

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

FEB. 14 and 21, 1936.*

I.—GENERAL; PLANT; MACHINERY.

Most economical pipe diameters for high-pressure chemical plants. S. UCHIDA (J. Soc. Chem. Ind., Japan, 1935, 38, 578—581 B).—Equations are derived for (1) the fixed annual cost, (2) the power cost of high-pressure pipe-lines. (2) falls into two cases; (a) when the Reynolds no. is very large, as with N_2-H_2 mixtures for NH_3 synthesis under 300 atm., (b) for Reynolds nos. from 2300 to 100,000. The total cost (1) + (2) is differentiated with respect to internal diam. and the result made = 0, whence the optimum diam. is obtained. Examples are given. C. I.

Improving boiler practice by returning the stack gases. VON LASSBERG (Papier-Fabr., 1935, 33, 423—426).—The Lutz-Feuer system is described. Up to 70% of the gases are returned and are taken from two points, the first after passing the air preheater and the other at a point where the temp. of the gases is higher. The gases are mixed with fresh air and returned under low pressure under the grate. The system is suitable for increasing the efficiency of small and obsolete installations, especially fire-tube boilers. The literature is summarised. D. A. C.

Experiences with the mercury boiler and turbine. S. FERGUSON (J. Franklin Inst., 1935, 220, 687—717).—An illustrated description is given of the difficulties overcome in developing the Hg boiler and turbine. Assuming 10 lb. of steam per kw.-hr. for the steam unit, the combined thermal efficiency of the Hg and steam units is 34.8% and it does not vary greatly with considerable variation of load. D. K. M.

Solid matter in boiler-water foaming. III. Effect of calcium carbonate and magnesium hydroxide precipitated inside the boiler. C. W. FOULK and H. C. BRILL (Ind. Eng. Chem., 1935, 27, 1430—1435; cf. B., 1934, 383).—In a boiler generating 450—500 g. of steam per min. at 250 lb. per sq. in. the effect of solids on priming has been determined by increasing the [NaCl] of the boiler H_2O until priming occurred. $CaCO_3$ formed in the boiler from $Ca(HCO_3)_2$ and $Mg(OH)_2$ decreased priming. $CaCO_3$ pptd. by pumping aq. $CaCl_2$ into aq. Na_2CO_3 in the boiler increased priming, but the ppt. lost this property after several hr. in the boiler. $CaCO_3$ pptd. by pumping aq. Na_2CO_3 into aq. $CaCl_2$ in the boiler had no effect. $Mg(OH)_2$ in sufficient quantity counteracted the priming tendency of $CaCO_3$. D. K. M.

Heat-transfer coefficients on inclined tubes. D. F. JURGENSEN, JUN., and G. H. MONTILLO (Ind. Eng. Chem., 1935, 27, 1466—1475).—Film and overall heat-transfer coeffs. for condensing steam flowing down-

wards through the annular space of a double pipe condenser and cooling H_2O through the inner pipe have been determined and graphed. The steam film coeff. decreases as the condenser is turned from the horizontal to the vertical. The H_2O film coeff. shows the greatest differences due to inclination of the condenser at the lower H_2O velocities; with H_2O flowing upward change of inclination from horizontal to vertical decreases, and downward increases, the film coeff. These differences are thought to be due to free convection. D. K. M.

Thermal properties of various binary systems in relation to their use in absorption refrigerating machines. W. MEHL (Z. ges. Kälte-Ind., 1934, 41, 186—190; Chem. Zentr., 1935, i, 2223—2224).—A review. The rates of absorption and desorption, in addition to the amount absorbed, are of prime importance for the application of absorption systems to refrigeration. J. S. A.

Problems and methods in industrial spectroscopy. S. J. LEWIS (J.S.C.I., 1935, 54, 427—432 T).—Several problems not easily tractable by chemical analysis are discussed, and methods described. Brief accounts of quant. methods in vogue by flame, arc, spark, logarithmic sector, and the arc method under the ratio-quant. system are given. Amongst the examples are the determination of Ni in fats, Cd in Zn, Ge in Zn, Zn in Ga, Fe in Al, and Ir in Pt, with literature pointers to several others; also determination of Nd and Pr by absorption spectroscopy. Absorption spectra of glasses, films, Cellophane wrappings, etc., as well as emission spectra for illuminants for kinemas, commercial, medical, and other purposes, receive notice.

Practical fields of application of colloids. II. Colloids in technology. E. BOYE (Chem.-Ztg., 1936, 60, 27—28; cf. B., 1935, 1163).—A review of applications of inorg. sols in industry. E. S. H.

Volumetric determination of water in liquids and solids. RICHTER (Angew. Chem., 1935, 48, 776).—Fischer's method (B., 1935, 785) may be applied to foodstuffs, since in absence of a catalyst the reaction of I with the org. compound is very slow in comparison with the reaction with H_2O and SO_2 . Even with foodstuffs containing a high % of sugar (marmalade) the method gives results agreeing with distillation with xylol. Where occlusion occurs owing to the coarseness of division, as in cheese, low results are obtained. R. S. B.

Principles of mathematical treatment of constant-pressure filtration. P. H. HERMANS and H. L. BREDÉE (J.S.C.I., 1936, 55, 1—4 T).—The equations given previously (B., 1935, 881) for the various types of filtration permit the construction of diagrams from experimental

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

data in which the filtration is represented by a straight line. The two consts. characterising the filtration, viz., initial rate of flow and filtration const., can be determined from these graphs. Examples are given from experiments on the filtration of viscose, dextrin solutions, and kieselguhr suspensions.

Calculation of countercurrent extractions. E. M. BAKER (Chem. Met. Eng., 1935, 42, 669—671).—A method is given, with examples worked out, which enables the no. of vessels required for countercurrent extraction to be calc. D. K. M.

Pressure storage of gases and liquids. R. S. McBRIDE (Chem. Met. Eng., 1935, 42, 676—678).—The advantages of storing gases and liquids under pressure is discussed and the vessels used are described and illustrated. D. K. M.

Specific heat of technical gases and vapours at high temperatures. E. JUSTI and W. PFLAUM (Forsch. Ing.-wes., 1934, A, 5, 297; Chem. Zentr., 1935, i, 1670—1671).—According to spectrographic measurements, account must be taken at high temp. of the second dissociation of H_2O vapour. J. S. A.

Waste-heat boilers of cement kilns.—See IX.
Cracking of boiler plates. Sn-plate for refrigerators.—See X.
Evaporation of tanning liquors.—See XV.
After-product vac. pans.—See XVII.

See also A., Jan., 45, Thermo-regulator.

PATENTS.

Melting furnace. G. SCHWAB, Assr. to A. C. NOLTE (U.S.P. 1,996,012, 26.3.35. Appl., 24.9.31).—A crucible suitable for continuous or intermittent charging and tapping comprises a straight, substantially vertical wall at the pouring side and an arched combined bottom and back wall, the lower part of the crucible being thus very narrow and exposing much surface to the heating flames. The narrow space is divided by a curtain baffle under which the molten metal must flow. B. M. V.

Furnace walls, furnace gas baffle plates, and the like. WITKOWITZ BERGBAU- U. EISENHÜTTEN-GEWERKSCHAFT, and B. BELOHLAVEK (B.P. 439,143, 2.2.35. Ger., 7.12.34).—Shaped metal lumps, which may be provided with a refractory lining on the fire side, are attached to H_2O tubes by means of welding which is effected through holes in the lumps, the holes being completely filled with welding metal, forming plugs attached to the tubes which on contraction draw the lumps into good contact with the tube. B. M. V.

Operation of furnace installations. F. STRÜBIN (B.P. 438,566, 1.4.35).—In a furnace embodying a fire-grate (G), air is admitted below and above G at 1 atm. and a jet (or sheet from a row of jets) of compressed air and O_2 is directed downwardly from the front towards the top of the firebridge. B. M. V.

Calciner. R. R. SHAFTER and R. BERNHARD, Assrs. to TRAYLOR ENG. & MANUFG. CO. (U.S.P. 1,995,948, 26.3.35. Appl., 28.11.33).—The shell of a rotary cylindrical kiln forms the outer wall of the space for the heating gases, the material being passed through a bundle of longitudinal muffle tubes. The gases from the material and from combustion are segregated into

separate outlets at the upper end, at which end the raw material is admitted. B. M. V.

Dryer. F. L. FURBUSH, Assr. to C. G. SARGENT'S SONS CORP. (U.S.P. 1,995,675, 26.3.35. Appl., 12.12.33).—An apparatus in which air is circulated by a fan over a heater and down through a perforated conveyor is described. B. M. V.

Heat-transfer element. R. M. GATES, Assr. to SUPERHEATER CO. (U.S.P. 1,996,105, 2.4.35. Appl., 11.5.33).—A pipe is provided with welded longitudinal fins and with pins or blades standing out from the fins; it is especially suitable for an outer fluid moving transversely to the axis of the pipe. B. M. V.

Tubular heat-exchange apparatus for fluids. R. MORTON & CO., LTD., and P. D. ROBINSON (B.P. 438,666, 29.5.34).—End caps secured by springs abutting against bridge pieces are described. B. M. V.

Manufacture of heating elements for mercury boilers. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of L. R. BIGGS (B.P. 439,482, 29.8.35. U.S., 30.8.34).—A "foundation member" (F) is rolled with deep grooves on one side; pairs of the walls of the grooves are bent together and welded, forming boiler tubes. The other side of F is covered with refractory material, which is placed towards the fire. B. M. V.

Filtration and clarification of water. M. J. MARTIN (U.S.P. 1,997,114, 9.4.35. Appl., 19.9.31. Austral., 29.9.30).—The H_2O is mixed with a coagulant producing a slight acid reaction and with an NH_4 salt and then percolates through an alkali which is insol. in neutral H_2O but sol. in acid, e.g., limestone or magnesite; it is finally filtered through gravel or the like, the last two operations being effected in one casing. B. M. V.

Treatment of steam boiler-water. R. E. HALL, Assr. to HALL LABS., INC. (U.S.P. 1,997,256, 9.4.35. Appl., 17.8.32).—Meta- and pyro-phosphates are molecularly rehydrated in the boiler to a condition of greater acidity (p_H 11) and to yield sufficient orthophosphate to prevent scale formation; alkali chromate ($1:10^4$) is also present to prevent corrosion. B. M. V.

[Base-exchange] water-softening apparatus. O. C. KERRISON (B.P. 439,416, 1.3.34).—Saturated brine from a dissolving and storage tank is drawn by hard H_2O through an injector into the softener, and, after cutting off the brine, washing continues by the same minor flow of hard H_2O which is finally diverted into the brine tank for make-up. Automatic valves are described to effect all those operations, their action being initiated by the reduction of pressure caused by the opening by hand of a simple waste- H_2O valve and washing being stopped by closing the same valve. B. M. V.

Temperature-regulating system. M. OSNOS, Assr. to TELEFUNKEN GES. F. DRAHTL. TELEGRAPHIE M.B.H. (U.S.P. 1,999,473, 30.4.35. Appl., 28.1.32. Ger., 7.2.31).—A body of liquid of predetermined d is heated electrically at the upper part, and the article to be heat-treated (of approx. the same d as the liquid) is submerged to a depth at which the desired temp. is found. B. M. V.

Antifreeze composition. F. L. LUND (U.S.P. 1,997,735, 16.4.35. Appl., 30.4.32).—A liquid having

f.p. $< -43^{\circ}$ and b.p. $> 103^{\circ}$ is composed of CaCl_2 2 lb., AlCl_3 7 oz., glycerin 1 pint, and H_2O to 1 gal. (U.S.).

B. M. V.

Gyratory crusher. A. GOLDBERG and I. M. JACKSON, Assrs. to ALLIS-CHALMERS MANUFG. CO. (U.S.P. 1,999,756, 30.4.35. Appl., 16.3.32).—One of the crushing surfaces is provided with a spiral rib to aid the passage of sticky material downwards.

B. M. V.

Crushing of material in jaw breakers. L. MELLERSH-JACKSON. From F. KRUPP GRUSONWERK A.-G. (B.P. 438,674, 26.7.34).—A high-speed crusher having a stroke $>$ the smallest gap is described. [Stat. ref.]

B. M. V.

Mincing or grinding machines. T. E. D. BILDE (B.P. 438,596, 14.4.34. Swed., 30.11.33).—Discs for a mincing machine are provided with perforations having radial cutting edges forming the larger diam. of the perforations, the idle edges being curved.

B. M. V.

Grinding apparatus for pulverising materials. W. A. SCOTT (U.S.P. 1,999,666, 30.4.35. Appl., 18.1.32).—A disc grinder is arranged within a housing which rotates with one disc and lifts the partly-ground material back to the feed channel; the distance between the discs is continually varied.

B. M. V.

Spherulising fusible, pulverisable filler materials. C. G. GILBERT, Assr. to RESEARCH CORP. (U.S.P. 1,995,803, 26.3.35. Appl., 1.11.32).—Glass or SiO_2 (e.g.) is pulverised and (the finer part) dispersed in a current of air or, preferably, combustible gas, the suspension being blown into a chamber where combustion takes place with the other combustible; the temp. attained is sufficient to fuse the glass, and the dispersion wide enough to prevent the particles running together.

B. M. V.

Dehydration of plastic earths. C. E. BLYTH (B.P. 439,332, 10.1.35).—The material is passed through a pulveriser together with hot air, the quantity and temp. of which is sufficient to remove only part of the H_2O , leaving sufficient for moulding purposes, e.g., 6% of the original H_2O content.

B. M. V.

Apparatus for handling, drying, and processing materials. A. O. HURXTHAL, Assr. to PROCTOR & SCHWARTZ, INC. (U.S.P. 1,996,020, 26.3.35. Appl., 11.2.32).—Sheet or strip material is carried in undulating form through a treatment chamber by means of a series of conveyors, to the construction of which the claims mainly relate.

B. M. V.

Apparatus for treating material. K. T. POTT-HOFF, Assr. to U.S. GALVANIZING & PLATING EQUIPMENT CORP. (U.S.P. 1,996,031, 26.3.35. Appl., 26.5.27. Renewed 9.1.32).—A conveyor suitable for conveying articles through a no. of plating or other tanks in succession is described. Unobstructed access is afforded to one side of the line of tanks.

B. M. V.

Apparatus for grading materials. W. J. WETTLAUER (B.P. 438,892, 22.5.34).—A screen, or a no. of superposed nested screens, is rotated continuously or intermittently about an axis perpendicular to the screening surface but inclined to the vertical, and is also rapped.

B. M. V.

Washing, grading, and otherwise treating granular material. H. R. LEWIS, Assr. to SPRAGUE-SELLS CORP. (U.S.P. 1,996,022, 26.3.35. Appl., 4.5.31).—An apparatus for separating buoyant material from a slowly rotating pulp is described.

B. M. V.

Separator [for granular materials]. A. J. MASON (U.S.P. 1,996,547, 2.4.35. Appl., 27.5.33).—Granular material is pulped with H_2O or other liquid and injected tangentially into a cylindrical tank in which a combined horizontal rotation and circulation up the centre and down the sides is maintained. The muddy H_2O is removed at the top centre, and the granular material drops on to a rotating disc and thence through a conical bottom outlet.

B. M. V.

Centrifugal separating apparatus. M. A. LISSMAN, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,996,076, 2.4.35. Appl., 28.7.32).—In an air separator of the centrifugal type the coarse material is, after thorough agitation, removed at the periphery at the end remote from the fan, and the fine material in suspension is exhausted at an intermediate radius between the up and down paths of the main circulation.

B. M. V.

Separation of intermixed divided materials. K. DAVIS, Assr. to PEALE-DAVIS CO. (U.S.P. 1,995,295, 26.3.35. Appl., 10.7.22. Renewed 23.8.34).—The material is treated for removal of dust while in an air-pervious hopper and is next fed to a reciprocating air-pervious table sloping both transversely and longitudinally, the lighter material being delivered over the lower long edge and the heavier caused to travel by suitably inclined riffles or depressions toward the other edge and end.

B. M. V.

Filter. V. C. NORQUIST, Assr. to BUTLER MANUFG. CO. (U.S.P. 1,996,000, 26.3.35. Appl., 3.3.34).—A vac. and/or pressure leaf-filter with scraping means operable without opening the casing is described.

B. M. V.

Apparatus for removing fibrous material from liquids. W. S. WISE (U.S.P. 1,995,829, 26.3.35. Appl., 27.7.33).—In a settling/skimming tank, means are provided for decanting the overflow at an intermediate level.

B. M. V.

Centrifugal separation. R. COWAN, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,998,359, 16.4.35. Appl., 26.12.31).—In the separation of, e.g., wax from oil the fluid is fed both to an axial conduit and a shell, the latter being formed with wax-collecting pockets and the former being serrated and having outlets through which the minor inner flow is projected through the major part in the shell.

B. M. V.

Duplex centrifugal separator. S. C. LINDBERG, Assr. to CENTRIFUGAL ENG. & PATENTS CORP. (U.S.P. 1,997,971, 16.4.35. Appl., 7.3.30).—All the effective rotating parts are duplicated and co-axial, two streams of paper pulp (e.g.) being treated simultaneously.

B. M. V.

Manufacture of emulsions. LANCASTER PROCESSES, INC., Assees. of T. ROBINSON (B.P. 438,680, 12.10.34. U.S., 12.10.33).—A continuous circulation of previously emulsified mother-liquor is at one point divided into two streams to which are added (1) new material and (2) H_2O and emulsifying agent, respectively. After recombining,

the mixture is agitated and discharged with turbulence, and a portion for market is continuously withdrawn.

B. M. V.

Apparatus for degassing of liquids. F. E. BANCROFT, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 439,255, 9.7.34).—The liquid, at suitable temp. and vac., is trickled down over a stack of alternate upright larger and inverted smaller saucers, the former having apertures for downflow in the centre. Both the treatment vessel and the outlet for vapours are cooled by jackets.

B. M. V.

Separation of liquids from gases. E. PYZEL and R. TILLMANN, ASSRS. to SHELL DEVELOPMENT Co. (U.S.P. 1,996,257, 2.4.35. Appl., 4.2.33).—A mixture of gas and liquid, e.g., N_2 , H_2 , and NH_3 , is divided into several streams which are caused to reunite with collision; the combined stream impinges on a plate from which most of the liquid drips, and the gas after removal upwards is caused to impinge on another plate.

B. M. V.

Evaporation of solutions. E. ÖMAN, ASSR. to INDUSTRIEKKEMISKA AKTIEB. (U.S.P. 1,995,999, 26.3.35. Appl., 4.2.31. Swed., 11.2.30).—Paper or the like is passed through a chamber in direct contact with heated air, the hot moist air from the dry end is passed to the wet end, and the very moist air from the wet end is passed in heat exchange with cellulose lye to preheat it; the lye is next evaporated by direct contact with other heated gases, and those wet gases may be used to preheat air for the dryer.

B. M. V.

Concentration of solutions. W. L. BADGER (U.S.P. 1,996,988, 9.4.35. Appl., 20.10.32).—The solution is refrigerated in a jacketed vessel having stirring blades moving at a distance from the cooled wall approx. = the desired diam. of the crystals of solvent and operated at a speed such that the crystals are removed from the wall by eddy currents, but are not thereby broken up.

B. M. V.

Crystallisation apparatus. W. E. BURKE, W. H. ALLEN, W. A. GALE, C. F. RITCHIE, and R. B. PEET, ASSRS. to AMER. POTASH & CHEM. CORP. (U.S.P. 1,997,277, 9.4.35. Appl., 6.9.32).—A crystalliser operating by vacuum-cooling is described, the claims relating to methods of cooling the vapours in two stages and removing non-condensable gases.

B. M. V.

Boiling or like pans. SOUTH METROPOLITAN GAS CO., D. CHANDLER, and A. J. SKINNER (B.P. 438,519, 12.5.34).—The bottom of a boiling pan is shielded from the primary combustion space by a dished metallic plate through the centre or periphery of which the gases pass in contact with the pan and finally over preheaters for the air and/or gas.

B. M. V.

Heated-drum apparatus for desiccating liquids and semi-liquids. BÜTTNER-WERKE A.-G. (B.P. 439,393, 21.12.34. Ger., 8.1.34).—A train of feed rollers is operated either: (1) all turning in the same angular direction as the drum, without contact with each other or the drum, or (2) alternately in opposite directions with gentle contact, the surface of alternate rollers being fluted and giving line contact between the drum and the tops of the flutes.

B. M. V.

Insipissating, heating, and cooling of liquids and solutions in single- or multi-stage plants. P. KNI-

CHALIK (B.P. 439,538, 21.1.35. Ger., 20.1.34).—The liquid is squirted from a group of jets across a header space into the lower ends of vertical tubes which are heated on the outside. The bulk of the unevaporated liquid returns from the upper vapour space by an external pipe to the pump for creating jet pressure, any spray caught in the lower header being picked up by the jets. The nozzles are slightly divergent at the outlet and are preferably provided with rifling to produce whirling.

B. M. V.

Treatment and concentration of liquids by freezing. W. M. ZORN and T. H. EICKHOFF, ASSRS. to LOW TEMPERATURE PROCESSING Co. (U.S.P. 1,999,712, 30.4.35. Appl., 30.6.31).—Fruit juice or the like is spread centrifugally on the inside of a rotating shell, and the inner surface is frozen by cold gas travelling at such speed that the ice crystals, as soon as they are formed, are blown up draining ramps inclined against centrifugal force and out of the shell.

B. M. V.

Purification of fluids. C. A. BULKELEY, ASSR. to C. F. HOCKLEY (U.S.P. 1,998,774, 23.4.35. Appl., 19.1.31).—In the dehydration of CO_2 (e.g.) by means of an adsorbent or absorbent, the gas to be dried is heated and passed through spent absorbent, then cooled to remove most of the H_2O as liquid, and passed through active absorbent in preferably ≤ 2 stages (partly spent and fresh material). A newly regenerated absorbent is purged by purified gas pumped back through it and the cooler.

B. M. V.

Air separator. T. J. STURTEVANT, ASSR. to STURTEVANT MILL Co. (U.S.P. 1,999,851, 30.4.35. Appl., 27.3.31).—A centrifugal agitator situated between the feed distributor and the fan is described.

B. M. V.

(A, D) **High-temperature filtering.** (B) **Bag filter.** (c) **Filtering system.** R. B. RATHBUN, ASSR. to AMER. SMELTING & REFINING Co. (U.S.P. 1,995,648—51, 26.3.35. Appl., [A] 25.6.31, [B] 9.7.32, [C] 11.7.32, [D] 29.7.32).—(A, B, D) Bag filters operating with outward current are provided with interior, rotating, vac.-cleaner nozzles (tapering in [D]) running on tracks which form strengthening rings for the filter. As filter medium, claim is made for steel wool, or parallel metal wires interwoven with fibrous material. (c) An assembly of such bags in a baghouse is described.

B. M. V.

[Dust removal from] gas [undergoing catalytic] treatment. C. B. CLARK, ASSR. to AMER. CYANAMID & CHEM. CORP. (U.S.P. 1,995,293, 26.3.35. Appl., 18.11.32).—In, e.g., the catalytic oxidation of SO_2 the mixture of SO_2 and air is passed ≤ 6 times in opposite directions through an annular mass of catalyst which is constantly renewed by charging clean material at the top and withdrawing dirty material at the bottom. During the initial pass the gases are subjected to radiant heat, and subsequently are cooled while they turn back in the outer chambers.

B. M. V.

Apparatus for measuring or indicating the density of solid particles, such as smoke, in a gaseous medium. ELLIOTT BROS. (LONDON), LTD., and L. W. PETTITT (B.P. 438,629, 26.9.34).—In an apparatus of the type in which a beam of light passes from a source (A) to a light-sensitive device (B) across

a flue, windows are provided in front of *A* and *B* which are washed by continuous streams of H_2O ; the zero of the recording instrument is ascertained by inserting a tube across the flue from *A* to *B*, the tube being kept full of clean air. B. M. V.

Photometers. GEN. ELECTRIC CO., LTD., and J. M. WALDRAM (B.P. 438,630, 3.10.34).—A surface of which the brightness is to be determined is viewed through a comparatively large aperture simultaneously with a no. of relatively small comparison surfaces which are illuminated to different known degrees of brightness, the standard surfaces being different parts of a translucent strip inclined to the source of light. B. M. V.

Spectrophotometer. A. HILGER, LTD., and O. W. PINEO (B.P. 438,511, 19.3.34).—A ray of light, or a pair of rays divided therefrom, passes through the following apparatus: (1) a selector slit of a monochromator, the adjustment of the slit causing a pen to move along a wave-length base on a chart, (2) a photometer prism rotatably adjustable to vary the angle of plane polarisation, (3) a Wollaston prism forming two beams polarised at 90° and slightly divergent, the adjustment of (2) varying the ratio of the two beams, (4) a retardation plate rotated to produce a slight flicker, (5) a stationary prism similar to (2) but taking both beams, (6) an integrator in which the rays are reflected from standard and sample surfaces into (7) a photo-electric cell which detects flicker. After amplification the current from (7) adjusts (2) until there is no flicker. (1) is provided with a logarithmic adjustment attained by cams so that it passes a band of const. λ in every position. B. M. V.

Plastometer. W. L. SHEARER (U.S.P. 1,973,297, 11.9.34. Appl., 3.11.32).—The plasticity of, *e.g.*, clay slips is determined by measuring the rate of flow of the slip from a narrow tube at the lower end of a graduated cylinder supported from one arm of a balance. The ratio of the times taken for the height of the slip in the cylinder to pass two marks is a measure of the plasticity. A. R. P.

[Hydraulic brake] fluid composition. G. L. DOELLING, ASST. to WAGNER ELECTRIC CORP. (U.S.P. 1,997,998, 16.4.35. Appl., 13.1.34).—A mixture is made of a monoricinoleate of mono-, di-, or tri-hydric alcohols or a di-ricinoleate of di- or tri-hydric alcohols, the alcohols being $\geq C_5$, and a diluent of low f.p., *e.g.*, an alcohol $\geq C_6$ or a glycol ether. B. M. V.

Insulating unit. C. H. THAYER, ASST. to SUN OIL CO. (U.S.P. 1,997,324, 9.4.35. Appl., 15.3.34).—A porous but impervious heat-insulating brick suitable for use in contact with wet vapours and corrosive liquids, also resistant to rapid changes of temp. of the order of 660° , is formed of a core of diatomaceous earth coated with borosilicate glass of low coeff. of expansion. B. M. V.

Priming of centrifugal pumps. APPAREILS ET EVAPORATEURS KESTNER (B.P. 439,023, 20.6.25. Fr., 26.6.34).

Manufacture of [reinforced, saucer-shaped] diaphragms for pumps and the like. W. W. TRIGGS. From DORR CO., INC. (B.P. 438,638, 1.2.35).

Mechanical timing unit for water-gas and other cyclic processes. E. LINSLEY and F. G. SARGENT (B.P. 438,906, 10.7.34).

[Evaporator for] $Al_2(SO_4)_3$.—See VII. Glass-melting furnaces. Glass filter.—See VIII. Heating shaft gases. Electrical pptn. [for gases]. Determining composition of fluids in motion.—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Spontaneous ignition of coal. W. BIELENBERG (Angew. Chem., 1935, 48, 779—781).—A discussion in terms of oxidation at low temp., the low conductivity of coal causing the temp. in the reaction zone to rise rapidly. The influence of drying and initial temp. is discussed. R. S. B.

Heating of ovens for degasifying coal. STIEF (Gas- u. Wasserfach, 1935, 78, 965—971).—Of the various gases employed in industrial heating only coal gas and air-water-gas (from coke) are economically usable. Their advantages and disadvantages are discussed and the effects of dilution with inert gases and addition of H_2O vapour to prevent deposition of C examined. It is concluded that a mixture of these two gases is best, and the proportioning of such mixtures is discussed. Calculations are given for the deduction of correct conditions and the effect on the coal throughput and gas and coke yields. J. W.

Elimination of sulphur from coke. G. E. FOXWELL (Gas J., 1936, 213, 31—33).—Methods of analysis for determining the forms in which S is present in the original coal are quoted and typical analyses given. A considerable amount of S may be removed in the coal washery, but too much still remains in coke. The action of H_2 on coke during carbonisation will remove S, but the process is not a commercial one. The only alternative is to fix the S in the ash so as to lessen atm. pollution. D. M. M.

Active carbon from Karafuto tundra peat. I. Comparison of raw materials of active carbon. M. SHIKATA and S. NAGANUMA (J. Agric. Chem. Soc. Japan, 1935, 11, 988—996).—Tundra peat is one of the best starting materials among plant products for production of active charcoal. P. G. M.

Desulphurisation of coal gas. F. FOERSTER and E. VON SAHR (J. pr. Chem., 1935, [ii], 144, 115—144).—According to the pressure employed, heating of the residues obtained in the desulphurisation of coal gas by technical Fe_2O_3 mixtures from glass tubes gives 74—83% of the S originally present as distillate. The latter contains considerable quantities of salts, mainly NH_4CNS and $(NH_4)_2CO_3$, which are removed by hot H_2O previous to the isolation and purification of S. The black residue is composed essentially of FeS, which is slowly oxidised by moist air to $Fe(OH)_3$, S, and $Fe_2(SO_4)_3$. Elementary S is best determined by Järvinen's method. The main impurities in gas-S are unsaturated org. compounds which are removed by conc. H_2SO_4 after dissolution of the S in C_6H_6 . With reference to the desulphurisation of coal gas by suspensions of $Fe(OH)_3$ in H_2O , an apparatus is devised for the production of Fe_2S_3 from H_2S-H_2O and suspended $Fe(OH)_3$. In

these suspensions Fe_2S_3 is determined by oxidation with FeCl_3 and titration of FeCl_2 so produced with $0.1N\text{-KMnO}_4$: $\text{Fe}_2\text{S}_3 + 4\text{FeCl}_3 \rightarrow 6\text{FeCl}_2 + 3\text{S}$. Oxidation of Fe_2S_3 by air proceeds with almost unchanged velocity from the beginning to the end of the oxidation. Rise of temp. accelerates the oxidation very slightly if the sulphide has been prepared at the same temp. Increasing amounts of alkali delay the oxidation and favour the formation of $\text{S}_2\text{O}_3^{2-}$. In presence of NH_3 production of $\text{S}_2\text{O}_3^{2-}$ can be hindered by addition of NH_4Cl . Oxidation of Fe_2S_3 is not accelerated by Na_2SO_3 . At room temp. FeS_2 is formed very slowly from Fe_2S_3 in presence of excess of H_2S . H. W.

Water-gas process. J. G. KING, B. H. WILLIAMS, and R. V. THOMAS (Dept. Sci. Ind. Res., Fuel Res. Tech. Paper No. 43, 1935, 58 pp; cf. B., 1931, 706).—To eliminate the effect of clinker formation in the generator on the efficiency of the water-gas process the zones of high temp. were kept to the centre of the fuel bed by placing an annular plate below the grate so that air could pass through only a central opening of limited area (about $1/8$ of the original area), and by introducing a charging cone which caused the breeze to be projected towards the wall and the larger pieces to collect in the centre; the sequence of operations was also so adjusted that the temp. in these zones was kept sufficiently low to avoid undue fusion of the ash. Trials were carried out with 4 coke having ash fusion temp., in a reducing atm., of $1200\text{--}1500^\circ$. Under the above conditions of operation the output may decrease to 50% of its rated val., but the efficiency increases by 20%; the higher the fusion temp. of the ash the less is the reduction in output. The dimensions of a plant necessary for any given output can be calc. on the assumption that the output \propto the area of cross-section of the fuel bed. The efficiencies of the process, expressed as therms of water-gas per 100 therms of coke gasified, for an approx. const. rate of gas output in therms per hr. of actual steaming, were 68.7, 72.4, and 76.8, respectively, for rates of blowing of 1400, 2300 (normal), and 4380 cu. ft./min. The variation agrees, at least qualitatively, with that deduced from a simplified theory of the process. For greater thermal efficiency during the blow cycle of the process, the rate of blowing should be as great as practical limitations allow, the period of blowing being correspondingly reduced so that the optimum temp. is not exceeded in the coke bed at the end of each blow. Alterations in the size of the coke within the limits examined, the conditions of operation remaining unchanged, had no important effect on the output or efficiency; the efficiencies obtained with coke sized to 2–3 in., 1–2 in., and 0–1 in., were, respectively, 73.5, 71.3, and 70.0%. If when using small coke the vols. of air per blow were increased in order to raise the temp. to the normal level for larger coke the output of water-gas would be greatly increased, but at the expense of efficiency. No significant differences of efficiency were observed when gasifying, under the same operating conditions, a horizontal-retort, a vertical-retort, and a low-temp. coke, respectively. The possibility of increasing the efficiency when using a low-temp. coke by suitably modifying the operating conditions is discussed. The effects on the calc. C

and thermal balances due to the presence of N, S, and H in the coke or of H_2O vapour in the air, or to dilution of the water-gas with blow gas, or *vice versa*, are normally < the experimental errors and are negligible.

A. B. M.

Dew point of flue products from manufactured-gas combustion. J. S. YEAW and L. SHNIDMAN (Ind. Eng. Chem., 1935, 27, 1476–1479).—The dew point as calc. is $0\text{--}10^\circ$ < that determined experimentally, due to the presence of SO_3 in the flue gas. D. K. M.

[Gas-liquor] ammonia recovery at Nantes. A. BOLZINGER (Gas J., 1935, 212, 844–848).—The factors affecting the concn. of the liquor which can be obtained from NH_3 washers, and means of improving this concn., are discussed. In the process described, all the NH_3 condensate liquors, with the exception of that condensing at $> 70^\circ$, are sprayed into the hot gas in the foul-main so that all the NH_3 can afterwards be recovered in the washing plant. The latter is operated at 15° with the stripped liquor from the spray system and a portion of the condensate obtained above 70° as make-up. Excess of this condensate is the only effluent. In tests (details given), 70–75% of the NH_3 was recovered at 41-oz. concn. E. S.

Catalytic hydrogenation of phenolic oil in low-temperature tar. III. Effect of catalysts. S. ANDO (J. Soc. Chem. Ind., Japan, 1935, 38, 567–569 B; cf. B., 1935, 259).—The proportion of oils, b.p. $< 170^\circ$, $170\text{--}220^\circ$, and $> 220^\circ$, obtained by high-pressure hydrogenation of the phenolic part of low-temp. tar in presence of various metallic oxides, sulphides, and chlorides is given. The highest yield of the fraction b.p. $< 170^\circ$ is obtained with a Mo oxide catalyst. With Mo, Ni, and Fe oxides and CoS as catalysts the unchanged oil was desulphurised. The phenolic oil in the middle fraction results from the de-alkylation of higher phenols, but this reaction is not appreciably catalysed. H. G. M.

Tar as a binder for roadmaking. HOEFFNER (Proc. Internat. Road Tar Conf., Rome, 1935, 13–22; Road Abs., 1935, 2, No. 628).—The comparative merits of, and respective fields of use for, cement, tar, and bitumen as road binders are reviewed. T. W. P.

Tar products for water- and damp-proofing. E. O. RHODES and E. H. HYDE (Ind. Eng. Chem., 1935, 27, 1408–1410).—Methods and suitable products for water- and damp-proofing masonry, floors, fabrics, etc. are reviewed. J. W.

Characterisation of petroleum fractions. K. M. WATSON, E. F. NELSON, and G. B. MURPHY (Ind. Eng. Chem., 1935, 27, 1460–1464).—The correlation which exists between the Universal Oil Products b.p. and sp.-gr. characterisation factor (B., 1933, 995) and the NH_2Ph point, η index, η -d const. (B., 1928, 592), and H content is discussed. Approx. relations are derived and charts given so that one characteristic may be calc. from another. J. W.

Viscosity of petroleum products. Viscosity-temperature characteristics of Pennsylvania lubricating oils. R. E. HERSH, E. K. FISHER, and M. R. FENSKE (Ind. Eng. Chem., 1935, 27, 1441–1446; cf. B., 1935, 613).—From accurate kinematic η determinations

for a large no. of carefully fractionated Pennsylvania oils an equation is derived relating η at 100° F. to η at 210° F. From available data a similar equation is derived for naphthenic oils. Tables are given enabling the kinematic η index for any oil to be calc. J. W.

Viscosity-temperature relation of Japanese petroleum oils. II. T. KUROSAWA (J. Soc. Chem. Ind., Japan, 1935, 38, 532–534 B).—A table gives η (Redwood) at 10°, 20°, 30°, 80°, 100°, and 150° as calc. from η at 50°, using η ratios described previously (B., 1935, 1125). C. C.

Laboratory vacuum distillation unit and seven-stage countercurrent-treating apparatus [for petroleum crude oils]. H. MOORE (J. Inst. Petroleum Tech., 1935, 21, 993–994).—In a still for evaluating the crude oils the packed fractionating column is electrically heated so as to control the reflux ratio. The adoption of several standard sizes is suggested. In the treating apparatus the oil and extracting solvent are mixed by means of a rotary pump and pass through (a) a closed circuit several times into a double cone-shaped separating tank, and (b) a second circuit from which the liquids enter the tank tangentially. S. M.

Thermal decomposition of higher paraffin hydrocarbons on a glowing wire. F. FISCHER, K. PETERS, and K. WINZER (Brennstoff-Chem., 1935, 16, 421–429).—Kogasin II, the higher-boiling fraction of the liquid hydrocarbon mixture obtained synthetically by the Fischer-Tropsch process (cf. B., 1935, 179), was thermally decomposed by immersing in the liquid an electrically-heated Pt wire. The products consisted of 20% of a highly unsaturated light oil and 80% of gaseous hydrocarbons; 70 vol.-% of the latter consisted of unsaturated hydrocarbons, principally C_2H_4 and its homologues. Similar results were obtained by the thermal decomp. under the same conditions of other Kogasin fractions, including a wax. of m.p. 65°. A. B. M.

Synthesis of liquid hydrocarbons from natural gas. III, IV. Discussion of the pyrolysis of methane and of the formation of acetylene from methane. K. KOBAYASHI, K. YAMAMOTO, H. ISHIKAWA, and S. HINONISHI (J. Soc. Chem. Ind., Japan, 1935, 38, 550–555 B; cf. B., 1935, 292).—During pyrolysis of CH_4 , the intermediate products in the formation of liquid products are C_2H_4 and C_2H_2 . The optimum temp. for the formation of C_2H_4 is 1200° (4% of C_2H_4 being obtained); above this temp. the % of C_2H_4 decreases and of C_2H_2 increases. Equations show the probable reactions at equilibrium. C. C.

Motor-benzol refining. W. H. HOFFERT and G. CLAXTON (Gas World, 1935, 102, Coking Sect., 53–56).—Essential properties of motor benzol are reviewed. The behaviour of small samples as to colour-stability cannot be taken as a criterion of the bulk, and in specifying the removal of probable causes the specification must be governed by condition of large-scale storage and blending. The val. of d and other tests is carefully considered, as also is the effect of S in the different forms in which it occurs in the spirit. The influence of various washing processes is compared and their influence on the product considered. D. M. M.

Influence of addenda on combustion of gas oil in internal-combustion motors. M. AUBERT, P. CLERGET, and R. DUCHÊNE (Compt. rend., 1935, 201, 879–881; cf. B., 1934, 132).—The influence of 5–25% of $EtNO_3$ (I) on flame propagation, pressure, and piston displacement in a motor has been studied. Addition of (I) to the oil suppresses detonation and decreases delay in inflammation. R. S. B.

"Pinking" [of motor fuels]. J. K. THOMPSON and R. V. WHEELER (J. Inst. Petroleum Tech., 1935, 21, 931–939).—Photographic records of flame movements and of pressures developed in explosions of hydrocarbon-air mixtures have been obtained in a closed cylinder fitted with suitable windows. For C_5H_{12} -air, a pinking explosion is obtained only when C_5H_{12} is in excess, from which it appears that the source of energy of the shock wave responsible for pinking lies in the partly burning gases behind the flame front. A measure of the anti-knock val. of a fuel can be obtained either from the lowest initial pressure with which a mixture containing nearly the theoretical quantity of fuel for complete combustion can produce a pinking explosion, or, alternatively, with a const. initial pressure, from the concn. of fuel required to produce an explosion the flame of which is striated. A comparison has been made of the explosion characteristics of C_5H_{12} , $n-C_6H_{14}$, C_6H_6 , cyclohexane, $n-C_7H_{16}$, and EtOH with those of commercial fuels. If N_2 in the air is replaced by A or He under the same conditions, pinking is inhibited. N_2 apparently plays an active part in a pinking explosion either as an absorber of energy or as a producer of oxides. C. C.

Anti-knock properties of liquid fuels. G. ROBERTI (Ric. sci. Prog. tecn., 1934, 5, 405–421; Chem. Zentr., 1935, i, 2114).—A review of methods of measuring anti-knock characteristics, and of results with various fuels. H. J. E.

Relation between the knocking power of light fuels and their physical properties. R. HEINZE and M. MARDER (Angew. Chem., 1935, 48, 776–779).—The relation between the C_8H_{18} no., d , n , and the parachor for various benzines is further studied (cf. B., 1935, 660). Points for pairs of variables are scattered about smooth curves, scattering increasing as the C_8H_{18} no. decreases. R. S. B.

Relation of power to antiknock fuel requirements for multi-cylinder engines. S. D. RUBENZ (J. Franklin Inst., 1935, 220, 615–656, 755–788).—Attempts are made to determine the min. antiknock requirements of such fuels, especially for air-cooled aëro-engines. A method of comparative testing of different fuels without stopping the engine is described, the incidence of knocking being measured by rise of temp. in the cylinder head. The variables affecting knocking and temp. rise are discussed thermodynamically; it is concluded that no simple solution of the problem is possible, and that even the most complete correlation of empirical data is unlikely to succeed in matching fuels to performance. D. M. M.

Nature of the octane scale [for fuels]. E. B. EVANS, E. M. DODDS, and F. H. GARNER (J. Inst. Petroleum Tech., 1935, 21, 1000–1012).—The C_8H_{18} no. of a fuel depends on the type of engine and conditions

of operation. Ratings determined under one set of conditions are not readily converted into corresponding vals. for different conditions, owing to the differences in susceptibility of different fuels to temp. and other engine conditions. Further, the C_8H_{18} scale is not linear. The bouncing pin was found to be unsatisfactory as a measure of pressure rise occurring on detonation, but the pin was used to obtain an approx. extension of the C_8H_{18} scale (above 100) by matching blends of C_6H_6 and cyclohexane, PhMe and A.2 (reference fuel), diisobutylene and A.2, against $C_8H_{18} + C_7H_{16}$ and $C_8H_{18} + C_6H_6$ on the S.30 engine. A pressure scale is proposed as giving a more convenient and accurate method for determining knock ratings, particularly of 85–100, and also of extending the measurements to fuels of higher antiknock val. than *iso*- C_8H_{18} . Using the CFR engine, incipient knock is determined by ear or by using a microphone and temp. plug, and the pressure is determined by a special pressure gauge in conjunction with a new cathode-ray oscillograph indicator. C_8H_{18} nos. are then obtained from a curve previously constructed (for the particular engine) relating max. quiet-combustion pressure to C_8H_{18} no. These curves are found to be hyperbolae in all cases. C. C.

Classification of [motor] fuels. M. SERRUYS (Compt. rend., 1935, 201, 815–817).—A method of rating of fuels is suggested in place of the use of C_8H_{18} nos. The max. feed pressure of the fuel-air mixture which fails to cause knocking under specified conditions is measured. H. J. E.

Production of lubricating oils. Separation of solvents and water in refining and dewaxing oils. E. R. SMOLEY and W. W. KRAFT (Ind. Eng. Chem., 1935, 27, 1418–1422).—Good lubricating oils may be produced from poor stocks by solvent processes. The chief difficulty is separation of solvent and H_2O . Various solvents used are classified according to their miscibility with H_2O , and methods used for removal of H_2O are critically discussed. J. W.

Action of ageing inhibitors on mineral lubricating oils. H. SUIDA and P. FRANCHETTI (Petroleum, 1935, 31, No. 49; Motorenbezt., 8, No. 12, 2–5).—The ageing characteristics of Pennsylvanian, Columbian, and Rumanian lubricating oils have been compared by determining the saponification index, petroleum and asphaltic resins, sludge, Conradson C no., η , and η index, before and after ageing by the Suida-Kamptner method. Oils containing the least H deteriorate most rapidly, although less sludge is pptd. Tests on the paraffinic, naphthenic, and aromatic fractions obtained by the action of selective solvents confirm this; asphaltic resins are rapidly formed in the aromatic fraction, but sludge formation is low owing to the solubility of the latter in this type of oil. The efficiency of a no. of oxidation inhibitors, e.g., PhOH, cresol, p - NH_2 - C_6H_4 -OH, pyrogallol (I), Sn, and Sn soaps, was examined. Sn naphthenates and stearate are insol. in mineral oil, but the linoleate is sol. The Sn soap inhibits resin formation in Rumanian oils and is particularly effective in Pennsylvanian oils, whereas (I) has a similar action in the case of the former only. Results with the various inhibitors are tabulated. C. C.

Adhesivity of lubricating oil. F. IRAUTH and E. NEYMAN (Petroleum, 1935, 31, No. 49, 4–8).—Oiliness of a lubricating oil is associated with the adsorption of a film of oil on to metal surfaces and is governed by the proportion of dipolar substances present in the oil. To ascertain this proportion, a known wt. of oil (3–10 g.) is mixed with C_6H_6 (2 ml.) and Fe powder (5 g.); the amount of Fe not wetted by the oil is determined volumetrically after extraction with aq. H_2SO_4 , and an adhesion factor is obtained. For straight mineral oils, adhesivity falls with rising η index, oils giving a steep η -temp. curve adhering strongly to metal surfaces. Addition to a lubricating oil of certain compounds containing polar groups (e.g., 0.05–0.1% of β - $C_{10}H_7$ -OH) increases the adhesion to Fe powder. C. C.

Experiments with the Allmen S.A.E. oil-testing machine. E. H. KADMER (Oel u. Kohle, 1935, 11, 956–959).—Results obtained using the above machine on polar high-pressure lubricants, neutral mineral oil raffinates, and polar lubricating oils are tabulated. Cl has a favourable action on high-pressure lubricants containing sulphonated or chlorinated oils, but Pb soap and S are less satisfactory. Castor oil appears to be the best and most harmless high-pressure lubricant. Mineral oil fails at an average load of about 400 kg./sq. cm., but addition of only 4% of CCl_4 raised the possible load considerably. η has no influence on film strength. Results are given for graphited oil, fatty acids, and for oxidised and voltolised oils. Zn lactate and a synthetic resin oil gave very satisfactory results on the Allmen machine. C. C.

Examination of quenching liquids. N. E. WOOD (J. Inst. Petroleum Tech., 1935, 21, 995–998).—The cooling curves obtained when test-pieces of steel were quenched in 3 different oils and in H_2O are compared. The η and temp. of the quenching oil affect the rate of cooling; the tendency of the oil to oxidise is also important. C. C.

Viscosity characteristics of chemically-doctored drilling fluid. C. A. ANDREWS (J. Inst. Petroleum Tech., 1935, 21, 963–981).—The flow characteristics of thixotropic liquid-solid suspensions (especially drilling fluid) are discussed. The “viscosity” of the fluid was investigated, using a modified Dallwitz-Wegener instrument. Concn.- η curves are given for kaolin- H_2O mixtures to which have been added varying amounts of chemicals, e.g., Na_2SO_4 , Na_2CO_3 , Na_2SiO_3 , CaF_2 , KNO_3 , $Al_2(SO_4)_3$, $NaOH$, $CaSO_4$. A min. η point is obtained on each curve. No connexion could be found between p_H and η . C. C.

Thin layers of tin and other metals. I. Influence of thin metal layers on deterioration of technical insulating oils. P. J. HARINGHUIZEN and D. A. WAS (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 1002–1006).—The effect of metals on sludge formation and on increasing the acidity of oils in contact with air follows the order $Cu > Pb > Sn$. Sn may act even as an antioxidant. The results indicate that the effects of metals are due to homogeneous catalysis by traces of the metal which dissolve in the oil. J. W. S.

Paraffin [wax] and its uses. M. FRIEDWALD (Rev. pétrol., 1934, 1501—1503; 1935, 4—7; Chem. Zentr., 1935, i, 2291).—The commercial applications of paraffin wax, including its oxidation products, are reviewed.

A. G. P.

Production of cyclic compounds by destruction of Rangoon paraffin at high temperature. H. I. WATERMAN, J. J. LEENDERTSE, L. ADAM, and C. VAN VLODROP (J. Inst. Petroleum Tech., 1935, 21, 959—962).—By heating Rangoon wax under high H_2 pressure at about 450° , with or without a Ni catalyst, it was found that while high-pressure H_2 without a catalyst decreased ring production the combination of H_2 and Ni caused a total absence of rings in the reaction product. By raising the reaction temp., e.g., to 530° in presence of Ni, or by reducing the H_2 pressure the production of rings increased.

C. C.

Nitrotoluenes from crude oil.—See III. H_2 from hydrocarbons.—See VII. Asphalt pavements. Adhesion in road materials.—See IX. Oil-resistant rubber.—See XIV. Gas-liquor effluents.—See XXIII.

See also A., Jan., 32, Explosion of combustible gas mixtures. 34, Dust explosions. 42, Determining CO in admixture with H_2 and CH_4 .

PATENTS.

Manufacture of a briquetted fuel. SOC. DE RECHERCHES ET DE PERFECT. INDUSTR. (B.P. 437,870, 27.3.35. Fr., 20.4.34).—A small amount, e.g., 1.8 pts., of a finely-powdered, dry amylaceous binder, e.g., starch, is mixed with a larger amount, e.g., 30 pts., of a finely-powdered coking coal, and the product is then mixed with anthracite fines, e.g., 68.2 pts. The mixture is heated to 80 – 100° and briquetted, and the briquettes are heated rapidly to 550 – 600° and baked at this temp. for about 1 hr.

A. B. M.

Fuel briquette. L. I. LOGHRY, ASST. to SUPERIOR CEMENT CORP. (U.S.P. 1,990,948, 12.2.35. Appl., 18.1.33).—Coal is briquetted under pressure, using as binder (60–75 lb. per ton of fuel) a mixture of hydraulic cement 75–99.65%, pitch or asphalt etc. 0.2–10%, metal salt, e.g., $CaCl_2$, $Ca(OH)_2$, to accelerate setting of the cement, 0.1–10%, O_2 -liberating agent, e.g., $Na_2Cr_2O_7$, KNO_3 , etc. 0.05–5%. The binder is finely ground and the binder-coal mixture suitably moistened before briquetting.

A. B. M.

Thermal treatment of carbonaceous substances. I. G. FARBERIND. A.-G. (B.P. 437,678, 23.5.34. Ger., 8.6.33).—Tars, mineral oils, etc. are cracked, in absence of added H_2 , in Fe or alloy-steel apparatus the inner surfaces of which have been coated with an Fe–Zn alloy by covering them with Zn and then heating to 400 – 800° , or by heating them to between the m.p. of Zn and 900° in contact with Zn vapour. Trouble due to corrosion or to excessive coke formation is thereby avoided.

A. B. M.

Production of coherent coke from non-caking carbonaceous materials. J. L. STREVEIS, E. W. BROCKLEBANK, and W. B. MITFORD (B.P. 437,730, 5.4.34).—Finely-divided non-caking coal is mixed with

oil (e.g., 10%), with the “gamma” fraction obtained from a caking coal by extraction or other means (2–20%), and with a wetting and peptising agent, e.g., creosote oil (5%), and the mixture is subjected to low-temp. carbonisation.

A. B. M.

Preparation and regeneration of activated carbon. G. CAROILE and E. GARDIOL (I. A. C. INDUSTRIA ARTICOLI CAOUTCHOUC) (B.P. 437,400, 28.9.34. It., 28.9.33).—Org. substances, e.g., peat, wood, spent activated C, to which a small quantity of aq. $ZnCl_2$ has been added, are heated to about 180° and mixed with aq. $ZnCl_2$ which has been preheated to about 240° and maintained in the liquid state during preheating by addition thereto of a small quantity of carbonaceous material, e.g., the material being treated. The mixture is then further heated. The product, after cooling, may be treated with an aq. solution of a sol. org. compound, e.g., sugar, and again heated to about 400° .

A. B. M.

Granules of carbon black. H. E. POTTS. From UNITED CARBON CO. (B.P. 437,647, 2.5.34).—Finely-divided C black is mixed to a stiff paste with a volatile liquid, e.g., EtOH or C_6H_6 , and fed to a rotary apparatus in which it is broken into fragments, which are then rapidly dried by exposure to gases at a suitable temp., e.g., 200 – 260° .

A. B. M.

Treatment with hydrogenating gases of distillable carbonaceous materials. INTERNA T. HYDROGENATION PATENTS CO., LTD., Assees. of I. G. FARBERIND. A.-G. (B.P. 438,084, 23.10.34. Ger., 24.11.33).—Coal, tar, mineral oils, etc. are hydrogenated under pressure in presence of metal halide catalysts (excluding Na or K halides), e.g., halides of V, Mo, Cr, W, Li, Cu, etc., the activity of which is maintained by addition, either continuously or intermittently, of suitable amounts of the same halogen as that contained in the catalyst, and/or the corresponding H halide, and/or compounds which form the H halide under the reaction conditions, e.g., MeCl, MeBr, MeI, CCl_4 , NH_4 halide, etc.

A. B. M.

Manufacture of fuel gas. A. T. STUART (B.P. 437,570, 14.3.35. Can., 14.3.34).— H_2 and O_2 are produced by the electrolysis of H_2O . The H_2 is carburetted and mixed with N_2 to give a gas (A) of desired d and calorific val. Solid or liquid fuel is gasified with the O_2 to give another gas (B) of similar properties, and the gases A and B are mixed. The H_2 may be carburetted by gasifying oil with air, or by reforming hydrocarbon gases, e.g., natural gas or coal-carbonisation gases, with air, and mixing the N_2 -containing gases so obtained with the H_2 .

A. B. M.

Manufacture of compressed carbide bodies. F. G. BRETTELL. From WIEDE'S CARBIDWERK FREYUNG M.B.H. (B.P. 438,008, 22.5.35).—Granules of CaC_2 are heated to 100 – 150° , impregnated with a viscous hydrocarbon oil, and mixed at about the same temp. with a fusible binding medium, sol. in or easily miscible with the oil, e.g., S or pitch. The mixture is then pressed to shape.

A. B. M.

Separation of asphalt from heavy oils or residues. N.V. MACHINERIEEN- EN APPARATEN FABR. “MEAF” (B.P. 437,843, 31.8.34. Ger., 31.8.33).—Crude mineral

oil residues or similar heavy oils are allowed to flow continuously under gravity down a column (C) counter-current to liquid benzene which in rising through the crude oil residue selectively dissolves the oil therefrom, leaving the asphalt to be withdrawn from the bottom of C. The oil and asphalt pass to evaporators to be freed from the dissolved benzene, which is recirculated.

A. B. M.

Emulsions of asphaltic and like materials. E. I. DU PONT DE NEMOURS & CO. (B.P. 437,674, 4.5.34. U.S., 6.5.33).—An aq. emulsion of asphalt etc. is formed by agitating the asphalt, at a temp. at which it is liquid, with H_2O containing an alkali or alkaline-earth salt of an alkylsulphuric acid the alkyl radical of which consists of a saturated or unsaturated straight chain of ≤ 8 C atoms, e.g., Na cetyl, oleyl, or stearyl sulphate. Other emulsifying or thickening agents, extenders, etc. may also be added.

A. B. M.

Purification of tar acids. C. E. HARTWIG, Assr. to BARRETT CO. (U.S.P. 1,991,979, 19.2.35. Appl., 19.7.33).—Tar acids, either in solution as phenolates or admixed with dil. acid, are agitated with a metal capable of causing the evolution of H_2 , e.g., powdered Zn or Mg.

A. B. M.

Treatment of deep [oil] wells. J. J. GREBE and S. M. STOESELER, Assrs. to DOW CHEM. CO. (U.S.P. 1,998,756, 23.4.35. Appl., 19.10.34).—A jelly to restrain access of H_2O or brine is formed down the well by means of a carbohydrate or other suitable material, followed by H_2O or acid.

B. M. V.

(A) Increasing the production of [oil] wells. (B) Drilling well and fluid therefor. H. A. AMBROSE and A. G. LOOMIS, Assrs. to GULF RES. & DEVELOPMENT CORP. (U.S.P. 1,999,146—7, 23.4.35. Appl., 25.6.34).—(A) Cl_2 and H_2O are sent down to a point adjacent to the obstruction, followed by a considerable flush of H_2O . (B) The mud fluid for drilling through gas-bearing strata is mixed with a colloidal neutral org. agent to lower the surface tension of the fluid, e.g., $EtOAc$, an alcohol, or a ketone.

B. M. V.

[Oil]-well drilling fluid. H. C. LAWTON, A. G. LOOMIS, and H. A. AMBROSE, Assrs. to GULF RES. & DEVELOPMENT CORP. (U.S.P. 1,999,766, 30.4.35. Appl., 28.3.34).—The η of a fluid clay mud is decreased by the presence of caustic alkali (0.1–0.8%) and a weak org. acid: humic, gallic, tannic, ulmic, or lignic (0.05–0.5% on the clay solids).

B. M. V.

Breaking of oilfield petroleum–water emulsions. L. P. CURTIN (U.S.P. 1,973,430, 11.9.34. Appl., 17.3.33).—Emulsions of H_2O in petroleum containing asphaltic substances are heated at $\leq 70^\circ$ with 0.5–4% (on the oil vol.) of low-temp. tar, whereby the H_2O separates.

A. R. P.

Oxidation of cracked petroleum. C. ELLIS, Assr. to ELLIS-FOSTER CO. (U.S.P. 1,992,691, 26.2.35. Appl., 21.2.22).—Atomised, cooled, lighter fractions and gases from cracking hydrocarbons are mixed with air or O_2 (with or without steam) and passed at room temp. through a reaction zone, heated at \leq low red heat, containing catalyst. Acids and oxygenated compounds, e.g., α -(C_6H_4 ·CO) $_2$ O, are formed.

C. C.

Reforming of [hydrocarbon] gases. G. A. DAVIS, Assr. to V. N. ROADSTRUM (U.S.P. 1,992,909, 26.2.35. Appl., 28.12.31).—Hydrocarbon gases, e.g., natural gas, oil-cracking still gases, etc., are reformed with respect to heating val., d , and rate of flame propagation so that the reformed gas is suitable for use in burners designed for standard city gas. The steps in the process comprise: (1) decomposing the hydrocarbon in presence of a catalyst at 538–871° with deposition of free C, (2) air-blowing to convert part of the C into producer gas, (3) steam injection, the steam reacting with the residual C to form water-gas. The reaction may be completed in the first two steps or the three steps may be combined in a single continuous process, hydrocarbon gas, air, and steam being led into a reformer at 538–871° in contact with a catalyst.

C. C.

(A) Chemical treatment of hydrocarbon oils. (B) Oxidation of hydrocarbons. (C) Treatment of hydrocarbons. E. W. HULTMAN, Assr. to HULTMAN & POWELL CORP. (U.S.P. 1,992,308–10, 26.2.35. Appl., [A] 5.9.29, [B] 30.4.30, [C] 17.5.33. Renewed [B] 26.10.34).—(A) Hydrocarbon oil is refined by bringing it in contact with freshly electrolysed 35–80% H_2SO_4 . The refined oil is separated, and the acid reactivated by further electrolysis. H_2SO_4 may be replaced by other electrolytes, e.g., aq. NaCl. (B) Oxidation compounds of hydrocarbons, e.g., alcohols, aldehydes, and fatty acids, which are generally sol. in the electrolyte, are separated from the latter by, e.g., fractional distillation. (C) The characteristics of hydrocarbons are improved, e.g., the C_8H_{18} no. of gasoline is increased or kerosene is improved in colour, odour, and burning quality, and is desulphurised, by passing the products of electrolysis formed in the anode compartment in intimate contact with the hydrocarbon.

C. C.

Temperature exchange between a catalytic mass in course of regeneration and a cooling [hydrocarbon] liquid. E. HOUDRY, Assr. to HOUDRY PROCESS CORP. (U.S.P. 1,992,307, 26.2.35. Appl., 27.1.32. Fr., 21.2.31).—In the regeneration by oxidation of the catalytic mass used for converting heavy into lighter hydrocarbons, part of the heat evolved is removed by indirect heat exchange between the mass and a cooling liquid at a no. of horizontal levels. The cooling liquid is supplied at a definite rate, permitting vaporisation, and venting the vapours to maintain the liquid under a definite pressure so that heat is absorbed throughout the mass by liquid at approx. const. temp., viz., the b.p. of the liquid under the predetermined pressure conditions.

C. C.

Refining of mineral, vegetable, or animal oils, paraffins, waxes, resins, and the like. PLANKTOKOLL CHEM. FABR. G.M.B.H., and J. B. CARPZOW (B.P. 438,185, 26.3.35).—Mineral oils etc. are first slightly acidified (in liquid form, i.e., if necessary, melted or in solution) and then treated with 5–20% of a chemically-active dry powder obtained as a residue after elutriating fresh- or salt- H_2O slime containing Si compounds deficient in O, e.g., SiO , M_2Si where M is a metal, Si hydrides, or Si alkyl compounds.

C. C.

Desulphurisation of crude benzene, petroleum oils, shale oils, and other hydrocarbon oils

containing sulphur. N. D. ZELINSKI and I. N. TITZ (B.P. 438,354, 12.4.34).—Hydrocarbon oils are completely desulphurised by passing the vapours at $\geq 350^\circ/1$ atm. over Ni deposited on $\text{Al}(\text{OH})_3$ or, in general, over metals of group VIII, particularly Pt and/or Pd deposited on finely-divided C, in presence of H_2 or gases containing H_2 . C. C.

Purification of [mixed] hydrocarbons. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 438,810, 2.6.34. Addn. to B.P. 352,164; B., 1931, 963).—The maleic acid or its anhydride is added in portions and the diene additive products are separated after each addition. Fractional isolation of substantially single dienes is thereby effected. A. W. B.

Manufacture of [mobile] fuels. A. A. ROBERTS (B.P. 438,351, 10.3.34).—Liquid fuel consists of fuel oil or a stable suspension of coal in oil, containing $\frac{1}{2}$ –1% of a H_2O -sol. B compound (H_3BO_3). The latter is added as an aq. emulsion formed with starch, gelatin, casein, or other emulsifier. Salts, e.g., NaCl , Na_3PO_4 , may be dissolved in the H_2O , and "non-sol. metals or salts," e.g., Fe_2O_3 , may also be added to control combustion. (Cf. B.P. 408,951; B., 1934, 614). C. C.

Improvement of mineral lubricating oils. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. ([A] B.P. 439,621 and [B] 439,674, 3.4.34 and 30.3.35).—(A) The temp.– η relation of mineral oils is improved by removal of the naphthenic and aromatic constituents by extraction at -20° to 100° (15 – 40°) with 1–6 vols. of a mixture of MeCN (5–95 vol.-%) and a C_6H_6 derivative or heterocyclic compound containing N and/or O, or an aliphatic alcohol, other than MeOH, ketone, aldehyde, or unsaturated ether, or an aliphatic compound containing N and/or Cl or 2 O atoms, other than MeCN, or liquid SO_2 , e.g., PhNO_2 , PhCN , PhOH . (b) MeOH is the essential constituent of the solvent mixture; mixtures with PhOH (I) must contain substantially $\geq 50\%$ of (I). A. W. B.

Refining of lubricating oil. E. J. SMITH, ASST. to CONTINENTAL OIL CO. (U.S.P. 1,998,292, 16.4.35. Appl., 8.10.32).—To impart bloom and increase the settling rate of acid sludge, 0.01–3.0% of furfuraldehyde is added before the final acid treatment. B. M. V.

Re-refining of waste lubricating oil. G. R. DUFFY, ASST. to STAR OIL REFINING CORP. (U.S.P. 1,997,295, 9.4.35. Appl., 21.7.33).—In a still, waste oil and clay are agitated by withdrawal of part of the pulp, heating in a tube coil or the like, and returning under pressure below the pulp level. The gases and vapours from the still are cooled, the latter being recovered as usable oil and the former mixed with some of the flue gases of the heater and the mixture de-oxidised (e.g., by pyrogallol) and injected into the still below pulp level. B. M. V.

Imparting of bloom or green fluorescence to hydrocarbon lubricating oils. ANGLO-IRANIAN OIL CO., LTD., and S. F. BIRCH (B.P. 438,425, 9.5.34).—Bloom or greenish-yellow fluorescence is imparted to lubricating oils by adding to the latter a small proportion (1 in 10^5) of a complex hydrocarbon mixture obtained by heating pyrene in presence of anhyd. AlCl_3 . C. C.

[Mantles for] incandescence gas lighting. A. J. PRESTAGE, C. C. CARPENTER, and SOUTH METROPOLITAN GAS CO. (B.P. 438,828, 4.12.34. Addn. to B.P. 429,961).

Centrifugal separators.—See I. $(\text{NH}_4)_2\text{SO}_4$.—See VII. **Road materials.**—See IX. **Determining composition of fluids in motion.**—See XI. **Motor spirit etc. from rubber etc.**—See XIV.

III.—ORGANIC INTERMEDIATES.

Synthesis of ethylene glycol. N. WADA and M. SATO (J. Soc. Chem. Ind., Japan, 1935, 38, 497–500 B).— C_2H_2 gives $(\text{CH}_2\text{OH})_2$ (I) in 71% yield when the chlorohydrin obtained from it, H_2O , and Cl_2 at 0 – 5° is saponified (17 atm./ 150°). The optimum conditions for the production of (I) through $(\text{CH}_2\text{Cl})_2$ are given, but the yield is only 43% of the theoretical. H. G. M.

Properties of alkyl alkali sulphates derived from higher fatty alcohols for detergent and wetting agents. S. UENO, S. YOKOYAMA, and Y. IWA-KURA (J. Soc. Chem. Ind., Japan, 1935, 38, 603–608 B).—The solubility in H_2O at 25° and 50° , surface tension, lathering power, and detergent power of $\text{RR}'\text{SO}_4$ ($\text{R} = \text{Na}$, K , NH_4 ; $\text{R}' = \text{lauryl}$, oleyl , cetyl) are recorded. Detergent power is optimum in 0.1–0.25% solution at 50° , and is approx. the same for all the sulphates. F. R. G.

Determination of acetone in methyl and ethyl alcohol. S. D. SUNAWALA and M. C. T. KATTI (J. Indian Inst. Sci., 1935, 18 A, 115–122).—Messinger's method gives accurate results in aq. solution in concns. as low as 0.5 mg./100 c.c. and under conditions more variable than those stated by Goodwin (A., 1920, ii, 273). In presence of MeOH high and irregular results are obtained; reaction between MeOH and NaOI leads to HCO_2H in yields of 80–90% of theory. The best method for determining COMe_2 (I) is that of Scott-Wilson modified by Marriott (A., 1914, ii, 79); (I) should be ≥ 8 mg., the ppt. must settle for 20 min., and 8–9 times the theoretical amount of reagent must be used. P. G. C.

Polymerisation: industrial applications. H. I. WATERMAN and C. VAN VLODRUP (Chim. et Ind., 1935, 34, 1036–1044).—Samples of linseed oil were polymerised at 285° and 290° and the changes in d , η , mol. wt., n , Lorentz-Lorenz sp. refractivity (R), acid, hexabromide, and I vals. are tabulated. The R -I val. curves show that at the outset R decreases less rapidly than do the calc. vals. (assuming that all the ethylenic linkings become saturated), but later more rapidly. These deviations are more marked with oil which has been polymerised in vac. at 260° , and are attributed to the presence of unsaturated decomp. products, e.g., acraldehyde, which increase the I val., and to the formation of conjugated linkings, which increase R . Polymerisation was effected also at 225° in an atm. of N_2 and in presence of Ni, and the product subjected to cathode-ray vac. distillation with internal condensation; the various fractions had higher I vals. than the original stand oil. It is suggested that the polymerisation should be conducted so that the I vals. of these fractions and the residues are approx. equal as the mean mol. wt. of the oil increases. Graphs are also given relating R and I

val. of distillates from polymerised C_2H_4 , isobutene, and hexadecene (cf. B., 1935, 836). S. M.

Separation and utilisation of *o*- and *p*-nitrotoluene from mononitrotoluene prepared from the gasoline fraction of Syukkôkô crude. I. Separation of *o*- and *p*-nitrotoluene. M. MIZUTA (J. Soc. Chem. Ind., Japan, 1935, 38, 576—577 B).—Nitrotoluene prepared by nitrating the PhMe (I) fraction from the gasoline fraction of Syukkôkô crude contained 60% of the *o*- (II) and 36% of the *p*-compound (III), amounts closely corresponding to those obtained by nitrating pure (I). (II) (98.2%) was separated by vac. fractional distillation, whilst (III) (98.8%) was obtained by repeated crystallisation from the EtOH solution of the residue after distillation. C. C.

Catalytic action of Japanese acid clay. I. Condensation of benzyl chloride and benzene. T. KUWATA (J. Soc. Chem. Ind., Japan, 1935, 38, 505—506 B).—The condensation of CH_2PhCl and C_6H_6 to CH_2Ph_2 and $p-C_6H_4(CH_2Ph)_2$ is catalysed by Japanese acid clay, the catalytic activity of which is due to Fe_2O_3 and Al_2O_3 . H. G. M.

Liquid hydrocarbons from natural gas. Cyclic compounds from wax.—See II. Storing acids.—See VII. Uses of alkylolamines.—See XII. Lacquer solvents.—See XIII. $PrCO_2H$ from molasses. **d-Lactic acid.**—See XVIII.

See also A., Jan., 65, Azo dyes and intermediates. 67, $HCO_2 \cdot CH_2Ph$. Synthesis of β -phenylbutyl alcohol. 69, Electrolytic prep. of anthranilic acid. 87, Prep. of saccharin.

PATENTS.

Manufacture of polymerisation products of acetylene. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 438,548, 21.9.34).—Low-mol. wt. polymerides, especially vinyl derivatives, are obtained by passing C_2H_2 into acid Cu^I salt solutions, free from N bases or their salts, containing also salts of the alkali or alkaline-earth metals or of metals of group III (including the rare-earth metals), maintained at $pH > 6$ and at 50—100°. A. W. B.

Treatment of vinyl-type monohalides. N. V. DE BATAAFSCHE PETROLEUM MAATS, Assees. of H. P. A. GROLL and G. HEARNE (B.P. 437,573, 19.3.35. U.S., 19.3.34).—Compounds containing the group $>C:CHal$ are treated with $HOCl$ (Cl_2-H_2O), $HOBr$, or alkyl hypohalites. Passage of Cl_2 and β -chloro- Δ^2 -butene into an aq. emulsion of CCl_4 gives Me α -chloroethyl ketone (85%), b.p. 116—117°, and $\gamma\gamma$ -dichloro-sec-butyl alcohol; similarly, $CH_2:CHCl$ gives $CH_2Cl \cdot CHO$ (90% of theory). $CMe:CHCl$ and aq. Cl_2 or $BuOCl$ give $OH \cdot CMe_2 \cdot CH_2Cl$, and $CHBr:CH \cdot CH_2Br$ and aq. Br give $CH_2Br \cdot CHBr \cdot CHO$. H. A. P.

Preservation of organic substances. H. L. COX and P. S. GREER, ASSTS. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,992,292, 26.2.35. Appl., 26.2.32).—Ethylene and diethylene glycol mono- (Et) -ethers are preserved by contact with Cu, Al, Cr, Ni, Cd, Fe—Cr—Ni, MnO_2 , or Cu_2O . H. A. P.

Production of decylene compounds. CARBIDE & CARBON CHEMICALS CORP., Assees. of J. N. WICKERT

(B.P. 438,848, 16.4.35. U.S., 3.5.34).— $CH_3EtBu^a \cdot CHO$ is condensed with $MeCHO$ (NaOH) at -3° to -5° ; the product is freed from unchanged starting materials and reduced ($Ni-H_2$ at 20—60°/700—900 lb. per sq. in.) to a mixture of decanediols, probably mainly $OH \cdot CHMe \cdot C(EtBu) \cdot CH_2 \cdot OH$, b.p. 132—137° (diacetate, b.p. 130—135°/5 mm.). H. A. P.

Manufacture of vinyl esters. I. G. FARBERIND. A.-G. (B.P. 438,728, 22.5.34. Ger., 20.5.33).— C_2H_2 is caused to interact with a carboxylic acid in presence of a Hg compound, BF_3 , and (aq.) HF; e.g., C_2H_2 is passed into AcOH (100 pts.) containing HgO (0.4 pt.), BF_3 (0.1 pt.), and 40% aq. HF (1.25 pts.) at 30—35°. Improved yields and life of Hg catalyst are claimed. H. A. P.

Production of alkyl thiocyanates and similar esters. W. M. LEE (U.S.P. 1,992,533, 26.2.35. Appl., 23.1.33).—An ester of a *sec*- or *tert*-alcohol and an acid stronger than HSCN (I) is treated with (I). E.g., *iso*- C_5H_{10} is treated with 60% aq. H_2SO_4 and to the mixture of sulphates thus produced NaSCN is added at 0°; the product has b.p. 165—170°. H. A. P.

Manufacture of bis- β -dichloroalkyl ethers. CARBIDE & CARBON CHEMICALS CORP., Assees. of G. A. PERKINS (B.P. 438,271, 7.5.34. U.S., 11.5.33).—Alkylene chlorohydrins (I) are caused to interact with Cl_2 and olefines; chloroalkyl hypochlorites are formed immediately. (I) may be formed *in situ*, e.g., from added alkylene oxide and HCl formed during the reaction or from olefine and $HOCl$ (Cl_2-H_2O). E.g., C_2H_4 (excess) and Cl_2 when passed through 99.5% $C_2H_4Cl \cdot OH$ (II) at 80° give $O(C_2H_4Cl)_2$ (III) [85% of theoxy, calc. on (II) consumed]. Use of C_3H_8 gives β -chloroethyl β -chloroisopropyl ether, b.p. 65°/8 mm. Apparatus is described in which C_2H_4 , H_2O , Cl_2 , and $(CH_2)_2O$ are made to react to give (III), and in which the interaction of C_3H_8 , H_2O , Cl_2 , and propylene $\alpha\beta$ -oxide gives $\beta\beta$ -dichlorodiisopropyl ether. H. A. P.

Manufacture of higher aliphatic and cycloaliphatic sulphonic acids. W. J. TENNANT. From HENKEL & Co. G.M.B.H. (B.P. 439,177, 28.5.34).—The corresponding *S*-thiosulphate (having $\leq C_6$) is oxidised. E.g., *n*- $C_{12}H_{25} \cdot S \cdot SO_3Na$ is treated with aq. $NaMnO_4$ at 40—60° to give Na dodecanesulphonate; other oxidising agents used are aq. HNO_3 , $NaOCl$, and H_2O_2 . Other examples describe the prep. of mixed C_{12} — C_{18} sulphoacetates, Na dodecyloxymethanesulphonate, sulphoacetdodecylamide (Na salt), dodecyl- γ -sulphopropyl sulphide (Na salt), and dodecyl- β -sulphoethylsulphone (Na salt). H. A. P.

Separation of acetic anhydride from mixtures containing it. USINES DE MELLE, Assees. of H. M. GUINOT (B.P. 438,399, 11.12.34. Fr., 12.12.33).— H_2O is completely removed from the liquid mixtures of H_2O , AcOH, and Ac_2O , obtained by pyrogenous dehydration of AcOH, by distillation with $EtOAc$, Pr^aOAc , or Pr^oOAc . These form azeotropes of low b.p. with the H_2O only, and the resulting completely dehydrated mixture is separated by fractional distillation. Apparatus for a continuous process is described. E. J. B.

Manufacture of amines. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 439,274, 15.5. and 14.6.34).

—A nitrile is hydrogenated in presence of a primary or *sec.*-amine and a base-metal catalyst at $> 50^\circ / > 1$ atm. (180–275°/200 atm.) in the liquid phase. *E.g.*, $n\text{-C}_{11}\text{H}_{23}\cdot\text{CN}$, NHMe_2 , and H_2 in presence of Ni-bleaching earth at 180°/200 atm. give $n\text{-C}_{12}\text{H}_{25}\cdot\text{NH}_2$ (11%) and $n\text{-C}_{11}\text{H}_{23}\cdot\text{NMe}_2$ (89%). Dibutyloctadecyl-*cyclohexyl*-dodecyl-, b.p. 200–210°/19 mm., methylododecyl-, and dodecyl- γ -*n*-butoxypropyl-amine, b.p. 174–184°/1 mm., methylododecylaniline, b.p. 193–198°/0.8 mm., dodecylpiperidine, b.p. 181–185°/14 mm., and dodecyl-diethylenetriamine, b.p. 163–173°/1 mm., are similarly prepared. $\text{CH}_2\text{Ph}\cdot\text{CN}$ and NHMe_2 ($\text{Cu-Al}_2\text{O}_3$ at 180°/200 atm.) give $\text{CH}_2\text{Ph}\cdot\text{CH}_2\cdot\text{NMe}_2$ and $\text{CH}_2\text{Ph}\cdot\text{CH}_2\cdot\text{NH}_2$; $\text{OH}\cdot\text{C}_2\text{H}_4\cdot\text{CN}$ and NHMe_2 (Ni-Ni chromite at 50°/100 atm.) give mainly dimethyl- γ -hydroxypropylamine, b.p. 68–70°/24 mm. H. A. P.

Manufacture of [higher aliphatic] amines. I. G. FARBERIND. A.-G. (B.P. 438,793, 15.5.34. Ger., 18.5.33. —Aliphatic nitriles having $> \text{C}_{10}$ are hydrogenated in the liquid phase at $> 50^\circ / < 25$ atm. *E.g.*, reduction of stearonitrile in *cyclohexane* with H_2 -Co at 100°/200 atm. gives $\text{C}_{18}\text{H}_{37}\cdot\text{NH}_2$ (70%) and $\text{NH}(\text{C}_8\text{H}_{17})_2$ (10% of theory). Other catalysts used are Ni-Mn and Ni-CrO₃ (reduced). Oleonitrile (Co- H_2 at 80–100°/100 atm.) gives octadecenylamine, and hydroxystearonitrile (from sulphonated oleonitrile) gives a hydroxyoctadecylamine of b.p. 145–153°/0.1 mm. H. A. P.

Production of glutamic acid compounds. E. BARTON and R. L. ALBROOK, Assrs. to A. E. STALEY MANUFACT. CO. (U.S.P. 1,992,804, 26.2.35. Appl., 9.7.32). —Zein is extracted from gluten press-cakes with aq. EtOH, pptd. with H_2O , and hydrolysed by conc. HCl at the top. The solution is decolorised (C) and evaporated in a vac. until glutamic acid hydrochloride separates. H. A. P.

Apparatus for vaporisation of formamide. H. A. BOND, Assr. to E. I. DU PONT DE NEMOURS & Co., INC. (U.S.P. 1,999,390, 30.4.35. Appl., 18.11.33). —A thick, slightly sloping (2°) bed of metal has heating elements embedded therein and uniformly distributed, the liquid being supplied at or near the lower end and forming a shallow pool tapering to nothing. B. M. V.

Manufacture of cyclic α -cyanoketimides and cyclic cyanoketones. SCHERING-KAHLBAUM A.-G. (B.P. 438,291, 19.11.34. Ger., 18.11.33. Addn. to B.P. 415,259; B., 1934, 953). —A solution of an $\alpha\omega$ -dinitrile is added slowly to a conc. solution of an alkali-metal (M) derivative of an amine, $\text{NR}'\text{R}''\text{M}$, R' being an aryl, and R'' a non-aromatic residue; the yield is the greater the higher is the at. no. of M. *E.g.*, addition (72 hr.) of $\alpha\omega\text{-C}_{13}\text{H}_{27}(\text{CN})_2$ in Et_2O to a saturated solution of NaNPhMe in Et_2O (containing C_{10}H_8) at the b.p. gives 62% of theory of the imide, m.p. 147–148°, of 2-cyanocyclotetradecanone. H. A. P.

Manufacture of nitrogenous condensation products [textile assistants]. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 437,104, 16.3.34). —Org. radicals of low mol. wt. containing CO_2H or groups convertible into CO_2H are introduced into amines having < 2 NH_2 -groups and < 1 alkyl or aliphatic acyl radical of $< \text{C}_6$. *E.g.*, the amides from stearic acid (I) and diethylenetriamine, and (I) or coconut-oil fatty acids

(II) and triethylenetetramine, are condensed with $\text{CH}_2\text{Cl}\cdot\text{CO}_2\text{H}$ (III), $\text{NH}_2\cdot[\text{CH}_2]_3\cdot\text{NH}\cdot\text{C}_{18}\text{H}_{37}$ is condensed with chloropropionic acid, the amines prepared by condensation of the alcohols obtained by reduction of palm-kernel fat with $\text{NH}_2\cdot[\text{CH}_2]_3\cdot\text{NH}_2$ are condensed with (III), and methyl- β -methylaminoethylglycine [from $s\text{-C}_2\text{H}_4(\text{NH}_2)_2$, CH_2O , and HCN , followed by hydrolysis] is condensed with the chlorides of (II). The products are stable to Ca and Mg salts, and in many cases the free acids are sol. in H_2O . They are used as levelling agents (for vat and S dyes), wetting agents, and softening and delustring agents for rayon. H. A. P.

Manufacture of β -bromoethylbenzene. L. S. E. ELLIS. From SOC. DES USINES CHIM. RHÔNE-POULENC (B.P. 438,820, 25.9.34). —Styrene, in an inert solvent, *e.g.*, PhEt, PhCl, is treated with HBr at $>$ room temp., *e.g.*, 90–125°, preferably in presence of a peroxide or peracid as catalyst, *e.g.*, Bz_2O_2 ; the product of one example contains 92% of $\text{CH}_2\text{Ph}\cdot\text{CH}_2\text{Br}$. A. W. B.

Manufacture of [aryl]amines. E. I. DU PONT DE NEMOURS & Co. (B.P. 439,055, 28.5.34. U.S., 26.5.33). —Corrosion of Fe reaction vessels used in the amination of aromatic *o*- or *p*-Cl- NO_2 - or - Cl_2 -compounds (*e.g.*, $p\text{-C}_6\text{H}_4\text{Cl}\cdot\text{NO}_2$) is inhibited by addition to the reaction mixture of *sec.*- or *tert.*-arylamines, aralkylamines, or arylalkylamines, or heterocyclic bases, guanidines, or thiocarbamides ($\text{C}_5\text{H}_5\text{N}$, quinoline). H. A. P.

Manufacture of substituted aromatic amino-compounds [o-alkoxyarylamines]. I. G. FARBERIND. A.-G. (B.P. 439,295, 4.6.34. Ger., 3.6.33). —A monoazo dye derived from an *o*-halogenoaniline is condensed with an alkali alkoxide, whereby replacement of the *o*-halogeno-group occurs; the resulting dye is split by reduction, and the resulting NH_2 -compounds are separated. *E.g.*, the dye $o\text{-C}_6\text{H}_4\text{Cl}\cdot\text{NH}_2 \rightarrow o\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{H}$ is heated with $\text{NaOMe}\cdot\text{MeOH}$ at 145° in an autoclave; the product on reduction gives $o\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{OMe}$. 2:1:3- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{OMe}$ (Ac derivative, m.p. 129°; lit. m.p. 168°), 2:1:3- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{OEt}$, m.p. 50–51°, and 2:1:5:3- $\text{NH}_2\cdot\text{C}_6\text{H}_2\text{MeCl}\cdot\text{OMe}$ are similarly prepared. H. A. P.

Production of benzidine and its homologues and derivatives from azo or azoxy-derivatives. E. H. and S. W. REICHENBERG (B.P. 438,427, 12.5.34). —In the reduction of azobenzene (I) or its homologues or derivatives [to benzidine (II) etc.] by SO_2 in presence of HI (cf. G.P. 172,569), the presence of a small amount of a sol. quinonoid compound which undergoes reaction with the reduction liquid effects economies of reagents and time. Azoxy-compounds are also reduced if Sn compounds are added, and then only moderately conc. acids are needed. *E.g.*, when SO_2 is passed into a mixture of (I), H_2SO_4 (95%), HCl (35%), H_2O , KI, and $p\text{-NO}\cdot\text{C}_6\text{H}_4\cdot\text{OH}$ heated slowly to 45–50° a 90% yield of (II) is obtained in 6–7 hr. E. J. B.

Manufacture of derivatives of chrysenequinones. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 438,609, 23.5.34). —Chrysenequinones (I) or products which form (I) under the reaction conditions, *e.g.*, chrysenhydroquinones or esters thereof, are halogenated. Preps. of tetrachloro- and mono- and di-bromo-1:2- and

di-chloro- and *-bromo-2:8-chrysenequinone* are described; the products are intermediates for dyes. A. W. B.

Manufacture of phenanthrene derivatives. IMPERIAL CHEM. INDUSTRIES, LTD., E. DE B. BARNETT, and C. A. LAWRENCE (B.P. 438,894, 23.5.34).—Octahydro-diphenyl is condensed with maleic anhydride (I) or a *p*-quinone; e.g., using α -naphthoquinone, dodecahydrodibenzanthraquinone, m.p. 208° (decomp.), is formed; this is oxidised by passing air through its suspension in aq.-alcoholic NaOH to the di(pentahydrobenz)-compound, m.p. 254°. Other examples are a *hydrotetrabenzanthraquinone*, m.p. 315° (decomp.) (from p -O:C₆H₄:O), and *octahydrophenanthrene-9:10-dicarboxylic anhydride*, m.p. 122° [from (I)]. H. A. P.

Manufacture of coumarin. L. GIVAUDAN & Co., Soc. ANON. (B.P. 438,361, 11.5.34. Switz., 12.5.33).— $\omega\omega$ -Dichloro-*o*-tolyl carbonate, *o*-OH-C₆H₄-CHO, or *o*-OAc-C₆H₄-CHO is heated with Ac₂O and a Co oxide or salt (eventually to approx. 170°). H. A. P.

Manufacture of vinyl compounds. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 438,281, 9.7.34).—*N*-Vinyl compounds are formed by heating C₂H₂, alone or diluted with inert gases and preferably under increased pressure, to 100–200° with substances containing the pyrrole ring, or their derivatives containing a free NH group, in presence of the hydroxides, alkoxides, or the pyrrole compounds of the alkali metals. Diluents (e.g., alcohols, glycols, hydrocarbons, or the corresponding vinyl compound) may be used, in which solid material (carbazole) should be dispersed. Hydrogenation of the products yields Et derivatives. E. J. B.

Manufacture of aldehydes of the indole series. I. G. FARBERIND. A.-G. (B.P. 438,278, 14.5.34. Ger., 13.5.33).—An indole derivative having reactive CH₂ in the 2 position is heated with NPhMe-CHO (I) and an "acid condensing agent containing Cl," e.g., POCl₃, SOCl₂, SO₂Cl₂. E.g., POCl₃ (30.6 pts.) is added to (I) (27 pts.) followed, after 2 hr., by *o*-C₆H₄Cl₂ (150 pts.) and 2-phenyl-1-methylindole (41.4 pts.) at > 10° to give 2-phenyl-1-methylindole-3-aldehyde, m.p. 128°, b.p. 229°/4 mm. 2-Phenyl-, m.p. 251°, 6-nitro-2-phenyl-1-methyl-, m.p. 233°, and 1:2-dimethyl-indole-3-aldehyde, m.p. 132°, 1:3:3-trimethyl-2-methyleneindoline-2- ω -aldehyde, m.p. 118°, and its 5-OMe-derivative, m.p. 105°, are similarly prepared. H. A. P.

Manufacture of quaternary ammonium compounds of derivatives of the anthracene series. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 438,122, 4.5.34).—Anthrones having a N-containing 6-membered ring attached at < 1 *peri*-position are treated with esters of strong acids. Examples are the *metho-p-toluenesulphonates* of 1:9-anthrapyrimidine (I) and its 2-, 4- (II), 5-, and 8-amino-, 4-*p*-chlorobenzamido- (III), 5-*p*-toluidino-, 4-amino-*C*-phenyl-, 4-hydroxy- (IV), 4-methylamino-, dichloro-4-hydroxy-, 4-amino- β -methyl- and *Py-C*-methyl-, and α -amino- [from (I) by nitration and reduction] derivatives, 1:9:4:10-anthradipyrimidine, and 1:9-anthraquinaldine; the *methosulphates* of (II), (III), (IV), and dichloro-8-amino-, 2:4-diamino-, 8-amino-, and 4-amino-2-*p*-toluidino-1:9-anthrapyrimidine, 4-amino-1:9-anthraquinaldine, and the anthrapyrimidine compound from 1-amino-4-

benzamidoanthraquinone and CH₂Ac·CO₂Et; the *methiodide*, *methochloride*, *methobromide*, *ethosulphate*, *benzylchloride*, *ethochloride*, and β -chloroetho-*p*-toluenesulphonate and *phosphate* of (II), and 2-bromo-4-benzamido-1:9-anthrapyrimidine *methiodide*. H. A. P.

Purifying mixed hydrocarbons.—See II. Rubber-like condensation products.—See XIII. [Basic] Pb dinitrobenzoates.—See XXII.

IV.—DYESTUFFS.

Testing the suitability of cotton dyes. K. VOLZ (Z. ges. Textilind., 1935, 38, 14–16; Chem. Zentr., 1935, i, 2262).—Various methods are described.

A. G. P.

Relations between constitution and substantivity of dyes. P. RUGGLI (Rev. gén. Teint., 1935, 13, 5–11; Chem. Zentr., 1935, i, 2259).—Absorption depending on the low solubility of the dyestuff is completely reversible; that which is related to chemical constitution is not completely reversible.

A. G. P.

Cudbear. E. H. WIRTH, L. E. MARTIN, and P. G. SODERDAHL (J. Amer. Pharm. Assoc., 1935, 24, 949–959).—Data from the examination (colorimetry, solubility, ash and As content, microscopy) of commercial samples of cudbear are given.

F. O. H.

See also A., Jan., 65, *peri*-Disazo dyes. Cr-azo dyes. 67, Metallic derivatives of 2-nitro-5-methoxyphenol and of its 3-chloro-derivative.

PATENTS.

Manufacture of heavy-metal complex compounds of azo dyes. A. CARPMAEL. From I. G. FARBERIND. A.-G. (B.P. 436,588, 5.4.34).—*o*-Aminoazo dyes, in which the NH₂ or substituted NH₂ is contained in the diazo component, are treated in substance or in the fibres with a compound of a heavy metal. Examples are: 3-nitro-*p*-toluidine (I) \rightarrow 1-*p*-sulphophenyl-3-methyl-5-pyrazolone, reduced, with Cr₂O₃ (brownish-yellow on wool); 2-aminodimethylaniline-5-sulphonic acid \rightarrow β -C₁₀H₇OH (red; + Cr, bordeaux); (I) \rightarrow N.W.-acid, reduced and *p*-toluenesulphonated, with Cr formate (violet); 3-nitro-*p*-phenitidine \rightarrow acetyl- γ -acid, reduced (+ Cr, violet).

C. H.

Colouring matters [of the anthraquinone series for oils, waxes, rubber, wool, etc.]. IMPERIAL CHEM. INDUSTRIES, LTD., F. LODGE, and C. H. LUMSDEN (B.P. 437,266, 19.3. and 12.7.34).—Long-chain (C₈–C₂₀) alkyl thioethers are made by condensing (a) a thiolanthraquinone carrying an auxochromic group (NH₂, NHAlk, NHAr, OH, OAr, or S·CH₂Ph) with an alkyl chloride or bromide (C₈–C₂₀), or (b) a corresponding chloro- or bromo-anthraquinone with an alkylthiol. The products may be converted into acid dyes by introduction of SO₃H groups. Examples include products from: 1:4-diamino-2-thiolanthraquinone with cetyl bromide (I) (violet); 1-amino-4-anilino-2-thiolanthraquinone with C₁₂H₂₅Br (dark blue; sulphonated, blue on wool); 1:4-dianilino-2:3-dithiolanthraquinone with (I) (dark green); 1:4-diamino-2-*p*-tolylloxy-3-thiolanthraquinone with C₁₂H₂₅Br (violet).

C. H.

Manufacture of carbocyanine dyes. I. G. FARBERIND. A.-G. (B.P. 438,603, 16.5.34. Ger., 16.5.33).

Symmetrical and unsymmetrical carbocyanines, suitable for sensitising photographic silver halide emulsions, are prepared from an indoline-2-methylene- ω -aldehyde (cf. B.P. 438,278; B., 1936, 140) and a quaternary heterocyclic N compound, which contains a reactive Me group (or from the corresponding methylene base), in presence of a condensing agent. The 8 examples include indo-, indothia-, indo-2', and indo-4'-carbocyanines.

F. M. H.

Dye pigments.—See XIII. **Dyes for leather.**—See XV.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Application of histological and histochemical methods to the study of collagen fibres. G. LEPLAT (Collegium, 1935, 513—521).—By treating sinew fibres with a chemically inert dyestuff and subsequently immersing them in dil. AcOH, the fibre sheathes are rendered plainly discernible. These consist of fine fibrils, mostly of elastin since staining occurs with resorcinol-fuchsin, but a portion is stained by the typical collagen stains.

D. W.

Viscose pulp and pulp woods. VIII. **Composition and cooking test of Manchurian fir (*Abies nephrolepis*, Maxim).** M. SHIKATA and K. TADOKORO (J. Agric. Chem. Soc. Japan, 1935, 11, 925—930).—This tree is inferior to Manchurian spruce as a viscose pulp wood, but by the Ca-Mg bisulphite method it yields a pulp which can be used as a viscose pulp. P. G. M.

Hydrolysis of sulphite[-cellulose] waste lyes. H. LAUBER and O. MERLAU (Papier-Fabr., 1935, 33, 420—423; cf. B., 1923, 993 A).—The possibility of commercially obtaining increased EtOH yields from the spent cooking liquors by hydrolysis with conc. H₂SO₄ would not be successful owing mainly to high costs and too small an increase in EtOH-producing substances. Further, the optimum conditions of hydrolysis are governed by the initial composition of the liquor and the nature of the cook, and have to be carefully regulated accordingly. The production of furfuraldehyde also is aided by the acid conditions. At the start of a cook and up to the end of the impregnation period the EtOH yield of the liquor is very greatly increased by the H₂SO₄ treatment. This increase, however, rapidly disappears as the cook proceeds, until in the spent liquor it may amount to 0.15%.

D. A. C.

Backwater in the pulp and paper industry. F. MEINCK (Papier-Fabr., 1935, 33, 416—420).—An account is given of the composition and regeneration of spent liquors in the various branches of the pulp industry together with known methods for the recovery and sterilisation of the backwater of groundwood, paper, and board mills.

D. A. C.

Examination of a flotation save-all [in the paper industry]. W. BRECHT, L. EBERSTADT, and W. KILPPER (Papier-Fabr., 1935, 33, 404—416).—The Adka save-all (S) and the mechanism of its action are described. Conditions for its commercial operation are investigated in making both wood-free and groundwood-containing papers with a max. ash content of 25%. To obtain the best efficiency, stock should be fed to it at a const. rate and at a consistency of $\geq 0.2\%$. The ash content of the

finished paper at the same time should be $\geq 17\%$. An average recovery of 93.4% of the total solids in the backwater was obtained (max. 99.4%, falling to 78.9% under less favourable operating conditions). The optimum quantities of reagents required per 100 cu. m. of backwater are 1 kg. of resin soap, 2.9 kg. of alum, and 0.2 kg. of NaOH. The fibre recovery is little affected by variations in NaOH additions; it decreases with the presence of excess alum, but is appreciably raised with increasing resin-soap quantities. It is important, when installing S, to have an accurate knowledge of the backwater quantities to be treated, since the efficiency of the S is sensitive to departure from the optimum operating conditions.

D. A. C.

Transparent foils from cellulose and cellulose derivatives. D. KRÜGER (Zellstoff u. Papier, 1936, 16, 9—11, 49—51).—A review.

Application of nitrocellulose emulsions to paper. C. B. HOLLABAUGH (Paper Trade J., 1935, 101, TAPPI Sect., 347—353).—Emulsions of nitrocellulose (I) lacquers in H₂O, prepared by treatment in a colloid mill, preferably of the homogeniser type, can be employed for coating even porous paper, provided certain conditions of lacquer manufacture are complied with. The solvent mixture used in the lacquer phase must be sufficiently H₂O-immiscible to keep (I) in solution in the emulsion, and it must remain so as it evaporates during the drying of the film. The b.p. of the solvent must be high enough to allow the H₂O to be removed from the film by evaporation or absorption, before sufficient solvent evaporates to prevent the droplets of lacquer from coalescing to a smooth film. The amount of the H₂O solution of emulsifying agent must be kept low to avoid the use of expensive solvents in the lacquer phase, and to allow adjustment in the η of the final emulsion. The emulsifying agent must be selected to avoid making the final film H₂O-sensitive. High η of the lacquer phase is necessary for use with porous papers, but droplet size has no bearing on penetration. These aq. emulsions are not permanently stable, but can be stored for 6 months. Saving in solvent, ease of handling, and reduction of fire hazard are among the advantages claimed.

H. A. H.

See also A., Jan., 28, η of cellulose solutions. 57, Celluloid. 81, Acetylation of lignin. 123, Lignin in straw and deciduous trees.

PATENTS.

Treatment of raw silk. E. I. DU PONT DE NEMOURS & Co. (B.P. 439,639, 11.6.34. U.S., 10.6.33).—Raw silk is treated with an oil-in-H₂O emulsion of, e.g., neatsfoot oil, containing a H₂O-sol. alkyl ($\leq C_8$) H sulphate or a salt thereof, of p_H 5—12. Subsequent throwing operations are facilitated.

A. W. B.

Production of fibrous material from animal skins. H. D. ELKINGTON. From C. FREUDENBERG GES.M.B.H. (B.P. 439,532, 1.11.34).—Mechanically-shredded skin substance is mixed with alkalis, alkaline earths, acids, tanning or pseudo-tanning agents, etc., and subsequently H₂O is removed therefrom by treatment with org. liquids (e.g., EtOH, COMe₂) miscible with H₂O.

D. W.

Manufacture of cellulose. BRIT. CELANESE, LTD. (B.P. 438,643, 8.3.35. U.S., 13.3.34).—Cellulosic material (wood chips, cotton linters) is treated with aq. HNO_3 (0.5–10%) at $\leq 95^\circ$ but $<$ the b.p. of the acid, and then with an alkaline solution at $> 90^\circ$ (1–3% NaOH or alkaline hypochlorite solution).

F. R. E.

Cellulosic solutions and articles made therefrom or treated therewith. RÖHM & HAAS CO. (B.P. 439,806, 8.6.34. U.S., 19.6.33).—Quaternary NH_4 hydroxides of the type $\text{CH}_2\text{Ph}\cdot\text{NRR}'\text{R}''\text{OH}$, where R, R', and R'' are alkyl, aryl, or aralkyl groups, which may be substituted, e.g., $\text{CH}_2\text{Ph}\cdot\text{NMe}_3\text{OH}$, are claimed as solvents for cellulosic material. Clear, filterable, conc. solutions are obtained which, treated with pigments if desired, may be pptd. to yield artificial fibre or used as coating solutions.

A. W. B.

Compositions and articles containing organic derivatives of cellulose. H. DREYFUS (B.P. 438,540, 19.2.34. Cf. B.P. 418,506; B., 1935, 33).—Monomeric esters of polycarboxylic acids containing residues of dihydric alcohols acylated with monocarboxylic acids, e.g., β -methoxyethyl β -acetoxyethyl phthalate, are used as plasticisers.

F. R. E.

Treatment of filaments, films, and similar materials containing organic derivatives of cellulose. BRIT. CELANESE, LTD., H. DREYFUS, and W. I. TAYLOR (B.P. 438,729, 20.3.34. Addn. to B.P. 362,939; B., 1932, 258).—The materials are stretched while under the influence of a substantially H_2O -insol. org. non-solvent (an alcohol, ether, aromatic hydrocarbon or NO_2 -derivative thereof) in the form of its saturated or wet vapour, or together with H_2O vapour, at elevated temp. and pressure.

F. R. E.

Manufacture of (A, D, F) cellulose acetate filaments and threads, (B) cellulose ester and ether filaments, threads, foils, etc., (E) cellulose acetate textile materials, (C) artificial threads, films, or the like, (G) artificial yarns, films, and like materials. (A–F) BRIT. CELANESE, LTD., and H. DREYFUS, (G) H. DREYFUS, (A, B, E, F) R. W. MONCRIEFF and F. B. HILL, (C, D) D. FINLAYSON (B.P. 438,584–7, 438,655–6, and 438,786, [A, E, F] 12.2. and 19.4.34, [B] 13.2. and 19.4.34, [C] 13.2., 20.4., and 23.4.34, [D] 12.2.34, and [G] 21.2.34).—To improve their tenacity (A, D, F) continuous filaments of cellulose acetate are stretched in presence of (A) wet steam under pressure at 100 – 120° , (D) hot H_2O under pressure at $> 100^\circ$ or $> 120^\circ$, (F) wet steam under pressure at $> 120^\circ$; (B) foils, films, etc. (other than continuous filaments and spun yarn) of cellulose acetate are stretched in presence of wet steam at $> 100^\circ$ or $> 120^\circ$; (C) spun yarn of cellulose ethers and esters is stretched in presence of hot H_2O at $> 100^\circ$ or $> 125^\circ$; (B, C) filaments, foils, etc. of cellulose ethers and esters other than acetate are stretched in presence of (B) wet steam at $> 100^\circ$ or $> 120^\circ$, (C) hot H_2O at $> 100^\circ$ or $> 125^\circ$; (B, C) filaments, foils, etc. of cellulose ethers and esters are stretched in presence of (B) dry steam at $> 100^\circ$ or $> 120^\circ$, (C) hot H_2O at $> 95^\circ$, but excluding H_2O under pressure at $> 100^\circ$; (E) spun cellulose acetate yarn is stretched in presence of wet steam at $> 100^\circ$ or 120° ;

(G) filaments, foils, etc. of cellulose esters including acetate are stretched in presence of hot H_2O under pressure at $> 95^\circ$. The materials may then be shrunk to improve their extensibility and subsequently hydrolysed. Suitable apparatus is described.

F. R. E.

Manufacture of crêpe threads and crêpe fabrics. (A, D, E) BRIT. CELANESE, LTD., H. DREYFUS, and D. FINLAYSON, and (A) C. E. STAFFORD. (B) BRIT. CELANESE, LTD., and H. DREYFUS, and (C) H. DREYFUS. (B, C) From CELANESE CORP. OF AMERICA (B.P. 438,588–91 and 438,654, [A, B] 13.2.34, [C] 9.2. and 6.7.34, [D] 10.2. and 24.3.34, [E] 14.2. and 24.3.34).—(A) Threads of org. derivatives of cellulose are stretched beyond their elastic limit in presence of steam or hot H_2O and subsequently twisted. (B, E) Threads of cellulose ethers or esters (other than acetate), of filaments formed by esterification of cellulose without destroying its filamentary form, or mixed threads of cellulose ethers or esters are crêpe-twisted and, during the insertion of at least the last part of the twist, are (B) steamed under conditions such that moisture is present, and (E) treated with hot H_2O . Alternatively, (B) threads of cellulose ethers or esters are crêpe-twisted and steamed in absence of moisture; (C, D) cellulose acetate threads are crêpe-twisted in ≤ 2 stages and, during the last stage at least, are (C) steamed under conditions such that moisture is present, or (D) treated with hot H_2O ($> 95^\circ$).

F. R. E.

Manufacture of artificial [viscose] sponges. J. SPEYER (B.P. 438,851, 24.4.35).—Fresh (unripened) viscose is used in the process to which a small proportion of CS_2 is added before or during addition of the pore-forming substances, which are composed of cryst. salts, except acid and strongly coagulating salts, which melt in their own H_2O of crystallisation ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$, $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$, borax). Before regeneration the mass is heated in order to solidify the outside first.

F. R. E.

Production of [wood] pulp etc. L. BRADLEY and E. P. MCKEEFE, Assrs. to BRADLEY-MCKEEFE CORP. (U.S.P. 1,973,557, 11.9.34. Appl., 8.8.25).—Wood is digested under pressure at $> 100^\circ$ with aq. Na_2SO_3 containing Na_2CO_3 and NaHCO_3 .

A. R. P.

Preparation of pulp stock for delivery to a paper-making machine. P. DENNETT (B.P. 439,360, 5.6.34).—After screening and, if desired, partial dehydration, the pulp is passed through a rotating and reciprocating distributing cylinder formed with larger perforations than those in the screen(s).

B. M. V.

[Preparation of] protective envelopes of paper or the like suitable for containing food. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 436,891, 12.3.34).—A colourless or slightly coloured substance having affinity for the sheet, and capable of absorbing ultra-violet light, is incorporated; an antioxidant (quinol) may be added. The use with textile fabrics is excluded. E.g., cellulose hydrate is impregnated with the urea from Na mono-*p*-aminobenzoyl-*p*-phenylenediaminesulphonate, or Na di-*m*-aminobenzamidostilbenedisulphonate, or gelatin is impregnated with 2:3-hydroxynaphthoylamino-sulpho- α -naphthalide.

H. A. P.

Purification or reclaiming of used or waste paper. DEUTS. HYDRIERWERKE A.-G. (B.P. 438,403, 31.1.35. Ger., 31.1., 12.2., and 16.6.34).—Printing ink, oily impurities, etc. are removed by treatment of the pulped paper with soap-like H_2SO_4 derivatives of organic compounds of high mol. wt. that are not pptd. in aqueous solution by Ca^{++} , e.g., "oleic alcohol sulphonate," $\text{C}_{10}\text{H}_{21}\text{O}\cdot\text{C}_2\text{H}_4\cdot\text{O}\cdot\text{SO}_3\text{Na}$, "N-laurylaminoethanesulphonic acid." Detergent assistants, e.g., NaPO_3 , may be added. H. A. P.

Manufacturing of floor coverings [of woven fabrics]. A. H. STEVENS. From BIGELOW-SANFORD CARPET CO., INC. (B.P. 439,611, 5.4.35).

Spinning arrangement for production of artificial filaments, more particularly artificial silk. N. V. ONDERZOEKINGSINSTITUUT RESEARCH (B.P. 439,154, 24.5.35. Holl., 24.5.34).

Separator. Removing fibrous material from liquids. Evaporation of solutions.—See I. **Liner for cellulose digesters.** Wallboard.—See IX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Mordanting and dyeing processes. XXIV. **Dyeing of weighted and unweighted natural silks.** E. ELÖD and N. BALLA (Monatsh. Seide Kunstseide, 1935, 40, 12—15; Chem. Zentr., 1935, i, 2089; cf. B., 1935, 323).—With a const. concn. of dye solution, the quantity of dyestuff taken up by the fibre increased with the quantity of dye used to a max. val. With weighted silk the quantity of dye taken up passed through a max. val. with increasing p_{H} . H. J. E.

Mercerisation as viewed under the microscope. H. REUMUTH (Z. ges. Textilind., 1935, 38, 21—24; Chem. Zentr., 1935, i, 2282).—Dry cotton is only incompletely mercerised. Addition of HF to the NaOH improves the action. A. G. P.

Waterproofing [of textiles]. H. REUMUTH (Z. ges. Textilind., 1935, 38, 46—47; Chem. Zentr., 1935, i, 2282).—A no. of processes are compared. A. G. P.

Coated fabrics in construction industry. D. MCBURNEY (Ind. Eng. Chem., 1935, 27, 1400—1403).—Oil exudation, cold-crack, and mechanical scrub-resistance tests for rubber- and pyroxylin-coated fabrics are outlined and an account is given of their use for various purposes. S. M.

Waterproofing etc. [fabrics].—See II. **Wetting agents, detergents, etc.**—See III. **Testing cotton dyes.**—See IV.

PATENTS.

Bleaching of textile materials. G. VON TRANSEHE-ROSENECK (B.P. 439,802, 7.5.34).—Textiles, pretreated with activators for bleaching agents and free from metals of at. wt. > 45 (I), e.g., an enzyme or soap, are introduced into stabilised bleaching solutions, e.g., H_2O_2 , free from (I) and strong acids, e.g., H_2SO_4 , HNO_3 , HCl ; suitable stabilisers are phosphates, borates, and oxalates. The process is particularly applicable to the bleaching of wool tops. A. W. B.

Jig-dyeing or like fabric-treating processes. BRIT. CELANESE, LTD. (B.P. 438,834, 31.12.34. U.S.,

30.12.33).—The usual drainage of dye liquor to the lower half of the fabric while batched on a stationary draw roller is prevented by providing means for oscillating either draw roller when desired. A. J. H.

Dyeing process. IMPERIAL CHEM. INDUSTRIES, LTD., D. CARTER, A. G. CUTHBERT-SMITH, H. JACKSON, A. SHEPHERDSON, and H. A. THOMAS (B.P. 436,875, 19.4.34).—Wool, especially felt, is dyed with acid or chrome dyes in a bath at 60—90°, the liquor being maintained in a state of throbbing turbulence by bubbles of air, steam, or inert gas impinging against the material. C. H.

Dyeing of animal fibres. SOC. CHEM. IND. IN BASLE (B.P. 436,790, 12.4.34. Switz., 9.6.33. Addn. to B.P. 433,230; B., 1935, 946).—In place of the iminazolium compounds of the parent patent there are used other bases or quaternary NH_4 salts containing at least one aliphatic or alicyclic group $> \text{C}_7$, free from polyethenoxy-groups; e.g., the product from $(\text{CH}_2\cdot\text{NHEt})_2$ and stearoyl chloride is added to a dyebath containing 4-chloro-o-aminophenol-6-sulphonic acid \rightarrow 2:4-dihydroxyquinoline (red on wool). C. H.

Dye preparations for dyeing animal fibres. Soc. CHEM. IND. IN BASLE (B.P. 436,863, 12.4.34. Addn. to B.P. 433,230 and 436,790; cf. B., 1935, 946 and preceding abstract).—A metal (Cr) complex of a mordant azo dye having at least 1 SO_3H is mixed with $> 5\%$ of a sol. salt of a H_2O -insol. org. N base or of a quaternary NH_4 compound (excluding polyethenoxy-compounds), containing an aliphatic or alicyclic group $> \text{C}_7$; e.g., the Cr compound of nitrated 4-sulphonaphthalene-1:2-diazo-oxide $\rightarrow \beta\text{-C}_{10}\text{H}_7\cdot\text{OH}$ with the product obtained by heating o- $\text{C}_6\text{H}_4(\text{NH}_2)_2$ with fats from hydrogenated fish oil, coconut oil, and olive oil and treating the mixed benziminazoles with glycerol chlorohydrin. C. H.

Dyeing of natural or regenerated cellulosic textile materials. IMPERIAL CHEM. INDUSTRIES, LTD., L. P. RENDELL, and H. A. THOMAS (B.P. 436,592, 13.4.34).—The material is "mordanted" with an anthraquinone solution of a quaternary NH_4 or PH_4 or ternary sulphonium salt, containing a saturated aliphatic chain $> \text{C}_9$ and free from OH and NHAr , and dyed with a chrome dye. Thus viscose stockinette is treated with 3% of trimethylcetylammmonium bromide, and dyed with Solochrome Brown RH. Other "mordants" are cetylpyridinium, trimethyloctadecylammmonium, dimethylcetylsulphonium bromides, and benzylmethyldodecylsulphonium methosulphate. C. H.

Mercerisation processes. I. G. FARBEIND. A.-G. (B.P. 436,660, 16.4.34. Ger., 15.4.33).—Wetting is improved by adding mixtures of phenols with N-substituted urea and/or thiourea derivatives (e.g., crude xylenol and N-dihydroxypropyl-N'-butylthiourea; crude cresol and xylenol and phenylurea) to the lye. C. H.

Treatment of artificial filaments, threads, films, and the like. H. DREYFUS (B.P. 438,724, 22.5.34).—Materials composed of cellulose derivatives are impregnated with cellulose by treating with swelling agent and then with a viscose solution, which latter is regenerated by use of a swelling agent having a pptg. action on viscose or by subsequent treatment in a pptg. bath. F. R. E.

Production of figured effects on cellulose-containing surfaces. HEBERLEIN & Co. A.-G., G. HEBERLEIN, and E. WEISS (B.P. 439,749, 26.7.34).—The η and penetrating power of printing pastes containing $\text{Ca}(\text{SCN})_2$ as a parchmentising agent are improved by addition of CH_2O . A. W. B.

Compositions for fireproofing fabrics. G. KINDERMANN (B.P. 435,240, 3.4.34. Ger., 4.8.33).—The fabric of electrically-heated cushions is impregnated with a 20–40% aq. solution of a mixture of $(\text{NH}_4)_2\text{SO}_4$ 5–10, NH_4Cl 1–4, H_3BO_3 2–5, and borax 1–3 pts. to which is added 4–5% of a urea- CH_2O condensation product. A. R. P.

Textile assistants.—See III. Colouring wool etc.
—See IV. Dyeing leather.—See XV.

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

System vanadic acid-cupric oxide-silicic acid as a compound catalyst in the formation of sulphuric acid. B. NEUMANN, C. KRÖGER, and R. IVANOVSKI (Z. Elektrochem., 1935, 41, 821–834).—The catalytic activity of V_2O_5 , SiO_2 , and CuO in oxidising a 7% mixture of SO_2 has been measured for the single components, and for binary and ternary mixtures of varying composition. An activity-concn. diagram is given for the ternary system. Investigation of the mechanism, based on measurements of the dissociation pressures of the various compounds which might be formed, shows that the effectiveness of mixtures containing V_2O_5 and $\text{V}_2\text{O}_5 + \text{SiO}_2$ is closely related to the dissociation of VOSO_4 . The activity of mixtures containing CuO is limited by the univariant equilibrium $\text{Cu}_2\text{O} + \text{CuO}, \text{CuSO}_4 \rightleftharpoons 4\text{CuO} + \text{SO}_2$. F. L. U.

Impurities of hydrofluoric acid. F. MAIER (Chem.-Ztg., 1935, 59, 1025).—A sample of HF which had been stored in a gutta-percha bottle for several years gave on evaporation 5.5% of a dark oily residue which on ignition yielded 0.22% of solids (on the wt. of acid). It contained org. matter, H_2SO_4 , Fe, and Mn. The Mn was derived from the bottle. HF should preferably be stored in ceresin bottles. C. I.

Handling and storing of acids. T. J. DIXON and F. ROFFEY (Chem. & Ind., 1935, 1104–1108).—A description of the plant used for handling and storing H_2SO_4 , HCl , HNO_3 , AcOH , HCO_2H , and $\text{H}_2\text{C}_2\text{O}_4$ is given. D. K. M.

Causticisation of alkali salts in presence of calcium aluminates. A. TRAVERS (Bull. Soc. chim., 1935, [v], 2, 2124–2128).—If aq. Na_2SO_4 or NaCl is treated at room temp. with $\text{Ca}(\text{OH})_2$ in presence of $\text{Al}(\text{OH})_3$ or bauxite a very pure lye of $\geq 8\%$ (NaCl) or 28% (Na_2SO_4) concn. is obtained. At the b.p. or in an autoclave at 10 kg. per sq. cm. the yield of NaOH is greatly increased, but Al is found in the solution as aluminate. The latter cannot be removed completely by agitation with $\text{Al}(\text{OH})_3$. F. L. U.

Recovery of compounds of sodium, magnesium, and bromine in the potash industry. O. F. KASELITZ (Chem.-Ztg., 1935, 59, 1021–1022).—Recent improvements in the industry relate to heat economies. NaCl

is principally produced as such from the beds and requires only grinding and freeing from clay and anhydrite. $\text{MgSO}_4 \cdot \text{H}_2\text{O}$ found in carnallite (I) residues is freed from NaCl by washing, dissolved in hot H_2O , and crystallised as $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$. The final liquor from (I) treatment contains MgCl_2 28–30, $\text{KCl} + \text{NaCl}$ 1.5–2.0, MgSO_4 2.5–3.5, Br 0.25%. It is used as such for laying dust or as a refrigerant, but if evaporated gives a series of MgCl_2 hydrates. Br is liberated from the mother-liquor by Cl_2 treatment followed by distillation with steam. $\text{Na}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$ is prepared by refrigerating a solution containing NaCl and MgSO_4 . C. I.

Stabilisation of 0.1N-sodium thiosulphate solution. P. HORKHEIMER (Pharm. Ztg., 1935, 80, 1330).—Addition of borax as stabiliser to 0.1N- $\text{Na}_2\text{S}_2\text{O}_3$ gives I vals. which are too low with neutral solutions, even using 1/12 of the usual amount (3.8 g. of cryst. borax per litre). Addition of ≥ 0.2 g. of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ per litre gives a reagent suitable for use with neutral solutions. R. S. B.

Determination of iron in phosphorites and apatites by the colorimetric method using sulphosalicylic acid. S. N. ROSANOV, G. A. MARKOVA, and E. A. FEDOTOVA (Z. Pflanz. Düng., 1935, 41, A, 59–74).—The method of Alten *et al.* (A., 1934, 49) is modified to avoid the ill-effects of excess of PO_4''' and of variations in the p_{H} of the test solution. The reaction of the extract is adjusted to p_{H} 2.0 (dinitrophenol) and that of the reagent by tropaeolin paper. The originally prescribed amount of sulphosalicylic acid reagent is increased and colours are matched 15 min. after mixing. A. G. P.

Manufacture of calcium arsenate. G. FESTER and F. A. BERTUZZI (Rev. Fac. Quím. Ind. Agric., 1934, 3, 211–212).—According to G.P. 586,349, a solution containing H_3AsO_4 and CaCl_2 is prepared by adding an aq. suspension of As_2O_3 to aq. bleaching powder (containing preferably 7.1% of active Cl), or passing the calc. quantity of Cl_2 into an aq. suspension of As_2O_3 and $\text{Ca}(\text{OH})_2$ [$\text{As}_2\text{O}_3 + 2\text{Cl}_2 + 2\text{Ca}(\text{OH})_2 + \text{H}_2\text{O} = 2\text{H}_3\text{AsO}_4 + 2\text{CaCl}_2$]. From this solution Ca arsenate (I) is pptd. as in Argentine P. 26,583. (I) containing > 30 –40% of As_2O_5 is unsatisfactory, since H_3AsO_4 , which damages crops, is liberated by slow reaction with H_2O . D. R. D.

Production of hydrogen from hydrocarbons. C. MATIGNON and M. SÉON (Rev. pétrolière, 1934, 1493–1497; Chem. Zentr., 1935, i, 2059).—Fission of gas containing 64% of CH_4 at 860–1050° in presence of a zircon catalyst gives products with a favourable $\text{H}_2 : \text{CO}_2$ ratio, with more CO_2 than CO . C_6H_{14} , cyclohexane, and cyclohexene produce C_2H_4 with short times of contact. Addition of H_2O vapour leads to progressive diminution of CO and CH_4 . J. S. A.

Economical large-scale production of oxygen and oxygen-enriched air. P. DOLCH (Chem.-Ztg., 1935, 59, 1024–1025).—Examples from actual large-scale practice to-day include the use of O_2 in a continuous water-gas plant burning lignite and the employment of enriched air (45% O_2) in blast furnaces. These have been made possible by the replacement of the pipe cold exchanger of the older Linde plants by the Fränkl

"cold accumulator." This consists of a pair of cylinders filled with Al or Fe ribbon so as to have a very large surface. The hot and cold currents are switched between the two every 1–4 min. It is no longer necessary to remove H_2O vapour and CO_2 from the air, as they are separated in the accumulator and mechanical advantages are also secured. In plant where current is available at 2 pf. per unit, the cost of 1 cu. m. of O_2 is 1 pf. C. I.

S from coal gas. NH_3 from gas liquor.—See II. Protecting wood in Na_2SO_4 .—See IX. Gas-liquor effluents.—See XXIII.

See also A., Jan., 37, Converting Na nitroprusside into Prussian-blue. 39, Prep. of S and $MgSO_4$ from SO_2 and MgO , Ca phosphates, and of pure CO.

PATENTS.

Manufacture of arsenic acid. J. N. LATIMER, ASSR. to LATIMER-GOODWIN CHEM. CO. (U.S.P. 1,974,747, 25.9.34. Appl., 9.3.32).— As_2O_3 (3) is added slowly to hot HNO_3 (4 mols.) and when the vigorous reaction ceases a small quantity of I or KI is added as catalyst to complete the reaction. A. R. P.

Cooling [of salt solutions]. L. G. BLACK and M. M. RICH, ASSRS. to AMER. POTASH & CHEM. CORP. (U.S.P. 1,996,053, 2.4.35. Appl., 21.10.32).—A solution of Na_2SO_4 (the natural solution, containing also Na_2CO_3 , from Searles Lake may be used) is crystallised by vac. evaporation and the $Na_2SO_4 \cdot 10H_2O$ (I) separated by a filter or the like and sludged with a solution of NaCl and (I) containing both solids in excess of saturation. The vapour is passed in direct contact with this sludge and is condensed by conversion of (I) into the anhyd. form, the presence of NaCl having lowered the transition temp. from 32° to 18° , i.e., below the crystallising temp. of (I) (even in presence of Na_2CO_3) and below the temp. attainable by cooling H_2O in tropical countries. The Na_2SO_4 is recovered. A small proportion of heat, stated to be 14.5% of that in the vapour, must be removed by refrigeration, e.g., by an NH_3 coil in the upper part of the barometric condenser. B. M. V.

Manufacture of ammonium sulphate. F. DENIG, ASSR. to KOPPERS CO. OF DELAWARE (U.S.P. 1,973,892, 18.9.34. Appl., 13.1.32).—About half the NH_3 in coke-oven gas is removed by scrubbing with H_2O and the resulting solution is converted into NH_4HSO_4 by treatment with SO_2 and O_2 in presence of a Co or Mn salt catalyst. The resulting solution is used for extracting the remainder of the NH_3 from the gas to produce neutral $(NH_4)_2SO_4$ solution. A. R. P.

Conditioning of crystalline materials [alkali silicates]. E. COWLES, ASSR. to ELECTRIC SMELTING & ALUMINUM CO. (U.S.P. 1,973,407, 11.9.34. Appl., 23.12.31).—Cryst. cakes of alkali silicates are roughly crushed and cooled in a current of cool air to produce regular distribution of the H_2O of crystallisation. A. R. P.

[Phosphatic] mineral concentration. (A) S. KLOSKEY, (B) J. T. SINGLETON, ASSRS. to AMER. AGRICULTURAL CHEM. CO. (U.S.P. 1,996,021 and 1,996,035, 26.3.35. Appl., [A, B] 21.9.31. Renewed [A, B] 18.8.34).

—A pulp of $Ca_3(PO_4)_2$, SiO_2 , and other gangue is mixed with a conditioner comprising basic sol. sulphide ($CaO-S$) and with an oil free from soap, e.g., bone oil or sulphonated oil, and is conc. on a table, not by flotation. B. M. V.

Recovery of phosphates from minerals. A. J. MASON (U.S.P. 1,973,439, 11.9.34. Appl., 20.6.30).—The ground mineral mixture is agitated with oil under H_2O , whereby the phosphates agglomerate and the silicious gangue settles out of the flocculated mass. A. R. P.

Phosphatic material. E. L. LARISON (U.S.P. 1,972,196, 4.9.34. Appl., 14.1.33).—Phosphate rock is treated with H_2SO_4 to convert all the Ca into $CaSO_4$, which is filtered off, and the H_3PO_4 conc. to 60–70%, mixed with 10–60% of H_2SO_4 , and heated at $> 170^\circ$ but $<$ the temp. at which $H_4P_2O_7$ is formed, to expel all F compounds. The acid is then neutralised with CaO to obtain a phosphate suitable for use in cattle feeds. A. R. P.

(A) Treatment of zinciferous material. (B) Purifying zinc sulphate solutions. (A) A. J. MYHREN, (B) J. C. THOMPSON, JUN., ASSRS. to NEW JERSEY ZINC CO. (U.S.P. 1,973,295 and 1,973,300, 11.9.34. Appl., [A] 26.7.32, [B] 4.1.32).—(A) Roasted Zn ore with a high Fe_2O_3 content is leached with 10–20% H_2SO_4 to remove as much ZnO and as little Fe_2O_3 as possible, the residue is heated with conc. H_2SO_4 to dissolve the remainder of the ZnO, and the solution from the first step is agitated with a vigorous current of air and an excess of ZnO while the solution from the second step is slowly added so as to ppt. the dissolved Fe in a granular, readily filterable form. (B) The dissolution of the ore in H_2SO_4 is effected in one step, the dissolved Fe^{+++} is reduced to Fe^{++} by addition of Zn or Fe, and the solution agitated with ZnO and air to reoxidise and ppt. the Fe as granular $Fe(OH)_3$. A. R. P.

Apparatus for manufacture of aluminium sulphate. G. L. SCOTT, ASSR. to GEN. CHEM. CO. (U.S.P. 1,995,401, 26.3.35. Appl., 28.2.33).—A construction of evaporator in Cu, Pb, and acid-resisting brick is described. B. M. V.

Precipitation of tungstic oxide. F. H. DRIGGS, ASSR. to WESTINGHOUSE LAMP CO. (U.S.P. 1,972,136, 4.9.34. Appl., 28.3.33).—In the production of W powder the grain size of which is 1–8 μ , the WO_3 is prepared by adding 2N- K_2WO_4 solution to hot 26–28% HCl with vigorous stirring until the mixed solution contains 7–8% HCl. A. R. P.

Production of expanded vermiculite. C. S. MINER, ASSR. to NAT. VERMICULITE PRODUCTS CORP. (U.S.P. 1,972,390, 4.9.34. Appl., 2.11.31).—Particles of vermiculite are charged below the surface of hot asphalt, wax, glycerin, or synthetic resin to cause sudden expulsion of the H_2O and simultaneous absorption of the impregnating liquid. A. R. P.

Catalyst roasting plant. D. A. SHEPARD, ASSR. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,998,401, 16.4.35. Appl., 5.5.31).—The "green" (foul) catalyst, especially that containing metal nitrates from the manufacture of H_2 , is placed in a portable tubular vessel of heat-resisting metal and lowered slowly into a furnace

which is kept at approx. const. temp. (870–1040°), meanwhile a flushing gas being blown through the catalyst. B. M. V.

Production of solid carbon dioxide. J. S. BELT and H. P. CADY, Assrs. to J. S. BELT NATURAL RESOURCE CORP. (U.S.P. 1,974,791, 25.9.34. Appl., 30.1.30).—Dried flue gas containing 90% of N_2 and 10% of CO_2 is compressed to 3000 lb. per sq. in., cooled to -76° , and expanded through a nozzle to about 150 lb. per sq. in., whereby the temp. falls to -104° and about 90% of the CO_2 solidifies; the residual gas is used for cooling further quantities of highly-compressed gas. A. R. P.

Obtaining dense carbon dioxide snow directly from liquid carbon dioxide. H. RUFENER and T. EICHMANN, Assrs. to G. B. SCARLETT and J. W. BROCK (U.S.P. 1,972,240, 4.9.34. Appl., 18.12.28. Renewed 29.6.34. Switz., 26.6.28).—Liquid CO_2 is expanded to a pressure below the triple point to produce dry snow and gas, the latter being caused to pass downwards through the snow to compress and compact it to a solid block. A. R. P.

Recovery of sulphur dioxide from gases. METALLGES. A.-G. (B.P. 435,116, 14.3.34. Ger., 6.5.33 and 13.1.34).—In processes for recovering SO_2 from roaster gases etc., by countercurrent treatment with org. bases (I) (e.g., xylidine), alkali oxides, hydroxides, or carbonates equiv. to the SO_4 produced in each cycle are added to the solvent prior to circulation through the absorber to decompose the sulphate of (I) formed by oxidation of the sulphite. A. R. P.

Separation of sulphur dioxide from gaseous mixtures. M. C. BOSWELL (U.S.P. 1,972,074, 4.9.34. Appl., 8.9.30).—Roaster gases are scrubbed to remove SO_3 and suspended matter, then passed countercurrent to a falling stream of cold H_2O containing quinoline which absorbs the SO_2 . The absorbed gas is subsequently recovered in a pure form by heating the solution to 70–100°. A. R. P.

Production of sulphuric anhydride. M. S. MAXIM, Assr. to MERRIMAC CHEM. CO., INC. (U.S.P. 1,974,829, 25.9.34. Appl., 15.6.31).—The gas mixture obtained by burning S in dry air is cooled from 600–850° to 550–600° by circulation through a cast-Fe heat exchanger against cool air, then further cooled to 400–450° in a similar way in a steel-tube heat exchanger before passing to the two-stage catalyst system with a tubular steel heat exchanger between the stages. The hot air from the coolers is used for raising steam. A. R. P.

Recovery of halogens [iodine from brine]. H. E. BIERBAUM, Assr. to GEN. SALT CO. (U.S.P. 1,972,546, 4.9.34. Appl., 6.5.33).—Oil-well brine is acidified, treated with an oxidising agent, and then passed through or agitated with active C to absorb the I. The C is impregnated with NaOH to convert the I into NaI and $NaIO_3$, heated at 230° to char org. matter also adsorbed from the brine, and leached with H_2O to recover NaI. A. R. P.

Separating liquids from gases. Purification of fluids (e.g., CO_2). Gas treatment.—See I. Compressed carbide.—See II. Fluxes for Al alloys.—

See X. Precipitator [for H_3PO_4].—See XI. Fertilisers. Insecticides.—See XVI.

VIII.—GLASS; CERAMICS.

Influence of composition on the brown coloration of glasses by sulphur. K. LITZOW and G. BROCKS (Sprechsaal Keram., 1935, 68, 51–53; Chem. Zentr., 1935, i, 2235).—The optimum colour is given by 1% of S + 1% of C. C may be replaced by Si or Al. For a const. amount of S and C, the colour is progressively lightened by replacement of SiO_2 by BaO, SrO, CaO, MgO, B_2O_3 , CdO, and ZnO, and darkened by K_2O and Na_2O , in that order. J. S. A.

Is the rose colour [of glass], due to selenium, a tempering colour? J. LÖFFLER (Glastechn. Ber., 1934, 12, 299–301; Chem. Zentr., 1935, i, 2063).—A discussion. H. J. E.

Properties of bottle glass. G. KEPPELER and F. KÖRNER (Sprechsaal Keram., 1934, 67, 607–609, 623–627, 640–643; Chem. Zentr., 1935, i, 2062).—Tests on the chemical and physical properties of 5 types of bottle glass are described. Addition of 3% of B_2O_3 in place of the corresponding amount of alkali improved the quality. H. J. E.

Variability of chemical properties of glass surfaces. G. KEPPELER (Glastechn. Ber., 1934, 12, 366–372; Chem. Zentr., 1935, i, 2062).—For a given composition, the resistance of a glass specimen to reagents varies with its mode of production and subsequent treatment. Tests on the attack by alkali are described. The resistance to alkali is improved by exposure to acid gases at a suitable temp. and, to a smaller extent, by grinding and polishing. H. J. E.

Mechanical tests for safety glass. H. G. BODENBENDER (Chem.-Ztg., 1935, 59, 1022–1024).—Balls of varying wt. are dropped from a height of 2 m. upon the centre of the sample at temp. of 0°, 20°, and 40°. The appearance of the result is noted and splinters are weighed. With increasing wt. the following are successively observed: injury to the intermediate layer, radial as well as concentric cracking, complete penetration with formation of a large quantity of splinters. By this means glass from different sources may be compared. C. I.

Effect of oxides of iron and chromium and a reducing atmosphere on rate of tridymite formation in a silica-brick batch. T. R. LYNAM and W. J. REES (Trans. Ceram. Soc., 1935, 34, 507–514).— SiO_2 briquettes containing various amounts (0.5–2.0%) of Fe_2O_3 , Cr_2O_3 , Siemens slag, or Prussian-blue, with or without 1–2% of C, were kiln-fired to cone 18, half the briquettes being burned under the normal (oxidising) conditions, and half (placed in saggars and surrounded by coke breeze) in a reducing atm. The bricks burned in the open kiln were stronger and tougher than, but of about the same powder d as, those burned under reducing conditions. Microscopical examination showed that the bricks burned under the normal conditions contained more tridymite (I), and that burning under reducing conditions did not increase the activity of Fe_2O_3 in accelerating (I) formation. Cr_2O_3 was less

effective than Fe_2O_3 , but Siemens slag and Prussian-blue were especially favourable, to (I) formation, bricks with these additions and burned in the open kiln containing 60–75% of (I). A. L. R.

New ceramic materials as aids in the study of technically important electrolytic melts. H. BORCHERS (Metallwirts., 1935, 14, 149–151; Chem. Zentr., 1935, i, 2235).—Sintered corundum, BeO , or Degussa-earth, suitably pretreated, may be used for crucibles for fused salts. J. S. A.

Agalmatolith as a material for reducing the plasticity of refractory materials in the glass industry. B. HOFMANN (Sklár. Rozhl., 1934, 11, 140–143; Chem. Zentr., 1935, i, 2063).—Agalmatolith on heating to the sintering temp. forms mullite. SiO_2 should be entirely in the insol. form. H. J. E.

Sealing metals into glass.—See X.

PATENTS.

Circular type tunnel kiln. P. D'H. DRESSLER and E. A. HANFF, ASSRS. to SWINDELL-DRESSLER CORP. (U.S.P. 1,999,356, 30.4.35. Appl., 15.9.33).—The train of cars is < a complete circle, a gap in the cars being maintained at the gap in the furnace, at which point cars may be added and subtracted for loading and repair. Since the train is pushed through, a thrust rail engaging with suitable rollers on the cars is provided on the outer circumference; in addition, a second pusher should be provided about half-way round. The sand seal and other details are described. B. M. V.

Glasswarelehr construction. H. B. EASTWOOD, ASSR. to HARTFORD-EMPIRE Co. (U.S.P. 1,997,250, 9.4.35. Appl., 2.12.33).—Constructional details of the tunnel walls are claimed. B. M. V.

Furnaces for melting glass. COMP. INTERNAT. POUR LA FABR. MÉCANIQUE DU VERRE (PROC. LIBBEY-OWENS) SOC. ANON. (B.P. 439,013, 30.3.35. Ger., 8.9.34).—In a tank furnace with skimming floats, the latter are constructed entirely of hollow fused SiO_2 and are immediately replaceable. B. M. V.

Manufacture of glass. G. E. HOWARD, ASSR. to HARTFORD-EMPIRE Co. (U.S.P. 1,999,761—2, 30.4.35. Appl., [A] 24.10.32, [B] 18.1.33).—(A) A substantial proportion of the wall of a glass tank is formed of the raw material of the glass, which is forcibly pushed forward by hydraulic rams or the like. (B) So that a glass tank may be operated at different rates while giving uniform quality, the melting flame passes from the refining zone towards the feeding point, and the amount of fuel and preheated air is regulated according to the rate of withdrawal of molten glass, the temp. fall increasing with the lighter loads. B. M. V.

Manufacture of [glass] filter. J. T. LITTLETON, ASSR. to CORNING GLASS WORKS (U.S.P. 1,999,770, 30.4.35. Appl., 18.6.34).—Two layers of parallel glass rods are superposed at 90° , and the whole is heated to cause adherence and gently pressed. B. M. V.

Manufacture of articles containing or consisting of silica. CORNING GLASS WORKS, and [J. F.] HYDE (B.P. 438,782, 12.7.35. U.S., 27.8.34).—Articles of vitreous SiO_2 (of high purity) are made at a relatively

low temp. by deposition from a flame in which a volatile Si compound (e.g., SiF_4) is hydrolysed. The SiO_2 may be deposited directly on a refractory core to give a finished article of clear vitreous SiO_2 , or the dust may be collected, shaped by pressure, and vitrified by heating to 1000–1400°. The dust may also be used as a binder for other refractories. Suitable apparatus is described. J. A. S.

Maturing of ceramic articles. R. C. BENNER, A. L. BALL, and H. R. HOCHINS, ASSRS. to CARBORUNDUM Co. (U.S.P. 1,996,851, 9.4.35. Appl., 3.9.32).—The articles are heated in a mould at the vitrification point of at least one constituent and simultaneously subjected to repeated changes of pressure, e.g., from 1 atm. to a 28-in. vac. B. M. V.

Manufacture of cellular ceramic products. J. R. PARSONS, ASSR. to UNITED STATES GYPSUM Co. (U.S.P. 1,998,686, 23.4.35. Appl., 9.9.33).—A mixture of clay, H_2O , deflocculant, and a foam-forming agent is aerated, placed in moulds while much air is still entrained, and allowed to stiffen by gelling before removal. Na silicate, Na_2CO_3 , NaCl, and soap bark are claimed as suitable reagents. B. M. V.

Manufacture of a fused amorphous ceramic composition [mullite]. T. S. CURTIS, ASSR. to VITREFRAX CORP. (U.S.P. 1,973,408, 11.9.34. Appl., 30.7.28).—A thick clay paste is extruded to form a bar, which is dried, vitrified, and fed into an arc so that the material fuses and falls in drops through a stream of high-pressure H_2O . The product thus shatters and is readily crushable to a vitreous amorphous powder. A. R. P.

Manufacture of light-weight clay product. C. WEIGEL (U.S.P. 1,997,282, 9.4.35. Appl., 22.10.30).—Bricks or blocks are formed of clay of high SiO_2 and low Al_2O_3 content, lignite high in alkali, and bentonite > 10% of the clay. The pores of the articles are interconnected and the apparent d is 57 lb./cu. ft. Detailed specifications of compositions and burning temp. are claimed. B. M. V.

Manufacture of refractory material for use in metal castings. A. S. WEYGANDT, ASSR. to GRASELLI CHEM. Co. (U.S.P. 1,999,382, 30.4.35. Appl., 13.6.32).—A mixture of sand, Na silicate, and $\text{Al}(\text{OH})_3$ is shaped and baked in an atm. free from CO_2 . B. M. V.

Manufacture of refractory brick. E. M. HARVEY and J. A. BOREN (U.S.P. 1,973,434, 11.9.34. Appl., 5.9.33).—A mixture of feldspar, clay, pyrophyllite, and SiO_2 is made into a plastic mass with H_2O , moulded into a brick under pressure, dried, burned for 5–6 days at 1260° , and cooled slowly for 4–5 days. A. R. P.

Manufacture of [rubber-bonded] abrasive article. C. S. NELSON and D. B. SHARPE, ASSRS. to CARBORUNDUM Co. (U.S.P. 1,995,321, 26.3.35. Appl., 27.7.32).—Abrasive grains are mixed with a vulcanising agent and an aq. dispersion of previously coagulated rubber with the aid of $\text{Pb}(\text{OAc})_2$ or other wetting agent, the H_2O in the mixture is reduced to 5–10%, and after disintegration the material is completely dried. A sheet is then formed by rolls which are spaced to prevent breakage of the grains, and wheel discs or the like are cut from the sheet. B. M. V.

Abrasive wheel. C. E. WILSON, ASST. to INDEPENDENT GRINDING WHEEL CO., INC. (U.S.P. 1,997,957, 16.4.35. Appl., 14.11.33).—Abrasive grains and a minor proportion of clayey material are bonded by Mg oxy-chloride cement. After partial setting the skin is removed. B. M. V.

Skimming devices for glass tanks or furnaces, and the gathering of charges therefrom. T. F. PEARSON (B.P. 438,850, 23.4.34).

Spherulising [vitreous] particles. Plastometer [for clay slip].—See I. Acoustic material.—See IX. Electric furnaces [for glass]. [Porcelain] insulator.—See XI.

IX.—BUILDING MATERIALS.

Economic balance of waste-heat boilers attached to cement rotary kilns. S. UCHIDA (J. Soc. Chem. Ind., Japan, 1935, 38, 581—583 B).—The overall heat-transfer coeff. in this case is $12.4u^{0.43}$ kg.-cal./sq. m./hr.°C., where u = gas velocity. Pressure drop through banks of tubes is given by $\Delta p = (0.18u^2 \rho N / 2gd) \times (dup/\mu)^{0.24}$ kg./sq. m., where N = no. of rows of tubes, d = outer diam. of tubes. Equations are obtained for the most economical mean gas velocity and most economical temp. difference at the hot-gas exit. An example is given and the annual optimum economy in the case calc. C. I.

Production of cement and iron in the rotary kiln. A. MARGARIT (Cement, 1935, 8, 281—283).—A commercial operation of the Basset process is described. Pyrites is calcined to Fe_2O_3 , and mixed with coal and calcareous and argillaceous materials for burning by the dry process, using a reducing flame. The kiln is modified so that Fe is removed before the clinker. The Fe is low in S, P, and Si. Mn can be varied by addition of MnO_2 to the raw mix. T. W. P.

[Cement-kiln] slurry rings. III. Y. YOSHII (J. Soc. Chem. Ind., Japan, 1935, 38, 592—596 B; cf. B., 1935, 1044).—Ring-formation on furnace walls is shown to occur when (total CaO—CaO in $\text{CaO} \cdot \text{Al}_2\text{O}_3$)/ SiO_2 (in mols.) is > 3.19 for the crude siliceous powder. When the latter is rich in CaO and poor in SiO_2 , free CaO reacts with SiO_2 of the wall. The removal of rings is discussed. R. S. B.

Special cements. L. FORSÉN (Betong, 1934, 219—248; Chem. Zentr., 1935, i, 2063).—A review of the properties of special cements. H. J. E.

Control of the fineness of grinding of cements. ZUCCHINETTI (Strade, 1935, 17, 481—490; Road Abs., 1935, 2, No. 640).—Methods for fineness determination are described, together with a modification of the Gonell method in which subdivisions of the elutriated fractions are obtained from photomicrographs. T. W. P.

Relation between mortar strength of cement and crushing strength of plastic concrete. A. F. ROSCHER (Zement, 1934, 23, 719—723, 732—735; Chem. Zentr., 1935, i, 2235).—A formula is advanced for calculating the strength of concrete, making allowance for the characteristic H_2O losses of different concretes before setting. J. S. A.

Tensile strength of plain concrete. A. GUTTMANN (Zement, 1935, 24, 532—542; Road Abs., 1935, 2,

No. 639).—A testing apparatus is described, and tabulated and graphical data are given of tests under varying possible conditions. No general relation exists between the tensile strengths of the concretes and those of standard sand mortars. The average strengths of the former were low for all cements except aluminous. Strength could be increased by use of the min. practicable amount of mixing H_2O , by increase in cement content, by H_2O storage during the first 7 days, and by use of high-strength aggregates (sandstones, blast-furnace slag). T. W. P.

Expansion and corrosion of hardened mortar of various cements. II. S. NAGAI, K. MATSUOKA, and K. NOMI (J. Soc. Chem. Ind., Japan, 1935, 38, 500—503 B; cf. B., 1935, 726).—Expansion measurements of test-pieces over a year show that 10% solutions of Na_2SO_4 and of MgSO_4 are highly corrosive, and those of NaCl and MgCl_2 rather less so. Blast-furnace slag cement, high- SiO_2 Portland cement (I), and aluminous cements (II) are less affected than is ordinary Portland cement, but (II) shows very great loss of compression resistance which is not the case with (I). C. I.

Compression test of concrete by [use of] small test-pieces. II. Comparison of the compression of small and common mould concrete, using different aggregates. III. Comparison of the compression of concrete and plastic mortar. Y. SANADA (J. Soc. Chem. Ind., Japan, 1935, 38, 555—557 B, 557—558 B; cf. B., 1934, 1101).—II. In a 1:2:4 concrete with varying H_2O content the physical properties of (1) test-pieces 5×10 cm., and (2) test-pieces 15×30 cm. were compared. The strength ratio between the two is unaffected by age, but varies with the H_2O content.

III. Physical properties, including "work abilities" and compression strengths, were determined for concretes and plastic mortars of various compositions. The effect of the H_2O -cement ratio increases with the amount of cement used in each case. The max. strength of any concrete is fixed by the H_2O -cement ratio, but with plastic mortar it also varies with age. C. I.

Physico-chemical aspects of asphalt pavements. Energy relations at interface between asphalt and mineral aggregate and their measurements. C. MACK (Ind. Eng. Chem., 1935, 27, 1500—1505).—Surface-energy changes at an asphalt-aggregate interface are discussed. Methods are described for the measurement of γ for asphalt and the interfacial tensions for the interfaces asphalt- H_2O and asphalt-aggregate. The asphalt-aggregate interfacial tension varies with both type of asphalt and type of aggregate. J. W.

Causes of adhesion [in road materials]. W. RIEDEL (Asphalt u. Teer, 1934, 34, 924—926, 941—943, 961—963, 979—980; Chem. Zentr., 1935, i, 2115; cf. B., 1935, 61).—A discussion of the classifications of materials as hydrophobic or hydrophilic. H. J. E.

Drying of solid materials. XV. Wood. S. KAMEI, M. TAKIMOTO, and Y. URAKAMI (J. Soc. Chem. Ind., Japan, 1935, 38, 534—544 B; cf. B., 1935, 1149).—Samples of fir, cedar, and cypress wood were immersed for 3 months in H_2O and then blocks cut out and dried in a

known current of air at known temp. Sides transverse to the vessels in the wood were covered with tinfoil so that all evaporation was from the surface tangential to the annual rings. Rate of loss of H_2O and shrinkage were recorded. Cypress, which is close-grained, gave a uniformly decreasing rate of loss of H_2O ; firwood showed 3 distinct stages. Drying rates with varying air temp. and velocity were also determined. Shrinkage begins when the H_2O content falls below the saturation val. of the cell walls. A test with firwood gives a comparison between drying rates of tangential, radial, and cross-sections, marked differences being shown in the second (or slow) stage of drying. C. I.

Moisture content of timber in new buildings. R. A. G. KNIGHT (Dept. Sci. Ind. Res., Forest Products Res. Rec. No. 5, 1935, 11 pp.).—The mean moisture content of timber in well-dried buildings is 12% (on dry timber) with a normal variation of 2%. After completion of the shell the moisture content is 16–20%. The variation of dimensions of deal, mahogany, oak, and teak with moisture content is given. D. K. M.

Old timbers. III. Post-Neolithic. E. A. RUDGE and H. LEWIS (J.S.C.I., 1935, 54, 433–434 r; cf. B., 1935, 806).—An examination of wood specimens from peat deposits at Pevensy and Caerphilly, respectively, shows a considerable extent of degradation, although a high degree of fibre strength remains. Where the situation of the peat-bed is such that leaching action of percolating H_2O is possible, there is evidence of partial separation of the products of humification and removal of H_2O -sol. fractions. The influence of Fe on the lignin is confirmed.

Protective coating for wood in sodium sulphate. K. A. KOBE and J. A. MOREY (Chem. Met. Eng., 1935, 42, 682).—Laminated synthetic-resin sheets and a Bakelite-base varnish coating satisfactorily withstood 24 hrs. immersion in boiling saturated aq. Na_2SO_4 ; cement and asphalt- and rubber-base paints did not. D. K. M.

Tar for roadmaking. Water- and damp-proofing products.—See II. Pulp woods.—See V.

See also A., Jan., 31, System alkali oxide-CaO- Al_2O_3 - SiO_2 - CO_2 .

PATENTS.

Manufacture of cement. SOC. ANON. DES CEMENTS DE THIEU, and L. BLONDIAU (B.P. 437,855, 11.1.35. Belg., 13.1. and 23.3.34).—Supersulphated cements are manufactured from $CaSO_4$ calcined at $> 850^\circ$ but $<$ the decomp. temp. of $CaSO_4$ (900–1200°). The material is used for addition to blast-furnace slag etc. T. W. P.

Manufacture of [shaped] cement products. W. GARTNER (B.P. 438,742, 24.7.34).—Slabs in imitation of tiles or bricks with joints are formed in moulds which are highly polished. B. M. V.

Acid-proof [mortar] composition. C. R. KUZELL, J. R. MARSTON, and F. X. MOONEY, Assrs. to UNITED VERDE COPPER Co. (U.S.P. 1,998,935, 23.4.35. Appl., 23.9.32).—The composition comprises Na silicate solution, fillers, and fluosilicates in amount $<$ equiv. to (e.g., 30–40% of) the NaOH which might be formed by hydrolysis of the silice^a. B. M. V.

Acidproof mortar for lining cellulose digesters. K. DIETZ and K. FRANK, Assrs. to PEN-CHLOR, INC. (U.S.P. 1,996,859, 9.4.35. Appl., 27.1.33. Ger., 5.2.32).—A mortar for use as rendering or in conjunction with acid-proof tiles and the like is composed of an acidproof filler, a liquid PhOH-aldehyde resin, and a hardener for the resin, e.g., $p-C_6H_4MeSO_2Cl$. B. M. V.

Aëration of [building-material] slurries. A. H. HARRISON, Assr. to CARBONATED LIME PROCESSES, LTD. (U.S.P. 1,995,540, 26.3.35. Appl., 5.7.32).—For the manufacture of porous building block, slurry containing a bubble-forming (stabilising) agent is run into a closed vessel and agitated under air pressure. B. M. V.

Manufacture of bricks or the like. C. W. BROWN and G. V. PARKER (B.P. 439,525, 14.9.34).—Diatom bricks are coated before burning with a mixture of raw or burnt moler or the like (47.5%), cement (40), and asbestos fibre (12.5%). B. M. V.

Manufacture of floor, wall, and/or roof tiles. T. BROWN (B.P. 439,273, 12.3.35).—A mixture is made of fine and coarse sawdust, a minor proportion of sand, and calcined $MgCO_3$, and is set by $MgCl_2$ solution. Addition of rubber latex is optional. B. M. V.

Acoustic corrective material. J. R. PARSONS, Assr. to UNITED STATES GYPSUM Co. (U.S.P. 1,999,371, 30.4.35. Appl., 9.9.33).—A material having interconnected pores and a "fired crawling glaze" on the areas only between the pores at the surface is claimed. Compositions of glazes having the tendency to crawl away from sharp edges are given. B. M. V.

Sound-absorbing compositions. (A) C. K. ROOS, (B) G. D. KING, Assrs. to UNITED STATES GYPSUM Co. (U.S.P. 1,996,032–3, 26.3.35. Appl., [A, B] 15.4.29. Renewed [A] 4.10.34, [B] 7.9.33).—Mineral wool and a minor proportion of pyrophyllite are mixed with $\beta-C_{10}H_7OH$ and (A) with glue, cooked starch, and $Al_2(SO_4)_3$, or (B) with globe pearl starch, karaya gum, raw sienna, blood-albumin, and $CuSO_4$. B. M. V.

Manufacture of bituminous road and like materials. E. ILLEMANN (B.P. 439,272, 23.2.35).—Bitumen and aggregate are mixed at the quarry or the like in the final proportion, but only to an extent that the fine aggregate takes up all the bitumen and forms a lumpy, non-sticky mass which, on site, is further mixed and heated. B. M. V.

Tennis court. E. H. NICHOLS (U.S.P. 1,999,130, 23.4.35. Appl., 8.3.32).—Quartzite-schistose greenstone is screened and various grades (in given proportions) are re-mixed with a gypsum binder. B. M. V.

Control of drying [of wood]. A. E. KRICK (U.S.P. 1,997,826, 16.4.35. Appl., 14.10.29).—Wood is dried by air in repeated cycles comprising 3 periods: (a) temp. and R.H. are both raised; (b) temp. is further raised, and R.H. lowered; (c) temp. is lowered. The temp. in a and b is controlled by the first occurring of two events, viz., attainment of predetermined temp., expiration of predetermined time. B. M. V.

Treatment of wood. I. H. DERBY and F. E. CISLAK, Assrs. to P. C. REILLY (U.S.P. 1,995,499, 26.3.35. Appl., 17.9.31).—The porosity of Douglas fir, hemlock,

and like woods is increased by treatment with SO_2 gas prior to saturation with creosote or the like. B. M. V.

Seasoning, preserving, and tempering wood and woody growths. G. E. RICE, Assr. to CONSERVATION CORP. OF AMERICA (U.S.P. 1,999,969, 30.4.35. Appl., 30.4.30. Renewed 3.10.34).—The wood is impregnated with an aq. solution of invert sugar 20, glycerin 5, $\text{Al}_2(\text{SO}_4)_3$ 0.5, and anhyd. glucose 5% (of the H_2O). B. M. V.

[Perforated] building material. C. WENCZEK (B.P. 439,349, 22.3.35. Ger., 22.3.34).

Manufacture of [bevelled] wallboard. A. W. PARFITT, From GYPSUM, LIME & ALABASTINE, CANADA, LTD. (B.P. 439,022, 11.6.35).

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

Quenching of steels and its mechanism. K. HONDA (Sci. Rep. Tôhoku, 1935, 24, 551–564).—A summary. J. W. S.

Acceleration of a structural reaction in steel by mechanical constraint. P. CHEVENARD and X. WACHÉ (Compt. rend., 1935, 201, 877–879).—The influence of a stress of 2.5–40 kg. per sq. mm. at 450–600° has been studied on steel containing Cr 7, Mo 0.7, V 0.3, and C 0.1%. Tenacity, permanent magnetism, resistance, and microstructure have been observed with the cooled specimen. The metal undergoes a structural change, scarcely visible under the microscope, due to coalescence of carbide. R. S. B.

Behaviour of inner surfaces of chromium-plated and nitride-hardened gun barrels. O. MACCHIA (Ind. meccan., 1934, 16, 180–182, 267–269; Chem. Zentr., 1935, i, 2240–2241).—Neither Cr-plating nor nitride-hardening possessed advantages over the usual treatment. Splintering was lessened by using steel containing Al. J. S. A.

Cracking of boiler plates. H. J. GOUGH and W. J. CLENSHAW (Mech. World, 1935, 98, 551, 553).—Inter-cryst. cracking (caustic embrittlement) could not be induced in test-pieces by thermal or mechanical conditions; exposure to alternate loading cycles while immersed in boiling aq. NaOH gave only transcryst. cracks on plain plates but definite evidence of embrittlement near riveted joints. G. H. C.

Welding of alloy steels. K. L. ZEYEN (Autog. Metallb., 1935, 28, 33–41; Chem. Zentr., 1935, i, 2245).—Procedure is discussed. J. S. A.

Intercrystalline corrosion of steels. E. HOUDRE-MONT and P. SCHAFMEISTER (Aciers spéc., Mét., 1934, 9, 258–268; Chem. Zentr., 1935, i, 2246–2247).—Inter-cryst. corrosion of alloy steels and its effect on mechanical properties are discussed. The corrosion is hindered by metals which raise the solubility of C in austenite or form stable carbides (V, Ti, Ta), or by production of new grain boundaries by cold-deformation. J. S. A.

Influence of surface condition, edge layers, and corrosion on fatigue strength. R. MAILÄNDER and W. RUTTMANN (Maschinenbau, 1935, 14, 73–77; Chem. Zentr., 1935, i, 2244).—The resistance of Fe to

fatigue is greatly diminished by simultaneous corrosion. The diminution may be decreased by agents which minimise the corrosive action, and may be inhibited by coating with Zn or Cd, or by nitride treatment or cementation. J. S. A.

Laboratory study of the atmospheric corrosion of metals. II. Iron: the primary oxide film. III. Secondary product or rust (influence of sulphur dioxide, carbon dioxide, and suspended particles on the rusting of iron). W. H. J. VERNON (Trans. Faraday Soc., 1935, 31, 1668–1700; cf. B., 1931, 763).—II. The log of the rate of oxidation of Fe heated (to temp. T) in air plotted against $1/T$ yields two straight lines, intersecting at 200°. Above 200° the amount of oxidation $\propto t^{-2}$ (where t = time), and the interference colours produced are in accord with the production of a continuous transparent film. Below 200° the amount of oxidation $\propto t^{-2.5}$, and film thicknesses which give interference colours at high temp. can be exceeded without appreciable change in appearance and the colours when produced suggest a granular film. At 25° the rate of oxidation decreases only slightly with t during 15 days, after which the formation of unit lattice of oxide on the surface seems to be complete. Between 15 and 30 days the amount of oxidation $\propto t^{-2}$, after which it $\propto t^{-2.5}$. This second inflexion is attributed to breakdown of the primary film to yield a secondary film of granular structure. Electron-diffraction measurements confirm a change in structure of the film at 200°.

III. The rusting of mild steel in pure air of high R.H. is least when the humidity is increased gradually from zero, this being attributed to strengthening of the primary film in early stages. In presence of SO_2 (0.01%) there are marked increases in corrosion at R.H. 50% and 80%. These crit. humidities are attributed to the attainment of the required $\text{H}_2\text{O}-\text{SO}_2-\text{O}_2$ relationships and to the gel structure of the initially formed rust, respectively. The behaviours of Fe, Cu, and Zn differ in the secondary crit. humidity phenomena. In supersaturated air containing 0.1–0.01% SO_2 the rate of corrosion decreases initially with t , but later becomes const. In presence of $(\text{NH}_4)_2\text{SO}_4$ (I) particles primary and secondary crit. humidities occur as with SO_2 . The corrosion at 90% R.H. is much greater when the R.H. is increased gradually to this val. than when it is kept const. throughout, this being attributed to breakdown of the primary film and to changes in the physical properties of the rust. (I) also accelerates attack in supersaturated air. In an unsaturated atm. the effect of (I) is additive to that of SO_2 . SiO_2 particles have little effect in pure air or in presence of SO_2 , but charcoal has an accelerating effect in presence of SO_2 , probably owing to local concn. of the gas. CO_2 has a repressive effect on corrosion under all conditions studied, probably owing to its modifying the gel structure of the primary $\text{Fe}(\text{OH})_3$. J. W. S.

Protection of steel against corrosion. F. M. HARTLEY (Decorator, 1935, 34, 46).—The factors affecting the anticorrosive efficiency of paints are discussed. D. R. D.

[Corrosion] inhibitors—safe and dangerous. U. R. EVANS (Trans. Electrochem. Soc., 1936, 69,

Preprint, 1—15).—Attempts to inhibit the anodic reaction in corrosion changes controlled by the cathodic reaction usually diminish the corroded area more rapidly than the total destruction of metal, and hence the intensity of corrosion is increased when the amount of inhibitor present is insufficient to stop corrosion completely; such methods of inhibition are termed "dangerous." On the other hand, since no intensification of attack occurs when the corrosion is under anodic control or when the inhibitor smothers the cathodic reaction, the use of inhibitors in these cases is "safe." Examples of dangerous inhibition are the addition of an alkali to a salt solution in contact with Fe and of chromates to dil. brine. A safe inhibitor should not intensify attack when added in only minute amounts, and in the case of protective films should not accelerate corrosion at small discontinuities; thus oxide films on Mg are safe, but graphite paint films on Fe are dangerous. A. R. P.

Metals sealing into glass. H. SCOTT (J. Franklin Inst., 1935, 220, 733—753).—The thermal expansion of Ni and Ni-Co steels is discussed. Kovar (Ni 29, Co 17, Mn 0.2, Fe balance to 100%) has a low expansivity to a relatively high temp. and is suitable for sealing into hard glass. The annealing technique and stresses set up in the seal are discussed. D. K. M.

Detailed statistical microscopical analyses of ore and mill products of the Utah Copper Co. R. E. HEAD, A. L. CRAWFORD, F. E. THACKWELL, and G. BURGNER (U.S. Bur. Mines, Rept. Invest. No. 3288, 1935, 93 pp.).—The degree of fineness to which it is economically advisable to grind the ore to obtain max. liberation of the valuable minerals at min. cost with min. sliming and oxidation, and the effects of time of conditioning, flotation, etc. to obtain max. recovery, have been determined. A. R. P.

Mechanical properties of tin-base alloys. D. J. MACNAUGHTAN and B. P. HAIGH (Tech. Publ. Internat. Tin Res. Dev. Counc., 1935, A, No. 26, 12 pp.).—Tensile, compression, hardness, and fatigue tests are discussed in relation to the time factor, especially in the light of creep and self-annealing. Published work on the influence of different alloying elements on the properties of Sn is reviewed. E. S. H.

Correct evaluation of the material value of metal castings. E. BECKER (Giesserei, 1935, [viii], 22, 3—6; Chem. Zentr., 1935, 2245).—Casting costs are discussed. J. S. A.

Stresses and flow of material during tube-drawing. E. SIEBEL and E. WEBER (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1934, 16, 217—224; Chem. Zentr., 1935, i, 2245).—Theoretical. The distribution of stresses and flow of material are calc. and compared with experimental data. J. S. A.

Deformation conditions during wire-drawing. E. SIEBEL (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1934, 16, 213—216; Chem. Zentr., 1935, i, 2244—2245).—Flow of surface material during successive extensions has been followed by the deformation of an engraved co-ordinate net. Results are related to differential hardening of the core and outer zones. J. S. A.

Determination of strength of thin wires towards repeated flexion. W. FRIEDMANN (Metallwirts., 1935, 14, 85—87; Chem. Zentr., 1935, i, 2244).—Suitable apparatus is described. J. S. A.

Aluminium as construction material for chemical plant in Germany. H. RÖHRIG (Chem. Fabr., 1935, 8, 487—489).—Methods for rendering Al resistant to corrosion are discussed. Welded Al apparatus is illustrated. C. I.

Determination of silicon in aluminium alloys. I. J. A. KLJATSCHKO (J. Gen. Chem. Russ., 1935, 5, 1130—1132).—The sample is dissolved in HCl through which a stream of H_2 is being passed; Si present in silicides is converted into SiH_4 , and residual uncombined Si is determined separately. R. T.

Direct electrolytic manufacture of aluminium-magnesium alloys. I—IV. I. NAMARI and T. ISHINO (J. Soc. Chem. Ind., Japan, 1935, 38, 583—591 B).—Compact alloys of uniform composition have been prepared by depositing Mg electrolytically on Al cathodes, using a graphite anode and a bath of fused $MgCl_2 + KCl + NaCl + 3\%$ of CaF_2 . Above 660° the current efficiency is approx. const. at 94% and is approx. independent of c.d. or omission of either NaCl or KCl. Using $MgCl_2$ alone, a temp. of $700-800^\circ$ must be used, giving a mean current efficiency of 95%, and the alloys produced do not corrode in air. Using 1:1 NaCl-KCl mixture in the bath the alloys corrode, KCl giving the more pronounced effect. Non-corrodible alloys may be formed at a more convenient temp. (670°) by addition of only 5—10% of NaCl to $MgCl_2$. Current efficiency is independent of duration of electrolysis. Fe and Si are present as impurities. R. S. B.

Specifications for cathodic coatings, with special reference to nickel and chromium on steel. C. F. J. FRANCIS-CARTER (J. Electrodep. Tech. Soc., 1935, 10, 69—84).—Inspection rather than process specifications are advocated and the possibility of specifying appearance, adhesion, thickness, porosity, and hardness is discussed. Some existing specifications for Ni, Cr, and Ag coatings are reproduced. C. E. H.

Electrodeposition of bronze, using bronze anodes. S. BAIER and D. J. MACNAUGHTAN (J. Electrodep. Tech. Soc., 1936, 11, Preprint, 14 pp.).—Cu-Sn alloys of different compositions can be deposited from an alkaline solution of $NaCu(CN)_2$ and Na_2SnO_3 at 65° , using annealed cast bronze anodes having a composition approximating to that of the deposit. The Sn:Cu ratio in the solution is approx. 3.5 times that in the deposit. The throwing power of the solution is high. The bronze deposits are hard and free from pores when < 0.0003 in. thick; they form suitable undercoats for Cr deposits. E. S. H.

Electrodeposition of bronze, using bimetallic anodes. C. BÉCHARD (J. Electrodep. Tech. Soc., 1936, 11, Preprint, 8 pp.).—Acid baths containing Cu^{++} and Sn^{++} oxalates are unsuitable under practical conditions. E. S. H.

Electrodeposition of zinc and cadmium on aluminium and aluminium alloys. B. K. BRAUND and H. SUTTON (Trans. Faraday Soc., 1935, 31, 1595—

1611).—Surface layers of Zn and Cd, deposited electrolytically on sandblasted Al or duralumin from ZnSO_4 , $\text{Zn}(\text{CN})_2$, or $\text{Cd}(\text{CN})_2$ baths, give a protection inferior to that afforded by high-purity Al coating on Alclad sheet, of the same order as that afforded by the Bengough-Stuart anodic treatment supplemented by application of grease, and superior to that of varnishes and enamels. None of the methods used by previous workers for preparing the Al surface is satisfactory. The best method of cleaning is anodic treatment in NH_3 solutions, but deposits applied subsequently are satisfactory only over parts of the surface. Na zincate solutions, preferably with Na stannate added, react with Al and alloys of high [Al], with dissolution of Al and deposition of Zn, under certain conditions in an adherent form, and forming a good undercoat for plating, especially on alloys. Results are improved by dissolving off the first coating of Zn and re-dipping. The Zn can be deposited from more acid ZnSO_4 after the zincate bath than after the sandblasting, probably owing to absence of roughening, and deposits can also be made from a ZnCl_2 bath. The current distribution in a ZnSO_4 plating bath is also discussed. J. W. S.

Electrodeposition of cadmium in electrical engineering. H. MARSTON (J. Electrodep. Tech. Soc., 1935, 10, 57—68).—The applications of electrodeposited Cd are reviewed and a practical account is given of plating solutions, equipment, chemical and electrical control of the process, and preliminary prep. of the work. Representative costs are included. C. E. H.

Electrodeposition of tin for refrigerating purposes. E. A. JOHNSON (J. Electrodep. Tech. Soc., 1935, 10, 119—124).—A practical account is given of the working of an alkaline bath, using sol. anodes. C. E. H.

Hardness of electrolytic chromium. II. Influence of current density and temperature on solubility of hydrogen in chromium and on its hardness. S. P. MAKARIEVA and N. D. BIRUKOV (Z. Elektrochem., 1935, 41, 838—842; cf. B., 1935, 905).—The hardness (H) of electrolytic Cr decreases with increase of c.d. between 7 and 120 amp./sq. dm., whereas the solubility (S) of H_2 reaches a max. at 25 amp./sq. dm. The H and S curves with respect to temp. run in different directions except in the interval 30—40°, in which both are similarly influenced by the grain structure. H is independent of S throughout the range studied. F. L. U.

Evolution of the plating bath. H. J. T. ELLINGHAM (J. Electrodep. Tech. Soc., 1935, 10, 109—118).—A historical review and discussion of the characteristics of different types of baths. C. E. H.

Throwing power of electrolytic baths. A. PORTVIN and M. CYMBOLISTE (Compt. rend., 1935, 201, 819—821).—The determination of the throwing power of such baths is described and discussed. Data are recorded for the deposition of Sn, Zn, Cd, Cu, and Ni. H. J. E.

Testing of electrodeposited coatings. L. C. BANNISTER (J. Electrodep. Tech. Soc., 1935, 10, 97—108).—A review of existing information. C. E. H.

Adhesion and reasons for non-adhesion of galvanic deposits. V. P. SACCHI (Ind. meccan., 1934,

16, 343—349, 456—461; Chem. Zentr., 1935, i, 2246).—The adhesion of electrodeposited metals is determined by mutual mol. cohesion, and is promoted by superficial alloy formation, or mechanical treatment favouring direct mol. contact. J. S. A.

Hg boiler. Spectroscopy.—See I. **Quenching liquids [for steel].** Effect of metals on insulating oils.—See II. Fe.—See IX. **Testing paints for steelwork. Anti-rust finishes.**—See XIII. **Corrosion of metals by fatty acids and leather.**—See XV.

See also A., Jan., 23, Cu-Be, Al-Zn, Sn-Sb, Sn-As, Rh-Cu, and Zn-Cd alloys. Binary systems of alkali metals. Pd-Ag and Pd-Au wires. Resistance thermometry. 39, Hg powder. Prep. of rare-earth amalgams, and of rare-earth metals therefrom. 45, Determination of V [in steel].

PATENTS.

Roasting of mineral-bearing particles. B. A. STIMMEL, K. D. McBEAN, and G. CRUICKSHANK, Assrs. to CONSOL. MINING & SMELTING CO. OF CANADA, LTD. (U.S.P. 1,963,282, 19.6.34. Appl., 4.3.32).—The furnace comprises a top preheating hearth, a deep central chamber through which the preheated ore falls and in which it is roasted while in suspension in an up-current of air mixed with a proportion of the roaster gases previously cooled by preheating the incoming ore, and a bottom hearth for completing the roasting, the hearths being mechanically rabbled by arms rotating on a central axis. A. R. P.

Production of pearlitic cast iron. H. A. MITCHELL and J. L. CAWTHON, JUN., Assrs. to BONNEY-FLOYD CO. (U.S.P. 1,973,263, 11.9.34. Appl., 30.4.31).—Fe containing Ni 0.01—5, Mo 0.01—2, C 1.75—3.75, Si 0.5—3, and Mn 0.25—2% is melted in a cupola and then superheated to 1400° in an electric furnace before casting, so that the castings have a pearlitic structure throughout which the free C is distributed as finely-divided graphite particles. A. R. P.

Surface-hardened cast iron article of manufacture. M. L. A. BABINET, Assr. to NITRICASTIRON CORP. (U.S.P. 1,972,082, 4.9.34. Appl., 13.6.31).—Cast Fe containing C 2—4 (3.4), Cr 1.5—3.5 (1.9), Si 1—4 (1.5), Mn 0.7, and Mo, Ti, or V \geq 1%, with or without \geq 2% W, is annealed at 950°, quenched to obtain a sorbitic structure, and nitrided in NH_3 at 450—600°. A. R. P.

Improving the magnetic properties of iron and iron alloys. O. DAHL and F. PAWLEK, Assrs. to GEN. ELECTRIC CO. (U.S.P. 1,973,525, 11.9.34. Appl., 11.10.32. Ger., 24.10.31).—Electrolytic Fe is annealed first in H_2 and then in vac. at 850°. A. R. P.

Cold-reduction [rolling] of [ferrous] metals. E. T. LORIG, Assr. to AMER. SHEET & TIN PLATE CO. (U.S.P. 1,973,684, 11.9.34. Appl., 8.8.33).—The rolls are sprayed with an aq. emulsion containing engine oil > 2 (3) and a H_2O -sol. oil ≤ 1 (2)%. A. R. P.

Treatment of (a) steel, (b) ferrous alloys. (a) C. H. LORIG, H. W. GILLET, and H. B. KINNEAR, and (b) C. S. SMITH, Assrs. to COPPER & BRASS RES. ASSOC. (U.S.P. 1,972,241 and 1,972,248, 4.9.34. Appl., [a]

3.5.32, [B] 5.4.32).—Steels containing Cu 0.5–5 and (A) C \geq 1 and Mn \geq 2, or (B) C \geq 0.9%, are (A) cooled at such a rate as to maintain most of the Cu in solution above 625° and kept at 625–350° for 15 min.—6 hr., or (B) heated at $> 750^\circ$ to cause the Cu to go into solid solution, and kept at 400–600° until pptn.-hardening occurs to the desired extent. A. R. P.

Heat-treatment of steels and iron alloys. S. MATSUNAWA, F. NOZAWA, and M. SUZUKI (B.P. 435,223, 15.9.34).—In the heat-treatment of steel an emulsion of H₂O and a fish and/or fatty oil containing \geq 15% of an emulsifier, e.g., alkali hydroxides or soaps, is used as quenching medium. A suitable mixture consists of fish oil 75, H₂O 25, and NaOH 0.1% emulsified in a colloid mill. A. R. P.

Treatment of silicon[–iron] alloy castings. J. A. PARSONS, Assr. to DURIRON Co., Inc. (U.S.P. 1,972,103, 4.9.34. Appl., 9.6.33).—Castings of acid-resisting Fe alloy containing Si 7.5–18 (14), Mo 0.1–10 (4), and C 0.25–1.5 (0.9%) are removed from the mould while still red-hot and transferred to an annealing furnace at 815° until a homogeneous structure is obtained; they are then cooled very slowly in the furnace to render them resistant to heat and mechanical shock. A. R. P.

Treatment [nitriding] of ferrous metals. V. T. MALCOLM, Assr. to CHAPMAN VALVE MANUFG. Co. (U.S.P. 1,975,064, 25.9.34. Appl., 19.5.34).—The NH₃ used in case-hardening Fe and steel is passed through a silent electric discharge to dissociate it into H₂ and N₂ just prior to passing it into the nitriding chamber. A. R. P.

[Case-]hardening [ferrous] metals. W. R. BENNETT, Assr. to BENNETT-CHAPMANIZING, Inc. (U.S.P. 1,975,058, 25.9.34. Appl., 20.8.31).—The articles are immersed in a molten salt bath containing cyanides, and a slow stream of NH₃ is bubbled through the salt mixture during the treatment. A. R. P.

Production of diffusion-alloy cases. [Case-hardening of metal articles.] J. W. HARSCH, Assr. to LEEDS & NORTHRUP Co. (U.S.P. 1,999,757, 30.4.35. Appl., 30.1.29).—A reactive gas is forcibly circulated in contact with the metal at a suitable temp., attained partly by means of heat (produced electrically or otherwise) added during the process. B. M. V.

Mechanically corroding relief intaglio variegated surfaces on metal [steel]. J. J. BURGESS, Assr. to ROCK ISLAND REGISTER Co. (U.S.P. 1,974,011, 18.9.34. Appl., 16.5.32).—The surface of the metal is spotted with asphalt, dried at 95°, and covered with acidified aq. CuSO₄, which etches the surface to different depths and undercuts the asphalt-covered spots, thereby producing irregular etch patterns which are exposed by removing the asphalt with hot aq. NaOH and the Cu sponge by brushing. A. R. P.

(A) Pickling solution, (B) descaling process [for stainless steels]. G. C. KIEFER, Assr. to ALLEGHENY STEEL Co. (U.S.P. 1,974,570–1, 25.9.34. Appl., [A] 28.1.30, [B] 29.3.32).—(A) The pickle contains conc. HNO₃ 20–25 and 48% aq. HF 1–3 (2) vol.-%. (B) The use of this pickle for descaling Cr and Ni–Cr steels is claimed. A. R. P.

Metal-treating compound. [Pickle for stainless steel.] J. W. MARKLEY and T. W. CLEMENT, Assrs. to PEERLESS, Inc. (U.S.P. 1,973,087, 11.9.34. Appl., 30.4.32).—A mixture of crude petroleum 1 qt., potatoes 10, oak bark 10, walnut bark 10, wild-cherry bark 10, boneset 5, and KOH 10 lb. is boiled with 200 gals. of H₂O and, after filtration, the liquid is made 3% acid by addition of H₂SO₄. A. R. P.

Coating of [ferrous-]metal strip [with brass or bronze]. E. L. DAVENPORT, Assr. to JOHNSON BRONZE Co. (U.S.P. 1,973,431, 11.9.34. Appl., 7.12.32).—The steel strip is passed through a bright-annealing furnace, and molten brass or bronze is fed on to it (as it emerges from the furnace) from an induction furnace. A. R. P.

Coating of ferrous articles with zinc. U. C. TAINTON (U.S.P. 1,972,835, 4.9.34. Appl., 8.3.32).—The articles are plated with Zn in a ZnSO₄ solution containing $> 10\%$ of free H₂SO₄, using a c.d. of > 50 amp./sq. ft. The spent electrolyte is used for pickling the articles prior to plating, and the spent pickle is reconverted into electrolyte by digesting it with roasted Zn ore until all the acid is neutralised and the Fe⁺⁺⁺ pptd., and then purifying the liquor with Zn dust and adding the necessary amount of free acid. A. R. P.

Manufacture of bright-finish tinned material. T. D. WILLIAMS and H. C. RALSTON, Assrs. to AMER. STEEL & WIRE Co. OF NEW JERSEY (U.S.P. 1,974,480, 25.9.34. Appl., 20.1.32).—In the continuous tinning of steel strip, the metal as it comes from the tinning bath is wiped to remove excess of Sn, then passed through a chamber in which it is cooled to about 100° by a stream of inert gas, and finally quenched in H₂O. A. R. P.

Alloy-steel spring. A. B. KINZEL, Assr. to ELECTRO METALLURG. Co. (U.S.P. 1,972,524, 4.9.34. Appl., 30.9.31).—The steel contains Mn 1–2.25 (1.1–1.4), Si 0.5–2 (0.8–1.0), C 0.5–0.7, Cr 0.4–1.5 (0.4–0.6), and V 0.15–0.3%; after forming into shape at a high temp. the spring properties are developed by air-cooling. A. R. P.

Alloy-steel railway track member. C. E. MACQUIGG, Assr. to ELECTRO METALLURG. Co. (U.S.P. 1,974,115, 18.9.34. Appl., 31.12.31).—The steel contains Cr 2.5–3.5 (3), C 0.22–0.4 (0.32), Mn \geq 0.9 (0.6), and Si \geq 0.4 (0.25%). A. R. P.

Filling material [steel] for welding scale-resisting steels containing aluminium. H. J. SCHIFFLER (U.S.P. 1,972,667, 4.9.34. Appl., 20.2.30. Ger., 25.3.29).—Steels containing Al are welded with a filler-rod consisting of steel with Cr 10–20, Ni 0.6–25 (or Mo 0.4–5.0), and C 0.02–0.4%. A. R. P.

Flotation of oxides. L. J. CHRISTMANN and S. A. FALCONER, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,997,280, 9.4.35. Appl., 12.8.29).—Froth flotation of oxidised ores containing heavy-metal oxides or carbonates is effected by means of an aryl- and/or alkyl-disubstituted alkali dithiophosphate. B. M. V.

Flotation (A) method, (B) ore separation. (A) F. A. BRINKER, (B) J. P. RUTH, JUN., and F. A. BRINKER (U.S.P. 1,973,558 and 1,973,578, 11.9.34. Appl., [A]

15.12.31, [B] 13.3.31).—In the treatment of Pb-Zn-Cu sulphide ores containing sol. Cu compounds, the ore is ground in H_2O (A) through which are passed air and SO_2 to oxidise the surface of the ZnS and PbS particles, or (B) containing $ZnSO_4$. Either treatment prevents deposition of CuS on the PbS and ZnS and thus facilitates differential flotation, but the sol. salts must first be removed by washing the pulp before passing it to the flotation machine. A. R. P.

Ore separation [by differential flotation]. J. P. RUTH, JUN., Assr. to RUTH Co. (U.S.P. 1,974,218, 18.9.34. Appl., 23.8.32).—In the flotation of complex sulphide ores of Cu, Zn, Pb, and Fe, the ore is ground with $Zn(CN)_2$ to inhibit flotation of blende, pyrite, and chalcopyrite and the galena is floated with Aerofloat. The tailings are activated first with NH_3 and the chalcopyrite removed, then with $CuSO_4$ and the ZnS floated. A. R. P.

Froth control in ore flotation. L. M. BARKER and O. C. RALSTON, Assrs. to UNITED VERDE COPPER Co. (U.S.P. 1,973,278, 11.9.34. Appl., 10.4.29).—A mixture of K ethylxanthate and K amylxanthate is used as collector, the relative quantities being regulated to produce a tough, clean froth which permits ready separation of the gangue and yields a rich sulphide concentrate. A. R. P.

Froth flotation of oxidised ores. G. H. WIGTON (U.S.P. 1,974,885, 25.9.34. Appl., 21.1.32).—The collector used is the reaction product of an org. amine, an alcohol, and NH_3 with P_2S_5 ; e.g., EtOH 25, BuOH 25, conc. aq. NH_3 60, and *o*-tolidine 25 pts. are treated at $< 40^\circ$ with 65 pts. of P_2S_5 . A. R. P.

Concentration of oxidised minerals. R. E. SAYRE, Assr. to AMER. SMELTING & REFINING Co. (U.S.P. 1,972,247, 4.9.34. Appl., 20.6.31).—Malachite, azurite, cerussite, and chrysocolla are recovered from ore mixtures by flotation, using an alkali (α -naphthyl-) dithiocarbonate as collector. A. R. P.

Froth-flotation process. M. S. HANSEN, Assr. to P. C. REILLY (U.S.P. 1,972,588, 4.9.34. Appl., 19.8.32).—Oxidised mineral surfaces are activated by addition to the pulp of $MSiF_6$, where M = Cu, Zn, Cd, Hg, Pb, or Ag_2 , and flotation is effected with Na_2S , Na ethylxanthate, and a frother. A. R. P.

[Collector for] froth flotation. I. H. DERBY and O. D. CUNNINGHAM, Assrs. to P. C. REILLY (U.S.P. 1,974,704, 25.9.34. Appl., 12.2.31).—Claim is made for the reaction product of P_2S_5 (1 pt.) with tar acids (2–3 pts.) at 100° . A. R. P.

Flux for use in [soft] soldering. W. K. SCHWEITZER, Assr. to GRASELLI CHEM. Co. (U.S.P. 1,974,436, 25.9.34. Appl., 16.12.33).—The flux consists of a solution containing $ZnCl_2$ 25, EtOH 20, and NH_4 cetyl sulphate 0.25%. A. R. P.

Purification of zinc metal. IMPROVED METALLURGY, LTD., Assees. of P. M. GINDER, W. McL. PEIRCE, and R. K. WARING (B.P. 429,820, 28.12.34. U.S., 28.12.33. Addn. to B.P. 395,602; B., 1934, 104).—Zn vapour from continuous distillation retorts passes through two rectifying columns in succession, the Pb being removed in the first and the Cd in the second. The Zn vapour

from the first column passes through a condenser and is supplied to the retort below the second column as liquid metal, the condenser being so arranged that a slow stream of liquid Zn also flows back down the first column to remove more effectively the Pb from the rising Zn vapour. A. R. P.

Recovery of zinc, lead, tin, and cadmium values [from metallurgical residues]. G. F. WEATON, H. K. NAJARIAN, and W. C. DOWD, Assrs. to ST. JOSEPH LEAD Co. (U.S.P. 1,973,590, 11.9.34. Appl., 7.7.31).—A mixture of the residues and a fuel is fed by means of a screw conveyor into the lower part of a grate hearth through which is passed a current of hot air to reduce and volatilise the Zn, Pb, Cd, and Sn. A. R. P.

[Nickel] alloy [for radio-valve filaments]. H. S. COOPER, Assr. to KEMET LABS. Co., INC. (U.S.P. 1,974,060, 18.9.34. Appl., 3.2.33).—Claim is made for an alloy of Ni with Cu 5–50 (30) and Ba 0.25–10 (0.38)%. A. R. P.

[Nickel-beryllium-copper] alloy. H. F. SILLIMAN, Assr. to AMER. BRASS Co. (U.S.P. 1,974,839, 25.9.34. Appl., 29.10.32).—Addition of small amounts of Ni to Be-Cu alloys materially reduces the grain size and improves the workability, the best results being obtained with Be 1–4 (2.25) and Ni 0.01–1 (0.5)%. A. R. P.

[Lead] alloy [for cable sheaths]. R. J. WISEMAN and B. B. REINITZ, Assrs. to OKONITE-CALLENDER CABLE Co., INC. (U.S.P. 1,973,302, 11.9.34. Appl., 14.9.33).—The alloy contains Pb 98.85–99.75, Sb 0.25–1, and V 0.005–0.15%. A. R. P.

Treatment [amalgamation] of metal [gold-] bearing ores. D. W. (Assee.) and E. F. BOWERS (U.S.P. 1,972,085, 4.9.34. Appl., 23.3.31).—The ore is roasted to expel As and S and ground dry with Zn amalgam and $NaHSO_4$; H_2O is then added to produce an evolution of H_2 by reaction of the Zn and $NaHSO_4$, which cleans the Hg and causes the Au amalgam to coalesce and separate from the gangue without serious loss of Hg by flouing. A. R. P.

Apparatus for precipitating metals from solutions. MERRILL Co. (B.P. 438,763, 7.2.35. U.S., 19.10.34).—Automatic regulating means for a continuous system for the pptn. of Au by means of Zn dust are described. B. M. V.

(A) Hard metal composition. (B) Cemented hard carbide material. (A) E. B. WELCH, (B) G. J. COMSTOCK, Assrs. to FIRTH-STERLING STEEL Co. (U.S.P. 1,973,422 and 1,973,428, 11.9.34. Appl., [A] 28.4.33, [B] 8.11.32).—The material consists of a pressed, sintered mixture of powdered (A) TiC 15–60 (32), W 25–82 (60), and Al 3–15 (8)%, or (B) WC 35–80 (58), TaC 5–45 (25), TiC 0.5–30 (10), and Fe, Ni, or Co 1–30 (7)%. A. R. P.

Recovery of compact metallic magnesium from magnesium dust by sublimation. OESTERR. AMERIKAN. MAGNESIT A.-G. (B.P. 435,234, 29.11.34. Austr., 4.5.34).—Crude Mg dust obtained by electrothermal reduction of MgO is made into paste with a heavy hydrocarbon oil and the paste is heated in an inert atm. to crack the oil and remove volatile constituents.

The cokey residue is then compressed and the Mg recovered from it by distillation or sublimation at low pressure.

A. R. P.

Inhibiting the oxidation of readily oxidisable metals [magnesium]. H. A. REIMERS, Assr. to DOW CHEM. CO. (U.S.P. 1,972,317, 4.9.34. Appl., 17.6.32).—In casting Mg, the surface of the mould is covered with a thin film of NH_4BF_4 , $(\text{NH}_4)_2\text{SiF}_6$, NH_4HF_2 , or NH_4PF_6 .

A. R. P.

Treatment of aluminium. R. BEYER, Assr. to BEYER RES. LABS., INC. (U.S.P. 1,973,040, 11.9.34. Appl., 6.2.32).—An intimate 1:1 mixture of KNO_3 and tartaric acid is heated to 760° , cooled, crushed, and dissolved in H_2O . Small pieces of Cu are immersed in the liquor for 30 min., then heated with As or As_2O_3 in a closed crucible at 950° for 2 hr.; the product is added to molten Al.

A. R. P.

Casting of aluminium and its alloys. BRIT. NON-FERROUS METALS RES. ASSOC., D. HANSON, and I. G. SLATER (B.P. 435,104, 15.12.33).—Al and its alloys are freed from adsorbed H_2 or other gas by melting under a flux of KCl 50, NaCl 40, and NaF 10% and bubbling N_2 through the metal. Alternatively, the flux treatment may be made in an induction furnace.

A. R. P.

Treatment of [silicon-aluminium] alloys. A. PACZ, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,974,971, 25.9.34. Appl., 2.6.32. Ger., 19.6.31).—Castings of high hardness and low thermal expansion are obtained from alloys of Al with Si 16–25, Ni 0.1–3, Mg 0.1–1.25, and Cu 0.1–1.75% by adding 0.05–1% of Cs, Rb, K, or, preferably, Na while the metal is covered with a flux, and then casting the metal into chill moulds and ageing the castings at 100 – 150° .

A. R. P.

[Aluminium] alloys. J. A. NOCK, JUN., Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,974,969–70, 25.9.34. Appl., 17.8.33).—Al alloys with a uniform, fine-grain structure are obtained by adding (A) 0.05–0.2% of W and/or Mo to Al containing 2–15% Mg, or (B) 0.02–0.5% of Mo and/or W to Al containing 0.75–3% Mn.

A. R. P.

Fluxes for aluminium and its alloys. H. C. HALL (B.P. 435,279, 12.4.34).—Claim is made for a mixture of BaCl_2 15, (K or Na) $_2\text{SO}_4$ 8, KMnO_4 2, ZnCl_2 27 (or ZnCl_2 24, MgCl_2 3), KF 24, and NaF 24%.

A. R. P.

Production of an adherent patina upon copper or its alloys. C. E. IRION and G. L. CRAIG, Assrs. to BATTELLE MEMORIAL INSTITUTE (U.S.P. 1,974,140, 18.9.34. Appl., 24.6.33).—The article to be coated is made an anode and a Cu roller cathode covered with a felt impregnated with 2–10 (8)% aq. NaHCO_3 is passed over the surface while a c.d. of 1–20 amp. per sq. dm. is maintained between the electrodes until the desired colour and thickness of deposit are obtained.

A. R. P.

Formation of dense, highly lustrous and impervious [electrolytic] deposits of nickel. M. SCHLÖTTER (U.S.P. 1,972,693, 4.9.34. Appl., 10.11.32).—The bath (p_{H} 2.5–4.5) contains NiSO_4 160, Ni benzenesulphonate 30, and H_3BO_3 30 g. per litre, or NiCl_2 160, Ni naphthal-

enesulphonate 30, and H_3BO_3 30 g. per litre; the deposits have an average grain size of < 0.0001 mm.

A. R. P.

Melting furnace. Furnace walls etc. Jigging machines for ores etc. Treating material [in plating tanks].—See I. Treating zinciferous material.—See VII. Refractory for metal castings.—See VIII. Muffle furnace. Welding electrodes. Cleaning Hg switches.—See XI. Synthetic resin-metal joints.—See XIII.

XI.—ELECTROTECHNICS.

Testing of materials with γ -rays. F. STÄBLEIN and W. TOFAUTE (Techn. Mitt. Krupp, 1934, 2, 101–105; Chem. Zentr., 1935, i, 2072).—Results of tests are described.

H. J. E.

Producing O_2 and O_2 -air mixture.—See VII. Ceramic materials for electrolytic melts.—See VIII. Al-Mg alloys by electrolysis. Ni- and Cr-plated steel. Bronze-plating. Zn- and Cd-plated Al. Cd-, Sn-, and Cr-plate. Plating baths. Throwing power of baths. Tests for coatings. Adhesion of deposits.—See X. Test for steelwork paints.—See XIII. Determining H_2O in soil. Titration of soil and plant substances.—See XVI.

See also A., Jan., 23, Resistance of Pd-Ag and Pd Au wires. Resistance thermometry. 45, X-Ray powder camera. 69, Electrolytic prep. of anthranilic acid. 125, Ferricyanide electrode for sugar determination.

PATENTS.

Electric furnaces. Y. R. E. CORNELIUS (B.P. 439,080, 21.1.35. Can., 19.1.34).—In a furnace of the charge-resistance type for glass, SiO_2 , etc. the electrodes are of large submerged surface and vol. and are so situated as to avoid flow of current through the walls as far as possible, specifications of distances in terms of electrode gap and thickness and applied voltage being given. The electrodes extend through a blanket of raw material and are supported upon projections from the floor of the furnace.

B. M. V.

Electric furnace and its operation. R. C. BENNER, G. J. EASTER, and C. E. HAWKE, Assrs. to CARBORUNDUM CO. (U.S.P. 1,977,622, 16.4.35. Appl., 17.11.31).—The lining is of SiC or other material of conductivity > 0.006 g.-cal./cm. 3 /° C./sec., and is backed by a poor conductor. The vol. of the lining is $<$ that of the goods chamber. The internal resistor is of SiC treated to have a positive temp. coeff. at normal operating temp., and, in absence of a charge, radiates to the lining, which acts as a heat reservoir pending the introduction of a new charge.

B. M. V.

Electric furnaces for heating sheets of plate or sheet glass before tempering. ASSUREX LE "ROI DES VERRES DE SECURITÉ" MAGNIEN, MONNIER, & Co. (B.P. 439,537, 11.1.35. Fr., 15.1.34).—So close to the glass as substantially to prevent convection currents are metallic heat-radiating walls which may be heated by electric resistors between them and the brick walls of the furnace (F), or, preferably, the metallic walls are composed of horizontal bands of magnetic material

surrounded by non-magnetic conducting metal forming the secondary of a transformer the primary of which is supplied with power and is embedded in the casing of *F*. The magnetic material is chosen to lose its permeability at a temp. slightly > that desired in the glass; the *F* is then self-regulating. B. M. V.

Induction furnace circuit. T. H. LONG, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,997,644, 16.4.35. Appl., 29.3.33).—A system for inverting d.c. at approx. const. current into high-frequency a.c. suitable for furnaces is described. B. M. V.

Muffle inductor electric furnace. E. F. NORTHRUP, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,997,741, 16.4.35. Appl., 2.5.33).—The induced currents are caused to flow halfway around the secondary coil, then across the diam. in zigzag fashion, the diametral conductors together forming a muffle for the treatment of strip or wire. B. M. V.

Coreless induction furnace. J. T. SHEVLIN. From SIEMENS & HALSKE A.-G. (B.P. 439,472, 29.6.35).—The furnace and mould are enclosed in a gastight hood, formed either of one sheet of metal or of several parts conductively joined and situated at a distance from the exciting coil < the diam. of the coil. The framework is insulated from earth. B. M. V.

[Electric] induction heater. T. H. LONG, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,995,811, 26.3.35. Appl., 20.5.30).—Furnaces constructed in accordance with mathematical formulæ which connect the permeability, conductivity, and radius of the cylindrical charge or crucible, and the radius of the inducing coil and frequency of supply are claimed. B. M. V.

Arrangement for [the electric] heating of gases flowing through shafts. L. HÖGEL, Assr. to ALLMÄNNNA SVENSKA ELEKTRISKA AKTIEB. (U.S.P. 1,997,776, 16.4.35. Appl., 7.6.33. Swed., 10.6.32).—Conical or pyramidal resistor grids are suspended in the shaft, their form permitting them to be heated almost to the softening point under their own wt.; the limbs of the V are joined by a heavy mass of metal at the apex. B. M. V.

Arc-welding electrodes. M. ZACK (B.P. 401,186 [A], 20.4.33, and Addn. B.P. 432,633 [B], 1.12.33. Ger., [A] 18.7.32).—The (Fe) welding wire is wound with insulated wire of (A) a dissimilar metal, e.g., Ni, Cu, Cr-Ni alloys, bronze, or monel metal, or (B) a similar metal, e.g., Fe or steel, and a current is passed through the winding to create a magnetic field which controls the arc. A. R. P.

Welding electrode and coating therefor. L. ANDREN, Assr. to AMER. CHAIN CO., INC. (U.S.P. 1,974,732, 25.9.34. Appl., 25.2.32).—The electrode consists of a mild-steel rod coated with a mixture containing Mn 1.5–12, Mo 0.5–3%, and C ≡ 0.6–1.3% of the Mn + 0.1–0.4% of the Mo + sufficient to give 0.05–0.25% C in the weld, e.g., a mixture of CaO, FeO, SiO₂ 600, CaF₂ 220, ferromanganese 110, ferromolybdenum 30, CaB₂ 10, bituminous coal 10, glue 55 pts., and sufficient H₂O to give a thick paste. A. R. P.

Coated ferrous welding wire or electrode.

(A) P. R. JUDY, (B, C) H. R. PENNINGTON, Assrs. to INDIANA STEEL & WIRE CO. (U.S.P. 1,972,063 and 1,972,066—7, 28.8.34. Appl., [A] 11.8.33, [B] 30.4.31, [C] 16.6.33).—Claim is made for a steel electrode coated with a mixture of (A) cellulose acetate 15–30, Na₂SiO₃ 25–40, ferromanganese 7.5–15, talc 20–30, and SiO₂ 5–20%, (B) a metal carbonate, SiO₂ flour, C, and a lacquer binder, e.g., CaCO₃ 75, Na₂CO₃ 10, SiO₂ 10, and C powder 5%, or (C) Na₂SiO₃, SiO₂ flour, hematite, and talc or kaolin bonded with < 8 (15)% of gum arabic. A. R. P.

Manufacture of photoelectric electrodes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 435,169, 14.5.35. Ger., 26.7.34).—Part of the inside of the tube is coated with Ag by vaporisation in vac. from a Ag wire, a small amount of O₂ is admitted and the Ag film oxidised by a glow discharge between the wire and the film, the residual gas is pumped out and replaced by sufficient H₂ to reduce about half the Ag₂O formed when the film is heated to 150°, and the H₂O vapour is pumped out and replaced by Cs vapour which reduces the remainder of the Ag₂O and thus produces a composite Ag-Cs₂O-Cs film. A. R. P.

Composition for coating electrodes [valve filaments]. E. A. GIARD, Assr. to CUTLER-HAMMER, INC. (U.S.P. 1,974,608, 25.9.34. Appl., 10.12.31).—A 1:1 mixture of BaO and SrO in glycol is saturated with CO₂ at 197° to ppt. the finely-divided carbonates, a small amount of a solution of Ba(NO₃)₂ or Sr(NO₃)₂ in glycol is added, and the mixture used for coating electron emitters. A. R. P.

Cleaning of metal [electrodes of mercury switches]. R. P. MATTERN, Assr. to MINNEAPOLIS-HONEYWELL REGULATOR CO. (U.S.P. 1,974,965, 25.9.34. Appl., 18.5.31).—The switch is filled with 16% aq. NaCN by exhausting the interior below the surface of the cleaning solution, the current is switched on until the solution in the switch boils, and the liquid is rinsed out by alternately switching the vac. on and off below a stream of running H₂O. A. R. P.

Electrolytic condensers. ELEKTRIZITÄTS-A.-G. HYDRAWERK (B.P. 438,608, 22.5.34. Ger., 26.5.33).—Narrow strips of metal and separating material are wound to form flat spirals, and several coils are assembled to be co-planar or co-axial as desired. B. M. V.

Electrolytic condenser. R. C. SPRAGUE and J. F. MCCANN, Assrs. to SPRAGUE SPECIALTIES CO. (U.S.P. 1,997,185, 9.4.35. Appl., 22.4.32).—The anode is formed of crimped Al, and the conducting support for the anode is brought out through a rubber plug in the neck of the metallic container-cathode. B. M. V.

Electrolytic condenser. H. L. SKLAR, Assr. to MICAMOLD RADIO CORP. (U.S.P. 1,999,373, 30.4.35. Appl., 30.9.32).—The electrolyte comprises equiv. amounts of NH₄ borate and glycerin, the mixture being heated to 60° and then, after addition of a small proportion of bentonite, to 125°. B. M. V.

Manufacture of electrolytic condensers. P. ROBINSON, Assr. to SPRAGUE SPECIALTIES CO. (U.S.P. 1,998,202, 16.4.35. Appl., 3.8.33).—Electrode foils and

interposed spacers are rolled up and impregnated with a weak acid (stronger than H_3BO_3), polyhydric alcohol, and H_2O , the excess electrolyte being removed by dipping the roll in a saturated aq. solution of H_3BO_3 . B. M. V.

Insulation of high-tension conductors in electrical precipitators. L. J. BURRAGE, R. B. PEACOCK, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 438,807, 25.5.34).—The surface of the insulator is formed wholly or partly of a solid chlorinated C_{10}H_8 containing, if desired, $\geq 20\%$ of chlorinated rubber and/or polymerised CH_2PhCl . B. M. V.

[Electric] insulator. M. H. HUNT, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,973,076, 11.9.34. Appl., 22.1.31).—Glazed porcelain insulators coated externally with a conducting film of Au or Au-Pt alloy applied as a resin solution and fired in a kiln are claimed. A. R. P.

Resistance materials. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 438,706, 26.6.35. Ger., 27.6.34).—Gypsum together with MgO or other oxides such as Al_2O_3 , B_2O_3 , TiO_2 , etc. is used as a binder for materials suitable for excess-voltage leaks and consisting of mixtures of conducting and semi-conducting materials, e.g., C and SiC . J. A. S.

Insulating material for use in electric-discharge devices. F. W. BROUGH (B.P. 439,511, 8.6.34).—Mica is heated in air, H_2 , or vac. until it swells to $\frac{1}{5}$ times its thickness ($800\text{--}1000^\circ/0.5\text{--}5.0$ min.), and is then subjected to pressure, preferably after cooling. B. M. V.

Electric gaseous-discharge tube. A. CLAUDE (U.S.P. 1,972,183, 4.9.34. Appl., 22.10.31. Fr., 5.11.30).—The atm. in a tube producing white light consists of Ne and He, the proportion of Ne to total gas varying from 10 to 0.75% as the pressure in the tube increases from 0.05 to 0.75 mm. A. R. P.

Apparatus for electrical precipitation. E. ANDERSON, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,995,790, 26.3.35. Appl., 26.7.32).—A pair of plates, assembled back to back, are formed with sharp-edged nozzles distributed over their outer surfaces, acting as the outlets for dirty gas supplied to the space between the plates and also as discharge electrodes, the collecting electrodes being foraminous plates substantially parallel to the others. B. M. V.

Electrical precipitator. P. HERBER, Assr. to RESEARCH CORP. (U.S.P. 1,997,729, 16.4.35. Appl., 11.4.34).—For highly corrosive gases, e.g., H_3PO_4 , the tubular, current-carrying, collecting electrodes are constructed mainly of C and the roof (also of C) of the lower entrance chamber is supported on them at a level intermediate their length. B. M. V.

Apparatus for electromagnetic separation of materials. R. C. FORRET-JAGGI, and MINES DOMANIALES DE POTASSE D'ALSACE (B.P. 439,387, 9.11.34. Fr., 14.11.33. Addn. to B.P. 394,471; B., 1933, 716).—An endless, non-metallic band is run transversely across the high-intensity pole to remove highly magnetic particles; the band is doubled on itself with one folded edge, the pole-piece inserting itself into the open edge and being wiped on both top and bottom. B. M. V.

Separation of electrically-charged substances from very dilute true or colloidal solutions. H. FINK (B.P. 439,251, 26.6.34. Ger., 26.6.33).—After adjustment of $[\text{H}^+]$ to the point of min. solubility of the desired substance, the liquid is filtered through, or filtered after passing through, an adsorbent containing one or more substances of opposite charge to that of the desired substance. The process is applicable to the production of alkaloids, hormones, and ferments. B. M. V.

[Electrical] device for determining the composition of fluids in motion, and for selectively distributing the flow of portions thereof. O. E. ANDRUS and K. S. WILLBORG, Assrs. to A. O. SMITH CORP. (U.S.P. 1,995,492, 26.3.35. Appl., 11.6.28).—An apparatus to detect the presence of H_2O in a stream of oil comprises a high-tension electrode insulated throughout its length except at the point, the insulation being washed by the arriving stream of oil to prevent films of H_2O forming on it. The earthed electrode is placed at an adjustable distance from the live point, and when any substantial current passes owing to the breakdown of the oil gap a relay in the low-tension circuit of the transformer initiates the operation of a valve which diverts the outgoing oil into another conduit. B. M. V.

Primary cells [of the Leclanché type]. SOC. ANON. LE CARBONE (B.P. 435,141, 9.4.34. Fr., 12.12.33).—The central C cathode is surrounded by two spaced, concentric, Zn cylinders and a Zn-sheet spiral covers the bottom of the cell; sufficient gelatinous material is added to the electrolyte to cause it to set to a jelly when cold. A. R. P.

Manufacture of a magnetic [core or sheath] body. K. MAIER, Assrs. to SIEMENS & HALSKE A.-G. (U.S.P. 1,974,079, 18.9.34. Appl., 14.6.33. Ger., 25.6.32).—Magnetic cores are built up of a no. of layers of different magnetic metals, e.g., Ni, Fe, Ni-Fe alloys, and Si-Fe alloys, with or without intermediate layers of granular alloys, the various layers being caused to stick together by heating under slight pressure to produce surface sintering. A. R. P.

Electric radiation indicator. E. RUPP, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,998,334, 16.4.35. Appl., 29.7.32. Ger., 13.8.31).—A crystal of PbS (galena), MoS_2 , or Ag_2S is coated by vaporisation on one of its faces with Au, Cu, Ag, Ni, W, Bi, Sb, Te, Al, Zn, Mg, or Ti, preferably Au, the films being thin enough to be transparent to heat and light rays. B. M. V.

Treating material [in plating tanks]. Measuring smoke density. Photometers.—See I. Treating hydrocarbons.—See II. Magnetic Fe alloys. Nitriding, and Zn-coating, ferrous metals. Alloy for valves. Pb alloy for cable sheaths. Patina on Cu. Lustrous Ni electro-deposits.—See X.

XII.—FATS; OILS; WAXES.

Report of the [A.O.C.S.] Fat Analysis Committee (Oil & Soap, 1935, 12, 285–290).—Recommended tentative standard methods are fully detailed for (a) determination of the Wiley m.p. and SCN val., for the Twitchell Pb salt–EtOH separation (including analysis

of the "solid" acids by the SCN method and correction for any "liquid" acids entrained with the "solid" acids), and (b) detection of "fats containing tristearin in non-hydrogenated lard" (modified A.O.A.C. test, based on the Bömer difference no.; COMe_2 is employed for the crystallisation in place of Et_2O). Colour standards based on the use of inorg. salt solutions (UO_2Cl_2 etc.), as proposed by Doherty (cf. B., 1934, 411), are in course of prep. for distribution. E. L.

Jaboty fat. A. STEGER and J. VAN LOON (Chem. & Ind., 1935, 1095—1097).—Brazilian jaboty kernels, probably from *Erisma calcaratum*, Warm. (possibly *E. uncinatum*, Warm.), yielded 49.2% of pale fat (I) on extraction with light petroleum and a further 2.2% of dark impure fat with Et_2O . (I) and a sample of commercial jaboty fat (II) had, respectively: m.p. 41.5° , 43° ; d_{25}^{25} 0.8760, 0.8764; n_D^{25} 1.4360, 1.4366; I val. (Wijs) 5.4, 4.8; sap. val. 233.0, 236.1; acid val. 20.0, 3.1; Ac val. 10, —; Reichert-Meissl val. 0.93, 1.3; Polenske val. 3.1, 4.2; unsaponifiable matter 0.7%, 0.35%; total fatty acids 93.0%, 92.9%; volatile matter 1.5%, 1.5%. The total fatty acids from (II) had: n_D^{20} 1.4271, I val. 3.9, mean mol. wt. 225, m.p. 42° , and consisted of (by Me ester fractionation) saturated acids [C_{12} 23.9%, C_{14} 52.8% (myristic acid isolated in substance), C_{16} (palmitic) 18.9%], unsaturated acids [C_{18} (oleic) 2.8%], and a (distillation) residue 1.6% (including resins). The high I val. of the fat must be ascribed to the presence of resinous matters. Refined jaboty fat could be used for edible purposes. E. L.

Composition of mink fat. G. LODE (Fettchem. Umschau, 1935, 42, 205—207).—A sample of the soft fat from *Putorius lutreula* had: d_{15}^{15} 0.941, n_D^{20} 1.4608, m.p. 36.5° , acid val. 2.6, sap. val. 199.6, Hehner val. 87.7, Reichert-Meissl val. 1.2, Polenske val. 0.85, Ac val. (Leys) 6.7, I val. (Hübl) 66.1. The insol. fatty acids had n_D^{20} 1.4520, m.p. 40.3° , sap. val. 205, I val. 71.8, and were separated by the Pb salt- Et_2O method (Heiduschka and Felsner) into about 57% of "liquid acids" (I val. 77.1), and 43% of "solid acids" (I val. 20.9, mean mol. wt. 263.7) which consisted of stearic and palmitic acids with isooleic acid (?) and myristic acid (?). The presence of C_{18} (? C_{20}) acids is indicated by the mean mol. wt. (= 291.8) of the "liquid acids." E. L.

Solubility in water and washing [action] of the sulphuric esters of unsaturated fats. C. STEINER (Fettchem. Umschau, 1935, 42, 201—205).—The appearance of the aq. emulsions of products prepared by treating castor, arachis, and linseed oils, oleic acid, and oleyl alcohol with varying amounts of H_2SO_4 is roughly correlated with the content of organically-combined SO_2 (I); only in the case of the last two could perfectly clear solutions be obtained [when (I) was $> 8.88\%$ and $> 21\%$ respectively]. Emulsions of sulphated oleyl alcohol are stable towards Ca^{++} , but it is suggested tentatively that trivalent metal ions might flocculate such suspensions, so that, e.g., Al salts might be used to wash crude sulphates of this type. E. L.

Determination of free alkali in soaps. II. W. ROETHKE (Fettchem. Umschau, 1935, 42, 180—182, 197—

201; cf. B., 1932, 777).—The mixture of $\text{Pr}^{\circ}\text{OH}$ and glycol (80:20) proposed (*loc. cit.*) as a solvent for the determination of free NaOH in soap shows a small acidity towards phenolphthalein; the necessary indicator correction (which is smaller when a salt or soap is present) has now been determined experimentally, so that great accuracy in the determination of free NaOH is possible. The solubility of Na_2CO_3 , which is appreciable in the case of the pure solvent, is reduced in presence of soap, and when $> 1\%$ of free Na_2CO_3 is present in the soap satisfactory results can be obtained by applying a small correction (determined experimentally) to the figure for apparent free NaOH. The Vizern and Guillot method (B., 1935, 237) for direct titration of Na_2CO_3 (to phenolphthalein in 50% EtOH) is criticised as a result of experiments indicating that such titration is unreliable in EtOH solutions. The prep. of pure Na palmitate and oleate is discussed. K_2CO_3 is appreciably sol. in EtOH and will affect the figures for free KOH in the Davidsohn titration method (for soft soaps); it is suggested that $\text{Pr}^{\circ}\text{OH}$ might prove a more suitable solvent. E. L.

Oxidation of linseed oil in solution. A. F. H. WARD and G. D. FRANCE (J.S.C.I., 1935, 54, 435—438 r).—The oil was oxidised by bubbling O_2 through the boiling solution in CCl_4 at 79° (concn. 0.14 g. per 100 c.c.) and the oxidation followed by a modified Wijs method. The I val. decreased with time, at first very slowly, then more rapidly with a unimol. mechanism. The induction period was increased by darkness or a small amount of quinol and decreased by the insol. polymeride from the oil, but the subsequent reactions always had the same unimol. coeff. (2.30×10^{-2}). The solid polymeride was not completely saturated and was not pptd. appreciably until the I val. of the oil was halved.

Investigation of saturated acids of completely hydrogenated oils by the method of fractional distillation. I. Hardened cottonseed oil. S. UENO and M. IWAI (J. Soc. Chem. Ind., Japan, 1935, 38, 602—603 B).—Completely hydrogenated cottonseed oil was saponified to a mixture of myristic (trace), palmitic (17%), stearic (76%), and arachidic (7%) acids, the Me esters of which were separated by fractional distillation. F. R. G.

New alcohols and hydrocarbons in sperm oil. S. UENO (J. Soc. Chem. Ind., Japan, 1935, 38, 608—611 B).—Probably C_8 , C_{10} , and C_{12} alcohols are present, contaminated with hydrocarbons, but have not been identified. J. L. D.

Hydrogenation catalysis. III. The hydrogen value—a constant for fatty oils. IV. Essential oils. A. GINZBERG (J. Gen. Chem. Russ., 1935, 5, 1168—1170, 1252—1254).—III. [With N. JURASCHEVSKI.] The H val. (cf. A., 1936, 35) of 30 oils is 60—80% as great as the corresponding I val.

IV. [With E. EVDOKIMOVA.] The H vals. of 34 essential oils are recorded. R. T.

Bleaching of Japan wax. III. I. SAKUMA and I. MOMOSE (J. Soc. Chem. Ind., Japan, 1935, 38, 503—504 B; cf. B., 1935, 733).—Bleaching by sunlight lowers the extinction coeffs. of the light petroleum-sol. portion. F. R. G.

Rapid iodine method [and its application] for castor oil. R. KLATT and K. G. MARGOSCHES (Fettchem. Umschau, 1935, 42, 183—190).—The peculiar behaviour of ricinoleic acid and its glyceride in the rapid I test (cf. Margosches, "Die Jodzahlschnellmethode u. die Ueberjodzahl der Fette," vol. 25 of "Die chem. Analyse," 1927) has been examined. The I vals. obtained are much affected by the concn. of the reagent, but conditions have been determined empirically by which "correct" vals. can be obtained, so that this rapid and convenient method may be of service for (routine) comparative tests. It is suggested that the appearance of more acid ("Plussäure") than corresponds to the HOI absorbed by the double linking ($I_2 + H_2O = HOI + HI$) may be due to a further splitting of HI from the iodised oil under the influence of the negative OH group of the ricinoleic acid; the new double linking created thereby might be relatively inert towards HOI. Possibly also, such double linkings can absorb O_2 and promote a secondary decomp.: $2HOI = 2HI + O_2$. The susceptibility to saturation of the double linking decreases in the order castor oil, ricinoleic acid, acetylated castor oil. E. L.

Fish oils. II. Decolorisation of pilchard oil. H. N. BROCKLESBY and L. P. MOORE (Contr. Canad. Biol. Fish., 1933, 7, No. 32, Ser. C, Industr., No. 8, 415—424). **III. Hydrogenation of pilchard oil.** H. N. BROCKLESBY and F. CHARNLEY (*Ibid.*, No. 41, Ser. C, Industr., No. 13, 523—535).—II. Experiments in the bleaching of pilchard oil with 8 earths from British Columbia are detailed. Raw diatomites from Quesnel and Williams Lake, B.C., and, particularly, a HCl-activated bentonite from Princeton, B.C., gave excellent results. The optimal temp. of decolorisation lie well below 150° , a temp. below which no appreciable hydrolysis of the oil occurs.

III. The curves for the hydrogenation of refined pilchard oil over a Ni-kieselguhr catalyst in a closed system at 160° and 180° show two branches of approx. linear type; a certain apparent general resemblance of the curves to those of the unimol. type cannot be attributed to the accumulation of impurities in the reaction flask. The curves relating the fall of I val. and of n to time (or H_2 absorption) show two distinct linear branches, the const. rate of decrease being slower in the second stage. The relation between I val. (I) and n of the hydrogenated products can be expressed approx. by $n = a + bI + cI^2$, where a , b , and c are consts. E. L.

Production of high-grade feeding oil from pilchards and similar fish. H. N. BROCKLESBY and B. E. BAILEY (Biol. Bd. Canada, 1935, Bull. 46, 8 pp.).—Admixture of Cu, Fe, and fatty acids and refining increase the rate of oxidation of pilchard oil, the effect diminishing in the order named. The stability of vitamin-A and -D and the nutritive val. are discussed. The methods of production and handling, and the use of maleic anhydride as an antioxidant, are described. E. C. S.

Hydrolysis of the body oil of the [Pacific] salmon. H. N. BROCKLESBY (Contr. Canad. Biol. Fish., 1933, 7, No. 40, Ser. C, Industr., No. 12, 507—519).—The oil

obtained from freshly-caught salmon may show small acid vals. (< 0.1). The rate of *post-mortem* hydrolysis of the oil in the fish is rapid, and greatly increased by rise in temp.; oils from fish kept in commercial cold-storage (at -13°) for 6—12 months showed acid vals. of 6—14, so that lower temp. are required to keep the free fatty acids within safe limits, as these increase the susceptibility of the fish to deterioration. In cold-stored fish, the oil from the outer, dark muscle shows lower acid vals. than that from the inner, pink muscle, probably because traces of NH_3 in the cold-storage room neutralise some of the acid produced in the outer tissues. The "exhaust" (cooking) treatment does not destroy all the lipolytic enzymes present in the fish tissues. The "retorting" process produces an increase in acid val. of the oil, depending on the time of treatment (*e.g.*, acid val. rises to 0.3—0.5 after 90 min. at 117°). The use of the acid val. in judging the freshness of stored or canned salmon is suggested. Extraction of the oil from the fish by solvents is unreliable, as the colour, P content, and acid val. of the oil varied according to the nature and amount of solvent used. The boiling-out and expression method used for the analyses is described. E. L.

Triethanolamine and other alkylolamines in the fat, oil, and wax industries etc. E. J. FISCHER (Allgem. Oel- u. Fett-Ztg., 1935, 32, 489—496).—The prep., properties, and uses of the alkylolamines are reviewed. E. L.

Polymerisation.—See III. **Effect of leather fats on Fe. Corrosion of metals by fatty acids.**—See XV. **Fish oil.**—See XIX.

See also A, Jan., 53, **Prep. of pure long-chain compounds. Unsaturated acids of natural oils.** 54, **Oxidation products of unsaturated acids of linseed oil. Brassidic acid from colza oil.** 95, **Eel oil.** 125, **Apple- and pear-seed oils.**

PATENTS.

Manufacture of floor and furniture, and boot and shoe, polishes. H. DEGUIDE (B.P. 438,841, 7.3.35. Fr., 7.3.34 and 12.2.35).—Polishes in the form of colloidal jellies, which are very stable and do not allow the solvent to separate even at the highest atm. temp., are prepared by heating a Ba soap [obtained by saponifying fats, such as linseed oil-tallow mixture, with $Ba(OH)_2$] with turpentine, white spirit, C_2HCl_3 , etc. and allowing the mixture (with or without addition of colouring matters, paraffin wax, etc.) to cool. A suitable autoclave for the saponification is described. E. L.

Refining oils etc.—See II. **Textile assistants.**—See III. **Colouring oils, waxes, etc.**—See IV.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Recent developments in paint technology. E. J. BOND (Oil and Col. Trades J., 1935, 88, 1931—1933).—A review of developments during the past ten years. D. R. D.

Functions of priming paints. P. S. SYMONS (Decorator, 1935, 34, 28—30).—The function of the primer and the special points to be considered in priming

metals, wood, plaster, cement, and Beaver board are discussed. D. R. D.

Naphthenate driers. M. D. CURWEN (Oil and Col. Trades J., 1935, 88, 1711—1714).—The manufacture and properties of the metal naphthenates are reviewed. The relative merits of naphthenate, linoleate, and resinates driers are discussed. Drying time-% metal curves are given for linseed oil containing Pb, Mn, and Co driers of all three types. Naphthenates are preferred. D. R. D.

Influence of the alcoholic residue on the film-forming properties of linseed oil esters. A. J. DRINBERG and A. A. BLAGONRAVOVA (J. Gen. Chem. Russ., 1935, 5, 1226—1232).—The mixture of the amyl esters of the acids obtained by hydrolysis of linseed oil (I) (oleic 20, linoleic 18, linolenic 52, saturated acids 10%) does not exhibit drying properties; the ethylene and propylene glycol esters give semi-solid films, the glycerol esters are identical with (I) with respect to their drying properties, those of pentaerythritol dry sooner and give harder films, whilst mannitol esters have the same drying time and give the same type of film as (I). R. T.

Quick-drying finishes. H. V. SMITH (Drugs, Oils, and Paints, 1935, 50, 466).—Historical. D. R. D.

Highly heat-resistant anti-rusting finishes. F. J. PETERS (Synth. Appl. Fin., 1935, 6, 230—232, 235).—To withstand stoving at 300—400° the varnish should contain large proportions of rosin, esterified rosin, or a synthetic resin, *e.g.*, Durophene. The low oil content induces poor weather-resistance, which can be improved by incorporating a pigment, *e.g.*, C black, TiO_2 ; the finish can be coloured with Cd-red, Cr_2O_3 , and burnt umber. At > 400° all the oil medium is burnt off, and the pigment must possess good adhesion; powdered Al or Zn is satisfactory, although their particles do not overlap and microscopic gaps are left exposed. Zn is initially more rust-resistant and can be more readily coloured with, *e.g.*, Cr_2O_3 , but Al is better for long exposures. A second coat contains preferably a vehicle which is not completely decomposed during stoving; Zn paints can, however, be applied on Al and sprayed, whereas Al coatings should be brushed on. S. M.

Test for the water-resisting properties of paints for steelwork. L. P. McHATTON (J. Inst. Petroleum Tech., 1935, 21, 989—992).—A metal plaque is coated with the paint under examination and forms one electrode of an aerated cell, the other being a C rod. The e.m.f. (*E*) and resistance (*R*) are measured initially and after short-circuiting the cell for 24 hr. With several paints *E* increased, but not proportionately, with decrease in *R*; this decrease is preferred as an indication of development of porosity in the paint film and tendency to failure on weathering. 96-hr. tests showed that addition of tung oil to boiled linseed oil was beneficial, whilst copal varnish films showed no decrease in *R*. S. M.

Evaporation of lacquer solvents. W. K. LEWIS, L. SQUIRES, and C. E. SANDERS (Ind. Eng. Chem., 1935, 27, 1395—1396).— $\text{MeOH}-\text{C}_6\text{H}_6$ mixtures with and without nitrocellulose and gum were allowed to evaporate at 22°; the residual MeOH did not become const. at the const.-b.p. composition (data graphed), but gradually

decreased to zero. A const.-b.p. mixture is not necessarily a const.-evaporating mixture. S. M.

Varnish-blending graph. R. C. SHUEY (Ind. Eng. Chem., 1935, 27, 1391—1394).—A graph gives the resin, oil, and thinner contents by wt. and by vol. of varnish mixtures of varying composition. S. M.

Weathering tests on clear [oil] varnishes. E. F. ROBERT and F. WILBORN (Farben-Ztg., 1936, 41, 10—12, 32—33).—A series of weathering tests over primed and filled steel panels of oil varnishes of various oil lengths and based on natural and synthetic resins is described and illustrated. The tests were accelerated in some cases by H_2O -spraying, acid and alkali treatment. The limitations of such exposures are discussed, with reference to undercoating systems, varying weather conditions, difficulty of making truly comparable varnishes from different resins, etc. Some results contrary to general experience were obtained; *e.g.*, "wetted" panels were more durable than "dry" panels, and short oil varnishes than long oil varnishes. In these cases initial breakdown was in line with expectation, but when ultimate durability is the criterion the results were as stated. S. S. W.

Resins. XX. Black Borneo "fossil" copal. II. E. STOCK (Farben-Ztg., 1935, 40, 1314).—A further sample of this resin (*cf.* B., 1930, 779) had m.p. 195—200°, sinter point 185°, acid val. (direct) 32.3—36.6, sap. val. (hot, $\frac{1}{2}$ -hr.) 92.6—84.4, ash (Fe, Ca) 9.54%. Extraction with CHCl_3 removes a purified resin of acid val. 36.48 and sap. val. (hot, $\frac{1}{2}$ -hr.) 130.6. The solubility characteristics, fluorescence under ultra-violet light, and capillary-analysis phenomena of the resin are tabulated. Varnishes of various oil lengths prepared from the resin had satisfactory drying and miscibility properties, and it is considered that the resin is suitable for varnish manufacture. S. S. W.

Sensitivity of urea resins to electrolytes. A. M. HARNISCH and M. K. SCHERBAKOV (Acta Physicochim. U.R.S.S., 1935, 2, 575—584).—Urea- CH_2O resins are separable into two fractions, one hydrophilic, the other relatively hydrophobic. If the condensation is arrested while the product is still liquid, turbidity is produced by adding a quantity of H_2O (called, under defined conditions, the " H_2O no.") which depends on the proportions of these fractions present and is affected by electrolytes. The " H_2O nos." for various salts exhibit a marked lyotropic effect, being, *e.g.*, lowered by SO_4^{2-} and greatly increased by I^- . The influence of $[\text{H}^+]$ is relatively small. F. L. U.

Nitrocellulose emulsions for paper.—See V. Coated fabrics.—See VI. Protecting wood.—See IX. Protecting steel.—See X. Leather finishing.—See XV. Gums for plastics.—See XVII.

See also A., Jan., 37, Prussian-blue. 81, Complete deoxidation of resins. Resinic acids of *Pinus sylvestris* resin.

PATENTS.

Preparation of [dye] pigments. W. A. ADAMSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,991,647, 19.2.35. Appl., 22.8.32).—A solution of the colour-material (*e.g.*, an anthraquinone vat dye) in conc.

H_2SO_4 is added in a fine stream to an aq. alkali carbonate or bicarbonate. The pptd. pigment is claimed to have excellent brilliance and softness and to be free from agglomerates. H. A. P.

Permanent brilliantly-coloured writing fluid. G. H. SAYLER, ASSR. to PARKER PEN CO. (U.S.P. 1,972,395, 4.9.34. Appl., 20.2.31).—Green ink consisting of a solution of C_{10}H_8 -green, NH_4VO_3 , thymol, phenol, and $\text{C}_2\text{H}_4(\text{OH})_2$ in H_2O is claimed. A. R. P.

[Manufacture of] artificial [resinous] masses. SOC. CHEM. IND. IN BASLE (B.P. 438,802, 24.5.34. Switz., 26.5.33. Addn. to B.P. 401,535; B., 1934, 71).—Non- or slightly polymerised polynuclear OH-NH_2 -bases (I) (cf. B.P. 432,143; B., 1935, 861) having excess of CH_2 groups, prepared, e.g., from phenol polyalcohols and aromatic amines, and still sol. in the usual solvents, are converted by heat and, if desired, pressure, into the insol. and infusible stage. (I) may be treated with an aldehyde during or after its production. S. S. W.

Uniting synthetic resin and metal. E. C. LOETSCHER (U.S.P. 1,972,307, 4.9.34. Appl., 2.2.32).—Bakelite layers are attached to metal sheets by interposing a layer of partly dehydrated $\text{PhOH-CH}_2\text{O}$ resin and heating under pressure to complete the resin reaction in the adhesive. A. R. P.

Plastic sealing cement. E. D. CURTIS (U.S.P. 1,997,924, 16.4.35. Appl., 7.11.33).—A composition of long-fibred asbestos 5, asphalt 12, and rosin 4 pts. by wt. is claimed. B. M. V.

Compound for preparing matrices for printing purposes. R. JUNGHÄNEL and H. GROSS (U.S.P. 1,974,714, 25.9.34. Appl., 23.9.30. Ger., 19.5.30).—A cardboard or asbestos millboard backing is impregnated with a suspension of glue 200, wax 70, and bronze powder 100 g. in 0.2% HNO_3 (5 litres) to fill the pores, then coated with a paste of bronze powder 50, casein 35, mineral powder 4000, wax 10, glycerin 10, HNO_3 1.5, EtOH 20, and H_2O 500 g. An Al-foil backing may be applied to the board. A. R. P.

Manufacture of rubber-like condensation products and of shaped articles therefrom. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 438,965, 24.5.34).— $\beta\beta'$ - $\text{O}(\text{C}_2\text{H}_4\text{Cl})_2$ is treated with an alkali, NH_4 , or alkaline-earth poly- (tetra-)sulphide in presence of H_2O and a H_2O -insol. inert filler (finely-divided BaSO_4). On vulcanisation by the normal process (alone or with $\geq 25\%$ of caoutchouc), oil-resistant, rubber-like plastics are obtained. H. A. P.

Greasewood product. U. K. TARWATER (U.S.P. 1,973,024, 11.9.34. Appl., 24.4.33).—A plastic mass suitable as a cement or for making moulded articles comprises the comminuted foliage of greasewood of the *Chenopodiaceae* family. A. R. P.

Refining resins etc.—See II. **Polymerised C_2H_2 .**—See III. **Cellulosic solutions.** **Compositions containing cellulose derivatives.**—See V. **Insulation of conductors.**—See XI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Acetone extraction of raw rubber. VII. **Period of extraction and saponification value of the**

extract and residue. H. ENDOH (J. Soc. Chem. Ind., Japan, 1935, 38, 514—517 B; cf. B., 1935, 1057).—The free acids and saponifiable matter are removed almost completely in 1—2 hr. With continuous extraction the sap. val. tends to decrease up to 12 or 16 hr., possibly due to further extraction of non-acidic and saponifiable substances and to esterification of some of the extracted acids. A subsequent increase is attributed to formation of acids by oxidation etc. D. F. T.

Oil-resistance of rubber. II. **Molecular polarisation and dipole moment of purified natural rubber.** S. KAMBARA (J. Soc. Chem. Ind., Japan, 1935, 38, 506—509 B; cf. B., 1935, 915).—The dielectric const. and n of C_6H_6 and Et_2O solutions of rubber purified by Pummerer's method are measured and the dipole moment (cf. A., 1935, 163) is calc. For total and gel rubber the dipole moment (in C_6H_6) is 2.45×10^{-18} and 2.91×10^{-18} , respectively. The vals. for sol rubber in C_6H_6 and Et_2O , respectively, were 2.79×10^{-18} and 0.72×10^{-18} , the discrepancies being attributable to impurities, e.g., from autoxidation. D. F. T.

Thermal decomposition of rubber under high pressure. I. **Decomposition of waste rubber in presence of petroleum heavy oil.** T. KATO and H. SAMESHIMA (J. Soc. Chem. Ind., Japan, 1935, 38, 596—598 B).—The behaviour of the heavy oil when heated with and without disintegrated waste rubber (3 oil:2 rubber) under 50—200 atm. pressure in an autoclave is examined. The presence of the rubber raises the proportion of resulting acidic gas and the proportion of unsaturated and aromatic constituents in the lighter fractions of the oil produced, and decreases the paraffin and naphthene content of these. D. F. T.

Coated fabrics.—See VI. **Leather finishing.**—See XV.

PATENTS.

Concentration of [rubber] latex. RUBBER PROD. USERS RES. ASSOC., and H. P. STEVENS (B.P. 438,795-18.5.34).—Latex (possibly dialysed) to which $\geq 2\%$ (rubber 100) of org., H_2O -sol. or -dispersible protective colloids not precipitable by weak alkalis, e.g., $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$ (I), or NH_4 caseinate or stearate, has been added is evaporated to give a liquid concentrate containing $\geq 55\%$ of rubber. NH_3 lost during the evaporation may be replaced by NH_3 or other alkaline stabiliser such as (I). D. F. T.

Production of rubber threads. KÖLNISCHE GUMMIFÄDEN FABR. VORM. F. KOHLSTADT & Co. (B.P. 438,744, 31.7.34. Ger., 31.7.33).—A process and apparatus are claimed for extruding a rubber composition through nozzles at a const. vol. rate, tapping off, at a point near the nozzles prior to extrusion, a (major) part of the rubber composition, and re-circulating it so that it becomes mixed with fresh composition. D. F. T.

Manufacture of microporous rubber compositions. H. J. HAMPTON (B.P. 438,765, 15.2.35. U.S., 30.3.34).—A mixture of rubber (shaped, if desired) with a hydrophilic colloid such as bentonite, in a non- or partly-hydrated condition, is subjected to the action of H_2O so as to effect further hydration of the colloid,

and is then vulcanised in contact with moisture to a rigid or semi-rigid, non-pliable condition. D. F. T.

Production of vulcanisable compositions. DUNLOP RUBBER CO., LTD., D. F. TWISS, and W. MCCOWAN (B.P. 438,544, 7.9.34).—A non-volatile fluid mixture of S, a rubber-sol. vulcanisation accelerator, and rubber-sol. compounding ingredients, in which other agents may be dissolved, is diffused into unvulcanised sheet or crêpe rubber to form a vulcanisable mass. D. F. T.

Treatment of vulcanised rubber. F. N. PICKETT (B.P. 438,555, 28.5.34).—Comminuted (vulcanised) rubber is plasticised by intimate incorporation with a solvent comprising "heveene" and like oils of higher b.p., obtained by fractionating the liquid product from the distillation of crude or vulcanised rubber, and heating, under pressure if desired, to ensure devulcanisation. D. F. T.

Obtaining motor spirit and lubricating oils from rubber, gutta-percha, and similar materials. C. M. CAWLEY and J. G. KING (B.P. 438,811, 5.6. and 21.11.34).—Rubber is treated with H_2 under pressure at 360–500° (370–380°) in presence of a catalyst containing, e.g., Mo sulphide on a porous support (Al_2O_3 gel). (Cf. B., 1935, 563.) D. F. T.

Stabilisation of chlorinated rubber. DEUTS. GOLD- U. SILBER-SCHNEIDANSTALT VORM. ROESSLER (B.P. 438,843, 14.3.35. Ger., 3.4.34).—The solutions in org. solvents (CCl_4 , $CHCl_3$) are treated with small proportions of alkali salts of HCN or of the high fatty acids, e.g., $C_{17}H_{35}CO_2H$; the salts may be in powder form or in solution, e.g., in H_2O or in an org. solvent the same as, or similar to, that used for the chlorinated rubber. D. F. T.

Manufacture of rubber threads. KÖLNISCHE GUMMI-FÄDEN-FABR. VORM. F. KOHLSTADT & Co. (B.P. 439,780, 13.4.35. Ger., 17.4.34).

Polymerised C_2H_2 .—See III. **Colouring rubber etc.**—See IV. **Rubber-bonded abrasives.**—See VIII. **Rubber-like condensation products.**—See XIII.

XV.—LEATHER; GLUE.

Report of an International Commission of the I.V.L.I.C. on the bating problem 1934–5. A. KÜNTZEL (Collegium, 1935, 550–556).—A review of papers dealing with the problem, which have already been abstracted. D. W.

Analysis of enzyme bating materials [for hides]. **Report of the Czechoslovakian Committee, 1933–5.** A. K. VLČEK (Collegium, 1935, 546–549).—A review (cf. B., 1935, 1105). D. W.

Evaporation of tanning liquors. E. KIRSCHBAUM and J. SCHIMUNEK (Chem. Fabr., 1935, 8, 490–492).—Relations between d and content of solid material for extracts of quebracho, myrobalans, and oak bark are given. They differ only slightly from each other. Further curves give relations between b.p. and concn. for a mixed extract, and the relation between sp. heat and d . Heat-transfer nos. for a 3-stage vac. evaporator were determined and related to d . They decrease rapidly with increasing concn., and also decrease with

rising vapour temp. Curves are similar to those given by sugar solutions. C. I.

Chrome[tanning] liquors. V. Effect of various factors in manufacture of sucrose-reduced liquors on the chromic oxide and oil taken up by pickled hide powder. E. R. THEIS and E. J. SERFASS (J. Amer. Leather Chem. Assoc., 1935, 30, 600–614; cf. B., 1935, 1105).—The amount of Cr_2O_3 taken up by the hide powder increased with increased concn. of liquors in reduction, by boiling the liquors, and by increasing their basicity. The amounts of Cr_2O_3 , SO_4 , and oil taken up were only slightly affected by the use of excess sucrose in the reduction. The oil taken up diminished as the basicity of the chrome liquor was increased. D. W.

Affinity of vegetable tannins for hide substance. W. GRASSMANN and R. BENDER (Collegium, 1935, 521–533).—Adsorption isotherms have been derived for different tanning materials (p_H 4.0) and hide powder. High affinity was shown by chestnut, mimosa, untreated and sulphited quebracho extracts, less affinity by oakwood, and much less by pine-bark extract. The isotherm for the synthetic product Tanigan FC was quite different from that of the others since the whole of the tannin was not adsorbed at p_H 4.0, even in presence of excess hide powder, but an isotherm similar to the others was obtained by lowering the p_H of the Tanigan solution to 2.0. The sulphite-cellulose waste-extract isotherm was quite different and showed that this material had practically no tendency to combine with hide substance, thus confirming practical experience. The isotherms for the tannins were progressively steeper as the p_H of their solutions was diminished, the inflexion was more acute, and the affinity of the tannins was progressively increased. The affinities as determined by the initial steepness of the isotherms were (in decreasing order): mimosa, quebracho (untreated), quebracho (sulphited), chestnut, oakwood, pine bark, Tanigan FC, sulphite-cellulose waste. Von Schroeder's views on semi-tannins (B., 1935, 963) and the Stather-Lauffmann equation (B., 1935, 1008) were not confirmed. D. W.

Corrosion of metals by free fatty acids and deterioration of [vegetable-tanned] leather by metallic soaps. F. STATHER and R. LAUFFMANN (Collegium, 1935, 541–545).—Cu, brass, and Zn, in diminishing order, were attacked by contact with oleic acid and fish-oil fatty acids, respectively; Fe, Al, and Ag were practically unaffected. The tensile strength of leather impregnated with metallic soaps of these fatty acids and set aside for some time diminished progressively with increase in the amount of impregnant, with rise in temp., and with time. The fibre structure of the leather was gradually destroyed. Deterioration of the leather by Fe is in smaller degree due to the comparatively small amount of Fe taken up by it. D. W.

Action of vegetable-tanned leather on iron. I. Effect of leather fats on iron. V. KUBELKA, V. NĚMEC, and S. ZURAVLEV (Collegium, 1935, 533–541).—Fe is practically unaffected by saturated hydrocarbons, fats, and free fatty acids, but is highly corroded by products containing unsaturated fatty acids (fish oils) or oxidised fatty acids (dégas); corrosion increases progressively with the degree of unsaturation. Corrosion is much

increased by incorporating the oil or fat with vegetable-tanned leather. Ten times as much Fe was dissolved by a leather containing a grease having I val. 46.6 as by others stuffed with greases having I vals. 8.9 and 12.7, respectively. D. W.

Deterioration of vegetable-tanned leathers containing sulphuric acid and glucose. E. L. WALLACE and J. R. KANAGY (J. Amer. Leather Chem. Assoc., 1935, 30, 614—620; cf. B., 1935, 1106).—The deterioration of such leathers was unaffected by additions of glucose. D. W.

Effect of acid on leather. W. E. EMLEY (J. Amer. Leather Chem. Assoc., 1935, 30, 620—626).—Work carried out by the National Bureau of Standards during the last 10 years is summarised. D. W.

Corrosion of metals by contact with leather. R. F. INNES (J. Soc. Leather Trades Chem., 1935, 19, 548—563).—Corrosion was progressively increased by raising the temp. and increasing the R.H., increased by treating the degreased leather with cod oil, and diminished by treating it with petroleum jelly. Cu, brass, and gunmetal were the most, and Sn was the least, corroded. Metals were corroded by the different tannages in the following diminishing order: synthetic tan, sumac, myrobalans, chestnut, Cr, oak bark, gambier, mimosa, quebracho. Corrosion by leathers tanned with sulphite-cellulose waste extracts occurred at high R.H. only. Steel and Cu were only stained by degreased sumac-tanned leathers treated with petroleum jelly, but they were slightly corroded after 23 weeks' contact with myrobalans-tanned leathers which had been similarly treated. D. W.

Chlorinated rubber in leather finishing. M. C. LAMB and W. E. CHAPMAN (J. Soc. Leather Trades Chem., 1935, 19, 563—569).—Chlorinated rubber dissolved in $C_{10}H_8$ yields a film free from "blushing" and "orange-peeling." Bu_2 phthalate (I) and $(C_6H_4Me)_3PO_4$ were good plasticisers, but castor oil was not satisfactory. Better adhesion to the leather was obtained by adding a little synthetic resin to the chlorinated rubber solution. Wet or dry leather sprayed with a mixture containing $C_{10}H_8$ 200 c.c., chlorinated rubber 10 g., (I) 5 c.c., and coumarone resin 1.5 g. yields a film impermeable to H_2O , fast to wet-rubbing, stretching, and graining, and possessing a bright finish. D. W.

Collagen fibres.—See V.

PATENTS.

Treatment of ready-dressed and tanned pelts. P. BURGER (B.P. 438,606, 18.11.34. Ger., 20.5.33).—Adhesive or glue solutions, with or without addition of tannic acid or other fixing agent, are applied to the hairs on dressed pelts, and the hairs are subsequently brushed or rolled against the skin. D. W.

[Dyes for] through-dyeing of leather, especially chrome leather. J. R. GEIGY A.-G. (B.P. 438,398, 7.12.34. Ger., 7.12.33).—The use of salts of di- or poly-amino- or -alkylamino-azobenzenesulphonic acids or their acyl derivatives or of NO_2 -derivatives of the above or of corresponding mono- NH_2 -compounds is claimed, about 1—2% of dye (on wt. of hide) being used at 65°.

Examples are: 2-, 3-, and 4-nitro- and 2:4-dinitro-, 3-nitro-6- and -2-methoxy- and 2-chloro-4-amino-4'-ethylamino-3'-methyl-, 2:4-dinitro, 4-chloro-2-nitro-, 2-nitro-4-amino-, 4-acetethylamido-, 3-chloro-4-acet-amido- and 2-nitro-4-acetamido-4'-diethylamino-, 2-nitro- and 3-acetethylamido-4'-diethylamino-4-methyl-, 3'-chloro-2-nitro-2':4'-diamino- and -2':4'-diamino-4-methyl-, 3'-chloro-3-nitro-6-methoxy-2':4'-diamino-, 2:6:3'-trichloro-4:2':4'-triamino-, 3'-chloro-2':4'-diamino-3-acetethylamido-4-methyl- and -5-acetethylamido-2-methyl-, 3'-chloro-2-nitro-4:2':4'-triamino-, 4-chloro-2-nitro- and 2-nitro-4-ethoxy-2':4'-diamino-3'-methyl-, 2-nitro-4:2':4'-triamino-3'-methyl-, and 2':4'-diamino-3-acetethylamido-4:3'-dimethyl-azobenzene-6'-sulphonic acid; 4-nitro-4'-ethylamido-3'-methyl-, 3'-chloro-4-nitro-2':4'-diamino-, and 2':4'-diamino-4:3'-dimethyl-azobenzene-2:6'-; 3-nitro-4'-ethylamido-3'-methyl-, 3'-chloro-3-nitro-2':4'-diamino-, and 3:4-dichloro- and 3-nitro-2':4'-diamino-3'-methyl-azobenzene-6:6'-; 4-nitro-4'-ethylamido-3'-methyl-azobenzene-3:6'- and 2-nitro-4'-ethylamido- and 2-nitro-2':4'-diamino-3'-methylazobenzene-4:6'-; 2':4'-diamino-5'-acetamido- and -5'-methoxyazobenzene-2:5-4-nitro- and 2:4-dinitro-2':4'-diaminoazobenzene-3':6'-, 4-nitro-2':4'-diamino-5'-phenoxyazobenzene-2:4'-, 3-nitro-2':4'-diaminoazobenzene-6:4'-, and 4-nitro-4'-diethylaminoazobenzene-2:2'disulphonic acids; and 3-nitro-2':4'-diamino-6'-carboxyazobenzene-6-sulphonic acid. The colours produced range from yellow to orange and red-brown or red-violet. H. A. P.

Fibres from skins.—See V.

XVI.—AGRICULTURE.

Soils. XVI. Two soils from Indo-China. Displaceable acid radicals and p_H . Formation of clay incorrectly called "colloidal." J. CLARENS and J. LACROIX (Bull. Soc. chim., 1935, [v], 2, 1884—1892).—The two soils have been investigated by the methods described previously (B., 1935, 371). O. J. W.

Adsorptive capacity and dispersion of sandy soils by elutriation. S. SUSHKO and R. IBRAGIMOV-KARNOVITSCH (Počwiwed., 1933, 4, 330—335; Bied. Zentr., 1935, A, 5, 544).—Treatment of light soils with 0.1N-NaCl markedly reduced their permeability. A. G. P.

Chemical nature and importance of the colloidal fraction of soils. J. VON CSIKY (Z. Pflanz. Düng., 1935, 41, A, 165—203).—The composition and properties of clay and humus colloids are discussed and methods of characterisation indicated. A. G. P.

Relation of soil erosion to certain inherent soil properties. J. F. LUTZ (Soil Sci., 1935, 40, 439—457).—The swelling of soil colloids was in an inverse order to their $SiO_2:R_2O_3$ ratios. Ca^{++} , Ba^{++} , and H^+ decreased the swelling in the order named. K^+ , Na^+ , and Li^+ showed no regular order of effect. The permeability of various cation-saturated clays was in the order $H^+ > Ba^{++} > Ca^{++} > K^+ > Na^+ > Li^+$. The stability of clay suspensions was more closely related to the degree of hydration than to the charge carried. These factors have a controlling influence on the erosiveness of soils. A. G. P.

Constitution of organic matter in soil. F. GELTZER, J. RUBINTSCHICK, and J. LASUKOV (Chem. Soz. Landw., 1933, 5, 37—43; Bied. Zentr., 1935, A, 5, 543—544).—The composition of the org. matter varied with the cultural methods adopted. The annual enrichment in org. matter in lucerne soils was increased by growing grasses simultaneously. The additional matter produced was principally cellulose and hemicellulose, the proportional increases varying with soil type. A. G. P.

Mechanical analysis of the ultimate natural structure of soils. G. J. BOUYOUKOS (Soil Sci., 1935, 40, 481—485).—A combination of wet-sieving and the hydrometer methods is described. A. G. P.

Determination of sand in soil samples. E. VON BOGUSLAVSKI (Z. Pflanz. Düng., 1935, 41, A, 1—8).—A siphon type of apparatus is described for sedimentation analysis. Soil samples are pretreated with H_2O_2 and NaOH . A. G. P.

Rapid determination of water in soil. F. OBATON (Compt. rend., 1935, 201, 845—846).—The sample is pressed between two C electrodes in an ebonite tube, and its H_2O content deduced from the electrical conductivity. The relationship between the resistance and H_2O content is hyperbolic. A soil containing much colloidal material does not obey the same law. H. J. E.

Sedimentation tube for analysing water-stable soil aggregates. R. C. COLE and N. E. EDLEFSEN (Soil Sci., 1935, 40, 473—479).—The tube consists of a no. of close-fitting segments enclosed in an outer jacket. The suspension is allowed to settle for the required period with the tube in a vertical position. The tube is then placed horizontally and the distributed sediment settles on the sides of the segments, and after very slow draining is removed in sections. A. G. P.

Examination of ashed and unashed [soil and plant] substances by electrometric titration. G. DEINES (Z. Pflanz. Düng., 1935, 41, A, 74—82; cf. B., 1935, 164).—Differences between experimental results for ashed and fresh materials are examined. Data are utilised for investigating relationships between soil-nutrient conditions and growth of forest trees. A. G. P.

Influence of exchangeable sodium in soil on its properties as a medium for plant growth. E. I. RATNER (Soil Sci., 1935, 40, 459—471).—The ill-effects of exchangeable Na on the physical properties of soils and on plant growth are accentuated in highly org. soils. In pot trials with high-Na soils, plant injury is not completely explained by alkalinity, Na accumulation, or unsuitable physical conditions. Immobilisation of Ca^{++} is probably concerned. These effects are examined in relation to the ameliorative treatment of saline soils by $(\text{NH}_4)_2\text{SO}_4$, CaSO_4 , etc. A. G. P.

Rôle of plant constituents in the preservation of nitrogen in the soil. S. A. WAKSMAN and I. J. HUTCHINGS (Soil Sci., 1935, 40, 487—497).—In a sand medium, loss of N from mixtures of $(\text{NH}_4)_2\text{HPO}_4$ or casein with cellulose (I), lignin (II), or straw varied with the N source and org. matter. (I) acts as an energy source for bacteria which convert the N into

microbial protein. (II) absorbs NH_3 and fixes protein matter. A. G. P.

Relation between soil hygroscopicity, water content, and plant growth. W. U. BEHRENS (Z. Pflanz. Düng., 1935, 41, A, 38—59).—The H_2O content of humus-free soils under comparable conditions is closely related to, but not \propto , their hygroscopicity. Surface (tilled) layers containing approx. 1% of humus contained twice the H_2O content of humus-free layers having the same hygroscopicity. Resistance to soil borers and to passage of plant roots depended essentially on the ratio of H_2O content to hygroscopicity. Relationships between productivity of soils and profile characteristics are examined. A. G. P.

Influence of soil reaction and of phosphoric acid on growth of vines. K. MÖHRINGER (Z. Pflanz. Düng., 1935, 41, A, 28—36; cf. B., 1933, 516).—In acid soils (pH 4.0), treatment with Rhenania phosphate increased the total growth of young vines much > did liming. Poor growth in acid soils results mainly from deficiency of available P. A. G. P.

Relation of soil treatment to nodulation of peanuts. H. B. MANN (Soil Sci., 1935, 40, 423—437).—Nodulation in acid soils (pH 5.3, 4.5) was increased by applications of CaCO_3 (2000 lb. per acre), delayed and reduced by CaSO_4 (2000 lb. per acre), and entirely prevented by S (400 lb. per acre). The dry-wt. yields of the plants are not related to the degree of nodulation. In some cases heavy applications of CaCO_3 retarded and decreased nodulation. A. G. P.

Determination of fertiliser requirements of soils on the basis of root-, citric acid-, and water-soluble phosphates. E. KNICKMANN (Z. Pflanz. Düng., 1935, 41, B, 208—224).—Differences between vals. obtained by the three methods fluctuate widely in soils of different types. Discrepancies between root- and citric-sol. vals. are generally > those between H_2O - and root-sol. methods. A. G. P.

Use of selenium as catalyst in Kjeldahl digestions. K. SCHARRER (Z. Pflanz. Düng., 1935, 41, A, 203—207).—Results obtained with a no. of agricultural products agree closely with those obtained with Cu catalyst. A considerable saving in time is effected. A. G. P.

Occurrence of the wheat bug in the 1935 harvest. W. KRANZ (Mühlenlab., 1935, 5, 177—182).—The bushel wt., d , and protein content of attacked wheat are normal, but the gluten content and gluten swelling factor are lowered. The meal-fermentation test is less valuable than the gluten-swelling test for estimating the injury effected. The dough from attacked grain slackens and runs during fermentation; the farinogram is narrower and exhibits a greater drop. Wheat attacked by the bug should be either rejected or used only in small amounts in the grist. The use of higher conditioning temp. (up to 50°) at high moisture contents (up to 20%) and bromate treatment of the flour are recommended. Some Hungarian samples (1929—30) were not, however, improved by bromate. E. A. F.

Viability of some common winter vegetable seeds. S. L. and S. G. SINGH (Agric. Live-Stock India,

1935, 5, 670—675).— $C_{10}H_8$, stored with the seeds, prevents insect attack and does not impair germination.

A. G. P.

Chlorosis of hortensia (*Hydrangea hortensis*) in relation to iron. W. SCHOLZ (Z. Pflanz. Düng., 1935, 41, A, 129—164).—Chlorosis results from excess of CaO in soil and the consequent decrease in the solubility of Fe. The mobility and utilisation of Fe within the plant also decrease. Chlorotic leaves are neither excessively rich in Ca nor poor in Fe. Treatment of soil with Fe salts corrects chlorosis, but the growth of plants is permanently restricted.

A. G. P.

Stall-manure problems. O. LEMMERMANN (Z. Pflanz. Düng., 1935, 41, A, 82—100).—Factors influencing losses of N and org. matter during storage and fermentation of manure, and the effect of the period and depth of ploughing-in on its efficiency, are reviewed.

A. G. P.

Determining Fe in phosphorites etc. Ca arsenate.—See VII. Effects of variety etc. on barleys.—See XVIII.

See also A., Jan., 39, Reactions of phosphates with soils. 121—2, Plant etc. growth.

PATENTS.

Phosphatic fertilisers. B. OBER and E. H. WIGHT, Assrs. to OBERPHOS Co. (U.S.P. 1,869,941 and 1,947,138, [A] 2.8.32, [B] 13.2.34. Appl., [A] 19.6.26, [B] 27.2.31).—(A) Phosphate rock is heated with H_2SO_4 under pressure in a rotating cylinder and when action has ceased the pressure is released and vac. applied so that the product cools and sets into porous granular nodules. (B) The product of (A) is claimed.

A. R. P.

Manufacture of calcium arsenate insecticides. J. HAGOOD, Assr. to AMER. AGRICULTURAL CHEM. CO. (U.S.P. 1,996,016, 26.3.35. Appl., 22.3.33).— $Ca_3(AsO_4)_2$ is prepared by reaction ($3CaO + As_2O_5$) in H_2O and in presence of a F compound, the temp. being controlled at 75° ; the process gives improved stability against formation of sol. compounds on atm. exposure.

B. M. V.

XVII.—SUGARS; STARCHES; GUMS.

Apparatus for rapid determination of sugar in extracted [beet] slices. M. BORGHI and M. BARBE (Sucr. belge, 1934, 54, 101—105; Chem. Zentr., 1935, i, 2102).—The apparatus effects complete removal of juice from the pulp. Results obtained agree with those of the warm-digestion process.

A. G. P.

Suggested method of juice analysis for sugar-cane plantations devoid of laboratory facilities. II. K. V. G. IYER and T. S. VENKATRAMAN (Agric. Live-Stock India, 1935, 5, 654—664).—Samples of thick cane, packed as prescribed, show no material difference in analysis after 3 days' transport (cf. B., 1934, 1077).

A. G. P.

Optimum coagulation with lime [in sugar-juice predefecation]. J. DĚDEK and J. VAŠÁTKO (Z. Zuckerind. Czechoslov., 1935, 59, 469—471; Internat. Sugar J., 1936, 38, 32).—It is pointed out that the so-called "optimum point" at which max. removal of albumins precipitable by tannin takes place is not a function of

the p_H . There is little basis for contending that the max. pptn. in predefecation occurs at a particular p_H , and it may vary between p_H 10.9 and 12.3 in different juices. If it is desired to effect predefecation by one small addition of CaO the particular p_H must be previously ascertained by a special test. A better procedure is to employ "continuous predefecation" in which the necessary amount of CaO is added in a slow continuous stream, which provides the closest approach to a process applicable to all juices.

J. P. O.

Improvement of the circulation of after-product vacuum pans. H. CLAASSEN (Centr. Zuckerind., 1935, 43, 295—296; Internat. Sugar J., 1936, 38, 29—30).—To improve the circulation of after-product pans, under the vertical tubes are placed circular open steam-coils, the steam bubbles from which carry the massecuite upwards past the tubes, the massecuite later descending through the central well. In using this method with a boiling duration of 7—8 hr. the steam is admitted to the coils for 2—3 hr. only, using twice-used evaporator vapour at > 1 atm.

J. P. O.

Cause of the presence of oxalates in [sugar-juice] evaporator scale. V. STANĚK and M. KMINEL (Z. Zuckerind. Czechoslov., 1935, 59, 377—381; Internat. Sugar J., 1936, 38, 30).—Allantoin, which is known to exist in the beet, is extracted with the juice and later is decomposed with formation of $H_2C_2O_4$ under the conditions of clarification and evaporation in the beet-sugar factory. It is estimated that 0.0005% of $H_2C_2O_4$ may be present in the clarified, unevaporated juice.

J. P. O.

Production of high-test molasses or "invert syrup" for distilleries. V. M. KILAYKO (Sugar News, 1935, 16, 386—388; Internat. Sugar J., 1936, 38, 36).—Mixed juice is clarified in the usual way, using the least amount of CaO possible to obtain a good clarification. H_2SO_4 is added in the evaporator to effect partial inversion, which is finally completed in the vac. pan, and finally the syrup is neutralised and conc. In this way it is claimed that so-called high-test molasses for use in distilleries can be produced in $2\frac{1}{2}$ —3 hr., whereas with inverting tanks fitted with steam-coils and stirrers the time would be considerably longer. The cost of acid and CaO would be about 50 cents per ton of the molasses, and the 90° Brix molasses would be about 16% on the cane, or about 20% on the juice.

J. P. O.

Tables for ascertaining raw sugar yields from thick-juice and run-off purities. W. PARR (Deuts. Zuckerind., 1934, 59, 885—886; Internat. Sugar J., 1936, 38, 25—26).—Using a yield formula deduced from the Schneider non-sugar formula, a table has been compiled showing the % yields which should be obtained with thick-juice purities of 95—90 and mother-syrup or run-off purities of 94—57. In a second table the corresponding vals. are 82—72 and 81—57.

J. P. O.

Water determination [in sugar-factory products] by the "Exluan" method. E. LANDT (Centr. Zuckerind., 1935, 43, 548; Internat. Sugar J., 1936, 38, 32).—In the determination of H_2O in beet-factory products by measuring the dielectric const. (ϵ) in presence of dioxan, the author finds that in its present stage of development the method gives only approx. results.

In the case of a sample of beet pulp containing 8% of H_2O , the val. found by the proposed method was 6–10%.

J. P. O.

Consistency changes in starch pastes. Tapioca, corn, wheat, potato, and sweet potato. G. V. CAESAR and E. E. MOORE (Ind. Eng. Chem., 1935, 27, 1447–1451; cf. B., 1932, 1050).—A modified consistometer is described. The net power in watts required to maintain a const. rate of agitation of the 20% starch paste is determined while the temp. is raised to 100° and lowered again to room temp. The record so obtained varies with, and is characteristic of, the type of starch and its degree of degeneration. Specimen curves are interpreted and their practical applications discussed. E. C. S.

Determination of the purity of starch-milk. O. WOLFF (Z. Spiritusind., 1935, 58, 401).—Raw starch-milk contains protein, fibre, etc., and its starch (I) content cannot be determined hydrometrically because of its strong foaming properties. If, however, the (I) of such milk be allowed to settle in suitable cylinders, the (I) content of a given vol. of milk is indicated approx. by the depth of deposit. A table showing the relationship between depth of deposit and (I) content (represented in degrees Baumé) for cylinders of different heights set aside for $\frac{1}{2}$, $\frac{2}{3}$, and 1 hr. is given. I. A. P.

Microscopical detection of karaya gum, gum tragacanth, and agar-agar. J. D. WILDMAN (J. Assoc. Off. Agric. Chem., 1935, 18, 637–638).—The first two, which are insol., are detected by their appearance under the microscope. Agar is detected by the red coloration with I, and by its ability to form a gel at 0.5–1.5% concn. A procedure is described for the detection of agar in presence of gelatin. E. C. S.

Cholla and mesquite gums—new aids for plastic materials. E. BELANI (Kunststoffe, 1934, 24, 309–310; Chem. Zentr., 1935, i, 2265).—Cholla gum from *Opuntia fulgida* is insol. in org. solvents, but sol. in aq. NH_3 and NaOH. Hydrolysis with 4% H_2SO_4 yields total reducing sugars 63% (as glucose), pentosans 67%. Mesquite gum from *Prosopis juliflora* has d 1.5, is sol. in cold H_2O but separates on heating, and is insol. in org. solvents. Hydrolysis yields l -arabinose. Both are Mexican gums. A. G. P.

$PrCO_2H$ from molasses.—See XVIII.

See also A., Jan., 55, Determining glucose and fructose. 56, Starch nitrates. 121, Sugar cane. 124, Leaf starch. Determining starch in plants. Aromatic substances in maple syrup. 124, Constituents of sugar-maple sap. 125, Sugar determination.

PATENT.

Manufacture of [hollow] moulded sugar bodies. K. W. SÜSSMUTH (B.P. 440,098, 12.3.34. Ger., 13.3.33).

XVIII.—FERMENTATION INDUSTRIES.

New kind of damage in a brewing barley. H. LEOPOLD and W. HORAK (Woch. Brau., 1935, 52, 409–414, 422–424).—A barley sample which after 3 days on the floor developed so much mould that further malting treatment was impossible contained 8.5% of corns which were split in the furrow. Microscopical

examination of sections of damaged corns showed that the endosperm cells around the crack were modified in a manner similar to that seen in malt. In Petri dishes with wort-gelatin the damaged corns developed a very vigorous growth of *Rhizopus nigricans*, originating at the point of damage; undamaged corns developed various moulds indifferently over their surface. The whole sample and its undamaged corns gave an approx. normal chemical analysis. The damaged corns showed a high content of ready-formed reducing sugar and tannin-precipitable N, but their content of sucrose and moisture was low. Their germinative power and diastatic activity were very much reduced, due, together with their high acidity, to the development of the mould. A high proportion of sensitised (highly reactive) starch granules was present. An extract of the *Rhizopus* mycelium gave slight but definite cytolytic (xylan) and amylolytic action. Undamaged corns were steeped in H_2O and then treated with PhMe and again with H_2O , portions of the product being stored at various temp. (20–55°) and H_2O added when the corns dried. A proportion of damaged corns resulted, essentially similar to those described, and reacting similarly to added *Rhizopus*. It appears that the damage in the natural sample was probably due to strong variations in temp. and moisture content during the vegetative period, between the early stages of ripening and malting, during storage, or as a result of unsuitable drying. I. A. P.

Effect of variety, soil, and season on the barleys and malts of the seasons 1932 and 1933. L. R. BISHOP (J. Inst. Brew., 1936, 42, 10–14).—The importance of accurate sampling for analysis is emphasised. In general (but not in 1933), there is a relation between high N content and poor germination; allowing for the latter, a modified equation is given for calculation of malt extract. Close agreement is observed between calc. and actual diastatic power in the malt samples. Comparing the costs of barleys and of their corresponding malts, it appears that there is a tendency for the lower-valued barleys to give higher malting gains. In the districts concerned it seems that early-sown barleys or those with a long growing season give the best results. During development of the grain there is a slight fall in N until the 1000-corn. wt. reaches approx. 30 g., with thereafter a slight increase. The period usually occupied by malting could probably be substantially decreased in many cases. I. A. P.

Malt diastases. I. Influence of shaking on malt-diastase solutions. M. HAMBURG and S. PICKHOLZ (Brau- u. Malzind., 1935, 28, 3–5; Chem. Zentr., 1935, i, 2275).—Shaking at room temp. does not greatly reduce the saccharifying power of malt extracts. With rising temp. injury to malt increases, although the accompanying protein and carbohydrate materials exert a protective action. At higher temp. protein matter is pptd. A. G. P.

Examination of baker's yeast. E. ROSENBAUM (Z. Unters. Lebensm., 1935, 70, 366–378).—The tests employed in evaluating yeast are reviewed. Data on the effect of quantity of yeast, its H_2O content, temp., and nature of substrate on fermentation time are recorded. E. C. S.

Foreign baker's yeast. E. ROSENBAUM (Z. Unters. Lebensm., 1935, 70, 378—383).—The % H_2O , N, protein, and P_2O_5 , the acidity, stability at 35°, colour, odour, and consistency of Austrian, Swiss, Dutch, Spanish, Norwegian, Swedish, Latvian, Italian, Finnish, Belgian, Polish, English, and French yeasts, and their fermentation times, are recorded. E. C. S.

Quantitative studies on yeast suspensions by turbidimetric and other methods. R. S. W. THORNE and L. R. BISHOP (J. Inst. Brew., 1936, 42, 15—26).—Methods for determining yeast must involve acceptance of some arbitrary property capable of giving consistent results. Methods are described for determining yeast (i) by dry-wt. determination; (ii) by cell counts; (iii) by centrifuging and weighing the deposit; (iv) photo-electrically; and (v) nephelometrically (Zeiss-Pulfrich). The results of (iii) are unreliable. (iv) yields consistent results, which may be correlated with the results of (i) or (ii); further, its use eliminates the necessity for sampling if special culture vessels are employed. The results from (v) are concordant and are directly related to dry wt., which can be calc. from them or from (iv) with a standard error of $\pm 5\%$. Using (iv) or (v), the effects of colour and turbidity can be eliminated, and these methods are equally applicable with (i) for following yeast development. I. A. P.

Influence of yeast on the growth of *Sarcina*. J. FUCHS (Woch. Brau., 1936, 53, 1—3).—Products of autolysis of yeast cells, whether added to infected beer or arising therein after the death of the cells by starving or heating, favour *Sarcina* development. Thus, in absence of many such dead cells, *Sarcina* present in beer may not develop, whilst if the conditions favour yeast fermentation, as in a wort previously weakly fermented, *Sarcina* development is checked in presence of yeast. I. A. P.

Oxidation, reduction, and brewing. I. A. PREECE (J. Inst. Brew., 1936, 42, 27—34).—The theory of redox potentials and of r_H is described and their colorimetric measurement outlined. In a review of the relevant literature the application of such measurements to brewing problems is discussed, it being emphasised that the results so far described have been obtained from a study of Continental beers. I. A. P.

Oxidation-reduction potentials and their significance in the brewery. F. MENDLIK (Woch. Brau., 1935, 52, 417—422).—Oxidation-reduction potential, r_H , and limit potentials are defined, and their measurement is outlined. The importance of oxidation-reduction enzymes in fermentation and other living processes is emphasised, and the possibility noted that they may themselves represent reversible redox systems. Curves automatically recorded for beer show the development of a limiting r_H , the val. of which is dependent on the degree of aëration. An unhopped wort gave an initial r_H of approx. 25 and a limiting val. of 16. Media fermenting with yeast rapidly reach r_H approx. 11, probably corresponding to the most favourable val. for fermentation. Earlier results of Mendlik and of De Clerck on beer- r_H are discussed (cf. B., 1934, 1030; 1935, 40). I. A. P.

Detection of saccharin and dulcin in beer. O. ANT-WUORINEN (Z. Unters. Lebensm., 1935, 70, 389—391).—The saccharin (I) and dulcin (II) are adsorbed by animal C, eluted with EtOH, taken up in H_2O , and the solution is made alkaline. (II) is identified in the Et₂O extract of this solution. If salicylic acid is present in the aq. residue, it is removed by oxidation with $KMnO_4$ (this treatment is in any case to be recommended), excess of which is removed with $H_2C_2O_4$. (I) is then extracted from the aq. residue with Et₂O, and identified by suitable tests. E. C. S.

Cherry water [kirschwasser]. III. Bouquet substance. H. MOHLER and W. HÄMMERLE (Z. Unters. Lebensm., 1935, 70, 329—344; cf. B., 1934, 982; 1935, 41, 376, 824).—The methods used in isolating the bouquet substance (I) are described in greater detail (cf. B., 1935, 824). Samples of kirsch contained 7—20 mg.-% of crude (I), which was insol. in H_2O , but sol. in EtOH, Et₂O, and, to a large extent, in C_5H_{12} and C_6H_{14} . When free from higher alcohols, (I) did not fluoresce in ultra-violet light. It gave a red colour with the Komarovsky reaction. The aroma was not affected by saponification. (I) was also isolated from cherry juice and from fresh cherries. E. C. S.

Detection of sorbitol in sweet wines. C. VON DER HEIDE and W. ZEISSET (Z. Unters. Lebensm., 1935, 70, 383—388).—Sugar may be pptd. as Ca saccharate and sorbitol (I) detected in the filtrate. (I) is neither appreciably attacked, nor is it produced, if the procedure recommended is adhered to. E. C. S.

Rectification of spirits. MAHLOW (Z. Spiritusind., 1935, 58, 399—400, 402).—The rectification of raw spirits, using periodic and continuous stills, and the charcoal filtration process are described. The grades of spirit recognised by the "Reichsmonopolverwaltung" are listed and their characters indicated. I. A. P.

Hydrogenation of freshly-distilled spirits. C. A. HOCHWALT, C. A. THOMAS, and E. C. DYBDAL (Ind. Eng. Chem., 1935, 27, 1404—1407).—Chemical changes occurring during ageing of whisky are discussed. Removal of substances which give an unpleasant taste and odour to freshly-distilled whisky may be effected by catalytic hydrogenation. Best results are obtained by vapour-phase working, using a Ni catalyst (prep. described). Photographs of suitable plant are reproduced and possible reactions involved in hydrogenation discussed. Hydrogenation decreases the maturing period required to produce a palatable whisky. J. W.

Fermentation method for production of *d*-lactic acid. E. L. TATUM and W. H. PETERSON (Ind. Eng. Chem., 1935, 27, 1493—1494).—90—95% conversion of glucose into *d*-lactic acid was obtained with strains of *S. lactis*, *L. casei*, and *L. Delbrückii*, using cerelese and malt sprouts as a source of N. E. C. S.

Production [by fermentation] of butyric acid from molasses. R. ARROYO (Internat. Sugar J., 1936, 38, 37).—An organism has been isolated from annatto seed (*Bixa orellana*) which vigorously ferments cane molasses with the production of $PrCO_2H$. It is facultative anaërobic. Yields of the acid from 30 to

40% on the wt. of total sugars as invert have been obtained. J. P. O.

[Laboratory] distillation apparatus [for fermentation products]. A. HANAK (Z. Unters. Lebensm., 1935, 70, 394–402).—Apparatus is described for steam-distillation, for accurate determination of EtOH, and for fractional distillation ("birectification").

E. C. S.

[EtOH from] sulphite-cellulose lye.—See V. Molasses for distilleries.—See XVII.

See also A., Jan., 110, Pure choline-esterase. 119, Vitamins in beer.

PATENT.

Separating electrically-charged substances.—See XI.

XIX.—FOODS.

Determination of the bacterial quality of milk. W. MAJOEWSKI (Chem. Weekblad, 1935, 32, 713–715).—The methylene-blue reductase test gives only a very rough indication of the bacterial quality. With a reductase time of 5 min. 17.5% of samples contained > 50,000 spores/c.c. and 29% contained < 100 *B. coli*/c.c., whereas 5% of samples with a rapid reductase test contained < 50,000 spores/c.c. S. C.

Soil reaction and the suitability of milk for cheese-making. J. F. HUSSMANN (Milch. Zentr., 1935, 64, 438–442).—Milk produced on acid-soil pasturage is of inferior val. for cheese-making.

A. G. P.

Differentiation of butter made from pasteurised and unpasteurised creams by means of the peroxidase test. L. WATERS and A. ZÜRN (Z. Unters. Lebensm., 1935, 70, 353–355).—A positive peroxidase (I) reaction indicates that the sample has been made from fresh cream, but a negative result does not necessarily indicate that pasteurised cream has been used since (I) may also be destroyed by storage. E. C. S.

Volatile acids in butter from cows fed on rice bran. N. MONTI (Lait, 1935, 15, 609–612).—A case is reported where the butter prepared from the milk of cows having rice bran in their ration showed a very low volatile acid val. and a somewhat high *n*. This abnormality was traced to the rice bran, but not to the fat in the bran. NUTR. ABS. (m)

[Use of] carbon dioxide in handling fresh fish. Haddock. M. E. STANSBY and F. P. GRIFFITHS (Ind. Eng. Chem., 1935, 27, 1452–1458; cf. B., 1933, 570).—Little difference in freshness (evaluated by taste, bacterial content, and electrometric titration) was observed in 5–6 days between freshly-caught haddock stored whole in < 25% CO₂ and those stored without CO₂, but after 7 days the former were perceptibly the fresher, and they remained wholesome for twice as long as the latter. Haddock caught 4 days before storage commenced were benefited from the outset by CO₂. In the case of fillets, cleanliness in handling was of major importance. E. C. S.

Care of fresh halibut aboard ship. R. H. BEDFORD (Biol. Bd. Canada, 1935, Bull. 49, 8 pp.).—Precautions to be taken for limiting bacterial spoilage are specified.

It is recommended that storage (in ice) aboard ship should be limited to 6 days. E. C. S.

Salt as a control of bacterial decomposition of halibut. R. H. BEDFORD (Biol. Bd. Canada, 1935, Bull. 29, 16 pp.).—The fish are immersed in 20% aq. NaCl for 30 min. immediately after evisceration and cleaning. Penetration of NaCl into the muscle is negligible. Fish so treated are free from discoloration on arrival at port, after further shipment up to 17 days from capture, and after 16 months' storage in the frozen state. E. C. S.

Analysis of fish. I. Tests for condition of oil of fish flesh. M. E. STANSBY (J. Assoc. Off. Agric. Chem., 1935, 18, 616–621).—The oil is extracted by shaking the finely-ground flesh with Et₂O and Na₂SO₄. The peroxide no. of the oil [determined by Wheeler's method (cf. Oil and Soap, 1932, 9, 89)] and the % of free fatty acid are of val. in appraising the condition of fresh and frozen mackerel. E. C. S.

Chemical composition of pig's stomach. I. A. SMORODINCEV and V. V. PALMIN (Z. Unters. Lebensm., 1935, 70, 365–366).—The mean composition of 15 stomachs is recorded, and compared with that of heart, lung, liver, kidney, and spleen. E. C. S.

Determination of changes in proteins of meat by digestion with pancreatin. I. A. SMORODINCEV and J. N. LASKOVSKAJA (Z. Unters. Lebensm., 1935, 70, 355–365).—The prep. and preservation of enterokinase and pancreatin are described. Digestion is carried out for 1 hr. at 37° with 1-g. samples of meat, and its extent is determined by titration with 0.2N-KOH. Digestibility is at a max. 6 hr. after slaughter, independent of the storage temp., and subsequently falls to a lower val. than the initial. The fall is more rapid at 37° than at 1–3°. E. C. S.

Soya-bean flour in smoked meat products. C. H. LAWALL and J. W. E. HARRISSON (J. Assoc. Off. Agric. Chem., 1935, 18, 644).—The test described previously (B., 1934, 810) can be applied to smoked and normally cooked products, but is negative if the flour is made into a paste and heated at < 100°. E. C. S.

Determination of small quantities of mercury in leafy vegetables by means of diphenylthiocarbazon (dithizone). W. O. WINKLER (J. Assoc. Off. Agric. Chem., 1935, 18, 638–644).—The material is digested by the method of Booth *et al.* (A., 1926, 929; 1928, 860). The solution so obtained is titrated with dithizone (I), with 2 mols. of which Hg forms a sol. orange-yellow complex. In absence of Cu the end-point is indicated by a change to green, and in presence of Cu, to red or red-violet. Excessive amounts of Cu interfere, and are removed by extraction with (I) in presence of KI. Otherwise, practically only the Pt metals interfere. Hg cannot be titrated or extracted from acid solution when I' is present, but can be extracted from aq. NH₃ solution, or by NEt₂CS₂Na and CHCl₃. 0.01–0.04 mg. of Hg was recovered quantitatively in absence of interfering substances; in presence of PO₄^{'''}, CaSO₄, Cu, Mn, Ba, SiO₂, Fe, or Mg 0.007–0.035 mg. of Hg was recovered to within 0.005 mg. E. C. S.

Extraction of pectin from apple thinnings. H. W. GERRITZ (Ind. Eng. Chem., 1935, 27, 1458—1459).—The best yield of pectin was obtained by treatment for 2–3 days at room temp. with 1.5 pts. of 0.5% aq. HCl before pressing. A second extraction with hot H₂O increased the yield. The pectin was of good colour and produced an excellent gel. 0.5% aq. H₂SO₄ and tartaric acid were less efficient. E. C. S.

Hydrogen-ion concentration and the preservation of mangoes. B. N. BANERJEE (Agric. Live-Stock India, 1935, 5, 665—669).—Mango pulp may be stored satisfactorily if chilled (0°) for 2–4 weeks and maintained at *p*_H 2.5–5.0. Addition of citric or tartaric acid facilitates storage and improves flavour. SO₂ is the best antiseptic and preserves colour and texture of the product. A. G. P.

Storage of soft fruit. T. RENDLE (Brit. Assoc. Refrig., Nov. 12, 1935, 9 pp.).—The available methods are reviewed. The effect of ripeness of, and damage to, the fruit, and the factors of time, bulk of material, air circulation, humidity, and temp. are discussed. E. C. S.

Chemical changes occurring in the roasting of coffee. F. W. SCHWARTZ and F. E. WAGNER (Rensselaer Polyt. Inst. Bull., Eng. Sci. Ser., 1935, No. 51, 18 pp.).—Determinations of the shrinkage, and H₂O, sugar, and caramel contents (the last-named based on a standard caramel) of coffee and of the consts. of coffee oil were made on Bogota coffee, fresh and after 18 months, after roasting at four temp. between 150° and 225° for times varying from 5 to 120 min. Results were consistent with accepted ideas of changes in roasting, the optimum flavour being obtained by a rapid, high-temp. roast. E. B. H.

Occurrence and detection of silicic acid in various foodstuffs [milk, meat, cacao, and eggs]. R. STROHECKER, R. VAUBEL, and K. BREITWIESER (Z. Unters. Lebensm., 1935, 70, 345—353; cf. A., 1935, 1472).—The SiO₂ content of milk was, in 13 samples, < 1 mg. per litre. In favourable circumstances it is possible to detect dilution of milk by determination of SiO₂. The SiO₂ contents of meat and meat products are compared with vals. obtained by other authors. Cacao husks, after removal of sand, still contain 2–10 times as much SiO₂ as the kernel, but adulteration cannot be detected with certainty by this method. As a result of preservation in water-glass, no SiO₂ appears in the contents of the egg, but much SiO₂ accumulates in the shell. The whites of eggs preserved in Ca(OH)₂ increase considerably in alkalinity. E. C. S.

Hæmolytic control of removal of bitter substances from soya beans. M. KRAJČINOVIĆ (Z. Unters. Lebensm., 1935, 70, 391—394; cf. B., 1934, 810). E. C. S.

Chemical composition of grasses in pure cultures at different stages of growth. T. B. VAN ITALLIE (Versl. Landbouwk. Onderzoek., 1934, No. 40A, 639—693).—Pure cultures of 14 grasses were grown for 2 years on sand, clay, and peat with clay. The variations in chemical composition agreed with those of the mixed herbage of natural grassland. The differences in the composition of one grass at different stages are > those

of the different species at the same time. *Holcus lanatus* is rich in ash, K, CaO, Mg, and Na. *Festuca rubra* is poor in ash, K, CaO, and Mg and rich in fibre. *Poa trivialis* is rich in CaO and Mg, *Alopecurus pratensis* in ash and K. *Poa pratensis* is poor in ash and K and rich in fibre. *Lolium perenne* is rich in Na. Grasses with a high proportion of leaf before the development of the inflorescence contain at that stage much N and P. Sand produced the highest % N in the grasses. The chemical analyses of individual grasses from natural pastures agreed with those of the grasses grown in pure cultures. NUTR. ABS. (m)

Treatment of straw with lime to increase its physiological value. A. KRATINOV (Probl. Tierzucht, 1933, 6, 40—42; Bied. Zentr., 1935, A, 5, 638).—Digestibility of cellulose in straw is increased by treatment with CaO, the digestion coeff. increasing from 44 to 72% in 10 days. Treatment probably stimulates secretion of digestive juices. A. G. P.

Feeding of young animals with ozonised foods. N. ANIKIN, N. TARTARINOVA, and M. MYSSÜTKINA (Probl. Tierzucht, 1934, 3, 71—75; Bied. Zentr., 1935, A, 5, 636).—Ozonised meat and bone meal, wheat bran, etc. stimulated growth, increased resistance to disease, and improved the utilisation of the foodstuffs. A. G. P.

Determining H₂O in liquids and solids.—See I. Jaboty fat. High-grade feeding oil. Body oil of salmon.—See XII. Wheat bug.—See XVI. Starch pastes.—See XVII. Baker's yeast. d-Lactic acid.—See XVIII.

See also A., Jan., 42, Kjeldahl method [for flour]. 55, Determining Ac₂. 97, Mineral constituents in fresh and canned milk. Manchu-Mongol cows' milk. Methylene-blue reductase test [for carabao milk]. Determining amylase in milk. 118, Vitamins and treatment of flour. 119, Nutrient val. of heptatoflavin. 125, Green tea.

PATENTS.

Production of a [compressed cereal] food. L. MELLERSH-JACKSON. From SOC. DE CRÉDITS INTERNAT. SOC. ANON. (B.P. 438,509, 13.3.34).—A compressed food, e.g., porridge in tablet form, is produced by mixing cereal flakes with lecithin and oil, adding milk powder, sugar, salt, and flavouring agents, and pressing into tablets. E. B. H.

Cheese manufacture. RAW PRODUCTS, LTD., and B. DUTTWELER (B.P. 439,746, 21.6.34. Addn. to B.P. 404,850; B., 1934, 256).—A modified form of pasteurising apparatus is described, in which the cheese in the form of a paste is forced through a series of shallow spiral or helicoidal passages, constituted by a revoluble cylindrical body provided with spiral or helicoidal ribs, and jacketed to allow of heat-treatment of the cheese. It is claimed that fat separation is prevented and disintegration avoided in pasteurised cheese prepared in this apparatus. E. B. H.

Manufacture of crustless cheese. W. J. TENNANT. From HENKEL & Co., G.M.B.H. (B.P. 438,529, 18.5.34).—To the finely-ground cheese material small quantities (1–5%) of H₂O-sol. alkali polyphosphates are added

either alone or with addition of Na citrate or a similar salt, and the mixture is heated to 80–100°, in some cases under reduced pressure. Polyphosphates of which the aq. solutions have p_H 6.5–7.5 are most suitable for use, the compounds being prepared by fusion of NaOH or NaOH + KOH with H_3PO_4 . E. B. H.

Storage of eggs. W. J. TENNANT. From B. M. McKENZIE (B.P. 438,912, 12.9.34).—The eggs are stored in an atm. designed to be of the same composition as the gases naturally present in the eggs, including those absorbed or dissolved, as determined by analysis; e.g., an atm. composed of CO_2 75, N_2 20, O_2 5 vol.-% is claimed. B. M. V.

Jelly manufacture. L. WALLERSTEIN, J. PFANNMULLER, and A. NOË, Assrs. to WALLERSTEIN CO., INC. (U.S.P. 1,997,615–6, 16.4.35. Appl. [A, B] 18.7.33).—The jellies are formed of pectin, sugar, various natural and artificial fruit acids, and $> 5\%$ of (A) $CaCO_3$ or (B) $MgCO_3$. B. M. V.

Treatment of coffee beans by steam. E. A. CLOSMANN, F. A. VORSATZ, and K. A. KASPER, Assrs. to COMMERZINAG A.-G. (U.S.P. 1,972,184, 4.9.34. Appl. 19.11.32. Ger., 25.11.31).—The beans are first roasted for $\frac{1}{4}$ – $\frac{1}{2}$ of the usual time, then treated with steam at $> 100^\circ$ to distil off derivatives of furan, PhOH, and org. amines without removing the flavouring oils, and finally again roasted to a uniform dark brown colour. A. R. P.

Manufacture of coffee free from caffeine. E. C. E. TYBERGHEIN and P. J. DE BACKER (B.P. 439,617, 30.5.35).—Preheated green coffee is treated with H_2O vapour at or $< 100^\circ$, condensation being avoided by admission of hot air. Caffeine is then removed by any suitable solvent. E. B. H.

Preparation of a beverage. W. B. WALKER, and J. S. FRY & SONS, LTD. (B.P. 439,572, 4.6.35).—A cocoa and milk beverage which remains free from sediment is prepared by mixing superfine cocoa with sugar, making into a thin paste, and boiling for 1 min. with $\frac{1}{2}$ of the total milk or heating at a lower temp. for a longer time, and then adding to the remainder of the cold milk. The prep. is bottled, and may be pasteurised, sterilised, or homogenised. E. B. H.

[Adsorbent] composition [for use with foods]. C. J. BURGESS (U.S.P. 1,999,499, 30.4.35. Appl. 25.4.32).—An adsorbent suitable to prevent odours from one foodstuff reaching another comprises activated C 1 pt., Portland cement 2 pts. and $CaCO_3$ 2 pts. by wt., with H_2O and Al powder to generate gas and set the cement. B. M. V.

Concn. of fruit juice.—See I. Envelopes for food.—See V. Phosphatic material [for feeds].—See VII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Assay of sulphur ointments. C. E. BRADY and H. M. BURLAGE (J. Amer. Pharm. Assoc., 1935, 24, 945–948).—The ointment (equiv. to 0.02–0.04 g. of S) is treated with KCN and aq. $COMe_2$, the KCNS formed caused to react with Br to give CNBr, excess Br removed

by PhOH, and the CNBr treated with KI + acid, the liberated I being titrated with 0.1N- $Na_2S_2O_3$. F. O. H.

Nitroglycerol content of 0.001-g. tablets prepared by different methods. Z. VON BARI (Magy. Gyógysz. Társaság Értes., 1935, 11, 68–81; Chem. Zentr., 1935, i, 2044).—The nitroglycerol (I) content was markedly influenced by the drying temp. used and, to a smaller extent, by the concn. of the (I) solution and the composition of the tablet. A. G. P.

Assay of camphor liniment. D. A. OVERBYE and R. E. SCHOETZOW (J. Amer. Pharm. Assoc., 1935, 24, 961–963).—Investigation of the accuracy of gravimetric and polarimetric methods of assay indicates the necessity of “blank” determinations on the oil base. F. O. H.

Emulsifiers in the pharmaceutical and cosmetic industry. F. HESEMANN (Angew. Chem., 1935, 48, 773–776).—A review. The importance of a knowledge of the physiological action of emulsions is stressed. R. S. B.

Stability of homœopathic preparations. H. NEUGEBAUER (Pharm. Zentr., 1936, 77, 1–5).—The effects of exposure to ultra-violet light, and of heating at various p_H vals. for 6 hr. at 100° , on the stability of various tinctures are discussed. E. H. S.

Rôle of microchemistry in pharmacy. ROSENTHALER (Sci. pharm., 1935, 6, 7–9; Chem. Zentr., 1935, i, 2214).—Applications of micro-methods to the testing and identification of drugs are discussed. A. G. P.

Suggested new characteristics for evaluation of pharmaceutical drugs. C. A. ROJAHN and O. P. KASHYAP (Pharm. Ztg., 1936, 81, 7–12).—A preliminary study is made of the utility of the determination of the following suggested vals. in the examination of pure and crude drugs: the furfuraldehyde and $H_2C_2O_4$ nos., the Ac val., and the raw-fibre, chlorophyll-Cu, SO_2 , AgI, N, NH_2Cl , $KMnO_4$, P, fat, and extract nos. E. H. S.

Chemical composition and pharmacological action of commercial solutions of heroin. G. RIZZOTTI (Boll. Soc. ital. Biol. speriment., 1935, 10, 259–261).—The toxicity of heroin (I) solutions falls on keeping, owing to the removal of the Ac groups by hydrolysis. Whereas (I) is hydrolysed rapidly to α -acetylmorphine, this latter undergoes little hydrolysis. R. N. C.

Solubility in water of the basic hydrochloride and basic formate of quinine in presence of antipyrine and of urethane. MUSSO and MONNET (J. Pharm. Chim., 1935, [viii], 22, 504–511).—The solubility at 15° of both the basic formate (I) (for concns. $> 9.2\%$) and the basic hydrochloride (II) (for concns. $> 17.5\%$) of quinine is higher in presence of urethane (III) than of antipyrine (IV) and the solubility coeff. is higher for the (II)–(III) and (II)–(IV) systems than for the (I)–(III) and (I)–(IV) systems. Hence the (II)–(III) combination is the most satisfactory for injection purposes. E. H. S.

Differentiating between quinine and quinidine. L. ROSSI and J. A. SOZZI (Quim. e Ind., 1934, 11, 199–201; Chem. Zentr., 1935, i, 2046).—To an acidified solution of the alkaloids are added a few drops of a solution of I in KI. Quinine yields a dark yellow and quinidine a

bright yellow ppt. The colour may be observed on diluting the suspension. A. G. P.

Volatile oils in mace and nutmegs. J. F. CLEVENGER (J. Assoc. Off. Agric. Chem., 1935, 18, 611—616). The c.c. per 100 g. of spice, d_{20}^{20} , $[\alpha]_D^{20}$, n_D^{20} , acid val., and ester val. of the volatile oil from samples of mace were, respectively, as follows: West Indian: 8.5—15.0, 0.860—0.892, +21.3° to +41.5°, 1.472—1.479, 1.9—6.2, 2.8—12.8; Banda: 10.4—16.4, 0.925—0.947, +2.7° to +11.8°, 1.486—1.494, 2.0—3.9, 1.2—7.3; Padang: 17.0—27.0, 0.917—0.936, +7.6° to +11.4°, 1.485—1.491, 1.4—3.0, 3.5—8.5; Papua: 6.5—10.0, 0.909—0.936, +19.9° to +35.3°, 1.487—1.495, 1.8—8.8, 1.9—6.2. Those of nutmegs were: West Indian: 8.5—10.0, 0.859—0.868, +40.8° to +48.4°, 1.469—1.472, 1.0—1.3, 6.8—7.3; Banda: 4.0—10.0, 0.919—0.956, +11.7° to +20.6°, 1.483—1.495, 2.5—8.8, 13.8—19.7; Padang: 8.0—11.5, 0.878—0.909, +20.7° to +27.7°, 1.476—1.481, 1.2—2.4, 6.0—11.2; Papua: 3.2—5.0, 0.892—0.917, +25.3° to +45.0°, 1.481—1.483, 2.1—8.2, 3.0—36.0; shrivelled East India: 11.5—21.0, 0.897—0.916, +19.3° to +21.8°, 1.479—1.482, 2.46, 12.3. The loss of volatile oil from the ground spice is approx. 80% in two months; the remaining oil has d , n , acid and ester vals. $>$, and $[\alpha]_D <$, those of oil from freshly-ground spice. E. C. S.

Sesquiterpenes of star-aniseed oil. R. W. JACKSON and W. F. SHORT (J.S.C.I., 1936, 55, 87).—The dextro-rotatory fraction, b.p. 130—136°/12 mm., of the oil possesses the consts. of a dicyclic sesquiterpene but contains oxygenated impurities not destroyed by Na but removable by K (cf. Duncan *et al.*, B., 1931, 128). The consts. of the purified sesquiterpene fraction indicate that it consists of a monocyclic sesquiterpene mixed with a small proportion of dicyclic sesquiterpenes. On treatment with HCl in AcOH, it affords bisabolene hydrochloride, m.p. 79—80°, $\alpha_D \pm 0^\circ$ in CHCl_3 , and cadinene hydrochloride, m.p. 117°, could be isolated from the mother-liquors. The bisabolene regenerated from the hydrochloride had b.p. 138.5—139.5° (corr.)/12 mm., d_4^{20} 0.8727, n_D^{20} 1.4937, $[R_L]_D$ 68.10, $[\alpha]_D^{18}$ —14.93°.

Character of the oils contained in various parts (husk, endosperm, cotyledon, and embryo) of the seeds of *Strophanthus kombe*, *ispido*, and *grato*: their importance for stabilising the time, state of conservation, and potency of the seeds. L. TOCCO and B. SANNA (Boll. Soc. ital. Biol. sperim., 1935, 10, 350—352; cf. A., 1935, 551).—Vals. are given for the oil contents of the different parts of the seeds, and also the m.p., acidity, and I vals. of the oils. The oil contents are influenced by the time, state of conservation, and the potency of the seeds; the endosperm and cotyledon oils are the most stable. R. N. C.

Essential oil from *Crithmum maritimum*, L. G. A. PEVRZOV (J. Gen. Chem. Russ., 1935, 5, 1185—1191).—90% of the oil from Crimean plants consists of hydrocarbons, amongst which limonene, *p*-cymene, and sabinene were identified. In addition, an unidentified *tert*-alcohol, $\text{C}_{10}\text{H}_{17}\text{OH}$, b.p. 205°, is described. Crithmene was not found. R. T.

Rotatory dispersion of essential oils. B. ANGAL (Ann. Chim. Analyt., 1935, [iii], 17, 341—347).—The ratio of the rotatory powers of many essential oils for $\lambda 5461$ and 5780 \AA . is 1.12—1.18. On using more widely-spaced lines (4358—6560 \AA .) the rotatory dispersion becomes a distinctive property by which fraudulent essences, *e.g.*, fractionated geranium oil, can be detected, even when the admixture cannot be demonstrated by the usual methods. R. S. B.

Effect of alcoholic fermentation on essential oils. S. SCHILINSKY (Riechstoffind., 1934, 9, 169—170; Chem. Zentr., 1935, i, 2100—2101).—Essential oils in seeds, roots, etc. possess a much more pleasant odour after fermentation of the plant material. This is attributed to the effect of acids, EtOH, etc. produced by fermentation and to the direct action of enzymes on the oils, *e.g.*, oxidation or reduction effects. Oil of juniper berries shows increased d after the fermentation process. A. G. P.

Cudbear.—See IV. Stabilising aq. $\text{Na}_2\text{S}_2\text{O}_3$.—See VII. Hydrogenation catalysis [of oils].—See XII.

See also A., Jan., 32, Influence of air on salvarsan derivatives. 70, Novocaine oxide. 76, Prep. of sex hormones. 84, Prep. of acridine derivatives. Antimalarials. 85, Flavin syntheses. 88—89 and 125, Alkaloids. 91, Titration of alkaloids and their salts. 108, Assay of digitalis, strophanthus, and squill. 116, Prep. of prolactin. 117—123, Vitamins. 119, Prep. of hepatoflavin. 123, South American drugs. 125, Tea oil. Agar-agar of Black Sea phyllophora.

PATENTS.

Preparation of an anti-anæmic substance. E. LILLY & Co., Assees. of G. B. WALDEN (B.P. 438,592, 13.3.34. U.S., 17.3.33).—Suitably prepared stomach-tissue material is subjected to incipient self-digestion at $\text{pH} > 7$, *e.g.*, in presence of HCl and at $> 46^\circ$; the product is subsequently dehydrated and defatted. E. H. S.

Manufacture of stable preparations of anæsthetic agents. I. G. FARBERIND. A.-G. (B.P. 439,168, 23.4.34. Ger., 22.4.33).—The use (as hydrochloride) of 3:4-dihydroxyphenyl- α -propanolamine (β -amino- α :3:4-dihydroxyphenyl-*n*-propyl alcohol) as vaso-constrictor (in conjunction with β -diethylaminoethyl *p*-aminobenzoate hydrochloride as anæsthetic) is claimed. Greater stability and less toxicity than has adrenaline are claimed. H. A. P.

Manufacture of substituted amides of aliphatic-aromatic acids. [Pharmaceuticals.] A. G. BLOXAM. From SOC. CHEM. IND. IN BASLE (B.P. 438,659, 15.5. and 24.9.34).—The manufacture of *N*-amino-alkyl or -aralkyl derivatives of $\text{CH}_2\text{Ph}\cdot\text{CO}\cdot\text{NH}_2$ or analogous substances having physiological properties resembling atropine is claimed. *E.g.*, $\text{CH}(\text{OPh})_2\cdot\text{CO}_2\text{Me}$ is heated at the b.p. with $\text{NH}_2\cdot\text{C}_2\text{H}_4\cdot\text{NEt}_2$; β -diethylaminoethyldiphenoxyacetamide, m.p. 104—105° [hydrochloride, m.p. 178—179°; methiodide, m.p. 194—195° (all corr.)], is formed. Other examples are β -dimethylaminoethyl-phenyl-, b.p. 121°/0.03 mm., and -diphenyl-acetamide, m.p. 108—109°; β -diethylaminoethyldiphenoxyacetamide, m.p. 94° (hydrochloride, m.p. 144.5°, methiodide, m.p. 167—168°, and methochloride,

m.p. 98—99°) (from $\text{CHPh}_2\cdot\text{CO}\cdot\text{NH}_2$, NaNH_2 , and $\text{NEt}_2\cdot\text{C}_2\text{H}_4\text{Cl}$ in PhMe, or from β -hydroxyethyldiphenylacetamide, m.p. 119—121°, through the β -Cl-compound, m.p. 125°); γ -diethylaminopropyl-, m.p. 89.5—91°, b.p. 175—180°/0.01 mm. (hydrochloride, m.p. 125.5—126.5°; methiodide, m.p. 167—169°; methochloride, m.p. 124.5—125.5°), and benzyl- β -diethylaminoethyl-diphenylacetamide, b.p. 187°/0.015 mm.; β -diethylaminoethyl-triphenyl-, m.p. 162—163°, α -phenyl- α -methoxy-, b.p. 160—162°/2 mm., and -phenyldiethylacetamide, b.p. 124—126°/0.09 mm. (hydrochloride, m.p. 168—169°); β -diethylaminoethyl-acetyltropamide (free OH-compound, m.p. 47—48°), -acetylbenzylamide, m.p. 72—73°, and -mandelamide, m.p. 79—80° (hydrochloride, m.p. 161—162°); β -piperidinoethyl-phenyl-, m.p. 57°, b.p. 122°/0.015 mm., and -diphenylacetamide, m.p. 78—80°, and bis- β -piperidinoethyldiphenylacetamide, m.p. 77—78°. H. A. P.

Treatment of tobacco. H. SHARLIT (U.S.P. 1,972,718, 4.9.34. Appl., 28.8.30).—Bentonite ($> 5\%$), with or without adsorbed medicaments or flavouring or aromatic substances, is incorporated in the tobacco to adsorb tarry matter produced during smoking. A. R. P.

Purification of crude extracts of the germinal-gland hormones and isolation of the latter therefrom. W. P. WILLIAMS. From SCHERING-KAHLBAUM A.-G. (B.P. 438,515, 7.5.34).—The extracts or solutions thereof in org. solvents are acylated, the esterified products isolated and purified, and the hormones obtained by saponification (cf. B.P. 432,851; B., 1935, 974). [Stat. ref.] E. H. S.

Manufacture of acyloctahydrofollicle hormones. SCHERING-KAHLBAUM A.-G. (B.P. 438,753, 9.11.34. Ger., 9.11.33 and 24.5.34. Addn. to B.P. 423,287; B., 1935, 333).—The octahydro-hormone, $\text{C}_{18}\text{H}_{30}\text{O}_2$, is acylated by the usual methods, or, alternatively, the acyl derivatives of the "follicle hormones," $\text{C}_{18}\text{H}_{22}\text{O}_2$, $\text{C}_{18}\text{H}_{20}\text{O}_2$ (equilin), and $\text{C}_{18}\text{H}_{18}\text{O}_2$ (hippulin), are hydrogenated by methods described previously. E. H. S.

Separating electrically-charged substances.—See XI.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Important light-sensitive systems. J. EGGERT (Phot. J., 1936, 76, 17—26).—Ag halide-gelatin, diazo-type, and dichromate-gelatin emulsions are discussed with regard to spectral sensitivity and sensitisation, and the possibility of imitating the spectral sensitivity of the human eye is considered. J. L.

Production of fine-grain [photographic] images by development. A. SEYEWETZ (Bull. Soc. Franç. Phot., 1935, 22, 236—240).—The new developer has the formula: Genol 10 g., quinol 1 g., anhyd. Na_2SO_3 60 g., anhyd. Na_2CO_3 4 g., Na_2HPO_4 20 g., KBr 1 g., H_2O 1000 c.c. The Na_2HPO_4 acts as a buffer, keeping the alkalinity at p_{H} 8. The γ and fineness of grain obtainable with this developer are almost = those obtained with $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ fine-grain developers (Micros and Super-Micros), without the disadvantage of the latter of staining the fingers. Better results were obtained than with the Kodak formula. J. L.

Treatment of [photographic] gradation problems. A. NARATH (Phot. Ind., 1935, 23, 1136—1139).—Gradation relations can easily be followed by combining the characteristic curves of the negative and positive emulsions, and turning the latter graph through a right-angle so that the curves become parallel, the exposure axis of the "positive" curve coinciding with the density axis of the other graph. The product of the two gradations is, in general, preferably > 1 . Other deductions are made. J. L.

See also A., Jan., 36, Density of emulsions and solarisation. 37, Desensitisation, and blackening, of plates. Photometry. 45, X-Ray powder camera.

PATENTS.

Providing a carrier with a light-sensitive substance. J. H. DE BOER and C. J. DIPPEL, Assrs. to N.V. PHILIPS' GLOEILAMPENFABR. (U.S.P. 1,999,088, 23.4.35. Appl., 23.9.32. Ger., 5.10.31).—A binder-free photographic plate or film is coated with an agglutinant and exposed to the vapour of the light-sensitive salt, which is deposited on (rather than in) the agglutinant. B. M. V.

Photomechanical resists and compositions therefor. KODAK, LTD. From EASTMAN KODAK CO. (B.P. 438,960, 26.4.34).—The light-sensitive layer consists of a cryst., unsaturated org. compound (I) the etching properties of which are altered by exposure to light and a crystallisation inhibitor (nitrosoacetophenone or a natural resin). A wax or wax-like substance is added if used on glass. After exposure the unexposed portions are removed by rubbing with mineral oil or kerosene and the plate is then etched. Examples of (I) are anisylidenecinnamylideneacetone, piperonylideneacetophenone, and dicinnamylideneacetone. H. A. P.

Preparation of intaglio lithographic plates from original plates and transfers. R. F. REED, P. W. DORST, and A. GEORGE, Assrs. to LITHOGRAPHIC TECHN. FOUNDATION, INC. (U.S.P. 1,992,771, 26.2.35. Appl., 28.11.33).—Deep-etched lithographic plates are prepared from plates on which a design has been drawn in greasy ink or crayon by first dusting the plate with rosin and/or talc, to increase the wetting action of a solution of dichromated colloid, which is next coated on; this solution is preferably composed of albumin 1 pt., glue 2 pts., and $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ 0.6 pt., with H_2O to make a solution of 20 g. of solids per 100 c.c. The colloid is then hardened in all parts not adjacent to the design, by exposure to light (2—3 times normal exposure); it is then washed, and the greasy ink removed by a solvent; the image thus prepared is etched with a dil. solution of HCl in abs. EtOH. The plate is subsequently washed and inked, and the hardened colloid removed by a solution of BaCl_2 (8 g.) and NaOH (1 g.) in 100 c.c. of H_2O . J. L.

Production of photographic diazotype prints. W. P. LEUCH, and S. C. & P. HARDING, LTD. (B.P. 438,805, 24.5.34).—The light-sensitive layer contains a diazo compound (e.g., diazotised $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{NHPh}$, 2:1:5- $\text{NHEt}\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{N}_2\text{Cl}$) capable of coupling only under alkaline conditions. After coating and drying, the paper is dusted with a coupling component (and, if

desired, with a substance having an alkaline reaction). Development is by exposure to H_2O or a weakly alkaline solution.

H. A. P.

Production of photographic relief images. C. BOCCA and L. AMATI (B.P. 438,776, 8.4.35. It., 14.4.34).—Low-relief images of great sharpness are obtained by use of sensitised (dichromated) layers comprising < 2 colloids, only one of which is washed out after exposure. Examples are: gelatin (I) and albumin (II) (or gum arabic) in which only the (II) is sol. in cold H_2O ; (I) and agar, only (I) being removed by warm H_2O ; (I) and casein, only the latter being removed by cold alkaline H_2O . The method is suitable for obtaining grating images.

J. L.

Production of whitish silver images in photographic gelatin silver halide layers. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 438,595, 19.3.34).—For such purposes a developer is used which contains, besides the normal constituents, a derivative of an org. base which dissolves Ag (e.g., a guanidine derivative, or an NH_4 or amine salt of dithiocarbamic acid) and/or an inorg. salt producing the same effect (e.g., KCN , NH_4Cl). The concn. of these compounds should be $> 1\%$ (on the wt. of developer). As such high concns. of these substances have a strong solvent action on gelatin, the latter should be hardened previously or by adding to the developer a hardening agent, e.g., CH_2O , Cr alum, Na_2SO_4 . Development time is 4–5 min. at 18° .

J. L.

Obtaining photographic contrasts by means of diazonium compounds and sensitive layers for use therein. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 439,005, 31.1.35. Ger., 3.2.34).—Production of an image is dependent on the interaction between an exposed diazonium salt and a Hg^I compound; permanency may be achieved by addition of a salt of a metal above Hg in the electrochemical series (e.g., Au, Ag), either to the light-sensitive layer or as an after-treatment. Special effects are claimed by the use, as carrier, of regenerated cellulose (superficially hydrolysed cellulose acetate). Thus, e.g., paper is sensitised with a solution containing diazotised 3:1:2:5- $NH_2 \cdot C_6H_2Me(OH) \cdot SO_3H$ (1%) and $HgNO_3$ (2.5%). After exposure it is developed by washing in H_2O and rendered permanent by treatment with 1% aq. $AgNO_3$, followed by fixing in a sulphite bath.

H. A. P.

Apparatus for examining the grain of a photographic image layer. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 439,239, 27.4.34).—The photographic plate or the like is placed across a beam of light in two positions successively: (1) early in the beam, where the scattered light can get away; (2) later in the beam, adjacent to an opal plate which picks up both the scattered and the unscattered light. The two intensities of the beam are compared in a photometer (Lummer-Brodhun cube) with a ray from the same punctiform source of light passing through a standard grey wedge.

B. M. V.

Colouring photographic images. P. D. BREWSTER (U.S.P. 1,992,169, 26.2.35. Appl., 5.5.33).—The Ag image in an emulsion is bleached to form a AgI image capable of mordanting dyes, by first soaking the film in

a solution of KI and KIO_3 , with aq. NH_3 to prevent premature liberation of I; I is then liberated for AgI formation by treating the film with an acid gas or acid solution (AcOH) containing KI and I to restrain diffusion of I formed in the gelatin from the first solution, and also with a metal salt [$Al(OAc)_3$ or NH_4 Cr alum] to aid in coagulation of colloidal AgI to a gel. Various formulæ, variations of the process, and instructions are detailed. It is claimed that the process gives an improved AgI mordant yielding clear, non-bleeding dyed images, especially suitable for cinema film. (Cf. U.S.P. 1,214,940; B., 1917, 403.)

J. L.

Production of photographic reproductions in colour. L. G. NICOLL (U.S.P. 1,972,311, 4.9.34. Appl., 25.7.31).—The film has a hard outer layer of sensitised gelatin emulsion and a soft inner layer of gelatin; after exposure the former layer is separated from the support by the action of steam. Several such films are produced in different colours and combined to form the final coloured photograph. Numerous examples are given.

A. R. P.

Erratum: B., 1935, 831, col. 1, line 7, for B.P. 425,233 read B.P. 425,235.

Sensitisation of photographic emulsions. KODAK, LTD., Assees. of L. G. S. BROOKER (B.P. 439,798, 6.3.34. U.S., 6.3.33).—See U.S.P. 1,962,124; B., 1935, 334.

[Perforated] photographic printing paper [in strip or roll form.] DÜRKOPFWERKE A.-G. (B.P. 440,016, 17.5.35. Ger., 19.5.34).

Photographic copying of lenticular colour-record films. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 439,947, 11.5.34).

Carbocyanine dyes.—See IV.

XXII.—EXPLOSIVES; MATCHES.

Nitroisobutylglyceryl nitrate. Preparation and explosive properties. A. STETTbacher (Nitrocellulose, 1934, 5, 159–162, 181–184, 203–206; Chem. Zentr., 1935, i, 2301).—The yield recorded by Aubry (A., 1933, 592) was not obtained. Characteristic data are recorded. The stability of the compound is $<$ that of nitroglycerin (I) and its shattering power is $>$ that of (I) or nitroglycol.

A. G. P.

Gun barrels.—See X.

See also A., Jan., 34, Dust explosions. 56, Starch nitrates.

PATENTS.

(A) [Basic] lead salts of dinitrobenzoic acid and priming compositions containing the same. (B) **Priming mixtures.** (A) W. BRÜN, and (B) J. E. BURNS, Assrs. to REMINGTON ARMS Co., INC. (U.S.P. 1,991,730–1, 19.2.35. Appl., [A] 19.10.31, [B] 26.5.31).—(A) The prep. and use of the basic salts $[(NO_2)_2C_6H_3 \cdot CO_2]_2Pb$, PbO and $[(NO_2)_2C_6H_3 \cdot CO_2]_2Pb \cdot 2PbO$ are claimed. (B) $Pb(OH) \cdot NO_3$ is used as oxidising agent in conjunction with guanil-nitrosoaminoguanilyltetracene, Pb styphnate, basic Pb picrate, and diazodinitrophenol.

H. A. P.

Pyrotechnic device. J. B. DECKER and H. C. CLAUSER (U.S.P. 1,974,015, 18.9.34. Appl., 22.3.32).—A device capable of detonating on percussion and producing

sparks and coloured lights consists of a case filled with a mixture of coarse particles of Zr (or Ti, Th, Y, or Se) with an oxidising agent (KClO_3) and a colouring agent (Ba or Sr salt). A. R. P.

XXIII.—SANITATION; WATER PURIFICATION.

Red squill investigations. Red squill extracts as rat poisons. R. E. BUCK and C. R. FELLERS (Ind. Eng. Chem., 1935, 27, 1497—1499).—Boiling MeOH extracts the toxic substance almost completely in about 4 hr.; the toxic dose of the extract is 500 mg./kg. of rat.

J. L. D.

[Eighth annual] report of the Water Pollution Research Board for year ended June 30, 1935 (Dept. Sci. Ind. Res., 1935, 51 pp.).—Materials suitable for H_2O -softening purposes can be prepared from certain British clays, some of which are equal in base-exchange val. to some of the imported materials and are more resistant to disintegration. Base-exchange properties are possessed by certain synthetic resins (cf. B., 1935, 465). A method has been devised, on base-exchange principles, whereby a true average of the $[\text{Pb}]$ in a drinking- H_2O , withdrawn from a household service, may be determined over a period of several weeks. As a result of experience gained from small-scale experiments on the biological purification of milk wastes, a large-scale plant is to be installed. Using the Barcroft respirometer technique, it has been confirmed that the rate of oxidation of a mixture of crude sewage and activated sludge is $>$ that of either of the constituents separately; the same is also true if the crude sewage be replaced by a purified sewage effluent. Activated sludge is shown to be capable of oxidising sugars, fats, fatty acids, and proteins in all the concns. used, and PhOH in concns. $< 0.1\%$. The physico-chemical nature of the clarification stage of this process is indicated by experiments using inert as well as oxidising gases (cf. B., 1935, 176). The investigation of the effect of crude sewage discharges on the silting of the River Mersey estuary is proceeding. C. J.

5th Report of the [Gas-]Liquor Effluents and Ammonia Committee [of the Institution of Gas Engineers]. A. KEY, W. ETHERIDGE, and A. H. EASTWOOD (Inst. Gas Eng., 1935, Comm. No. 123, 66 pp.; cf. B., 1934, 1118).—Experiments carried out at the Rothamsted Experimental Station showed that $(\text{NH}_4)\text{HCO}_3$ (I) is a useful fertiliser, but did not prove whether it was as good as $(\text{NH}_4)_2\text{SO}_4$. A new process for the production of (I) from gasworks crude liquor is described. It is shown that in places where, owing to the large vol. of H_2O available, sewage can be discharged without treatment, the influence of a normal dose of gas liquor is usually negligible. Results of previously reported laboratory tests on the effect of addition of gasworks liquor to sewage have been confirmed by a large-scale investigation. The effluent produced by treating sewage on a set of percolating filters was compared with that produced when the same sewage containing gasworks liquors was treated on similar sets of filters. With an addition of 0.25% of spent or crude liquor, the effluent still maintained its excellent quality; a slight deterioration occurred with 0.5% of spent liquor, and a more pronounced one with 0.5% of crude

liquor. Laboratory tests on the effect of gas liquors on all stages of the bacteria bed and activated-sludge systems of sewage purification are described. W. H. B.

Pulp and paper backwater.—See V.

See also A., Jan., 38, H_2O purification and p_{H} val.

PATENTS.

Air-conditioning device. E. C. BAEHNI (B.P. 438,736, 7.6.34).—A fan and a disinfecting and/or cleansing device are enclosed in a common casing, the fan delivering a stream of conditioned air. B. M. V.

Respiratory apparatus for protection against noxious gases. A. LEIGH-SMITH and H. O. W. RICHARDSON (B.P. 438,980, 17. and 25.7.34).—The apparatus comprises a hand- or foot-operated bellows or pump, air purifier, collapsible bag reservoir, and mask, and the whole is maintained under slight pressure. B. M. V.

Toothpastes. J. E. POLLAK. From WORCESTER SALT Co. (B.P. 434,985, 19.6.34).—Claim is made for a suspension of finely-divided NaCl in a colloidal prep. of $\text{Mg}(\text{OH})_2$ in glycerin and gum containing small amounts of flavouring materials, the NaCl being > 25 (40—75)% of the paste. A. R. P.

Grit-removal apparatus [for sewage]. W. C. WEBER, ASST. to DORR Co., INC. (U.S.P. 1,997,161, 9.4.35. Appl., 15.7.32).—Sedimentation tanks and rake classifiers are arranged so that the latter deliver only clean inorg. sand, org. solids being returned to the effluent over a lip sloped to function at a varying liquid level. B. M. V.

Apparatus for preventing nuisance in incinerating waste [refuse] materials. J. W. V. DENBERG (U.S.P. 1,995,723, 26.3.35. Appl., 17.1.31).—The gases are passed through a secondary combustion chamber (C) to which both fuel and air are supplied under control of a thermostat situated in C near its outlet. B. M. V.

Water-purifying device. J. E. MICHAUD (U.S.P. 1,997,830, 16.4.35. Appl., 12.12.32).—Prior to cooling, potable H_2O is passed through 6 layers (in order downwards): a powdered filter, porous stone, charcoal, fibrous filter, porous stone, a clarifying material. B. M. V.

Antisepticisation of water. C. T. HENDERSON (U.S.P. 1,995,639, 26.3.35. Appl., 17.8.32).—The H_2O is treated with Br > 5 pts. (0.1—0.25 pt.) per 10^6 in aq. solution, the amount added being $>$ equiv. to the org. matter. The Br may be measured out by metering the supply of heat necessary to boil it, the vapour being absorbed in a minor flow of H_2O to approx. saturation. B. M. V.

Treatment of [flowing] water [and sewage]. J. C. BAKER and G. D. PEET, ASSTS. to WALLACE & TIERNAN Co., INC. (U.S.P. 1,995,914, 26.3.35. Appl., 2.3.32).— Cl_2 (metered by any suitable means) is picked up in an injector by a pumped minor flow of H_2O and immediately injected into the main stream. The Cl_2 need not completely dissolve in the minor flow. B. M. V.

[Felt] filtering elements for gas masks and the like. SOC. DES ATELIERS R. DE MAGONDEAUX ET Co. (B.P. 438,556, 11.12.34. Fr., 12.12.33).

H_2O clarification.—See I.