brewery plant. H. SCHULZE (Allg. Brauer- Hopfen-Ztg., 1932, 72, 1112; Chem. Zentr., 1933, i, 2010).—NH₃ attacks Cu and its alloys, but not Fe. Explosions in NH₃ compressors are frequently due to decomp. owing to superheating and entry of explosive oil vapours. CO₂ does not attack Fe or Cu. SO₂ does not attack Fe or Cu at $< 100^{\circ}$.

A. A. E. EtOH as motor fuel.—See II. EtOH in olive press-H₂O. Hop oil.—See XII. Fermentation of honey.—See XIX. Sludge digestion.—See XXIII.

PATENTS.

Rectification of alcohol. USINES DE MELLE, and H. M. GUINOT (B.P. 396,605, 17.12.32. Fr., 11.1.32. Addn. to B.P. 387,589; B., 1933, 328).—The modification consists in so limiting the supply of entrainer (E)to the column as to maintain above the oil zone several plates charged with EtOH while maintaining a sufficient group of plates charged with E to prevent fusel oil from rising. On lateral withdrawal a mixture of EtOH, H₂O, and E slightly less rich in H₂O than the ternary azeotropic mixture is obtained. To this a slight amount of H₂O is added, the mixture is decanted, and the alcoholic layer dehydrated by simple azeotropic distillation without the use of an auxiliary E. A. B. M.

CL. XIX.-Foops.

Production of gluconic acid by fermentation. J. N. CURRIE and R. H. CARTER, Assrs. to C. PFIZER & Co. (U.S.P. 1,896,811, 7.2.33. Appl., 3.2.30).-The sugar liquor, containing 20% of glucose, 0.2-2% of nutrient, and a suitable neutralising agent, is allowed to flow down a generator packed with coke or wood shavings inoculated with gluconic acid-forming bacteria, while a current of air is forced up through the packing. A continuous process is described. R. H. H.

Treating wheat germ. Food product.-See XIX.

XIX.-FOODS.

Determination of selenium in wheat and soils. W. O. ROBINSON (J. Assoc. Off. Agric. Chem., 1933, 16, 423-424).-Wheat flour is ashed at 525° in presence of 10% of its wt. of Ca(OAc)₂, and the ash treated with Br + HBr and distilled into 5 c.c. of Br-H₂O. The solution is decolorised by SO,, and Se pptd. by reduction with NH₂OH,HCl. Soils are treated with aqua regia, and the filtrate is reduced by SO2 and H2S. After volatilising the S, Se is dissolved in Br + HCl, and determined as before. J. S. A.

Electrical conductivity of flour ; relation to ash content. G. KAUERT (Ann. Zymol., 1932, [ii], 1, 143-151; Chem. Zentr., 1933, i, 2012).-Increasing concn. of extracts or suspensions increases the conductivity. The resistance diminishes with time owing to the ionisation of org. $PO_4^{\prime\prime\prime}$ by phytase. The increasing acidity of suspensions also affects the resistance. For comparison with ash content conductivity is preferably measured in 2.5% suspension. Treated flour gave the following vals. : NO2 1000, Cl 1225, BrO3' 905 (untreated flour 1550). A. A. E.

Polarimetric determination of the saccharogenic power of flour. H. C. GORE (J. Assoc. Off. Agric. Chem., 1933, 16, 403-412).-A 10% suspension of flour in a phosphate buffer solution of $p_{\rm H} 5 \cdot 4$ is incubated at 37° for 1 hr., cooled to 20°, and Na2WO4 added. The optical rotation of the filtered solution is determined, and this serves as a measure of the saccharogenic power of the flour diastase, though the increase in rotation with time is not strictly proportional to that in reducing sugars. Cu₂O pptd. according to the Rumsey method is not pure, and should be ignited to CuO.

J. S. A.

Adsorptive power of wheat flour and other cereal flours of various types. G. Rossi and A. MARESCOTTI (Annali Chim. Appl., 1933, 23, 331–334).—The adsorption of night-blue when its solutions are shaken for a definite time with wheat flours increases with the proportions of gluten and bran present and serves to distinguish one grade of flour from another. Methyleneblue is adsorbed more by barley flour than by wheat flour, so that adulteration of the latter with the former is detectable. T. H. P.

Nutritive value of soya-bean cakes. K. Suzuki and A. YAZAKI (J. Agric. Chem. Soc. Japan, 1933, 9, 145-151).-The cake obtained in removing the oil by pressure contains more vitamin-A than that obtained by extraction of the oil with solvents. CH. ABS.

Determination of fat in milk. J. E. LOBSTEIN and M. FLATTER (Lait, 1933, 13, 277-284, 456-466).-The

official Soxhlet method (a) (extraction with EtOH-Et₂0) is compared with (b) a modified Soxhlet method, in which the fat is extracted by means of EtOH, and (c) EtOH extraction in the Kumagawa-Lemeland apparatus. The extract obtained by method (a) is found to contain traces of lactose and casein. The following modifications are suggested. The coagulum should be dried over H₂SO₄ in a vac. desiccator for 24 hr., the time of extraction should be \lt 4 hr., and the extract should be dried at 100° for 3 hr. The wt. of extract obtained by method (b) is appreciably > that given by method (a). Method (c) gives results in fair agreement with those obtained by method (a). E.B.H.

Determination of lactic acid in milk and milk products. B. G. HARTMANN and F. HILLIG (J. Assoc. Off. Agric. Chem., 1933, 16, 435-445).-The lactic acid (I) is oxidised to $H_2C_2O_4$, which is determined by titration. Casein is pptd. by addition of a 2% solution of H2C2O4 containing 21% of KOAc. The filtrate is warmed with Pb(OAc)2 and filtered, Pb being removed by pptn. with H₂S. The filtrate is evaporated to a small bulk and (I) extracted with Et.O. H.O is added, Et_2O evaporated, and (I) oxidised by conc. alkaline KMnO₄. NaOH is neutralised and excess KMnO₄ reduced by H2S. The liquid is filtered, CaC2O4 pptd., removed by filtration, and titrated with KMnO4. Fresh milk shows a concn. of (I) of 0.022-0.029%; the "reconstituted" milk of milk products should contain < 0.03%. J. S. A.

Approximation of the milk solids of a milk product by means of its citric acid content. B. G. HARTMANN and F. HILLIG (J. Assoc. Off. Agric. Chem., 1933, 16, 427-431).-The citric acid (I) content of fluid whole milk as determined by the pentabromoacetone method (B., 1933, 40) is fairly uniformly 0.16%. Formulæ are given for calculating the milk solids of evaporated milk and the original solids of milk used for commercial milk products from their content of (I). J. S. A.

Determination of milk solids in bread. B. G. HARTMANN and F. HILLIG (J. Assoc. Off. Agric. Chem., 1933, 16, 431–435; cf. preceding abstract).—Bread, mixed with H_2O , is shaken with EtOH and H_2SO_4 . Phosphotungstic acid solution is added and the solution filtered. The filtrate is treated with Pb(OAc)2 and centrifuged. Determination of citric acid (I) is then continued as with milk (cf. B., 1933, 40). A small correction must be applied for (I) present in other constituents of the dough ; the method assumes the presence of the normal proportion of butter fat. J. S. A.

Pasteurisation of milk. II. Nitrogen-containing constituents and the susceptibility to rennet action of milk under the influence of various methods of heating, particularly the "flash" treatment. F. KIEFERLE and L. EISENREICH (Milch. Forsch., 1933, 15, 349-366; cf. B., 1933, 730).-The effect of different "flash"-pasteurisation apparatus on the coagulation of albumin (I) was studied and compared with period pasteurisation. More (I) is coagulated by prolonged heating at about 60° than by "flash" heating to 74° and 85°. The relation between the duration of rennet action and acidity was found to follow a similar curve both for pasteurised and raw milks. Pasteurisation, Determination of iron in cream, butter, and curd, with special reference to the preparation of butter from cream containing iron. G. SCHWARZ and E. MULLER (Milch. Forsch., 1933, 15, 321-348).—Fe is determined colorimetrically, using dimethylglyoxime. The churning of Fe-containing cream resulted in most of the metal appearing in the butter. Copious washing with Fe-free H₂O did not clear all the Fe, which seriously affected the keeping qualities of the butter. The greater the content of Fe, the more rapid was the decomp. of the butter fat, especially when the butter was exposed to the light. E. B. H.

Catadyne process. W. GRIMMER and A. GRENZ (Milch. Forsch., 1933, 15, 367-380).—A content of 50 g. Ag per litre was found to be the min. for bacteria destruction in 24 hr. Moulds, yeasts, and aërobic spore-forming organisms were found to be most resistant. This was particularly apparent in the treatment of butter, when these organisms survived at the expense of lactic acid bacteria. The keeping quality of butter was seriously impaired by washing by the catadyne process. E. B. H.

Chemical standardisation of ice cream. L. H. LAMPITT and M. BOGOD (Chim. et Ind., 1933, 29, Spec. No., 1200—1204).—A 35-min. method for the determination of dry extract, fat, and sucrose in ice-cream mixtures is described. Deviations from a fixed standard are compensated by addition of a standardising mixture, the composition of which is easily calc. by means of a special slide-rule. R. H. H.

Factors concerned in the fermentation of honey. A. G. LOCHHEAD (Zentr. Bakt. Par., 1933, ii, 88, 296— 302; cf. B., 1932, 321).—All honeys examined contained sugar-tolerant yeasts. The H₂O content of honey is an important factor controlling its fermentation. A. G. P.

Thermal properties of meat. J. H. AWBERY and E. GRIFFITHS (J.S.C.I., 1933, 52, 326–328 T).—Data as to the thermal properties of meat at low temp. have been determined. Samples having various H_2O contents have been studied and the sp. heats determined in the ranges -80° to -180° and $18-48^{\circ}$. The thermal conductivity of a slab of fresh beef has been determined in the range -40° to -80° . From the above data together with the density, the thermal diffusivity has been deduced, and the same quantity has been measured directly. The agreement between the observed thermal diffusivity and the calc. val. was within 1%.

Influence of freezing temperatures on haddock's muscle. I. G. A. REAY (J.S.C.I., 1933, 52, 265—270 T).—Both the globulin (I) and albumin fractions of the proteins of haddock's muscle undergo denaturation in the frozen state. The influence of various temp.-time cycles of cold storage on the rate of denaturation of the (I) fraction was studied, using whole muscle. Within the temp. range 0° to -20° denaturation proceeded at a max. rate between -2° and -4°.

Fruit-enzyme investigations. W. V. CRUESS, R. SAMISCH, and H. M. PANCOAST (Fruit Products' J., 1933, 12, 323-324, 344).—Experiments to destroy the oxidase system by SO_2 and then remove SO_2 failed as the gas could not be entirely removed. Darkening may be influenced by pyrocatechol compounds in fruits. Fruit satisfactory in colour was not obtained by sun-drying or dehydration tests without SO_2 . Apricots cooked a short time in sugar syrup, rolled in dry sugar, and cooked in a dehydrator were best. E. B. H.

Arsenical residues found on apples in the Pacific North West throughout a season of typical spraying with lead arsenate. R. H. CARTER and E. J. NEWCOMER (J. Econ. Entom., 1933, 26, 572—580).— The gradual accumulation of As with successive spraying is examined. The final residue on harvested fruit results largely from late spraying and may be reduced by 60% by the use of non-arsenicals for the last 2 applications. Relationships between As residues expressed as grains per lb. and as mg. per sq. cm. of surface is discussed. A. G. P.

Removal of lead and arsenic spray residues from apples. A. L. WEBER and H. C. MCLEAN (J. Econ. Entom., 1933, 26, 727-730).—Alkaline washes are not satisfactory. The following treatments are suitable: (a) HCl alone, where no late sprays are applied and there is no heavy wax coat on the fruit; (b) HCl with "Vatsol" or "Alkanol-B" on late sprayed fruit having no wax coat; (c) HCl with "Vatsol" for waxycoated fruit or fruit sprayed with oil preps. A. G. P.

Is the banana nutritious? M. S. PENTEADO (Chimica, 1933, 1, 176—179).—Comparative analyses (due to Balland) of various fruits, vegetables, etc. are quoted in order to illustrate the high food val. of the banana and banana flour. E. L.

De-aëration and flash-pasteurisation of orangeand grape-fruit juices. H. H. MOTTERN and H. W. von LOESECKE (Fruit Products' J., 1933, 12, 325—326).— The juices were obtained free from cooked flavour and unpleasant after-taste by a continuous process involving rotary squeezing, very rapid removal of the pulp and seeds, and then vac.-packing. Flash-pasteurisation took place in a Sn tube at 96° followed by cooling to 77°. E. B. H.

Identification of flavouring constituents of commercial flavours. III. Identification of γ -undecolactone. J. B. WILSON and G. L. KEENAN (J. Assoc. Off. Agric. Chem., 1933, 16, 420–422; cf. B., 1933, 42). —Addition of 42% N₂H₄,H₂O solution to the liquid (lactone fractions of scheme of separation, *loc. cit.*) deposits hydrazino- γ -undecolactone, which is recryst. from BuOH. The optical properties of the crystals are described. J. S. A.

Food contamination. W. CLAYTON (Munic. Eng., 1933, 92, 328-330, 370-372).

Digestive coefficient of melilot (Bokhara clover) as compared with lucerne. P. A. KORMSHIKOV (Trans. Omsk Inst. Dairying, 1931, 1, 31-47).--Melilot in first bloom showed a poorer feeding val. than lucerne at the same vegetative stage, although it had higher digestibility coeffs. for its protein and fat; the two were equal with respect to their N-free extractives. Melilot hay is less palatable than lucerne.

NUTR. ABS. (b)

Comparison of the feeding values of rape cake and linseed cake. F. I. DENISOV (Trans. Omsk Inst. Dairying, 1931, 1, 5—29).—Rape cake and linseed cake fed to give the same starch equiv. and in amounts $\gg 2.5$ kg. per head produced the same effect on the yield and quality of milk. NUTR. ABS. (b)

Laboratory control of market milk. Fumigants for raw cacao stores.—See XXIII.

PATENTS.

(A) Manufacture of a disembittered product of wheat germ. (B) Obtaining high-valued nutrients from products of cerealia and legumens. (c) Treatment of wheat germs. E. KOMM (U.S.P. 1,896,520-1 and 1,896,490, 7.2.33. Appl., [A, c] 24.5.28, [B] 2.6.28).--(A) Wheat germs are digested with H_2O in absence of air and the mixture is steam-distilled. (B) Bran and germs of cereals and legumes mixed with H_2O and a diastase ferment are mashed at a definite temp. and the aq. extract is steam-distilled. (c) The aq. mixture obtained in (A), before steam-distillation, is separated into solid and liquid components, which are dried and conc., respectively, under suitable conditions. E. H. S.

Preparation of a food product. S. S. LERNER (U.S.P. 1,894,377, 17.1.33. Appl., 17.2.30).—An easily digested food is prepared by treating a mixture of skimmed milk, cream, and butter with a culture produced from kefir fungi. E. B. H.

Manufacture of refined vegetable product. M. BONOTTO (B.P. 397,482, 20.11.31).—Soya beans are bleached and refined by immersion in a dil. solution of SO_2 for 10 hr., the SO_2 being subsequently removed by treatment with H_2O at 60—80° for 20—30 min. and finally with steam for 1—4 min. E. B. H.

Light-coloured mixture of vegetable phosphatides and fatty oil. B. REWALD (U.S.P. 1,895,424, 24.1.33. Appl., 6.5.31. Ger., 21.10.29).—Soya lecithin, after removal of most of the oil, is treated with an oil solvent which does not dissolve the lecithin, *e.g.*, COMe₂, EtOAc, and the lecithin, after removal, is mixed with a refined vegetable oil and residual traces of solvent are removed by distillation in vac. L. A. C.

Preparation of edible emulsions of solid in fat. L. B. ESMOND and W. W. DUECKER, ASSTS. to ESSEX GELATINE CO. (U.S.P. 1,894,677, 17.1.33. Appl., 15.1.31). -0.3-3.5% of finely-powdered gelatin, together with < 1% of H₂O, is added to chocolate in the melangeur. It is claimed that less fat can be used, milling time is reduced, covering power is increased, and that, in the finished chocolate, both sugar bloom and fat bloom are retarded. E. B. H.

Manufacture of jellies, jams, and similar food products. CALIFORNIA FRUIT GROWERS' EXCHANGE (B.P. 397,714, 10.11.32. U.S., 10.11.31).—Cranberries, blueberries, etc., which do not normally yield good jams or jellies, are treated in the broken or pulped state with pectinase and kept at 38—40° until the natural pectin is destroyed. Jam of improved flavour and excellent consistency is made from the treated fruit, sugar, and added pectin; or the juice from the pulp will filter easily, yielding a jelly of superior flavour, clarity, and set. E. B. H.

Treatment of coffee beans. A. KASPER (QUIETA-WERKE A. KASPER) (B.P. 397,727, 25.11.32. Ger., 25.11.31 and 6.5.32).—The flavour of coffee is improved by pre-roasting the raw beans to remove H_2O , treating with steam (with or without O_3 etc.), and finally roasting. E. B. H.

Treatment of coffee beans. CONTINENTAL CAN Co., INC., Assees. of R. B. MCKINNIS (B.P. 397,776, 22.2.33. U.S., 21.7.32).—Mechanical pressure is applied to the roast beans to reduce them to thin flakes. The coffee components are then uniformly accessible to extracting liquids, and coffee gas is removed from the bean without loss of flavour and aroma. E. B. H.

Decaffeinising of coffee and detheinising of tea extracts. C. MASSATSCH (B.P. 397,323, 15.10.32).— The extracts, conc. if necessary, are fed through caffeine or theine solvents of high d (e.g., CHCl₃), or solvents of low d are passed through the conc. extracts. E. B. H.

Sausage casings.—See V.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Ether for narcosis. J. F. REITH (Pharm. Weekblad, 1933, 70, 878-879).—Et₂O satisfactory for narcosis could not be prepared by van den Berg's method (B., 1930, 1130). Treatment with KMnO₄ and NaOH or Na₂CO₃ was also unsatisfactory. By treating Et₂O (2 kg.) successively with 40 g. of NaOH for 4 hr. and 15 g. of Na wire for a week, and then distilling, 1.6 kg. of Et₂O, free from peroxides and aldehydes and suitable for narcosis, were obtained. S. C.

Preparation and purification of the alkaloids of ergot. M. HEROLD (Chim. et Ind., 1933, 29, Spec. No., 1017-1018) .- The drug is slightly moistened, rendered alkaline, and extracted with C6H6. The solution is washed repeatedly with slightly alkaline H₂O and then with dil. tartaric or citric acid. The amorphous bases are pptd. by NaOH, care being taken not to exceed $p_{\rm H}$ 7.7. The ppt. is filtered off in vac., dissolved in Et₂O, withdrawn by 1% sulphanilic acid, and repptd. by Na₂CO₃. The product, after desiccation in an inert gas, is a colourless powder readily sol. in EtOH, MeOH, COMe₂, or Et₂O, and insol. in H₂O. O₂ and sunlight cause it to become yellow and more sparingly sol. From EtOH or COMe₂ it yields crystals, decomp. at 185° after darkening at 145°. It consists of ergotoxine and ergotinine, the latter being apparently in a masked form. Results of the gravimetric determination according to Forst are most harmonious with biological assays. H. W.

Assay of Nux vomica preparations. E. LÉGER (J. Pharm. Chim., 1933, [viii], 18, 281-287).—The alkaloids of extracts of Nux vomica are determined by extraction with EtOH-Et₂O or EtOH-CHCl₃ mixtures, evaporation to dryness, dissolving in HCl, filtering, and extracting with CHCl₃. The residue after removal of CHCl₃ is dissolved in EtOH and titrated with 0·1N-acid. H, D.

Pharmaceutical analysis. XIV. Microchemical detection of the more important cations and

British Chemical Abstracts-B.

939

anions. C. A. ROJAHN [with J. A. MILLER] (Pharm. Ztg., 1933, 78, 869-870, 881-885, 895-897).—A scheme is outlined and the sensitivity of the methods is given.

Stability of insulin solutions. J. von Mikó (Pharm. Zentr., 1933, 74, 561—563).—Biological assay of a 10-year-old commercial sample of insulin ($p_{\rm H}$ 3.55) indicated practically complete retention of activity.

F. O. H.

Natural and synthetic menthol. A. SERINI (Pharm. Ztg., 1933, 78, 979).—Pure, isomeride-free *r*-menthol is equiv. in quality with *l*-menthol and can be differentiated from other varieties by its double f.p.; initially at 28° (after supercooling) it remains for $\frac{1}{2}$ —3 min. as a paste and the temp. then rises to 31—32°, when it sets to a hard mass. E. H. S.

Lead plaster. S. BABITSCH (Arch. Pharm., 1933, 271, 446—448).—Methods of determining Pb and fatty acids (I) given, and analyses of typical plasters are recorded. The H₂O, but not the Pb or (I), content varies considerably. R. S. C.

Essential oils of Ocimum canum, Sims, and Ocimum gratissimum, L. L. S. GLICHITCH and Y. R. NAVES (Chim. et Ind., 1933, 29, Spec. No., 1029— 1033).—Two types of essential oil are obtained from Ocimum gratissimum, characterised by high content of thymol and eugenol, respectively. Similarly, O. canum, Sims, yields oils containing d-camphor and Me cinnamate, respectively. A well-defined botanical species may therefore be a union of elementary species differentiated by their chemistry and without possibility of discrimination by external features. H. W.

South American rose-wood oil and its original plants. F. W. FREISE (Perf. Ess. Oil Rec., 1933, 24, 307-308).-Distillation of the wood or bark of the genuine rose-wood oil tree, Aniba rosaeodora, var. amazonica, gives oil having the following average consts.: $d^{20} 0.9055 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to $6^{\circ} 10'$, $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to 10', $n^{20} 1.4585 - 0.9220$, $\alpha^{20} + 5^{\circ} 45'$ to $\alpha^{20} + 0.9220$, $\alpha^{20} + 0.92200$, $\alpha^{20} + 0.922000$, α^{20} 1.4620, solubility in 70% EtOH 3.5 vols. Seven other species of Lauraceae, the oils from which are used as substitutes, are described. The following are also frequently found in adulterated rose-wood oils : oil from Hedwigia balsamifera, Swartz, having d¹⁵ 0.885-0.920, α^{20} —4° 30′ to +6° 10′, n^{20} 1.550 and containing *l*-linalool, terpineol, and cineole; oil from *Bursera* balsamifera, Pois., having d^{20} 0.875, α^{20} —3° 50′, n^{20} 1.448, and sol. in 5 vols. of 70% EtOH; Swietenia oil (from S. mahagoni, L.) (d²⁰ 0.965-1.055), detected by its cedar-wood odour; and oil from a species of Piper having an odour of Me salicylate. E. H. S.

Determination of primary alcohols in essential oils by phthalic anhydride. L. S. GLICHITCH and Y. R. NAVES (Chim. et Ind., 1933, 29, Spec. No., 1024—1028). —Treatment of the sample with $o-C_6H_4(CO)_2O$ (I) in C_6H_6 followed by 0.5N-KOH and titration of residual KOH does not ensure quant. reaction and necessitates a correction depending on the nature of the alcohol and its % present and the duration of the alkaline treatment. It may be employed in the comparative examination of citronella oil. Irregular behaviour is shown by sec. alcohols. The method of Radcliffe *et al.* (B., 1926, 849), modified by using 2 g. of sample, 5 g. of (I), and 20 c.c. of C_5H_5N (distilled over BaO), gives satisfactory results for the sum of primary and *sec.* alcohols. *tert.* Alcohols, aldehydes, ketones, lactones, phenols, esters, indole, *tert.* amines, and amides do not interfere. Me anthranilate reacts slowly but quantitatively, whereas Me methylanthranilate does not react. Primary and certain *sec.* amines give the corresponding amic acids. H. W.

Uses of hop oil.—See XII. Nicotine insecticides. —See XVI.

PATENTS.

Manufacture of esters of fatty-aromatic acids with amino-alcohols. F. HOFFMANN-LA ROCHE & Co. A.-G. (B.P. 396,318, 24.2.33. Ger., 22.3.32).—Compounds having antispasmodic but little or no anæsthetic action are obtained by esterifying γ -dialkylamino-alcohols, NR₂·CH₂·CRR'·CH₂·OH (R = alkyl, R' = H or alkyl) with aryl-substituted aliphatic acids. Examples are : γ -diethylamino- $\beta\beta$ -dimethyl-*n*-propyl phenylacetate, b.p. 173—174°/12 mm. (B,HCl, m.p. 80°), and O-acetyltropate (B,HI, m.p 92°); γ -dimethylamino- $\beta\beta$ -dimethyl-*n*propyl cinnamate. C. H.

Manufacture of compounds of 4-dimethylamino-1-phenyl-2:3-dimethyl-5-pyrazolone with *p*-aminobenzoic esters. B. and M. REUTER (U.S.P. 1,881,317, 4.10.32. Appl., 12.4.30. Ger., 30.7.28).—The components are fused together or allowed to interact in an indifferent solvent. The *compounds* with Et, m.p. 95— 96°, and Bu^g *p*-aminobenzoate, m.p. 72—73°, are described. H. A. P.

Preparation of [pure] antipyrine. E. F. GRETHER, Assr. to Dow CHEM. Co. (U.S.P. 1,896,619, 7.2.33. Appl., 29.1.30).—Antipyrine is separated from the crude methylation mixture by distillation with (superheated) steam or inert gas at 115—200°, preferably under reduced pressure, after neutralisation of free acid (Na₂CO₃). H. A. P.

Manufacture of stable acridine salt solutions. I. G. FARBENIND. A.-G. (B.P. 395,405, 15.1.32. Ger., 15.1.31. Addn. to B.P. 342,690; B., 1931, 515).— Reducing substances other than carbohydrates, e.g., NaHSO₃, Na₂SO₃, Na₂S₂O₄, sulphoxylates, or compounds of these with aldehydes or ketones, or hydrazines and hydroxylamines, are added to solutions of amino-acridines or -acridinium salts other than those of the parent patent. C. H.

Production of organic salts of bismuth. Boors' PURE DRUG CO., LTD., F. L. PYMAN, and A. P. T. EASSON (B.P. 397,249, 26.4.32).—An inorg. basic Bi salt (nitrate) is treated with an alkali salt of a *l*-acyloxyhexahydrobenzoic acid or of a semi-ester of a malonic acid CHR(CO₂H)₂ in which R = cyclohexyl or alkyl > C₆ (or with the acid and caustic alkali) in presence of (olive) oil to give a solution of the org. Bi salt in the oil, suitable for injections. In the examples, acyl = Ac or COEt, or R = cyclohexyl or C₆H₁₃·CHMe. C. H.

Manufacture of soluble [organic] calcium salts. CHEM. FABR. VORM. SANDOZ (B.P. 395,296, 28.2.33. Switz., 4.3.32).—CaBr₂ forms sol. double salts with Ca lactobionate, maltobionate, or other Ca polyhydroxymonocarboxylate derived from a polysaccharide aldose. The components may be ground together, or the

polysaccharide oxidised with Ca(OBr)₂ in presence of Ca(OH)₂. C. H.

Manufacture of alkali-metal salts of adenylpyrophosphoric acids. I. G. FARBENIND. A.-G. (B.P. 396,647, 27.2.33. Ger., 27.2.32).—An adenylpyrophosphoric acid or sparingly sol. salt (e.g., from muscle or yeast) is converted into the stable alkali salt by a standard method (e.g., neutralisation of the acid or pptn. of the Ca salt with Na or Ni oxalate), and isolated by evaporation or pptn. with an org. solvent. H. A. P.

Manufacture of complex double compounds of thio-substituted carbohydrates [thioglucose]. SCHERING-KAHLBAUM A.-G. (B.P. 397,293, 18.7.32. Ger., 3.8.31).—The heavy-metal (Au, Ag, Sb, As, Ni) compounds of thioglucose etc. (cf. B.P. 386,562; B., 1933, 251) give with the corresponding Na, K, Ca, Sr, or Ba compounds sol. stable complex compounds of therapeutic val. C. H.

(A) Removal of albuminous substances from therapeutic sera and other liquids. (B) Production of therapeutic preparations. S. G. T. BENDIEN (B.P. 397,515-6, 23.2.32. Ger., 2.3.31).--(A) The liquids are treated with alkali-metal or NH_4 salts of acidic oxides, *i.e.*, tungstates, uranates, vanadates, or their solutions, mixed with org. acids, preferably AcOH, and at $p_H 3\cdot 3-5\cdot 4$. After keeping, the ppt. is removed and the metal salts may be separated by dialysis. (B) Cholesterol-free sera of healthy human beings or animals are mixed with substances, such as Ca or Mg compounds or colloidal S, which are capable of influencing the lability of the albuminous materials present, and are then treated as in (A). Other org. extracts, lecithin, insulin, etc. may be incorporated.

Ê. H. S.

Anthyridines.—See III. Cod-liver oil.—See XII. Extraction of caffeine and theine.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Fine-grain images from coarse-grain emulsions. A. SEYEWETZ (Brit. J. Phot., 1933, 80, 511-513).— The fineness of grain obtained with a given developer is const., and bears no relation to the initial coarseness of the AgBr grain. Various formulæ and types of developer have been tested. A new borax-metol (I) -quinol (II) formula is recommended. A developer containing $p-C_6H_4(NH_2)_2$ (III) and (I) (development time 7 min. at 18°) gives a max. degree of fineness and thin negatives suitable for enlarging; a stronger negative, for projection, is obtained with a developer containing (I—III) (development time 15 min. at 18°). J. L.

Comparison of several developers and the specification of relative sensitivity. R. DAVIS and G. K. NEELAND (Bur. Stand. J. Res., 1933, 11, 379-407).--The International sensitometric standard developer, p-NH₂:C₆H₄·OH, is not as satisfactory as certain metolquinol developers, because the "toe" region of the development characteristic is increased, accompanied by increased inertia, and also because the solution recommended is supersaturated. The presence of KBr in some developers gives with some emulsions an increased sensi-

tivity with prolonged development. The ratio of the sensitivity indices varies in general with the development time. It is suggested that comparisons of sensitivity should be made only when emulsions have each received equiv. development. The view that the gradient of the characteristic above the inertia point is approx. $\gamma/2$ is confirmed, and the application of this const. to co-ordinate inertia and gradient methods of measuring sensitivity is discussed. J. W. S.

Dependence of the reflexion density of a photographic paper on the orientation of the paper with respect to the incident light. R. E. OWEN and T. D. SANDERS (Phot. J., 1933, 73, 398—402).—Variations of reflexion density (A) are due to specular reflexion at the gelatin-air interface of the gelatin-coated fibres of the paper. A definition of A as the mean of max. and min. vals. is suggested. The effect is negligible with baryta-coated papers. J. L.

Photo-electric cell in [photographic] densitometry. J. M. BLAIR, M. C. HYLAN, and G. T. MEREDITH (Phot. J., 1933, 73, 409-411).—New types of transmission and reflexion densitometers using photoelectric cells are described. J. L.

PATENTS.

Photographic plates and films. I. G. FARBENIND. A.-G. (B.P. 397,740, 15.12.32. Ger., 15.12.31. Cf. B.P. 374,735; B., 1932, 1056).—The anti-halation layer on the back of a film is protected from splitting by coating with a layer of a natural or artificial resin containing a OH or CO_2H group and capable of forming a H_2O -sol. alkali salt. Natural resins, *e.g.*, shellac and colophony, can be prepared for use by dissolving in a solution of alkali, extracting with an org. solvent, and pptg. with acid. Examples of suitable artificial products are given. J. L.

Manufacture of water-soluble pyridine derivatives for use as contrast media in X-ray photography. I. G. FARBENIND, A.-G. (B.P. 396,414, 18,12,31. Ger., 20.12.30).—3:5-Dibromo-, -di-iodo-, or -bromoiodo- γ -pyridones are converted into sol. compounds by introduction of salt-forming groups or by forming quaternary salts. Compounds described are: 3:5-di-iodo- γ pyridones containing the groups: 1-CH₂·CO₂H [m.p. 246° (decomp.)], 1-C₂H₄·NEt₂ (m.p. 85°; +Me₂SO₄, m.p. 215°), 1-C₂H₄·OH (m.p. 260°), 1-C₂H₄Cl (m.p. 180°), 1-C₂H₄·SO₃H, 1-C₂H₄Br (m.p. 189°), γ -pyridone-Nacetic acid, m.p. 261° (decomp.), and its 3:5-Br₂compound, m.p. 261° (decomp.). [Stat. ref.] C. H.

Photographic filter layers or anti-halation layers. G. FARBENIND. A.-G. (B.P. 396,646, 27.2.33. Ger., 27.2.32).-Such layers are coloured with dyes obtained by condensing an aromatic aldehyde or furfuraldehyde with suitable CH2-compounds. Examples are : barbituric or thiobarbituric acid with 4-dimethylaminobenzaldehyde-2-sulphonic acid; thioindoxyl m-C₆H₄(OH)·CHO, or with o-C₆H₄(CHO)·SO₂H, $1:2:4-C_6H_3(CHO)(SO_3H)_2;$ selenoindoxyl with p-C₆H₄(CHO)·SO₃H. C. H.

Production of multi-colour photographic images. V. VON GERDANOVITS (B.P. 397,489, 15.2.32. Ger., 17.2.31).—Emulsion screens composed of lines or dots

of emulsions of differing colour-sensitivities are prepared with a blue-sensitive emulsion of greater speed than the other emulsions. Appropriate insol. vat dyes, *e.g.*, indanthrene, indigosol, are added in powder form to each emulsion. A sol. yellow dye (removable by washing) may be added to the red and green emulsions. The emulsions may be thickened with gum arabic, albumin, or resins. The Ag image may also be toned for suitable colour effects. J. L.

Production of coloured photographic pictures. DÜRKOPP-WERKE A.-G. (B.P. 397,884, 1.2.32. Ger., 9.2.31).—Two-colour pictures are made by printing the colour-separation negatives on opposite sides of doublycoated film. For 3-colour work, the two films of the original bipack are sensitive (1) to red and weakly to green light, and (2) to blue and green light, respectively. The positives are developed with proportionate hardening, and then weakly coloured with red and blue pigments respectively. The film is afterwards treated with $(NH_4)_2Cr_2O_7$ and exposed through the red side, causing partial exposure of the blue side, which is then coloured in the unhardened parts with yellow pigment. A reflecting support is provided for viewing the picture.

J. L.

Production of (A) photographic pictures and kinematograph films in colour, (B, C) multi-colour photographic images and kinematograph films. B. GÁSPÁR (B.P. [A] 397,159, [B] 397,188, and [C] 397,192, 16.11.31. Cf. B.P. 395,718; B., 1933, 813).-(A) Dyed films are decolorised at the points near the metal (Ag) deposit forming the image, using reagents which attack the Ag, giving reaction products which bleach the dye, which is, however, not attacked by the reagent alone. Suitable compounds are, e.g., KCNS, cysteine salts, NHPh·NH₂,HCl, compounds of the urea group such as CS(NH₂)₂, Na₂S, thiodiglycollic acid. V, Mo, W, and Fe salts may be used as catalysts. (B) Multi-colour images may be produced by using a no. of emulsion layers dyed different colours, the dyes being bleached out as in the case of the part images in (A), or with, e.g., NaClO3 or KBrO3 in acid solution. Acid dyes, particularly azo dyes, are used, and dyes having different rates of bleaching are permissible. (c) The methods of (A) and (B) (cf. also B.P. 249,530; B., 1927, 350) are applied to multi-layer material, after development and before fixing, using reagents giving either a positive or negative dye image. J. L.

Production of multi-colour photographic images, more particularly coloured films. B. GÁSPÁR (B.P. 397,170, 15.2.32. Ger., 19.2.31).—A no. of component colour images are copied simultaneously on to multi-layer emulsion material, the different layers being suitably dyed. A multi-colour master image may be made first, from which the final copies are made. J. L.

Dyes for sensitised emulsions.—See IV. Flexible films.—See XIII.

XXII.—EXPLOSIVES; MATCHES.

EtOH solubility of nitrocellulose.-See V.

PATENTS.

Ammunition. W. H. Woodford, Assr. to Remington Arms Co., Inc. (U.S.P. 1,892,759, 3.1.33. Appl., 19.3.30).—A projectile is coated with Cd, which will be transferred to the bore of the gun and prevent corrosion. B, M, V.

Dehydrating (etc.) cellulose nitrates .- See III.

XXIII.—SANITATION; WATER PURIFICATION.

Modified Quevenne lactometer for the public health laboratory control of market milk. R. V. STONE (Amer. J. Pub. Health, 1933, 23, 939-942). E. C. S.

Application of fumigants to ships and warehouses. I. Distribution of ethylene oxide in empty warehouses. II. Distribution of hydrogen cyanide in empty warehouses. III. Penetration of hydrogen cyanide into bags of raw cacao stacked in piles of different sizes. A. B. P. PAGE and O. F. LUBATTI (J.S.C.I., 1933, 52, 309–316 T, 316–323 T, 323–326 T).—I. Even distribution and economy of fumigant can best be secured by vaporising the liquid by artificial heat and by agitating the air during vaporisation. No arrangement of cold sprays has been found which will give satisfactory distribution. In large buildings (about 200,000 cu. ft.) the actual average max. concn. attained is 60-70% of the theoretical.

II. The above methods applied to HCN confirm the conclusions already reached. In particular, convection currents produced by warm gases do not ensure even distribution. Effects produced by different building materials and construction are noted. The actual average max. concn. attained is 60—80% of the theoretical.

III. The results of the fumigation of bagged cacao stacked in different ways show the importance of proper stowage. Two-bag piles are recommended. Two different methods of application of fumigant are described and suggestions for practical fumigation are made.

O. F. L.

[Sewage-]sludge digestion at Peoria, III. L. S. KRAUS (Sewage Works' J., 1933, 5, 623-634).-The sewage treated is from a population of 115,000, but wastes from a BuOH-COMe2 fermentation and strawboard paper factories raise the equiv. population to 1,250,000. The activated-sludge process is used and the surplus sludge is dealt with by digestion and final disposal on open drying beds. The digestion tanks are of the fixed-cover type and are equipped with Dorr thickeners and scum-submerging arms. The best results are obtained by operating at 32° at such a charging rate that sufficient agitation is produced by the gases evolved to make the entire contents homogeneous, and finally separating the sludge and supernatant H₂O in open secondary tanks. The waste from the fermentation plant is delivered at the works at 77° and may be submitted to separate thermophilic digestion at 56°, if desired. The total cost of sludge treatment including capital charges is \$8.95 per ton of dry solids.

C. J.

Incineration of [sewage] skimmings. A. P. BANTA (Sewage Works' J., 1933, 5, 659-661).—When mixed with sludge the skimmings were found to affect deleteriously the drainage qualities of the digested product and so are dealt with separately. The total production is 4300 lb. per day ($H_2O = 80\%$) and 33% of the dry matter is sol. in Et₂O. The material is

. Il-stanticon mainster .

drained on sand beds and burned in a furnace fitted with forced draught and fired by sludge gas at 1300— 1450°, without nuisance. C. J.

Effect of sunlight on dissolved oxygen in White River. C. K. CALVERT (Sewage Works' J., 1933, 5, 685—694).—A survey of the river for $6\frac{2}{3}$ miles below the Indianapolis sewage outfall illustrates the effect of sunshine and shade, shallow stretches, and algal growths on the amount of O_2 present in the stream. The org. load is such that in the absence of sunlight the O_2 content may be zero, but in bright sunshine the biologic activity of the river is able to maintain a considerable O_2 concn. unless toxic materials are present in quantities sufficient to be inhibitory. C. J.

Apparatus for rapid determination of oxygen or other gases dissolved in water. R. C. HOATHER (Chem. & Ind., 1933, 689–690).—The sample of H_2O is admitted into a flask containing boiling H_2O and steam under conditions which permit the evolved gas being driven by the steam through a tube which delivers it to a micro-burette inverted in a trough of Hg. The vol. of gas can be read after cooling, and again after the introduction of a suitable absorbent, *e.g.*, conc. pyrogallate for O_2 . A. B. M.

Treatment of water by certain forms of silver. J. GIBBARD (Amer. J. Pub. Health, 1933, 23, 910–916). -B. coli suspended in distilled H₂O is killed by exposure to silvered porcelain rings (I). The effective concn. of Ag in H₂O exposed to (I) is of the same order as in effective AgNO₃, AgCl, or colloidal Ag solutions. The sterilising time increases with fall in temp. and in the presence of org. matter and of light. Inactive (I) are reactivated by dil. HCl. E. C. S.

Changes in numbers of bacteria in polluted water. C. T. BUTTERFIELD (Sewage Works' J., 1933, 5, 600–622).—Samples of polluted H_2O from four sources were incubated at 10°, 20°, and 37° and the change in bacterial content was noted. At all three temp, the bacteria increased to a max. and then steadily decreased, the time required for the complete cycle decreasing with rise intemp. The changes were unaffected by the nature of the containing vessel, the size of sample, exposure to light, or the presence or absence of air as provided by filled or partly filled bottles. Filtered or centrifuged samples showed a marked tendency for the bacteria to multiply on storage. C. J.

Taste and odour control on Pennsylvania water supplies. H. E. Moses (J. Amer. Water Works' Assoc., 1933, 25, 1066—1080).—The experiences derived from a no. of Pennsylvanian plants using NH_3 -Cl₂, activated C, prechlorination, and absorptive clay as the effective agents are described. For preventive purposes frequent examination of reservoirs is necessary to control the growth of micro-organisms, and heavy doses of CuSO₄ are more efficient than repeated lighter ones. The withdrawal of stagnant H_2O from the reservoir may be avoided by using multi-level outlets. C. J.

o-Tolidine test for chlorine [in water]. H. W. ADAMS and A. M. BUSWELL (J. Amer. Water Works' Assoc., 1933, 25, 1118—1139).—The colour produced with o-tolidine (I) is an oxidation reaction and not one of chlorination. The chloroamines produce colour reactions equal to those of the corresponding amounts of Cl₂, but require a longer time for full development, particularly at $p_{\rm H} > 7.0$. Mn[°] compounds do not produce colour reactions with (I), but Mn^{°°} and permanganate produce colorations identical with those of chemically equiv. quantities of Cl₂. Details are given for the determination of total Mn in H₂O, using Na metaperiodate (Na₂H₃IO₆) (II) and comparing the colour with permanent standards of KMnO₄. Two methods are given for determining residual Cl₂ in H₂O : the one, utilising (II) and taking into account total and oxidised Mn, the chlorination rate, and the $p_{\rm H}$ of the solution ; and the other, in which Mn^{°°} is reduced to Mn[°] by means of 0.02% H₂O₂ before adding (I). C. J.

Effect of precipitants on textile waste liquors. H. F. CHRISCO, A. M. WHITE, and H. G. BAITY (Sewage Works' J., 1933, 5, 674–684).—The effect of various commonly used precipitants on 29 textile wastes from indigo, S dyes, and processing, with respect to the nature and rapidity of flocculation, the ratio of sludge to supernatant H_2O , the amount of colour removal, and the $p_{\rm H}$ val. are tabulated. In general, copperas and Ca(OH)₂ proved most useful, the type of sludge depending on the ratio of the two precipitants. As a partial process, CaCl₂ followed by carbonation with flue gases has advantages. C. J.

Rendering coal gas non-poisonous.-See II.

PATENTS.

Fumigant gas-producing composition. H. W. HOUGHTON, ASST. to SAFETY FUMIGANT CO. (U.S.P. 1,894,041, 10.1.33. Appl., 3.7.28).—NaCN and CaOCl₂ or other substances capable of generating CNCl and HCN are mixed with CaCl₂ or other hygroscopic substance and packed dry, being caused to react on exposure to air or moisture. B. M. V.

[Manufacture of] insecticidal, wood-preserving, disinfectant, and the like compositions. E. I. DU PONT DE NEMOURS & Co. (B.P. 396,064, 16.10.31, U.S., 16.10.30. Cf. B.P. 391,141; B., 1933, 741).—Fluosilicates of aliphatic or heterocyclic amines are dissolved in H_2O or other suitable liquid diluent with or without other insecticides. C. H.

Sewage purification. K. IMHOFF (U.S.P. 1,893,623, 10.1.33. Appl., 30.8.30. Ger., 20.1.30).—Sewage is treated in a settler (a), which forms the roof of a digester (b), and then in an aëration tank (c), settler (d), aëration tank (e), and settler (f). Settled solids are returned by air-lifts from d to a and from f to c, respectively, no solids being allowed to escape. B. M. V.

Water-purification process. O. M. URBAIN, Assr. to C. H. LEWIS (U.S.P. 1,892,972, 3.1.33. Appl., 12.10.31).—Removal of aldehydes or ketones (which require O_2) is effected by means of N_2H_4 , or a derivative having 2 replaceable H atoms to one N, in presence of NH₃ or an NH₄ salt. B. M. V.

Water disinfectant. C. B. Woon (U.S.P. 1,894,969, 24.1.33. Appl., 16.10.31).—Mixtures of N-chlorosuccinimide with org. acids or their derivatives (BzOH, succinic anhydride or imide), prepared by fusion $< 170^{\circ}$, are cast into suitable shapes. H. A. P.

Derivatives of 2-hydroxydiphenyl .--- See III.