

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

OCT. 11 and 18, 1935.\*

### I.—GENERAL; PLANT; MACHINERY.

**The "Ansatzring" [in furnaces].** I. T. YOSII (J. Soc. Chem. Ind., Japan, 1935, 38, 337—340 B).—The causes of ring formation ("Ansatzring") in the wall linings of rotary furnaces are discussed. F. N. W.

**Chemical plant construction.** H. S. JACOBY (Ind. Eng. Chem., 1935, 27, 999—1004).—The design of buildings for housing chemical plant and the conditions for which different materials are suitable are discussed. D. K. M.

**Heat transfer involving turbulent fluids.** (A) A. P. COLBURN. (B) C. C. FURNAS and W. A. KAYE (Ind. Eng. Chem., 1935, 27, 1103—1104).—(A) The Kaye and Furnas method (B., 1934, 735) of predicting heat-transfer coeffs. for heating from those for cooling is criticised; Morris and Whitman's data (B., 1928, 351) do not offer a satisfactory basis for methods of correlation applicable to turbulent flow.

(B) A reply. The Kaye and Furnas method agrees with existing data better than do Colburn's curves (Trans. Amer. Inst. Chem. Eng., 1933, 29, 174).

D. K. M.

**Common refrigerants.** J. S. BEAMENSDEFER (Ind. Eng. Chem., 1935, 27, 1027—1030).—The refrigerating effect of, the best conditions for use of, and the most suitable type of compressor for  $\text{CO}_2$ ,  $\text{NH}_3$ ,  $\text{CCl}_2\text{F}_2$ ,  $\text{MeCl}$ ,  $\text{SO}_2$ ,  $\text{CCl}_3\text{F}$ ,  $\text{CH}_2\text{Cl}_2$ , and  $\text{H}_2\text{O}$  are discussed.

D. K. M.

**Laws of filtration.** P. H. HERMANS and H. L. BREDÉE (Rec. trav. chim., 1935, 54, 680—700).—Earlier theories have been concerned mainly with "sludge filtration," in which a relatively conc. suspension is filtered through a base such as a filter cloth and a gradually thickening layer or "cake" of the filtered substance is built up. In a further class of process, viz., "stoppage filtration," no true cake is formed, but the pores of the base are gradually stopped up by small amounts of the filtered substance. Stoppage filtration occurs when the liquid contains a relatively small quantity of suspended particles, as in technical solutions of colloidal substances, such as viscose. The following "idealised" cases are considered, the mathematical expressions being derived by assuming Poiseuille flow through the pores. (A) Pure stoppage filtration, in which each suspended particle encountering a pore of the filtration medium blocks it completely. Assuming pores of equal size, the expression  $\phi = kw^2$  is obtained (alternatively  $kV = S_0 - S$ ). (B) Standard case, where the particles deposit regularly on the walls of the pores, gradually reducing their radius. Here  $k = \phi w^{3/2}$ , or  $kt/2 = t/V - 1/S$ . (C) Intermediate case leading to the expression  $\phi = kw$  or  $kt = 1/S - 1/S_0$ , at present

purely empirical. (D) Sludge filtration, where  $\phi = k$ , or  $kV/2 = t/V - 1/S_0$  ( $V = \text{vol. of liquid passed in time } t$ ,  $S = dV/dt = \text{rate of filtration at time } t$ ,  $S_0 = \text{initial rate}$ ,  $w = 1/S = \text{resistance of filter at time } t$ ,  $\phi = dw/dV = \text{rate of blockage}$ ,  $k = \text{const.}$ ). The experimental evaluation of the consts. is discussed and a no. of alternative forms of the equations are given.

[With J. DE BOOYS.] The above laws have been tested experimentally at a pressure of 2 atm. For cases A, B, and C a solution, usually of viscose, was filtered through a cloth or wad. The pure stoppage law A was hardly ever obeyed, whereas the standard law B was followed in hundreds of cases with the most varied cloths and wads, with kieselguhr, and for a wide range of  $k$  and  $S$  vals. The intermediate case C was found only occasionally, and even then  $\phi$  was usually  $<$  that demanded by the equation. A large-scale test, with a filtering surface of 11.70 sq. m., also followed the standard law closely. Many examples of sludge filtration D have been drawn from industrial practice (cf. Ruth, B., 1933, 287) for media such as kieselguhr,  $\text{CaCO}_3$ ,  $\text{PbCrO}_4$ , and many varieties of charcoal. Deviations from the law occur with carboraffin and norit. S. J. G.

**Criticism of the Gurwitsch table for the viscosity of mixtures.** E. L. LEDERER (Petroleum, 1935, 31, No. 33, Motorenbezt., No. 8, 2—4).—Mathematical. Comparison has been made of  $\eta$  found by experiment for mixtures of petroleum oils with  $\eta$  calc. from  $\eta$  of the two components, (a) from the Gurwitsch table, (b) by the author's modified equation (cf. A., 1932, 116).

C. C.

**Modified Orsat apparatus for complete gas analysis.** F. SCHUSTER, G. PANNING, and H. BÜLOW (Gas- u. Wasserfach, 1935, 78, 584—585). J. W.

**Abrasiveness of fine powders.**—See VIII. **Cleaning gases.**—See XI.

### PATENTS.

**Initiation of polymerisation reactions.** P. J. WIEZEVICH and J. M. WHITELEY, JUN., Assrs. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,981,819, 20.11.34. Appl., 8.5.31).—In, e.g., the prep. of petrol from olefines the vaporous materials are preheated at 200—400° and their pressure is raised to 10—200 atm.; then a gaseous oxidising agent insufficient to react with all the olefine is added, and reaction continued during 5—10 hr. The ratio olefine :  $\text{O}_2$  is 1 : 0.03—0.2.

B. M. V.

**Filling of reaction chambers or towers.** CHEM. FABR. CURTIUS A.-G. (B.P. 431,788, 15.1.34. Ger., 18.1.33).—The fillers are of lens, plate, or hollow form and are elongated so that when poured in around the sides and not intentionally at the centre they will, on

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

the average, take up an angle that directs the down-flowing liquid from the sides to the centre. B. M. V.

**Heat-insulating materials.** F. W. SEVING, A. BERGQVIST, and K. E. OLSSON (B.P. 432,019, 14.12.33).—A no. of thin sheets of cellulose acetate (or other such substance of low conductivity) have dispersed therein particles of material with a metallic lustre (*e.g.*, Al foil). The dispersed particles may be made to take up a position of max. reflection by a process of rolling. The sheets can be folded or crinkled without breaking. J. A. S.

**Tubular heat exchangers applicable to refrigerant condensers and evaporators.** LIVERPOOL REFRIGERATION Co., LTD., and J. ALLAN (B.P. 432,230, 15.3.34).—A mechanical method of lining tubes with another metal, *e.g.*, steel with Cu, is described. B. M. V.

**Heat-treatment [of refrigerator evaporators].** F. T. COPE, Assr. to ELECTRIC FURNACE Co. (U.S.P. 1,960,808, 29.5.34. Appl., 24.6.32).—To prevent oxidation and scaling of the inside of the tubes while the enamel is being baked on to the outside, a current of inert or reducing gas, *e.g.*, flue gas, is passed through the tubes. A. R. P.

**Heat-exchange medium.** P. H. ELLIOTT and W. E. WHITE, Assrs. to CHEM. MANUFG. Co. (U.S.P. 1,981,849, 27.11.34. Appl., 30.3.33).—A heat-transferring liquid comprises vegetable oils with  $\leq 5\%$  of oleic acid and, optionally, a metallic soap and mineral oil. B. M. V.

**Preparation of water for industrial purposes of all kinds, especially boiler feed-water.** A. SCHNEIDER and F. GAISSER (B.P. 432,123, 22.1.34. Ger., 21.1.33).—Raw H<sub>2</sub>O is treated at 100°, countercurrent in a filled tower, with CH<sub>4</sub>, N<sub>2</sub>, or the like in presence also of NH<sub>3</sub>. The filling may be of known catalytic type, *e.g.*, Fe ore, and the gases are passed over bare metal to remove O<sub>2</sub> and used again. B. M. V.

**Separator.** C. G. HAWLEY, Assr. to CENTRIFIX CORP. (U.S.P. 1,981,549, 20.11.34. Appl., 16.12.31).—A steam and H<sub>2</sub>O separator of the deflection type is described. B. M. V.

**Apparatus for measuring the hardness of materials.** A. F. SHORE (U.S.P. 1,982,026, 27.11.34. Appl., 24.3.30).—A Shore scleroscope is provided with means for measuring the depth of the depression with the load on, independently of contraction of the penetrator. B. M. V.

**Pulverising of minerals and similar materials.** INTERNAT. PULVERIZING CORP. (B.P. 432,191, 21.11.33. U.S., 9.10.33).—In an apparatus of the mutual-impact type the grinding takes place in a circular zone in which whirling is produced by tangential jets of gas, and the fine material is removed with the gas from the centre of the vortex. B. M. V.

**Pulverising and granulating mill.** P. W. KENNEDY (U.S.P. 1,981,415, 20.11.34. Appl., 5.11.32).—A pulveriser, especially for re-treating fertiliser, is provided with walls and screen which are adjustable to the rotor. B. M. V.

**Grinding apparatus for paper pulp and like substances.** W., H., and H. VOITH (J. M. VOITH)

(B.P. 432,009, 19.1.35. Ger., 19.1. and 10.3.34).—To an elongated roll co-operating with a bed-plate, the feed is supplied as a narrow stream at one end and after each grinding pass is transferred longitudinally one pitch by suitable passages in the housing. It finally leaves the other end of the roll, still in a narrow stream. B. M. V.

**Wet-grinding mills.** INTERNAT. COMBUSTION, LTD., and J. C. FARRANT (B.P. 432,089, 8.2.35).—To the side of a feed-tank or scoop-box (*A*) of a grinding mill is attached another tank (*B*), preferably tapering downwards; the H<sub>2</sub>O supply is adjusted to cause overflow of slimes from *B* and permit only coarse material to pass to *A* and the mill. B. M. V.

**Separation of powdered or granular materials.** T. ROBINSON & SON, LTD., I. ROBINSON, and E. N. MOLESWORTH (B.P. 432,060, 9.3.34).—A hood surrounding a pneumatic shaking table, embodying an outlet for the airborne lighter material lifted from the bed, is described. B. M. V.

**Grading, classifying, and like screens.** L. HERRMANN (B.P. 431,841, 20.2.35).—A screen is constructed of non-crossing crimped wires or bars. B. M. V.

**Pasteurising or sterilising apparatus.** W. R. GREENSLADE (B.P. 431,939, 16.1.34).—An apparatus in which bottled goods travel in a substantially straight line is described, the heat-treatments being effected by spraying circulated liquids on them. B. M. V.

**Heating of fluids.** H. TROFSCH, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,981,129, 20.11.34. Appl., 14.3.33).—An apparatus for the heating of, *e.g.*, hydrocarbon vapours for periods of 0.005–0.1 sec. at 600–1200° to produce olefines comprises a vertical annular vessel placed in a downdraught furnace and heated by burner flames impinging on the inside and outside near the lower end only, the fluid under treatment being admitted at that end. B. M. V.

**Filters.** J. A. PICKARD (B.P. 432,102, 20.12.33).—The discs of a leaf filter are formed of filter paper or the like without internal supporting means, the passage of filtrate being afforded solely by inherent or specially formed roughness on the internal surfaces. Washers are interleaved at the central part to ensure abs. fluid-tightness around the central hollow mast. B. M. V.

**Filter.** G. TABOZZI (U.S.P. 1,981,397, 20.11.34. Appl., 25.9.33).—A filter in which the cloth or the like is supported in the form of a deeply fluted cylinder is described. B. M. V.

**Method of and material for filtration.** G. C. PIERCE, Assr. to E. L. PIERCE (U.S.P. 1,981,877, 27.11.34. Appl., 13.6.32).—As a filter medium the use of uncalcined diatomaceous earth (30–180-mesh), the particles comprising rigid bodies with diatomic structures protruding therefrom, is claimed. B. M. V.

**Distillation system.** W. SIECK, JUN., Assr. to W. GARRIGUE & Co. (U.S.P. 1,982,598, 27.11.34. Appl., 17.4.33).—A distillation system for the separation of, *e.g.*, fatty acids comprises: (1) a vac. still with steam injection, (2) a partial surface condenser, (3) a flash chamber in which a cold fluid is injected into the

vapours from (2), and (4) a barometric condenser. A thermo-compressor is placed between (3) and (4), and a control heating means in the H<sub>2</sub>O pool in (3) upon which a layer of fatty acids collects. B. M. V.

**Reclaiming or distilling apparatus.** C. P. TOLMAN, Assr. to COLUMBIA APPLIANCE CORP. (U.S.P. 1,981,480, 20.11.34. Appl., 17.9.31).—A still for dry-cleaner's solvent or the like is provided with means for drawing off liquid residue without disturbing sediment. B. M. V.

**Chemistry. [Fractional distillation.]** T. MIDGLEY, JUN., Assr. to GEN. MOTORS CORP. (U.S.P. 1,961,774, 5.6.34. Appl., 31.7.30).—The rectifying column is provided with plates or other supports coated with sharp-edged crystals, *e.g.*, of SiC, corundum, or micaceous hæmatite. A. R. P.

**Bubble cap.** D. A. MONRO, Assr. to STANDARD OIL Co. (U.S.P. 1,982,226, 27.11.34. Appl., 11.11.32).—A cap of elongated form is described, the reflux liquid flowing lengthways. B. M. V.

**Fractionating tower.** L. DE FLOREZ (U.S.P. 1,981,346, 20.11.34. Appl., 14.1.31).—The trays are in the form of conical cascades composed of nesting annular trays and the outer wall of each being extended downwards and serrated to permit the passage of the gas. During sudden rushes of gas the trays may lift as a whole. B. M. V.

**Crystallisation.** DORR Co., INC. (B.P. 431,812, 25.6.34. U.S., 7.7.33).—A system for pptn. of impurities or other minor constituents which show decreasing solubility with increasing concn. of the major constituent comprises an evaporator (*A*), a vessel (*B*) for mixing conc. liquor with fresh feed, a crystallising, storage, and settling vessel (*C*), and the necessary pump(s). The liquor is circulated at a controlled high rate through *A-B-C-A* and always maintained in the metastable condition, the introduction of feed into *B* being usually sufficient to start crystallisation though seed crystals may be necessary. The settling vol. of *C* and the rate of circulation are of sufficient magnitude to prevent scaling in *A*. B. M. V.

**Emulsifying apparatus and the like.** W. M. and A. L. MELMORE (B.P. 431,978, 29.8.34).—The apparatus comprises a long cylinder with hand-operated plunger, and has an unrestricted inlet valve at the bottom and restricted outlet at the top. B. M. V.

**Recovery of volatile liquids.** G. FRENKEL (B.P. 432,176, 5.3.35).—Air containing inflammable vapour from industrial processes is, after cooling by inexpensive means, passed over solid CO<sub>2</sub> with recovery by condensation of most of the volatile liquid. The CO<sub>2</sub> gas produced may be utilised as atm. in the upper parts of storage tanks etc., also if convenient, in the apparatus where the vapour is produced. B. M. V.

**Apparatus for countercurrent treatment of two immiscible liquids.** T. C. WHITNER, JUN., Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,981,818, 20.11.34. Appl., 21.2.31).—The apparatus comprises a filled tower divided into sections by constrictions. The difference in *d* is the sole agency effecting countercurrent flow. B. M. V.

**Liquid-testing device. [Viscosimeter.]** F. S. STICKNEY, Assr. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 1,982,328, 27.11.34. Appl., 17.11.30).—In a viscosimeter, quickly detachable means are provided for coupling the testing instrument mechanically to a pressure (torque) measuring device and electrically to a thermometer dial. B. M. V.

**Apparatus for treatment of gaseous products.** I. HECHENBLEIKNER, Assr. to CHEM. CONSTRUCTION CORP. (U.S.P. 1,982,099, 27.11.34. Appl., 23.9.31).—Filtration or catalytic medium of a sandy nature, restrained in annular spaces between foraminous tubes (the flow of fluid being radial), is continually renewed by gravity flow from a common hopper at the top to a collecting space at the bottom. B. M. V.

**Dust-removal device.** T. F. HATCH, Assr. to KADCO CORP. (U.S.P. 1,981,356, 20.11.34. Appl., 16.6.33).—The gas is cleaned by deflexions at progressively increasing velocity and is finally filtered. B. M. V.

**Gas treatment.** E. PARKINSON (U.S.P. 1,976,629, 9.10.34. Appl., 10.11.32).—Flue gases from boilers or metallurgical furnaces are mixed with flaming streams of other gas, *e.g.*, from internal-combustion engines, in a mixing tower (*A*) and passed together with H<sub>2</sub>O down a condensing tower (*B*); the non-gaseous constituents are settled out in a series of towers (*C*), from the last of which the gases are exhausted at a no. of different levels. Induced-draught devices are provided in *A*, *B*, and each of *C*. B. M. V.

**Combined gas-washing and sludge-recovery apparatus.** J. P. GRILLI (U.S.P. 1,976,392, 9.10.34. Appl., 6.6.32).—The gas is first scrubbed by sprays (in *A*) of hot, (nearly boiling) re-circulated H<sub>2</sub>O and the sludge settled in a thickener (*B*) below *A* comprising a no. of nested conical baffles. The gas is then scrubbed in cold H<sub>2</sub>O in another tower (*C*). The make-up H<sub>2</sub>O for *A* is taken from *C*, and the liquor removed from *B* in the thick sludge is usually sufficient to prevent sol. solids accumulating to the crystallising point. B. M. V.

**Measurement of thermal conductivity [of gases].** T. R. HARRISON, Assr. to BROWN INSTRUMENT Co. (U.S.P. 1,981,172, 20.11.34. Appl., 15.2.27).—In an apparatus comprising a pair of combined heating and temp.-measuring electrical resistances used in, *e.g.*, the determination of CO<sub>2</sub>, the sample gas is caused to flow downwards over its resistance at a rate substantially to balance the natural convection circulation. B. M. V.

**[Heart-shaped] mixing devices or beaters.** AMER. MACHINE & FOUNDRY Co. (B.P. 431,846, 15.3.35. U.S., 20.10.34).

**Treated fibres [as insulation].**—See V. Hg boiler. **Coating metal surfaces.**—See X. Treating gases.—See XI.

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Pure coal and its applications.** M. F. BERTRAND (J. Inst. Fuel, 1935, 8, 328—342).—The nature and separation of the constituents of coal are discussed mainly from the viewpoint of producing coke to compete

with petroleum coke for electrode manufacture. The reduction of ash content to  $< 1\%$  is accomplished by increasing as far as possible the vitrain content of the coal, the process consisting in passing crushed coal, previously de-dusted and de-sludged, through a series of  $(CaCl_2)$  solutions of increasing  $d$  to a gravity separator where the coal is collected in the upper part and the residue removed from the bottom. The product then passes through the solutions in the reverse direction. By this means change of  $d$  of any solution is avoided, decrease due to entering coal being offset by increase due to returning product, and they can move in a closed circuit. An additional process for removing fusain is mentioned. Special coke produced from pure coal obtained by this process has  $< 0.6\%$  of ash. Various properties have been examined and are compared with competitive products.

D. M. M.

**Coal blending, with special reference to low-temperature tar production.** Y. C. H. YOUNG (J. Chem. Eng. China, 1935, 2, 44—55).—Blending of highly coking Changhsing coal with poorly coking Shunkengshan coal improves the semi-coke and gives a higher yield of better tar.

T. H. B.

**Reaction of bromine with a coking coal, including a study of its unsaturation.** J. F. WEILER (Fuel, 1935, 14, 190—196).—Buckwalter and Wagner's method (A., 1931, 193) has been applied to determine the "unsaturation" of a Pittsburgh coal. The rate of reaction of the coal with Br in  $CCl_4$  solution was practically independent of particle size in the range  $1\ \mu$  to 100-mesh, was nearly the same for undried and dried samples, was almost independent of temp. in the range  $0-65^\circ$ , and increased slightly with increase in [Br] from  $N/16$  to  $N/4$ ; it was nearly the same for the residue from a  $C_6H_6$  pressure extraction, and for the fraction thereof insol. in light petroleum, as for the original coal. Reaction occurred both by substitution and addition, the former predominating; e.g., after 177 hr. at  $30^\circ$  Br consumed was 25, HBr formed was 11, and therefore Br added was 3 milliequivalents per g. of coal. The apparent addition of Br decreased with rising temp. and with increased time of contact, giving in some instances negative vals.; these are the result of cleavage of HBr from the brominated coal in excess of that due to substitution of H by Br, and indicate a hydroaromatic structure. The highest val. for the apparent addition of Br was  $\equiv$  one double linking in a mol. of mol. wt. 400. Approx.  $2/3$  of the Br combining with the coal was hydrolysed by alcoholic KOH and was therefore linked to aliphatic C atoms.

A. B. M.

**Pyrolysis of coal.** B. JUETTNER and H. C. HOWARD (Ind. Eng. Chem., 1934, 26, 1115—1118).—Pyrolysis of a sample of Pittsburgh coal was effected in a specially designed mol. still under pressures of  $10^{-2}$ — $10^{-3}$  mm. Hg and at temp. up to  $620^\circ$ . No condensable distillates were obtained until temp. were reached at which gas evolution was considerable, so that the products obtained are the result of thermal decomp. Rapid heating gave higher yields of condensates than slow heating. Distillation at 1 atm. gave lower total condensate, but much higher yields at  $400^\circ$  than those obtained under vac. The smaller decomp. under vac. gave more neutral  $Et_2O$ -

insol. material and more  $H_2$ . Coal ground to 0.001 mm. particle size gave approx. twice the yield, to  $380^\circ$ , given by 20/40-mesh coal, particularly of  $Et_2O$ -insol. material, the total yield of which is an index of thermal decomp. From the decomp. of these products the simpler phenolic substances are formed.

C. L. G.

**Coke for domestic heating.** J. E. MACONACHIE and C. TASKER (Gas J., 1935, 211, 265—268).—The physical and chemical properties and firing characteristics in domestic furnaces of 8 cokes, representative of the central Canada supply, have been investigated, and the relations between these properties are discussed. Combustibility, flexibility, and general efficiency increase as the  $d$  decreases, and are more dependent on this than on any other property. The advantages and disadvantages of coke in comparison with anthracite are summarised.

E. S.

**Activation of fuels by sodium carbonate.** I. P. J. ASKEY and S. M. DOBLE (Fuel, 1935, 14, 197—201).—Addition of  $< 3\%$  of  $Na_2CO_3$  was necessary to effect a marked increase in the reactivity (towards  $CO_2$  at  $1000^\circ$ ) of a coke (ash 6.2%) from a North Staffordshire slack. The greater part of the  $Na_2CO_3$  was absorbed by the ash, probably with formation of Na aluminosilicate. This effect of the ash was eliminated by addition of CaO, the same increase in reactivity (from 14 to 40% of  $CO_2$  reduced) being effected by addition of 2% of CaO + 0.5% of  $Na_2CO_3$  as by 3% of  $Na_2CO_3$  alone. The migration of alkali (cf. B., 1931, 466; 1934, 260) amounted to about 16% (calc. on the  $Na_2CO_3$  added) with 3% of  $Na_2CO_3$  alone, and about 50% with 2% of CaO + 0.5% of  $Na_2CO_3$ . The catalytic effects of CaO and  $Fe_2O_3$  are ascribed to the release of alkali from the ash; this has been confirmed by experiments with ash-free sugar charcoal.

A. B. M.

**Decolorising charcoal from corncobs.** M. S. HSIEH (J. Chem. Eng. China, 1935, 2, 39—42).—Corncobs were soaked in a solution of 3%  $ZnCl_2$  and 7%  $H_2SO_4$  for 24 hr., destructively distilled at  $600^\circ$  for 50 min., and treated with superheated steam at  $400^\circ$ . The resulting activated charcoal was very effective for decolorising commercial  $d$ -glutamic acid hydrochloride, glucose, glycerin, and cottonseed oil.

T. H. B.

**Determination of calorific value of difficultly combustible fuels.** K. SUSUKI (J. Soc. Chem. Ind., Japan, 1935, 38, 363—364 B).—The use of a mixture of  $KClO_3$ ,  $KNO_3$ , and  $MnO_2$  (2:2:1) in the determination of the calorific val. of coke, anthracite, etc., using the Lewis Thompson calorimeter, is recommended.

F. N. W.

**Dry purification [of gas].** P. MADSEN (Gas- u. Wasserfach, 1935, 78, 528—529).—An equation has been deduced for the rate of removal of  $H_2S$  from gas by Fe oxide purification in presence of sufficient  $O_2$  to revivify the oxide. The calc. results agree with the observed.

A. B. M.

**Removal of carbon monoxide from [town's] gas.** R. MEZGER (Gas- u. Wasserfach, 1935, 78, 573—579, 593—602).—Figures are given to show the incidence in Germany of poisoning by CO. Removal of CO to leave a gas of the required quality can be accomplished only by catalytic processes. These are of two kinds: (i)

$\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2$ ; (ii) the process of (i) followed by the reaction  $\text{CO} + 3\text{H}_2 = \text{CH}_4 + \text{H}_2\text{O}$ . The necessary plant is described. Formulae are given which enable the properties of the gas produced to be calc. Neither process is economic, but (i) has the better prospects if a market can be found for the increased coke yields. The relationship between the physiological action of CO and its explosion limits is discussed, with reference to the dangers of explosions (leaks) in rooms in the case of non-odorous gases. J. W.

**Production of hydrocarbon oils from industrial gases.** I. A. AICHER, W. W. MYDDLETON, and J. WALKER (J.S.C.I., 1935, 54, 313—319 T).—A general survey is given of the reactions in which hydrocarbon oils are formed at atm. pressure from industrial gases containing CO and  $\text{H}_2$ . A method for comparison of rates of reaction under different conditions has been devised and has been applied to determine the distribution of the free heat of the exothermic reaction in a bed of catalyst. Adsorption of oil on the surface of the catalyst is shown to retard the reaction strongly. By reducing the partial pressure of the product the yield of oil per unit vol. of catalyst space per unit time, and also the yield from a given vol. of gas, have been increased. Blue water-gas has been found to give good yields of oil.

**Analysis of benzols.** W. J. GOODERHAM (J.S.C.I., 1935, 54, 297—301 T).—A fractionating column consisting of a vac.-jacketed Dufton spiral is described, together with other apparatus for the analysis of liquid mixtures by distillation. A modification of the Manning-Shepherd method (cf. B., 1931, 284) is described as a corollary to analysis by fractional distillation; the methods of analysis are applied particularly to benzols.

**Removal of thiophen from benzene by the action of acidified hypochlorite solutions.** E. G. R. ARDAGH and W. H. BOWMAN (J.S.C.I., 1935, 54, 267—268 T).— $\text{C}_4\text{H}_4\text{S}$  was completely removed (isatin test) from  $\text{C}_6\text{H}_6$  by means of HOCl. The min. mol. ratios are 1  $\text{C}_4\text{H}_4\text{S}$ , 5 OCl, 16 AcOH.  $\text{C}_6\text{H}_6$  after distillation is free from S (lamp test). E. H. M. B.

**Apparatus for determination of naphthalene in motor benzol.** W. ZWIEG and F. KOSSENDEY (Gas-u. Wasserfach, 1935, 78, 602—603).—3 bubblers, A ( $\text{H}_2\text{O}$ -cooled), B, and C (both ice-cooled), contain clear 0.7% picric acid (I) solution (saturated at 0°). A weighed quantity of benzol is added to A and is drawn through B and C. The  $\text{C}_{10}\text{H}_8$ -(I) compound formed in A, B, and C is determined in the usual way. Good accuracy is claimed. J. W.

**Continuous regeneration of benzol wash oil.** A. THAU (Gas World, 1935, 103, Coking Sect., 84—86).—Wash oil is continuously regenerated in a gas-heated still. Gas from the outlet of the benzol washers is drawn through the boiling oil to the suction main before the coolers. The distillation thus takes place under vac. and products of low b.p. are recovered. Pitch is removed by means of a siphon. 2400 cu. ft. of gas are used per ton of oil. No fresh oil need be bought, and the pitch is saleable. The still may be used for tar. E. H. M. B.

**Effect of continued heating on asphalts.** A. W. SIKES and C. H. COREY (Ind. Eng. Chem., 1935, 27, 192—195).—The effects of continuous heating for 70 days at 170° on the properties of two Mid-Continent asphalts (m.p. 32.8° and 41.1° respectively) and of an asphalt-rosin-rosin oil compound are described. In general, the acid val., after an initial increase, decreased considerably (possibly due to volatilisation of the acids formed), ductility decreased markedly, flash point did not alter much, penetration decreased rapidly, softening point and  $\eta$  increased. Solubility in  $\text{CS}_2$  varied between 99.6 and 99.9% without apparent congruity. It is not implied that all types of asphaltic materials will behave similarly under similar heating conditions. C. L. G.

**Measurement of surface tension of viscous substances such as tars and bitumens.** A. LÉAUTÉ (Compt. rend., 1935, 201, 41—43).—Results with the method of capillary rise are recorded for 6 specimens. H. J. E.

**Decomposition of phenoxide liquors by means of an electric current.** K. DREES and G. KOWALSKI (Brennstoff-Chem., 1935, 16, 268—271).—Aq. NaOPh has been separated into PhOH and NaOH in the laboratory by electrolysis (Pt anode and Hg cathode; 6—9 volts; temp. of bath 30—65°). Na was recovered as Na-Hg amalgam which could be converted into 25% aq. NaOH without loss. There was a 5—13% loss of PhOH due to oxidation. Similar results were obtained with the corresponding compounds of the cresols and of xylol, except that with *o*- and *p*-cresol and xylol the losses due to oxidation were higher (10—30%). The process compares favourably with the usual method of working up phenoxide liquor. A design for a large-scale plant is suggested. A. B. M.

**Composition of Fushun shale oil.** VII, VIII. F. HORIE (J. Soc. Chem. Ind., Japan, 1935, 38, 332—337 B; cf. B., 1935, 613).—The fraction b.p. 50—85° consists of olefines (35%) (principally  $\Delta^2$ -hexene, also  $\beta$ -methyl- $\Delta^2$ -pentene and  $\beta\gamma$ -dimethyl- $\Delta^2$ -butene), and saturated hydrocarbons (65%) (*n*- $\text{C}_8\text{H}_{18}$  and  $\beta\gamma$ -dimethylbutane). Traces of S compounds are present, but no saturated cyclic hydrocarbons. F. N. W.

**Comparison of crude petroleum oils from North Germany.** N. BRINCKERT (Petroleum, 1935, 31, No. 30, 1—5).—The properties of 11 crude oils have been examined and the results are tabulated for *d*,  $\eta$ , colour, flash point, Engler distillation, together with the proportions of  $\text{H}_2\text{O}$ , paraffin wax, asphalt, N, and S present in each case. C. C.

**Utilisation of waste products of the petroleum industry.** E. VELIKOVSKAJA (Neft, 1933, 4, No. 10, 14—17).—The oil obtained from spindle-oil or machine-oil sludge in the recovery of  $\text{H}_2\text{SO}_4$  is heated to 300° and oxidised by blowing with air to solidification. The product is heated to 170°, diluted with mineral oil to the required  $\eta$ , and treated with 1% of NaOH (*d* 1.32). The product is an axle grease. Shoemaker's wax substitute is prepared from lubricating oil bottoms stripped of fractions of b.p. < 300° and blown with air until solid. The product is mixed with 20% of heavy-distillate alkali sludge. Binder for briquettes can be made from acid sludge. Insecticidal and fungicidal

emulsions are prepared from kerosene, heavy kerosene, and transformer-oil alkali sludges with the addition of cresol or fusel oil (5%). A good putty was made from 75% of machine-oil distillate, 25% of polymerides, and dry ground chalk. A wood-tar substitute was prepared from oil collecting in oil traps (45%), upper acid-sludge layer (40%), and black turpentine and red or wood tar (15%). Burnt pyrites is converted into a paint by washing with hot H<sub>2</sub>O until free from sol. sulphates, drying, and grinding. CH. ABS. (e)

**Phase equilibria in hydrocarbon systems. VII. Physical and thermal properties of a crude oil.** B. H. SAGE, W. N. LACEY, and J. G. SCHAAFSMA (Ind. Eng. Chem., 1935, 27, 162—165; cf. A., 1935, 290).—An examination has been made of the physical and thermal properties of a crude oil from which all dissolved gas that would leave the liquid at 48.9°/1 atm. was removed. A vented sample of Keilleman Hills field crude was analysed and data on the sp. vals. of heat content, entropy, vol. at 15—104° and under pressures from the v.p. of the crude to 3000 lb. per sq. in. abs. were obtained. The application of these data is illustrated by calculations on the flow problems of a pumping well operating under arbitrarily chosen conditions. C. L. G.

**[Use of] nickel and its alloys in the refining of crude petroleum.** R. R. W. MÜLLER (Oel u. Kohle, 1935, 11, 504—507).—A survey is given of the many applications of Ni alloys, e.g., monel metal, Cu-Ni, Cr-Ni, Ni steels, cast Fe containing Ni, etc., in the petroleum refining industry. The special advantages of individual alloys as constructional material for particular parts of the plant are discussed. C. C.

**Applications of the film concept in petroleum refining.** C. C. MONRAD (Ind. Eng. Chem., 1934, 26, 1087—1093).—Many petroleum refinery processes, e.g., heat transfer, pressure drop, thermal decomp., fractionation, absorption, and evaporation, can be correlated with the properties of stagnant films, i.e., the relatively stationary film at the interface of a fluid film and a solid surface. Equations developed for different problems in connexion with the above processes are reviewed, and reference is made to the possibility of correlating this concept with other refinery processes, e.g., acid and solvent treatment, fuel burning, gas-temp. measurement, and corrosion of furnace tubes at high temp. due to erosion effects at high velocities. C. L. G.

**Determination of paraffin in asphaltic mineral oils by distillation under high vacuum.** A. ZWERGAL (Oel u. Kohle, 1935, 11, 431—433).—Light constituents are distilled off from the oil at 1 atm. and the residue is distilled under high vac. (< 1 mm.). Paraffin wax is determined in the distillate by the Heinze-Zwergal method, using CHCl<sub>3</sub> and tricresol (B., 1935, 391). The amount of wax found by this method is usually < by those methods in which asphaltic matter is removed by H<sub>2</sub>SO<sub>4</sub> or filter earth. It is considered that no wax is formed during distillation. The m.p. of wax obtained by the latter method from asphaltic-base oils is < that of the wax obtained, e.g., by acid-refining. This is ascribed to the presence of ceresin, which is decomposed by distillation. C. C.

**New German cracking process [for petroleum oil].** C. H. BORRMANN (Oel u. Kohle, 1935, 11, 437—438).—Crude oil enters an evaporator (*E*) tangentially near the top, the stream of oil forming a spiral around the walls of *E*. Vaporised oil passes to a fractionator (*F*) from which products heavier than gasoline return through a cracking coil to *E*. Gasoline and cracked gases obtained from *F* pass to condensers from which light and heavy benzines are obtained and the gas is liberated. Heavy residue from *E* is distilled in a separate tower for the production of asphalt. C. C.

**Vapour-phase cracking. II. Decomposition products, with special reference to cracked gas.** H. OTSUKA (J. Soc. Chem. Ind., Japan, 1935, 38, 305—306 B; cf. B., 1934, 707).—Gas oil cracked (cf. B., 1934, 707) at 720 mm. and a charge rate of 5 g. per min. yields a distillate falling from 86% (7.2% of b.p. < 200°) at 550° to 52.5% (19.4% of b.p. < 200°) at 750°. The higher cracking temp. favours the formation of aromatic hydrocarbons with corresponding decrease in unsaturated hydrocarbon. The gas yields rise from 2.25 litres per 100-g. charge at 550° to 35.6 litres at 750°. Higher temp. favours the formation of H<sub>2</sub> and CH<sub>4</sub>, whereas C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, and C<sub>3</sub>H<sub>6</sub> are formed principally at lower temp. F. N. W.

**Vapour-phase clay treatment of cracked gasoline.** H. M. STEININGER (Ind. Eng. Chem., 1934, 26, 1039—1044).—Data presented on the properties of cracked gasolines treated in the vapour phase with clay indicate that as the clay usage time is increased, good initial colour is retained, but stability in dark and in sunlight and the gum-induction period decrease. After treating 5000—6000 barrels of gasoline, the clay effects no improvement in gum-induction period. Sweetened stocks show improved stability in dark, but decreased in sunlight. Blends of virgin with clay-treated cracked material are more stable in dark storage than the straight-cracked material. In sunlight, however, the order of stability is approx. the same in both cases. Treatment at high pressure and temp. with resulting longer contact time gives an improved product. It is shown that besides rate of treatment and clay usage, type of stock and cracking conditions are important. Low colour-stability of stocks treated after high clay usage is easily improved by use of butyl- or amyl-amines. C. L. G.

**Distribution of aromatic hydrocarbons in Rumanian benzines.** CERCHEZ (Oel u. Kohle, 1935, 11, 474—476).—Three benzines [from Moreni (*M*), Boldesti (*B*), and Arbanasi (*A*)] were fractionated and the *d* and % aromatics determined for every 2° fraction. *d* for each fraction rises uniformly, the rate of increase being greater below 100°. The aromatic content in each fraction rises with the b.p. of the fraction, and for *M* and *B* the curve flattens and becomes almost horizontal at about 80° and 110°. Curves are also given showing the total amount of aromatics in each fraction (vol.-%). For benzines from *A* and *M* the curves are similar. C. C.

**Separation of petroleum hydrocarbons with silica gel.** B. J. MAIR and J. D. WHITE (J. Res. Nat.

Bur. Stand., 1935, 15, 51—62).—Aromatic and olefine hydrocarbons can be separated from paraffins and naphthenes by filtration through  $\text{SiO}_2$  gel. The adsorptive capacity for diamylene is about one third of that for aromatic hydrocarbons. The adsorptive power increases with increasing aromatic hydrocarbon concn. in the mixture and also varies with the aromatic hydrocarbon present. Naphthenes are slightly more readily adsorbed than paraffins, and paraffins of low mol. wt. slightly more readily adsorbed than those of higher mol. wt. The  $\text{SiO}_2$  does not decompose a mixture of hydrocarbons under the experimental conditions used. A method is described, employing adsorption or  $\text{SiO}_2$  gel, for removal of  $\approx 15\%$  of the aromatic from naphthene or paraffin hydrocarbons, with recovery of  $\leq 98\%$ .

J. W. S.

**Removal of mercaptans from naphtha by caustic [soda].** J. HAPPEL and D. W. ROBERTSON (Ind. Eng. Chem., 1935, 27, 941—943).—The distribution coeffs. of mercaptans between dil. NaOH and a light, stabilised, cracked naphtha, from Luling crude, in a countercurrent scrubbing plant agree with the vals. obtained in laboratory experiments.

F. R. G.

**Separation of a dimethylcyclohexane fraction from a Mid-Continent petroleum.** R. T. LESLIE (J. Res. Nat. Bur. Stand., 1935, 15, 41—50).—By fractional distillation and crystallisation of the fraction, b.p. 119—121°, of a Mid-Continent petroleum a material of const. b.p. and f.p. has been obtained. Comparison of physical properties and crystal form with synthetic products suggests that it is mainly *m*-dimethylcyclohexane, with a little of another isomeride.

J. W. S.

**Synthesis of benzene from carbon monoxide by catalytic reduction under atmospheric pressure.** IV. S. WATANABE, K. MORIKAWA, and S. IGAWA (J. Soc. Chem. Ind., Japan, 1935, 38, 328—331 B; cf. B., 1934, 867).—Using the apparatus and method described previously (B., 1934, 867), the effect of CO in excess of the optimum mixing ratio of CO and  $\text{H}_2$  (or dilution with  $\text{N}_2$ ) is to increase the yield of gaseous olefines,  $\text{CO}_2$ , and oil, and to decrease the yield of gaseous paraffins. The reverse effects result from initial excess of  $\text{H}_2$ . The *d* and unsaturated hydrocarbon content of the oil produced decrease with increase of  $\text{H}_2$ . A theory covering the effects noted is outlined.

F. N. W.

**Production of gasoline by polymerisation of olefines.** C. R. WAGNER (Ind. Eng. Chem., 1935, 27, 933—936).—Gases from low-pressure vapour-phase cracking, containing  $\text{C}_2\text{H}_4$  20—24,  $\text{C}_3\text{H}_6$  13—18, and unsaturated  $\text{C}_4$  hydrocarbons 6—10%, were polymerised (after removal of  $\text{H}_2\text{S}$ ) on a semi-works scale at 355—511°/600—1000 lb. The max. yield, on the once-through basis (1.7 gals. of gasoline per 1000 cu. ft.) was obtained at 510°/800 lb. By recycling  $\text{C}_3\text{H}_6$  and  $\text{C}_4\text{H}_8$  (derived from stabilising the condensate) the yield was raised to 3.0 gals. The reaction is strongly exothermic and hence the ratio of recycled gas to fresh gas must be uniform, otherwise temp. and yield fluctuate widely. On a small commercial unit, at 525—537°/600—800 lb. with the ratio of recycled gas to fresh gas = 1.5, a yield of 3.23 gals. was obtained from absorber gas containing 59% of unsaturates, and 9.0 gals. from stabiliser reflux

containing 27% of  $\text{C}_3\text{H}_6$  and 66.5% of  $\text{C}_4$  compounds. If olefinic gases are heated to 592° and the temp. is allowed to rise to 643—698° by the heat of the reaction, an aromatic distillate of  $\text{C}_8\text{H}_{18}$  no. about 100 was produced.

C. C.

**Gasoline from waste cottonseed oil. II.** K. G. CHANG, H. Y. CHANG, and T. H. CHANG (J. Chem. Eng. China, 1935, 2, 32—37; cf. B., 1935, 179).—The NaOH extract from the refining of the crude oil was treated with CaO to yield a Ca soap, which was destructively distilled to yield gasoline. 100 g. of the crude oil yielded 80.3 g. of refined oil, 14.1 g. of gasoline products, 10.7 g. of glycerin, and 9 litres of combustible gas.

T. H. B.

**Knock characteristics of gasolines and their constituents.** T. SUWA (J. Fuel Soc. Japan, 1935, 14, 74—81).—A table gives the  $\text{C}_8\text{H}_{18}$  no. (*N*) and the chemical characteristics of 21 gasolines on the Japanese market. *N* varies from 50 to 69 (average 61). Compression ratios for incipient knock have also been determined for a no. of the fuels. *N* for 20% blends with either of 2 base fuels are recorded for a no. of hydrocarbons, phenols, and alcohols. *N* of the blends are termed "blending  $\text{C}_8\text{H}_{18}$  nos." Conclusions are drawn as to the relation between *N* and chemical structure. Curves are given showing *N* for various concns. of pure compounds in the base fuels. *n*- $\text{C}_7\text{H}_{16}$  and *iso*- $\text{C}_8\text{H}_{18}$  give straight lines, cyclohexane and its Me derivative give convex curves, whilst  $\text{C}_6\text{H}_6$  and PhMe give concave curves. The effect of alcohols increases linearly up to about 40%, when the curve becomes convex to the concn. axis. Cresols have a strong antiknock action which  $\propto$  the vol.-%, and it is suggested that they may be blended with base fuels to form secondary reference fuels of *N* > 70. Alternative reference fuels to A-3 and C-7 have been prepared from Japanese crudes.

C. C.

**Knocking characteristics of hydrocarbons.** W. G. LOVELL, J. M. CAMPBELL, and T. A. BOYD (Ind. Eng. Chem., 1934, 26, 1105—1108).—The crit. compression ratios (C.C.R.) at incipient knock of 103 pure hydrocarbons have been determined in a single-cylinder, variable-compression engine, using a method similar to Ricardo's H.U.C.R. method (except that speed was 600 instead of 1500 r.p.m.). The following relations between mol. structure and knocking characteristics have been developed. For paraffin hydrocarbons from  $\text{CH}_4$  to  $\text{C}_5\text{H}_{12}$  the C.C.R. decreases rapidly; above  $\text{C}_5\text{H}_{12}$  the decrease is slower. More compact spacing of C atoms gave increased C.C.R. (e.g., the val. for *n*- $\text{C}_7\text{H}_{16}$  was 2.8, but for  $\beta\beta\delta$ - $\text{C}_4\text{H}_7\text{Me}_3$  was 13.0). Generally C.C.R. vals. of unsaturated hydrocarbons are higher than those of corresponding paraffins, but  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ , and  $\text{C}_3\text{H}_6$  are exceptions. The effect of a double linking appears to increase as it approaches the centre of the mol. Naphthenes have lower C.C.R. vals. than the corresponding aromatics. cyclohexane derivatives have similar C.C.R. vals. to commercial gasolines. One double linking has little effect, but two or three of them within the ring exert a strong antiknock effect. Increasing the length of the chain decreases the C.C.R. and branching of the side-chain increases it. The C.C.R. vals. of mixtures of widely varying antiknock val. are not directly  $\propto$  concn. over the entire range. The

relative knocking characteristics of hydrocarbons determined in dil. solution with gasoline, and expressed as "NH<sub>2</sub>Ph equivs," do not necessarily correspond to the C.C.R. vals. of the pure hydrocarbon.

C. L. G.

**Colour-stabilisation of gasoline by amines.** L. V. SORG (Ind. Eng. Chem., 1935, 27, 156—160).—The optimum concn. and relative effectiveness of alkylamines in stabilising gasolines against discoloration in sunlight has been investigated. Measurements of varying intensities of sunlight were made with the UO<sub>2</sub>(OAc)<sub>2</sub>-H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> actinometer (A., 1931, 1019). Optimum concn. of the butyl- or amyl-amine to provide colour-stability against 1 hr. of sunlight was 0.002—0.003%, regardless of the original colour of the gasoline. The greatest improvement in colour-stability is obtained on stocks with the poorest original colour-stability. The NH<sub>2</sub>-group is probably responsible for the colour-stabilisation, this increasing with the no. of C atoms in the alkyl group. Effectiveness also decreases from primary through *sec.* to *tert.*-amines. For storage in the dark amines are not as effective as for sunlight exposure, but the trend is towards stabilisation. Sweetening treatment has little effect on the stabilising effect of the amines. The cost of amylamine treatment is \$0.01 per (U.S.) barrel of gasoline.

C. L. G.

**Effect of lead tetraethyl on preflame reactions in an engine.** L. WITHROW and G. M. RASSWEILER (Ind. Eng. Chem., 1935, 27, 872—879).—Photographs of absorption spectra of the gaseous charge in a single-cylinder engine fitted with quartz windows have been obtained, using a moving plate. Pressure records have been made at the same time. Reproductions of 10 spectra for a gasoline, with and without added PbEt<sub>4</sub> (I), each for different crank angles, are analysed. When (I) is added to the fuel there is a decrease in the continuous-absorption characteristic of non-inflamed charge prior to knock. At the moment (I) begins to reduce knock the absorption lines of at. Pb appears in the non-inflamed gas, but no PbO bands were observed. Experiments in which Pb was vaporised in a nichrome tube showed that the PbO bands appeared at a lower temp. than for Pb. It is concluded that PbO is reduced in the non-inflamed gas in the engine, *i.e.*, the PbO may be acting as an oxidising agent at the moment the anti-knock agent takes effect.

C. C.

**Viscosity of hydrocarbon solutions. Solutions of methane and propane in crystal oil.** B. H. SAGE, J. E. SHERBORNE, and W. N. LACEY (Ind. Eng. Chem., 1935, 27, 954—956).— $\eta$  for saturated solutions of CH<sub>4</sub> and C<sub>3</sub>H<sub>8</sub> in crystal oil have been measured over the range 38—94° for saturation pressures up to 3000 lb./sq. in. abs. for the former gas and up to 70% of the v.p. of C<sub>3</sub>H<sub>8</sub> in the latter case. Results are given in a series of curves.  $\eta$  falls with increasing pressure and rising temp., but the decrease is less rapid at the higher temp. For C<sub>3</sub>H<sub>8</sub> the curve for const. saturation pressures with variable composition show that  $\eta$  actually increases over a limited temp./pressure range, the effect being due to the rapid decrease in solubility with rise in temp. partly or wholly compensating for the decrease in  $\eta$  with temp.

C. C.

**Gum deposits in gas-distribution systems. Vapour-phase gum (contd.).** C. W. JORDAN, A. L. WARD, and W. H. FULWEILER (Ind. Eng. Chem., 1934, 26, 1028—1038; cf. B., 1934, 227).—The sticking of pilot-light needles etc. in such systems may be caused by deposition of 0.015 mg. of gum with larger quantities of dirt, Fe<sub>2</sub>O<sub>3</sub>, and grease. White crystals (product of cyclopentadiene) are deposited first, these resinifying and accumulating dirt etc. Prolonged storage of gas will lessen the no. of gum particles passing into the system. An immunity period, which may be 2.5 years, is at first given by chemical reaction with the surfaces of adsorption and absorption by oil etc. It is concluded that to ensure freedom from gum the content of NO must be reduced to 0.000005 vol.-%. Methods which have been tested to prevent gum deposition are reviewed. These all prove uneconomical or unsatisfactory, though H<sub>2</sub>O-spraying has been used with success in some districts.

C. L. G.

**Physico-chemical measurements in the [petroleum] oil industry. The dielectric constant.** R. BÜLL (Oel u. Kohle, 1935, 11, 499—503).—For pure hydrocarbons, the dielectric const. ( $\epsilon$ ) increases with the length of the chain and also with ring-closure. With petroleum distillates,  $\epsilon$  increases with rising b.p. (*e.g.*, from 2.020 for b.p. 200—270° to 2.382 for b.p. 500—550°). Examination of a series of raffines of increasing  $\eta$  showed that max.  $\epsilon$  is given at  $\eta$  8.5—12.5° E. Used lubricating oil has a higher  $\epsilon$  than the original oil. When  $\epsilon$  is  $\gtrsim 3$ , *i.e.*, for all paraffin hydrocarbons,  $\epsilon = n^2$ . The deviation of  $\epsilon$  from  $n^2$  gives some information concerning the proportions of aromatic and unsaturated hydrocarbons present. The more highly refined is the oil, the more nearly does  $\epsilon$  approach  $n^2$ . From measurements of  $\epsilon$  on fractions from distillations it is possible to follow to some extent the composition of the distillate, *e.g.*, to obtain the point at which all EtOH has distilled over during distillation of an alcohol fuel. If activated C or bleaching earth is treated with "Exluan" (consisting mainly of dioxan) and  $\epsilon$  determined on the extract, the H<sub>2</sub>O content of the earth can be obtained ( $\epsilon$  for H<sub>2</sub>O is 80 and for Exluan 2.23). Exluan quickly and completely extracts H<sub>2</sub>O from such solids.

C. C.

**Cold test for fuels.** B. H. MOERBEEK and A. C. VAN BEEST (Inst. Petroleum Tech., Preprint, Jan. 8, 1935, 21—34).—The disadvantages of the A.S.T.M. pour-point test (D. 97—33) (A) and of the I.P.T. setting-point test (B) on waxy fuel oils are outlined. A gives a max. pour point which is generally well above the temp. at which the oil can be pumped and also depends on the previous thermal history of the sample, and B a min. pour point which is frequently below that at which the fuel is just usable. Neither test gives true max. or min. pour points. The sensitivity of fuels to the effect of preheating is attributed to the deposition of a skin of asphaltenes on the wax crystals on cooling down. This prevents the formation of a close network of wax crystals and lowers the pour point, and can be avoided by heating the fuel to 100°, cooling to 0° (to ppt. wax and asphaltenes), and reheating to 35°, at which temp. only the wax goes into solution. Fuels treated thus are relatively insensitive to previous thermal history. A



test is described in which oils treated thus are recooled and the temp. at which they will just flow under a pressure of 20 cm. Hg is determined. This test has the advantage of simulating practical conditions to a greater extent than do tests *A* and *B*. C. L. G.

**Spontaneous ignition of petroleum fractions.** P. J. WIEZEVIK, J. M. WHITELEY, and L. B. TURNER (Ind. Eng. Chem., 1935, 27, 152—155).—Determinations of spontaneous ignition temp. (S.I.T.) in air of fractions from W. Texas, Pennsylvanian, and Colombian crudes in a described apparatus showed that under open conditions no ignition occurs up to 510°. Under closed conditions gasoline fractions gave S.I.T. vals. of approx. 288°, kerosenes decreasing to 250° and lubricating oils rising to 377° and 432°. Similar results were obtained with fractions of the different origins mentioned. Tests in O<sub>2</sub> under pressure resulted in detonation and burning of metal, but introduction of N<sub>2</sub>, steam, etc. reduced the danger. From data from other investigators it may be concluded that for the same no. of C atoms the decrease in S.I.T. falls in the following order: aromatics, alkylated aromatics, naphthenes, alkylated naphthenes, straight- and branched-chain paraffins, and unsaturated aliphatics, thus giving a method of investigating the structure of petroleum fractions. C. L. G.

**Lubricating oils from ethylene.** R. G. ATKINSON and H. H. STORCH (Ind. Eng. Chem., 1934, 26, 1120—1122).—Low- $\eta$  lubricating oils of good quality have been produced from C<sub>2</sub>H<sub>4</sub> (97% pure) by two-stage polymerisation. The C<sub>2</sub>H<sub>4</sub> is first thermally polymerised in a bomb at 371° under an initial pressure of about 1000 lb. per sq. in., yielding a highly unsaturated oil of boiling range 20—300°, with about 50% distilling over at 150°. The residual gas was largely C<sub>2</sub>H<sub>4</sub> and could therefore be recirculated. The thermal polymeride was further treated with AlCl<sub>3</sub> at room temp. in an agitator and filtered after dilution with naphtha. After removing the naphtha, vac. distillates were taken off the filtrate oil. The lighter distillates had good  $\eta$  indices, but the vals. for the heavier distillates were lower (attributed to their more naphthenic character). The oil retained on the AlCl<sub>3</sub> was highly unsaturated and dark, but could probably be converted into a suitable lubricant by hydrogenation. The advisability of polymerising with AlCl<sub>3</sub> only the lighter thermal polymerides is emphasised. C. L. G.

**Constitution of the lubricating oils prepared from kogasin II.** H. KOCH and G. IBING (Brennstoff-Chem., 1935, 16, 261—268; cf. B., 1934, 744).—The alkyl chlorides obtained as previously described (B., 1935, 709) were treated with activated Al, or, after admixture with C<sub>6</sub>H<sub>6</sub> or xylene, with anhyd. AlCl<sub>3</sub>. The following types of compounds were identified in the reaction products: (a) the hydrocarbon corresponding to the alkyl chloride, (b) an alkylbenzene, in which, however, the paraffin chain had one less CH<sub>2</sub> group than had the original alkyl chloride, (c) a hydrocarbon containing one double linking and one or two naphthene rings, formed by the condensation of two mols. of the alkyl chloride, (d) diphenylparaffins, mixed with compounds of type (c), when dichlorides were used, (e) compounds formed by the condensation of  $\leq 2$

mols. of the alkyl chloride together with the aromatic hydrocarbon. All the products were free from Cl. The compounds of type (c) and (e) had the flattest  $\eta$ -temp. curves. Introduction of an aromatic nucleus into a mol. increased  $\eta$  of the compound, but increased also the slope of the  $\eta$ -temp. curve. The relation between constitution,  $\eta$ , and lubricating val. is briefly discussed. A. B. M.

**Nature and quality of Russian lubricating oil.** E. W. STEINITZ (Petroleum, 1935, 31, No. 32, 6—7).—It is claimed that Russian lubricating oils, the main constituents of which are naphthenes (I) and aromatics, possess advantages over oils from other sources mainly due to (I). The setting point is low, they are resistant to the action of air or O<sub>2</sub>, and do not form excessive deposits in compressors or internal-combustion engines. The Conradson C residue is low whilst carbonaceous deposits in the cylinders are not resinous, but are soft and oily. C. C.

**Graphited lubricants and bearing metals.** W. LENZ (Petroleum, 1935, 31, No. 33, Motorenbezt., 8, 4—5).—Comparative tests on lubricating oils with and without added graphite show that the lubricating efficiency of graphited oils is not appreciably affected by the nature of the bearing metal. Thus with a mild-steel shaft and cast-Fe bearings, seizure occurred with a straight oil under a load of 8 kg./sq. cm., whilst with 0.5% of added graphite the temp. was  $\gt 30^\circ$  up to a load of 30 kg./sq. cm. C. C.

**Resistance of lubricating oils to pressure.** T. RABINOVITCH (Petroleum, 1935, 31, No. 28, 9—14; No. 33, 4—8).—The lubricating properties of lubricating oil films under increasing load have been investigated, using the Kammerer and Welter machine in which the load, speed, temp., and efficiency can be measured. The turning moment of the shaft is measured by a torsion dynamometer, temp. by a Hg thermometer, and the load is applied by a lever. The change of the type of friction, e.g., from fluid to semi-fluid, is indicated by measuring the electrical conductivity through the oil film, using a circuit incorporating a valve amplifier. A sudden increase in conductivity takes place when breakdown of the film occurs. If temp. (*T*) is plotted against mean surface pressure, *T* rises approx. logarithmically up to a given load, when a slight increase in pressure causes a rapid rise in *T*. This occurs at the transition point between fluid and semi-fluid friction. Mathematical expressions are given for calculating coeff. of friction and the theoretical temp. of the oil film. C. C.

**Behaviour of automobile lubricating oils at low temperatures.** A. BAADER (Oel u. Kohle, 1935, 11, 471—474).—Five motor lubricating oils representing oils marketed [in Germany] were examined by the usual tests and more particularly as regards their behaviour below the setting point. Differences in the frozen oils could not be detected by their appearance or by touch. The "viscosity" at  $-35^\circ$  (*V*) was determined as the time taken to withdraw a Cu tube immersed in the oil, maintained at  $-35^\circ$ , by the pull exerted by a wt. attached to the tube by a cord passing over pulleys. *V* showed no relation to the  $\eta$  curve

of the fluid oils. Similarly no definite relationship exists between  $V$  and the setting point. It appears desirable to fix a max. (*e.g.*,  $-20^\circ$ ) for this point and possibly a max.  $\eta$  at  $-20^\circ$ . A limit should also be fixed for the loss on evaporation, to exclude oils containing light constituents added to reduce the setting point and  $V$ . C. C.

**Pressure-volume-temperature relations for fractions of an oil.** R. B. DOW and M. R. FENSKE (Ind. Eng. Chem., 1935, 27, 165—168).—Fractions of Mid-Continent lubricating oil have been examined at normal and at high pressures in an attempt to discover a possible relation between the thermodynamic properties of oils and their composition. Data are presented on the results of vac. fractionation of the oil,  $d^{40}$  and  $d^{75}$ , the kinematic viscosities at  $37.8^\circ$  and  $98.9^\circ$ , and  $\eta^{20}$  of the original oil, distillates, and bottoms. The vols. of the oils at  $40^\circ$  and  $75^\circ$  at different pressures relative to the vol. at 1 atm. are plotted graphically and the variation of thermal expansion with pressure is shown similarly. C. L. G.

**Determination of bromine or iodine values of mineral lubricating oils.** E. E. CASIMIR and M. DIMITRIU (Petroleum, 1935, 31, No. 33, 1—4).—Comparative tests have been made of the McIlhiney and Wijs methods for determining the unsaturation of lubricating oils. The former method is preferred since substitution also occurs in the Wijs method. In the case of the McIlhiney method, precautions must be taken to reduce hydrolysis of the halogen compounds formed to a min., otherwise high results are obtained for the amount of substituted halogen. The halogen added should not be in too great excess (50—70%), the reaction time should be short (15—30 min.), the reaction should proceed in the dark at low temp., the final titration should be rapid, and the first end-point taken as correct. C. C.

**Determination of ash in used lubricating oils, especially those containing water.** F. SCHEMELING (Oel u. Kohle, 1935, 11, 433—434).—For ashing dry oils, a Sn-plate cover with a central hole is fitted to the dish (which is heated in the usual way) and the vapours are ignited by a second burner placed horizontally above the orifice. The charred residue is ignited in a muffle. When the oil contains  $H_2O$ , the major portion of the latter is removed by stirring with folded ashless filter paper previously wetted by EtOH. A layer of EtOH is poured on to the surface of the oil and the paper is placed flat on the surface and ignited. C. C.

$\eta$  of mixtures. Modified Orsat apparatus.—See I. Demonstrating explosive gases.—See XXII.

See also A., Aug., 937, Combustion of hydrocarbon fuels. 948, Rapid determination of  $H_2S$  in gases.

## PATENTS.

**Cleaning of coal.** K. PRINS (B.P. 431,801, 20.3.34).—Coal is fed on to a layer of fine coal and both are conveyed to a series of pans which are given a combined vertical and longitudinal reciprocation. Skimmers over each pan divert the cleaned coal, which remains on the surface, into collecting channels; the refuse falls into the fine coal, which is re-used. D. K. M.

**Washer boxes for coal.** SIMON-CARVES, LTD., and J. ROBSON (B.P. 431,865, 17.1.34).—A control float completely submerged in two strata of solids is provided with a positive stop to prevent it emerging. B. M. V.

**Apparatus for distilling carbonaceous material.** J. N. VANDEGRIFT and C. POSTEL, Assrs. to INTERNAT. BITUMEN OIL CORP. (U.S.P. 1,976,816, 16.10.34. Appl., 11.8.30).—Carbonaceous material is coked in a horizontal cylindrical rotary retort ( $R$ ) and part of the flue gas used for heating  $R$  and free from  $O_2$  is introduced into  $R$  at the feed end to prevent caking. A horizontal tube is placed inside  $R$  at the discharge end and extends for about a third of its length. By applying suction to the external end of this tube the volatile products are drawn through it and cracked. Steam may be introduced to assist the cracking. D. K. M.

**Retorts for distillation, calcination, or heat-treatment of coal, shale, peat, wood, and other suitable fragmentary solid or semi-solid materials.** S. MOORE (B.P. 430,969, 2.1.35).—The material is conveyed through an externally-heated horizontal retort by means of an endless band-conveyor of push-plate or similar type. An adjustable levelling plough provided within the inlet end of the retort distributes and compresses the material evenly into the spaces between the push-plates. A. B. M.

**Heat-treatment of carbonaceous material.** H. P. STEPHENSON (B.P. 431,063, 29.12.33 and 12.4.34).—A (3 : 1) mixture of pulverised coal with oil, together with a catalyst, is injected under pressure, either continuously or intermittently, into a preheater, and thence into one end of a slightly coned, horizontal carbonising chamber. The latter is heated by means of a central flue in such a manner that the coal-oil mixture passes through zones of progressively rising temp., *e.g.*, from  $300^\circ$  to  $600^\circ$ . The products are discharged into a chamber from which the solid residue is periodically withdrawn. The whole of the volatile products may also pass into this chamber and thence to a condensing system, or the greater part of them may be withdrawn through valves arranged at intervals along the retort. A. B. M.

**Coking of powdered coal and like hydrocarbonaceous fuel.** F. L. DORNBROOK and M. K. DREWRY (B.P. 430,587, 19.1.34. Cf. B.P. 417,555; B., 1935, 55).—Pulverised caking coal is oxidised by exposing it to hot gases containing  $O_2$ , the conditions being so chosen that the finer particles lose their caking power and form a coating for the larger particles, which are thereby prevented from agglomerating. After separation from the gases the oxidised coal is transferred to a retort wherein it is carbonised without being brought into direct contact with the heating gases. The hot, powdered coke is fed directly to the furnace of a boiler. Apparatus is described. A. B. M.

**Production of gas of high calorific value.** METALLGES. A.-G. (B.P. 431,030, 20.12.34. Ger., 8.1.34. Addn. to B.P. 364,407; B., 1932, 248).—Solid carbonaceous fuel is gasified under pressure, as described in the prior patent, but using a mixture of air and steam as gasifying agent. The conditions are so chosen as to give a gas containing substantial amounts of  $CH_4$  and other hydrocarbons. The  $CO$  and part of the  $N_2$  are subsequently

removed, *e.g.*, by supercooling, leaving a product suitable for use as town's gas. The CO may be catalytically converted into  $\text{CH}_4$  and  $\text{H}_2$ , either before or after its separation from the gas. A. B. M.

**Purification of combustible gases.** W. C. HOLMES & Co., LTD., C. COOPER, and D. M. HENSHAW (B.P. 430,989, 27.12.33).—Coal gas etc. is scrubbed with a sufficient vol. of oil, *e.g.*, 30 gals./1000 cu. ft., to remove substantially all the volatile hydrocarbons such as  $\text{C}_6\text{H}_6$ , a proportion of which is subsequently returned to the gas to restore it to the desired calorific val. This may be effected by only partly stripping the wash oil and returning it to the gas while it still contains a substantial proportion of the  $\text{C}_6\text{H}_6$  etc.; or the wash oil may be completely stripped and a part of the light oil revaporised into the gas. A. B. M.

**Separation of sulphur from gases containing hydrogen sulphide.** DR. C. OTTO & Co., G.M.B.H. (B.P. 430,865, 25.7.34. Ger., 25.7. and 5.12.33).—The gas is washed with a liquid, preferably a coal-tar oil, containing  $\text{SO}_2$ , and having in solution an org. base, *e.g.*,  $\text{C}_5\text{H}_5\text{N}$ ,  $\text{NH}_2\text{Ph}$ , and a substance, *e.g.*, EtOH or PhOH, capable of dissolving org.-base sulphites. The deposited S is separated and then washed with  $\text{C}_6\text{H}_6$ -EtOH to produce a highly pure form of S. The S oxyacids are removed from the system in the aq. layer which is formed; the org. base also removed in this solution is recovered and returned to the system. A. B. M.

**Removal of carbon disulphide from gases.** C. J. HANSEN and K. EYMANN, Assrs. to KOPPERS Co. of DELAWARE (U.S.P. 1,964,572, 26.6.34. Appl., 30.6.31. Ger., 30.6.30).—The gas is passed through aq.  $(\text{NH}_4)_2\text{S}_2$ , which absorbs the  $\text{CS}_2$  to form  $(\text{NH}_4)_2\text{CS}_3$ ; the solution is boiled to produce  $\text{NH}_4\text{CNS}$  (I) and S, then saturated with  $\text{SO}_2$ , and heated under pressure to convert the (I) into  $(\text{NH}_4)_2\text{SO}_4$ , S, and  $\text{CO}_2$ . A. R. P.

**Disposal of gas-works effluents and the like.** HAYWARDS HEATH DISTRICT GAS Co., and A. E. WHITCHER (B.P. 430,630, 8.10.34. Addn. to B.P. 407,374; B., 1934, 532).—Ammoniacal liquor etc. is evaporated by being sprayed on to evaporating surfaces, *e.g.*, fireclay tiles, extending transversely, and arranged in groups stepped vertically, in a current of hot waste gases. A. B. M.

**Manufacture of solutions of natural asphalt.** A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 432,406, 22.11.34. Ger., 20.12.33).—Natural asphalt insol. in benzene is dissolved in a mixture of the latter with a small proportion (4–6%) of compound containing <math>\text{C}</math> 1 CO group which itself does not dissolve the asphalt, *e.g.*,  $\text{C}_6\text{H}_5\text{COMe}_2$ . Fillers, pigments, drying oils, etc. may be incorporated in the solution. C. C.

**Manufacture of bituminous emulsions.** W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 430,917, 27.12.33).—The stability of bituminous emulsions in which insol. humic acid, a salt thereof, or similar insol. material is used as an emulsifying agent is improved by the addition of a small proportion, *e.g.*, 0.1–0.5%, of a neutral salt, *e.g.*, NaCl,  $\text{Na}_2\text{SO}_4$ ,  $\text{CaCl}_2$ . A. B. M.

**Destructive hydrogenation of carbonaceous materials, particularly high-temp. tars.** CHEM.

REACTIONS, LTD., and J. BURNS (B.P. 430,364, 29.12.33).—The raw material, mixed with  $\text{H}_2$  under pressure (200 atm.), is heated up to reaction temp. (350–500°) in a pipe still and then passed through another coil in a separate furnace compartment wherein it is maintained at the reaction temp. for the desired time; it is discharged thence into a separating vessel. Conditions of turbulent flow are maintained in both coils. A catalyst may be incorporated in the raw material. A. B. M.

**Production of hydrocarbons by heat-treatment of carbonaceous materials.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 430,655, 15.12.33).—In the production of benzene by destructive hydrogenation of middle oils in the vapour phase a means is provided for supplying a proportion of the preheated middle oil, or other hydrocarbon oil, to the reaction chamber at one or more points some distance from the inlet. A product having a desired b.-p. curve can thereby be obtained. A. B. M.

**Production of liquid hydrocarbons by thermal treatment of carbonaceous materials.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 432,489, 22.1.34).—Prior to heat-treatment and/or destructive hydrogenation of solid carbonaceous material, *e.g.*, coal or peat, the basic constituents are neutralised by aq. mineral or org. acids, and subsequently, during the treatment, substances which yield acid products under the reaction conditions, *e.g.*, org. halogen compounds or metalloidal halides, are added. In the case of hydrogenation 0.02–10% of catalyst (metal compounds of groups II–VIII) are added to the starting material, and substances for reducing the surface tension between  $\text{H}_2\text{O}$  and solid are added to the acid or the catalyst. Hydrogenation is effected at 400–600° (410–475°)/100–1000 atm. C. C.

**Breaking of petroleum emulsion.** C. H. M. ROBERTS, Assr. to TRETOLITE Co. (U.S.P. 1,979,347, 6.11.34. Appl., 13.4.33).—The emulsion is cut by treatment with a halogenated hydroxy-, aldehydo-, or keto-derivative of a petroleum hydrocarbon. The preferred reagent is produced from Pennsylvania petroleum distillate (b.p. 250–325°,  $d^{20}$  0.8125) by treatment as in U.S.P. 1,681,237 (B., 1928, 865). The product is a mixture containing <math>\text{C}</math> 70% of aldehydo-fatty acids and <math>\text{C}</math> 30% of a mixture of aldehydes and unaltered hydrocarbons. The acids obtained on distillation are chlorinated for use in treating the emulsions. D. K. M.

**Preventing choking of oil wells and the like.** J. T. KING (U.S.P. 1,979,558, 6.11.34. Appl., 27.8.34).—A liquid consisting of a solvent, *e.g.*,  $\text{C}_6\text{H}_6$ , a carrier, *e.g.*, rubber gum, and a diluent, *e.g.*, coal oil or kerosene, is forced to the blockage, where it dissolves the congealed base. D. K. M.

**Treatment of mineral oils.** H. SUIDA, H. PÖLL, and A. NOWAK (B.P. 432,249, 17.12.34. Austr., 15.12.33).—Mineral oils, *e.g.*, lubricating oils, are treated with anhyd. crude cresol, whereby the naphthenes (I) and aromatics (II) are extracted and separated from the paraffinic constituents. (I) are separated from the extract by saturating with  $\text{H}_2\text{O}$ , while (II) and resin constituents remain in the aq. cresol. C. C.

**Treatment of hydrocarbon oils, and improved oils resulting therefrom.** STANDARD OIL CO. (B.P. 432,478, 20.11.33. U.S., 21.11.32).—Mineral oils, *e.g.*, lubricating oils, are extracted with  $\sphericalangle$  two solvents simultaneously, one having a greater solvent power for naphthenes than the other, *e.g.*, phenols, and the other a greater solvent power for paraffins, *e.g.*,  $C_3H_8$  and other hydrocarbons of low b.p. The resultant solution is cooled (by allowing  $C_3H_8$  to expand) until the naphthene solvent separates. Dewaxing of the paraffin fraction may be accomplished at the same time by cooling sufficiently to cause crystallisation of the wax, a process facilitated by the antisolvent action of  $C_3H_8$  on wax. The latter is removed mechanically. C. C.

**Refining of petroleum products.** E. C. HIGGINS, JUN., and F. T. GARDNER (U.S.P. 1,977,631, 23.10.34. Appl., 8.6.31).—Petroleum distillates are passed upward through  $H_2O$ , mixed with a solution of S in gasoline, and passed upward through a bed of brucite, whereby acidity is neutralised and mercaptans are converted into org. disulphides. When necessary the brucite is rejuvenated by treatment with hot  $H_2O$ . D. K. M.

**Treatment [refining] of hydrocarbon oils.** J. C. MORRELL and G. EGLOFF, ASSRS. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,979,565, 6.11.34. Appl., 29.1.31).—The gum-forming constituents are reduced and colour is improved by subjecting cracked petroleum products, especially those of low b.p., to the action of  $SO_2$  and gas containing  $O_2$ , *e.g.*, air, with or without steam, in presence of a heavy-metal oxide, *e.g.*,  $ZnO$ , in the vapour phase at 120–315°, followed by neutralisation of the condensed vapours. D. K. M.

**Dewaxing of oil.** P. J. CARLISLE, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,978,010, 23.10.34. Appl., 15.9.31).—Hydrocarbon oil is mixed with  $CH_2Cl_2$ , with or without other wax solvents, *e.g.*, naphtha or  $BuOH$ , cooled to  $< 0^\circ$ , and the wax separated. D. K. M.

**Transformation of hydrocarbons.** E. G. M. R. LÉGÉ (B.P. 432,368, 1.2.34. Ger., 15.2. and 29.7.33).—Solid, liquid, or gaseous hydrocarbons are treated with a large excess of  $H_2SO_4$  ( $d$  1.498–1.820) at 150–300°/approx. 1 atm. while a current of steam, or steam and air, is injected into the reaction mixture with or without added catalyst, *e.g.*, metals or metallic compounds of Fe, Ni, Cu, etc. which dissolve in  $H_2SO_4$ . Partial or complete carbonisation is effected. To obtain hydrocarbons (mainly naphthenes) as the chief product, the max. temp. should be  $\sphericalangle$  200–250°, whilst to obtain C the temp. may be 250–300°. C. C.

**Polymerisation products from unsaturated hydrocarbons.** STANDARD OIL DEVELOPMENT Co. (B.P. 432,310, 10.5.34. U.S., 6.6.33).—Highly viscous to plastic solid polymerisation products (mol. wt.  $> 800$ ) are prepared by treating cracked hydrocarbons (b.p.  $< 49^\circ$ ), particularly those containing *isobutylenes* and other *isolefines*, with an active halide polymerising agent, *e.g.*,  $BF_3$ ,  $AlF_3$ , in the liquid phase at  $< 38^\circ$  ( $< 27^\circ$ ). High-mol. wt. polymeride is separated from the mixture, and when it is added in small proportions to lubricating oil the  $\eta$ -temp. characteristics of the latter are improved. C. C.

**Motor-fuel lubricating and anti-knock materials.** G. F. RUDDIES (U.S.P. 1,980,097, 6.11.34. Appl., 7.2.30).—Mono- and/or di-esters of dicarboxylic acids, *e.g.*,  $Bu_2C_2O_4$  or  $C_6H_4(CO_2Bu)_2$ , with or without graphite and an oxidation promoter, *e.g.*, V or Pt chloride, is introduced with the fuel into the cylinder of an internal-combustion engine. D. K. M.

**Refining of [lubricating] oil.** H. W. CAMP, ASSR. to EMPIRE OIL & REFINING Co. (U.S.P. 1,961,898, 5.6.34. Appl., 17.8.32).—Blue bloom is removed by heating the oil for 10 min. at 205° in contact with a 1 : 1 mixture of decolorising clay and finely-divided cracking-still coke containing volatile matter 10–20 and fixed C 90–80%. A. R. P.

**Lubricant containing a cellulose derivative.** K. C. D. HICKMAN, ASSR. to EASTMAN KODAK Co. (U.S.P. 1,963,901, 19.6.34. Appl., 17.4.31).—Claim is made for a jelly produced by dissolving cellulose stearate and/or acetate in hot sperm or castor oil, and cooling. A. R. P.

**Lubricating grease.** E. N. KLEMGARD, ASSR. to SHELL DEVELOPMENT Co. (U.S.P. 1,979,943, 6.11.34. Appl., 28.7.30).—A mixture of Al soap, *e.g.*, Al stearate, mineral oil, and uncoagulated rubber from latex ( $< 5\%$ ) is made at 120–260°. D. K. M.

**Screening appliances for coal and the like.** G. E. A. THOMAS, and EMLYN ANTHRACITE COLLIERY, LTD. (B.P. 432,240, 29.6.34).

**[Burner for] combustion of powdered or granulated fuel.** J. M. WHITEHOUSE and A. J. H. HADDAN (B.P. 432,379, 24.3.34).

**Cracking of oils.** W. F. MOORE, ASSR. to TEXAS Co. (U.S.P. 1,985,053, 18.12.34. Appl., 18.4.28).

**Treatment [cracking] of [petroleum] oils.** D. G. BRANDT, ASSR. to DOHERTY RESEARCH Co. (U.S.P. 1,985,440, 25.12.34. Appl., 24.9.26).

**Cracking of hydrocarbons.** (A) E. C. HERTHEL, (B) W. S. GULETTE, ASSRS. to SINCLAIR REFINING Co. (U.S.P. 1,983,664 and 1,985,029, [A] 11.12.34, [B] 18.12.34. Appl., [A] 18.8.26, [B] 16.12.29).

**Vapour-phase cracking [of hydrocarbon oils].** M. B. COOKE and H. C. SCHUTT, ASSRS. to ALCO PRODUCTS, INC. (U.S.P. 1,984,569, 18.12.34. Appl., 12.3.32).

**Handling residuum [from cracking of hydrocarbon oil].** J. CUTTER, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,983,659, 11.12.34. Appl., 19.3.27. Renewed 21.6.33).

**Conversion of hydrocarbon oils.** K. SWARTWOOD, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,984,662, 18.12.34. Appl., 2.3.33). J. K. ROBERTS, ASSR. to STANDARD OIL Co. (INDIANA) (U.S.P. 1,985,214, 18.12.34. Appl., 29.4.33). E. W. BEARDSLEY and A. P. SACHS, ASSRS. to PETROLEUM CONVERSION CORP. (U.S.P. 1,985,233, 25.12.34. Appl., 6.10.28).

**Thermal decomposition of hydrocarbons.** F. M. PYZEL, ASSR. to SHELL DEVELOPMENT Co. (U.S.P. 1,983,992, 11.12.34. Appl., 18.8.31).

**Conversion of hydrocarbons.** F. E. FREY, ASSR. to PHILLIPS PETROLEUM Co. (U.S.P. 1,987,007, 8.1.35. Appl., 22.11.32).

**Treatment of hydrocarbons.** D. B. MAPES, ASSR. to FRANKFORTER OIL PROCESS, INC. (U.S.P. 1,985,680, 25.12.34. Appl., 2.7.31).

**Treatment of hydrocarbon oils.** (A) C. H. ANGELL, (B) P. MATHER and D. J. BERGMAN, ASSRS. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,983,688 and 1,984,686, [A] 11.12.34, [B] 18.12.34. Appl., [A] 11.3.32, [B] 27.4.31). W. K. HOLMES, ASSR. to TEXAS Co. (U.S.P. 1,985,926, 1.1.35. Appl., 28.12.28).

**Oil-refining apparatus.** N. WEBER, ASSR. to C. H. LEACH Co. (U.S.P. 1,985,068, 18.12.34. Appl., 13.4.32).

**Refining apparatus for hydrocarbons.** G. B. FINCH, ASSR. to J. W. DAVISSON and R. D. JONES (U.S.P. 1,985,083, 18.12.34. Appl., 24.4.33).

**Distillation of [hydrocarbon] oils.** H. L. DOHERTY, ASSR. to DOHERTY RESEARCH Co. (U.S.P. 1,984,522, 18.12.34. Appl., 31.1.30).

**Distillation of hydrocarbon oil.** M. G. PAULUS, ASSR. to STANDARD OIL Co. (U.S.P. 1,983,919, 11.12.34. Appl., 11.10.30).

**Preventing corrosion of apparatus for distilling hydrocarbon oils.** W. G. WHITMAN, ASSR. to STANDARD OIL Co. (U.S.P. 1,986,236, 1.1.35. Appl., 26.6.30).

**Fractionation of gasoline-like hydrocarbons.** C. R. WAGNER, ASSR. to PURE OIL Co. (U.S.P. 1,988,061, 15.1.35. Appl., 25.2.32).

**Dewaxing [of oils] by filtration.** E. W. REMBERT and B. V. VOORHEES, ASSRS. to TIDE WATER OIL Co. (U.S.P. 1,986,762, 1.1.35. Appl., 9.11.31).

**Apparatus for dehydrating oil and water emulsions.** W. C. BAILEY (U.S.P. 1,983,832, 11.12.34. Appl., 8.9.31).

**Production of luminous flame in furnaces.** L. A. MEKLER, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,984,687, 18.12.34. Appl., 23.5.29).

**Apparatus for clay-treating [lubricating] oils.** V. C. BENJAMIN (U.S.P. 1,987,175, 8.1.35. Appl., 26.7.32).

**Polymerisation reactions. Heating of fluids.**—See I.  $\text{SO}_2$  from refuse  $\text{H}_2\text{SO}_4$ . Revivifying  $\text{Mg}(\text{OH})_2$ .  $\text{H}_2$ .—See VII. Road surfacing. Testing paving mixtures.—See IX. C-black pigment. Bituminous moulded articles.—See XIII.

### III.—ORGANIC INTERMEDIATES.

**Esterification by reaction of soaps and chlorinated hydrocarbons.** T. YAMADA (J. Soc. Chem. Ind., Japan, 1935, 38, 361—363 B).—Up to about 35% esterification occurred on heating Na oleate, stearate, or naphthenate with the chlorination products of turpentine or tetralin for 10 hr. at 160°. Only 10% esterification occurred with chlorinated transformer oil. G. H. C.

**Synthesis of acetic acid from methyl alcohol and carbon monoxide.** A. D. SINGH and N. W. KRASE (Ind. Eng. Chem., 1935, 27, 909—914).—Apparatus is described for the quant. conversion of  $\text{MeOH}$  with  $\text{CO}$  into  $\text{AcOH}$  or  $\text{MeOAc}$  at 300—500°/2000—4000 lb. per sq. in. in presence of  $\text{C-H}_3\text{PO}_4$ . F. R. G.

**Technical preparation of formaldehyde.** M. KLAR (Chem.-Ztg., 1935, 59, 741—744).—A review.

**New aliphatic amines.** A. L. WILSON (Ind. Eng. Chem., 1935, 27, 867—871).—A survey of the literature with special reference to the industrial applications and solvent action of the aliphatic amines. F. R. G.

**Hydrolysis of members of the Naphthol AS series with sulphuric acid.** F. M. ROWE and C. H. GILES (J. Soc. Dyers and Col., 1935, 51, 287).—Naphthol-AS, -AS-BS, -AS-BO, and -AS-BR give the appropriate arylamine (I) in good yield and sulphonated 2-hydroxy-3-naphthoic acid when heated with 98%  $\text{H}_2\text{SO}_4$  at 100°. The progress of the hydrolysis can be followed conveniently by titrating (I) with  $\text{NaNO}_2$  solution. Naphthol-AS-RL and -AS-TR are unchanged by this treatment. S. C.

**Corncob charcoal. [Products from] phenoxide liquors. Mercaptans from naphtha. Dimethylcyclohexane from petroleum. Thiophen from  $\text{C}_6\text{H}_6$ . Lubricating oils from  $\text{C}_2\text{H}_4$ .**—See II. Sp. heats of gases.—See VII.

See also A., Aug., 940, Catalytic hydrogenation. 959, Prep. of  $\text{CHMeCl-CH}_2\text{Cl}$ . 961, Prep. of  $\text{H}_2\text{C}_2\text{O}_4$  from  $\text{HCO}_2\text{Na}$ . 966, Prep. of urea from  $\text{CO}_2$  and  $\text{NH}_3$ . 970, Prep. of 1-alkyl- $\beta$ -naphthols. Purification of benzonaphthol. 922, Prep. of aromatic alcohols. 976, Homo-amines and -acids. 980, Synthesis of  $\beta$ - $\text{C}_{10}\text{H}_7$ - $\text{COMe}$ . 995, Oxidation of o-toluenesulphonamide.

### PATENTS.

**Pyrolysis of olefines.** E. I. DU PONT DE NEMOURS & Co. (B.P. 432,430, 26.1.34. U.S., 27.1.33).—An olefine having  $< \text{C}_{10}$  is heated at 550—650° in a vessel having a large ratio of vol. to surface, in presence of  $\geq 5$  (0.5—1.0)% of  $\text{O}_2$ . *E.g.*,  $\text{C}_2\text{H}_4$  at 600° gives  $\text{C}_3\text{H}_6$  59.3,  $\text{C}_4\text{H}_8$  12.2, and  $\text{C}_5\text{H}_{10}$  28.4%;  $\text{C}_3\text{H}_6$  at 600° gives  $\text{C}_4\text{H}_8$  9.3,  $\text{C}_5\text{H}_{10}$  27.4,  $\text{C}_6\text{H}_{12}$  32.3, and higher olefines, b.p. 74—100°, 30.4%. H. A. P.

**Manufacture of polymerisation products of high. mol. wt. from isobutylene.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 432,196, 13.1.34).—*iso*Butylene, prepared by dehydration of  $\text{Bu}^\circ\text{OH}$  or  $\text{Bu}^\circ\text{OH}$ , is carefully purified by distillation (at 2—3 atm.), and polymerised by contact with  $\text{BF}_3$ ; the polymeride formed at  $-80^\circ$  has mol. wt. 40,000 (Staudinger). H. A. P.

**Preparation of organic esters.** W. E. VAIL, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,979,717, 6.11.34. Appl., 31.12.31).—An olefine is condensed with  $\text{CO}$  and an alcohol, or a substance capable of giving an alcohol on hydrolysis, *e.g.*, an ether, amine, or alkyl halide, in presence of a catalyst ( $\text{NH}_4\text{Cl}$ ) at 200—500°/25—900 atm. (275—375°/700 atm.). *E.g.*,  $\text{CO}$ ,  $\text{C}_2\text{H}_4$ ,  $\text{MeOH}$ ,  $\text{H}_2$  (diluent), and  $\text{NH}_4\text{Cl}$  (trace) are passed over active C at 325°/700 atm., forming  $\text{EtCO}_2\text{Me}$  (16% of theory). H. A. P.

**Production of liquid nitric esters [of polyhydric alcohols].** F. A. F. CRAWFORD, W. A. P. CHALLENGOR, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 432,488, 20.1.34).—The nitration is carried out by passing the

reaction mixture through a series of vessels (2), part only of the polyhydric alcohol [glycerol,  $C_2H_4(OH)_2$ ] used being added to the first. Economy in cooling materials and avoidance of deleterious action by the waste acids are claimed. H. A. P.

**Manufacture and application of textile assistants.** IMPERIAL CHEM. INDUSTRIES, LTD., and H. A. PIGGOTT (B.P. 432,356, 22.1.34).—Urea is condensed with  $(CH_2)_2O$ , e.g., at 85–100° in presence of a little aq. NaOH, and the product is acylated with a natural fatty (lauric, oleic, ricinoleic) acid.  $H_2O$ -sol. products, claimed to be dispersing, emulsifying, and wetting agents, are obtained. H. A. P.

**Manufacture of acetaldehyde and a catalyst therefor.** C. O. YOUNG, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,977,750, 23.10.34. Appl., 7.12.31).—EtOH is passed at 225–350°/0.5–5 atm. over a catalyst comprising reduced Cu containing > 5% of Cr, probably in the form of  $Cr_2O_3$ , supported on an inert carrier, e.g., porous artificial filter stone. The catalyst is made by impregnating the support in a conc. solution of  $Cu(NO_3)_2 \cdot 6H_2O$  (545 g.) and  $Cr(NO_3)_3 \cdot 9H_2O$  (11 g.), drying, roasting at 600° until evolution of NO is complete, and heating to 250° in a stream of EtOH. Apparatus is described. A. W. B.

**Preparation of *p*-sec.-alkylaminophenols.** R. T. MAJOR, Assr. to MERCK & Co., INC. (U.S.P. 1,978,433, 30.10.34. Appl., 23.3.31).— $p$ -NO<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·OH, in solution in a dialkyl ketone (I), is reduced with H<sub>2</sub> in presence of a metal catalyst, e.g., Pt, Pd, or (at 100°/50 atm.) Ni.  $p$ -NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·OH is removed by treatment with an aromatic aldehyde, e.g., PhCHO, in presence of a weak acid, e.g., AcOH. In the examples, using the appropriate (I), *p*-NHP<sup>8</sup>·C<sub>6</sub>H<sub>4</sub>·OH and *p*-sec.-butylaminophenol, m.p. 118–119°, are prepared. The salts of the products are used as photographic developers and fur dyes. A. W. B.

**Production of compounds containing an ethylenic linking or a polymethine chain.** J. D. KENDALL (B.P. 432,628, 23.12.33. Cf. B.P. 431,141; B., 1935, 842).—A compound containing the group ·CO·CH<sub>2</sub>·X, where X is C, O, or S, as part of a 5-membered ring, is condensed with a heterocyclic quaternary NH<sub>4</sub> salt (I) having an aryl-, alkyl-, or aralkyl-thio- or -seleno-ether, amino-, acetamido-, arylamino-, or acetaryl-amido-vinyl group, or a halogen as reactive group or atom. (I) may be prepared *in situ*. E.g., 1:3-indandione (II) when boiled with NPh·CH·NHPh in Ac<sub>2</sub>O gives 2-acet-anilidomethenyl-1:3-indandione, m.p. 192–193°; this with 2-methylbenzthiazole and *p*-C<sub>6</sub>H<sub>4</sub>Me·SO<sub>3</sub>Et (III) in C<sub>5</sub>H<sub>5</sub>N at 130–140° gives 1'-ethyl-dihydrobenzthiazolyl-2:2'-dimethenylindan-1:3-dione, m.p. 258°; the corresponding compounds from lepidine methiodide and quinaldine ethiodide (methiodide?) have m.p. 275–280°, and 275°, respectively. Other examples are: 1'-ethyl-dihydrobenzthiazolyl-2:2'-indan-1:3-dione [from (II) and 2-methylthiolbenzthiazole (IV) in C<sub>5</sub>H<sub>5</sub>N], m.p. 212°, and -1:2'-dimethenylindan-2-one, m.p. 210°; 1'-methyl-dihydroquinolyl-2:2'-indan-1-one [from 1-methylquinoline-2-thione, (III), and  $\alpha$ -indanone], m.p. 160°, and -2:2'-indan-1:3-dione (from 2-methylselenoquinoline); and compounds from (IV), *p*-C<sub>6</sub>H<sub>4</sub>Me·SO<sub>3</sub>Me, and 2-hydroxy-

5-methylthiophen, and from  $\beta$ -coumaranone, 2-iodoquinoline ethiodide, and NaOEt. H. A. P.

**[Preparation of] water-soluble azo dye intermediates.** F. B. HOLMES and M. A. DAHLEN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,979,327, 6.11.34. Appl., 14.4.33).— $H_2O$ -sol. diazoimino-compounds are prepared by coupling diazotised arylamines free from CO<sub>2</sub>H or SO<sub>3</sub>H with *sec.*-amines having at least one OH and SO<sub>3</sub>H and/or CO<sub>2</sub>H. They are converted by acidification (e.g., with dil. HCO<sub>2</sub>H at 93°) into the original diazo-compound. Examples are 1:4:2-C<sub>6</sub>H<sub>3</sub>MeCl·NH<sub>2</sub> →  $\beta$ -hydroxyethyltaurine, 2:5-C<sub>6</sub>H<sub>3</sub>Cl<sub>2</sub>·NH<sub>2</sub> → Na  $\beta$ -hydroxyethylaminoacetate, *m*-C<sub>6</sub>H<sub>4</sub>Cl·NH<sub>2</sub> →  $\beta$ -sulphoethylglucamine, 2:4:1-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>Cl·OMe → NHMe·CH<sub>2</sub>·[CH·OH]<sub>4</sub>·CO<sub>2</sub>H (prepared by oxidation of methylglucamine), and 1:4:2:5-NH<sub>2</sub>·C<sub>6</sub>H<sub>2</sub>(NHBz)(OEt)<sub>2</sub> → NH[CH<sub>2</sub>·CH(OH)·CO<sub>2</sub>H]<sub>2</sub>. H. A. P.

**Manufacture of [o-]dihydroxybenzenes.** E. I. DU PONT DE NEMOURS & Co., F. B. DOWNING, and R. G. CLARKSON (B.P. 432,276, 24.1.34. Addn. to B.P. 425,230; B., 1935, 443).—In the process of the prior patent, (part of) the alkali is added gradually or, alternatively, the reactants are added to, and an aq. suspension of Ba or Sr salt of *o*-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub> is withdrawn continuously from, the autoclave. H. A. P.

**[Manufacture of] flaked resorcinol.** I. GUBELMANN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,979,971, 6.11.34. Appl., 2.7.32).—The manufacture, using known plant, of flaked resorcinol, by exposing the liquid mass to rapid cooling in the form of a thin film or small droplets, is claimed. H. A. P.

**Manufacture of stabilised [organic] preparations.** I. G. FARBERIND, A.-G. (B.P. 432,480, 21.12.33. Ger., 24.12.32).—Aq. solutions of oxidisable aromatic amino-hydroxy-, polyhydroxy-, or polyamino-compounds, amino-quinolines or -acridines, or alkaloids are stabilised by addition of a ( $H_2O$ -sol.) org. SH compound (SH·CH<sub>2</sub>·CO<sub>2</sub>H; < 1%). H. A. P.

**Manufacture of compounds of the benzanthrone series.** E. I. DU PONT DE NEMOURS & Co. (B.P. 430,914, 23.12.33. U.S., 27.12.32).—A purer product is obtained in the conversion of benzanthrone (I) into *Bz*1:*Bz*1'-dibenzanthronyl (II) by oxidation with MnO<sub>2</sub>·H<sub>2</sub>SO<sub>4</sub> by use of 78–83 (80%) aq. H<sub>2</sub>SO<sub>4</sub>, or, if conc. H<sub>2</sub>SO<sub>4</sub> is used, by stopping the reaction (by dilution) when only 60–70% of (I) has undergone conversion into (II). The product is purified by extraction with aq. NaHSO<sub>3</sub> and NaOH, and oxidised to dihydroxydibenzanthrone in the normal way. H. A. P.

**Production of 3:6-diamino-2-alkylpyridines.** H. J. SCHNEIDERWIRTH (U.S.P. 1,979,351, 6.11.34. Appl., 25.4.32).—A 2-alkylpyridine (1 mol.) is heated with NaNH<sub>2</sub> (< 2 mols.) in an inert diluent, e.g., paraffin, C<sub>10</sub>H<sub>8</sub>·Et, at 125–250°. 3:6-Diamino-2-methyl-, m.p. 65–66°, and -2-ethyl-pyridine are described. H. A. P.

**Separation of carbazole from anthracene.** A. O. JAEGER, Assr. to AMER. CYANAMID & CHEM. CORP. (U.S.P. 1,978,580, 30.10.34. Appl., 30.1.31).—Crude anthracene is treated with a heterocyclic aldehyde, e.g., furfuraldehyde (I), and a mild alkali, e.g., Na<sub>2</sub>CO<sub>3</sub>. The

carbazole forms a condensation product (II) with (I) which is sol. in, e.g., MeOH, EtOH, COMe<sub>2</sub>, etc. and readily removed by washing with these. (I) is recovered by decomp. (II) with hot H<sub>2</sub>O. A. W. B.

**Purification of lead tetra-alkyl.** A. E. PARMELEE, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,975,171, 2.10.34. Appl., 28.3.31).—Suspended matter is removed by agitating the liquid with H<sub>2</sub>O containing a small amount of a wetting agent, e.g., Na<sub>3</sub>PO<sub>4</sub>, Na<sub>2</sub>CO<sub>3</sub>, borax, Na<sub>2</sub>SO<sub>3</sub>, NaHSO<sub>3</sub>, or Na isopropyl-naphthalene-sulphonate, which causes the impurities to collect at the interface between the two liquids. A. R. P.

**Distillation system [for fatty acids].**—See I. CS<sub>2</sub> from gases.—See II. Alkali acetates.—See VII. Inhibitors. Urea synthesis.—See X. EtOH from sugar beets etc.—See XVIII.

#### IV.—DYESTUFFS.

See A., Aug., 1969, Coloured local anaesthetics. Prep. of fat-sol. azo dye. 973, Prep. of lower basic members of magenta series. 992, Neocyanine. 994, Bilirubin and its azo dyes.

#### PATENTS.

**[Manufacture of] azo dyes and their application in leather dyeing.** WILLIAMS (HOUNSLOW), LTD., A. G. GREEN, A. ACKROYD, and A. MACMASTER (B.P. 432,355, 20.1.34).—Dis-, tris-, and tetrakis-azo dyes derived from benzidine-2 : 2'-disulphonic acid (I) or its 5 : 5'-Me<sub>2</sub> derivative (II) and at least one sulphonic acid of 2 : 5- or 1 : 8-NH<sub>2</sub>·C<sub>10</sub>H<sub>6</sub>·OH as coupling component, have good affinity for leather combined with level-dyeing properties and good penetration. Examples are: (I) ⇌ 2[H-acid (III)] (violet); (I) (rose) or (II) ⇌ 2[acetyl-H-acid (IV)] (blue-red); phenylmethyl-pyrazolone ⇌ (I) ⇌ (acid) (III) ⇌ *p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NO<sub>2</sub> (VI) (blue-green); (I) ⇌ 2[J-acid (V)] (terra-cotta); (I) or (II) ⇌ 2[(III) ⇌ (acid) (VI)] (green-blue); (I) (acid) ⇌ 2[(III) ⇌ NH<sub>2</sub>Ph or β-C<sub>10</sub>H<sub>7</sub>·NH<sub>2</sub>] (dark blue); (III) ⇌ (I) ⇌ *p*-xylylene ⇌ (III) (purple); *m*-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub> ⇌ (I) ⇌ (IV); β-C<sub>10</sub>H<sub>7</sub>·OH ⇌ (I) ⇌ (IV); (I) ⇌ 2[(III) ⇌ α-C<sub>10</sub>H<sub>7</sub>·NH<sub>2</sub>], and (I) ⇌ 2[(V) ⇌ (III)]. H. A. P.

**Manufacture of [oil-soluble] azo dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 432,599, 28.4.34).—Diazotised arylamines free from SO<sub>3</sub>H or CO<sub>2</sub>H are coupled with ω-arylamino nitriles of the aliphatic series. The products are used as dyes for cellulose esters and ethers, oils, waxes, and varnishes, etc. Examples are: *p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NO<sub>2</sub> → NHPH·CH<sub>2</sub>·CN, NHPH·[CH<sub>2</sub>]<sub>2</sub>·CN (yellow-orange), *m*-C<sub>6</sub>H<sub>4</sub>Me·N<sub>2</sub>Et·C<sub>2</sub>H<sub>4</sub>·CN (I) (orange), α-C<sub>10</sub>H<sub>7</sub>·NH·C<sub>2</sub>H<sub>4</sub>·CN (red-violet), or *m*-N(C<sub>6</sub>H<sub>4</sub>Me)(C<sub>2</sub>H<sub>4</sub>·OH)·CH<sub>2</sub>·CN (red), and 1 : 2 : 4-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>Cl·NO<sub>2</sub>, *p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·N<sub>2</sub>Ph, and 2 : 1 : 5-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>(OH)·NO<sub>2</sub> → (I) (red to red-orange). H. A. P.

**Manufacture of [chromable] azo dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 432,353, 18.1. and 31.12.34).—Yellow monoazo dyes that readily form Cr compounds in substance are prepared from aminobenzoyl or aminobenzenesulphonyl derivatives of aminosalicic acid (I) as first components (II) and

pyrazolones derived from (I) or those having an *o*-C<sub>6</sub>H<sub>3</sub>(OH)·CO<sub>2</sub>H residue attached to the Ph of an *N*-phenylpyrazolone by ·CO·NH·, ·SO<sub>2</sub>·NH·, or ·SO<sub>2</sub>· as second component (III). Examples of (II) are: the 2 : 1 : 4-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>Me·CO, *m*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·SO<sub>2</sub>, *m*- or *p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·CO derivatives of 5 : 2 : 1-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>(OH)·CO<sub>2</sub>H, and the *m*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·CO derivative of 5 : 2 : 3 : 1-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>(OH)(SO<sub>3</sub>H)·CO<sub>2</sub>H; and of (III): 1-(2'-hydroxy-3'-carboxy-5'-sulphophenyl)-3-methyl-5-pyrazolone and -5-pyrazolone-3-carboxylic acid and the pyrazolones from 2-hydrazino-4'-hydroxy-3'-carboxydiphenylsulphone-5'-sulphonic acid and CH<sub>2</sub>Ac·CO<sub>2</sub>Et and CO<sub>2</sub>Et·CO·CH<sub>2</sub>·CO<sub>2</sub>Et, respectively. H. A. P.

**[Preparation of] disazo compounds for therapeutic use.** J. EBERT, ASSR. to FARASTAN Co. (U.S.P. 1,979,534 and 1,979,678, 6.11.34. Appl., [A, B] 15.10.31).—A tetrazotised diamine of the C<sub>6</sub>H<sub>6</sub>, Ph<sub>2</sub>, or CH<sub>2</sub>Ph<sub>2</sub> series is coupled (A) with an alkoxyarylamine or an arylenediamine and an aromatic amino-, hydroxy-, or hydroxyamino-carboxylic acid (I), and (B) with 2-hydroxyquinoline (II) (2 mols.), or with (II) (1 mol.) and (I). Examples are the dyes: (A) *o*-phenetidine (III) ⇌ benzidine (IV) → *o*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·CO<sub>2</sub>H (V); (III) ⇌ (IV) → *o*-OH·C<sub>6</sub>H<sub>4</sub>·CO<sub>2</sub>H (VI); (III) ⇌ (IV) → 4 : 2 : 1-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>(OH)·CO<sub>2</sub>H (VII); *o*-anisidine (VIII) ⇌ (IV) → (V); (III) ⇌ (IV) → 4 : 1 : 3-OH·C<sub>6</sub>H<sub>3</sub>Me·CO<sub>2</sub>H (XIV); *m*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub> (IX) ⇌ (IV) → (V); (IX) ⇌ (IV) → (VI); (IX) ⇌ (IV) → (VII); (III) ⇌ 3 : 3' : 4 : 4'-[C<sub>6</sub>H<sub>3</sub>(OMe)(NH<sub>2</sub>)<sub>2</sub>] → (V); (III) ⇌ *o*-tolidine (XIII) → (V); (III) ⇌ (IX) → (V); (IX) ⇌ (IX) → (VII); (III) ⇌ 1 : 3 : 4-C<sub>6</sub>H<sub>3</sub>Me(NH<sub>2</sub>)<sub>2</sub> (X) → (V); (IX) ⇌ (X) → (VI); (III) ⇌ 4 : 4'-CH<sub>2</sub>(C<sub>6</sub>H<sub>4</sub>·NH<sub>2</sub>)<sub>2</sub> (XI) → (V); (IX) ⇌ (XI) → (VI); (III) ⇌ 2 : 2' : 1 : 1'-CH<sub>2</sub>[C<sub>6</sub>H<sub>3</sub>(OEt)(NH<sub>2</sub>)<sub>2</sub>]<sub>2</sub> (XII) → (VII); (IX) ⇌ (XII) → (V); or (B) (II) ⇌ (IV) → (V); (II) ⇌ (IV) → (VI); (II) ⇌ (X) → (VII); (II) ⇌ (IV) → (IX); (II) ⇌ (IV) → (V); (II) ⇌ (XIII) → (VIII); (IV) ⇌ 2 (II); (II) ⇌ (IX) → (IX); (II) ⇌ (IV) → (VII); (II) ⇌ (IX) → (V); (II) ⇌ (IX) → (VI); (II) ⇌ (IX) → (III); (II) ⇌ (XI); (II) ⇌ (XII) → (V), and (II) ⇌ (IV) → (XIV). H. A. P.

**Manufacture of dyes of the anthraquinone series.** I. G. FARBENIND. A.-G. (B.P. 432,647, 31.1.34. Ger., 1.2.33).—Blue to green-blue wool dyes are prepared by interaction of a primary or sec.-amine with a 4-halogeno-1-amino-5- or -8-arylamidoanthraquinone-2-sulphonic acid. E.g., interaction of 4-bromo-1-amino-5-acetamidoanthraquinone-2-sulphonic acid with 5% aq. NH<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>, and a little CuSO<sub>4</sub> at 70–80° gives the 1 : 4-(NH<sub>2</sub>)<sub>2</sub>-compound. 1-Amino-4-methylamino-, 4-cyclohexylamino-, 4-anilino-4-*p*-acetamidamino-, and 4,4'-acetamidodiphenylamino-5-acetamidoanthraquinone-2-sulphonic acid, and 1-amino-8-acetamido-4,4'-acetamido-3' : 6'-dimethoxyanilinoanthraquinone-2-sulphonic acid are similarly prepared. H. A. P.

**Manufacture of [triarylmethane] dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 432,204, 22.1.34).—Aromatic dialdehydes or corresponding halogeno-compounds (e.g., ωωω'ω'-tetrachloro-*m*- or ωωω'ω'ω'-hexachloro-*p*-xylene) are condensed with sec.- or tert.-aromatic amines, and the leuco-compounds produced are oxidised. E.g., *p*-C<sub>6</sub>H<sub>4</sub>(CHO)<sub>2</sub> is condensed

with  $NPhMe_2$  ( $ZnCl_2$ ),  $NPhEt_2$  (80%  $H_2SO_4$ ), or 1- $\beta$ -hydroxyethyltetrahydroquinoline (conc.  $HCl$ ), and the products are oxidised with  $PbO_2$  and acid to give blue-to green-black basic dyes. H. A. P.

**Stabilisation of [dye] suspensions.** A. J. JOHNSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,979,469, 6.11.34. Appl., 23.1.31).—Aq. dye suspensions, e.g., indigo, are prevented from foaming or settling by mixing them in a colloid mill with Na cellulose-glycolate. A dispersing agent such as sulphite-cellulose pitch may be added. D. A. C.

**p-sec.-Alkylaminophenols.**—See III. Spectrophotometric analysis.—See XXI.

## V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

**Distinguishing between new and secondhand cotton [upholstery] filling materials.** S. MOSKOWITZ, W. LANDES, and D. HIMMELFARB (Amer. Dyestuff Rep., 1935, 24, 463—466).—Secondhand (used) cotton fillings have a  $SO_4$  content  $> 0.25\%$  and show an ivory-white or tan fluorescence in ultra-violet light (purple or blue with new fillings), but existing tests based on these distinctions are found to be unreliable when the filling has previously been fumigated with  $SO_2$ , or loaded with S-containing substances (e.g., clays), or exposed for  $> 6$  weeks to  $H_2O$ -saturated air (fluorescence of new filling thereby changes to ivory-white). The test now adopted by the New York State Dept. of Labour (Bedding Division) is based on records showing that used fillings contain  $> 0.03\%$  of  $NH_3$  and  $> 0.01\%$  of urea, and determination of these substances is effected by a modification of the method of Van Slyke and Cullen (A., 1916, ii, 61, 62). A. J. H.

**Effect of alkalis on wool.** M. HARRIS (J. Res. Nat. Bur. Stand., 1935, 15, 63—71).—On treatment of wool with dil.  $NaOH$  rapid splitting off of S occurs, and on continued treatment the S content approaches a const. val. of about 1.8%. It is suggested that a portion of the S is changed into a more stable form, and so resists splitting from the mol. Oxidising and reducing agents attack the disulphide group and make wool more susceptible to attack by alkali. The susceptibility of wool to alkaline reagents is associated with the lability of its S in alkaline solution. J. W. S.

**Dermatitis in relation to knitted woollen goods.** S. R. TROTMAN (J. Soc. Dyers and Col., 1935, 51, 284—287).—The effects of various physical and chemical irritants on the skin are examined. Stoved wool may contain 0.4% of  $SO_2$  and 1.75% of  $H_2SO_4$  if not properly washed, and wool dyed with acid dyes invariably contains mineral acid (up to 2.8% as  $H_2SO_4$ ) which is very difficult to remove with  $H_2O$ . Alkalis in the form of residual soap may occur in knitted goods. Experiments failed to detect free bases due to hydrolysis of the dye-stuff under reducing conditions with wool dyed with Acid Yellow, Acid Orange G and 2G, Croceine Scarlet, Lissamine Fast Yellow, Chrysoidine, and Bismark Brown. Much more detailed information is required before the question whether certain dyestuffs cause dermatitis can be settled. S. C.

**Mechanism of nitration and the properties of cellulose nitrate.** XIII. Formation of intermediate

compounds. XIII. Formation of unstable foreign substances. T. TOMONARI (J. Soc. Chem. Ind., Japan, 1935, 38, 323—326 B, 326—328 B; cf. B., 1935, 540).—XII. When ramie fibre is nitrated with mixtures containing equal vols. of  $HNO_3$  ( $d$  1.52) and  $H_2SO_4$  ( $d$  1.84) and various vols. of  $H_2O$  swelling is a max. at 30%  $H_2O$ , but the N content decreases with increasing  $H_2O$  content. Of these products only those almost free from N (40—50%  $H_2O$ ) are swollen by a second treatment, after washing with  $H_2O$ , with a mixture containing 30% of  $H_2O$ . It is deduced that an intermediate compound, possibly a mononitrate, is formed, and that this is converted by  $H_2O$  into another, unknown, compound.

XIII. With increasing  $H_2O$  content of the nitrating mixture the acid no. of the product falls and the explosion temp. rises, but when the ratio  $H_2SO_4/HNO_3$  is  $> 3$  these properties pass through a max. and a min., respectively, at about 12%  $H_2O$ . The curves of acid no. and N content run parallel when the nitrating mixture is rich in  $H_2SO_4$ , and the unstable foreign substance is probably a sulphuric ester of cellulose dinitrate or of a hydrolysis product of this. A. G.

**$Na_2SO_4$  from rayon.**—See VII. Effect of paper-mill waste on fish.—See XXIII.

See also A., Aug., 965, State of technical cellulose acetate in solution. 978, Jute-lignin.

## PATENTS.

**Manufacture of treated fibrous material.** W. R. SEIGLE, Assr. to JOHNS-MANVILLE CORP. (U.S.P. 1,982,542, 27.11.34. Appl., 5.3.32).—To form thermal insulation, asbestos is soaked in conc. aq.  $Mg(HCO_3)_2$ , at 60° and then boiled to ppt. basic  $Mg$  carbonate in the pores.

B. M. V.

**Preparation of cellulose.** F. OLSEN, Assr. to CELLULOSE RESEARCH CORP. (U.S.P. 1,979,341, 6.11.34. Appl., 11.4.29. Renewed 3.4.34).—The wood chips are explosively disintegrated, and tannins and sugars extracted by leaching out with  $H_2O$ . The pulp is then digested by any known method, either acid or alkaline, washed, screened, and finally acidified by steeping in 5% aq.  $H_2SO_4$  at 50° prior to being bleached. D. A. C.

**Digestion of fibrous material.** T. L. DUNBAR (U.S.P. 1,977,379, 16.10.34. Appl., 12.7.32).—The heat from spent liquors from a previous cook is used for preheating the digester liquor by storing them in an accumulator and discharging them through a heat exchanger. The last-named consists of a vertical cylindrical chamber containing a spiral so arranged that both the spent and the fresh liquors flow in counter-current along adjacent and vertically superimposed compartments. The digester liquors are heated externally with steam during digestion by circulating through the heat exchanger. D. A. C.

**Manufacture of spinning solution.** J. D. W. HUBBELING, Assr. to AMER. ENKA CORP. (U.S.P. 1,979,268, 6.11.34. Appl., 6.12.33).—Inert inorg. pigments, e.g.,  $SnO_2$ ,  $BaSO_4$ , are incorporated in viscose solution by dispersing them in aq.  $NaOH$  the concn. of which is  $>$  the  $NaOH$  content of the viscose. An immiscible, volatile, unsaponifiable oil is then dispersed in the viscose solution and the pigment is mixed with the dispersion with



the aid of a high-speed stirrer. It is claimed that clogging of the spinnerets is obviated. D. A. C.

**Production of artificial silk.** W. OSTERMANN, Assr. to AMER. BEMBERG CORP. (U.S.P. 1,979,403, 6.11.34. Appl., 13.10.31. Ger., 10.12.30).—Cuprammonium filaments are pptd., and at the same time stretched, by passing against a stream of 70% CO<sub>2</sub> in steam. D. A. C.

**Desulphurisation of viscose artificial silk.** VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 432,692, 1.2.35. Ger., 5.2.34).—The viscose filament is sprayed with 1.2% aq. H<sub>2</sub>SO<sub>4</sub> which is substantially free from salts, and then washed with hot H<sub>2</sub>O. The filament is led in a helical path over two superimposed rollers about 15 m. apart, the axes of which are inclined and between which the filament is stretched. Sufficient H<sub>2</sub>SO<sub>4</sub> to moisten the filaments is sprayed on to the top roller, any excess dripping off into a collecting trough at its lower end. The wash takes place similarly on the bottom roller. D. A. C.

**Desulphurisation of rayon.** G. I. THURMOND, Assr. to AMER. ENKA CORP. (U.S.P. 1,977,533, 16.10.34. Appl., 29.12.33).—To the desulphurising solution of rayon 0.1–1% of NaHCO<sub>3</sub>, Na carbamide, or Na carbamate is added in order to keep in solution any Fe salts which may be present. D. A. C.

**Manufacture of paper and board.** F. L. CARSON, Assr. to PACIFIC LUMBER CO. (U.S.P. 1,979,864, 6.11.34. Appl., 7.1.31).—Shredded redwood bark, or other raw fibrous material such as asbestos, bagasse, or mineral wool, is suspended in a viscous medium, *e.g.*, aq. starch, Na silicate, or resin dispersions, prior to forming into boards. D. A. C.

**Paper manufacture.** H. R. RAFTON, Assr. to RAFFOLD PROCESS CORP. (U.S.P. 1,976,743–5, 16.10.34. Appl., [A] 25.5.33, [B] 29.11.32, [C] 6.12.32).—(A) Alkaline filler (*e.g.*, CaCO<sub>3</sub>) is incorporated in paper which contains alum and may have been sized. The filler is added at a point where min. time of contact with the alum will occur, *e.g.*, by spraying on to the web at the first suction box of a Fourdrinier paper machine. Alum and the size are added in the beaters. (B) An acidic compound, either in solid, gaseous, or aq. form (*e.g.*, SO<sub>2</sub>, alum, HCl, AcOH, NaHSO<sub>4</sub>) is added to the sized paper web containing filler when it is fully formed but still in an absorbent condition, *e.g.*, at the third press of a Fourdrinier paper machine. It is claimed that any deterioration of the sizing effect due to the presence of filler is prevented. (C) Paper containing groundwood or colouring matter which is affected by filler is preserved from discoloration by treatment as in (B). D. A. C.

**Paper manufacture.** J. A. YATES, Assr. to BROWN CO. (U.S.P. 1,977,221, 16.10.34. Appl., 5.11.32).—Paper in which is incorporated  $\frac{1}{2}$ –2% of regenerated viscose is treated with glycerin which has been saturated with Cl<sub>2</sub> gas. The glycerin absorbs 1.95% of Cl<sub>2</sub>, which is intended to remove malodorous S compounds from the viscose. D. A. C.

**Removal of printing ink from paper.** S. D. WELLS, Assr. to L. L. ALSTED (U.S.P. 1,962,164, 12.6.34. Appl., 6.9.32).—The nodulised paper is washed in a

series of diffusers with an upward current of aq. SO<sub>2</sub> and then with H<sub>2</sub>O. A. R. P.

**Making felt, paper, and the like.** B. C. BACKMAN and W. T. HOFMANN, Assrs. to PATENT & LICENSING CORP. (U.S.P. 1,979,819, 6.11.23. Appl., 4.11.27).

**Heat insulation. Grinding paper pulp.**—See I. **Lubricant.**—See II. **Sausage casings.**—See XIX.

## VI.—BLEACHING; DYEING; PRINTING; FINISHING.

**New use for cobalt [in mordanting].** C. C. DOWNIE (Rayon and Melliand Text. Month., 1935, 16, 67).—Co may replace Ni in the electrolytic mordanting process for dyeing cloth in a bath of alum and alizarin. The anode is Ni covered with Co by hot-rolling, and the cathode is Pt. Co requires a lower e.m.f. than Ni. The process is applied to cotton, silk, rayon, wool, and other fabrics. A. G.

**Application of soluble [sulphonated] oils in the processing of textiles.** R. A. PINGREE (Oil & Soap, 1935, 12, 182–186).—A general account. E. L.

**Vat dyeing of [cotton] crêpon [fabrics].** A. J. HALL (Text. World, 1935, 85, 1640).—Dyeing methods are described with special reference to the prevention of premature oxidation of the dye liquor when using winch and Obermaier types of dyeing machines. A. J. H.

**Iron stains on dyed wool.** K. KATAOKA, M. WAKI, and T. IRIE (J. Soc. Chem. Ind., Japan, 1935, 38, 322–323 B).—Dyed wool sometimes contains reddish-brown spots; these contain Fe and can be avoided by adding Na<sub>2</sub>CO<sub>3</sub> to the dye bath. The amount of Fe absorbed by wool increases with increasing I val. of the fatty constituent of the soap used in the bath. A. G.

**Level dyeing of cuprammonium [rayon] hosiery.** W. H. HAND (Text. World, 1935, 85, 1644).—Cuprammonium rayon dyes deeper than mercerised cotton with direct dyes, but level dyeing is obtained on mixture knitted goods by dyeing for 20–30 min. at 100°, then adding 1–3% of Na<sub>2</sub>SO<sub>4</sub>·10H<sub>2</sub>O, and continuing dyeing for a further 20 min. in a dye liquor maintained 0.001N-alkaline. A. J. H.

**Uses of latex in textile finishing.** G. D. KRATZ and W. M. SPENCER (Rayon and Melliand Text. Month., 1935, 16, 76–79).—Rubber latex acts as a binding agent for size or H<sub>2</sub>O-sol. dyes, and partly prevents their removal during washing. A. G.

**Pressed-felt finishing.** F. A. HAYES (Text. World, 1935, 85, 1650–1651).—Scouring is considered most important in the prep. of felt materials for dyeing and finishing, and satisfactory methods and machines are discussed and described. A. J. H.

**Finishing of modern rayon crêpes.** ANON. (Rayon and Melliand Text. Month., 1935, 16, 58–60).—Methods for carrying out the alkaline (crêping) treatment in batches or continuously are described. The fabric must always be dried loose, and it is dyed by the reel method. A. G.

**Effect of alkali on wool. Dermatitis and woollen goods.**—See V.

## PATENTS.

**Production of multi-coloured [rayon] threads.** P. J. JACQUET, Assr. to DU PONT RAYON CO. (U.S.P. 1,975,153, 2.10.34. Appl., 3.2.32. Fr., 15.6.31).—At least two separate and differently coloured supplies of cellulose acetate solution (or other solution capable of being dry-spun into rayon) are forced simultaneously through the same spinneret without thorough mixing; a multi-coloured yarn is produced on twisting the threads together. A. J. H.

**Fabric-cleaning composition [detergent].** E. C. PAILLER, Assr. to SILK-EZE CORP. (U.S.P. 1,964,006, 26.6.34. Appl., 25.3.29).—A detergent and proofing medium for silk and woollen fabrics comprises a mixture of sulphonated castor oil or tallow, palm oil, olive oil, or peanut oil soap, and 5–10% of an alkali-sol. protein, e.g., sericin, gelatin, keratin, or casein. A. R. P.

**Dry-cleaning process [for textiles].** R. A. MORGEN (U.S.P. 1,979,399, 6.11.34. Appl., 8.6.33).—Cleaning is effected first with a non-aq. volatile solvent (I) (e.g.,  $\text{CCl}_4$ ,  $\text{CHCl}_3$ ) to remove loose dirt, and then with the filtered solvent containing an alkaline detergent having sufficient alkalinity to neutralise fats and fatty acids removed from the articles being cleaned, a dry clarifier being added towards the end of the treatment to promote complete neutralisation. The detergent is sol. in the solvent and has  $p_{\text{H}}$  7–12 when diluted 3 times; it may consist of EtOH (76%), maize oil completely saponified with KOH (20), and  $\text{K}_2\text{CO}_3$  (4). The clarifier is a Colorado clay activated by calcination. A. J. H.

**Dressings for textile materials.** BRIT. CELANESE, LTD. (B.P. 431,964, 3.7.34. U.S., 3.7.33).—A non-polymerising textile softener which may be applied to yarns or fabrics or added to rayon spinning solutions consists of a  $\text{H}_2\text{O}$ -insol. oil or fat or a higher fatty acid (e.g., olive oil, stearic acid) and 0.5–5.0% of an aromatic compound having as substituents unsaturated aliphatic groups (e.g., propenyl, allyl, vinyl, and crotonyl derivatives such as  $\text{OH}\cdot\text{C}_6\text{H}_4\cdot\text{OEt}$  or  $\text{OH}\cdot\text{C}_6\text{H}_4\cdot\text{OMe}$ ). [Stat. ref.] A. J. H.

**Treatment [delustring, mildew- and water-proofing] of textiles [rayons].** W. H. ALTON and H. I. JONES, Assrs. to R. T. VANDERBILT CO., INC. (U.S.P. 1,975,493, 2.10.34. Appl., 10.9.32).—Rayon is impregnated with an aq. suspension of bentonite (I) containing  $\text{Al}(\text{OAc})_3$  or an acetate of Zn, Th, Ce, or La, and a softener, e.g., oleic or stearic acid, and then dried; the resulting finish is fast to washing. A. J. H.

**Production of figured effects on textiles.** HEBERLEIN & Co. A.-G. (B.P. 432,389, 28.6.34. Ger., 28.6.33).—Opaque and lustrous transparent patterns on a cotton fabric accompanied by an increased uniform stiffness of handle are obtained by printing the fabric with a resist paste consisting of a solution of a cellulose ester (e.g., the acetate dissolved in  $\text{CH}_2\text{Cl}\cdot\text{CH}_2\cdot\text{OH}$ ) containing an inert coloured or white pigment (e.g., Ti-white), followed by drying and parchmentsation with  $\text{H}_2\text{SO}_4$  ( $d$  1.6). A. J. H.

**Reclaiming apparatus [for dry-cleaner's solvent].**—See I. Textile assistants.—See III. Leather dyeing.—See IV. Treating hair fibres.—See XV.

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

**Gaillard-Parrish liquid-phase system of sulphuric acid manufacture.** P. PARRISH (Ind. Chem., 1935, 11, 300–305).—Improvements in design in recent years include several mechanical alterations of the turbo-disperser, and a new type of acid cooler in which the acid flows through a Pb coil enclosed in a steel coil carrying  $\text{H}_2\text{O}$  in the reverse direction. The dimensions of this are calc. Dispersed acid should have  $d$  1.50 and be free from NO. Acid for sale should be taken from the leading chamber only. This in the case of a tower chamber has a temp. of 65–70° when working at 3 cu. ft. per lb. of S per 24 hr. Working results for several plants operating this system are given; it is claimed that experience has shown that no excessive corrosion of Pb occurs. C. I.

**Sulphuric acid catalysis. VI. Vanadic acid contact masses.** B. NEUMANN (Z. Elektrochem., 1935, 41, 589–593; cf. A., 1932, 578).—The relative catalytic activities of vanadic acid, Na and Ca vanadates, and technical vanadic acid catalysts have been compared by measuring the yield of  $\text{SO}_3$  at different temp. and rates of flow. Pure Ca vanadate has no advantage over pure vanadic acid. The enhanced activity of technical catalysts is due to the presence of Na vanadate. E. S. H.

**Sodium sulphate. II. Recovery from rayon coagulation solution. III. Thermodynamical study of the production of sodium sulphate by the Leblanc process.** T. OKUNO (J. Soc. Chem. Ind., Japan, 1935, 38, 310–314 B, 314–321 B).—II. Spent rayon-coagulation baths contain an excess of  $\text{Na}_2\text{SO}_4$  and a deficiency of  $\text{H}_2\text{SO}_4$ . Evaporation at 50° and subsequent cooling leads to pptn. of  $\text{Na}_2\text{SO}_4\cdot 10\text{H}_2\text{O}$ , which has then to be dehydrated. By first adding  $\text{H}_2\text{SO}_4$ , then evaporating at as high a temp. as possible, and cooling,  $\text{Na}_2\text{SO}_4$  is pptd., but this process is uneconomical because the solubility of  $\text{Na}_2\text{SO}_4$  in aq.  $\text{H}_2\text{SO}_4$  is only slightly affected by the temp. Solubility data are recorded from which it is deduced that after evaporation at 50° the solution should be cooled to 10° if the deficiency of  $\text{H}_2\text{SO}_4$  has already been made up, and to 12° if not.

III. The three equilibria  $2\text{NaHSO}_4 = \text{Na}_2\text{S}_2\text{O}_7 + \text{H}_2\text{O}$ ,  $\text{Na}_2\text{S}_2\text{O}_7 = \text{Na}_2\text{SO}_4 + \text{SO}_3$ , and  $\text{NaHSO}_4 + \text{NaCl} = \text{Na}_2\text{SO}_4 + \text{HCl}$  have been studied by measurements of pressure at various temp., and the corresponding mathematical equations deduced. A. G.

**Production of oxygen for enrichment of air in blast furnaces.** E. KARWAT (Stahl u. Eisen, 1935, 55, 860–863).—A modified Linde-Fränk process for producing an air blast containing 42–98% of  $\text{O}_2$  is briefly described. The costs per ton of Fe for enriching the air in a blast furnace are given. W. P. R.

**True and mean specific heats of technically important gases.** H. BRÜCKNER (Gas- u. Wasserfach, 1935, 78, 637–639).—Data for  $\text{H}_2$ ,  $\text{N}_2$ ,  $\text{CO}$ ,  $\text{O}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{NH}_3$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_6\text{H}_6$ , and air are recorded. T. G. P.

**ZnCrO<sub>4</sub>.**—See XIII.

See also A., Aug., 928, Permeability of Pd to H<sub>2</sub>. 941, Prep. of Pt oxide catalyst. Oxidation of NH<sub>3</sub>. 942, Electrolytic prep. of Al<sub>2</sub>O<sub>3</sub>. 944, Prep. of phosphorescent ZnS.

## PATENTS.

**Concentration of sodium hydroxide [solution].** R. B. MACMULLIN, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,961,590, 5.6.34. Appl., 19.9.32).—Solutions containing > 20% of NaOH are saturated with NH<sub>3</sub> at 35–70° (60°), whereby they separate into two layers, the lower being relatively conc. aq. NaOH. A. R. P.

**Treatment of brine containing soluble silica.** W. A. KUHNERT (U.S.P. 1,964,161, 26.6.34. Appl., 11.2.29).—The small quantity of SiO<sub>2</sub> in Owens Lake brine may be coagulated and pptd. by addition of NaAlO<sub>2</sub> and heating. A. R. P.

**Separation of ammonium chloride [from alkali salts].** SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIM. (B.P. 432,770, 11.8.34. Fr., 21.12.33).—NH<sub>4</sub>Cl crystals are separated from crystals of KNO<sub>3</sub>, Na<sub>2</sub>SO<sub>4</sub>, etc. by froth flotation in a brine circuit, slightly ammoniacal and saturated with the salt mixture, by the use of oleic acid, pine oil, or cresol frothers. The NH<sub>4</sub>Cl froth is treated with HCl or HNO<sub>3</sub> until neutral or slightly acid, whereby it breaks down and the oil rises to the surface, whilst the crystals can be recovered by centrifuging. A. R. P.

**Simultaneous production of potassium nitrate and ammonium sulphate.** A. HOLZ (U.S.P. 1,964,158, 26.6.34. Appl., 19.8.30).—CaCO<sub>3</sub> is dissolved in HNO<sub>3</sub> and the greater part of the Ca pptd. as CaSO<sub>4</sub> by addition of K<sub>2</sub>SO<sub>4</sub>. The filtrate is treated with NH<sub>3</sub> and CO<sub>2</sub> to ppt. the remainder of the Ca as CaCO<sub>3</sub>, and the solution evaporated to recover KNO<sub>3</sub> and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. A. R. P.

**Manufacture of disodium phosphate.** J. H. COLEMAN, Assr. to WARNER CHEM. CO. (U.S.P. 1,961,127, 5.6.34. Appl., 9.8.32).—Phosphate rock is dissolved in H<sub>2</sub>SO<sub>4</sub> to give CaSO<sub>4</sub>·2H<sub>2</sub>O and a solution containing a 3:1 mol. mixture of H<sub>3</sub>PO<sub>4</sub> and CaH<sub>4</sub>P<sub>2</sub>O<sub>8</sub>, which is treated with Na<sub>2</sub>CO<sub>3</sub> and NaOH. After filtration to remove Na<sub>2</sub>SiF<sub>6</sub> the remaining Ca is pptd. with Na<sub>2</sub>SO<sub>4</sub> and the Fe and Al are pptd. by neutralising with Na<sub>2</sub>CO<sub>3</sub> to form NaH<sub>2</sub>PO<sub>4</sub>, which is recovered by crystallisation and finally converted into Na<sub>2</sub>HPO<sub>4</sub>·10H<sub>2</sub>O. A. R. P.

**Manufacture of crystalline anhydrous disodium phosphate.** K. A. KILBOURNE and C. F. BOOTH, Assrs. to SWANN RESEARCH, INC. (U.S.P. 1,962,080, 5.6.34. Appl., 29.8.32).—Tabular crystals of anhyd. Na<sub>2</sub>HPO<sub>4</sub> are obtained by evaporation of solutions of the salt at > 96°, preferably under reduced pressure. Addition of 0.05% of Na<sub>2</sub>P<sub>4</sub>O<sub>7</sub> to the liquor affords crystals which give no ppt. when dissolved in H<sub>2</sub>O containing traces of Al or Fe<sup>III</sup> salts. A. R. P.

**Manufacture of potassium [penta-]borate.** A. NEWMAN, Assr. to PACIFIC COAST BORAX CO. (U.S.P. 1,961,073, 29.5.34. Appl., 19.9.28).—Borax (3), H<sub>2</sub>SO<sub>4</sub> (2), and KCl (2 mols.) are introduced into the min. quantity of hot H<sub>2</sub>O, and the mixture is cooled to allow K<sub>2</sub>O·5B<sub>2</sub>O<sub>3</sub>·8H<sub>2</sub>O to crystallise. A. R. P.

**Manufacture of alkali acetates.** C. J. STROSACKER, C. C. KENNEDY, and E. L. PELTON, Assrs. to DOW CHEM. CO. (U.S.P. 1,961,625, 5.6.34. Appl., 15.2.32).—EtOH vapour is passed at 250–300° (290°) into a fused 1:1 mol. mixture of MOH and MOAc, where M is a 1–3:2–1 at. mixture of Na and K. The product is dissolved in H<sub>2</sub>O and NaOAc·3H<sub>2</sub>O recovered by crystallisation, the mother-liquor being evaporated to dryness and the residue fused with more NaOH for use in the first stage of the process. A. R. P.

**Controlling the crystal size [of gypsum in decomposing phosphate rock].** K. D. ASHLEY and W. C. HANSEN, Assrs. to AMER. CYANAMID CO. (U.S.P. 1,962,887, 12.6.34. Appl., 7.2.31).—The rock is decomposed with 1:1 H<sub>2</sub>SO<sub>4</sub> to produce CaSO<sub>4</sub>·0.5H<sub>2</sub>O (I), H<sub>2</sub>O is added to hydrate the (I), then more of the acid mixture and so on added to cause the gypsum crystals gradually to grow. A. R. P.

**Stable calcium hypochlorite composition.** M. C. TAYLOR, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,961,576, 5.6.34. Appl., 17.8.32).—Claim is made for a mixture of Ca(OCl)<sub>2</sub> with Na<sub>2</sub>O. A. R. P.

**Treatment of lime [calcium] aluminates.** J. C. SEAILLES (B.P. 428,584, 15.10.34. Luxemb., 29.11.33).—Crude Ca aluminate is dissolved in H<sub>2</sub>O or in aq. NaCl, the insol. material removed, and the solution conc. or treated with Ca(OH)<sub>2</sub> to bring the p<sub>H</sub> to < 11.5, whereby the pure aluminate is pptd. This may be converted into NaAlO<sub>2</sub> by digestion with aq. Na<sub>2</sub>CO<sub>3</sub>. A. R. P.

**Production of cyanides.** E. J. PRANKE, Assr. to GRANGERS MANUFG. CO. (U.S.P. 1,961,569, 5.6.34. Appl., 3.1.29).—An intimate mixture of CaC<sub>2</sub> (100), NaCl (80), and C (10 pts.) is heated and agitated in a N<sub>2</sub> atm. and the reaction product is cooled rapidly. A. R. P.

**Parting compound. [Mould dressing.]** L. H. HEYL, Assr. to FEDERAL FOUNDRY SUPPLY CO. (U.S.P. 1,962,686, 12.6.34. Appl., 12.12.33).—The dressing comprises an intimate mixture of finely-divided phosphate rock (51–87.5) and CaCO<sub>3</sub> (49–12.5%) which has been made H<sub>2</sub>O-repellent by the addition of 2% of stearic acid. A. R. P.

**Manufacture of an adsorption agent [of silica gel].** L. K. WRIGHT (U.S.P. 1,963,818, 19.6.34. Appl., 7.9.27).—Greensand is treated with hot dil. H<sub>2</sub>SO<sub>4</sub> to extract the bases, and the SiO<sub>2</sub> skeleton is well washed with H<sub>2</sub>O, then with Et<sub>2</sub>O, CCl<sub>4</sub>, EtOH, or CS<sub>2</sub>, and heated under reduced pressure to remove the solvent and leave a SiO<sub>2</sub> gel having a high adsorptive power for C<sub>6</sub>H<sub>6</sub> or CCl<sub>4</sub>. A. R. P.

**Expanded vermiculite manufacture.** C. S. MINER and R. ERICSON, Assrs. to NAT. VERMICULITE PRODUCTS CORP. (U.S.P. 1,963,276, 19.6.34. Appl., 8.8.32).—The mineral is passed continuously through the flame of a torch in which it is heated at 800° for about 8 sec. to expel H<sub>2</sub>O; the cellular product formed is cooled rapidly to prevent it from becoming friable. A. R. P.

**Treatment of vermiculite.** O. A. LABUS (U.S.P. 1,963,275, 19.6.34. Appl., 25.10.33).—The mineral is passed through a rotary dryer at 120° to a highly heated,

gas-fired furnace in which the  $H_2O$  of hydration is suddenly expelled to produce a highly porous product.

A. R. P.

**Manufacture of base-exchange silicates.** K. P. McELROY, Assr. to PERMUTIT Co. (U.S.P. 1,961,902, 5.6.34. Appl., 22.12.31).—A 4:5:1 mixture of clay ( $Al_2O_3$  17,  $SiO_2$  64,  $Fe_2O_3$  5, and  $K_2O$  2%),  $Na_2CO_3$ , and fine coke is made into small pellets which are passed over a sintering grate on which the coke is burned by a stream of hot air, whereby porous semi-fused globules of Na aluminosilicate are obtained. Leaching of these with hot  $H_2O$  leaves a porous residue of zeolite having a high base-exchange capacity.

A. R. P.

**Revivification of brucite or magnesium hydroxide.** E. C. HIGGINS, JUN., and F. T. GARDNER (U.S.P. 1,963,493, 19.6.34. Appl., 16.9.31).— $Mg(OH)_2$  used in the purification of gasoline is regenerated by boiling it in hot aq. NaOH to remove the  $SiO_2$  coating on the grains.

A. R. P.

**Recovery of aluminium [from foundry dross] as aluminium sulphate.** J. G. G. FROST, Assr. to NAT. SMELTING Co. (U.S.P. 1,962,498, 12.6.34. Appl., 15.1.30).—Dross containing Fe and nitrides is washed to remove dust and sol. matter, treated magnetically to remove Fe, and heated with  $H_2SO_4$  to convert all the Al particles and the nitrides into  $Al_2(SO_4)_3$  and  $(NH_4)_2SO_4$ . The product is leached with  $H_2O$  and the hot-filtered solution cooled to recover  $NH_4$  alum.

A. R. P.

**Preparation of cuprous chloride.** D. GERNEs (U.S.P. 1,964,569, 26.6.34. Appl., 18.7.32).— $CuCl_2$  in 20% HCl is reduced to  $Cu_2Cl_2$  by boiling with finely-divided Cu and the solution is cooled slowly to allow the  $Cu_2Cl_2$  to crystallise.

A. R. P.

**Manufacture of zinc arsenate.** O. F. HEDENBURG, Assr. to REX RESEARCH CORP. (U.S.P. 1,981,044, 20.11.34. Appl., 29.12.32).—A suspension of 1000 lb. of ZnO and 10 lb. of NaOH in 10,000 lb. of  $H_2O$  is mixed at 60° with a solution of 705 lb. of  $As_2O_5$  in 1300 lb. of  $H_2O$ .

B. M. V.

**Purification of crude nickel carbonyl.** C. F. R. HARRISON and A. E. WALLIS (B.P. 428,610, 11.11.33).— $Ni(CO)_4$  (I) is separated from admixture with  $Fe(CO)_5$  by fractional freezing, (I) crystallising almost completely at  $-20^\circ$ . Oil and/or  $H_2O$  may be separated from (I) in a similar way.

A. R. P.

**Production of lead [suboxide] powder.** L. S. ISHIMURA (U.S.P. 1,961,296, 5.6.34. Appl., 25.7.30).—Lumps of Pb are fed into a tumbling mill in which they are heated by streams of hot air which serve to produce superficial oxidation and to blow out the  $Pb_2O$ , as it is formed, into a  $H_2O$ -cooled jacket which prevents further oxidation.

A. R. P.

**Production of highly plastic colloidal tungsten compounds.** A. PACZ (B.P. 428,627, 23.11.33. Ger., 24.11.32).—The reaction products of a 1—4:2:1 mixture of gallic acid and  $(NH_4, K, \text{ or } Na)_2WO_4$  in hot  $H_2O$  or dil. HCl are plastic masses which can be used in the prep. of W or W alloy filaments or in the manufacture of hard alloys for cutting tools.

A. R. P.

**Manufacture of krypton and xenon from atmospheric air.** L'AIR LIQUIDE, SOC. ANON. POUR L'ÉTUDE

ET L'EXPLOIT. DES PROC. G. CLAUDE (B.P. 432,644, 31.1.34. Ger., 9.2.33).—The air is cooled to a temp. just above its condensation point and subjected to rectification with a small vol. of liquid  $O_2$  or  $O_2 + N_2$  which condenses the Kr and Xe, and the resulting liquid is further rectified to obtain the pure gases and  $O_2$ .

A. R. P.

**Preparation of hydrogen.** A. T. LARSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,960,912, 29.5.34. Appl., 21.10.30).—In the catalytic conversion of  $CH_4$  and  $H_2O$  into CO and  $H_2$  the temp. of the catalyst is maintained by injecting small quantities of  $O_2$  into the gas after partial conversion, to burn some of the CO and  $CH_4$ , and the hot gases are passed in heat exchange with the catalyst.

A. R. P.

**Extraction of sulphur.** A. NAGELVOORT, Assr. to DELAWARE CHEM. ENG. Co. (U.S.P. 1,963,921, 19.6.34. Appl., 7.1.33).—The S ore is introduced through a layer of  $H_2O$  to displace air into a lower layer of  $CS_2$  maintained at 40° to dissolve the free S.

A. R. P.

**Production of sulphur.** A. R. LINDBLAD (B.P. 428,979, 12.6.34).—Roaster gases from ores containing Cu, As, or Sb are cooled to 200°, purified in an electrostatic precipitator, again heated to  $> 200^\circ$ , and passed through a C reducer at  $> 800^\circ$ . The reduced gases are mixed with more  $SO_2$  to destroy COS and  $CS_2$ , and the mixture then passed over an  $Fe_2O_3$  or  $Al_2O_3$  catalyst at 800°.

A. R. P.

**Recovering sulphur dioxide from refuse sulphuric acid.** METALLGES. A.-G. (B.P. 432,714, 25.1.34. Ger., 15.3. and 29.11.33).—Waste acid from oil-refining is sprayed into a hot furnace in which waste fuel or by-products containing a high % of C are burned and the resulting  $SO_2$  is reconverted into  $H_2SO_4$  in a contact plant.

A. R. P.

**Preparation of aqueous solutions of chlorine.** G. ORNSTEIN (U.S.P. 1,962,571, 12.6.34. Appl., 17.11.32. Ger., 9.2.32).—Liquid  $Cl_2$  and  $H_2O$  are mixed continuously in a chamber fitted with an injector.

A. R. P.

**Medium for detecting impurities in gases.** B. DRÄGER (B.P. 431,809, 23.5.34. Ger., 24.5.33).—The medium consists of a white or colourless, inorg. gel, e.g.,  $SiO_2$  or  $TiO_2$  gel, impregnated with a substance which changes colour in contact with a noxious gas, e.g.,  $CoSO_4$  (blue with  $NH_3$ ) or a mixture of  $NHPh_2$  and  $p\text{-NMe}_2\text{-C}_6\text{H}_4\text{-CHO}$  in xylene (coloured by  $PH_3$ ).

A. R. P.

**Pulveriser [for fertilisers]. Measuring thermal conductivity of gases.**—See I. S from gases.—See II. Pb tetra-alkyl.—See III. Pressure electrolyzers.—See XI.  $Cu_2O$ .—See XIII. Fertilisers.—See XVI.

## VIII.—GLASS; CERAMICS.

**Devitrification of glass.** XIV. Growth of crystals of  $R_2O\text{-}B_2O_3\text{-}SiO_2$ . XV. Effect of replacement of  $Na_2O$  by  $K_2O$  on rate of crystal growth; X-ray analysis of the crystals. K. TABATA, T. MORIYA, and T. SUGAHARA (J. Soc. Chem. Ind., Japan, 1935, 38, 304 B).—XIV. At  $\triangleright 1150^\circ$  crystal growth is accelerated by increasing the content of  $SiO_2$  or diminishing that of  $B_2O_3$ , and it is greater for  $Na_2O$  glasses than for those

containing mixed alkalis. The rate is greater above 1150° unless the content of SiO<sub>2</sub> is low and that of B<sub>2</sub>O<sub>3</sub> high.

XV. In glasses of the composition  $x\text{K}_2\text{O}-(1-x)\text{Na}_2\text{O}-1.0\text{B}_2\text{O}_3-10.0\text{SiO}_2$  at  $\gt 1150^\circ$  crystal growth is accelerated by replacing K<sub>2</sub>O by Na<sub>2</sub>O. Crystals formed at 900° are cristobalite. A. G.

**Action of steam on glass.** O. G. BURCH (J. Amer. Ceram. Soc., 1935, 18, 233—238).—A series of autoclave tests on various sizes, shapes, and kinds of bottle are described and illustrated by photographs. The resistance to the action of saturated steam depends on the size and shape of the bottle. The inside surface is more susceptible to attack than the outside. The rinsing of the surface of a bottle after prolonged storage removes sufficient alkali to increase the resistance to attack by steam. Partial removal of liquid H<sub>2</sub>O from the steam decreases its action on glass, and dry steam is without action. The action of saturated steam therefore appears to be that of superheated H<sub>2</sub>O. The autoclave test is not a reliable test of glass durability. J. A. S.

**Effect of temperature treatment on glass-to-metal seals.** J. T. LITTLETON (J. Amer. Ceram. Soc., 1935, 18, 239—245).—Strain conditions of the joints were examined by a photo-elastic method. Heat-treatment of a glass sample near its annealing point decreases the contraction of the glass, whereas rapid cooling increases the contraction. Strain-free joints can be obtained only by a proper heat-treatment. A high degree of control is possible by the method described. Photographic strain records of glass-Pt and -Mo seals are given. J. A. S.

**Mechanics of enamel suspension. II. Electro-dialysis of some enamels and glasses.** R. M. KING (J. Amer. Ceram. Soc., 1935, 18, 230—233; cf. B., 1935, 630).—1 g. of material (200-mesh) was mixed with 2 g. of alkali-free alundum grain (46-mesh) and treated in a Bradfield cell (cf. B., 1928, 162) for periods varying up to 15 hr. Great differences exist in the rate at which various materials release their alkali. The method is a satisfactory accelerated-weathering (durability) test and gives results consistent with acid-resistance tests (20% HCl for 3 hr. at 100°). The accuracy of the method (3—10%) and sources of error are described. J. A. S.

**Use of a nickel dip in enameling practice.** J. E. HANSEN and J. T. IRWIN (J. Amer. Ceram. Soc., 1935, 18, 225—229).—The methods of analysis, compositions, and use of commercial Ni-plating (dipping) solutions are discussed. The use of such solutions increases enamel adherence, and decreases "fishscaling" and "copper-heading." A successful formula is NiSO<sub>4</sub>·7H<sub>2</sub>O 2.4 oz., H<sub>3</sub>BO<sub>3</sub> 0.25 oz., H<sub>2</sub>O 1 gal.. The optimum pH is 5.6—6.2. J. A. S.

**Determination of the heat-conductivity of enamel.** W. DAWIHL (Chem. Fabr., 1935, 8, 327—329).—The thermal conductivity of enamel depends chiefly on the porosity, which varies with the time and temp. of burning. Changes in chemical composition have a relatively slight effect. R. S.

**Detection of Japanese acid clay by the colour reaction of benzidine solution.** K. KOBAYASHI and

H. ISHIKAWA (J. Soc. Chem. Ind., Japan, 1935, 38, 308—309B).—A 1% aq.-EtOH (1:1) solution of benzidine gives an intense blue or greenish-blue colour with Japanese acid clay. F. N. W.

**Change of inner structure of quartz and of felspar heated at a high temperature.** T. NAKAI and Y. FUKAMI (J. Soc. Chem. Ind., Japan, 1935, 38, 340—342B).—The change of quartz into cristobalite can be followed by X-ray diagrams and by its *d*. Small grains of quartz change more rapidly than large grains, and in a sample of SiO<sub>2</sub> of grain size 2—9 μ the change was half completed after 10 hr. at 1400°. The fusion of felspar can also be followed by its *d*; fusion begins at 1000° and is complete at 1300°. A. G.

**Kaolin-quartz-felspar system after heat-treatment.** T. NAKAI and Y. FUKAMI (J. Soc. Chem. Ind., Japan, 1935, 38, 342—344B).—18 mixtures of kaolin, quartz, and felspar were heated for 1½ hr. at 1100—1500° and the X-ray diagrams and *d* determined. Quartz was always present, but its amount diminished with rising temp., owing to formation of vitreous substances and of cristobalite. Mullite was present in all mixtures heated above 1100°, unless the amount of kaolin was < 30%. *d* falls with rising temp., with decreasing kaolin content (felspar or quartz const.), and with decreasing quartz content (kaolin const.). A. G.

**Influence of sodium aluminate in a fireclay sewer-pipe body.** W. K. CARTER, G. H. DUNCOMBE, E. E. HILLYER, and R. M. KING (J. Amer. Ceram. Soc., 1935, 18, 251—258).—The initial strength of sewer pipe may be decreased by 5—40% by "weathering." Addition of up to 1% of Na<sub>2</sub>O·Al<sub>2</sub>O<sub>3</sub> (I) to an Ohio coal-measure fireclay increased the initial fired strength of the ware and decreased the loss in strength on weathering. A comprehensive laboratory and plant-scale test is described. Petrographic examination shows that the beneficial effect of (I) is due to an enhanced development of a network of mullite crystals. J. A. S.

**Fused magnesia.** B. MOORE and W. L. PATRICK (Ind. Chem., 1935, 11, 318—320).—A review. D. K. M.

**Influence of particle size, shape, aggregation, and hardness on the abrasiveness of fine powders.** M. L. SMITH (J.S.C.I., 1935, 54, 269—275 T).—The abrasiveness of monodisperse calcite in glycerin suspension increased regularly with wt. average particle diameter (1.8—45 μ). Aggregates characteristic of commercial pptd. chalks abraded similarly to calcite crystals of the same diameter. Tests on other materials showed that the abrasiveness increased more rapidly with particle diameter as the hardness was greater. The type of scratching, the first stage in abrasion, was studied for the different powders. Particles < a certain diameter (5 μ for calcite) gave no visible scratching on a Ag plate.

**Colours and pigments.**—See XIII.

See also A., Aug., 935, Systems CaO-SiO<sub>2</sub>-H<sub>2</sub>O and alkali oxide-CaO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-CO<sub>2</sub>.

#### PATENTS.

**Muffles.** GIBBONS BROS., LTD., and W. E. GIBBONS (B.P. 431,871, 19.1.34).—In a tunnel kiln the

substantially vertical walls between the tunnel and combustion spaces are formed of material of smaller heat conductivity in the upper parts and of higher conductivity in the lower parts. Forms of hollow blocks for this purpose are described. B. M. V.

**Glass-melting furnace.** G. LUFKIN and F. FLEXON, Assrs. to OWENS-ILLINOIS GLASS CO. (U.S.P. 1,981,625, 20.11.34. Appl., 17.8.33).—A forehearth, suitable for operating with a suction-gathering machine, is provided with a manifold including a no. of fuel burners resting upon the curved front wall, the heat therefrom being retained by a jack arch. B. M. V.

**Annealing of glassware.** W. A. MORTON and P. L. GEER, Assrs. to AMCO, INC. (U.S.P. 1,982,477—8, 27.11.34. Appl., [A] 4.5.34, [B] 11.4.27).—In continuous lehrs, (A) both runs of the perforated conveyor pass through the muffle, the heating means of which is adjacent the bottom wall, and baffles are provided to prevent longitudinal convection; (B) the muffle is heated by a longitudinal flue beneath, the gases from which afterwards pass into the tunnel, and near the discharge end the tunnel atm. is withdrawn, mixed with air, and returned under pressure at the end, to afford cooling without admission of wayward air currents. B. M. V.

(A) **Manufacture of glass.** (B) **Glass composition.** E. E. FISHER, Assr. to NAT. PIGMENTS & CHEM. CO. (U.S.P. 1,962,495—6, 12.6.34. Appl., [A] 7.2.31, [B] 14.12.31).—(A) Addition of a Ba compound and a small amount of  $TiO_2$  to  $Na_2O$ -CaO glass reduces its solubility and increases its resistance to weathering. A suitable batch consists of sand 100,  $Na_2CO_3$  25,  $CaCO_3$  27, cullet 100, mixture of  $BaSO_4$  (1600), BaS (400), and  $TiO_2$  (1—10 pts.) 10—25 pts. (B) The Ba mixture consists of BaO 40—60 and  $BaSO_4$  60—40%. A. R. P.

**[Glass for] metal-vapour lamp.** H. P. HOOD, Assr. to CORNING GLASS WORKS (U.S.P. 1,964,321, 26.6.34. Appl., 16.1.33).—The glass contains  $SiO_2$  55—80,  $B_2O_3$  10—25, and  $Na_2O$  10—25, the %  $B_2O_3$  being  $< 2.57 \times \% Na_2O$ . A. R. P.

**Production of glass wool or other inorganic fibrous material.** W. W. TRIGGS, From OWENS-ILLINOIS GLASS CO. (B.P. 428,720, 2.3.34).—Molten glass issuing from a series of holes of, e.g.,  $\frac{1}{8}$  in. diam. is forced into a series of fine filaments by the action of a blast of steam or hot air flowing at high speed in the direction of flow of the glass streams. A. R. P.

(A) **Safety glass.** (B) **Laminated glass.** (A) R. W. WAMPLER, (B) G. B. WATKINS, Assrs. to LIBBEY-OWENS-FORD GLASS CO. (U.S.P. 1,963,569 and 1,963,601, 19.6.34. Appl., [A] 27.6.31, [B] 21.5.30).—The binder for cementing the cellulose acetate layer between the two layers of glass consists of (A) casein 7, aq.  $NH_3$  or borax 1, and diethylene glycol (I) 92%, or (B) gelatin and (I) in suitable proportions. A. R. P.

**Manufacture of vitreous material.** A. W. H. WEDLOCK, and MYCALEX (PARENT) CO., LTD. (B.P. 432,424, 26.10.33).—Dielectric which will adhere to metal and can be moulded (at  $620^\circ$ ), pressed, and rolled is composed of dry and finely-ground mica, asbestos, and

ceramic materials including cryolite and alkaline carbonates, others being, e.g.,  $BaCO_3$  and  $H_3BO_3$ .

B. M. V.

**Production of electrically conducting coating on vitreous substances [glass].** J. F. HYDE, Assr. to CORNING GLASS WORKS (U.S.P. 1,964,322, 26.6.34. Appl., 7.11.30).—The glass is treated with  $SiCl_4$  vapour at  $200$ — $400^\circ$  until iridescent, then heated in a reducing atm. A. R. P.

**Manufacture of enamel ware.** J. E. ROSENBERG, Assr. to ENAMELERS GUILD, INC. (U.S.P. 1,962,617, 12.6.34. Appl., 4.10.32).—The Fe or steel to be enamelled is sprayed with a suspension of CoO 3 and bentonite 1.5 pts. in 100 pts. of  $H_2O$ ; the layer, after drying, provides a groundcoat for the enamel. A. R. P.

**Cellular clay insulation for metallurgical apparatus.** C. E. WILLIAMS and J. D. SULLIVAN, Assrs. to BATTELLE MEMORIAL INST. (U.S.P. 1,982,490, 27.11.34. Appl., 29.7.32).—A refractory lining (A) of high  $d$  is inseparably united with an insulating backing which is also refractory and owes its insulating properties only to bloating, its  $d$  being  $<$  half that of A; the cells are of uniform size, separated by thin, fired walls. B. M. V.

**Refractory linings for furnaces and bricks therefor.** STERLING METALS, LTD., and D. J. GASCOIGNE (B.P. 432,512, 9.7.34).—The face of the brick bulges outwards beyond the edges so that molten slag drips clear of the joints in the course below. Erosion of the brickwork is thus minimised. J. A. S.

**Rubber-bonded abrasive article.** C. S. NELSON and G. H. PORTER, Assrs. to CARBORUNDUM CO. (U.S.P. 1,976,798, 16.10.34. Appl., 27.7.32. Can., 1.8.30).—The abrasive grains (92 pts.) are wetted with a mild coagulant [ $\geq$  1% of  $Pb(OAc)_2$ , 10% solution] and stirred into a dispersion of rubber (8 pts.) + S (4 pts.). After some min., MgO (1% of the whole) is added and stirred for 1 min. The mixture is dried (to 5—10% of  $H_2O$ ) and disintegrated, and can then be moulded at approx.  $140^\circ$ . J. A. S.

**Refrigerator tubes.**—See I.

## IX.—BUILDING MATERIALS.

**Ore cement or iron cement.** III. S. NAGAI and K. MATSUOKA (J. Soc. Chem. Ind., Japan, 1935, 38, 298—302 B; cf. B., 1935, 497).—Cements containing 7.42, 7.37, and 6.10%  $Fe_2O_3$  were prepared from limestone, clay, ganister, and Cu slag and burned at  $1350^\circ$ . These Fe cements are slow-hardening and stable, and evolve an unusually small amount of heat during setting and hardening. A. G.

**Fineness of Portland cement.** W. WATSON and Q. L. CRADDOCK (Cement, 1935, 8, 201—206).—Methods for determining fineness by air and liquid elutriators and by sedimentation are described. T. W. P.

**Particle-size distribution of cement.** G. ROTHFUCHS (Tonind.-Ztg., 1935, 59, 318—321).—A formula for particle-size grading is developed, to produce cements giving best properties. T. W. P.

**Variation of length of a cement [test-piece] with atmospheric humidity.** M. LUCAS (Compt.

rend., 1935, 201, 58—59).—Data are recorded for the increase in wt. and length of a hardened cement test-piece on exposure to an atm. of varied humidity. Over a large range the length  $\propto$  the humidity. The max. total variation of length was approx. 2 mm. per m.

H. J. E.

**Mortars suitable from the viewpoint of water-tightness in unit masonry.** L. A. PALMER (J. Amer. Ceram. Soc., 1935, 18, 245—250; cf. B., 1934, 719).—It is pointed out that in previous investigations certain important points have been overlooked. Thus, variation of the degree of wetting of the brick may completely mask the true result. Both under- and over-wetted bricks should be included in the tests. The mortar and brick should be matched to suit each other; e.g., a porous brick needs a mortar of high H<sub>2</sub>O-retaining capacity (high-lime mortar). Laboratory tests on mortars may give a false impression, for a poor-workability-high-strength mortar is favoured by the more careful and standardised practice of the test, whereas workability is of paramount importance in actual building. The results of tests on various combinations of bricks and mortars are recorded. Laboratory freezing and thawing tests may be misleading due to the unnaturally wet conditions of the test and to the practice of commencing the test before the slow-hardening mortars have attained reasonable strength. With the proper proportioning of lime and cement it is possible to obtain a mortar to suit any type of well-fired brick.

J. A. S.

**Hydraulic properties of blast-furnace slag.** E. LEDUC (Rev. Mat. de Constr. et de Travaux Publ., 1935, 310, 161—165).—Slag, either granulated or not, has potential hydraulic qualities, but the compression strengths of test-pieces of the former are  $>$  those of the latter. Test-pieces made under pressure and autoclaved in steam gave highest strengths. Small additions of Ca(OH)<sub>2</sub> (up to 2.5%) or CaSO<sub>4</sub> accelerate the hardening, but this is not due to combination of the Ca(OH)<sub>2</sub> with gel as in the case of pozzuolanas.

T. W. P.

**Gas volumes per ton of clinker and gas velocities in rotary [cement] kilns.** ANON. (Cement, 1935, 8, 190—200).—Tables are given correlating excess air with various standard coal consumptions, wts. and vols. of kiln exit gases with various % of standard coal at different exit-gas temp., and kiln data on gas velocities at various gas temp. and coal consumptions.

T. W. P.

**Blisters in floated asphalt.** P. MARX (Strassenbau, 1935, 26, No. 10, 137—143; Road Abs., 1935, 2, No. 343; Building Sci. Abs., 1935, 8, No. 1120).—Blistering usually begins in spring, increases in summer, and in winter the blisters are crushed or absorbed. They are not due to the inclusion or penetration of H<sub>2</sub>O, since they may appear on coatings on steel, which must be dry before application. They are often completely enclosed by asphalt. H<sub>2</sub>O is found only in cases of poor adhesion. They may be caused by gradual evolution of gas from the asphalt itself.

T. W. P.

**Decay of wood in relation to humification.** E. A. RUDGE (Fuel, 1935, 14, 202—205).—The biological theory of coal formation is adversely criticised and a chemical mechanism, analogous to the author's "infil-

tration theory" of wood decay (cf. B., 1934, 675 etc.), is suggested for the initial stages of the humification process.

A. B. M.

**Chemical plant construction.**—See I.

See also A., Aug., 1043, **Chemistry of white rots of wood.**

PATENTS.

**Coloring concrete.** E. W. SCRIPTURE, JUN., ASS. to MASTER BUILDERS Co. (U.S.P. 1,982,541, 27.11.34. Appl., 10.4.31).—Natural-coloured, H<sub>2</sub>O-insol. silicate gel, or a neutral coloured gel ground with pigment in a colloid mill, is mixed with the gauging H<sub>2</sub>O.

B. M. V.

**Surfacing of roads.** SOC. DE RECHERCHES ET DE PERFECT. INDUSTR. (B.P. 431,781, 8.1.34. Fr., 9.1.33).—Bitumen or pitch is mixed (e.g., in a solvent, with subsequent evaporation) with chalk, SiO<sub>2</sub>, slate, coal, etc. pulverised and suspended in tar. The dissolution of the bitumen etc. is brought about before laying on the road, by heating to 100°; or after laying, by the action of solar heat.

J. A. S.

**Testing of bituminous and other [paving] mixtures.** H. L. HOWE (U.S.P. 1,979,267, 6.11.34. Appl., 16.11.29).—Bituminous paving materials or the like are compressed under definite temp. and pressure in a cylinder with plunger, the circular end-surfaces being lined with paper or other stain-revealing material.

B. M. V.

**Composition for making a building unit.** A. HEDE, ASS. to CINDER CHROME Co. (U.S.P. 1,981,043, 20.11.34. Appl., 29.7.32).—Artificial marble is formed of stated proportions of white cement, marble dust or sand, and a mineral colour, which is rendered plastic with a solution of Na silicate, H<sub>3</sub>BO<sub>3</sub>, casein, and NH<sub>4</sub>Cl.

B. M. V.

**Manufacture of [waterproof and insulating] compositions.** M. T. HARVEY, ASS. to HARVEL CORP. (U.S.P. 1,977,826, 23.10.34. Appl., 25.10.30).—Cashew nut-shell liquid ( $\geq$  60%) is caused to react with alkali ( $\leq$  40%), e.g., Ba(OH)<sub>2</sub>, CaO, hydraulic cement, giving a H<sub>2</sub>O-resistant product. (Cf. U.S.P. 1,838,075; B., 1932, 889.)

S. S. W.

**Production of moulded compositions from asbestos.** D. WOLOCHOW (U.S.P. 1,962,577, 12.6.34. Appl., 2.4.32).—Waste chrysotile asbestos fibres are made into a plastic mass with H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, or HCl ( $<$  60%) and, after moulding, the shapes are heated at  $>$  100° to const. vol.

A. R. P.

**Insulation for heat, cold, and sound.** J. E. AUBANEL and G. H. ALABASTER (B.P. 432,274, 24.1.34).—Sheets of glossy corrugated paper are arranged with the corrugations at right-angles and surrounded by a waterproof sheath, e.g., of 3-ply paper and bitumen.

B. M. V.

**Shrinking of wood.** A. G. OLSEN (U.S.P. 1,981,567, 20.11.34. Appl., 20.6.32).—The wood is impregnated with a hot but not boiling mixture of linseed oil and NaCl, the oil is expressed, and the fibres are caused to collapse by application of heat and pressure, the latter in both directions of the grain; the pressure is retained while cooling.

B. M. V.

**Wood stain.** C. G. MOORE and M. ZUCKER, Asssts. to GLIDDEN Co. (U.S.P. 1,977,345, 16.10.34. Appl., 31.10.29).—A stain which does not raise the wood fibres consists of  $H_2O$ -sol. dye 4,  $O[C_2H_4 \cdot OH]_2$  Et ether 5, EtOH 80, and  $OH \cdot [CH_2]_2 \cdot OMe$  15 pts. J. A. S.

**Cement-paint prep. Resin product from molasses etc. Bituminous compositions.**—See XIII. Adhesives.—See XV.

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

**Regulation of cupola furnaces.** G. HÉNON (Usine, 1935, 44, No. 2, 34).—During melting in the cupola the losses of Si and Mn are 8—10 and 10—15% respectively. P is const. and S increases slowly, the Fe becoming more sulphurised the less fluid is the slag. The wear of the refractory lining is less the shorter the melting time and the more Si is used. Other criteria for satisfactory operation are reviewed. CH. ABS. (e)

**Operation of a blast furnace on an oxygen-enriched blast.** M. A. SCHAPOVALOV (Domez, 1934, No. 10, 7—14).—Tests with a blast enriched in  $O_2$  gave a product too high in Si and S, and a slag too rich in Fe oxides. CH. ABS. (e)

**Resistance of open-hearth furnace bottoms.** A. KULBERG and G. LIADVANSKI (Domez, 1934, No. 10, 14—22).—Tests are described with bottoms prepared from mixtures of dolomite, magnesite, and open-hearth slag. A dense, compact, well-constructed bottom is most resistant to disintegration. CH. ABS. (e)

**Oolitic iron ores in the Dogger sandstone of the Jura Mountains.** E. SCHMIDTILL (Arch. Eisenhüttenw., 1935—6, 9, 1—13).—The geology and palaeogeography of the deposits are discussed with reference to the genesis of the two seams of oolitic hæmatite which occur in the sandstone. A magnetic concentrate containing Fe 50,  $SiO_2$  14, and  $Al_2O_3$  7% can be obtained in 90% yield by roasting the ore under reducing conditions at  $700^\circ$  followed by magnetic separation after removal of the fines; the original ore contains Fe 32,  $SiO_2$  40, and  $Al_2O_3$  5%. A. R. P.

**Heavy alloy iron castings.** C. C. MILLER (Met. & Alloys, 1935, 6, 185—186).—Castings of medium thickness are made from Fe containing Mo 0.3—0.5, C 2.65—3.0,  $SiO_2$  0.8—1.5, Mn 0.8%. For heavy sections, up to 3 ft., 0.25—0.35% Cr is added; for light sections, up to 5 in., 0.6% Ni is added. The alloys are superheated in a 25-ton, acid-lined, oil-fired furnace. E. H. B.

**Malleable castings.** A. SAUVEUR and H. L. ANTHONY (Trans. Amer. Soc. Met., 1935, 23, 409—430).—Free  $Fe_3C$  graphitises only above the thermal crit. range, and  $Fe_3C$  in pearlite is previously spheroidised before it transforms into graphite. By suitable annealing treatments white cast Fe with ferritic, pearlitic, or sorbitic matrices can be obtained, and the annealing treatment need not exceed 40 hr. W. P. R.

**Forging of cast iron.** S. A. BARANOV (Soobsch. Vsesoy. Inst. Met., 1931, No. 8, 22—25).—Brittle white cast Fe with 2.9% C was successfully forged. The product had Brinell hardness 286—600. In forging the temp. was slowly raised to 1000—1050°. The final

temp. should be  $\leq 850$ — $900^\circ$ . The product is recommended for cutting tools. CH. ABS. (e)

**Nickel wrought iron.** E. F. CONE (Iron Age, 1935, 135, No. 4, 22—24).—A 3% Ni addition to Aston-processed wrought Fe increased the yield point 50% and the tensile strength 25% without a marked decrease in ductility. CH. ABS. (e)

**Pearlite structure of a cold-drawn wire.** J. SIEGLE (Rev. tech. Luxembourg, 1934, 26, 82—95; Chem. Zentr., 1935, i, 1295).—Data are recorded for a steel with 0.22% of C. H. J. E.

**Expansion measurements on annealing hardened steel containing 1.15% of carbon.** T. BERGLUND (Jernkont. Ann., 1934, 118, 495—514; Chem. Zentr., 1935, i, 1295).—Interferometric measurements of changes in length of a test-piece on annealing at 100— $500^\circ$  are recorded. Decomp. of the tetragonal martensite causes contraction (max. at 100— $150^\circ$ ). Decomp. of austenite occurs at 270— $300^\circ$ . H. J. E.

**Directional properties in rolled and annealed low-carbon steel.** A. PHILLIPS and H. H. DUNKLE (Trans. Amer. Soc. Met., 1935, 23, 398—408).—In cold-rolled steel directional properties are most marked in directions  $90^\circ$  to that of rolling. In annealed material the effect is most marked at  $45^\circ$  to the rolling for reductions  $> 50\%$ . W. P. R.

**Optical measurement of the temperature of liquid iron and steel.** F. BLAUROCK (Arch. Eisenhüttenw., 1934—5, 8, 517—532).—The disappearing-filament type of optical pyrometer with the usual red filter does not give satisfactory readings on liquid Fe and steel. From laboratory and works tests it is shown to be possible to obtain readings within  $\pm 15^\circ$  of the true temp. by the use of carefully standardised apparatus and by taking two readings, one with the red and the other with a green filter; from the difference between these readings the correction factor for the true temp. can be obtained by reference to a graph which varies with the emissivity of the metal and with the nature of its surface, whether bright or oxidised. In the case of cast Fe the surface is oxidised at 1300— $1400^\circ$  but becomes bright at about  $1500^\circ$ , the exact temp. of the change depending on the Mn and Si content. Numerous observations made on Fe and steel in various furnaces, ladles, and converters are tabulated and analysed. A. R. P.

**Age-hardened steel.** P. D. MERICA (Metal Progress, 1935, 27, 29—32).—Age-hardening in mild, cold-worked and Cu-bearing steels is discussed. It is suggested that the lack of ductility in the “blue-brittle” temp. range may be caused by the combined pptn. effect of strain and temp. The pptd. constituents are probably carbides and nitrides. W. P. R.

**Physical properties of case-hardened steels.** O. W. McMULLAN (Trans. Amer. Soc. Met., 1935, 23, 319—381).—Hardness, bending, notched and unnotched brittleness, distortion, and wear-resistance tests on the case and core of carburised C and alloy case-hardening steels have been tabulated. Fine- and coarse-grained steels were included, and carburising was effected by means of solid compounds. W. P. R.



**Magnetic behaviour of cold-rolled iron-nickel alloys due to separation-hardening. (Development of the isoperm.)** O. DAHL and J. PFAFFENBERGER (*Metallwirts.*, 1934, 13, 527—530, 543—549, 559—563; *Chem. Zentr.*, 1935, i, 1113—1114; cf. B., 1935, 500).—A comprehensive discussion and review of data. H. J. E.

**Double-yoke magnet-steel tester.** F. STÄBLEIN and R. STEINITZ (*Arch. Eisenhüttenw.*, 1934—5, 8, 549—554).—The apparatus is designed for measuring the magnetic properties of steels with a coercivity of > 500 oersteds. Its standardisation and some examples of its use are described. A. R. P.

**Hardening and tempering of steels containing carbides of low solubility, especially vanadium steels.** E. HOUDREMONT, H. BENNEK, and H. SCHRADER (*Amer. Inst. Min. Met. Eng.*, 1934, *Tech. Publ.* 585, 29 pp.).—Owing to removal of C from the matrix to form carbides of V etc., the hardening power of the steel when quenched from the usual temp. is low, the special carbide being less sol. in austenite than is Fe carbide. At higher quenching temp. V steels are not susceptible to overheating. The special carbide of low solubility separates from  $\alpha$ -Fe only at high tempering temp., and increases the hardness. Martensite formed by the  $\gamma$ - $\alpha$  transformation decreases the hardness during tempering. The secondary hardness increase in high-speed steels is due not only to pptn.-hardening, but also to transformation of residual austenite. The stability of the martensitic hardness up to 600° is due to the fact that special carbides ppt. and coagulate at higher temp. than cementite. CH. ABS. (e)

**High-speed steel with molybdenum and tungsten.** F. GARRETT (*Metal Progress*, 1935, 27, 38—43).—Details of the heat-treatment of a high-speed steel (C 0.76, Mn 0.30, Si 0.30, W 1.60, Mo 7.90, Cr 3.85, V 1.10%) are described. It replaces steel with 18% W, and is more easily forged than the latter. A soft surface on the hardened tool can be avoided by coating the steel with borax before heating to the quenching temp. W. P. R.

**Tenacity of two manganese-silicon steels.** G. PIQUET (*Aciers spéc., Mét., Alliages*, 1934, 9, 107—114, 137—144, 162—175; *Chem. Zentr.*, 1935, i, 1296).—Tests are described on two steels (C 0.4—0.48, Si 1.62—2.02, Mn 0.5—0.76%; and C 0.4—0.49, Si 1.6—1.88, Mn 0.4—0.6, Ni 0.44—0.55, Cr 0.23—0.6%) after various heat-treatments. H. J. E.

**Influence of forging and dimensions of heat-treated test-pieces on the mechanical properties of structural steel.** H. KORSCHAN and E. MAURER (*Stahl u. Eisen*, 1935, 55, 828—831).—Tensile tests indicated that the dimensions of the specimens heat-treated had a greater influence than the degree of forging. W. P. R.

**Magnetic detection of flaws in ferromagnetic materials.** M. VON SCHWARZ and J. KRAUSE (*TZ pr. Metallbearb.*, 1934, 44, 483—488; *Chem. Zentr.*, 1935, i, 952—953).—A method of testing by applying fine Fe powder gave satisfactory results. H. J. E.

**Assay of chromite.** D. MILLIN (*S. African J. Sci.*, 1934, 31, 177—183).—A discussion. CH. ABS. (e)

**Physical and casting properties of the nickel silvers.** T. E. KIHLGREN, N. B. PILLING, and E. M. WISE (*Amer. Inst. Min. Met. Eng., Inst. Met. Div.*, 1935, *Tech. Publ.* 610, 31 pp.).—Physical and mechanical properties are recorded for alloys with up to 30% Ni and 50% Zn with additions, in certain cases, of 0—8% Sn and 0—10% Pb. CH. ABS. (e)

**Losses of precious metals during melting.** I. N. PLAKSIN and M. A. KOSHUCHOVA (*Sovet. Zolotoprom.*, 1934, No. 6—7, 38—43).—Au was mixed with Cd, Zn, Hg, Sn, Sb, Pb, or Cu and heated at 1262° in an atm. of coal gas, N<sub>2</sub>, CO<sub>2</sub>, O<sub>2</sub>, or Cl<sub>2</sub>. Volatilisation of Au was particularly pronounced in coal gas and Cl<sub>2</sub>, owing to formation of AuH<sub>3</sub> and AuCl<sub>3</sub>. Volatilisation of Au from Au—Zn and Au—Cd mixtures increased for different gases in the order O<sub>2</sub>, coal gas, N<sub>2</sub>, CO<sub>2</sub>, Cl<sub>2</sub>. CH. ABS. (e)

**Removal of gases from metals.** L. MOREAU, G. CHAUDRON, and A. PORTEVIN (*Compt. rend.*, 1935, 201, 212—214).—The metal to be de-gassed is made one electrode of a discharge tube and heated by induction if required. Removal of gas from Al at 550—600° was complete in several hr. The selective removal of CO<sub>2</sub>, N<sub>2</sub>, CO, and H<sub>2</sub> from Al is described, these gases being removed in the above order with successive treatments. H. J. E.

**Prevention of the attack of light metals by water.** H. RÖHRIG and K. KREKELER (*Aluminium*, 1934, 17, 140—141; *Chem. Zentr.*, 1935, i, 1297).—1% of a protective oil capable of emulsification with H<sub>2</sub>O hinders corrosion, even at higher temp. and where conditions favour development of local e.m.f. H. J. E.

**Simple method of distinguishing the common light-metal casting alloys.** M. BOSSHARD (*Aluminium*, 1935, 17, 13—15).—The characteristic reactions of aq. NaOH (20 g. in 100 c.c. of H<sub>2</sub>O), aq. HCl (1 : 7 and 1 : 1), and 5 g. of CdSO<sub>4</sub>, 1 g. of NaCl, and 20 c.c. of conc. HCl in 100 c.c. of H<sub>2</sub>O, with Al—Zn, Al—Cu, Al—Si, and Al—Mg alloys, and with Mg, are described. CH. ABS. (e)

**Polish [of metals] and corrosion protection.** PLÜCKER (*Metallwar.-Ind. Galvano-Tech.*, 1934, 32, 406—408; *Chem. Zentr.*, 1935, i, 954).—A review and discussion. H. J. E.

**Electrodeposition of iron-nickel alloys. II.** F. MARSCHAK, D. STEPANOV, and L. LEVIUS (*Z. Elektrochem.*, 1935, 41, 596—597; cf. B., 1934, 801).—The influence of temp., total concn. of Fe<sup>2+</sup> and Ni<sup>2+</sup>, and c.d. on the composition of the deposit has been determined. E. S. H.

**Hardness of electrolytic chromium and the influence of hydrogen dissolved in the metal.** S. P. MAKARIEVA and N. D. BIRÜKOV (*Z. Elektrochem.*, 1935, 41, 623—631).—The hardness of electrolytic Cr is not related to the H<sub>2</sub> content. When heated at 200° about 30% of the H<sub>2</sub> is removed and the hardness of Cr increases, due to transformation from a hexagonal to a cubic lattice. At about 575°, 98% of the H<sub>2</sub> is removed and the hardness remains at the high val. The softening which is observed at slightly higher temp. is due to recrystallisation of the metal. E. S. H.

**Specification of electrodeposited coatings. IV. Cathode deposits, with particular reference to**

**nickel and chromium.** S. WERNICK (Ind. Chem., 1935, 11, 315—317; cf. B., 1935, 772).—A specification for Cr-plate on mild steel is given and methods of testing are discussed. D. K. M.

**Electrodeposition of lead from perchloric acid solution.** R. WEINER (Z. Elektrochem., 1935, 41, 631—635).—An electrolyte containing  $\text{Pb}(\text{ClO}_4)_2$  (50 g.) and  $\text{HClO}_4$  (10 g.) in  $\text{H}_2\text{O}$  (1 litre) gives good Pb deposits when a c.d. of 0.25—0.50 amp. per sq. dm. is applied. Agitation of the bath and the addition of 0.2—0.4 g. of peptone per litre effect improvements and enable higher c.d. to be used. E. S. H.

**Errata:** On pp. 885 and 192 of "B" abstracts, 1934 and 1935, respectively, for HORNERBERG, on col. 2, line 14 from bottom, read HOMERBERG.

**Ni in petroleum refining.**—See II. **Air for blast furnaces.**—See VII. **Glass-metal seals.**—See VIII. **Blast-furnace slag.**—See IX.

See also A., Aug., 919, **Solid solutions in Ag. Lattice distortion in Ni-Fe. Crystallites in cast Ni. 920, Electrolytic white Sn. Cu-Hg. Au<sub>3</sub>Pb. 922, Prep. of thin single crystals of Ag. Heat effects in Co transformations. Hardness of metals. Twinning in  $\alpha$ -Fe. 926, Intermetallic compounds of Be with Cu, Ni, and Fe. Si-Al. Crystallisation of binary eutectic systems. Mg-Zn-Si alloys rich in Mg. Fe-Ni-Cu alloys. System Co-Fe-Ti. 928, Permeability of Pd to  $\text{H}_2$ . Solubility of Au in  $\text{Fe}_2(\text{SO}_4)_3$ , of Pb in Hg, and of Na in Al. 930, Wetting power of metals. 936, Electrolysis of solid alloys. Cd-Sb alloys. 939, Corrosion of Zn in  $\text{H}_2\text{O}$ . 941, Rh-Pt gauze. 942, Electrolysis of Na stannate. Prep. of Ce by electrolysis. 944, Prep. of pure Na and K. Dry purification of Hg. 949, Electro-analysis of Ag. 951, Determination of Ni. Separation of Pt-group metals.**

#### PATENTS.

**Operation of rotary drum furnaces.** METALLGES. A.-G. (B.P. 432,465 and 432,476, 27.6.34. Ger., 19.5.34).—In the treatment of sulphide ores in a rotary inclined cylinder, (A) the quantity of charge present is  $\ll$  half the daily input, annular baffles being provided to retain that amount; air is admitted at points distributed over the whole length, and outlets for gases are distributed over the upper third of the length. In (B) additional details are given of the above openings. B. M. V.

**Smelting furnaces.** M. H. V. DELOT and R. A. PIGAL (B.P. 432,497, 27.1.34).—A furnace, preferably rotatable on a horizontal axis, is provided with a tiltable burner giving an annular flame which becomes flattened inside the furnace. B. M. V.

**Reduction of [iron] ore.** B. M. S. KALLING and C. VON DELWIG, Assrs. to A. JOHNSON & Co. (U.S.P. 1,964,402, 26.6.34. Appl., 12.5.31. Swed., 13.10.30).—A mixture of fine Fe ore and relatively coarser particles of hard, porous coke is passed through a rotary furnace against a current of  $\text{CH}_4$ , water-gas, coal gas, CO, or  $\text{H}_2$  supplied in quantity sufficient to reduce all the  $\text{Fe}_2\text{O}_3$  to sponge Fe without the aid of the coke, which remains unchanged in the process and serves simply to prevent sintering of the charge. A. R. P.

**Reduction of [iron] oxide ores or the like by means of gas.** O. and J. B. STÅLHANE, Assrs. to ALLMANNA SVENSKA ELEKTRISKA AKTIEB. (U.S.P. 1,964,680, 26.6.34. Appl., 22.9.32. Swed., 23.9.31).—Finely-divided Fe ore is reduced by means of a counter-current stream of hot producer gas so that the issuing gas contains  $\gtrsim$  10% of  $\text{CO}_2$ , and part of this gas is burned to heat the remainder to a temp. at which it reacts with finely-divided C in the producer to yield more gas for the first stage. A. R. P.

**Production of iron or steel.** M. SHIRAS (U.S.P. 1,963,315, 19.6.34. Appl., 22.6.33).—Fe scale or ore, blast-furnace flue dust, or other Fe oxide material in a finely-divided form is melted in a basic-lined furnace, and similar solid finely-divided material is added to the stream as it leaves the furnace, so as to produce dense heavy lumps of Fe oxide suitable for use as a substitute for "fix" ore in open-hearth practice. A. R. P.

**Desulphurising and purifying iron.** C. T. HENNIG (U.S.P. 1,963,269, 19.6.34. Appl., 12.7.24).—The steel is treated with  $\text{Na}_2\text{CO}_3$  in the ladle; the boiling action caused by the evolution of  $\text{CO}_2$  removes the Fe oxides, and the Na combines with the S. Spraying of  $\text{H}_2\text{O}$  on the slag decomposes the  $\text{Na}_2\text{S}$  with evolution of  $\text{H}_2\text{S}$ , and the liberation of  $\text{Na}_2\text{O}$  to absorb more S. A. R. P.

**Production of wrought iron.** F. SINGER, Assr. to TUBUS A.-G. (U.S.P. 1,960,832, 29.5.34. Appl., 26.7.30. Renewed 14.6.33. Ger., 25.6.28).—Sponge or electrolytic Fe powder is mixed with the requisite amount of powdered  $\text{FeSiO}_3$ , the mixture is briquetted under 60—90 tons per sq. in., and the briquettes are heated to welding temp. and extruded into tubes. A. R. P.

**Manufacture of Bessemer steel.** R. S. MCCAFFERY (U.S.P. 1,976,354, 9.10.34. Appl., 3.12.31).—The charge in the acid-lined converter is blown until practically all the Si, Mn, and C are removed, over-oxidation being avoided by introducing before or during the blow a small excess of P which serves to take up the excess of  $\text{O}_2$  used in the final elimination of the other impurities. The oxidised compounds of P which remain in the converted metal are finally removed by treatment with  $\text{CaO}$ ,  $\text{CaF}_2$ , or ferrocium. In this way a metal containing  $>$  99.8% Fe with  $\gtrsim$  0.01% Si + Mn is readily obtained. A. R. P.

**Case-hardening of steel.** V. T. MALCOLM, Assr. to CHAPMAN VALVE MANUF. Co. (U.S.P. 1,961,520, 5.6.34. Appl., 3.3.32).—The articles are immersed in a fused salt bath containing  $\text{Ca}(\text{CN})_2$  15—40,  $\text{NaNO}_3$  20—40,  $\text{BaCO}_3$  10—15, and  $\text{NaCl}$  5—10%. The temp. is maintained at 760—960° and a current of  $\text{NH}_3$  is passed through the bath to produce a nitride case. A. R. P.

(A) **Magnetic testing [of steel etc.].** (B) **Preparation of magnetic-testing material.** A. V. DE FOREST, Assr. to A. V. DE FOREST ASSOCIATES (U.S.P. 1,960,898—9, 29.5.34. Appl., [A] 5.7.29, [B] 16.12.30).—(A) Defects in a steel object can be detected by subjecting it to a magnetic field and spraying it with finely-divided magnetic particles individually coated with a lubricant. Deviations in the lines of force from the theoretical indicate the presence of flaws. (B) The particles are

prepared by coating fine Fe filings with a thin oil film and shaking them with an equal vol. of ZnO.

A. R. P.

**Preparation of metallic articles [steel screws].** W. H. CASTNER, Assr. to BETHLEHEM STEEL CO. (U.S.P. 1,960,895, 29.5.34. Appl., 21.2.30).—Soft steel screws are Cr-plated and then heat-hardened, the Cr plate preventing oxidation and scaling during this latter stage.

A. R. P.

**Fluxes for use in galvanising [iron].** H. E. POTTS. From HANSON-VAN WINKLE-MUNNING CO. (B.P. 432,746, 7.4.34).—Mixtures of  $\text{NH}_4\text{Cl}$ ,  $\text{ZnCl}_2$ , or  $(\text{NH}_4)_2\text{ZnCl}_4$  with small quantities of froth-stabilisers, e.g., soapbark, saponin, xylose, or starch, are claimed.

A. R. P.

**Protective coatings for preventing the oxidation of heated metal [steel].** H. W. BROWNSDON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 428,855, 13.9.34).—A coating of Ni about 0.008 in. thick is rolled on to the steel and this is sprayed with Al to a thickness of 0.002 in.; on heating at 1000°, a protective layer of Ni-Al alloy is formed which resists scaling on long heating at 1000°.

A. R. P.

**Cleaning metal [e.g., tinned iron] surfaces.** H. W. KOCHS, Assr. to VICTOR CHEM. WORKS (U.S.P. 1,962,821, 12.6.34. Appl., 20.11.30).—The articles are immersed in hot ( $> 80^\circ$ ) solutions of a mixture of  $\text{Na}_2\text{CO}_3$  and  $\text{Na}_3\text{PO}_4$  with 3–12 (10)% of  $\text{Na}_2\text{SiO}_3$  and 1–8 (5)% of  $\text{Na}_2\text{CrO}_4$ .

A. R. P.

**Pickling [of ferrous metals].** P. F. BRUNS, Assr. to A. O. SMITH CORP. (U.S.P. 1,962,295, 12.6.34. Appl., 10.10.31).—The articles are pickled at 55–60° in 5%  $\text{H}_2\text{SO}_4$  saturated at 20° with  $\text{FeSO}_4$ , and when the  $d$  rises to 1.35–1.4 the solution is cooled to 20° to crystallise  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ . The mother-liquor is made up to 5%  $\text{H}_2\text{SO}_4$ , heated, and used again.

A. R. P.

**Inhibitors [for use in pickling steel].** O. D. CUNNINGHAM, Assr. to P. C. REILLY (U.S.P. 1,961,096–7, 29.5.34. Appl., [A] 31.3.32, [B] 9.5.32).—(A)  $\text{NH}_4\text{CNS}$ ,  $\text{C}_5\text{H}_5\text{N}$ , and HCl or  $\text{H}_2\text{SO}_4$  are heated at 100–120° under pressure for 5–10 hr. until a dark-red liquid is produced. (B)  $\text{NH}_2\text{Ph}$ , a Cl or Br derivative thereof, or one of its homologues is heated with  $\text{H}_2\text{SO}_4$  and perisothiocyanic acid for 10 hr. at 120°.

A. R. P.

**[Inhibitor for] metal pickling.** D. H. TOMPKINS, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 1,961,652, 5.6.34. Appl., 18.9.31).—The product obtained by refluxing in EtOH solution a 2:2:1 mol. mixture of  $\text{NH}_3$ , MeCHO, and  $\text{CS}_2$  is claimed.

A. R. P.

**Corrosion inhibitor [for steel vessels in urea synthesis].** W. S. CALCOTT, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,961,194, 5.6.34. Appl., 25.10.32).—A small quantity (e.g., 0.5%) of the solid product obtained by treating waste sulphite-cellulose liquor with  $\text{NH}_3$  and  $\text{CO}_2$  to remove Ca and evaporating the filtrate to dryness is added to the reaction mixture.

A. R. P.

**Treatment of metal and alloy articles [e.g., stainless steel] to improve the resistivity to corrosion.** C. G. FINK and F. J. KENNY (U.S.P. 1,961,752, 5.6.34. Appl., 23.7.31).—The areas of high potential in the surface are anodically dissolved in 42% aq.  $\text{CrO}_3$

at 40°, using 6 amp. per sq. dm. for 1 hr. in the case of 18:8 Cr-Ni steel.

A. R. P.

**Preventing ageing in silicon-steel sheets.** W. MORRILL, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,964,475, 26.6.34. Appl., 1.3.32).—The sheets are heated singly at  $> 800$  (950–1100°), cooled at 4.5° per min. to 500–550°, then air-cooled to room temp.

A. R. P.

**Case-hardening [of ferrous metals].** D. A. HOLT, Assr. to E. I. DU PONT DE NEMOURS & CO., INC. (U.S.P. 1,962,091, 5.6.34. Appl., 27.1.32).—The articles are immersed in a fused salt bath containing NaCN 10–45 and  $\text{B}_2\text{O}_3$  1%.

A. R. P.

**Manufacture of locally hardened molybdenum steel.** F. C. T. DANIELS (U.S.P. 1,963,403, 19.6.34. Appl., 26.1.33).—Steel containing Si 0.1–0.4, S 0.01–0.06, P 0.01–0.08, Mn 0.3–1.5, C 0.3–1.25, and Mo 0.1–0.75% is provided with a hard surface on one side by rapidly heating it with a flame to 685–980° and quenching this side to give it a hard, close-grained structure.

A. R. P.

**Wear-resisting ferrous alloy.** A. W. GREGG and R. H. FRANK, Assrs. to BONNEY-FLOYD CO. (U.S.P. 1,963,525, 19.6.34. Appl., 20.8.31).—The alloy, which is suitable for use as a welding rod for coating metal surfaces, consists of Fe with W 25, Ni 5, Cr 15, V 1, C 2.5–3.5, and Si 1%.

A. R. P.

**Manufacture of iron-chromium alloys.** ALLOY RESEARCH CORP. (B.P. 428,950, 22.8.33. U.S., 24.8.32).—Cr-steel scrap is melted in an arc furnace at  $> 1680^\circ$  with a slag containing CaO, roll scale, and chromite to oxidise all the C, and the greater part of the Cr and Fe in the slag is then reduced by an exothermic reaction with a Si-containing reducing agent, e.g., a mixture of 75% ferrosilicon, CaO, and  $\text{MnO}_2$ .

A. R. P.

**Ferrous alloy. [Nickel-chromium steel.]** F. R. PALMER, Assr. to CARPENTER STEEL CO. (U.S.P. 1,961,777, 5.6.34. Appl., 28.1.32).—Claim is made for an austenitic Fe alloy containing Cr 4–45 (18), Ni 5–46 (8), S 0.16–1.8, and P 0.06–0.05, the Ni + Cr being 10–50%.

A. R. P.

(A) **Alloy steel.** (B) **Corrosion-resisting alloys.** W. H. KEEN, Assr. to C. W. GUTZTEIT (U.S.P. 1,962,598–9, 12.6.34. Appl., [A] 3.6.30, [B] 11.6.32).—(A) The steel contains W 18, Cr 4, V 1, and B 3%, and is formed into cutting tools by fritting the B and the steel in the arc. (B) A corrosion-resistant steel contains Cr 3–20, Ni 0.25–10, and Mg 0.15–3 (0.5)%.

A. R. P.

**Corrosion-resistant ferrous alloy comprising chromium, nickel, manganese, and copper.** P. A. E. ARMSTRONG (U.S.P. 1,962,702, 12.6.34. Appl., 14.12.33).—A ferrous alloy with a high resistance to corrosion by  $\text{H}_2\text{SO}_4$  and to intercryst. corrosion contains Cr 12–30 (18), Ni 8–30 (8), Cu 1–3 (2), Mn 2–12 (3), Si  $< 3$  (1), and C  $< 0.15\%$ .

A. R. P.

**Heat-treatment of chromium-containing corrosion- and/or heat-resisting steels.** UNITED STATES STEEL CORP., Asses. of R. H. ABORN and J. J. B. RUTHERFORD (B.P. 432,548, 21.10.33. U.S., 22.10.32).—Steels containing Cr 18, Ni 8, C 0.1, and Ti or Nb 0.5% are annealed at 1175°, quenched, and reheated for

1—4 hr. at 870—760° to cause the C to combine with the Ti or Nb. [Stat. ref.] A. R. P.

**Manufacture of permanent magnets [from alloys requiring heat-treatment].** J. LUCAS, LTD., and E. A. WATSON (B.P. 428,615, 16.11.33).—Ni-Al-Fe alloys are cast into a mould having Cu faces and Fe backs with a space between filled with Al or other metal having a high latent heat of fusion and a m.p. within the range in which the magnet has to be heat-treated. A. R. P.

**Copper-base alloy.** D. K. CRAMPTON and H. L. BURGHOFF, ASSTS. to CHASE COS., INC. (U.S.P. 1,962,637, 12.6.34. Appl., 3.2.33).—A Cu alloy which can be hot-worked without cracking and acquires a high tensile strength after cold-working contains Si 2.75—3.25 (2.75) and Zn 0.5—1.25 (1%). A. R. P.

**Copper-indium alloys.** D. GRAY and W. S. MURRAY, ASSTS. to ONEIDA COMMUNITY, LTD. (U.S.P. 1,960,740, 29.5.34. Appl., 15.5.30).—Claim is made for alloys containing In 10—50 and Cu 90—50%. A non-tarnishing surface may be produced on Cu by plating it with In from a cyanide bath containing glucose and heating to produce diffusion of the In into the surface layers. A. R. P.

**Press [cap] and [lead-in] wire for incandescence [electric] lamps, radio tubes, and the like.** H. C. JENNISON, ASSR. to AMER. BRASS CO. (U.S.P. 1,964,204, 26.6.34. Appl., 6.3.31).—The press cap is provided with lead-in wires made of Cu containing 0.001—0.25% Mn. A. R. P.

**Welding of copper alloys, particularly wrought alloys.** M. J. WALL, ASSR. to LINDE AIR PRODUCTS CO. (U.S.P. 1,961,117, 29.5.34. Appl., 4.6.32).—Manipulating details are claimed. A. R. P.

(A) **Zinc refining.** (B) **Reduction of zinc ores.** C. G. MATER, (B) ASSR. to R. S. DEAN and H. A. DOERNER (U.S.P. 1,961,424—5, 5.6.34. Appl., [A] 26.12.31, [B] 7.7.32).—(A) Roasted Zn ore and CH<sub>4</sub> are passed downwards through a vertical retort heated at 800—1000° and the gaseous reaction products are passed through a filter into a condenser below the retort. (B) A mixture of ZnO and C is heated in a hydrocarbon (e.g., CH<sub>4</sub>) atm. at 800—1000° and the gaseous products are passed over Ni-Al<sub>2</sub>O<sub>3</sub> heated at 1000—1100° to cause the excess of CH<sub>4</sub> to react with the CO<sub>2</sub> and H<sub>2</sub>O produced in the retort, and then through a condenser to recover the Zn, the remaining gas being burned to heat the reduction vessel. A. R. P.

**Flotation reagent.** F. E. DOWNS, ASSR. to E. L. MARTIN and E. F. RUSSELL (U.S.P. 1,961,899, 5.6.34. Appl., 19.9.32).—In the flotation of Pb-Zn ores with xanthates and pine oil, the ZnS may be depressed by addition of NaCNS. A. R. P.

**Recovery of tin from residues.** T. A. MITCHELL, ASSR. to L. M. HUGHES (U.S.P. 1,961,065, 29.5.34. Appl., 25.5.31).—The material is smelted with Fe ore in a rotary furnace to give a Sn-Fe alloy in a porous clinker form, and this is treated at > 114° (300°) with Cl<sub>2</sub> and O<sub>2</sub> sufficient to convert all the Sn into SnCl<sub>4</sub> and all the Fe into Fe<sub>2</sub>O<sub>3</sub> without forming any FeCl<sub>3</sub>. A. R. P.

**Apparatus for concentrating or separating gold or gold ore from pulp.** E. A. KNAPP and W. R. BATES (B.P. 432,677, 26.11.34).—Claim is made for an inclined strake or table covered with a rubber blanket having a riffled, undulating, pitted, or other type of irregular surface which will retain the Au particles. A. R. P.

**Lixiviation of ores of precious metals.** F. KRUPP GRUSONWERK A.-G. (B.P. 428,562, 23.3.34. Ger., 13.4., 25.10., and 20.12.33).—In cyaniding Au ores a portion or all of the solution is withdrawn from the pulp by means of immersion filters, de-aerated under vac., and re-aerated with air enriched with O<sub>2</sub> or O<sub>3</sub> before being returned to the solid to complete the leaching. A. R. P.

**Comminuted alloy [for dental amalgams].** A. W. GRAY (U.S.P. 1,963,085, 19.6.34. Appl., 5.8.33).—An alloy of Ag 67—70, Sn 25—29, Cu 3—5, and Zn < 1% is cast into rods which are turned on the lathe, and the turnings are wet-ground and elutriated to obtain particles of > 100 μ in diam. and free from cracks and jagged projections. A. R. P.

**Mercury boiler.** H. J. KERR, ASSR. to BABCOCK & WILCOX CO. (U.S.P. 1,964,160, 26.6.34. Appl., 25.9.28. Renewed 3.1.33).—The boiler is provided with a tube the lower end of which is closed and the upper end constricted inside the boiler and below a deflector. The tube contains a Hg displacer having a central longitudinal hole and nearly filling the tube, but leaving an annular passageway for rising Hg vapours. A. R. P.

**Extraction of manganese from [manganosiderite] ore.** A. T. SWEET and J. D. MACCARTHY, ASSTS. to GEN. MANGANESE CORP. (U.S.P. 1,962,160, 12.6.34. Appl., 29.4.29. Renewed 18.8.33).—The ore is leached with HCl insufficient to dissolve the Fe content, the filtered solution is treated with MgO to ppt. Mn(OH)<sub>2</sub>, and the filtrate is treated with more MgO and CO<sub>2</sub> to ppt. CaCO<sub>3</sub>. The final filtrate is evaporated to dryness and the residue heated to recover HCl and MgO. A. R. P.

**Composition of matter [chromium-cobalt alloy].** E. G. TOUCEDA, ASSR. to CONSOLIDATED CAR HEATING CO., INC. (U.S.P. 1,961,626, 5.6.34. Appl., 28.12.33).—An alloy of Cr 32, Co 58, W 2, Si 1, and Ti 6% is claimed. A. R. P.

**Sintered [carbide] alloy.** R. R. WALKER (U.S.P. 1,961,468, 5.6.34. Appl., 4.12.30. Ger., 3.1.30).—The alloy consists of 3Cr<sub>3</sub>C<sub>2</sub>·W<sub>2</sub>C (I) (30—97), a carbide of a group VI metal (1—60%), and a metal of the Cr or Fe group, e.g., (I) 35, WC 35, WCN 10, Co 10, and W 10%. A. R. P.

**Separation of metals from ores.** W. D. BRISCOE, ASSR. to B.M.P. CO., INC. (U.S.P. 1,960,726, 29.5.34. Appl., 10.4.31).—The apparatus comprises a container with a central impeller divided into horizontal sections all of which are provided with a no. of arcuate passages and the lowermost with a central opening communicating with the section above it. The movement of the impeller moves the ore pulp towards the opening at a speed which allows the metal particles to sink out and the gangue to pass through the opening towards the discharge pipe. A. R. P.

**Working of metals.** H. R. TREUTING, Assr. to AMER. MACHINE & FOUNDRY CO. (U.S.P. 1,977,562, 16.10.34. Appl., 5.1.34).—Metal sheet to be rolled, stamped, or pressed, or wire to be drawn, is coated with a thin layer of Pb, Pb-Sn alloy, or Pb-Bi-Sn alloy containing P (0.25%). The coating serves as an efficient lubricant during working and prevents scratching or scoring of the metal. A. R. P.

**[Lubricant for] wire drawing.** F. C. ELDER, Assr. to AMER. STEEL & WIRE CO. of NEW JERSEY (U.S.P. 1,963,298, 19.6.34. Appl., 23.7.29).—The metal is cleaned, coated with CaO, and drawn through dies with a lubricant comprising a 5—6:4—3 mixture of Al stearate and Ca(OH)<sub>2</sub>. A. R. P.

**[Solder-]coated electrolytic [copper] product.** R. A. WILKINS, Assr. to INDUSTRIAL DEVELOPMENT CORP. (U.S.P. 1,963,604, 19.6.34. Appl., 2.8.30).—Claim is made for minutely perforated, electrolytically-deposited Cu sheet, 0.0002—0.001 in. thick, coated successively with layers of Sn, Pb, and Sn which act as a solder when heated. A. R. P.

**Coating a metallic surface with fusible material or substance.** DUNLOP PLANTATIONS, LTD., and E. A. MURPHY (B.P. 428,559, 3.2.34).—Molten wax or similar material is sprayed into the interior of metal containers designed to hold corrosive liquids and the whole is gently heated until the powdery deposit melts to a thin non-porous layer. [Stat. ref.] A. R. P.

**Welding of metals and manufacture of electron-discharge device electrodes.** MARCONI'S WIRELESS TELEGRAPH CO., LTD., Assces. of G. M. ROSE, JUN. (B.P. 428,667, 3.10.34. U.S., 3.10.33).—A no. of parallel support wires (Ni) are arranged at regular intervals longitudinally around a mandrel or thicker core wire (Fe), and a wire of smaller coeff. of expansion (*e.g.*, Mo) is wound tightly around the assembly to form a coil which is welded to the Ni by heating the whole in H<sub>2</sub>. The Fe core is then removed by treatment with HCl. A. R. P.

**Production of beryllium.** B. WEMPE (B.P. 428,458, 8.11.33).—BeF<sub>2</sub> alone or mixed with alkali or alkaline-earth fluorides and/or with BeO is reduced by heating with Ca, CaH<sub>2</sub>, Mg, or Na in a high-frequency induction furnace operated in vac. or in an atm. of H<sub>2</sub>. Be alloys may be made in a similar way by adding the other metal(s) before or after the reduction. A. R. P.

**Casting magnesium.** H. A. REIMERS, Assr. to DOW CHEM. CO. (U.S.P. 1,960,711—3, 29.5.34. Appl., 20.2.33).—Small quantities of the following substances are incorporated in the sand mould to prevent oxidation and remove oxide skins: (A) HPF<sub>6</sub>, HPO<sub>2</sub>F<sub>2</sub>, H<sub>2</sub>PO<sub>3</sub>F, or their NH<sub>4</sub> salts, (B) NH<sub>2</sub>Ph or NH<sub>2</sub>Me salts of HBF<sub>4</sub>, HF, H<sub>2</sub>SiF<sub>6</sub>, or the P-F acids claimed in (A); (C) HSO<sub>3</sub>F or NH<sub>4</sub>SO<sub>3</sub>F. A. R. P.

**Manufacture of magnesium alloys.** J. A. GANN and M. E. BROOKS, Assrs. to DOW CHEM. CO. (U.S.P. 1,960,700, 29.5.34. Appl., 10.1.30).—For the production of hardener alloys of Mn and Mg, MnCl<sub>2</sub> is added in small portions continuously to the MgCl<sub>2</sub> electrolyte used in making Mg. A. R. P.

**Modifying the mechanical properties of light-metal alloys.** I. G. FARBERIND, A.-G. (B.P. 432,828, 18.5.34. Ger., 3.6.33).—Mg alloys which have been forged and rolled in such a way as to cause the mechanical properties in the direction of flow of the metal during working to be superior to those in the transverse direction are subjected to < 10 straightening operations, each involving a no. of bendings or twistings, to destroy the fibrous crystal structure and produce twinning of the new crystals. A. R. P.

**Heat-treatment of aluminium alloys.** H. C. HALL (B.P. 432,815, 1.3.34).—Internal stress is removed from age-hardenable Al alloys by immersing the metal in an oil, metal, or salt bath at 190—250° immediately after quenching from the high temp. and prior to ageing. A. R. P.

**Composite metal articles [plated aluminium alloys].** ALUMINIUM, LTD., Assces. of F. KELLER and G. F. SAGER (B.P. 432,617, 27.8.34. U.S., 20.10.33).—Claim is made for Cu-Al alloys clad on one or both sides with a Cr-Al alloy containing 0.1—1% Cr. A. R. P.

**Manufacture of sodium and other light metals.** E. I. DU PONT DE NEMOURS & Co. (B.P. 432,810, 2.2.34. U.S., 2.2.33).—The crude Na obtained by electrolysis of a fused mixture of NaCl and CaCl<sub>2</sub> is cooled to just above its m.p. and filtered to remove the sludge of Ca, oxides, and salts which separate. This sludge is then agitated with a current of N<sub>2</sub> in a fused 60:40 mixture of NaCl and CaCl<sub>2</sub>, whereby the CaO falls to the bottom, the Ca reacts with the NaCl, and the Na thus formed together with that in the sludge rises to the surface, from which it is collected and purified as above. A. R. P.

(A) **Extraction of [alkali] metals from amalgams.**  
(B) **Recovery of alkali metals and by-products.**  
(A) P. F. CRAHAN (Assee.), S. A. MOULTON, and G. E. SEAVOY, (B) S. A. MOULTON, Assr. to P. E. CRAHAN (U.S.P. 1,961,135 and 1,961,160, 5.6.34. Appl., [A] 9.6.33, [B] 14.1.33).—(A) The amalgam is vac.-distilled in two stages, the excess of Hg being removed at a low temp. and the residual solid amalgam decomposed at a higher temp. (B) Aq. solutions of K or Na salts are electrolysed with a Hg cathode, the resulting amalgam being treated as in (A) and the recovered metal combined with one of the gases, *e.g.*, O<sub>2</sub>, evolved at the anode in the electrolysis. A. R. P.

**Production of galvanoplastic or electrotype deposits [*e.g.*, of iron].** W. E. EVANS, From KELSEN SPECIAL SHEET HOLDING SOC. ANON. (B.P. 431,468, 9.10.33).—The metal is electrodeposited on very highly polished cathodes, either stationary or rotary, without an intermediate layer, the high polish permitting ready stripping of the deposit. Composite deposits, *e.g.*, of Ni with a thick backing deposit of Fe, may be built up in the form of sheets or tubes by the use of suitable electrolytes. [Stat. ref.] A. R. P.

**Electroplating [with nickel and chromium].** R. J. WIRSHING and H. C. MOUGEY, Assrs. to GEN. MOTORS RES. CORP. (U.S.P. 1,963,391, 19.6.34. Appl., 10.11.30).—For the protection of ferrous articles from attack by aq. CaCl<sub>2</sub> they are first plated with Ni from a hot acid (pH 2) bath, then with Cr from the usual CrO<sub>3</sub> bath, and

finally are heated at 120° for 1 hr. or at 260° for 20 min. to expel occluded H<sub>2</sub>. A. R. P.

Continuously coating metal members with metal. [Galvanising iron wire.] J. L. SCHUELER (B.P. 428,866, 15.11.33).—See U.S.P. 1,936,487; B., 1934, 843.

Casting of antifriction metallic alloys on ferrous metals. G. TRIONE (B.P. 428,586, 22.10.34. It., 27.3.34).

Coating of metallic wire with a viscous liquid like varnish. A. W. PARFITT. From A. H. ADAMS (B.P. 428,595, 9.11.33).

Production and treatment of metal articles [tubular fittings for connecting pipes]. O. H. BALDWIN (B.P. 428,636, 29.12.33).

[Apparatus for continuous] electroplating [of sheet metal]. A. R. N. HEATH and T. C. TAPP (B.P. 428,488, 8.2.34).

Gas treatment.—See I. Mould dressing. Al from foundry dross. Colloidal W compounds.—See VII. Enamel ware. Clay insulation.—See VIII. Lamp filament.—See XI. Binder for foundry cores.—See XIII.

## XI.—ELECTROTECHNICS.

Electrostatic precipitation for cleaning industrial gases. H. W. WAGNER (Fuel Econ., 1935, 10, 895—899, 942—945, 971—973).—The process of electrostatic removal of dust from industrial gases is outlined in theory, various types of precipitators are described, and their industrial application is discussed. D. M. M.

Decomp. of phenoxide liquors. Dielectric const. of petroleum oil.—See II. Mordanting with Co.—See VI. Enamel suspension.—See VIII. Fe-Ni alloys. Cr. Ni- and Cr-plate. Pb.—See X. Rubber-S compounds.—See XIV. Demonstrating explosive gases.—See XXII. Mine-air purification. Determining atm. CO<sub>2</sub>.—See XXIII.

See also A., Aug., 920, Electrolytic white Sn. 926, Fe-Ni-Co alloys. 936, Electrolysis of solid alloys. 942, Electrolysis of Na stannate. Prep. of Ce. Prep. of Al<sub>2</sub>O<sub>3</sub>. 949, Electro-analysis of Ag. 1043, Determining p<sub>H</sub> of solid culture media.

### PATENTS.

Electric [induction] furnaces. I. RENNERFELT (B.P. 437,711—2, 27.12.33. Swed., [A] 24.12.32, [B] 31.12.32).—Furnaces comprising induction devices arranged below a melting hearth (so that dangerous heat concns. in the charge are prevented) and arcing electrodes above the charge are claimed. J. S. G. T.

Electric induction furnace. E. F. NORTHRUP, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,981,631, 20.11.34. Appl., 5.1.31).—The charge is preheated in an uncontrolled part of the furnace and passes to another part in which the difference between the temp. of entrance and the desired final temp. effects automatic control of the heating current. B. M. V.

High-voltage cable. W. PFANNKUCH, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,977,325, 16.10.34. Appl.,

24.12.32. Ger., 7.1.32).—In oil-filled, high-voltage cables a layer of the rubber-like polymerisation product of acrylic acid or its homologues or derivatives, preheated with an inert gas to produce small gas bubbles throughout it, is placed between the conductor and the sheath to absorb the expansion of the oil on heating. A. R. P.

Electric storage cells or batteries. L. FULLER (B.P. 432,775, 26.10. and 6.11.34).—A container fitted with or serving as one of the electrodes is filled with active material serving as the other electrode, so that there is substantially no free acid space between the electrodes. J. S. G. T.

Electrolytic cell. V. ENGELHARDT and N. SCHÖNFELDT, Assrs. to SIEMENS & HALSKE A.-G. (U.S.P. 1,981,498, 20.11.34. Appl., 19.11.32. Ger., 9.12.31).—In a cell for the electrolysis of alkali halides, the anode comprises a pool of Hg supported on a horizontal partition (P) and surmounted by gauze, and the electrolyte communicates with a cathode below P by means of porous or channeled plugs. B. M. V.

Pressure electrolyzers. R. A. ERREN (B.P. 432,698, 21.2.35).—In an electrolyser, designed more especially for producing H<sub>2</sub> and O<sub>2</sub>, the gas-separating chambers, interconnecting pipes, and, preferably, also the pressure-equalising chambers are enclosed in a steel casing filled with oil to maintain a uniform pressure on all parts of the apparatus. The ratio of the H<sub>2</sub> space to the O<sub>2</sub> space in the pressure equalisers is 224 : 97, and the gas off-take of each pressure-equalising chamber has a safety valve which operates should rupture occur in the external piping. J. S. G. T.

Electrolytic condenser. H. F. FRUTH, Assr. to P. R. MALLORY & Co., Inc. (U.S.P. 1,981,352, 20.11.34. Appl., 1.3.34).—The condenser comprises two metallic plates or foils, either or both being film-forming, between which are sandwiched gauze of other reticulated material and a non-fibrous cellulose; the electrolyte is a paste held in the interstices of the gauze and impregnating the cellulose. The sandwich may be rolled up. B. M. V.

Production of flexible insulation on electric conductors from polystyrol, cellulose derivatives, or similar substances. SIEMENS & HALSKE A.-G. (B.P. 432,407, 4.12.34. Ger., 4.12.33).—An extrusion process and stranding device are claimed. J. S. G. T.

Insulated electrical conductor. B. H. REEVES, Assr. to ROCKBESTOS PRODUCTS CORP. (U.S.P. 1,982,539, 27.11.34. Appl., 11.7.31).—A low-tension, Pb-covered cable is insulated with non-inflammable material which will evolve gas when heated (e.g., by a short-circuit arc due to a workman's pick), a suitable material being asbestos impregnated with urea. B. M. V.

Waterproofing composition [for electrical conductors]. J. F. and V. P. FLORICH, Assrs. to AUTO COMFORT PRODUCTS Co. (U.S.P. 1,963,895, 19.6.34. Appl., 6.6.32).—A mixture of mineral oil with 5—20% of a non-mineral oil and small quantities of EtOAc (I) and C<sub>5</sub>H<sub>11</sub>·OAc (II) is claimed, a suitable composition being neatsfoot oil 25, mineral oil 70, (I) 2, (II) 2 pts., and colouring matter 1 pt. A. R. P.

**Manufacture of a magnetic material.** E. M. DAVIDSON (U.S.P. 1,962,733, 12.6.34. Appl., 3.4.25. Renewed 4.11.33).— $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{CaO}$ , and  $\text{MgO}$  are mixed with  $\text{H}_2\text{SO}_4$  to a paste, and the whole is made into a paste with  $\text{Fe}_2\text{O}_3$ ,  $\text{H}_2\text{SO}_4$ , and small amounts of  $\text{P}$ ,  $\text{As}_2\text{O}_3$ , and  $\text{W}$  and then smelted to a hard mass. A. R. P.

**Tellurium alloy rectifier.** E. A. HARTY, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,961,825, 5.4.34. Appl., 10.5.32).—The rectifier consists of plates of  $\text{Mg}$  and an alloy of  $\text{Te}$  97.5,  $\text{Cu}$  2,  $\text{Ag}$  2.5 pts., and  $\text{Na}$  0.5 pt. which have been welded together by passing a current from one to the other with a film of  $\text{H}_2\text{O}$  between them.

A. R. P.

**Dielectrics.** BRIT. THOMSON-HOUSTON Co., LTD., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 432,284, 26.1.34. Ger., 26.1.33).—The dielectric, *e.g.*, paper, cotton wool, after removal of occluded air, is impregnated with material, *e.g.*, thick or thin oil, containing  $\text{CO}_2$  under pressure. If desired,  $\text{CO}_2$  is introduced into the dry, evacuated cable etc. before impregnation.

J. S. G. T.

**Magnetic separators.** H. H. THOMPSON and A. E. DAVIES (B.P. 432,431, 26.1.34).—In a drum-type separator the usual brass rotating drum is surrounded by a wear-resisting cylinder of  $\text{Fe}$  or steel.

B. M. V.

**Thermionic cathode.** E. F. LOWRY, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,961,122, 29.5.34. Appl., 28.12.33).—The filament consists of an alloy of  $\text{Ni}$  90,  $\text{Fe}$  7.5, and  $\text{Ti}$  2.5% coated with alkaline-earth oxides.

A. R. P.

**Manufacture of [electric] lamp filament.** S. RUBEN, Assr. to SIRIAN LAMP Co. (U.S.P. 1,981,878, 27.11.34. Appl., 23.9.29. Renewed 25.1.34).—Mo wire is coated with  $\text{Be}$  and the latter partly oxidised.

B. M. V.

**Introduction of active metal into electric-discharge devices.** J. H. DE BOER, J. L. H. JONKER, and K. M. VAN GESSEL, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 1,964,506, 26.6.34. Appl., 18.11.31. Holl., 18.11.30).—A mixture of  $\text{Ba}$ ,  $\text{CaO}$ , and  $\text{BaO}$  is used as a getter in radio valves.

A. R. P.

**Gaseous electric-discharge device [glow-discharge tube].** H. EWEST and G. GAIDIES, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,961,750, 5.6.34. Appl., 15.12.33. Ger., 31.12.32).—The tube contains a starting gas ( $\text{A}$  or  $\text{Ne}$ ), a difficultly vaporisable material ( $\text{Na}$ ), and  $\text{Hg}$  (10% of the  $\text{Na}$ ).

A. R. P.

**Permanent-colour gaseous-conduction tube.** R. E. MIESSE, Assr. to GEN. SCIENTIFIC CORP. (U.S.P. 1,977,688, 23.10.34. Appl., 10.3.30).—A gas filling composed of  $\text{Hg}$  vapour,  $\text{Kr}$  or  $\text{Xe}$ , and a monatomic gas of at. wt.  $>$  that of  $\text{A}$  is claimed for blue light.

J. S. G. T.

**Manufacture of sodium-containing electric lamps and electric-discharge devices.** MARCONI'S WIRELESS TELEGRAPH Co., LTD., and E. W. B. GILL (B.P. 432,808, 2.2.34).—An electrodeless discharge is produced in the lamp envelope, which is partly immersed in a bath of molten  $\text{NaNO}_3$ .

J. S. G. T.

**Manufacture of selenium [light-sensitive] tubes.** G. F. METCALF and A. J. KLING, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,978,165, 23.10.34).—A method of forming a no. of electrically-separate conducting films of  $\text{Se}$  on

a foundation member in an exhausted envelope is claimed.

J. S. G. T.

**Electrical precipitator [for treating gases].** A. W. KNIGHT, Assr. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,981,455, 20.11.34. Appl., 14.3.32).—A precipitator having permeable collecting electrodes and means for rapping is installed in the central space of a vertical cylindrical container, between a pair of segmental inlet passages.

B. M. V.

**Electrical precipitator [for treating gases].** H. A. POILLON, Assr. to RESEARCH CORP. (U.S.P. 1,981,754, 20.11.34. Appl., 29.7.32).—Separation is effected in coaxial, annular compartments bounded by the cylindrical collecting electrodes; inclined entrance nozzles cause the gas to travel spirally.

B. M. V.

**Apparatus for treatment of fluids with ultra-violet radiations and the like.** HANOVIA CHEM. & MANUFACTURING Co., Assees. of H. A. TREBLER and C. J. LARSEN (B.P. 432,011, 23.1.35. U.S., 16.3.34).

**Measuring thermal conductivity of gases.**—See I. Glass for metal-vapour lamp. Coating glass.—See VIII. Insulating compositions.—See IX. Magnetic testing. Treating stainless steel. Permanent magnets.  $\text{Cu}$ - $\text{In}$  alloy. Press cap (etc.) for lamps etc. Solder-coated  $\text{Cu}$ . Electrodes. Light metals. Alkali metals. Deposits on  $\text{Fe}$ . Electroplating.—See X. Moulded articles.—See XIII. Insulation.—See XIV. Hardening clay.—See XVI. X-Ray photography.—See XXI. Disinfectants etc.—See XXIII.

## XII.—FATS; OILS; WAXES.

**New molecular characterisation of fats according to their polarity.** P. REHRINDER and L. SOLOVJEVA (Masl. Shir. Djelo, 1935, 11, 60; Allgem. Oel- u. Fett-Ztg., 1935, 32, 277—282).—Oils and fats are characterised by their polarity (and surface saponifiability), which can be deduced from measurements of the lowering of the interfacial tension between aq.  $\text{KOH}$  and a non-polar solvent (*e.g.*, petroleum spirit, vaseline oil) which occurs when the fat (oil) is dissolved in the latter. Such information is useful in assessing fats for the soap and margarine industries.

E. L.

**Rapid determination of the oil content of linseed.** F. FRITZ (Chem.-Ztg., 1935, 59, 695).—When determining the oil content refractometrically, the val. of  $n_D$  of the oil itself need not be assumed, but should be determined experimentally on a few drops of oil which can easily be expressed from a small sample of the warmed crushed seed.

E. L.

**Effect of different methods of disintegration of cottonseed on some properties of the crude oil, with special reference to high-moisture seed.** J. M. NEWBOLD (Oil & Soap, 1935, 12, 166—167).—In processing high-moisture seed in N. Carolina the hydraulic mill yields a better oil as regards colour, free fatty acids, and refining loss than does an expeller, the advantage procured by the former being the more marked the higher is the  $\text{H}_2\text{O}$  content of the seed. The use of a food-chopper for grinding the meats (in the laboratory) has much the same effect as an expeller.

E. L.

**Colour and spectral transmission of vegetable oils.** H. J. McNICHOLAS (Oil & Soap, 1935, 12, 167—178).—The spectral transmissions of 125 vegetable oils [including refined cottonseed oil (111 samples), soya-bean, sesame, rape, maize, and olive oils] have been plotted, and are all essentially of the same type. The oils fall into two principal groups, depending on the concns. of the two chief groups of pigments present, viz., the green (chlorophyll type, causing sharp absorption bands centred at about  $\lambda$  6100 and 6700 Å., or 6500—6600 Å. in the case of some cottonseed oils) and yellow-brown. It is impossible accurately to represent all oils on any one-dimension chromaticity scale, but in the Lovibond system accurate colour grading can be obtained with a two-dimensional scale based on the independent variation of yellow (20—80) and red. Various methods of colour grading, based on comparative colorimetry and spectral transmission, are suggested and discussed in relation to possible application in commercial practice. E. L.

**Effect of varying the conditions of the air-blowing accelerated test for oils and fats.** L. B. KILGORE and D. H. WHEELER (Oil & Soap, 1935, 12, 178—180; cf. B., 1933, 876).—Variations in the rate of air flow between 2.5 and 10 litres per hr. have no appreciable effect on the rate of increase of the peroxide val. in the case of maize, soya-bean, and cottonseed oils. The shape and type of the jet orifice (sintered glass, capillary, and bell-shaped orifices were tested) is immaterial, and, e.g., 3—4-mm. glass tubing, supplying bubbles at a rate just above counting rate, is adequate. E. L.

**Application of absorption spectra in fatty oil research. I, II.** L. J. N. VAN DER HULST (Rec. trav. chim., 1935, 54, 639—643, 644—650).—I. The absorption spectra for the range 200—330  $\mu\mu$  for solutions of a no. of constituents of oils in  $C_6H_{14}$  have been determined, in order to serve as a basis for analytical work. Conjugated double linkings, as in the linoleic acids, produce highly characteristic max. Results for elæostearic acids, Me ricinoleate, stearolic and elaidic acid are also recorded.

II. The above results are applied to the quant. analysis of castor, sesame, and palm oils, also tung oil and its hydrogenation products. The spectrum of palm oil is practically identical with that of carotene. The curve for tung oil hydrogenated under high pressure shows no max. at 230  $\mu\mu$ , whence it is concluded that it contains no linoleic acid, elæostearic acid being transformed directly into oleic and stearic acids; at high temp./1 atm. linoleic acid is formed in quantity. S. J. G.

**Drying of tung oil.** H. L. TCHANG and C. LING (J. Chem. Eng. China, 1935, 2, 21—29).—Crude tung oil was converted into a drying oil by heating with a drier. The effects of temp. and duration of heating and of quantity and nature of the drier were investigated, using metal oxides, borates, resinates, and tungates as drier. Cobalt driers are very effective, but manganese driers are commercially best on account of cost. The optimum conditions of heating the oil are: 0.1—1% of drier, heating at 100—200° for 1—2 hr. T. H. B.

**Composition of Itoyo fish oil.** S. UENO and S. KOMORI (J. Soc. Chem. Ind., Japan, 1935, 38, 345—

352 B).—The oil had  $d_4^{20}$  0.9232,  $n_D^{20}$  1.4789, acid val. 0.75, sap. val. 186.9, I val. (Wijs) 165.0, unsaponifiable matter 1.01%. The fatty acids (total saturated about 18.2%) contained myristic, palmitic (chief component), stearic, oleic, and cetoleic, and perhaps zoömaric, moroctic, and clupanodonic acids. Cholesterol, pristane, oleyl alcohol, and an unsaturated sterol were isolated from the unsaponifiable matter. G. H. C.

**Unsaponifiable matter of some fish-liver oils. I.** S. UENO and S. KOMORI (J. Soc. Chem. Ind., Japan, 1935, 38, 352—356 B).—From Alaska pollack (*Theragra chalcogramma*, Pallas) were obtained cholesterol (I), oleyl alcohol, and hydrocarbons. Aburagarei oil yielded myristic, palmitic, stearic, and behenic acids and (I). G. H. C.

**Preparation of edible hardened fish oils. S.** UENO, N. KUZEI, and S. MATSUDA (J. Soc. Chem. Ind., Japan, 1935, 38, 357—361 B).—Sardine oil and mixtures with tallow, lard, chrysalis oil, and coconut oil were freed from unpleasant odour and taste after hydrogenation by refining with alkali and treatment with superheated steam. G. H. C.

**Partial hydrogenation of fish oil. III. Hydrogenation of unsaturated fatty acids of the oleic series of sardine oil.** M. TAKANO (J. Soc. Chem. Ind. Japan, 1935, 38, 302—304 B; cf. B., 1935, 859).—On hydrogenating the "liquid acids" (obtained by the Pb salt- $Et_2O$  and Na salt-COMe<sub>2</sub> processes) by stages, the neutralisation val. of the residual unsaturated acids fell from 195 to 180 during the process because acids of low mol. wt. were reduced first. G. H. C.

**Corncob charcoal. Gasoline from cottonseed oil.**—See II. **Oils for textile processing.**—See VI. **Colloidal clay [in soap].**—See XIII.

See also A., Aug., 960, **Sardine oil. Pomegranate-seed oil. Seed oil of karasu-uri. Prep. of trinonadecylin.** 978—9, **Vitamins.** 998, **Identification of linoleic and linolenic acids.** 1004, **Fatty acids of pig liver.** 1034—7, **Vitamins.** 1041, **Acids of kernels of *Parinarium laurinum* and *P. macrophyllum*.**

#### PATENTS.

(A) **Bleaching, (B) purification and bleaching, of waxes.** A. HOUGH, ASS. TO THEODOR LEONHARD WAX Co. (U.S.P. 1,980,273 and 1,980,338, 13.11.34. Appl., [A] 25.6.30, [B] 17.8.31. Renewed [A] 16.4.34).—(A) Beeswax (100 pts.) is bleached under pressure at, e.g., 130° with dil. mineral acid (e.g., 33 pts. of 15%  $H_2SO_4$  or 20 pts. of 70%  $H_3PO_4$ , and 100 pts. of  $H_2O$ ) and  $KMnO_4$  (e.g., 40 pts. of 5% aq. solution), the treatment being continued until all the (reduced) Mn is converted into a sol. salt ( $MnSO_4$ ). (B) Beeswax etc. is clarified by treatment at 80—95° with dil. (1—8%) crude  $H_3PO_4$  and then bleached with  $KMnO_4$  and the dil. acid, the initial temp. of treatment (65°) being chosen so that the temp. shall rise, owing to the heat of reaction, to  $\geq$  80°, and finally is washed with acidulated  $H_2O$ . E. L.

**Heat-exchange liquid.**—See I. **Lubricant. Grease.**—See II. **Textile assistants.**—See III. **Detergent. Dressings for textiles.**—See VI. **Lubricant for wire drawing.**—See X.



**Manufacture of cold-process soaps.** E. H. & C. W. TAYLOR (B.P. 432,227, 24.2.34).—A rosinate solution (made by treatment of rosin and oil, fat, etc. with sufficient alkali to saponify the rosin but not the fat) is added to fatty stock that has been treated with an equiv. quantity of alkali, *e.g.*, by crutching together for 10–15 min., and finally, a further quantity of alkali is added to saponify the excess fat. S. S. W.

### XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

**Use of ozone as rapid drying agent for paint and varnish films.** A. KUFFERATH (Paint and Var. Prod. Man., 1935, 13, No. 2, 30–31).—The use of ozonised air in the drying chamber considerably accelerates drying without bringing about brittleness of the film. Suitable apparatus is described. D. R. D.

**British colours and pigments.** T. S. COOPER *et al.* (Oil and Col. Trades J., 1935, 88, No. 1919, Suppl., 12 pp.).—A review, covering paint pigments and extenders, artists' colours, and ceramic materials.

D. R. D.

**Colloidal clay.** ANON. (Oil and Col. Trades J., 1935, 88, 255).—The properties and uses (in paint and soap) of bentonite and colloidal kaolin are reviewed.

D. R. D.

**Chemistry of blue ultramarine.** K. LESCHEWSKI (Angew. Chem., 1935, 48, 533–536).—An historical review. It is concluded from a study of the progressive action of various reagents that the presence of S<sup>''</sup> and alkali in the ultramarine lattice is necessary for the development of the blue colour. R. S.

**Lead chromates as anti-rust pigments.** H. WAGNER and E. PABST (Farben-Chem., 1935, 6, 165–167).—In addition to having chemical, electrochemical, or passivation action, anti-corrosion pigments should (a) consist of microcryst. particles of medium fineness and hard texture, (b) possess low absorption and swelling power in the film, (c) form stable soaps with the oil. Of the neutral chromes (PbCrO<sub>4</sub>–PbSO<sub>4</sub>) the monoclinic variety is more stable than the rhombic, but in spite of its smaller surface area possesses greater oil absorption and swelling power, which are increased by the H<sub>2</sub>O retained in most commercial samples. (Drying should be done at > 100°.) Both varieties are subject to hydrolysis, which leads to reduction of the PbCrO<sub>4</sub> and subsequent discoloration. Basic chromates (PbCrO<sub>4</sub>–PbO) do not form soaps in the film although some swelling takes place. Superior new chromes (composition not stated) contain basic groups which react with linseed oil; they are very resistant to light, weather, and CaO and are comparable with Pb<sub>3</sub>O<sub>4</sub> in their passivation. The swelling powers of several chromes are tabulated and graphed. S. M.

**Zinc chromate. II.** ANON. (Paint and Var. Prod. Man., 1935, 13, No. 2, 26–29).—Methods of manufacture are reviewed. The necessity of precautions on account of the toxicity of Cr compounds is stressed. Its pigment properties are compared with those of primrose-chrome. D. R. D.

**Luminous pigments.** L. VANINO (Chem.-Ztg., 1935, 59, 656–657; cf. B., 1932, 900).—A brief summary is given of the qual. analysis of the various pigments,

which contain, besides the main ingredient, impurities, such as MgO and activating foreign metals (Cu, Bi, Mn). Spectroscopic examination is also discussed; it is of service to detect addition of dyes, and of radioactive materials as excitants. The chief pigments together with their activators, colour, and max.  $\lambda$  of their characteristic luminescence are tabulated. S. S. W.

**Granulometric composition of pigments.** H. RABATÉ (Peint. Fig. Ver., 1935, 12, 66–69).—The significance of pigment particle size, shape, and distribution, with respect to properties of paints made therefrom, is briefly indicated. Methods (such as the sedimentation, levigation, air-separation, optical, etc.) of determining these particulars are mentioned, and the Rabaté–Audubert flocculation method is detailed. S. S. W.

**Causes and prevention of separation and floating of pigments in paints.** W. LUDWIG (Farben-Chem., 1935, 6, 47–49).—The defect consists in the formation of streaks or spots in a paint film in consequence of local concn. of one of the pigments. It ensues when the components possess different dispersibilities or solubilities in the media and is promoted by: (a) variation in their *d*, particularly if one of them occludes gases, *e.g.*, gas-C black in admixture with ZnO; (b) presence of a volatile solvent during evaporation of which the more finely-divided particles may be carried to the surface. A medium of high  $\eta$  hinders the separation. Uniform dispersions of, *e.g.*, PbCrO<sub>4</sub> or ZnCrO<sub>4</sub> and Prussian blue are produced by vigorous agitation of the mixture in the pptn. bath followed by grinding of the dried product, or by addition of a substrate of intermediate *d*. When solubility of the pigment in the medium cannot be avoided, the use of an extender having marked absorptive properties, *e.g.*, china clay, is suggested. S. M.

**Chemistry in the service of the printing industry.** A. BARGILLIAT (Chim. et Ind., 1935, 34, 276–288).—The three main types of printing processes, *i.e.*, typography, offset, and rotogravure, are detailed and illustrated, and various chemical problems involved therein are enunciated. S. S. W.

**Iron gallate inks—liquid and powder.** E. W. ZIMMERMAN (J. Res. Nat. Bur. Stand., 1935, 15, 35–40).—Gallic acid inks have a permanence = that of tannic acid inks, when exposed to weather, and have also better keeping qualities. H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> is the best stabilising agent for inks containing Fe<sup>III</sup> salts. The formulæ recommended are: gallic acid 10 g., Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> 10.7 g., H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> 2 g., sol. blue 3.5 g. per litre; and gallic acid 10 g., FeSO<sub>4</sub>·7H<sub>2</sub>O 15 g., tartaric acid 1 g. (or H<sub>2</sub>SO<sub>4</sub> 0.654 g.), sol. blue 3.5 g. per litre. J. W. S.

**Amyl propionate as solvent for the lacquer industry.** ANON. (Paint and Var. Prod. Man., 1935, 13, No. 2, 10).—The physical properties of the ester are tabulated and its use as a solvent for cellulose nitrate is advocated. D. R. D.

**Optimum proportion of plasticisers and durability of lacquers. II.** C. BOGIN (Amer. Paint J., 1935, 19, No. 43, 16–18, 48–52).—The durabilities of a series of cellulose nitrate lacquers containing different plasticisers were compared, in order to determine the relative merits of the latter and the optimum

proportion of each. The dialkyl phthalates, castor oil, and  $C_6H_4Bz\cdot CO_2Bu$  gave the best results. D. R. D.

**Casein finishes for leather manufacture.** A. HEVESI (Farben-Chem., 1935, 6, 257—258, 290—295).—A review is given of the development of coloured casein finishes, the special characteristics of the pigments, dyes, binding media, preservatives, plasticisers, and hardening agents used therein, and of their application and analysis. (Cf. B., 1935, 323.) S. M.

**Permeability to moisture of organic applied films.** ANON. (Synth. Appl. Fin., 1935, 6, 120—124, 131).—Cellulose acetate films were sealed with bitumen to the flange of a metal cup (diam. 1 in., depth  $\frac{5}{8}$  in.) containing  $CuSO_4$  (2 g.). Coating preps. (compositions given) containing the following bases were brushed or sprayed on, dried, exposed to an atm. having R.H. = 100%, and the increase in wt. due to penetration of  $H_2O$  was determined at intervals. The order of increase of permeability was: bitumen, tung oil, orange shellac, alkyd resin, polystyrene resin, nitrocellulose, but this does not correspond with their resistance to outside exposure. For testing stoving varnishes a fine-mesh gauze should replace the cellulose acetate support. S. M.

**Use in oil varnishes of reactive, hardenable, 100%-phenolic resins.** H. ULRICH (Peint. Fig. Ver., 1935, 12, 164—167).—The methods of manufacture of oil varnishes comprising drying oils and a proprietary 100%-phenolic resin, and the advantages claimed therefor, are discussed. S. S. W.

**Fundamental physical properties of lac.** I. Mechanical properties. L. C. VERMAN (London Shellac Res. Bur., 1935, Tech. Paper No. 3, 28 pp.).—A crit. review is given with collected data of the  $d$ , adhesion and tensile strength, and modulus of elasticity (calc. from the velocity of sound) of various commercial samples of shellac. As in the case of adhesion action (B., 1925, 292) the scratch-hardness (tabulated) of baked and unbaked films varied with the at. vol., compressibility, etc. of the metal used as the base; Cu gave higher results than Sn. It was increased by the presence of wax, which also increased the abrasion-resistance. The action of 6 common plasticisers on the film also varied with the metal surface. S. M.

#### PATENTS.

**[Lithopone] paint.** G. F. A. STUTZ and A. C. ELM, Assrs. to NEW JERSEY ZINC CO. (U.S.P. 1,978,727, 30.10.34. Appl., 24.4.30).—Dispersion of lithopone in oil media and levelling of the spread films are promoted by incorporating < 0.5% of  $o\text{-OH}\cdot C_6H_4\cdot CO_2H$ , or a salt or derivative thereof, with the dry-calcined pigment. S. M.

**Dry-powder cement-paint preparation.** W. P. D. MOROSS, Assr. to AMER. CEMENT PAINT CO. (U.S.P. 1,978,141, 23.10.34. Appl., 19.6.30).—Dry-powder paints (to be mixed with  $H_2O$  for use) comprise Portland cement, filler, e.g.,  $CaCO_3$ , clay, or talc, a quantity of  $Ca(OH)_2$  and  $Al_2(SO_4)_3$  which, with  $H_2O$ , produce > 20% of  $Al(OH)_3$  and > 3% of  $CaSO_4$  (based on the cement, for which  $CaSO_4$  acts as retarder), casein, an alkaline solvent therefor, and  $CH_2O$ , the last 3 ingredients forming a binder of high  $H_2O$ -resistance. S. S. W.

**[Metallic] paints.** METALLGES. A.-G., Asses. of O. SCHÖBER (B.P. 433,101, 7.9.34. U.S., 7.9.33. Addn. to B.P. 409,334; B., 1934, 772).—Paints comprising 25—60% of extremely finely-divided Al-Si pigment (5—95% Si), binding media (25—70%), diluents (> 10%), and inert mineral fillers (> 35%) are claimed. S. S. W.

**Treated [carbon-black] pigment.** H. A. GARDNER (U.S.P. 1,963,896, 19.6.34. Appl., 21.5.32).—C black is rendered readily miscible with oil or other dispersing medium by grinding it with about 5% of a S-terpene reaction product (S balsam), expelling the occluded gas, and compressing the mixture under 10 tons per sq. in. A. R. P.

**Production of cuprous oxide [for paint pigments].** T. B. SWIFT, Assr. to MOUNTAIN COPPER CO., LTD. (U.S.P. 1,963,105, 19.6.34. Appl., 6.6.33).—Crude cement-Cu is blown with steam and air in 1% aq. NaCl in a pachuca tank. A. R. P.

**Preparation of carotene pigment material.** H. M. BARNETT, Assr. to S.M.A. CORP. (U.S.P. 1,978,981, 30.10.34. Appl., 12.4.32).—A solution, in, e.g., light petroleum, of palm oil or other carotene-containing material consisting mainly of glycerides is treated with I, which is removed from the pptd. iodide by  $Na_2S_2O_3$  etc. S. M.

**Plasticiser.** A. O. JAEGER, Assr. to AMER. CYANAMID & CHEM. CORP. (U.S.P. 1,978,710, 30.10.34. Appl., 28.9.29).—The use of esters of a keto-acid, e.g., benzoylacrylic, and a monohydric alcohol is claimed in plastics and lacquers containing cellulose esters and resins. S. M.

**[Plasticisers for] manufacture of lacquers, films, plastic masses, and the like.** DEUTS. HYDRIERWERKE A.-G. (B.P. 432,404, 19.11.34. Ger., 18.11.33).—Cellulose ester compositions are plasticised by the use of OH-containing esters of aliphatic polycarboxylic acids and mono- or poly-nuclear hydroaromatic alcohols, e.g., dicyclohexyl malate, dimethylcyclohexyl tartrate. S. M.

**Cellulosic composition [for lacquers etc.].** H. S. MORK (U.S.P. 1,979,986, 6.11.34. Appl., 20.5.31).—Mixtures of a phenylphenol ( $C_6H_4Ph\cdot OH$ ) and  $H_3PO_4$ , or an ester, e.g.,  $Ph_3PO_4$ , are used as plasticisers for cellulose acetate. D. A. C.

**Preparation of nitrocellulose compositions.** A. F. YORK, Assr. to S. STERNAU & Co., Inc. (U.S.P. 1,978,070—1, 23.10.34. Appl., [A] 25.2.32, [B] 29.2.32).—(A) Highly nitrated nitrocellulose, practically insol. in  $Me_2O\text{-}EtOH$ , is solubilised by MeOH at < 0°, and the cold mixture is allowed to expand against retaining means. (B) An aliphatic monohydric alcohol (<  $C_3$ ) is specified. If desired, a gas is dispersed in the cold sol, and retained under pressure in the gel formed by allowing the temp. to rise. S. S. W.

**Coating of articles [with heat-resistant films].** BAKELITE CORP. (B.P. 432,508, 29.1.34. U.S., 30.1.33).—A coating of an alkyd or other resin which has been baked on a surface of polished metal is inverted on and hot-pressed to the article with the use of an interposed bonding sheet which is impregnated with a suitable adhesive, e.g., a thermo-hardening phenol- $CH_2O$  resin

and a plasticiser. Designs may be introduced into the film before it is transferred. S. M.

**Refining of rosin.** I. W. HUMPHREY, Assr. to HERCULES POWDER Co. (U.S.P. 1,978,135, 23.10.34. Appl., 8.4.31).—Rosin, particularly wood rosin, is freed from colour substances by preliminary refining, *e.g.*, vac. distillation at 250–300°, or treatment with a selective solvent for the colouring matter, *e.g.*, furfuraldehyde, followed by crystallisation from a neutral, org., H<sub>2</sub>O-miscible solvent, *e.g.*, MeOH, EtOH, COMe<sub>2</sub>. S. S. W.

**Manufacture of artificial resins.** A. NOWACK A.-G., and R. HESSEN (B.P. 432,190, 19.10.33).—PhOH-CH<sub>2</sub>O-type resins are manufactured in a single stage by maintaining concns. of alkali in dil. aq. solutions or effluents containing phenols and/or CH<sub>2</sub>O (the concns. of which are adjusted as necessary) such that the resin formed remains in solution, the concn. of alkali being increased during the process by evaporating H<sub>2</sub>O from the dil. solution. The reaction is interrupted by pptg. the resin at the desired degree of condensation. S. S. W.

**Production of condensation products [from Novolaks].** W. KRAUS (B.P. 432,359, 25.1.34. Ger., 27.1.33).—Separately produced condensation products of PhOH-CH<sub>2</sub>O type and urea-CH<sub>2</sub>O-(CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub> type (the latter in quantity sufficient to saturate the free valencies of the Novolak) are mixed (after neutralisation and concn. as desired) and matured without application of heat. S. S. W.

**Preparation of synthetic resin.** E. G. PETERSON, Assr. to HERCULES POWDER Co. (U.S.P. 1,978,598, 30.10.34. Appl., 19.3.32. Renewed 22.9.33).—Maleic anhydride is heated at 125–250° with a mixture of  $\alpha$ -terpinene and rosin or abietic acid; residual volatile matter is removed by reducing the pressure. The acidic product may be esterified with glycerol and used in varnishes etc. S. M.

**Organic product [resin] obtained from molasses and molasses residues.** E. A. VAZQUEZ (U.S.P. 1,976,590, 9.10.34. Appl., 24.1.33. Cuba, 15.9.32).—Molasses is treated at 20–30° with an equal wt. of EtOH containing 5% of H<sub>2</sub>SO<sub>4</sub> and 12.5% of EtOAc to extract the org. acids and other impurities from the sugars and inorg. salts, the solution is evaporated, and the residue heated at 100–120° for 24 hr. to convert it into a black insol. resin, which is ground, washed free from sol. acids, and used as a filler for moulded resinous products, *e.g.*, bricks, tiles, etc. A. R. P.

**Manufacture of [bituminous] moulded articles.** J. H. REILLY, Assr. to RICHARDSON Co. (U.S.P. 1,979,012, 30.10.34. Appl., 6.8.28).—The fillers are incorporated with the binder, a little (4%) of which is then added in the liquid state and the mixing continued until aggregates suitable for transferring to the mould are formed. The product thus receives a smooth coating of the clear binder. S. M.

**Moulded articles containing inserts.** F. GROFF, Assr. to BAKELITE CORP. (U.S.P. 1,977,876, 23.10.34. Appl., 20.11.29).—In such articles, *e.g.*, distributor heads for automobile ignition systems, the insert is coated with a reaction product of a phenol, a fatty oil,

*e.g.*, tung oil, and a CH<sub>2</sub>-containing agent, *e.g.*, (CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub>, which has dielectric strength 3–10 times that of the PhOH-CH<sub>2</sub>O condensation product comprising the body of the article. S. S. W.

**Preparation of [casein] moulded products.** H. S. HOLT, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,978,533, 30.10.34. Appl., 6.7.33).—The ppt. obtained by acidifying an alkaline solution of casein and a thermo-hardening alkyd resin (preferably modified with castor oil) is maintained in contact with aq. CH<sub>2</sub>O and then freed from H<sub>2</sub>O, acid, and CH<sub>2</sub>O. The product is ground and moulded. S. M.

**Binding composition [for foundry sand cores].** G. F. KENNEDY and J. N. BORGLIN, Assr. to HERCULES POWDER Co. (U.S.P. 1,978,948, 30.10.34. Appl., 29.8.30).—“B” wood rosin or other resin is ground (preferably in a colloid mill) with molasses, invert sugar, etc.; an alkali may be added to increase the  $\eta$ . S. M.

**Moulded compositions from asbestos.**—See IX. **Rubber for paints etc.**—See XIV. **Spectrophotometric analysis.**—See XXI.

#### XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Acetone extraction of raw rubber.** III. **Effect of time of extraction on the acid value of the extract and of the residue.** IV. **Relation between time of saponification and saponification value of raw rubber and its acetone extract.** H. ENDOH (J. Soc. Chem. Ind., Japan, 1935, 38, 288–290 B, 290–293 B; cf. B., 1935, 861).—III. When pale crêpe rubber is extracted with COMe<sub>2</sub> the free fatty acids are removed almost completely in 1–2 hr. The acid val. of the extract tends to decrease gradually with continued extraction up to 12 hr., possibly due to gradual extraction of non-acid substances and esterification of some of the acids. The change occurs mainly in the COMe<sub>2</sub> solution itself. On account of such changes it is important not to store the COMe<sub>2</sub> extract for long periods.

IV. The sap. val. of the COMe<sub>2</sub> extract is best determined by heating with 20 c.c. of 0.2N-alcoholic KOH on a water-bath for 1 hr. and then titrating with 0.1N-HCl (phenolphthalein). The sap. val. of the COMe<sub>2</sub> extract obtained with an 8-hr. extraction is > that of the 16- and 24-hr. extracts. D. F. T.

**Oil-resistance of rubber.** I. **Swelling of vulcanised rubber.** Y. TANAKA, S. KAMBARA, and J. NOTO (J. Soc. Chem. Ind., Japan, 1935, 38, 364–367 B).—The swelling of rubber by C<sub>6</sub>H<sub>6</sub> with the addition of various diluents is examined and the stress-strain curve determined at various degrees of distension. The S-form of the curve becomes less marked the more swollen is the rubber; this effect is explained by the theory of Fikentscher and Mark (B., 1930, 249).

D. F. T.

**Effect of pressure on the dielectric constant, power factor, and conductivity of rubber-sulphur compounds.** A. H. SCOTT (J. Res. Nat. Bur. Stand., 1935, 15, 13–34).—The dielectric const. ( $\epsilon$ ) and power factor (at 1000 cycles per sec.) and conductivity ( $\kappa$ ) (after 1 min. electrification) have been measured at pressures of 1–690 atm. for rubber-S compounds containing 0–32% S. With < 7.5% S  $\epsilon$  increases

slightly, but at higher [S] decreases with increasing pressure. The power factor is independent of pressure with  $< 2\%$  S; with 2—12% it increases, and with  $> 12\%$  S decreases, with increasing pressure. The  $\kappa$  of compounds with 12—19% S increases, and that of compounds with higher and lower [S] decreases, with increasing pressure.  $\epsilon$  for gutta-percha is almost independent of pressure, whilst the power factor increases, and  $\kappa$  decreases, with increasing pressure.

J. W. S.

**Chloro-rubber.** A. NIELSEN (Chem.-Ztg., 1935, 59, 681—684; cf. B., 1934, 158).—The prep., properties, and possible uses of chlorinated rubber are reviewed.

D. F. T.

**Latex in textile finishing.**—See VI.

## PATENTS.

**Dissolution of rubber for manufacture of paints, varnishes, and like products and for insulating purposes.** J. P. HENHAREN (B.P. 432,405, 21.11.34).—A mixture of equal proportions of wood oil, rosin, and boiled linseed oil is heated at approx.  $150^\circ$ , a drier incorporated at approx.  $280^\circ$ , rubber (10—20% of total wt.) added, and the heating continued at  $315$ — $345^\circ$ .

S. M.

**Manufacture of crazy-pattern (marbled) rubber goods.** J. A. TALALAY (B.P. 432,884, 3.1.34).

**Rubber-bonded abrasive.**—See VIII.

## XV.—LEATHER; GLUE.

**Supposed tanning in the palæolithic age.** A. GANSSER (Boll. Uff. Staz. Sperim. Ind. Pelli, 1935, 13, 240—244).—From the presence in Alpine caves of cave-bear skulls and of bones evidently used by human beings, the theory is evolved that the skins of the animals were prepared by palæolithic man for clothing by treatment with marrow and brain-fat. T. H. P.

**Treating cod skins.** N. LOSEV (Kozh. Obuvn. Prom., 1933, 12, 493—494).—A chrome-tanning process is described.

CH. ABS. (p)

**Rapid concentrated drum tanning of hides.** G. OBRUTZKI, M. LESCHTSCHINSKI, and A. SMIRNOVA (Kozh. Obuvn. Prom., 1933, 12, 612—613).—After delimiting and pickling (1.5% HCl and 8% NaCl) hides have  $p_H$  4.3—4.5 and are tanned with oak extract at a similar  $p_H$  and a liquid factor of 1:2.5. Oil is added (1% of wt. of hides) and after drumming at  $25$ — $28^\circ$  for 24 hr., the hides are washed, pressed, and fat-liquored.

CH. ABS. (p)

**Accelerated tanning of tawed hides with oak extract.** V. KOTOV (Kozh. Obuvn. Prom., 1934, 13, 684—685).—To prevent shrinkage, tanning should be carried out at a  $p_H$  which ensures a min. of positive ions in the hide gel and an excess of negative ions in the colloidal solution of the tannides. For dense-structured hides conditions approaching the isoelectric points of the gel and of the tannides are desirable. Immediately prior to tanning hides are treated with the buffer solution of a spent tanning solution having low % of tannides, high % of non-tanning substances, and  $p_H$  approx. 4.

CH. ABS. (p)

**Accelerated tanning of sole leather.** S. KATZ-NELSON (Kozh. Obuvn. Prom., 1933, 12, 570—572).—The process is based on successive short treatments in a series of tanning vats with appropriate renewal of the end-series liquid.

CH. ABS. (p)

**Analysis of leather tanned with iron salts.** E. BAER and D. LANGER (Kozh. Obuvn. Prom., 1933, 12, 497—499).—Total Fe is determined by ashing or digesting with  $H_2SO_4$  (Kjeldahl), and applying the Zimmermann-Reinhardt method. The determination of  $H_2O$ -sol. Fe is also described.

CH. ABS. (e)

**Determination of fat in finished chrome-tanned goods.** D. FEIGIN and Z. SHLIANSKI (Kozh. Obuvn. Prom., 1933, 12, 494).—The leather was extracted with light petroleum, the residual fat saponified by 15% aq. NaOH, and the fat acids were extracted with  $Et_2O$ .

CH. ABS. (e)

**Determination of the acidity of synthetic tannins.** A. BORGIALLI (Boll. Uff. Staz. Sperim. Ind. Pelli, 1935, 13, 245—248).—In ultra-violet light, solutions of Thioflavine, Patent Phosphine, and Acid R Phosphine exhibit marked fluorescence at  $p_H$  7—6.5, 6—7, and 6—7, respectively. Their use for measuring the acidity of dark synthetic tannins is suggested.

T. H. P.

**Chemical control of the one-bath chrome tannage.** S. T. LEO and Y. H. CHEN (J. Chem. Eng. China, 1935, 2, 4—20).—The variation of the concns. of the Cr-tanning liquors, their basicities, and the fixation of Cr and acid by the pelt have been determined. The equation  $t = [-E - BR \pm \sqrt{\{(E + BR)^2 - 4C(AR^2 + DR + 1)\}}] / 2C$  has been derived in which  $R = C/[H(b_1 - b_2)]$ , where  $C$  is the Cr content of the liquor,  $H$  the hide substance in the original pelt,  $b_1$  and  $b_2$  are the basicities at the beginning and end of the tannage, and  $A - E$  are consts. A Cr-tanning liquor prepared by reducing acidified  $K_2Cr_2O_7$  with sugar was cheaper than were commercial Cr-tanning agents.

D. W.

**Influence of sulphonated cod-liver oil on deterioration of vegetable-tanned leathers by sulphuric acid.** E. L. WALLACE, C. L. CRITCHFIELD, and J. BECK, JUN. (J. Res. Nat. Bur. Stand., 1935, 15, 73—77).—The addition of 10% of the sulphonated oil increases the effect of  $H_2SO_4$  in causing deterioration in the tensile strength of leathers tanned with chestnut-wood extract, and, excepting at high  $[H_2SO_4]$ , does not influence the effect of acid on leathers tanned with quebracho-wood extract. The oil increases the tensile strength of leathers containing no acid. Leather which has a  $p_H < 3.0$  before ageing shows deterioration after 2 years.

J. W. S.

**Finishes for leather.**—See XIII.

## PATENTS.

**Treatment of animal furskins, animal hair fibres, and the like.** G. LEVY (U.S.P. 1,978,800, 30.10.34. Appl., 20.7.32).—Furskins are killed and re-dressed with aq.  $Na_2CO_3$  and  $CH_2O$ , and subsequently mordanted with aq. complex metallic  $NH_4$  salts of the type  $[Me_x(NH_3)_2]^{x+}$ , bleached, and finally stripped.

D. W.

**Manufacture of adhesives.** (A, B) C. N. CONE and (A) H. GALBER, Assrs. to I. F. LAUCKS, INC. (U.S.P.

1,976,435—6, 9.10.34. Appl., [A] 29.12.30, [B] 6.11.31).—(A) Mixtures of oil-seed residue flours and blood-albumin in aq. NaOH are treated with  $\text{CH}_2\text{O}$ , CaO, and Na silicate. (B) A suspension of dried blood in  $\text{H}_2\text{O}$  is treated with NaOH (8), CaO (7), and Na silicate (30% of the wt. of dry blood). The resulting adhesives are of val. in making plywood by the hot- and cold-pressing methods, respectively. A. R. P.

**Manufacture of cements. [Adhesives.]** A. S. COLLING (B.P. 432,493, 25.1.34).—A cement for attaching rubber or fabric to metal consists of Paris-white 40, rosin 3, dammar or copal gum 15, benzol 15, naphtha 23, rubber 1.5 pts. by wt. J. A. S.

**Leather dyeing.**—See IV.

## XVI.—AGRICULTURE.

**Soils. XV. So-called colloidal complexes of soils.** J. CLARENS and J. LACROIX (Bull. Soc. chim., 1935, [v], 2, 1431—1435; cf. B., 1935, 371).—Conditions of existence of stable suspensions are discussed. T. G. P.

**Soil moisture meter depending on the "capillary pull" of the soil: use in fallow land and in grass and irrigated orchards.** W. S. ROGERS (J. Agric. Sci., 1935, 25, 326—343).—The meter consists essentially of a thick-walled porous pot which is filled with  $\text{H}_2\text{O}$  and attached to a Hg manometer. The pot is inserted in soil to the required depth. It may be used to examine evaporation of  $\text{H}_2\text{O}$  from soil surfaces or absorption by tree roots at lower depths. A. G. P.

**Infiltration capacity of soils in relation to control of surface run-off and erosion.** G. W. MUSGRAVE (J. Amer. Soc. Agron., 1935, 27, 336—345).—Methods for determining infiltration capacities of soils are described. Data are given for soils of varied types and their utilisation is discussed. A. G. P.

**Comparison of glass and quinhydrone electrodes for determining the [H] of some Iowa soils. I. Comparison of different types of glass electrodes.** H. L. DEAN and R. H. WALKER (J. Amer. Soc. Agron., 1935, 27, 429—436).—Four types of glass electrodes gave similar results. The bulb, Ag—AgCl type of electrode is the most practicable for soil work. A. G. P.

**Decomposition of the base-exchange compounds of soil by acids and its relation to the quantity of alumina and silica dissolved.** G. S. FRAPS and J. F. FUDGE (J. Amer. Soc. Agron., 1935, 27, 446—455).—Comparison of the amount of Al removed from soils by HCl of varying concn. and the corresponding loss of exchange capacity indicates the presence in the complex of a series of aluminosilicic acids varying in amount and activity in soils of different types. Extraction with dil. acid (up to N) lowers considerably the exchange capacity for the loss of relatively small amounts of Al. After destruction of the more unstable complex acids the ratio of the decrease in exchange capacity to the Al removed approaches a similar val. in all soils. No relationship was apparent between the loss of exchange capacity and the removal of Fe by HCl. Exchange compounds containing  $\text{SiO}_2$  sol. in 0.5N-NaOH are formed only when much Al has been removed from the complex by acid treatment. Acid decomp. and loss of exchange

capacity were much smaller with bentonite with than soils. The capacity of dickite and kaolin was unaffected by the acid treatment. A. G. P.

**Iodine content of south German soils.** K. SCHARRER (Z. Pflanz. Düng., 1935, 39, 315—326).—Vals. for 200 soils varied from 63 to 1218 (average 356)  $\times 10^{-6}$  g. I per 100 g. of dry soil. In general the I content increased with the proportion of fine particles in the soil and with the org. matter content, but was unrelated to the soil reaction. A. G. P.

**Selenium in soils in relation to its presence in vegetation.** H. G. BYERS and H. G. KNIGHT (Ind. Eng. Chem., 1935, 27, 902—904; cf. A., 1935, 71).—The absorption of Se from the soil by plants varies markedly with the species and with %  $\text{SO}_4^{--}$  and %  $\text{H}_2\text{O}$  in the soil. Young plants contain more Se than mature seeds. The nature of the Se compounds formed in the plant is discussed. E. C. S.

(A) **Available [exchangeable] potash [in Trinidad sugar-cane soils].** G. RODRIGUEZ and F. HARDY. (B) **Soils of the Orange Grove estate.** P. E. TURNER (Proc. Sugar-Cane Invest. Commee. [Trinidad], 1932, 4, 107, 140—141).—(A) There was no correlation between the  $\text{pH}$  of soils and the available (sol. in 0.5N-AcOH)  $\text{K}_2\text{O}$  contents.

(B) No significant differences exist between the available  $\text{K}_2\text{O}$  contents of surface soils or subsoils from fields yielding good or poor crops. CH. ABS. (p)

**[Manganese in] Trinidad limestone [marl and soil].** P. E. TURNER (Proc. Sugar-Cane Invest. Commee. [Trinidad], 1933, 4, 206—207).—Analyses are recorded. CH. ABS. (p)

**Phosphate status of sugar-cane soils.** F. HARDY (Proc. Sugar-Cane Invest. Commee. [Trinidad], 1932, 4, 23—24, 38—39, 63—65, 90, 124—125).—The available  $\text{PO}_4^{--}$  of such soils increased with fineness of texture and was generally higher in neutral and alkaline than in acid soils, and higher in surface soils than in sub-soils. CH. ABS. (p)

**Soil organic matter and crop rotation.** E. M. CROWTHER (Empire Cotton Growing Corp. 2nd Conf., 1934, 319—327).—Fertiliser requirements of cotton are discussed with special reference to the supply and distribution of org. matter and N in soil. CH. ABS. (p)

**Determination of carbon in soils by the wet-combustion method.** W. S. MARTIN and G. GRIFFITH (J.S.C.I., 1935, 54, 234—235 T).—Hardy's method is modified by preliminary moistening of the soil sample (1:1), by introducing  $\text{CrO}_3$  into the reaction flask in the form of a finely-ground mixture with  $\text{H}_2\text{SO}_4$  (1:3), and by small variations of the distillation technique. Rubber connexions between reaction flask and burette should be minimised. Results obtained average 90% of those given by dry-combustion methods. A. G. P.

**Response of Illinois soils to limestone.** F. C. BAUER (Illinois Agric. Exp. Sta. Bull., 1934, No. 405, 303—363).—Results of long-period trials with limestone on various soil types and crops are recorded and discussed. A. G. P.

**Nitrogen fixation in some Michigan soils.** L. M. TURK (Mich. Agric. Exp. Sta. Tech. Bull., 1935, No. 143,

36 pp.).—The rate of N fixation in solution cultures  $\propto$  the no. of organisms present, but the quantity of N fixed depended on the energy material supplied. No relationship was apparent between N fixed and the  $p_H$  of the medium. A few soils having  $p_H > 6$  failed to fix N, whereas a certain no. with  $p_H < 6$  fixed considerable amounts. In all soils in which aerobic fixation occurred, *Azotobacter* were present. The organism was absent from all soils which fixed no N aerobically. The N-fixing capacity of soils was not influenced by manurial treatment in any definite manner. The beneficial effect on N fixation of additions of  $\text{CaCO}_3$  to soils was  $>$  that induced by corresponding additions of  $\text{CaCl}_2$  or  $\text{Ca}(\text{OAc})_2$ . The activity of organisms in  $\text{CaCl}_2$ -treated soil was increased by supplementary application of  $\text{CaCO}_3$ . No relationship existed between the amounts of N fixed under aerobic and under anaerobic conditions.

A. G. P.

**Graphs for calculating lime requirements [of soils].** F. HARDY (Proc. Sugar-Cane Invest. Commee. [Trinidad], 1932, 4, 58—61).—Graphs based on the Hardy-Lewis method (B., 1929, 183) show the CaO required to change the  $p_H$  of soil to 7.2. For a given initial  $p_H$  the requirements increase in the order sands, loams, silts, clays.

CH. ABS. (p)

**Nitrification in Grundy silt loam as influenced by liming.** R. H. WALKER and P. E. BROWN (J. Amer. Soc. Agron., 1935, 27, 356—363).—Increased nitrification following liming was directly related to the  $p_H$  changes induced. The change in  $\text{NO}_3'$  production per unit CaO added were smaller when the CaO requirement of the soil was satisfied. In 5-year trials the action of limestone (20-, 40-, and 120-mesh) was  $<$  that of  $\text{Ca}(\text{OH})_2$ .

A. G. P.

**Biological soil studies in a citrus orchard.** P. KAMERMAN (Farming in S. Africa, 1934, 9, 393—394).—Nitrification of  $(\text{NH}_4)_2\text{SO}_4$  (I) is considerable 4 weeks after application. The effect disappears (top 18 in. of soil) in 4—6 months according to rainfall. (I) should be effective for navel oranges, which require high N immediately before and during the setting period, but low levels of N during Feb.—March. (I) is less suitable for Valencia oranges, which need a continuous and fairly const. supply of N throughout the season. Application of  $\text{K}_2\text{SO}_4$  and superphosphate caused no marked increase in bacterial activity. (I) caused a marked increase in  $\text{CO}_2$  production. No accumulation of  $\text{NO}_3'$  occurred in 3 months after ploughing-in sunn hemp as green manure, but a temporary accumulation occurred after 4.5 months.

CH. ABS. (p)

**Nitrogen fixation in soil.** N. R. DHAR and S. K. MUKERJI (Proc. Acad. Sci. Agra and Oudh, 1935, 4, 330—341).—The addition of cane sugar to soils produces an increase in the  $\text{NH}_3$ -N content, especially under the influence of light; with unsterilised soil the increase is ninefold.

C. W. G.

**Method in soil microbiology as illustrated by studies on *Azotobacter* and the nitrifying organisms.** S. WINOGRADSKY (Soil Sci., 1935, 40, 59—76).—A review.

A. G. P.

**Calculation of the efficiency of the principal [plant] nutrients.** CLAUSEN (Ernähr. Pflanze, 1935,

31, 173—174).—The interpretation of results of manurial trials is discussed.

A. G. P.

**Effect of various absorbents on growth of plants.** K. SCHARRER and W. SCHROPP (Landw. Versuchs-Stat., 1935, 122, 323—338).—The influence on the growth of barley and maize of additions to soil of fuller's earth, kieselguhr, lignite, coal, bone C, activated C, and humic acid is examined. In general, differences in yield, composition, grain: straw ratio, and grain size were small.

A. G. P.

**Utilisation of ammonia-nitrogen by cotton.** V. S. IVANOVA (Lenin Acad. Agric. Sci. Ged. Inst. Fert., 1934, No. 3, 77—103).—With  $\text{H}_2\text{O}$  cultures in a modified Naftel medium additions of Ca salts at  $p_H$  4.8 improved yields. The optimum  $p_H$  for cotton was in the alkaline range. In media of  $p_H$  3.0 the presence of  $\text{CaCl}_2$  or  $\text{CaSO}_4$  favoured the utilisation of  $\text{NH}_4$ -N, which became most intense in slightly acid media, and declined at neutrality as a result of pptn. of Ca in the medium as phosphate. The presence of K did not influence the intake of  $\text{NH}_4'$  or  $\text{NO}_3'$  in acid media but favoured  $\text{NO}_3'$  absorption in neutral media. Addition of  $\text{MgSO}_4$  or  $\text{MgCl}_2$  decreases the utilisation of  $\text{NH}_4'$  at  $p_H$  3.5 and 4.8. The relative intake of  $\text{NO}_3'$  or  $\text{NH}_4'$  is controlled principally by the  $p_H$  of the medium.

CH. ABS. (p)

**Adaptation of fertilisers for cotton soils.** O. SCHREINER and J. J. SKINNER (Amer. Fertiliser, 1934, 81, No. 12, 5—7, 28, 30).—Inorg. sources of N may be as effective as more costly "org. ammoniates." Delayed applications of N are not superior to full treatment at planting. The mixing of modern fertilisers to suit the requirements of cotton is discussed.

CH. ABS. (p)

**Conversion of calcium cyanamide in soils and in storage, and its effects on the growth of flax.** F. K. VOROBEV (Lenin Acad. Agric. Sci. Ged. Inst. Fert., 1934, No. 3, 130—165).—The conversion of  $\text{CaCN}_2$  into  $\text{NO}_3'$  is more rapid in sandy soils than in loams or peat. The change is facilitated by increased  $\text{H}_2\text{O}$  content in sandy loam, but to a smaller extent in loam.  $\text{CaCN}_2$  persists longest in peats and depresses biological activities therein. In sand cultures  $\text{CaCN}_2$  in media is more injurious to flax than to maize. Storage of  $\text{CaCN}_2$  in humid atm. causes 60% conversion into dicyanodiamide in 8—9 months, involving an increase in wt. of 20% and some loss as  $\text{NH}_3$ . Mixing the material increases the losses. In a dry atm. at 16—17° no conversion occurs.

CH. ABS. (p)

**Effect of fertilisers on length of cotton fibre.** E. B. REYNOLDS and R. H. STANSEL (J. Amer. Soc. Agron., 1935, 27, 408—411).—Differences in fibre length on manured plots were related neither to the amounts of N, P, or K used, nor to the rate of application of the complete fertiliser.

A. G. P.

**Sweet potato soils.** R. R. FOLLETT-SMITH (Div. Repts. Dept. Agric. Brit. Guiana [1932], 1934, 112—113).—Analytical data and fertiliser trials are recorded.

CH. ABS. (p)

**Influence of different quantities of moisture in a heavy soil on rate of growth of pears.** M. R. LEWIS, R. A. WORK, and W. W. ALDRICH (Plant Physiol., 1935, 10, 309—323).—Rate of growth is markedly affected by relatively small variations in the  $\text{H}_2\text{O}$

content of soil in the root zone, even when the vals. are considerably  $>$  the wilting point. A. G. P.

**Statistical treatment and evaluation of agricultural data and results by means of a "loose-leaf" system.** E. G. DOERELL (Landw. Versuchs-Stat., 1935, 122, 171—252).—A system of filing results and a rapid method of examination of mathematical distribution and significance of data are described.

A. G. P.

**Electric oven for drying [crop] samples from field plots.** F. H. GARNER, J. GRANTHAM, and H. G. SANDERS (J. Agric. Sci., 1935, 25, 315—317).—The construction is described and tests of uniformity are recorded.

A. G. P.

**Place of legumes in pasture production.** E. N. FERGUS (J. Amer. Soc. Agron., 1935, 27, 367—373).—In blue grass-clover pastures, the effect of the legume is to increase total dry matter production, to increase the vigour of the grass and thus minimise weed growth, and to increase the protein and mineral matter contents of the grass. The formation and improvement of pastures is discussed.

A. G. P.

**Monthly clipping of pastures.** R. H. LUSH (J. Dairy Sci., 1935, 18, 295—299).—Analyses covering a period of 5 years are recorded. The protein content of February samples was approx. double that of September samples. Ca and to a less extent  $\text{PO}_4^{''}$  decreased from spring to late summer. Dry matter and fibre increased as the season advanced, but other constituents were generally uniform. The composition of the pasture is influenced by rainfall, temp., and shading.

A. G. P.

**Report of cotton experiment station, Barberton, S. Africa. Rotation crops.** W. L. FIELDING and M. F. ROSE (Empire Cotton Growing Corp. Repts. Exp. Sta. [1932—33], 1934, 83—100).—Analyses of soya beans, peanuts, and sunflower seed are recorded.

CH. ABS. (p)

**Rapid determination of nitrogen in plants: soluble nitrogen as a measure of the nitrogen available for anabolic processes.** E. M. EMMERT (Plant Physiol., 1935, 10, 355—364).—In determining total N by oxidation with  $\text{NaClO}_3$  and  $\text{H}_2\text{SO}_4$ , distillation of the  $\text{HNO}_3$  may be avoided, and the acid determined directly in the oxidation mixture by  $\text{C}_6\text{H}_3(\text{OH})(\text{SO}_3\text{H})_2$  (cf. B., 1935, 515). The sol. N in aq. extracts of plants may be determined similarly. In a no. of plants examined an increase in sol. N was nearly always associated with an increase of  $\text{PO}_4^{''}$  in the extract. The general level of sol. N is paralleled by the vigour of the plant, but not always by the final crop yield.

A. G. P.

**Development of rotenone and similar substances as insecticides.** R. M. WHITTAKER (J. Chem. Educ., 1935, 12, 156—160).—A review.

L. S. T.

**Controlling codling moth by spraying.** W. P. FLINT (Rept. Iowa State Hort. Soc., 1933, 68, 135—139).—Arsenates of Cu, Pb, and Zn were almost equally effective. All were improved by the addition of 1% of summer oil. Mn arsenate was slightly inferior; it caused considerable scorching unless used with CaO. Paris Green was less satisfactory than Pb arsenate and injured foliage. For first- and second-brood sprays,

1% summer oil with nicotine (1 in 800—1200) was very effective, but caused some fruit spotting. Neither of the sprays gave complete control.

CH. ABS. (p)

**Finger-and-toe disease (*Plasmodiophora brassicae*).** G. POTTS (Trans. Brit. Mycol. Soc., 1935, 19, 114—127).—The disease did not develop in turnips when the soil was maintained at  $p_{\text{H}} > 7.0$  by  $\text{Ca}(\text{OH})_2$  or in soils containing  $> 30\%$   $\text{CaCO}_3$ , but appeared when the latter reached  $< 10\%$ . Additions of horse manure increased the incidence of the disease. In pot trials with mustard heavy applications of  $\text{KNO}_3$ ,  $\text{NaNO}_3$ , or  $\text{Ca}(\text{NO}_3)_2$  reduced, and  $\text{K}_2\text{SO}_4$ ,  $\text{Na}_2\text{SO}_4$ , or  $\text{CaSO}_4$  increased, infection. The presence of org. matter in soil is not necessary for the development of finger-and-toe but encourages the disease by facilitating  $\text{H}_2\text{O}$  retention.

CH. ABS. (p)

**Control of the tarnished plant bug, *Lygus pratensis*, L., in celery.** R. W. THOMPSON (64th Ann. Rept. Entomol. Soc. Ontario [1933], 1934, 43—47).—Nicotine and derris dusts did not control the insect and  $\text{C}_{10}\text{H}_8$  was ineffective as a repellent. Satisfactory results were obtained with Koloform (56% S with an inert carrier) using 2 applications of 200 lb. per acre at a 7-day interval (mid-June).

CH. ABS. (p)

**Decane ring-spot of apple leaves and symptoms of decane injury in apple, potato, and onion.** P. A. YOUNG (Amer. J. Bot., 1935, 22, 629—634).—*n*-Decane (I) caused rapid spotting of apple but not of potato leaves. Young apple leaves and dormant buds were killed and cankers developed on twigs. Addition of 50% of (I) to a petroleum insecticidal spray caused no increase in toxicity. (I) killed potato leaves and passed into leaf stems and also penetrated onion leaves and entered the roots. In both cases it occupied spaces between parenchyma cells.

A. G. P.

See also A., Aug., 1037, **Nutrient intake of plants. Assimilation of inorg. nitrogenous salts by grass. 1043, Determining  $p_{\text{H}}$  of solid culture medium.**

## PATENTS.

**Hardening of clay or clay-containing soils.** G. RODIO (B.P. 432,253, 2.1.35. Ger., 16.1.34).—Electrodes of Al and another metal remote from it in the electromotive scale (e.g., Cu) are embedded in the soil and connected either directly together or to a commercial source of p.d. Al sulphate or acetate may be introduced into the soil.

B. M. V.

**Manufacture of fertiliser.** C. J. HANSEN, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,961,104, 29.5.34. Appl., 26.7.30. Ger., 7.8.29).— $\text{SO}_2$  and  $\text{NH}_3$  are passed into  $\text{H}_2\text{O}$  to give a mixture of  $(\text{NH}_4)_2\text{SO}_3$  and  $\text{NH}_4\text{HSO}_3$ , which is treated with  $\text{NH}_3$  and  $\text{NH}_4\text{S}_x$  and boiled to yield  $(\text{NH}_4)_2\text{S}_2\text{O}_3$  (I). The solution of (I) is then heated (a) with  $\text{SO}_2$ , or (b) with  $\text{H}_3\text{PO}_4$  under pressure, to yield S and (a)  $(\text{NH}_4)_2\text{SO}_4 + (\text{NH}_4)_2\text{HPO}_4$ , or (b)  $(\text{NH}_4)_2\text{SO}_4$ .

A. R. P.

**Apparatus for producing phosphatic fertilisers.** (A) B. OBER, W. W. PAGON, G. L. PRUETT, and W. W. TROXELL, (B) G. C. PFAFF, Assrs. to OBERPHOS CO. (U.S.P. 1,982,479—80, 27.11.34. Appl., [A] 9.4.31, [B] 19.8.32).—In an injector device a rotating annular

stream of conc.  $H_2SO_4$  draws a core of powdered phosphate rock and delivers the mixture to an autoclave. (Cf. U.S.P. 1,893,437; B., 1933, 935.) B. M. V.

**Preparation of an insecticidal composition.** K. H. FULTON, Assr. to COMBUSTION UTILITIES CORP. (U.S.P. 1,964,283, 26.6.34. Appl., 17.11.30).—A suspension of C black in an emulsion of whale oil soap containing nicotine or other insecticide is claimed.

A. R. P.

**Pulveriser [for fertilisers].**—See I.

## XVII.—SUGARS; STARCHES; GUMS.

**Darkening [of beet-sugar juices] during evaporation and boiling.** O. SPENGLER and S. BÖTTGER (Z. Wirts. Zuckerind., 1935, 85, 447—460).—Abnormal darkening during evaporation, boiling, and crystallisation is attributed to invert sugar or its decomp. products. Excessive quantities of invert sugar in raw juice, e.g., 0.1—0.3%, are mostly due to the working of unripe or over-ripe beets or to faulty diffusion technique, such as the return of acid press-waters to working so that the  $p_H$  of the juice falls to  $< 5$ . The invert sugar may not be completely eliminated by the normal liming and carbonatation treatment, and then unusual darkening occurs later, coupled with an abnormal fall in alkalinity and  $p_H$  val. Such juices can be recognised after the first carbonatation and filtration, by pouring repeatedly from vessel to vessel or otherwise aerating, which causes a marked increase in colour. If at the syrup stage they darken considerably after being heated for 4 hr. at  $90^\circ$  and  $p_H$  9.6 (faint blue reaction with thymol-blue paper), they will darken also during pan-boiling and crystallisation. Apart from these factory tests, frequent determinations of invert sugar in fresh slices and in raw and first carbonatation juice are advised, as a control on diffusion and a guide as to the severity of the liming treatment required to eliminate invert sugar completely. Treatment of fresh slices with  $SO_2$  is also recommended (B., 1935, 743).

J. H. L.

**Non-sugar in [beet] juices purified by two different methods.** J. ZAMARON (Bull. Assoc. Chim. Sucr., 1935, 52, 530—546).—In a series of tests last campaign the author's Gelzam process produced an average rise in purity of 3.89% compared with 3.00% by the usual process (cf. B., 1932, 1131; 1933, 38).

J. H. L.

**Treatment of [beet] juice with lime and hyposulphites.** J. THIEBE (Bull. Assoc. Chim. Sucr., 1935, 52, 546—550).—The advantages derived from the use of hyposulphites, recorded earlier (B., 1935, 39), have been confirmed.

J. H. L.

**Colouring substances of cane sugar.** V. I. SAKUMA and I. MOMOSE (J. Soc. Chem. Ind., Japan, 1935, 38, 293—294 B; cf. B., 1935, 870).—Extinction coeffs. are obtained at varying  $p_H$  for the  $COMe_2$ - and EtOH-light petroleum-sol. colouring matter of Formosan cane sugar. The substance obtained by the action of  $FeCl_3$  on tannin has a max. colour depth at  $p_H$  7.0. F. N. W.

**Crystallisation of sugar and formation of molasses.** III. P. M. SILINE and Z. A. SILINE (Bull. Assoc. Chim. Sucr., 1935, 52, 516—529; cf. B., 1935,

870).—In practice the cooling of after-product beet-sugar massecuites does not retard crystallisation. Addition of  $H_2O$  serves mainly to reduce  $\eta$  for malaxage and centrifuging. The quantity added should be such that the molasses run-off is saturated in respect of sugar and has  $\eta = 4000$  centipoises. The latter condition is fulfilled by normal molasses at a refractometric Brix of  $82.0^\circ$  at  $40^\circ$ ,  $79.6^\circ$  at  $30^\circ$ , or  $84.1^\circ$  at  $50^\circ$ . To obtain molasses run-off of refractometric Brix  $b$  and purity  $g$ , from massecuite containing  $B\%$  of total solids and  $P\%$  of total sucrose, the wt. of  $H_2O$  to be added is  $\{(B - P)(100 - b)/b(1 - 0.01g)\} + B - 100$  kg. per 100 kg. For average conditions, at  $40^\circ$ ,  $b = 82^\circ$  refractometric Brix ( $\equiv 85^\circ$  densimetric Brix); if it can be raised to  $82.5^\circ$  the molasses purity will be reduced by 0.5%.  $g$  will vary from factory to factory; it depends on the coeff. of saturation, which varies according to the character of the non-sugars, and with the uniformity of crystal size in the massecuite and other factors. Molasses from 8 Russian factories, after stirring with sucrose crystals for 4 days at  $40^\circ$ , at various consens. between  $80^\circ$  and  $86^\circ$  Brix, were analysed to determine saturation coeffs. At  $82^\circ$  Brix the coeffs. ranged from 1.03 to 1.14, corresponding to purities from 54.0 to 59.8%; the actual factory purities ranged from 55.0 to 61.0%. J. H. L.

**Corncob charcoal.**—See II.

See also A., Aug., 928, **Solubility of sucrose and CaO in their conc. solution.**

### PATENTS.

**Defecation of diffusion juices.** R. PICKA (B.P. 432,403, 15.11.34).—The pptg. agent, e.g.,  $CaO$ , is added to the diffusion juice directly after its exit from the diffuser or from the sealed pulp separator before it comes in contact with air, staining of the juice through darkening of the impurities being thereby avoided and about 50% of the pptg. agent being saved. W. J. W.

**Product from molasses etc.**—See XIII. **EtOH from sugar beets etc.**—See XVIII.

## XVIII.—FERMENTATION INDUSTRIES.

**Determination of acetaldehyde in wines and spirits.** P. JAULMES and P. ESPEZEL (Ann. Falsif., 1935, 28, 325—335).—The reaction between  $HSO_3'$  and  $MeCHO$  and the oxidation of the excess  $HSO_3'$  with I are studied. In the determination of  $MeCHO$  excess of  $HSO_3'$  is added at  $p_H$  7, residual  $HSO_3'$  is oxidised by I at  $p_H < 2$ , and the dissociated complex is titrated with I at  $p_H$  9.5. H. D.

**Copper in musts and wines.** J. RIBEREAU-GAYON (Ann. Falsif., 1935, 28, 349—360).—Cu is removed from wines etc. by addition of  $Na_2S$ , the amount added depending on the quantity of dissolved  $O_2$  present.

H. D.

**Composition of the first and last runnings of [fermented] plum water.** A. FREY and E. MALENKE (Z. Unters. Lebensm., 1935, 69, 467—472).—The changes in the acid, ester, aldehyde, and alcohol content of the first and last runnings in the distillation of fermented plum juice were investigated. From the



viewpoint of flavour, the runnings can be added only to a limited extent to the main distillate for use as a wine.

E. A. F.

**Rapid detection of mineral acids in vinegar by indicators.** P. DU QUENOIS (Ann. Falsif., 1935, 28, 347—348).—Neutral kaolin should be used in the decolorisation of vinegar in the Me-violet test for inorganic acids.

H. D.

**Malt-house waste treatment.**—See XXIII.

See also A., Aug., 1924, **Yellow oxidation enzyme. Cataphoresis apparatus. Prep. of thrombin. 1925. Extraction of  $\alpha$ -lipase. 1926. Prep. of dry glyoxalase.**

PATENT.

**Production of alcohol from sugar beets and other sugar-containing raw materials.** AKTIEB. SEPARATOR, and N. E. SVENSKÖ (B.P. 432,387, 6.6.34).—After fermentation the yeast is extracted in a centrifuge, inside the bowl of which are a conveyor consisting of a pile of discs and a sludge space. The separated yeast is discharged from the outer zone of the sludge space to a point immediately outside the conveyor. If the outer periphery of the latter is nearer to the centre than 0.7 of the bowl radius, then the yeast is conducted to a point at least that distance from the centre.

W. J. W.

## XIX.—FOODS.

**Order of magnitude of wheat-gluten particles in the colloidal condition.** T. RUEMELE (Z. Unters. Lebensm., 1935, 69, 453—458).—The filtration method was used for investigating the particle size of the gluten of strong (Garnet) and of weak (Land) wheats dispersed in 0.02*N*-lactic acid. The latter yields a more turbid and viscous solution than the former wheat. The filtration of strong-wheat solutions is more rapid and regular than that of weak-wheat solutions, which latter exhibit a max., and practically ceases after 20 c.c. have been filtered off. The diam. of the particles of strong wheat is  $< 0.4 \mu$ , but the size of the weak-wheat particles cannot be defined more exactly than that the upper limit is  $> 2 \mu$ .

E. A. F.

**Action of enzymes in flour and their elimination.** H. KÜHL (Landw. Versuchs-Stat., 1935, 122, 253—261).—The colour developing (notably in rye bread) cannot be eliminated by ordinary bleaching since neither the chromogen nor the oxidase is destroyed. Sufficiently intensive bleaching lowers the quality and nutritive val. of the flour. Some improvement in colour is obtained by treating the whole grain with 8%  $H_2SO_4$  for 10 min. and subsequently washing and milling. The activity of the oxidase is thus restricted.

A. G. P.

**Fermentable sugars, alcoholic, fermentation, and gas production during bread-making.** R. GUILLEMET, C. SCHELL, and P. LE FUR (Bull. Soc. Chim. biol., 1935, 17, 1058—1060; cf. B., 1934, 1080).—An error in the calculation of  $CO_2$  wts. is rectified.

A. L.

**Clean milk supply.** T. RUDDOCK-WEST (Chem. & Ind., 1935, 843—847).—A lecture.

**Influence of physical and mechanical treatment on firmness of butter.** J. LYONS (Econ. Proc. Roy. Dublin Soc., 1935, 2, 541—558).—A modified Perkins method is used to compare the firmness of butters prepared from sweet cream under different temp. and time conditions of chilling and pasteurising. Firmer butter is obtained from cream chilled to  $0^\circ$  than from that cooled to  $15^\circ$  and chilled 5 hr. later. Cream held chilled for 3 hr. gives butter as firm as that held for 16 hr., and with cream so held churning temp. has no marked influence. The temp. of flash-pasteurising and the fat content of cream have no influence on the firmness of the butter. Butter held at  $-9^\circ$  for 3 months is not improved in firmness.

E. B. H.

**Foaming of egg-white.** M. I. BAILEY (Ind. Eng. Chem., 1935, 27, 973—976).—A method for the determination of foaming power and stability of foam is described. The foaming power of frozen whites was = that of unfrozen, but the stability of the foam was less. Thick white had greater foaming power than thin. Increase or decrease in  $p_H$  caused a decrease in foaming power, but at  $p_H$  5 the foam was more stable. The decrease in foaming power and stability of foam caused by addition of yolk was  $<$  that caused by addition of an equiv. amount of olive oil.

E. C. S.

**Transmission of light through eggshell.** J. W. GIVENS, H. J. ALMQUIST, and E. L. R. STOKSTAD (Ind. Eng. Chem., 1935, 27, 972—973).—The transmission of light through the shell in relation to thickness and % of  $H_2O$  and protein has been studied. Drying causes a loss in transparency. Removal of the membranes has little effect.

E. C. S.

**Influence of technological processes in the preparation of sour cabbages on the preservation of vitamin-C.** I. Distribution of vitamin-C in the cabbage head. M. M. EIDELMAN and E. I. POVERENNA. II. Reversible oxidation of vitamin-C in cut cabbages. M. M. EIDELMAN and M. L. BUTOM (Problems of Nutrition, Kharkov, 1934, 3, No. 6, 18—21, 21—25).—I. Vitamin-C is unevenly distributed throughout the different parts of the cabbage, the stalk containing  $>$  the outer leaves.

II. Partly reversible oxidation occurs in minced cabbage on keeping. The process is favoured by an atm. of  $CO_2$  or by treatment with  $H_2S$ , which allows formation of a completely reversible system.

NUTR. ABS. (m).

**Vitamin- $B_1$  and - $B_2$  contents of prunes.** A. F. MORGAN, M. J. HUNT, and M. SQUIER (J. Nutrition, 1935, 9, 395—402).—In rat experiments with dried prune flesh vals. obtained were 266 Sherman units of - $B_2$  and 80—100 units of - $B_1$  per 100 g.

A. G. P.

**Spectro-analytical determination of traces of lead in organic material, especially preserves.** H. KRINGSTAD (Angew. Chem., 1935, 48, 536—539).—The Pb in sardines has been determined spectrographically. Abnormal amounts of Pb occurring in tinned sardines are derived from packing apparatus and solder.

R. S.

**Chemical deterioration reactions in foods.** J. GANGL (Oesterr. Chem.-Ztg., 1935, 38, 146—151).—A review.

**Pharmacological action of [food] adulterants and impurities in small quantities.** A. ST. G. HUGGETT (Chem. and Ind., 1935, 748—750).—The subject is reviewed, and for certain metallic elements the medicinal, toxic, and lethal doses, their occurrence in foodstuffs, and the nature of the poisoning produced are tabulated. E. C. S.

**Substances other than food constituents which may be present in food.** E. B. HUGHES (Chem. and Ind., 1935, 746—748).—The substances are classified and discussed under the headings: org. dyes, synthetic flavours, bleaching agents and improvers, preservatives and fumigants, and metallic contaminants. E. C. S.

**Metabolic alterations due to additions of materials, with special reference to vitamins and synthetic foodstuffs.** A. WORMALL (Chem. and Ind., 1935, 27, 750—751).—The requirements of a satisfactory diet are specified, and the effect of added substances on palatability, digestibility, and energy val. is discussed. E. C. S.

**Addition of substances to foodstuffs affecting their nutritive value.** J. C. DRUMMOND (Chem. and Ind., 1935, 744—746).—A review. As examples of justifiable additions, the addition of I or I' to certain foods and of vitamins to margarine and milk are quoted; that of Cu and Fe to milk is regarded as unwarranted. E. C. S.

**Removal of bitterness from [seeds of] lupins.** W. HENTRICH and F. HOERMANN (Chem.-Ztg., 1935, 59, 621—623).—A detailed account of the use of alkylene oxides (cf. B., 1935, 477). E. H. S.

**Detection and determination of rice granules in linseed cakes.** R. CECCONI and C. FERRARI (Ann. Falsif., 1935, 28, 335—346).—A characteristic distinguishing rice granules from linseed in linseed cake is found in the much higher % of ash in the crude fibre obtained from the dry, fat-extracted rice purified by flotation on  $\text{CCl}_4$ . H. D.

(A) **Influence of stored low- and high-fat herring meals on the live-weight increase and carcass quality [of pigs].** A. BOMER, H. BÜNGER, W. HELMS, P. MALKOMESIUS, and D. MEYER. (B) **Influence of the period and quantity of herring-meal feeding on live-weight and carcass quality [pigs].** A. BOMER, P. RINTELEN, and P. MALKOMESIUS. (C) **Summary of feeding trials of fish meals for pigs.** H. BÜNGER (Landw. Versuchs-Stat., 1935, 122, 1—103, 104—163, 164—169; cf. B., 1935, 78).—(A) High-fat meals gave somewhat better results than low-fat samples, and fresh material was slightly more efficient than that stored for 1—2 years. Except in the case of a single animal no adverse effects on flavour of flesh or fat were observed. Sausages made from livers, however, had an oily flavour.

(B) The above results are further confirmed. The oily flavour produced in livers is more marked when high-fat than when low-fat meals are used, and is affected to some extent by the method of prep. of sausages. By replacing herring meal by plant-protein foods about 6 weeks prior to slaughtering any adverse flavour is practically eliminated. A. G. P.

**Retention of protein by growing pigs.** J. H. W. T. REIMERS and L. H. BARTEL (J. Agric. Sci., 1935, 25, 397—418).—The use of data concerning live-wt. increases alone as a basis of formulating feeding standards leads to inaccuracies unless supplemented by examination of the proportion of fat and protein included in the gain in wt. The digestion-chamber method is utilised to determine max. N retention at various stages of growth. This should correspond with 60—70% of the daily ingested protein. By comparison with live-wt. increases the corresponding requirement of non-N constituents is calc. Feeding standards thus are compared with other standard vals. A. G. P.

**Ruminant digestion without roughage.** S. W. MEAD and H. GOSS (J. Dairy Sci., 1935, 18, 163—170).—Except for lower vals. for crude fibre the digestibility of a roughage-free ration was not significantly < the val. calc. for the same materials fed with roughage. Addition of paper pulp to a concentrate diet increased the apparent digestibility of the crude fibre without affecting that of the other constituents. The higher vals. for fibre are attributable to the digestibility of paper fibre being > that of the fibre of roughage or concentrate. Fine grinding lowers the digestibility of the crude fibre of the concentrate ration. A. G. P.

**Composition of draw-moss.** B. THOMAS (J. Min. Agric., 1935, 42, 458—461).—The particular nutritive val. associated with the bleached leaf bases (scallions) in spring is ascribed, in part, to their notably high  $\text{PO}_4^{'''}$  content. The influence of this is accentuated in spring when the accompanying heather pasturage is poor and contains little P. Comparative analytical data for scallions and whole plants are given. A. G. P.

**Preparation of silage, with special reference to the German protein and fat programme.** GABRIEL (Landw. Versuchs-Stat., 1935, 123, 11—24).—A discussion. A. G. P.

**Ensilage of green fodder with the use of acid.** HAGER (Landw. Versuchs-Stat., 1935, 123, 88—96).—Experiments on the use of acids and of acid-sugar mixtures in the prep. of silage are discussed. A. G. P.

**Neutralising power of forage crops for organic and mineral acids.** J. K. WILSON (J. Dairy Sci., 1935, 18, 317—325).—Titration curves of aq. extracts of various crops are examined. Certain leguminous crops probably contain insufficient fermentable carbohydrate to permit the attainment of an appropriate pH during ensilage. A. G. P.

**Influence of feeding silage on nitrogen and mineral metabolism, with special reference to acid silage.** W. KIRSCH (Landw. Versuchs-Stat., 1935, 123, 82—87).—A review. A. G. P.

**Use of hydrochloric acid in silage-making and its effect on the animal body.** W. KIRSCH (Züchtungskunde, 1935, 10, 48—55).—Small quantities of mineral acid ensure good conservation. Appetite, yield, and wt. increase in sheep, cattle, and pigs are not impaired by moderate quantities of acid, but large additions

adversely affect N, Ca, and P metabolism. Silage made with HCl causes increased excretion of Ca in ruminants. This effect on the Ca balance is counteracted by feeding Ca or fresh fodder.

NUTR. ABS. (m).

**Losses of crude and digestible nutrients in sugar-beet leaf silage made in the usual way and with addition of different preservatives, Alfasil, Defu solution, and Penthesta.** F. HONCAMP, O. MEIER, K. NEUMANN, W. SCHRAMM, and W. WÖHLBIER (Züchtungskunde, 1934, 9, 214—221).—The loss of nutrients was not significantly < in silage made by cold fermentation, but might be further reduced. The silage fed to wethers was as readily eaten and gave as good results as silage without preservative.

NUTR. ABS. (m).

(A) **Comparative biological value of maize, wheat, and soya beans as sources of proteins.**  
(B) **Raising the assimilability of protein in soya beans by adding meat to the ration.** S. E. EPPELBAUM (Problems of Nutrition, Kharkov, 1934, 3, No. 6, 8—15, 16—18).—(A) Soya bean is a better source of protein than wheat or maize. Maize is less good than wheat, and the removal of the germ in milling further reduces its food val.

(B) Addition of meat to a diet containing soya bean appears to increase the assimilability of the soya-protein.

NUTR. ABS. (m)

**Fish oils.**—See XII. **Treating [packinghouse] sewage.**—See XXIII.

See also A., Aug., 978—9 and 1034—7, **Vitamins.**

#### PATENTS.

**Treatment of soya beans.** H. W. K. JENNINGS. From A. BORKOWSKY (B.P. 432,694, 7.2.35).—Undesirable flavours are removed by steeping the beans (deprived of some of the fat, if desired) in warm H<sub>2</sub>O until the H<sub>2</sub>O content is 20%, squeezing to 1 mm. thickness, and drying in thin films between heated rollers. Cereal products may be added in the steeping process.

E. B. H.

**Condimentation of food products.** F. B. DEHN. From W. J. STANGE Co. (B.P. 432,396, 3.10.34).—Flavouring liquid is absorbed, giving an apparently dry product, in the flour of the whole, or protein portion of the, soya bean.

B. M. V.

**Manufacture of pectous material.** MUTUAL CITRUS PRODUCTS CO., INC. (B.P. 432,244, 12.10.34. U.S., 16.10.33).—Washed fruit or vegetable pulp is ground, mixed with a filter-aid, and then pressed. The cake is dried and the jelly strength adjusted to a standard predetermined by the quantity of pectin obtained on acid hydrolysis.

E. H. S.

**Production of vegetable extract and juice.** J. B. ROLLE (U.S.P. 1,978,171, 23.10.34. Appl., 6.2.32).—A mixture of H<sub>2</sub>O, a fixed oil, and a herbal vegetable, e.g., celery, is distilled and the distillate containing the essential oil is either employed as such or used for extracting a further portion of the vegetable at 15°.

E. H. S.

**Manufacture of sausages.** C. H. VOGT (U.S.P. 1,964,009—11, 26.6.34. Appl., [A] 7.9.27, [B] 3.4.28,

[C] 10.11.28. Renewed [B] 30.10.33).—(A) A comminuted meat mixture in the form of a sausage is heated at 49° in a current of air to form a thin skin thereon, and then at 76° in a smokehouse to render the skin thicker and tough. (B) The sausage is formed in a suitable mould, then treated as in (A), canned, and cooked at > 90°. (C) The skin is formed on the uncooked sausage by partial hydrolysis of the surface proteins in a current of warm moist air.

A. R. P.

**Preparation of artificial sausage casings.** J. VOSS and O. WÜRGES, Assrs. to VISKING CORP. (U.S.P. 1,978,774, 30.10.34. Appl., 21.2.33. Ger., 24.2.32).—A casing of a H<sub>2</sub>O-sensitive cellulose derivative, e.g., regenerated cellulose, prepared by known methods, is coated on the inner wall with a gelatinous material, e.g., hardened gelatin.

E. H. S.

**Decaffeinating coffee beans.** H. K. WILDER, Assr. to KELLOGG Co. (U.S.P. 1,977,416, 16.10.34. Appl., 4.2.32).—An apparatus is described in which the beans are preheated to 93°, treated with steam and H<sub>2</sub>O vapour until the H<sub>2</sub>O content is 16—20%, and then extracted with C<sub>2</sub>HCl<sub>3</sub>. The solvent is drained off, the last traces being removed by means of steam. The beans are finally dried with hot air. The colour and flavour of the coffee are claimed to be unaffected.

E. B. H.

**Production of canned salmon.** L. T. HOPKINSON (B.P. 433,242, 30.7.34).

#### XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Copper tetramminosulphate.** II. **Pharmaceutical data.** E. DEL CARLO and P. G. PATERNOSTO (Rev. fac. cienc. quim., La Plata, 1934, 9, 41—47; cf. A., 1935, 714).—Solutions of Cu(NH<sub>3</sub>)<sub>4</sub>SO<sub>4</sub>·H<sub>2</sub>O (I) used for therapeutic purposes usually also contain caffeine and NaOBz (II). Such solutions are unstable. By substituting NH<sub>4</sub>OBz for (II) stable solutions are obtained. Such solutions may be heated at 70° for 20 min. Sucrose (III) + glycerin, and (III) + Na K tartrate also have a stabilising action. Methods of preparing stable sterile solutions of (I) are given.

F. A. A.

**Non-staining iodine ointments.** C. L. M. BROWN (Pharm. J., 1935, 135, 271—272).—Terebene is a suitable base for the prep. of such ointments or for stabilising the present types made with fixed oils. Formulæ for a standard ointment, which can be diluted as required, are given. When I and a fixed oil are heated together in a closed system an equilibrium is established, so that a small amount of free I is always present.

E. S. H.

**Thermal analysis and eutectics of medicinal mixtures.** J. MEIJER (Pharm. Weekblad, 1935, 72, 922—936).—Published data concerning the m.-p. diagrams of binary mixtures of numerous drugs are tabulated and discussed, with special reference to intermol. compounds of medicinal importance (veramon, compral, hypnal, etc.).

D. R. D.

**Philippine totaquina.** J. MARAÑON, A. PEREZ, and P. F. RUSSELL (Philippine J. Sci., 1935, 56, 229—255).—The prep. of totaquina from Philippine *Cinchona*

*ledgeriana* bark containing quinine (I) (5.51%), cinchonidine (1.45%), quinidine (1.94%), cinchonine (trace), and amorphous alkaloids (0.72%) is described. The recovery was 93% of a product containing 53.9% of (I), equiv. clinically to quinine sulphate. S. C.

**Separation and detection of cocaine in mixtures of cocaine and procaine.** C. H. RILEY (Amer. J. Pharm., 1935, 107, 270—279).—Three methods of separation, using a  $p_H$  such that cocaine (I) hydrochloride is converted into the free base, which is extracted, while procaine (II) hydrochloride remains unchanged, are examined. Citric acid and  $Na_2HPO_4$  buffers are employed. For rapidly separating and detecting (I) in a mixture of the hydrochlorides, a buffer of  $p_H$  3.6 is used and (I) extracted by  $CHCl_3$ . In the second method, for detecting (I) in presence of a large excess of (II), the solution is made alkaline with  $Na_2HPO_4$  and both bases are extracted, after which (II) is removed from the  $CHCl_3$  layer by a buffer of  $p_H$  4.7. (I) separated by these two methods is free from (II). For determining (I) in a mixture with (II), a buffer of  $p_H$  4.9 is used, and the  $CHCl_3$  extract is evaporated and titrated with  $H_2SO_4$ ; a small amount of (II) is also extracted, but this error approx. compensates for (I) unextracted. E. W. W.

**Determination of strychnine and quinine in the mixed alkaloids. Study of the method used in the Danish Pharmacopœia for determination of strychnine and quinine in Easton tablets.** F. HALSTRØM (Dansk Tidsskr. Farm., 1935, 9, 181—201).—The methods of Evers (A., 1922, ii, 669) and Haddock and Evers (B., 1931, 861) are compared. The partition coeff. of strychnine between  $CHCl_3$  and 2*N*-HCl (used in the former) is about 1.0, and between  $CHCl_3$  and a 1:1 mixture of *N*-HCl and saturated aq. NaCl (used in the latter) is about 3.2. For quinine, the corresponding vals. are  $1.6 \times 10^{-3}$  and  $3.4 \times 10^{-2}$ ; const. vals. can be obtained only with  $CHCl_3$  that is free from EtOH. E. W. W.

**Concentration of nicotine in cigarette ends.** C. PYRIKI (Pharm. Zentr., 1935, 76, 513—517).—Nicotine accumulates in the unburnt end of a cigarette. The use of a filter offers no advantages in this respect, provided that the same length remains unburnt. E. S. H.

**Citronella oil.** J. ROZEBOOM (Pharm. Weekblad, 1935, 72, 893—894).—A sample of the oil, apparently from Java, had  $n_D^{20}$  1.4714,  $d_4^{15}$  0.8925,  $\alpha_D^{20}$  -2.3°. S. C.

See also A., Aug., 961, Prep. of lactones with musk and amber odours. 969, Coloured local anæsthetics. 978—9, Vitamins. 983, Isomerisation of linalool to geraniol. 988, Condensation products of  $\alpha$ -carboxylic esters of  $C_5H_5N$  series. Derivatives of  $\beta$ -2-pyridylpentan- $\beta$ -ol. 989, Derivatives of 8-aminoquinoline as antimalarials. 990, 8-Amino-6-methoxyquinoline. Determination of 2-phenylquinoline-4-carboxylic acid in presence of other acids. 995—6, Alkaloids. 997, Arsenicals. 999, Colour reactions of pyrimidone. 1003, Prep. of diphtheria toxin. Adsorption of purified diphtheric vaccines by  $Al_2O_3$ . Prep. of anti-vibrioseptic

serum. 1017, Prep. of antimalarials. 1028, Purification of diphtheria toxoid, and of diphtheria toxin and anatoxin. 1032, Determination of sex hormones. New cryst. male hormone. 1034—7, Vitamins. 1041, Isolation of frangularoside and frangularol.

## PATENTS.

**Cosmetic preparation.** N. D. HARVEY, JUN., ASSR. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,979,385, 6.11.34. Appl., 10.11.31).—Preps. made from ethanolamines, fatty acids, polyethylene glycol ( $O[C_2H_4 \cdot OH]_2$ ) monoalkyl (Et) ethers, unsaponifiable material, and  $H_2O$  are claimed. E. H. S.

**[Preparation of] sec.-butylcarbinyethylbarbituric compound [5-ethyl-5- $\beta$ -methylbutylbarbituric acid].** H. A. SHONLE, ASSR. to E. LILLY & Co. (U.S.P. 1,977,561, 16.10.34. Appl., 23.7.30).— $Et_2$  ethyl- $\beta$ -methylbutylmalonate, b.p. 141—143° [from  $CH_2Et(CO_2Et)_2$  and  $C_5H_{11}Br$ ] is heated with urea and NaOEt in EtOH at 105° to give 5-ethyl-5- $\beta$ -methylbutylbarbituric acid, m.p. 136—138° (Na salt). H. A. P.

**Treatment of psyllum seeds.** J. F. PARSONS, ASSR. to NAT. VACCINE & ANTITOXIN INST. (U.S.P. 1,975,731, 2.10.34. Appl., 17.8.33).—The outer coatings of the seeds are removed and converted into a powder, without crushing the woody centres, by feeding the seeds to a hammer mill containing a screen with  $\frac{1}{8}$ -in. holes and in which the hammers rotate at 3000—4000 r.p.m. Three treatments suffice to remove the mucilaginous coatings, and the woody centres can then be separated on a 50-mesh sieve. A. R. P.

**[Preservation of] allergen solution.** M. B. MOORE, ASSR. to ABBOTT LABS. (U.S.P. 1,977,803, 23.10.34. Appl., 11.4.32).—The potency of aq. solutions of allergic protein extracts, e.g., ragweed pollen, is maintained by addition of a sugar and a bacteriostatic agent, e.g., 5% of glucose and 0.1% of cresol. E. H. S.

**Reducing the nicotine content of tobacco.** P. M. GROSS and L. F. DIXON, ASSRS. to HALL TOBACCO CHEM. Co. (U.S.P. 1,962,145, 12.6.34. Appl., 15.3.33).—Tobacco containing 8—15% of moisture is treated with the vapour of  $(CH_2)_2O$ , preferably in a  $CO_2$  atm. A. R. P.

**Pharmaceutical preparation. [Laxative.]** P. A. HOUSEMAN, ASSR. to MACANDREWS & FORBES Co. (U.S.P. 1,976,668, 9.10.34. Appl., 21.7.32).—A mixture of  $MgSO_4 \cdot 7H_2O$  and Mg glycyrrhizate (I), or a mixed glycyrrhizate containing 5—50% (20%) of (I), is claimed. A. W. B.

**Production of (A) glandular hormone in aqueous solution, (B) testicular hormone, (C) ovarian hormone.** F. R. ELDRÉD, ASSR. to REED & CARRICK (U.S.P. 1,978,079 and 1,978,297—8, 23.10.34. Appl., [A] 2.5.27, [B] 17.8.27, [C] 13.4.32).—(A) An alcohol (MeOH, EtOH) extract of the fresh glands, particularly female sex glands, is freed from solvent and the residue extracted with a hormone solvent, e.g., EtOAc. This solvent is removed from the extract and an alcoholic solution of the residue is cooled, filtered, and evaporated. The residue is saponified in  $Et_2O$  solution and the  $Et_2O$  extract washed in alcoholic solution with light petroleum. Solvent is distilled off and the hormone is dissolved in

H<sub>2</sub>O. (B) Alcohol sufficient to give a solution containing 70–75% thereof is used to extract fresh testicles, and a solution of the alcohol-free extract in hormone solvent is treated with aq. alkali before purification of the hormone as in (A). (C) The glands, including liquor folliculi, are treated as in (B) and after removal of hormone solvent the remaining waxy material is formed into tablets.

E. H. S.

**Isolation of follicle hormones.** SCHERING-KAHLBAUM A.-G. (B.P. 432,435 and Addn. B.P. 432,474, 26.1.34. Ger., [A] 31.1.33).—(A) Volatile phenols are removed from the urine of pregnant individuals by steam-distillation and the residue, after boiling with aq. alkali, is treated with acylating agents. The acylated follicle hormone is isolated and saponified. (B) Other substances containing the hormone, e.g., placenta extract, are used.

E. H. S.

**Production of a biological product [pullorin].** R. W. TERRY (U.S.P. 1,979,421, 6.11.34. Appl., 7.3.29).—A standardised aq. suspension of *Salmonella pullora* is treated with a regulated quantity of alkali (NaOH), held at 37° for > 20 min., neutralised (HCl), and insol. material filtered off.

E. H. S.

**Preparation of halogenophenols [bactericides].** LEHN & FINK, INC., Assees. of E. KLARMANN and L. W. GATES (B.P. 432,955, 28.10.33. U.S., 28.10 and 2.11.32).—See U.S.P. 1,938,911—2; B., 1934, 860.

**Stabilised preps. 3 : 6-Diamino-2-alkylpyridines.**—See III. Therapeutic disazo compounds.—See IV. Vegetable extract.—See XIX.

## XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Photography in the far ultra-violet.** G. RATHENAU (Physica, 1935, 2, 840–842).—Photographic plates which filter out the longer wave-regions may be prepared by immersing the plate in a selectively transparent dye, e.g., fuchsin. After drying, the plate is covered with a film of Cenco pump oil 11021B, which is fluorescent in the transparent region of the dye.

T. G. P.

**Absolute colour-sensitivity of photographic emulsions.** M. BILTZ (Physikal. Z., 1935, 36, 559–563).—The essential parts of an apparatus for determining the abs. colour-sensitivity of the emulsions are a spectrograph and thermo-element. The apparatus is used to determine the colour-sensitivity of various films.

A. J. M.

**Are the [photographic] emulsion and developer alone determinative of fine grain?** P. STRAUSS (Phot. Ind., 1935, 33, 721–723).—A short review of present knowledge of fine-grain production is given. The influences of the intensity of the exposing light, surface of the printing paper, types of enlargers used, method of drying, etc. are also considered.

J. L.

### PATENTS.

**Development of silver halide emulsions and photographic material therefor.** I. G. FARBENIND. A.-G. (B.P. 432,283, 26.1.34. Ger., 26.1.33).—The addition of a nuclear alkylated and/or halogenated

aryliminazole or of an unsubstituted polynuclear aryliminazole, e.g., 6-chloro-, 4 : 6-dichloro-, or 5-chloro-6-methyl-benziminazole, or 1 : 2-naphthiminazole, to a developing bath or to a photographic layer is claimed to promote clearness of the image.

H. A. P.

**Acid-hardening [photographic] fixing bath.** H. D. RUSSELL, Assr. to EASTMAN KODAK Co. (U.S.P. 1,981,391, 20.11.34. Appl., 27.9.32).—The bath comprises Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, alum, an org. acid (8 are named), a hardening agent and an ester of H<sub>3</sub>BO<sub>3</sub> [e.g., B(OAc)<sub>3</sub>, glycol borate, Ph<sub>3</sub>BO<sub>3</sub>, or a glyceryl borate].

B. M. V.

**Photographically sensitive element. [Printing paper.]** K. C. D. HICKMAN and L. A. STAB, JUN., Assrs. to EASTMAN KODAK Co. (U.S.P. 1,962,307, 12.6.34. Appl., 2.6.32).—The paper is coated with a suspension of PbS in gelatin and a saturated solution of [Co(NH<sub>3</sub>)<sub>6</sub>]Cl<sub>3</sub> containing citric acid 5 g. and glycerin 5 g. per litre is painted over the surface. On exposure to light the PbS becomes oxidised to PbSO<sub>4</sub>. The image is fixed simply by washing the paper with H<sub>2</sub>O. The PbS may be replaced by Ag<sub>2</sub>S, HgS, CuS, Bi<sub>2</sub>S<sub>3</sub>, or NiS.

A. R. P.

**Production of multicolour prints and printing plates therefor.** T. DITTMANN, Assr. to HEINECKE Co., Inc. (U.S.P. 1,978,784, 30.10.34. Appl., 9.6.32. Ger., 12.6.31).—Each of the colour-separation negatives is made by exposing a plate through a series of masks corresponding to the areas of the different tones of one colour.

J. L.

**Production of natural-coloured photographic images on paper, films, and the like.** R. GSCHÖFF (B.P. 432,349, 20.12.33. Austr., 21.12.32).—Printing matrices for the imbibition process are coloured with colloidal solutions of suitable dye bases. These are prepared by adding alkali, e.g., NH<sub>3</sub>, to a dye solution until the dye base is liberated. Slight excess of alkali may be added to intensify the unilateral electric orientation of the free base. Such dyes do not “bleed.”

J. L.

**Manufacture of sound records.** L. A. JONES, Assr. to EASTMAN KODAK Co. (U.S.P. 1,962,310, 12.6.34. Appl., 10.1.30).—A photographic record of notes of the order of 8000 cycles is made by exposing to a light beam influenced by such notes a photographic film carrying a fine-grained, panchromatic, positive emulsion and a dye layer absorbent of all  $\lambda\lambda$  to which the emulsion is sensitive.

A. R. P.

**Colour photography with key print.** J. A. BALL, Assr. to TECHNICOLOR MOTION PICTURE CORP. (U.S.P. 1,978,979, 30.10.34. Appl., 21.7.33).—Colour-separation negatives are prepared, and gelatin matrices made from them. A key negative is prepared separately, or from the composite colour records. In making the final picture, one of the colour records, or, preferably, the key negative, is printed by projection with optical means of compensation for distortions produced in the other prints during the various processes, the final composite picture being then more exactly in register.

J. L.

**X-Ray photography.** I. G. FARBENIND. A.-G. (B.P. 432,432, 26.1.34. Ger., 26.1.33).—An intensifying screen consists of a layer of a fluorescent substance of

low mol. wt., e.g., ZnS, in front of the photographic plate, and a layer of Ca tungstate behind the plate.

J. L.

#### Spectrophotometric analysis and prediction.

A. HILGER, LTD., and O. W. PINEO (B.P. 432,306, 24.4.34).—A mathematical discussion is given of methods of obtaining curves ( $\lambda$  against energy transmitted) characteristic only of the properties of a dye solution or printer's ink and the like, i.e., independent of the thickness and concn. or glossiness of the surface as the case may be. Cams are embodied in the recording apparatus to eliminate those variables. Having obtained characteristic curves for a no. of dyes or the like, it is claimed that the correct mixture of dyes to give any desired result may be predicted. B. M. V.

*p*-sec.-Alkylaminophenols.—See III.

### XXII.—EXPLOSIVES; MATCHES.

Apparatus for the demonstration of explosive gases or vapours in air above and below the explosive limits. H. F. GÖRLACHER (Chem. Fabr., 1935, 8, 329).—Air containing a small amount of combustible gas is passed through a heated tube containing a thermocouple. Combustion of the gas produces a rise in temp. which is indicated on a millivoltmeter.

R. S.

Cellulose nitrate.—See V.

See also A., Aug., 938, Relation between explosiveness and structure. Explosion of EtN<sub>3</sub>.

#### PATENTS.

**Explosive.** G. B. HOLDERER, Assr. to CHILI EXPLORATION Co. (U.S.P. 1,960,907, 29.5.34. Appl., 12.4.33).—Claim is made for a mixture of granular C from lignin residues with liquid O<sub>2</sub>. The C should be finer than  $\frac{1}{4}$  in., but  $\gt$  25% should pass 100-mesh and it should preferably contain 8–32% of H<sub>2</sub>O. A. R. P.

**Explosive.** A. S. FOX and F. RAPE, Assrs. to BURTON EXPLOSIVES, INC. (U.S.P. 1,979,681, 6.11.34. Appl., 23.12.31).—The absorbent ingredient consists of hemp hurds ( $d < 0.15$ ), of such fineness as to pass a 20-mesh and be retained on a 40-mesh sieve, and having an absorbent capacity for nitroglycerin of  $\gt$  2.6 times its wt. The NH<sub>4</sub>NO<sub>3</sub> consists of relatively coarse grains,  $\gt$  5% passing 60-mesh. A suitable composition contains: nitroglycerin 6–16, nitrocotton 0–1, NH<sub>4</sub>NO<sub>3</sub> 50–35, NaNO<sub>3</sub> 0–20, NaCl 0–20, NH<sub>4</sub>Cl 0–20, hemp hurds 3–20, and CaCO<sub>3</sub> 0–0.5%. The cartridge count is  $> 400$   $\frac{1}{4}$  in.  $\times$  8 in. per 100 lb. and the detonation velocity  $< 1500$  m./sec.

W. J. W.

**Liquid oxygen explosives.** A. E. LANCE (B.P. 432,308, 1.5. and 8.6.34).—The absorbent consists of cellulosic material, ground to pass 36-mesh and be held on 60-mesh, together with metallic powders, and mixed with  $\gt$  20% of a high-b.p. hydrocarbon, e.g., petroleum jelly. The composition is filled into containers, so that the  $d$  of the cartridge is 0.3–0.5. Temp. depressants may be added. W. J. W.

**Liquid oxygen explosives.** LIGHTFOOT REFRIGERATION Co., LTD., and A. E. LANCE (B.P. 432,338,

30.11.34).—Cellulosic materials, used as absorbents, and metals used in admixture with them are ground to pass 36-mesh and be held on 60-mesh, and the mixture is filled into containers to a  $d$  of 0.3–0.5.

W. J. W.

**Blasting cartridges.** J. TAYLOR, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 428,617, 16.11.33).

Nitrocellulose compositions.—See XIII.

### XXIII.—SANITATION; WATER PURIFICATION.

**Conditioning of mine air with special regard to its purification.** E. L. JOSEPH (J. Chem. Met. Soc. S. Africa, 1935, 35, 360–365).—It is proposed to eliminate org. matter by ozonising the mine air, using at the intake a large unit of 25% of the total capacity required and boosting units at various points. Cost is not prohibitive. C. I.

**Effects of exposure to dusts in two Georgia talc mills and mines.** W. C. DRESSEN and J. M. D. VALLE (U.S. Publ. Health Repts., 1935, 50, 131–143).—Georgia talc contains only traces of free SiO<sub>2</sub> as quartz, but has approx. 10% of tremolite. Details of examination of dust samples and of workers are recorded. Georgia talc is more injurious than tremolite talc. CH. ABS. (p)

**Apparatus for potentiometric determination of atmospheric carbon dioxide.** Y. KAUKO (Angew. Chem., 1935, 48, 539–540).—Air containing CO<sub>2</sub> is bubbled into aq. NaHCO<sub>3</sub> in a capillary tube and the  $p_H$  determined by the quinhydrone electrode. The % CO<sub>2</sub> is then calc. (cf. B., 1934, 449). Two capillary saturators can be arranged in a thermostat, one being connected to a known CO<sub>2</sub> supply and the other to the unknown. The % CO<sub>2</sub> may be calc. from the e.m.f. developed. R. S.

**Biochemical changes in the formation of activated [sewage] sludge.** H. HEUKLEKIAN (Sewage Works J., 1935, 7, 214–221).—Sewage containing an excessive amount of fresh sewage solids was aerated continuously for 20 days, during which changes in the sludge and sewage were noted. The rate of oxidation of the solids and the quality of the sludge improved for 4–7 days, giving a sludge of max. purifying efficiency and a liquor from which all the original, dispersed, non-settleable solids had been flocculated. Continued aeration produced an over-oxidised condition of the sludge with re-dispersion of the floc, decreased purification efficiency, and an excessive production of NO<sub>3</sub>'. C. J.

**Effect of varying the daily charge of sewage solids on the activated-sludge process.** H. HEUKLEKIAN (Sewage Works J., 1935, 7, 405–416).—In an experimental plant the daily charges of sewage were based on the relation between the suspended solids of the sewage added and of the sludge in the tank, and varied between 3.4 and 17.7%, sludge and sewage being withdrawn daily so as to maintain a definite concn. of suspended solids. A loss of these always occurred, a 3.4% addition proving too small to compensate for the deficiency and resulting in the production of an over-oxidised sludge and of turbid effluents containing brownish material of a humic acid nature.

Daily additions of 17.7% proved too high, the sludge becoming under-oxidised and the effluents containing excessive amounts of suspended solids. C. J.

**Settling and filtering activated-sludge aerated [sewage] liquors.** S. I. ZACK (Sewage Works J., 1935, 7, 514—533).—Results obtained from an experimental Laughlin (magnetite) filter and tank dealing with partly- and fully-aerated aeration-tank liquor at Chicago indicated that effluents containing 5 p.p.m. of suspended solids and biochemical  $O_2$  demand can be obtained at normal settling and filter rates of 2 gals./sq. ft./min. Satisfactory results when operating at settling rates  $> 3500$  gals./sq. ft./day and filter ratio  $> 3$  gals./sq. ft./min. are dependent on the settling and concn. characteristics and the amount of solids in the aerated influent liquor. C. J.

**Effect of comminution of sewage solids on their subsequent digestion.** G. M. FAIR and E. W. MOORE (Sewage Works J., 1935, 7, 417—421).—The advantage gained by comminuting fresh sewage solids prior to digestion is of little practical importance unless the additional surface area created can be used more effectively by agitation of the tank contents. In experimental work the greater uniformity of the material dealt with is an advantage. C. J.

**High- and low-temperature [sewage-sludge] digestion experiments. I. Operation and seeding.** W. RUDOLFS and H. J. MILES (Sewage Works J., 1935, 7, 422—434).—Experiments at Freehold, N.J., on two pilot tanks of 140 gal. capacity showed that thermophilic ( $50^\circ$ ) sludge could not be produced from digesting mesophilic ( $28^\circ$ ) sludge to which fresh solids were added daily. No true thermophilic digestion was obtained, and when the digestion period was reduced from 40 to 17—20 days, gas production decreased, liquefaction increased, and excessive foaming occurred. C. J.

**Sewage treatment. III. Clarification.** E. J. THERIAULT (Sewage Works J., 1935, 7, 377—392).—Theories concerning the basic phenomena of sewage purification are reviewed. On a time basis, biological processes are ruled out as a major factor in the primary clarification stage unless the hypothesis of direct absorption by bacteria etc. without accompanying oxidation is introduced. Apart from the embedded bacteria, protozoa, and secreted enzymes the primary absorbent is the sludge floc, and hence the question arises as to the composition of the gelatinous matrix previously regarded as an indivisible component of the bacteria. The absorbent principle in activated sludge has been identified as a base-exchanging substance (cf. B., 1935, 752). C. J.

**Purification of sewage by aeration.** H. HEUKEL-EKIAN (Sewage Works J., 1935, 7, 393—404).—Aeration for 6 hr. prior to sedimentation gives greater purification than sedimentation alone, an additional 17—27% removal of suspended solids being obtained. The return of settled solids to the crude sewage does not improve the final effluent, though higher % removals and reductions in biochemical  $O_2$  demand are obtained. C. J.

**Treatment of sewage at Oklahoma City with iron, chlorine, and lime.** L. H. SCOTT (Sewage Works J., 1935, 7, 506—513).—Nuisance has been caused by overloading Imhoff tanks with septic domestic sewage and discharging the imperfectly purified effluent into a stream permitting no dilution in summer. In consequence,  $FeCl_3$  has been made from scrap Fe and  $Cl_2$  and added to the sewage, the  $p_H$  of which was raised to 8.5 with  $Ca(OH)_2$ . The liquor is flocculated and given 2-stage clarification, the final effluent containing 10 p.p.m. of suspended solids and having a biochemical  $O_2$  demand of 19 p.p.m. The cost of treatment, excluding capital charges, is \$8.04 per  $10^6$  gals., of which one half represents the cost of chemicals. The sludge from the second clarifier is returned to the sewage ahead of the clarifier and the remainder is either digested in the Imhoff tanks or dewatered on vac. filters and dumped. Nuisance and damage to sewers caused by  $H_2S$  from packing-house wastes has been prevented by adding  $FeCl_3$  at a convenient point in the sewer. C. J.

**Standard methods of sewage analysis.** ANON. (Sewage Works J., 1935, 7, 444—491).—The methods proposed are recommended by the Committee of the Federation of Sewage Works Associations. Two standard tests in this country are losing favour in America, viz., (a) the determination of  $O_2$  consumed from  $KMnO_4$ , as it does not differentiate between stable and unstable org. matter and thus is not  $\propto$  the  $O_2$ -demand conditions of the sample; (b) the albuminoid N test, which is replaced by the determination of org. N, using the Kjeldahl method with  $CuSO_4$  as a catalyst. C. J.

**Harmful influence of ash deposits on surface water.** H. HAUPT (Gas- u. Wasserfach, 1935, 78, 526—528).—A  $H_2O$  supply drawn from the neighbourhood of an old sand pit which had been filled with ash and clinker (from brown coal) had a tenfold greater hardness than a supply drawn from outside the influence of the ash deposit. The increase was due principally to the presence of sulphates. A. B. M.

**Use of sodium thiosulphate dilution blanks in determining the germicidal efficiency of chlorine sterilisers.** C. C. PROUTY and R. T. OLSON (J. Dairy Sci., 1935, 18, 171—175).—Plate counts made with dilutions containing  $Na_2S_2O_3$  were  $>$  when ordinary  $H_2O$  dilutions were used, unless the period of exposure was  $> 10$  min. In an examination of the bacteriostatic action of residual Cl, counts made with dilutions of 1 in 1 to 1 in 100 did not increase with greater dilution. A. G. P.

**Sterilising velocities of chlorine and chloroamine under varying conditions of organic load and  $p_H$ .** P. J. BEARD and N. J. KENDALL (J. Amer. Water Works Assoc., 1935, 27, 876—887).—The velocity ( $V$ ) and extent of sterilisation of  $H_2O$  are increased by the use of  $NH_3$  with  $Cl_2$  and by lowering the  $p_H$  val., the effect of  $NH_3$ - $Cl_2$  being better after 30 min. than  $Cl_2$  alone after 60 min. At higher  $p_H$  vals., e.g., 8.2, a lag in  $V$  is noticeable and with equal amounts of  $Cl_2$  the residuals in both treatments show an increase. In  $H_2O$  of high org. content an increase therein affects  $NH_3$ - $Cl_2$  sterilisation  $>$  that

of  $\text{Cl}_2$  but with similar additions to  $\text{H}_2\text{O}$  of low org. content the reverse is the case. C. J.

**Evaluation of residual chlorine [in water].** A. E. GRIFFIN (J. Amer. Water Works Assoc., 1935, 27, 888—896).—The *o*-tolidine test is recommended and methods of overcoming errors therein due to interfering substances, *e.g.*, Mn, Fe,  $\text{NO}_2'$ , etc., are described. C. J.

**Colorimetric determination of dissolved oxygen [in water].** M. L. ISAACS (Sewage Works J., 1935, 7, 435—443).—The colour produced by amidol in presence of K citrate at  $p_{\text{H}}$  5.1 is compared with permanent standards made from solutions of  $\text{CoCl}_2$  and  $\text{K}_2\text{Cr}_2\text{O}_7$ . The apparatus is suitable for field tests. C. J.

**Measures of natural oxidation in polluted streams. I. Oxygen-demand factor. II. Re-aëration factor and oxygen balance.** H. W. STREETER (Sewage Works J., 1935, 7, 251—279, 534—552).—I. Among the various factors which modify observed progressive changes in the biochemical  $\text{O}_2$  demand of polluted stream  $\text{H}_2\text{O}$  are intermediate inflow (pollution or dilution), sedimentation and adsorption, channel scouring, the presence of an "immediate"  $\text{O}_2$  demand possibly resulting from the anaërobie decomp. of sludge deposits, and a transition from the carbonaceous fermentation stage to that of nitrogenous oxidation. A formula is developed to determine the deoxygenating effect of sludge deposits from observations on the biochemical  $\text{O}_2$  demand in the supernatant  $\text{H}_2\text{O}$ , and methods of applying corrections for the various other factors are outlined.

II. The present state of knowledge of the underlying principles, nature, and practical measurement of natural oxidation in flowing streams is reviewed. Methods and formulæ are suggested whereby rates of oxidation and re-aëration and the trend of the resultant oxidation curve may be calc. from observations of progressive changes in the biochemical  $\text{O}_2$  demand and dissolved  $\text{O}_2$  content of the  $\text{H}_2\text{O}$  together with certain collateral data relating to the vols. and times of stream flow between the various observational points. C. J.

**Malt-house waste treatment studies in Wisconsin.** H. W. RUF, L. F. WARRICK, and M. S. NICHOLS (Sewage Works J., 1935, 7, 564—574).—The combined wastes, which have a biochemical  $\text{O}_2$  demand of 400 p.p.m. and contain a large proportion of the polluting material in solution, can be dealt with so as to obtain 90% purification on percolating filters 6—8 ft. deep and designed on a basis of 50 cu. ft. per lb. of  $\text{O}_2$  demand per day. The largest vol. and most polluting liquor results from the steeping of the grains. C. J.

**Effect of industrial (pulp and paper mill) wastes on fish.** A. E. COLE (Sewage Works J., 1935, 7, 280—302).—The main effect of both sulphite and sulphate (kraft) waste liquors is to deplete the  $\text{H}_2\text{O}$  of  $\text{O}_2$  so that the fish suffocate. Sulphate liquor causes irritation in concns.  $> 1$  in 500 and is toxic, apart from  $\text{O}_2$  depletion, in dilutions  $< 1$  in 200. Treatment with  $\text{O}_3$  (7.2 g. per gal.) does not decrease the toxicity sufficiently to justify its use. Sulphite liquor is less irritating and toxic, but has a higher  $\text{O}_2$  demand. Wood fibres have

no direct ill effect on the fish, but by forming a mat on the stream-bed they interfere with the food supply and spawning grounds. C. J.

**Determination of fumigants. I. Residual hydrocyanic acid in stored products.** O. F. LUBATTI (J.S.C.I., 1935, 54, 275—282 r).—Study of the aëration method described shows that the proportion of product to  $\text{H}_2\text{O}$  and HCN and the rate of aëration are the main factors determining the recovery. The  $p_{\text{H}}$  of the suspension should be 1—2. Increase of surface by subdivision or otherwise decreases the recovery. Adsorption appears to be the principal cause of retention.

**Dermatitis and woollen goods.**—See V.

See also A., Aug., 948, Determining  $\text{SO}_2$  in air.

#### PATENTS.

**Recovery of water from atmospheric air.** E. ALTENKIRCH (B.P. 432,394, 22.9.34. Ger., 28.9.33).—Hygroscopic substance is exposed at night to free air, and in the daytime to the heat of the sun and to a circulation of air localised between this substance and a condenser which is situated in, or cooled by air drawn from, a shady place. B. M. V.

**Treatment of sewage, garbage, or similar waste material.** A. H. STEVENS. From NICHOLS ENG. & RES. CORP. (B.P. 432,198, 18.1.34).—Sludge filter-cake or garbage is passed downwards through a multi-hearth roaster (*R*) to which clean preheated air is admitted at an intermediate level. Gases from the top of *R* are scrubbed with  $\text{H}_2\text{O}$  to remove  $\text{H}_2\text{O}$  and condensable matter and the permanent gases are reheated in the lower hearths of *R* and, with fuel, burned to heat the air. B. M. V.

**Digestion of sewage sludge.** A. J. FISCHER, Assr. to DORR CO., INC. (U.S.P. 1,982,246, 27.11.34. Appl., 11.10.30).—After separation of grit the sewage is aërated (in *A*), and from a second settling (in *B*) the effluent is run to waste. Part of the sludge from *B* is thickened (in *C*) and the sludge digested (in *D*) with separation and running to waste of final sludge. Overflows from *D* and *C* and the remainder of the sludge from *B* are returned to *A*. B. M. V.

**Production of oligodynamically active substances for sterilising and disinfecting.** W. KRUSE and M. J. FISCHER (B.P. 428,764, 15.8.33).— $\text{H}_2\text{O}$  or a NaCl solution ( $< 0.2N$ ) is electrolysed between a Ag anode and a stainless-steel cathode, using a c.d. of  $< 0.1$  amp. per sq. dm. The process is applicable to the sterilisation of Ag or Ag-plated surgical instruments. A. R. P.

**[Liquid] waste disposal.** A. WRIGHT (U.S.P. 1,980,244, 13.11.34. Appl., 17.7.31).—Disintegrated combustible fibrous material, *e.g.*, paper pulp, is mixed with the waste at convenient points during the purification process as an aid to clarification and the subsequent disposal of the separated solids, particularly when dewatered on vac. filters. C. J.

**Recovery of volatile liquids.**—See I. Gasworks effluents.—See II.