

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JUNE 21 and 28, 1935.*

I.—GENERAL ; PLANT ; MACHINERY.

Heat transfer in evaporators. B. KRANZ (Chem. Fabr., 1935, 8, 145—146).—Heat transfer (H) from the vapour to the tube (T) wall depends only on the temp. gradient. H from the wall to the boiling liquid depends on (1) the temp. gradient, (2) the b.p. of the liquid in the apparatus, and (3) the apparent height of the liquid in T . This effect is slight except with low temp. gradients, when a max. rate of transfer is found with a level at about 30% of the length of T . It also varies with the nature of the liquid. These relations are illustrated by curves for H_2O and glycerin- H_2O mixtures. Further curves show the effect of circulating the liquid with a pump, which is marked for small temp. differences. C. I.

Jacketed industrial glass heat exchanger. H. C. BATES (Ind. Eng. Chem., 1935, 27, 273—275).—Details, including overall heat-transfer coeffs. and sizes recommended for various pressures, of a double-pipe heat exchanger with glass inner and Fe outer pipes are given and illustrated. D. K. M.

Velocity and temperature curves of the drying process. A. V. LYKOV (Kolloid-Z., 1935, 71, 103—111).—A mathematical treatment of drying curves obtained with peat, brown coal, clay, and chrome leather. E. S. H.

Solution cycles as applied to step-up transformers for temperatures. G. G. BROWN (J. Franklin Inst., 1935, 219, 405—432).—The literature on the use of solution cycles (I) for generating steam is reviewed and examples of the method of calculating efficiency are given. The use of (I) for refrigeration, heating, increasing steam pressure, and as a means of enabling energy to be stored in the form of conc. solution and solvent are indicated. D. K. M.

Optical pyrometry. G. NAESER (Stahl u. Eisen, 1934, 54, 1158—1160).—The possible errors in optical pyrometry are discussed and shown to be chiefly accidental, caused by (a) temp. scale $\pm 2^\circ$, (b) matching errors $\pm 2^\circ$, (c) instrument errors $\pm 3^\circ$. The apparent temp. of a radiating polished metal surface may differ by 100° from the true temp. For non-black-body radiation a colour pyrometer (P) is more accurate than a photometric P . A new optical P is briefly described by which a simultaneous determination of colour temp. and apparent temp. as the sum of two colours is made. The colour temp. of a polished surface radiating freely, measured by this P , is very close to the true temp. W. P. R.

Principles of vibrating screen practice. J. G. TURVEY (Trans. Ceram. Soc., 1935, 34, 250—267).—The design, operation, and efficiency of vibrating screens (I) are discussed. On a basis of overall cost per ton of

material screened, and when handling reasonably large tonnages, (I) are concluded to be cheaper, and generally to yield better results, than other types. A. L. R.

Determination of oxygen in boiler feed-water de-aerated by the sulphite method. R. B. GOLDINA (Izvest. Teplo-Tekh. Inst., 1934, No. 6, 43—45).—The sample is treated with $NaOH-MnSO_4$ and, after the ppt. has settled, with $KHCO_3$. The ppt. is collected and washed with aq. $KHCO_3$, removal of SO_3 being checked by $HCl-KI$ -starch mixture to which 2—3 drops of 0.01N- $K_2Cr_2O_7$ are added, and the colour is compared with a blank test. The ppt. of Mn oxides is determined by treatment with $HCl-KI$ -starch and titration with 0.01N- $Na_2S_2O_3$. CH. ABS. (p)

Removal of oxygen from boiler feed-water by sodium sulphite. K. A. KOBE and W. L. GOODING (Ind. Eng. Chem., 1935, 27, 331—333).—The optimum pH val. for the removal of O_2 from H_2O at 20° is 6, but at pH 9—11 85—90% of the O_2 is removed at 50° . The rate of O_2 removal is increased by rise in temp. and increased $[Na_2SO_3]$. With the addition of $CuSO_4$ (0.1 p.p.m.) all the O_2 is removed at 20° from H_2O having pH 9.8. Na_2SO_4 resulting from the oxidation of Na_2SO_3 is beneficial in the boiler H_2O in reducing caustic embrittlement. D. K. M.

Oil in boiler water. J. H. PRATT (Rept. Assoc. Hawaiian Sugar Tech. 13th Meet., 1934, 185—195).—The amount of oil in boiler (B) H_2O showed no relationship to the visible oil accumulation within the B , with various working factors, or with the ratio of total : free oil present. This ratio was unrelated to the proportion of unsaponifiable oil (I). The proportion of (I) in the B was much $>$ that in the original oil. There was no correlation between the pH of the H_2O and the proportion of total oil and (I). The sludge contained 1—100% of the oil present. The oil-retaining capacity of the sludge was not related to the pH of the H_2O or the proportion of (I). Sludges having high SiO_2 and Fe_2O_3 but low Mg , PO_4 , SO_4 , and org. matter contents retained most oil. Et_2O extracted more oil from samples than did $CHCl_3$. CH. ABS. (p)

Design calculation for multicomponent rectification. E. R. GILLILAND (Ind. Eng. Chem., 1935, 27, 260—265).—Published methods for the design of columns for multicomponent rectification (I) are critically reviewed. A rapid and simple method is derived for determining the no. of plates required for (I) and its use is illustrated. D. K. M.

Distillation and absorption in packed columns. Convenient design and correlation method. T. H. CHILTON and A. P. COLBURN (Ind. Eng. Chem., 1935, 27,

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

255—260).—In the design of packed columns for rectification and absorption the concept "height of a transfer unit" (H.T.U.) is introduced and equations for it are derived and its use is illustrated. In many cases H.T.U. and the height equiv. to a theoretical plate are identical, but in some instances of absorption there are large differences.

D. K. M.

Entrainment in plate columns. T. K. SHERWOOD and F. J. JENNY (Ind. Eng. Chem., 1935, 27, 265—272).—Entrainment (E) has been determined by bubbling air through aq. NaOH, and graphs are given showing the effect at different air rates (1—8 g. per min. per sq. cm.) of plate spacing, liquid level, ratio of slot width to column cross-section, and no. of caps per plate. The effect of E on column performance is considered and illustrated by examples. The effect of E of < 0.1 mol. per mol. of vapour is negligible in most cases.

D. K. M.

Effect of entrainment on plate efficiency in rectification. F. H. RHODES (Ind. Eng. Chem., 1935, 27, 272).—The graphical method of McCabe and Thiele for the determination of the no. of plates required for rectification is modified so as to include for each plate factors for plate and entrainment efficiency.

D. K. M.

Coefficients of heat conduction for evaporation of various chemical compounds, solutions, and liquid mixtures. A. D. MALIKOV (Khimstr., 1934, 6, 531—537).—A discussion of plant construction.

CH. ABS. (e)

Methods of inducing crystallisation. E. W. WASHBURN (Bull. Amer. Ceram. Soc., 1935, 14, 138—141).—The mechanism of and conditions necessary for recrystallisation by sublimation, dissolution, and pptn., and in presence of a "mineraliser," are described. A list of mineralisers suitable for use with acidic or neutral refractory oxides above 310° is given.

J. A. S.

Absorption of gases in spray towers. A. W. HIXSON and C. E. SCOTT (Ind. Eng. Chem., 1935, 27, 307—314).—Absorption of NH_3 in 1—3% concn. in air by a falling H_2O -spray, $K_g a = 2.5 \times 10^{-5} \times G^{0.8} \times L / H^{0.5}$, where G and L are the gas and liquid flows and H is the height of the tower. a is the interfacial area, and K_g may be approx. calc. (by making assumptions as to the no. and size of drops) to be 5.75×10^{-6} g. of NH_3 per sq. cm. per mm. partial pressure of NH_3 per sec. Similar relations to G , L , and H were found for SO_2 in H_2O and for C_6H_6 in absorption oil, except that variation is with $L^{0.9}$. Consts. for these gases are given and the overall coeffs. determined. Equations are limited to the conditions of experiment as to ratio of length to diam. of tower, drop size, and turbulence.

C. I.

Gas-analysis apparatus. H. H. MÜLLER-NEUGLÜCK (Brennstoff-Chem., 1935, 16, 129—132).—The following modifications of the portable (Orsat-type) gas-analysis apparatus are recommended: (1) replacement of the single-tube gas-measuring burette (B) by a double-tube B which is shorter but possesses the same accuracy of reading, (2) use of Tramm absorption pipettes (P) (A., 1932, 593), (3) use of a suspension of I_2O_5 in oleum for the determination of CO. The P for (3) is contained

in an Al box packed with kieselguhr and sawdust. The mouths of the P are provided with small U-tubes, having 4 spherical enlargements, to prevent access of air to the absorption liquid.

A. B. M.

Small constant-humidity chamber. T. LONSDALE (Engineering, 1935, 139, 321).—The air is circulated through a wet pumice or a CaCl_2 tower as required, the control being operated by a hair hygrometer.

A. G.

Welding.—See X. **Photoelectric apparatus in chemistry.**—See XI.

See also A., May, 583, **System CaCO_3 — CaSO_4 — H_2O [in boiler- H_2O].** 591, **Decomp. of aq. Na_2CO_3 [in boilers].**

PATENTS.

Furnace structure. G. F. WEATON, Assr. to ST. JOSEPH LEAD CO. (U.S.P. 1,970,209, 14.8.34. Appl., 13.9.32).—A shaft furnace is constructed of bricks in such form that all joints—both the approx. vertical and the approx. horizontal ones—slope inwards.

B. M. V.

[Filter-]clay-burning furnace. J. HANSEN, Assr. to SHELL PETROLEUM CORP. (U.S.P. 1,969,979, 14.8.34. Appl., 26.4.27. Renewed 2.7.34).—The furnace comprises a no. of superposed rotary drums (with stationary ends) heated externally. The material being calcined passes through in series, but each drum is provided with an independently regulated inlet and outlet for air.

B. M. V.

Retort. H. M. ROBERTSON (U.S.P. 1,968,775, 31.7.34. Appl., 9.6.31).—In a tunnel kiln for, e.g., MgCO_3 , heating is mainly effected by radiation from muffled combustion chambers, but a portion of the CO_2 is recirculated to effect convection transfer, the bulk of the CO_2 being used to preheat the incoming material. The whole of the goods tunnel is maintained under slight pressure to exclude O_2 .

B. M. V.

Heat-treatment of materials by means of gases in rotary retorts or drums. J. M. and R. V. PEARSON (B.P. 427,084, 4.12.34. Denm., 4.12.33).—A device for introducing high-temp. gas (G) through the wall of a rotary kiln (K) comprises a central passage for G surrounded by a hollow and suitably perforated collar through which an inert gas of lower temp. is supplied, to prevent lateral dispersion of G . Both stationary passages are in close proximity to the rotating-drum wall, which is of louvre or other formation to permit inward passage of G , preferably under the moving bed of material within K .

B. M. V.

Reaction chamber. R. D. MAILEY, Assr. to GEN. ELECTRIC VAPOR LAMP CO. (U.S.P. 1,969,655, 7.8.34. Appl., 27.9.23. Renewed 23.3.34).—A reaction chamber is formed as the annulus between co-axial walls, the inner one being transparent and containing a source of actinic light and a renewable atm. of gas permeable to desired rays but impermeable to rays of undesired λ .

B. M. V.

Reaction chambers containing contact masses and their assembly. HOUDRY PROCESS CORP., Asses. of E. J. HOUDRY, R. C. LASSIAT, and R. H. HAMMELL (B.P. 426,642, 6.10.33. U.S., 29.10.32, 9.12.32, and

14.1.33).—Perforated tubes for distribution of the gases amongst the contact mass are installed in such a way as to permit free individual expansion. B. M. V.

Control of exothermic reactions. G. A. KRAMER, ASSR. to SHELL DEVELOPMENT CO. (U.S.P. 1,967,410, 24.7.34. Appl., 14.7.31).—Olefines are caused to react with acid in a comparatively large mass of fluid (*F*) which is recirculated and recooled to a temp. < the max. at which the desired reaction product (*R*) is stable. *F* may be one of the reactants, or another reaction product that is easily separable from *R*, or an inert liquid. B. M. V.

Heat-insulating material. C. H. SCHUTTLE (U.S.P. 1,969,156, 7.8.34. Appl., 8.1.30).—A suspension or solution in H₂O of mineral wool and MgSO₄ is settled in stratified form by slow drainage, and then treated with superheated steam and air. B. M. V.

Heat-exchange device. A. L. STAMSVIK, ASSR. to HEAT EXCHANGER CO. (U.S.P. 1,969,766, 14.8.34. Appl., 11.6.32).—An apparatus comprising a no. of hollow plates in a fluid-tight casing giving very turbulent flow to both fluids is described. B. M. V.

Apparatus for treating [conditioning] materials. G. D. HARRIS, ASSR. to INDUSTRIAL DRYER CORP. (U.S.P. 1,968,764, 31.7.34. Appl., 30.7.30).—A conveyor takes an elliptical course and during both straight runs and one bend conveys the goods through chambers in which the air (or inert gas) is conditioned by heaters in the sides and humidifiers in the roof. B. M. V.

Drying machines. W. W. SPOONER (B.P. 427,179, 14.10.33).—Granular or tufty material is conveyed on a stepped series of belts or the like and subjected to downwardly inclined jets of air arranged in spaced groups, the nozzles (*N*) of successive groups being of opposite inclination. The used air may be collected in a casing and re-blown through a heater and the same set of *N*. B. M. V.

Drying of solids [e.g., hexachloroethane]. R. D. MYERS (U.S.P. 1,966,456, 17.7.34. Appl., 2.8.32).—A volatile solid, e.g., C₂Cl₆, which is moist with a liquid of low intersolubility is melted in a closed jacketed vessel divided into upper and lower communicating compartments in which the two liquids stratify. B. M. V.

Mechanical drying of fibrous or granular materials and the like. C. F. NIELSEN (B.P. 426,951, 7.10.33).—The material is drawn through a rotating spiral conduit, against the conveyor action caused by the rotation, by means of a current of drying gas of which part is admitted through apertures distributed in the outer wall of the conduit. B. M. V.

(A) Apparatus for heating and cooling at high temperatures. (B) Economical use of mercury and other liquids [in boilers]. C. FIELD, ASSR. to (A) CHEM. MACHINERY CORP. (U.S.P. 1,966,441—2, 17.7.34. Appl., [A] 5.2.27, [B] 20.8.30. Renewed [A, B] 10.10.33).—(A) To the Hg-vapour heat-transmission system described in U.S.P. 1,403,471 (B., 1922, 164 A) a supplementary condenser is added, of use when the useful heating is to start an exothermic reaction and as a general precaution to prevent Hg

reaching the vac. pump. (B) The lock-up of Hg in a boiler is diminished by the presence of compressed steel wool. B. M. V.

Pulveriser. W. W. PETTIBONE (U.S.P. 1,967,323, 24.7.34. Appl., 25.8.31).—The apparatus comprises two stages (I, II) of beaters and one fan on the same shaft. The disc of (II) has a centre hole large enough to pass over the hub of (I). B. M. V.

Impact pulverisers. HEPHAEST A.-G. F. MOTORISCHE KRAFTERZEUGUNG, and B. GRAEMIGER (B.P. 426,596, 24.8.34).—The throat producing the high velocity of the impact fluid is obstructed more or less by a needle of stream-line form which is adjusted under control of one or more of the factors: firing gas temp., steam pressure, steam temp. in the boiler fired by the fuel pulverised. B. M. V.

Pulveriser and separator. G. H. FRASER (U.S.P. 1,967,236, 24.7.34. Appl., 1.9.31).—Within an outer casing (*O*) is rotated a shell bearing a crushing ring and within that a spider carrying crushing rollers. Air-separation is effected by these parts in conjunction with suitable guides etc., the ground material being collected in the lower part of *O*. B. M. V.

Granulation of finely-divided materials. H. R. ARNOLD, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,222, 24.7.34. Appl., 15.8.31).—A finely-divided catalytic material (e.g., Zn chromite) is mixed with 10–80 (50) wt.-% of volatile liquid (H₂O) and continuously agitated until the mass suddenly changes to moist granular aggregates having the consistency of cottage cheese, which are then dried. B. M. V.

Production of granulated materials. F. UHDE (B.P. 426,472, 30.6.33. Ger., 30.6.32 and 10.1.33).—Plastically moist materials (e.g., salts or fertilisers) are subdivided (e.g., by extrusion) and subjected to drying and vibration in a cascade apparatus. B. M. V.

Grinding mill. B. SCHERBAUM (B.P. 426,712, 9.9.33. Ger., 30.9.32).—Fixed and rotating discs are provided in each case with intercalating rings of teeth, those in the outer belt being very fine. B. M. V.

Separator or classifier for ore pulp and the like. D. MACLEAN (U.S.P. 1,969,619, 7.8.34. Appl., 23.1.32. S. Afr., 23.11.31).—A circular vessel is provided with an upright conical bottom of less steep inclination than the angle of repose of the solids, the apex being truncated to provide an outlet for coarser solids which are dragged there by rotating spiral rakes. The inlet pipe is tangential at an upper level, and the outlet for fine solids and liquid peripherally at an intermediate level. B. M. V.

Grading, sifting, or sorting of solid materials. W. H. ALLEN (B.P. 427,159, 4.12.33 and 28.8.34).—A conveyor-screen is provided with stationary ploughs inclined successively in opposite directions. B. M. V.

Apparatus for determination of grain sizes in granular material. M. VOGEL-JØRGENSEN, ASSR. to F. L. SMIDT & Co. (U.S.P. 1,969,081, 7.8.34. Appl., 3.12.31. Fr., 26.12.30).—Samples of a suspension, e.g., of cement in H₂O, are taken from different levels, after settling for definite periods of time, by means of

a pipette having a common bulb and a no. of branched inlets (with cocks) extending to different depths in the settling bottle.

B. M. V.

Mixing mills. SOC. CHEM. IND. IN BASLE (B.P. 427,157, 7.8.34. Switz., 4.8.33 and 3.6.34).—On the outside of a mixing drum (*D*) a longitudinal passage (*P*) is formed, having communication with *D* through perforations and containing a screw conveyor (*C*). After completion of the mixing, *D* is stopped with *P* at the lowest point and *C* is driven by suitable gearing to discharge *D*.

B. M. V.

Mixing machine. D. DE F. CRANDELL AND R. NEHER, ASSRS. to NAT. GYPSUM CO. (U.S.P. 1,967,291, 24.7.34. Appl., 8.9.31).—Of materials differing greatly as to stickiness or liquid content, the driest is spread in a corrugated layer (by means of a comb) on a conveyor belt and the wet material spread on top, the two being left on the belt long enough for the moisture to diffuse downwards.

B. M. V.

Centrifugal machine. L. D. JONES, ASSR. to SHARPLES SPECIALTY CO. (U.S.P. 1,968,491, 31.7.34. Appl., 20.9.29).—A hydraulically operated turning tool for removing solids from the basket is described.

B. M. V.

Centrifugal machine. C. L. HEISLER, JUN., ASSR. to GEN. ELECTRIC CO. (U.S.P. 1,970,377, 14.8.34. Appl., 28.1.33).—To the shaft of a centrifuge that has to run above the first crit. speed (*A*) of the unstiffened shaft is attached a large flange that forms part of the flexible coupling (*C*) to the motor. When starting up, *C* is clamped by springs to form a more rigid form of coupling so that the crit. speed is raised to *B*; on approaching *B*, i.e., after passing safely right through *A*, the springs are released and the shaft will rotate steadily. The reverse takes place on shutting down.

B. M. V.

Separation of suspended solids from liquids by sedimentation or settling. W. J. DONOHUE (U.S.P. 1,968,031, 31.7.34. Appl., 21.11.31).—The liquid is passed from a common deep entrance chamber (*E*) through a no. of superposed shallow sedimentation chambers or trays to a common exit at the other end. The settled sludge is raked transversely at intervals and united with any that may have settled in *E*.

B. M. V.

Straining apparatus. AUTO-KLEAN STRAINERS, LTD., W. R. BELDAM, and L. W. ENGLISH (B.P. 427,192, 2.11.33).—The perforated discs of a metallic edge-filter are stiffened by bending the plates back on themselves at positions not actually in the filtering margin.

B. M. V.

Treatment of emulsions. T. A. NOVOTNEY and L. N. HUNTER, ASSRS. to NAT. RADIATOR CORP. (U.S.P. 1,968,614, 31.7.34. Appl., 11.5.32).—The emulsion (e.g., brine and oil from a well) enters, and the largest constituent (*L*) leaves, at comparatively high speed through conduits which permit heat exchange between flow and return. At the point of reversal the flow is comparatively slow, the heat to make up losses is applied, and *L* (assumed to be the lighter constituent) is scrubbed by accumulated heavier constituent.

B. M. V.

Purification of [mixed] liquids. C. O. YOUNG, ASSR. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P.

1,968,512, 31.7.34. Appl., 7.12.31).—High-boiling, thermally unstable liquids, especially a mixture of mono-, di-, and tri-ethanolamines, are distilled under vac. by indirectly transmitted and progressively raised heat, the vapours being immediately removed to a separate rectifier where they are fractionated without additional heat. A filled tower is used, the vapours being removed from each storey.

B. M. V.

Precipitation of materials from colloidal solutions. KODAK, LTD. (B.P. 427,155, 21.7.34. Fr., 22.8.33).—Drops of the solution (e.g., of cellulose derivatives) are allowed to fall into a precipitant, the drop-forming apparatus comprising a tray perforated with circular holes in the centre of each of which is a rod $\frac{5}{8}$ — $\frac{3}{4}$ the diam. of the hole.

B. M. V.

Apparatus for treating liquids with solids. W. F. VAN LOENEN, ASSR. to L. BLAKE-SMITH (U.S.P. 1,967,601, 24.7.34. Appl., 21.5.32).—Resolution of emulsions by contact with a granular solid (*S*) which is only slightly sol. in either constituent is effected in a rotary drum provided with longitudinal baffles (*B*) to lift *S*, and with stationary inclined *B* to hold the bulk of the liquid quiescent so that the constituents can be decanted off.

B. M. V.

Water-softening composition and method. L. A. LUX, ASSR. to LUX ELECTROLYZER SERVICE, INC. (U.S.P. 1,969,983, 14.8.34. Appl., 24.12.32).—A suitable composition is formed from an alkali (NaOH), a finely-divided aluminosilicate material (clay), and an alkali silicate, the whole being placed in H₂O which is ionised by the passage of an electric current, e.g., 7—15 amp. at 110 volts a.c.

B. M. V.

[Fractional] distillation [temperature]-control device. W. J. PODBIELNIAK (U.S.P. 1,967,258, 24.7.34. Appl., 30.10.31).—The cooling medium is controlled by the pressure in the top (*T*) of the column. A valve (*V*) in the vapour-outlet pipe automatically opens more with increased flow of vapour, the control being by pressure changes in a receiver and by temp. in *T*. The position of *V* may be recorded on a chart and the quantity of vapour made integrated therefrom.

B. M. V.

Rapid freezing of liquids. N. SNITKIN (U.S.P. 1,970,437, 14.8.34. Appl., 18.3.32. Esth., 21.3.31).—The liquid is sprayed into and frozen in cooled air which is admitted through tangential openings into a circular chamber, forming a whirlwind, or, preferably, two whirlwinds in opposed directions in superposed zones.

B. M. V.

Viscosimeters. J. G. A. RHODIN, and E. B. WESTMAN, LTD. (B.P. 426,876, 11.10.33).—Liquid is caused to flow under const., superposed, pneumatic pressure through a sharp-edged orifice (*O*) and then through a vertical tube which is obstructed by a central rod (*R*), the elongated constriction thus formed, though small, being large compared with *O*. *R* is supported by a straight-line motion to hold it central, and is counter-balanced so that the longitudinal motion of *R* \propto the viscous resistance.

B. M. V.

Air separator. T. J. STURTEVANT, ASSR. to STURTEVANT MILL CO. (U.S.P. 1,968,862, 7.8.34. Appl., 2.4.30).

—A separator comprising an inner, upward-current separating chamber, a circulating fan, an outer settling chamber, and a rotary distributor is described.

B. M. V.

Apparatus for separation of suspended material from gases. K. I. MARSHALL, ASST. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,970,048, 14.8.34. Appl., 13.11.31).—All the gas is passed through a centrifugal device, whence the clean (inner) layer is sent direct to the outlet (*O*) and the dirty (outer) layer passed through an electrical precipitator before rejoining the main stream in *O*.

B. M. V.

[Purifying hot gases by] heat exchange. H. S. COLBY and P. H. KARLSSON, ASSTS. to AIR PREHEATER CORP. (U.S.P. 1,970,534, 14.8.34. Appl., 30.7.32).—Dirty hot gases are passed through one semicircle of a rotating heat-regenerative mass (*M*), are then scrubbed or otherwise cleaned and returned through the other half of *M*. To prevent short-circuiting of dirty gas, a screen of clean cold gas is maintained at the division of *M*, under positive pressure from a fan.

B. M. V.

Scrubbing of gases with liquids. SIMON-CARVES, LTD., and J. H. BROWN (B.P. 427,087, 31.1.34).—A scrubber is filled with sheets of expanded metal preferably always vertical, but otherwise arranged in the 4 possible positions successively. The mesh may be $\frac{3}{8}$ and the spacing $\frac{1}{4}$ in.

B. M. V.

Apparatus [packing] for treatment of gases or vapours with liquids. H. S. SAYLES, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 426,560, 3.10.33).—Irrigated packing is composed of vertical plates (*P*) arranged at right-angles in successive tiers. The top of each *P* is castellated by slitting, and the lugs so formed are bent alternately in opposite directions, thus forming supports for the *P* above and distributors for the liquid, which forms a complete film without cascading.

B. M. V.

Apparatus for detection of suspended matter in fluids. W. KIDDE & Co., INC. (B.P. 426,599, 31.8.34. U.S., 6.9.33).—From several sources of gas that may be smoky, conduits (*C*) lead to individual visual detectors situated in a common chamber, and by means of 2-way valves in the *C* each stream in succession is passed through a photo-electric inspection tube. Electrical means are described for recording the results, issuing warnings for too much smoke, and issuing other warning for any breakdown of the apparatus.

B. M. V.

(A) Smoke-density meter device. (B) Gas-cleaning apparatus. A. W. SIMON, L. C. KRON, and H. RAYMOND (U.S.P. 1,969,626—7, 7.8.34. Appl., 14.8.31).—(A) In a meter of the radiation type the by-pass flue in which the gases are examined is, at intervals, automatically cleared of gases by clean air in order to establish a zero reading free from errors due to dirt on any part of the optical system. (B) H_2O or other cleaning medium is regulated automatically by the light passing through a sample of the flue gas in an apparatus as in (A).

B. M. V.

Apparatus for testing the fastness to light of dyes, inks, and other colour materials. R. O. HALL, ASST. to ONTARIO RESEARCH FOUNDATION (U.S.P. 1,969,606, 7.8.34. Appl., 13.6.32).—Samples are

subjected to light (artificial, but approx. daylight), to heat at a definite temp., and to controlled humidity, in an apparatus comprising a double-concentric shell having windows for the samples in the inner wall, a source of light on the axis, and air-conditioning means.

B. M. V.

Brake-lining composition. R. L. SEABURY and L. W. MURRAY, ASSTS. to GEN. MOTORS CORP. (U.S.P. 1,969,041, 7.8.34. Appl., 29.5.30).—The lining is composed of (a) asbestos, e.g., 53%, (b) a phenolic condensation product 14%, and (c) Pb \leq 33%. In manufacture, *a* is wetted with H_2O and mixed with a solution of *b* in an alkali, *b* is then pptd. by acid, and the solid is filtered, washed, dried, pulverised, wetted with EtOH, and mixed with powdered *c*.

B. M. V.

Brine solution.—See VII. Pptg. particles from gases.—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

New era in the coal industry. Scientific, technical, and commercial evolution of the coal industry in France and abroad. C. BERTHELOT (Chim. et Ind., 1935, 33, 307—318, 559—574).—Recent progress in the winning, cleaning, briquetting, carbonisation, and hydrogenation of coal is discussed in relation to the economic position of the coal industry, particularly in France.

A. B. M.

Composition of bituminous coals. G. STADNIKOV and A. FALKOVSKAJA (Brennstoff-Chem., 1935, 16, 107—109).—Exhaustive methylation of a coal constituent can be used to indicate its origin. The transformation undergone by humic acids involves loss of CO groups but not of phenolic OH groups; thus the humic acids of the older brown coals show, after methylation, a smaller content of ester-OMe than those of the younger brown coals, whereas the ether-OMe content of the methylated humic acids of both types is the same (about 9.5%). On the other hand, the transformation undergone by unsaturated fatty acids consists of polymerisation to cyclic carboxylic acids followed by conversion into ketones or acid anhydrides, thus giving rise to compounds which, after methylation, contain only ester-OMe groups. Examination by this method of the "humic acids" derived from some Russian coals indicates that they consist of varying mixtures of true humic acids with material of sapropelic origin.

A. B. M.

Methods of evaluating coals. L. KAATZ and H. E. RICHTER (Gas- u. Wasserfach, 1935, 78, 221—229).—The laboratory methods of examining coal are discussed with especial reference to the precautions necessary to obtain consistent results. Some of the methods [softening point by the penetrometer, plastic behaviour by Foxwell's method, caking index (cf. Kattwinkel, B., 1932, 487), etc.], which have been slightly modified, are described in detail.

A. B. M.

Isolation and study of humic acids from peat. C. L. ARNOLD, A. LOWY, and R. THIESSEN (Fuel, 1935, 14, 107—112).—The humic acids (I) were obtained by treating the peat successively with 2% HCl, C_6H_6 , 95% EtOH, and H_2O , extracting the purified material with 1% NaOAc, pptg. the dissolved (I) with HCl,

dialysing, and drying. They behave as negatively-charged colloids. When carefully purified and dried the (I) and their salts can be prepared as reversible colloids. They are peptised by dil. solutions of salts of the alkali metals and by many aq.-org. solvents. Mol. wts. calc. from osmotic pressure measurements gave 2350–2700 for the (I) and 1200–1350 for the Na humates; the higher osmotic pressures of the latter may be due to ionic dissociation. On analysis the (I) gave C 56–57, H 3.6–3.9, O 33–35, N 2.5, S 0.7–1.2, ash 1.4–1.9%; the ash was chiefly SiO_2 and Al_2O_3 , due to colloidal clay. Analysis of the Ba, Ca, and Na salts gave the equiv. wt. of the acid as 673, 653, and 1009, respectively; the higher val. obtained from the Na salt may be due to hydrolysis and loss of Na during dialysis. The p_H of the (I) sols was approx. 3.8. The (I) were not readily nitrated, sulphonated, or reduced. They were readily oxidised, even by dil. H_2O_2 , to CO_2 , H_2O , and simple org. acids; it is concluded that the mols. are not made up predominantly of benzenoid structures. They yielded no furfuraldehyde on distillation with HCl. The OMe content was low. When heated in an atm. of H_2 the (I) evolved CO_2 at 140–150°; on heating to 400° there was an increase in the C content (to 75.9%) and a decrease in the O content (to 12.9%), whilst the H, N, and S contents were only slightly affected. A. B. M.

Equivalent and mol. wts. of humic acids from a bituminous coal. R. C. SMITH and H. C. HOWARD (J. Amer. Chem. Soc., 1935, 57, 512–516).—The equiv. wt. (by electrometric titration) of the "humic acids," formed from bituminous coal by HNO_3 and dried at room temp. to 150° is 232–248; at > 200° loss of CO_2 occurs, giving lower equiv. wts. The mol. wt. [cryoscopic, in pyrocatechol (I), k 59] is 300–360 for acids dried at 150–200°, but 220 for those dried at 25°. The COMe_2 -sol. and -insol. fractions have equiv. wts. 210 and 277 and mol. wts. 190–240 and 260–300 in (I), respectively. The EtOH-sol. and -insol. fractions of the Et esters have mol. wts. 380 and 315, respectively, in (I). The hydrogenation product has mol. wt. 260 in (I), 510 in $\text{C}_6\text{H}_2\text{Br}_2\text{OH}$ (k 204), and 1200 in Ph_2 (k 80). It is concluded that the acids consist of mol. aggregates which dissociate in polar solvents, but resist the disruptive action of heat. Reaction of the acids with (I) is very slow. R. S. C.

Solid fuel for internal-combustion engines. M. MOLDENHAUER (Chem.-Ztg., 1935, 59, 356).—A discussion of the use of pulverised coal. E. S. H.

Choice of fuels in powdered-coal machines. F. SCHULTE (Stahl u. Eisen, 1935, 55, 442–444).—The ash content (A) of coal is a most important factor if it is to be used as a fuel in powdered-coal engines. The wear of the cylinder is determined both by the proportion and the type of ash. Methods for obtaining ash-free coal are indicated, flotation and pressure extraction being the most promising. The ignition temp. may also be influenced by A and by the ash-extraction method. W. P. R.

Decomposition of sulphur compounds in coal. A. LISSNER and A. NEMES (Brennstoff-Chem., 1935, 16, 101–107).—Coal of high S content (org. S 2.09, pyritic S

1.29, sulphate S 0.27%) was heated in stages to 550° in a current of superheated steam and/or N_2 and the S in the volatile products of decomp. determined. Between 100° and 340° the S evolved as H_2S gradually increased, while that evolved as oxygenated compounds decreased. The S evolved at this stage \equiv the PhOH-sol. S. The H_2S is formed probably by decomp. of groups of the type $:\text{C}\cdot\text{SH}$ and $:\text{C}\cdot\text{S}\cdot\text{S}\cdot\text{C}\cdot$, which may be attached to N and are derived from proteins containing S. The oxygenated S compounds are probably derived by secondary decomp. of the H_2S with air absorbed in the coal. At 380° there was a greatly increased evolution of H_2S , accompanied by some SO_2 , due to hydrolysis of the pyrites by the steam. During the formation of tar H_2S is also probably produced by decomp. of the groups $:\text{CH}\cdot\text{SH}$ and $:\text{CH}\cdot\text{S}\cdot\text{CH}\cdot$ (cf. Terres, Angew. Chem., 1931, 44, 474). Part of the S remaining in the semi-coke prepared in superheated steam can be oxidised by conc. HNO_3 and thereby brought into solution; the residual org. S in the coke is very firmly held. A. B. M.

Design and operation of upwardly-heated vertical retorts. H. PARTINGTON (Gas J., 1935, 210, 151–153).—The performance of a bench of twenty-four 72-in. Woodall-Duckham retorts is described. The heating of the retorts is satisfactory with a pull of $4\frac{1}{2}$ in. w.g. on the flue gases. The carbonising results for two tests are given. E. H. M. B.

The Knowles oven process. A. FISHER (Gas J., 1935, 210, 208–211).—The Knowles oven is D-shaped, with a flat hearth heated from below. The standard oven is 30 ft. long, 10 ft. $4\frac{1}{2}$ in. wide, and 2 ft. to the spring of the arch and $4\frac{1}{2}$ ft. to the crown. Coals of low coking power may be carbonised direct, and non-coking coals as a suspension in tar. The distillate is fractionated and the high-boiling fractions are used as a vehicle for the coal. Tar and pitch can also be coked. The heavy fractions are recirculated. E. H. M. B.

Carbon black. E. DITTRICH (Brennstoff-Chem., 1935, 16, 121–126).—The prep., properties, and applications of C black are discussed on the basis of the available literature. A. B. M.

Moulding-black and soot. M. ROSÉN (Gjuteriet., 1933, No. 1, 3).—Molasses can be used instead of clay as a filler. Small amounts of soap and soda improve the consistency. Formulæ are given. CH. ABS. (e)

Separation of the constituents of coke-oven gas by intensive cooling. P. SAKMIN (Brennstoff-Chem., 1935, 16, 109–111).—Examination of the composition of the liquid and gaseous phases of coke-oven gas under various pressures at -185° and at various temp. under 11 atm. shows that the efficiency of separation of the $\text{H}_2 + \text{N}_2$ fraction is improved by operating at -185° and at \geq about 10 atm. The efficiency of recovery of C_2H_4 is improved by effecting the condensation at -160° instead of -140° , under 11 atm., and subsequently fractionating the liquid phase under 1 atm. A. B. M.

Action of methane in Rumanian natural gas on calcium chloride. C. CANDEA and I. G. MURGULESCU (Chim. et Ind., 1935, 33, 800–802).— CH_4 is dissociated at $> 700^\circ$ and serves as a medium of hydrogenation. Its reaction with CaCl_2 in absence and in presence of

SiO_2 and Fe_2O_3 is expressed by: (1) $\text{CaCl}_2 + 2\text{H}_2 = \text{CaH}_2 + 2\text{HCl} - 97.2 \text{ g.-cal.}$; (2) $\text{CaCl}_2 + 3\text{SiO}_2 + \text{Fe}_2\text{O}_3 + \text{H}_2 = \text{CaSiO}_3 + 2\text{FeSiO}_3 + 2\text{HCl} - 10.5 \text{ g.-cal.}$ Laboratory tests show increasing yields of HCl in (2) with rise in temp., reaching 95% at 1000°. A little SiCl_4 is also formed. If CH_4 is used in place of H_2 yields are rather lower and 900° is the optimum temp. It is proposed to apply this process to the natural gas of Sarmasel, Rumania, which contains 98.7% CH_4 .

C. I.

Indian coal tar. B. J. HEGDE, B. S. RAO, and P. C. GUHA (J. Indian Inst. Sci., 1935, 18, 15—18; cf. B., 1934, 612).—Further samples of coke-oven tar from Jamshedpur have proved to be of normal quality; the sample examined previously was not representative.

A. B. M.

Effect of fillers on variability of physical properties of tar in fine-mineral mixtures. H. KUNDE (Teer u. Bitumen, 1934, 32, 139—142; Chem. Zentr., 1934, ii, 2929—2930).—A discussion of the binding action of tar.

H. J. E.

Rational analysis of tar. B. G. ŠIMEK and J. KRŮMÁŘ (Chem. Listy, 1935, 29, 96—98).—An analytical procedure is described, serving for the determination of asphaltic, polymerised, acidic, and neutral constituents of 5 g. of tar.

R. T.

Determination of free sulphur and tar in spent oxide. H. L. G. BOOT and A. M. WARD (J.S.C.I., 1935, 54, 116 T).—S is determined by refluxing spent oxide with Na_2SO_3 solution. After filtering, excess of Na_2SO_3 is rendered inactive in an aliquot portion by addition of CH_2O and AcOH , and $\text{Na}_2\text{S}_2\text{O}_3$ present is titrated by standard I. Tar is determined by extracting the residue with CS_2 or C_6H_6 .

Ageing of road tars. L. SABROU (Compt. rend. 57th Congr. Ind. Gaz, 1934, 271—297; Road Abs., 1935, 2, No. 159).—Heat and ultra-violet light did not produce polymerisation in a dehydrated gasworks tar (I) in a CO_2 atm. Air did not oxidise (I), but heating in air or O_2 caused evaporation from (I) with increase in η . Comparison of road tars may be made by using a coeff. of ageing, i.e., the ratio of increase in η to loss in wt.

T. W. P.

Petroleum asphalt containing paraffins. J. MÜLLER and S. VON PILAT (Asphalt u. Teer Strassenbautechn., 1934, 34, 649—654; Chem. Zentr., 1934, ii, 2929).—Data are recorded for the treatment of paraffin-containing asphalts (I) with benzines (II) of varying d . The low ductility of (I) is mainly due to asphaltenes (III) insol. in heavy (II). Addition of (III) to (I) lowered the ductility.

H. J. E.

Refining, testing, and utilisation of petroleum oils. VII. **Lubricating oil treating.** G. N. CRITCHLEY (Fuel, 1935, 14, 98—106; cf. B., 1934, 1092).—The methods of refining lubricating oils (a) by chemical processes, e.g., H_2SO_4 treatment, (b) by solvent extraction, e.g., with PhNO_2 , $\beta\beta'-(\text{C}_2\text{H}_4\text{Cl})_2\text{O}$, or liquid SO_2 , and (c) by adsorption processes, e.g., with Florida earth etc., are reviewed.

A. B. M.

Discontinuous fractionating column for separation of benzene, toluene, and xylene from the

gasoline fraction of Syukkôkô crude. IV. **Number of fractionating plates required for the separation of benzene from the benzene fraction.** M. MIZUTA (J. Soc. Chem. Ind., Japan, 1935, 38, 98—99 B; cf. B., 1935, 179).—Mixtures of C_6H_6 (I) and aromatic-free gasoline fractions of b.p. 70—85° and 50—97° have been distilled, using a standard column equiv. to an industrial column with 12.5 plates. (I) is totally distilled below 80° from all mixtures except that containing the fraction b.p. 50—97°. Non-aromatic hydrocarbon with b.p. the same as or slightly > that of (I) distils over below the dry point of (I) and is difficult to separate by fractionation alone, solidification being also necessary. It is inferred that 70% (I) can be obtained from Syukkôkô crude containing 30% (I) by an industrial column with 25 plates. Further concn. is difficult.

R. S. B.

Refining of low-boiling hydrocarbons by condensation processes. H. BRÜCKNER and A. LANG (Brennstoff-Chem., 1935, 16, 126—128).—Crude benzols and a cracked benzene have been satisfactorily refined by treatment with 0.1—0.5% of anhyd. AlCl_3 or anhyd. FeCl_3 . The latter may be used in solution in MeOH. The washing losses were 30—50% < with H_2SO_4 refining, the olefines (valuable constituents of motor fuel) not being removed.

A. B. M.

Sweetening of gasoline with alcoholic alkali and sulphur. B. A. STAGNER (Ind. Eng. Chem., 1935, 27, 275—277).—Crude gasoline (I) or kerosene containing mercaptans (II) and/or free S is sweetened by treatment with the requisite amount of free S (or mercaptan) and anhyd. alcoholic (MeOH) alkali solution. (II) are converted into alkyl disulphides. The colour-stability of (I) is improved by washing with dil. H_2SO_4 . The chief alkali by-products are Na_2S and $\text{Na}_2\text{S}_2\text{O}_3$. MeOH is recovered by extracting with H_2O and distilling the aq. solution.

C. C.

Colour-stability of gasolines. **Effect of mercaptans, alkyl disulphides, and sulphur.** G. EGLÖFF, J. C. MORRELL, W. L. BENEDICT, and C. WIRTH, III (Ind. Eng. Chem., 1935, 27, 323—329).—Colour-stabilities (I) were determined by exposing samples to light from a Car lamp. colours being measured on a Saybolt colorimeter. Alkyl disulphides (II) cause colour and haze formation in gasolines (III) exposed to light, particularly with straight-run or blended (III). S caused a marked colour and haze in (III) exposed to light; it is particularly harmful to cracked (III). S and (II) together are more deleterious to (I) than is either material separately. Plumbite sweetened (III) containing excess of S; colour is stabilised, not by earth treatment, but by complete removal of S and (II). The colour of straight-run (III) is due to suspended particles, whilst that of cracked (III) is mainly due to sol. coloured compounds.

C. C.

Pure hydrocarbon standard for evaluating inhibitors. C. G. DRYER, C. D. LOWRY, JUN., G. EGLOFF, and J. C. MORRELL (Ind. Eng. Chem., 1935, 27, 315—317).—Cracked gasolines are unsatisfactory standards for evaluating inhibitors (I). *cyclo*Hexene (II) is proposed as a standard, and satisfactory secondary standards (III) were prepared by blending cracked

Pennsylvanian and W. Texas gasolines, respectively, with straight-run Pennsylvanian gasoline in such proportions that, over a wide range of concn., 1 pt. of α -C₁₀H₇·OH in (II) produced the same increase in induction period (IV) as 5 pts. in the gasoline standards. This was adopted as the necessary criterion for (III). The (II) no. is defined as the calc. increase in (IV) of (II) which 0.002 wt.-% of (I) would produce. The calculation is based on the (IV) experimentally determined in (III), which has been related to (II) by α -C₁₀H₇·OH. Solvents may affect the action of (I), but (IV) was unaffected if (I) were dissolved in hexone or C₆H₆. (II) nos. are given for 41 inhibitors. C. C.

Determination of water in light petroleum. M. CORD (Chem.-Ztg., 1935, 59, 288).—The apparatus comprises a cylindrical glass vessel (I) (capacity > 1 litre) closed at the upper end with a wide glass stopper carrying an inverted burette (II) the lower end of which is widened out to make a small funnel which covers the centre of a conical depression (III) in the bottom of (I). A small piece of Na is placed in (III), (II) is placed over it, and sufficient anhyd. light oil is placed in (I) to permit (II) to be filled with it by suction; 1 litre of the liquid to be tested is then placed in (I) and after 48 hr. the vol. of H₂ in (II) is read off, 1 c.c. of H₂ being \equiv 0.803 mg. of H₂O. A. R. P.

Benzene determination in alcohol-benzene mixtures for automobile motors. J. FORMÁNEK (Chem. Obzor, 1934, 9, 41–43; Chem. Zentr., 1934, ii, 2779).—The presence of C₆H₆ or its homologues is shown by formation of a rose or red solution on shaking with Algol-red B or Ciba-red B. C₆H₆ may be determined from the decrease in vol. on sulphonation with 90% H₂SO₄. J. S. A.

Determination of mol. wt. of mineral oils and polymerised hydrocarbons. M. LERER (Ann. Off. nat. Comb. liq., 1934, 9, 511–550; Chem. Zentr., 1934, ii, 2636).—The cryoscopic method is recommended. For oils of medium mol. wt. and for heavy oils PhNO₂ and C₆H₆, respectively, are recommended as solvents. For paraffins or for hydrocarbons which crystallise readily from C₆H₆, dioxan is used. H. J. E.

Synthetic alcohols and related products from petroleum. I. Olefine raw materials. II. Manufacture of alcohols and esters. B. T. BROOKS (Ind. Eng. Chem., 1935, 27, 278–282, 282–288).—A summary of the literature. C. C.

Refining lubricating oils by solvent extraction. J. V. HIGHTOWER (Chem. Met. Eng., 1935, 42, 82–85).—The oil is mixed with solvent (to prevent deposition of wax) withdrawn from a compartment of a continuous extractor (E), cooled, and passed into E, at one end of which C₃H₈ (I) is introduced and Selecto (S) (C₆H₆Me·OH 63, PhOH 37%) at the other. From opposite ends are withdrawn S with naphthenes in solution and (I) with paraffins in solution. A little of the S fraction contaminates the (I) fraction, and *vice versa*. In one of two series of towers (T), (I) and S are removed from the (I) fraction by evaporation by steam in the earlier T and by heat obtained by passing some of the bottoms from the last T through a tube furnace and returning it, and a residue of lubricating oil is left. The S fraction is

similarly heated in the other series of T, leaving a residue of naphthenic oil. The (I) and S are recovered and re-used. D. K. M.

Manufacture of paraffin [wax]. R. FUSSTEIG (Chim. et Ind., 1935, 33, 289–296).—The effect of the nature of the crystals of paraffin wax (I) present in crude petroleum on the ease with which they may be separated has been examined. From a detailed study of the crystallisation of (I) from solvents it is concluded that the most satisfactory method of isolating (I) from an oil containing paraffin is to treat the distillate in fractions. *E.g.*, 3 fractions (A–C) were treated: A, of lowest *d*, contained (I) in acicular form (III) and was easily separated by the usual methods; in B, containing lamellar crystals, the latter were transformed into (III) by the addition of a small amount of PhOH, after which separation occurs normally. A similar change was obtained in C (of highest *d*) by adding powdered siliceous earth to a solution of the oil in gasoline at –15°. By this process, gas oils and cylinder oils are obtained without further distillation of the fractions. C. C.

Drying [of coal etc.]. Multicomponent rectification. Absorption of gases. Gas-analysis apparatus.—See I. Properties of C₁₈H₃₈ etc. as lubricants. Separating H₂O from AcOH. Thermal reactions of C₆H₆.—See III. C at arc temp. Uses of photo-electric apparatus.—See XI. C blacks.—See XIII. Hydrogenation-cracking of rubber.—See XIV. NH₄NO₃ explosives.—See XXII. Determining C₆H₆ in air.—See XXIII.

PATENTS.

Agglomerated fuel. C. R. GOURDJI (B.P. 425,529, 26.9.34).—Coal or coke is briquetted, using a binder consisting of 70% of heavy oil and 30% of animal, vegetable, or mineral wax. A. B. M.

Absorbent briquette. C. L. KROPP, Assr. to OHIO CARBON CO. (U.S.P. 1,966,553, 17.7.34. Appl., 20.10.32).—Adsorbent material, *e.g.*, active C or SiO₂ gel, is mixed with a thermo-setting binder (B), *e.g.*, a PhOH–CH₂O resin, with H₂O, and, if desired, a filler, *e.g.*, cork or asbestos, and the mass is moulded and heated rapidly to the temp. at which B sets. A. B. M.

Manufacture of fuel briquettes [from waste material]. O. VON T. ROHN (U.S.P. 1,966,598, 17.7.34. Appl., 26.10.31).—Garbage containing animal and vegetable waste is ground, treated with a disinfectant, *e.g.*, CaOCl₂, mixed with 10–15% of a filler, *e.g.*, wet sawdust, and 5–10% of a bituminous binder, and heated with agitation at about 93° for 5–6 min. The mixture is then briquetted. A. B. M.

Regenerative coke oven with vertical heating flues. J. SCHAEFER (U.S.P. 1,967,975, 24.7.34. Appl., 11.8.30. Ger., 20.9.29).—The flues are provided with burners (B) at both top and bottom, which are used alternately. Within the transverse walls between adjacent flues are vertical passages which convey air from the regenerators (R) to the flues (or, during alternate periods, serve to withdraw waste gases from the flues to the R), and are so designed that one air-supply (A) enters the flue adjacent to the top or bottom B (whichever is in use), while another A enters about

halfway along the flue. When weak gas is used, another vertical passage in the wall conveys the gas to the top *B* from the *R*. A. B. M.

Manufacture of coke and combustible gas. W. W. ODELL (U.S.P. 1,968,053, 31.7.34. Appl., 1.11.30).—Solid fuel is carbonised, *e.g.*, in vertical retorts, and a gaseous or atomised hydrocarbon and steam are introduced in such manner as to be decomposed in contact with the hot coke, with the production of an additional amount of combustible gas (CH_4 , H_2 , and CO). A. B. M.

Production of coke and distillate. F. M. HESS (U.S.P. 1,968,038, 31.7.34. Appl., 16.1.29).—A mixture of powdered coal and a hydrocarbon liquid, *e.g.*, crude petroleum, is passed through a still (*S*) into a coking chamber (*C*) wherein it is briquetted while in a heated and plastic state, the material being subjected during the briquetting operation to restricted combustion in a current of air and steam in order to expel the remaining volatile constituents. The hot gases and vapours from *C* pass through *S*, their sensible heat being utilised in effecting the distillation. The initial materials are preheated before entering *S* by heat interchange, in the dephlegmator and condenser, with the vapours leaving it. A. B. M.

Coking hydrocarbon oils. G. R. LORD, Assr. to SINCLAIR REFINING CO. (U.S.P. 1,966,801, 17.7.34. Appl., 9.3.29).—Control of the coking of crudes, topped crudes, etc., in particular those containing foreign substances such as salt, is facilitated by first mixing therewith a proportion of residual tar from a cracking process. A. B. M.

Production of semi-coke. SOC. GÉN. DE FOURS À COKE, SYSTÈMES LECOCQ SOC. ANON. (B.P. 424,389, 26.5.34. Belg., 3.6.33).—The discharge of semi-coke from carbonising plants having horizontal or inclined chambers is facilitated by overbaking or completely coking the layer of semi-coke in contact with the sole of each chamber (*C*). This is effected, *e.g.*, by providing a horizontal heating flue beneath each *C*. A. B. M.

Treatment of coke. A. R. POWELL, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,968,311, 31.7.34. Appl., 1.9.31).—Coke is "de-dusted" and coloured by solutions of $\text{Ca}(\text{NO}_3)_2$ and CuSO_4 , the former in excess of equivalence. B. M. V.

Water-gas process. F. H. DECHANT, Assr. to INDUSTRIES OF AMERICA, INC. (U.S.P. 1,966,886, 17.7.34. Appl., 5.9.28).—The apparatus comprises a combined generator (*A*) and boiler (*B*). *A* is charged with low-grade anthracite culm or similar fuel, which is alternately air-blasted and steamed. The blast gases are burned in *B*. The fuel is only partly burned in *A*, the remainder being withdrawn and transferred to the furnace of *B*, where combustion is completed. The water-gas formed is passed to storage. Sufficient steam is generated to provide any required for other power purposes in addition to that used in *A*. A. B. M.

Contact substances [for the water-gas reaction]. NON-POISONOUS GAS HOLDING CO., LTD., and H. COHN (B.P. 424,478, 27.8.34).—A catalyst (*C*) for effecting the reaction $\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2$ is prepared by mixing an Fe compound, *e.g.*, bog-Fe ore (70 pts.), with an

alkali, *e.g.*, K_2CO_3 (10 pts.), and with a H_2O -eliminating binder, *e.g.*, cement (20 pts.), suitably shaping the mixture, and allowing it to harden. Water-gas etc. may be substantially freed from CO by passing it, admixed with the requisite quantity of steam, over the *C* at 400° . A. B. M.

Recovery of waste heat in water-gas operations. F. W. STEERE, Assr. to SEMET-SOLVAY ENG. CORP. (U.S.P. 1,967,013, 17.7.34. Appl., 17.11.28).—The hot waste gases from the "blow" are passed through a flash-boiler (*A*) containing refractory heat-absorbing surfaces. H_2O , preheated in a heat transformer (*B*), is then supplied to *A* and the high-temp. steam so produced is delivered beneath the surface of the H_2O in *B*. The steam, after giving up its excess heat in *B*, and augmented by steam formed in *B*, is supplied to the generator for the production of water-gas. A. B. M.

Treatment of gas. P. J. WILSON, JUN., Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,968,275, 31.7.34. Appl., 28.3.31).—Coke-oven gas or other crude fuel gas is cooled and partly condensed in the usual manner to produce tar and gas liquor. The latter is dephenolised in known manner and the phenoxide solution obtained is returned to a suitable point in the gas-cooling system, where the CO_2 in the gas decomposes the phenoxides, the liberated phenols being taken up by the tar condensed from the gas and by the gas itself. A. B. M.

Purification and removal of the poison and odour from the exhaust gases of internal-combustion engines. R. BLUM (B.P. 424,731, 2.3.34. Ger., 3.2.34).—The exhaust gases, together with additional air supplied by means of an injector (*I*), are passed through a catalyst chamber. The suction passages of *I* for the entry of the air open directly to the atm. outside the parts of the apparatus which become heated. A. B. M.

Recovery of ethylene and its homologues from gases. G. F. HORSLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 424,843, 1.9.33).—The gases are treated with a solution containing ammoniacal Cu^I nitrate, salicylate, or phenoxide, and the dissolved C_2H_4 etc. is recovered by subsequent heating and/or reduction of pressure. A. B. M.

Treatment of gas and apparatus therefor. J. M. JENKINS, R. C. THOMPSON, and D. R. MCNEAL, Assrs. to ANDALE CO. (U.S.P. 1,966,173, 10.7.34. Appl., 8.5.31).—Gas is freed from H_2O and oil vapours, in particular those which give rise to gum deposition, by refrigeration. The refrigerating system is so designed as to be operated, at least in part, by the sensible heat of the gas leaving the scrubbers. A. B. M.

Continuous generation of fixed gas from oil. H. BIRKBECK (TONGUE & BIRKBECK). From CARBURETTED GAS, INC. (B.P. 426,496, 11.10.33).—A mixture of CO and H_2 [produced from hydrocarbon oil (*I*) and O_2] is enriched to about 850 B.Th.U. per cu. ft. by injecting the requisite amount of (*I*) or oil gas. The mixture is heated at 620 – 900° (to obtain max. yield of fixed hydrocarbon gases) by causing it to traverse a channel (*C*) in counterflow to unenriched gas mixture flowing in an adjacent *C*, heat transfer occurring through the walls separating the channels. C. C.

Manufacture of permanent or fixed gases from fuel oils. H. A. HICKEY (U.S.P. 1,967,669, 24.7.34. Appl., 13.1.33).—The fuel oil, which should be a distillate oil leaving no residue on evaporation, is vaporised and passed through a catalyst consisting of a carrier impregnated with a metallic oxide (firebrick- MnO_2) under such conditions that its temp. is gradually raised to 750–1100°. Apparatus is described. A. B. M.

Distillation of tar and cracking of oil. T. O. WILTON (B.P. 424,645, 26.8.33).—A plant of the type described in B.P. 337,581 (B., 1931, 234) is provided with a thermostatic control so designed that the temp. of the finished product controls the amount of crude product admitted. A. B. M.

Manufacture of an asphaltic product. M. ERNOTTE (B.P. 424,494, 14.8.33. Belg., 12.8.32 and 24.3.33).—Bitumen of m.p. 40–65° is mixed with "sugar scum" (a by-product in the purification of sugar juices, containing CaCO_3 , Ca pectates, etc.), preferably in the ratio of $\leq 1:4$. The product can be granulated. Tar or heavy oil and, if desired, aggregates, e.g., sand or gravel, may be incorporated with the product. A. B. M.

Asphaltic and bituminous compositions. R. HERRMANN, LTD., and A. WOLF (B.P. 424,415, 17.7.33. Addn. to B.P. 372,755; B., 1932, 679).—Fresh Florida bleaching earth, as used for refining and decolorising in the petroleum industry, is incorporated in the compositions to render them hard without making them brittle or less ductile. A. B. M.

Analytical apparatus for testing asphalts. H. G. NEVITT, Assr. to WHITE EAGLE OIL CORP. (U.S.P. 1,967,424, 24.7.34. Appl., 17.10.32).—Asphaltic oil is weighed into a cup (*C*) which is placed over a source of heat (*H*) in a casing provided with means to withdraw fume. *C* is supported on a balance beam which is weighted to withdraw *C* from *H* at a predetermined loss in wt. B. M. V.

Treatment of acid tar or sludge obtained in refining oils with sulphuric acid. H. W. KUNZE (B.P. 426,844, 30.4.34. Ger., 4.5.33).—Undiluted acid-sludge tar from the refining of mineral oils and the like, the working up of fatty oils and wool grease with H_2SO_4 , etc. is agitated at 160–180° and then subjected to 10–25 atm. for 2 hr. Acid and asphaltic substances (*I*) are separated after atm. pressure has been gradually restored, and the mixture is cooled to 70°. H_2SO_4 etc. is driven off from (*I*) by superheated dry steam at 150–250°. C. C.

Removal of solvents from oils and other organic liquids. EDELEANU GES.M.B.H. (B.P. 426,764, 7.9.34. Ger., 21.2.34).—The high-boiling fraction (*I*) of a mixture of solvents (e.g., from solvent extraction of petroleum oil) is stripped with vapours (*II*) of the low-boiling fraction (*III*). Complete or partial separation of (*I*) from (*II*) is effected by cooling and/or irrigating with pure (*III*) in a rectifying column. If separation is incomplete, (*II*) are reintroduced about the middle of the stripping column, pure (*III*) being introduced at the bottom. C. C.

Separation of [solid] hydrocarbons. AKTIEB. SEPARATOR-NOBEL, and G. H. ANDERSSON (B.P. 426,920, 10.10.34).—Solid hydrocarbons (*I*) are removed from chilled solutions of hydrocarbons (*II*) by \leq a 2-stage

centrifugal treatment. A solution of (*II*) free from (*I*) and a concentrate (*III*) of (*I*) are first separated, (*III*) being further centrifuged to remove (*I*). Liquid in which (*I*) are insol. may be added to (*III*). Q. C.

Dispersions of combustible solid in oils. J. L. STEVENS and K. G. S. HATFIELD (B.P. 426,732; 9.10.33).—Stable dispersions containing 50% of combustible solid (*I*) in high-boiling oil (*II*) (b.p. 100–400°), e.g., coal in oil, are formed by grinding (*I*) to coarse colloid dimensions (passing 200-mesh I.M.M. sieve) with (*II*) and $\frac{1}{2}$ –1% [calc. on (*I*)] of vulcanised or unvulcanised rubber. The major portion of (*II*) may be added after dispersion. A peptiser, e.g., C_{10}H_8 oil, may also be added. C. C.

Production of fuels. A. P. A. C. ZU COREDO (B.P. 426,478, 2.9.33).—Fuels for internal-combustion engines are claimed, consisting of $\leq 40\%$ of benzol or its homologues (*I*), $\leq 30\%$ of raw spirit (85% EtOH), and $\leq 10\%$ of H_2O . Wood-spirit oil containing higher alcohols may replace part of (*I*). C. C.

Manufacture of lubricating oils. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 427,042, 30.10.33).—Distillation residues, b.p. $> 350^\circ$, obtained from solid carbonaceous materials by destructive hydrogenation or low-temp. carbonisation, are treated with alcoholic solutions of alkaline reagents (e.g., caustic alkalis) at $< 200^\circ$ ($< 100^\circ$). The undissolved portion after separation is extracted with selective solvents. C. C.

Testing of lubricating oils. W. HELMORE and A. A. GRIFFITH (B.P. 427,260, 19.10.33).—A measure of the tendency of a lubricating oil (*I*) to deteriorate under high-temp. oxidising conditions is obtained by subjecting (*I*) to continuous shearing in a closed cylinder *C* containing a free piston (*P*) (or a ball), by reciprocating *C* relative to *P*. The temp. is controlled and friction measured by observing the change of the load reaction, e.g., by an electric current indicator or recorder. *C* is charged with a measured quantity of O_2 or other gas and the depletion of O_2 can be periodically measured. C. C.

Raising the m.p. of montan wax. O. EBERHARDT, Assr. to A. RIEBECK'SCHE MONTANWERKE A.-G. (U.S.P. 1,966,168, 10.7.34. Appl., 24.9.31. Ger., 23.10.30).—The crude wax is heated at $> 200^\circ$ for about $\frac{1}{2}$ hr. with up to 1% of a metal hydroxide, basic oxide or carbonate, e.g., $\text{Ca}(\text{OH})_2$, in presence of H_2O . D. K. M.

Control of exothermic reactions. Treating emulsions.—See I. Alkylenes etc. Wetting etc. agents. Separating *p*-cresol from mixtures.—See III. H_2S detector.—See VII. Containers for transformer oil. Hydrogenation apparatus. Al alloys [for bearings, pistons, etc.].—See X. Fertiliser.—See XVI.

III.—ORGANIC INTERMEDIATES.

Properties of Δ^8 -octadecene, *n*-octadecane, and di-*m*-tolylethane. M. V. DOVER and W. A. HENSLEY (Ind. Eng. Chem., 1935, 27, 337–339).—Hydrocarbons $\text{C}_{18}\text{H}_{36}$, $\text{C}_{18}\text{H}_{38}$, and $(-\text{CH}_2-\text{C}_6\text{H}_4\text{Me})_2$ (*I*) were synthesised and their physical properties, together with acid and *I* vals., compared with those of petroleum fractions distilling at 160–166° and 171–177° at 10 mm. Hg pressure.

It was concluded that unsaturation is of no importance in relation to "oiliness." (I) gave a high coeff. of friction indicating that this series are not good lubricants. There is some evidence that a high dielectric const. is equiv. to a high friction coeff., and that straight-chain hydrocarbons are the best lubricants. C. I.

Detection and determination of methyl alcohol in liquids and in natural substances. M. FLANZY (Ann. Falsif., 1935, 28, 146—158).—The various methods are described and discussed, and it is concluded that the results obtained hitherto are only approx. Oxidation methods give variable yields, but should be applicable to research problems. J. G.

Modification of Thorpe and Holmes' method for determination of total proportion of methyl, ethyl, isopropyl, and propyl alcohols. S. S. AIYAR and P. S. KRISHNAN (Analyst, 1935, 60, 237—240; cf. B., 1903, 232).—The modification consists in washing the light-petroleum extract 5 times with H_2O after the first washing with brine, the washings being added to the brine layers for distillation. E. C. S.

Separation of water from acetic acid by azeotropic distillation. D. F. OTHMER (Ind. Eng. Chem., 1935, 27, 250—255).—Capital and steam costs for the production of AcOH from pyroigneous acid from wood distillation by azeotropic distillation are low compared with other processes. The operation of the plant is simple. Plate efficiency may be improved by the use of opposed tangential slot bubble-caps. D. K. M.

Determination of a mixture of formaldehyde and formic acid in presence of iodic acid. V. MACRI (Boll. Chim. farm., 1935, 74, 119—120).—A criticism of Lange's method (cf. B., 1935, 181). E. W. W.

Thermal reactions of benzene. F. C. MEAD, JUN., and R. E. BURK (Ind. Eng. Chem., 1935, 27, 299—301).— C_6H_6 vapour and N_2 were passed through a SiO_2 U-tube at 750—850° and Ph_2 , H_2 , CH_4 , and C_2H_2 identified among the products. If the tube was filled with SiO_2 chips decomp. was increased but was not \propto to the surface. Steel chips act catalytically and give greater decomp. There is little separation of C. The reaction, under these conditions, is heterogeneous and bimol., the quant. results being represented by $dx/dt = k(a-x)^2/x$. C. I.

Alleged isolation of o-3-xylidine from commercial xylidine. R. C. COOPER (J.S.C.I., 1935, 54, 134 T).—The process of Hodgkinson and Limpach (J.C.S., 1900, 77, 65) for isolating the constituents of commercial xylidine is criticised on the basis of new analysis figures. The fraction described previously as o-3-xylidine is held to be m-4-xylidine, and the isolation of the former substance by the above process is considered impossible.

Multicomponent rectification.—See I. **Determining C_6H_6 in EtOH-benzine mixtures. Synthetic alcohols etc. from petroleum.**—See II. **EtCO₂H by fermentation.**—See XVIII. **Determining C_6H_6 in air.**—See XXIII.

See also A., May, 589, **Effect of d.c. on nitration and oxidation of PhMe.** 604, **Electrolytic dehalogenation of simple org. compounds.** 605, **Prep. of**

tert.-amyl bromide, and of ethers in liquid NH_3 . 618, **Prep. of Et benzoylacetate.**

PATENTS.

Manufacture of alk[yl]enes and derivatives thereof. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 426,843, 30.4.34. Holl., 15.5.33).—Cracking of paraffin wax (I) or mixtures containing $\leq 20\%$ of (I) at $\geq 600^\circ$ in the vapour phase yields products from which alkylenes having $\leq C_5$ are readily separated by fractional distillation. *E.g.*, Indian (I) is cracked at 560° and fractionated to give heptenes, b.p. 92.8—94.5°, and nonenes, b.p. 143—147°, from which β -nonanol, b.p. 175—200°, is obtained by action of 90.3% H_2SO_4 at 0—5°, followed by hydrolysis. H. A. P.

Manufacture of acetic acid from acetaldehyde. A.-G. F. STICKSTOFFDÜNGER (B.P. 426,875, 11.10.33. Ger., 11.10.32).—MeCHO dissolved in AcOH or an inert medium is treated at $> 0^\circ$ (50—58°) with O_2 (air) containing O_3 , the AcOH being removed as formed. Pure N_2 is obtained as a by-product when air is used. Apparatus is described. H. A. P.

Manufacture of wetting and emulsifying agents. E. BERL (B.P. 426,785, 7.7.33).—The org. acids of H_2O -sol. acid tar are separated by osmosis, by removal of the bulk of H_2SO_4 by washing with H_2O (until the $[H_2SO_4]$ in the washings falls to $< 25\%$) and extraction with org. solvents other than H_2O -insol. alcohols, or by pptn. with aq. sulphates (saturated solutions), chlorides, etc., and are neutralised. Use of the products as emulsifying agents (+ soap) and as constituents of drilling oils is claimed. H. A. P.

Separation of p-cresol from liquid phenolic mixtures containing it. MONSANTO CHEM. CO., Assees. of F. COMTE (B.P. 426,175, 17.8.34. U.S., 25.11.33).—The mixture is heated with excess $H_2C_2O_4$ in an inert diluent (I) (solvent naphtha, b.p. 90—100°), the product is cooled, the cryst. adduct is separated, heated with (I) at 70—80° to decompose o- and m-cresol compounds, and the residue of p-cresol- $H_2C_2O_4$ adduct finally distilled in a vac. or with (I) or boiled under reflux with (I). H. A. P.

Manufacture of amino-alcohols [from sugars]. E. I. DU PONT DE NEMOURS & Co. (B.P. 426,062, 27.9.33. U.S., 27.9.32).—A mixture of a monosaccharide with NH_3 or a primary or sec.-amine in H_2O or EtOH is hydrogenated, using a base-metal catalyst [Ni-kieselguhr (I)] at 50—200° (80—125°)/ ≤ 15 atm., the temp. being raised slowly in the initial stages in order to facilitate the intermediate Schiff base formation. *E.g.*, glucose is heated with excess NH_2Et and (I) in H_2O at 90—100°/1500 lb. per sq. in. to give ethylglucamine, $NH_2Et \cdot CH_2[CH(OH)]_4 \cdot CH_2 \cdot OH$, m.p. 133—134. Other examples include the prep. of glucamine, m.p. 127°, methylglucamine, m.p. 127—128°, and of crude dimethyl- and β -hydroxyethyl-glucamine, xylamine, butylxylamine, and methyl-fructamine and -galactamine. H. A. P.

Manufacture of mixed carbonylsalicylic ether-anhydride of salicylocarbonic acid and homologues thereof. L. A. DUPONT (B.P. 426,243, 5.7.34. Fr., 11.7.33).—Interaction of $COCl_2$ with Na_2 salicylate in

PhMe at -5 to 0° gives the PhMe-sol. substance $o\text{-C}_6\text{H}_4\text{<}\begin{smallmatrix} \text{CO}\cdot\text{O} \\ \text{O}-\text{CO} \end{smallmatrix}$, which decomposes with evolution of CO_2 at $<$ its m.p. H. A. P.

Drying C_2Cl_6 . Purifying [mixed org.] liquids.—See I. C_2H_4 and homologues from gases.—See II.

IV.—DYESTUFFS.

Reactions of artificial organic dyestuffs permitted as colours for foodstuffs. P. RUGGLI and H. BENZ (Mitt. Lebensm. Hyg., 1935, 25, 345—371).—The properties, spectral characteristics, and chemical reactions of 29 dyestuffs are described. J. G.

Influence of atmospheric sulphur on dyestuffs and fabrics. A. T. KING (Proc. Chem. Eng. Group, 1933, 15, 99—102). A. G.

Photographic sensitisers.—See XXI.

See also A., May, 580, Prep. of sols of emeraldine. Diffusion coeffs. of dye solutions. 630 and 634, Prep. of carbocyanines. 634, Blue S dyes.

PATENTS.

Testing light-fastness of dyes.—See I. Cellulosic pigments.—See XIII. Photographic dyestuff images.—See XXI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Determination of damage in silk. S. R. TROTMAN and H. S. BELL (J.S.C.I., 1935, 54, 141—142 T).—Damage in silk may be determined by means of the viscosity, η , of its solution in a solvent which dissolves it without decomp. ZnCl_2 solution, d 1.67, is a suitable solvent. A 2.5% solution (wt./vol.) of undamaged degummed silk made by incubating the silk with the ZnCl_2 solution for 6 hr. at 37° should give $\eta \leq 19$ centipoises. Normal bleaching with H_2O_2 lowers η to about 18 centipoises, whilst overbleaching, damage due to HCl and NaCl, cause a marked depression of η . The drying-in of Na_2SO_4 also gives a distinct decrease in η , but 0.1N-NaOH has only a very slight effect.

Yellowing of wool by ultra-violet light. A. CASTIGLIONI (Chim. e l'Ind., 1935, 17, 82—84).—Yellowing probably depends on the occurrence of Salkowski's reaction between the H_2SO_4 formed by oxidation of the S of the wool and the cholesterol of the wool fat. T. H. P.

Temperature indicator for controlling the ironing of cellulose acetate rayon fabrics. FREITAG (Textilber., 1935, 16, 276).—A pellet of NHPbBz (m.p. 160°) is attached to the hot iron; it melts when the temp. is high enough to affect the rayon adversely. A. J. H.

Moisture requirements of mould fungi, with special reference to mildew in textiles. L. D. GALLOWAY (J. Text. Inst., 1935, 26, T 123—129).—For materials in equilibrium with the atm. the liability to mildew depends on the atm. R.H. rather than on the H_2O content (I) of the material; increasing (I) by adding deliquescent (II) does not increase the liability correspondingly, and any increase is a sp. effect of the (II). Different mould fungi vary in their min. R.H. from 75 to 95%. A. G.

Utilisation of bagasse. IV. Physical properties of Celotex. II. Tensile strength, bending strength, and hardness. H. KATO (J. Cellulose Inst., Tokyo, 1935, 11, 74—79; cf. B., 1935, 221).—The average vals. found are: tensile strength 16.13, bending strength 53.54 kg. per sq. cm., and hardness 58.9—102.8. A. G.

Cuprammonium hydroxide solutions for fluidity determinations. W. F. A. ERMEN and W. M. LORD (Textile Manuf., 1934, 60, 247).—Use of a modified prep. for detecting chemical damage to cotton, rayon, and linen is described. Results are comparable, but not identical, with those of the Shirley Institute method. Substitution of $\text{NMe}_4\cdot\text{OH}$ for NaOH in the prep. yields as good, but not better, results. CH. ABS. (p)

Manufacture of cellulose acetate films. P. V. KOZLOV (Photo-Kino Chem. Ind., 1933, No. 4, 43—59).—A general discussion. CH. ABS. (e)

Swelling of viscose films and methods of increasing their resistance to water. P. I. VOSKRESENSKI (Photo-Kino Chem. Ind., 1934, No. 1, 81—86).—Feasible methods of increasing the H_2O -resistance of viscose films are (1) lacquering; (2) esterifying, so as to produce a monomol. layer of cellulose; (3) adding suitable materials to the viscose; and (4) parchmentising the finished film. CH. ABS. (e)

Mechanism of nitration and the properties of cellulose nitrate. IX. Formation of cellulose trinitrate II and of cellulose dinitrate I. X, XI. Nitration of cellulose fibres and denitration of trinitrated fibres with dilute nitric acid-sulphuric acid mixture. T. TOMONARI (J. Soc. Chem. Ind., Japan, 1935, 38, 58—62 B, 62—69 B; cf. B., 1935, 265).—IX. When cellulose (C) is nitrated with mixed acid in which the ratio vol. of HNO_3 (d 1.52) to vol. of H_2SO_4 (d 1.84) is 4 the velocity of nitration falls with increasing % H_2O ; the products are C dinitrate II (D II) and trinitrate II (T II) which yield C hydrate when denitrated with $(\text{NH}_4)_2\text{S}$. When the ratio is 0.25 the velocity increases with increasing % H_2O . When $[\text{H}_2\text{O}]$ is $\geq 22\%$ the products are (D I) and (T I) which yield normal C when denitrated, but when $[\text{H}_2\text{O}]$ is 27% (D II) is obtained. When any of these mixtures is used to denitrate (T I) the products are different from those obtained by their use as nitrating acids.

X, XI. According to the conditions of nitration four nitrates, (D I), (D II), (T I), and (T II) may be formed, and these differ in % N, solubility, and X-ray diagram. The nitration may proceed homogeneously (permutoid-like) or it may be micellar heterogeneous (H) and nitrate the outside of the micelles first. Denitration is always H. A. G.

Ageing of cellulose nitrate films. A. DRINBERG and E. E. VEDENSKAJA (Photo-Kino Ind., 1933, 22—34).—The most durable plasticisers (I) are org. esters. Phosphates liberate H_3PO_4 which attacks cellulose nitrate. Bu_2 phthalate is satisfactory. Mixed (I) have advantages. Non-plasticising fats of the higher acids are useful stabilisers provided they have low I vals. CH. ABS. (p)

Testing and classification of coated papers. H. M. ANNIS (Paper Trade J., 1935, 100; T.A.P.P.I.

Sect., 133—134).—Methods for testing coated papers (*C*) are briefly reviewed, and the more promising of them indicated. The Ingersoll glarimeter for measuring finish should be supplemented by visual examination of *C*. The p_H of *C* may be determined by allowing distilled H_2O to remain on the sheet for a definite time. In applying the wax test for determining resistance to plucking, *C* should be in a moist condition, as in the offset printing process. H. A. H.

Determination of the cellulose content of news-paper. A. BACKMAN (Suomen Pap. Puntav., 1934, 302—308, 392—396; Chem. Zentr., 1934, ii, 2466—2467).—The method depends on microscopical measurement of the length of fibres, data for the wt. per unit length of which are recorded for various types of pulp. With < 15% of cellulose (I) the method is better than that using $p\text{-NO}_2\cdot C_6H_4\cdot NH_2$. With > 60% (I) it is less reliable than the lignin method. H. J. E.

Plastics from wood pulp.—See XIII.

See also A., May, 578, **Air-permeability and rate of filtration of Cellophane films.** 581, η of very dil. solutions of cellulose nitrate in $Et_2O\text{-}EtOH$. 610, **Native cellulose from crude cotton wool.**

PATENTS.

Production of viscose for producing artificial silk, films, lacquers, bands, and the like. UDDEHOLMS AKTIEBOLAG SKOGHALLS-VERKEN (B.P. 426,553, 31.7.33. Ger., 29.11.32).—Small quantities (0.5%) of "methylhexanol," borneol, terpineol, or Yarmor pine oil are added to the cellulosic material before or during the tearing or mercerising operations, whereby a viscose free from undissolved fibres is obtained. F. R. E.

Production of artificial filaments, ribbons, and like materials. J. BOWER (B.P. 426,330, 2.8.33. U.S., 8.8.32).—The spinning solution, *e.g.*, cellulose acetate, is extruded downwards through a hot air stream of const. velocity for a short distance to initiate setting, which is afterwards completed by a long air run in the open so that the filaments are accessible. F. R. E.

[Apparatus for] after-treating [washing] artificial silk. BRIT. BEMBERG, LTD. (B.P. 425,392, 31.1.34. Ger., 31.1.33).—Artificial silk threads are led in a helical path upwards around a vertical rotating cylinder or pair of cylinders, and is treated thereon with one or more washing liquors (I), arrangements being provided to prevent appreciable mixing of (I). A. J. H.

Manufacture of fibre boards and like products. W. W. TRIGGS. From MASONITE CORP. (B.P. 426,817, 4.11.33).—Hard fibrous board, which has been dried under pressure after formation on the machine, is impregnated with 4% of tung oil (*T*) (or other drying agent) and about 2% of a hydrocarbon waterproofing agent (*W*). It is then baked at 93° in presence of air for < 7 hr. Alternatively, *T* and *W* may be added either directly to the slush pulp (*S*) or partly to *S* and partly to the dried board. D. A. C.

Mineral material for use in the manufacture of paper and the like. MEAD CORP., Assees. of J. J. O'CONNOR (B.P. 426,948, 12.9.33. U.S., 12.9.32 and

28.8.33).—A small quantity of a dispersing agent (*e.g.*, 1 wt.-% of Na silicate) is added to an aq. suspension of china clay (*C*), and the mixture separated into two fractions by centrifuging. The fine fraction (*F*), which may comprise 50% of *C*, is then flocculated by addition of 0.75% of alum and filtered. *F*, in admixture with casein etc., is used as a coating agent, whilst the coarse fraction is used as a filler. *F* is claimed to give a higher finish than satin-white and regular coating clay. D. A. C.

Removal of printing ink from paper. L. L. ALSTED (B.P. 426,841, 13.4.34).—Printed paper is treated in a rod mill at 12—33% consistency, so as to form pellets (*P*) of loosely held fibres. These are then treated in a tank (*T*) with conc. aq. SO_2 (*S*) (about 1.8% of SO_2) and then with more dil. aq. SO_2 (about 0.5% of SO_2). *S* is introduced into the bottom of *T* and allowed to diffuse upwards through *P*, which are finally washed with H_2O acidified with H_2SO_4 . D. A. C.

Freeness tester [for paper pulp]. A. R. HARVEY, Assr. to GARDNER-RICHARDSON CO. (U.S.P. 1,970,521, 14.8.34. Appl., 25.4.31).—A predetermined quantity of paper pulp is kept in agitation for a period, after which it is permitted to form a mat upon a screen; the quantity of H_2O falling through the mat in unit time is measured. B. M. V.

Drying fibrous materials. Pptg. colloidal [cellulose] solutions.—See I. Asbestos sheet.—See IX. Cellulosic pigments. Coating sheet materials. Wrapping foil.—See XIII. Translucent film support.—See XXI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Bleaching of cellulose by irradiation. H. E. WAHLBERG (Svensk Pappers-Tidn., 1934, 37, 481—488; Chem. Zentr., 1934, ii, 2924).—Irradiation with a quartz-Hg arc lamp facilitates Cl_2 bleaching, but the action is largely superficial. H. J. E.

Azoic colours: their application to linen, technical control, and properties on the fibre. H. BLACKSHAW (J. Text. Inst., 1935, 26, p 51—59).—A summary of current practice, with special reference to securing thorough penetration by the dye and consequently good fastness to rubbing. Generally impregnation with Brenthols (I) is best carried out at a high temp., and the material entered dry. For subsequent drying a hot flue is best and 15% of H_2O should be left in the cloth. The developer should preferably have a moderate rate of coupling, and soaping should be at the boil. (I) are best applied to lawn in a padding machine, but to heavy caustic-shrunk dress linens in a jig. A. G.

Dyeing of cotton: particle size and substantivity. I, II. S. LENHER and J. E. SMITH (J. Amer. Chem. Soc., 1935, 57, 497—503, 504—508).—I. The rate of diffusion of Na *p*-sulphobenzeneazo-6-benzamido- (I) and 6-benzoyl-*p*-aminobenzamido-1-naphthol-3-sulphonate (II) (modified prep.) into (a) H_2O and (b) 0.1% NaCl at 25° is determined by Fürth's micro-diffusion method and the average micelle radii, *R*, are calc. *R* give apparent mol. wts. of 100 for (a), showing that the Einstein equation is not valid for calculations.

of R in H_2O ; in (b) (I) and (II) have apparent mol. wts. of about 1000 and 2300, respectively, showing the greater degree of aggregation of (II). Similar measurements show that large additions of electrolytes ($NaCl > Na_2SO_4$ or $Na_2SO_4 + AcOH$) decrease R ; rise in temp. has a similar effect, continuous for (I), but for (II) becoming appreciable only at 65° and marked at $> 80^\circ$. Cotton is dyed only when R is decreased to 18.8×10^{-8} cm. by addition of electrolytes or rise in temp. The difference in substantivity of (I) and (II) is thus connected with sensitivity of the micelles to breakdown rather than with structural groups.

II. Similar results are recorded for benzopurpurin 4B and 4BI, micelles of the former in H_2O at 25° containing several hundred mols. and those of the latter < 20 . Dyeing with the former can be achieved with exhaustion of the bath when R is about 35×10^{-8} cm., due, it is considered, to the presence of many smaller micelles and dissociation of the larger micelles (to maintain equilibrium) after adsorption of the small ones.

R. S. C.

Application of antimony electrodes for p_H measurements in dyebaths. M. DÉRIBÉRE (Rev. gén. Teint., 1934, 12, 331—335; Chem. Zentr., 1934, ii, 2603).—The construction, uses, and advantages of Sb electrodes for this purpose are described. They can be used in bleaching baths.

H. J. E.

Treatment of waste-water in sulphur-black dyeing. L. P. MICHEL (Rev. gén. Teint., 1934, 12, 337—345; Chem. Zentr., 1934, ii, 2602—2603).—Methods of treating the H_2O (containing org. matter, Na_2SO_4 , Na_2S , and Na_2CO_3) are discussed. Treatment with $Al_2(SO_4)_3$, $FeCl_3$, or $FeSO_4$ and with H_2SO_4 , or waste acid, is recommended.

H. J. E.

Dyeing of leather.—See XV.

PATENTS.

Production of dyeings and printings by means of ester-salts of leuco-vat dyes. DURAND & HUGUENIN A.-G. (B.P. 426,073, 12.12.33. Ger., 12.12.32).—The acid-oxidation stage is conducted in presence of $SnCl_2$ or $TiCl_3$, which prevents over-oxidation. The process is particularly applicable to Indanthrene and its derivatives.

H. A. P.

Printing and dyeing [of fabrics]. A. B. PÖSCHEL, Assr. to DECORATIVE DEVELOPMENT, INC. (U.S.P. 1,965,257, 3.7.34. Appl., 25.8.32).—Four-colour half-tone designs are printed on textile fabrics (I) by pressing thereon (e.g., by passage through a hot 2-bowl calender) a transfer sheet, coated with coloured patterns consisting of a plastic adhesive composition (II) and suitable dyes, and also a web of fabric or paper saturated with an org. volatile liquid which is a solvent for the dye but not for (II).

A. J. H.

Treatment of textile and fibrous materials. M. FREIBERGER (B.P. 425,689, 20.9.33).—Products obtained by acid or alkaline decomp. of protein (e.g., glue or milk-casein) beyond the protalbinic and lysalbinic stages (i.e., the degree of decomp. is $> 10\%$) but not beyond the peptide stage, improve the brightness and depth of the shades obtained in dyeing and printing wool with vat dyes.

A. J. H.

Improvement of wool. F. H. ROGERS. From DEUTS. KUNSTSEIDEN-STUDIENGESELLSCHAFT (B.P. 425,475, 6.9.33).—Raw (I) and dyed wools (II) are degreased and then treated so that their dyeing properties are inappreciably affected and in absence of H_2O for 1—4 hr. [4—6 hr. for (II)] with a fatty acid (e.g., HCO_2H , $AcOH$) or halogenated fatty acid (e.g., CCl_3CO_2H) containing $> C_5$ diluted with a volatile org. solvent (e.g., C_6H_6 , $COMe_2$, $EtOH$) which is afterwards removed by circulating air through the wool. (I) and (II) are thereby made more elastic and whitened (I) or brightened (II) in colour.

A. J. H.

Removal of stains from fabrics. C. KIENER (B.P. 427,071, 12.7.34. Fr., 12.7.33).—Apparatus is claimed.

B. M. V.

[Production of crinkled patterns on] crêpe fabrics. HEBERLEIN & CO. A.-G. (B.P. 426,158, 5.5.34. Ger., 22.5.33).—Crêpe (C) fabric containing fibres capable of parchmentisation (P) is printed with a reserve, then parchmented [H_2SO_4 (d 1.58) is used for cotton], and crêped. Alternatively, the fabric is first crêped, then stretched sufficiently to remove the C and dried, parchmented, and wetted to restore the C. P destroys the C so that a crinkled pattern on a C ground is obtained.

A. J. H.

Improvement [crease-proofing] of textile materials. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 426,956, 11.10.33).—Cotton and viscose (I) fabrics are made crease-resistant by impregnation with CH_2O or compounds reacting as CH_2O , a non-oxidising acid, and a non-resinophorous basic compound having < 1 radical of $< C_4$ (and a polyethylene glycol ether group) and drying at elevated temp. E.g., (I) is impregnated at 20 — 30° with 17% aq. CH_2O containing 0.2% of $NH_2 \cdot C_{18}H_{35}$ and 0.1% of HCl , and the goods are ironed at 140 — 150° .

H. A. P.

Producing a [cellulose] filler dressing for fabrics. I. and A. HEIDENHEIMER (B.P. 426,066, 14.11.33).—Fabric is filled with a paste consisting of paper-making material (e.g., wood pulp; 15—30 kg.), potato- or wheat-starch (10—15 kg.), and H_2O (80 litres). [Stat. ref.]

A. J. H.

Glazing, embossing, and finishing of textile fabrics. CALICO PRINTERS' ASSOC., LTD., L. A. LANTZ, and A. L. MORRISON (B.P. 425,032, 6.6.33).—The fabric is impregnated with an aq. solution of the initial condensation product of substances which give rise to synthetic resins, e.g., the solution obtained by boiling $PhOH$, CH_2O , and K_2CO_3 for a short time, then dried, conditioned, and subjected to mechanical treatment to give the desired lustre effect, which is stabilised by heating the fabric until the resin is converted into the insol. form.

A. R. P.

Testing light-fastness of dyes.—See I. Wetting etc. agents.—See III. Coating sheet materials.—See XIII.

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

Charts for specific volumes of mineral acids. J. H. PERRY and D. S. DAVIS (Chem. Met. Eng., 1935,

42, 87—88).—Nomographic charts are given for the determination of the sp. vol. of HNO_3 (1—100%), HCl (1—30%) and H_2SO_4 (1—99%) at 0—100° and of oleum (99—108% H_2SO_4) at 20—55° and oleum (108—111%) at 22—54°. D. K. M.

Chemical lime hydrate [calcium hydroxide]. S. P. ARMSBY (Chem. Met. Eng., 1935, 42, 90—93).—Examples are given of the different behaviour of Ca(OH)_2 (I) of apparently similar composition. (I) should be evaluated by its behaviour in use rather than by its composition alone. D. K. M.

Dielkometric measurement of combined water in lime paste. W. DAWIHL (Tonind.-Ztg., 1934, 58, 561—562; Chem. Zentr., 1934, ii, 2579).—On keeping over 50% H_2SO_4 , approx. 95% of the H_2O was given up rapidly, the residual H_2O coming off over 70% H_2SO_4 . Data are recorded for the rate of loss of H_2O on shaking with dioxan. The results are discussed. H. J. E.

Double decomposition and oxidation of inorganic compounds under pressure. Transformation of heavy spar into barium carbonate. V. N. IPATIEV and C. FREITAG (Ind. Eng. Chem., 1935, 27, 342—343).— Cr_2O_3 and excess of Ca(OH)_2 were heated for 12 hr. at 300—350°/100 atm. and the whole of the Cr_2O_3 was converted into CaCrO_4 . BaSO_4 heated at 320° with twice its equiv. of Na_2CO_3 in saturated solution at 180 atm. gave 93% conversion into BaCO_3 . Introduction of gases does not affect the reaction, except that CO_2 retards it. Dilution with H_2O slightly improves conversion. C. I.

Separation of potassium sulphate from schoenite solutions in processes for working up mother-liquors of salt lakes. E. NICCOLI (Chim. e l'Ind., 1935, 17, 155—159).—The advantages of the author's process (B., 1927, 249) over Bozza's (B., 1934, 623, 671) are stressed. D. R. D.

Principles of the manufacture of potassium permanganate. G. RAPIN (Chim. et Ind., 1935, 33, 803—810).—A review of known processes. C. I.

Efficacy of stabilisers used for preservation of hydrogen peroxide [solutions]. J. SONOL (Rev. fac. cienc. quim., La Plata, 1934, 9, 15—28).—Of 16 org. compounds tested, the most effective were phenacetin (I), NHPhAc , PhOH , and thymol. A diluted (12-vol.) solution to which 0.25% of (I) was added retained about 96% of its concn. after 7½ months. F. A. A.

Absorption of gases. Gas-analysis apparatus.—See I. Determining free S in spent oxide.—See II. Ti compounds in enamels.—See VIII. Residues from AlCl_3 manufacture.—See IX. Determining Zn in impure ZnO .—See X. Asbestos diaphragms [in NaCl electrolysis].—See XI. Natural guano.—XVI. Na aluminate and H_2O softening.—See XXIII.

See also A., May, 565, Phosphorescent substances. 589, Electrolysis of alkali fluophosphates. 591, Recovery of Ag and I from AgI . 593, Direct synthesis of nitrates at ultra-pressures. 596, Rapid test for As [in acids etc.].

PATENTS.

[Vacuum] concentration apparatus [for acid]. I. HECHENBLEIKNER, Assr. to CHEM. CONSTRUCTION CORP. (U.S.P. 1,969,793, 14.8.34. Appl., 10.8.31).—Dil. H_2SO_4 is passed downwards through a zigzag tube in the horizontal runs of which pools are maintained by suitable internal weirs. The tubes are heated by jackets, and the vapours drawn through a mist separator by a vac.-creating jet condenser. The conc. acid leaves by a barometric column long enough, when filled with heavy acid, completely to resist the vac., but an adjacent column filled with feed acid is insufficiently long to resist the vac. even at the higher inlet level. B. M. V.

Ammonium salt [for fertilisers]. E. W. HARVEY, Assr. to BARRETT CO. (U.S.P. 1,969,980, 14.8.34. Appl., 16.12.29).—To hygroscopic $(\text{NH}_4)_2\text{SO}_4$ dead-burnt CaSO_4 is added to take up H_2O , and also, if desired, a more basic Ca compound. B. M. V.

Brine solution. W. G. FINCH, Assr. to KOLD-HOLD MANUFG. CO. (U.S.P. 1,969,124, 7.8.34. Appl., 28.12.31).—A brine suitable for mechanical refrigeration comprises BaCl_2 19, KCl 18, and NaCl 4 oz. per gal. of H_2O . B. M. V.

(A) **Detergent composition.** (B) **Solid detergent.** G. S. EVANS, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,968,752—3, 31.7.34. Appl., 26.1.33).—(A) Dry fused mixtures of Na_3PO_4 and Na_2CO_3 in various proportions are claimed, including, if desired, < 10% of Na silicate. (B) A cake, preferably hemispherical and suitable for maintaining the detergency of dish-washing H_2O , is cast from the above or similar mixtures in such form that area (in sq. cm.) of cake surface ÷ wt. in g. = 0.4—0.9. B. M. V.

Production of hydrated basic sodium metasilicate. GRASSELLI CHEM. CO. (B.P. 427,497, 25.10.33. U.S., 25.10.32).—A hot solution of Na_2SiO_3 containing 35—40% of $\text{Na}_2\text{SiO}_3 \cdot \text{NaOH} \cdot 5\text{H}_2\text{O}$ and an excess of > 23 g. of NaOH per 100 c.c. is allowed to cool slowly to 25° and the crystals are separated, washed with aq. Na_2SiO_3 = the excess of NaOH in the mother-liquor which adheres to them, and dried in warm air. A. R. P.

Manufacture of potassium sulphate. BORAX CONSOLIDATED, LTD. From G. A. CONNELL (B.P. 426,305, 29.8.34).—An intimate mixture of KCl 53 and $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ 64 pts. is dissolved in cold H_2O 100 pts., whereby the temp. falls from 25° to —4° and almost pure K_2SO_4 is pptd. Alternatively, one salt may be dissolved in a cold solution of the other. A. R. P.

Production of barium sulphate and composite titanium pigments containing it. TITAN CO., INC. (B.P. 427,220, 5.3.34. Norw., 7.3.33).—A suspension of finely-divided BaCO_3 in H_2O containing about 0.1% of BaCl_2 is treated slowly with vigorous stirring with the theoretical quantity of H_2SO_4 to form BaSO_4 . The washed ppt. is suspended in aq. $\text{Ti(SO}_4)_2$ and the solution boiled to hydrolyse the Ti salt and produce a composite pigment. Alternatively, pure TiO_2 is added to the BaCO_3 suspension before treatment with H_2SO_4 . In either case the product is ground wet, dried, and calcined. A. R. P.

Preparation and purification of nickel carbonyl.

C. F. R. HARRISON and A. E. WALLIS (B.P. 426,741, 11.11.33).—CO saturated with $\text{Ni}(\text{CO})_4$ (II) obtained in the Mond Ni-refining process is compressed at 0° to 55 atm., whereby 95.4% of the (I) is condensed; alternatively, CO gases from a high-pressure reaction vessel at $80^\circ/250$ atm. are expanded to 70 atm., whereby 94% of the (I) is condensed. A. R. P.

Apparatus for producing solid carbon dioxide.

A. SELIGMANN (U.S.P. 1,968,318, 31.7.34. Appl., 15.1.32. Ger., 17.1.31).—To prevent stoppage of a dry-ice plant by choking of valves, the liquid CO_2 is pre-cooled to a temp. at which oil is still viscous and then passed through an oil separator before traversing the expansion valve. The admission valve (V) to the cake-making cylinder (C) is mounted on the wall of C, and before liquid CO_2 is admitted the pressure in C is raised above the triple point (T) by gas taken from some convenient point in the liquefying plant so that the temp. of V never falls below T. B. M. V.

Treatment of gases [for use in mercury switches].

C. J. WARNKE, ASSR. to ADAMS & WESTLAKE CO. (U.S.P. 1,967,952, 24.7.34. Appl., 29.4.33).—A gas claimed to be superior to H_2 in arc suppression, and in being neither absorbed by nor reactive with Ta, is composed approx. of $2\text{He} + \text{H}_2$ (probably HeH); it is purified by exposure to an arc in presence of Na, K, Ca, black P, Mg, Cs, and/or Ti, ionised from one of the electrodes. B. M. V.

Purification of gases [e.g., nitrous oxide].

BRIT. OXYGEN CO., LTD., and C. R. HOUSEMAN (B.P. 426,280, 6.12.33).— N_2O containing a small amount of N_2 is liquefied at room temp. by compressing it to > 60 atm. and is cooled by passage through a heat exchanger (I) to about the b.p. of N_2O ; on releasing the pressure practically all the N_2 is evolved. The residual liquid is again subjected to 60 atm. and warmed to room temp. by passage through (I). A. R. P.

Automatic apparatus for detecting hydrogen sulphide and the like in gases.

R. NORGATE (B.P. 426,378, 23.5.34).—A ray of light (of adjustable intensity) is caused to pass through a sheet of $[\text{Pb}(\text{OAc})_2]$ impregnated paper (I) and into a photo-electric cell, (I) being exposed to the gas in a cell which has transparent, pressure-resisting walls. B. M. V.

(A—C) Production of sulphur by reduction of sulphur dioxide (B) Production of sulphur by reduction of gases containing sulphur dioxide. (D) Recovery of sulphur by reduction of sulphur dioxide. A. R. LINDBLAD (B.P. 426,165, 426,455—6, and 426,850, [A, D] 13.6.34, [B, C] 12.6.34. Swed., [A] 6.9.33, [D] 22.2.34).—(A) Roaster gases (R) from pyritic ore containing 8—10 vol.-% of SO_2 are passed through a preheater (I) into the lower end of a reaction chamber (II) filled with porous brick coated with a mixture of finely-divided Fe_2O_3 and Na_2CO_3 , and hot producer gas (P) is passed into the top of (II), the resulting gas mixture containing S vapour being withdrawn from the bottom of (II) through (I). (B) A mixture of R and P is passed through (II) and up (I), which is kept at $500\text{--}1050^\circ$, then through a Cottrell

apparatus before passing to the S condenser. (C) A portion of R is passed over hot coke to produce P containing S vapour, and the hot gases are mixed with the remainder of R and passed through (I). (D) The catalyst in (I) comprises a mixture of cement containing < 25 (35)% of Al_2O_3 with Fe_2O_3 and/or Mn_2O_3 , preferably bog-Fe ore. A. R. P.

Treatment of gases [with acids]. E. J. MULLEN and W. S. ALLEN, ASSRS. to GEN. CHEM. CO. (U.S.P. 1,969,381, 7.8.34. Appl., 20.10.31).—In order to dry SO_2 gases immediately prior to catalytic conversion into SO_3 , the gas is passed downwards through a ring of filled tubes (T) concurrent with drying acid which is cooled *in situ* (H_2O may be applied to the exterior of T) and then upwards through a filling in a central tower of much greater cross-section to remove spray. B. M. V.

Electrolytic production of fluorine.

E. I. DU PONT DE NEMOURS & CO. (B.P. 425,979, 22.6.33. U.S., 31.10.32).—The electrolyte comprising a nearly saturated solution of KHF_2 in anhyd. HF is contained in an alloy-steel vessel (I) in which is immersed a Ni anode (II) within a steel cylinder (III) which is perforated only below the liquid line. Insulation of the various parts is effected with a mixture of AlF_3 and fused AgCl . (I) and (II) are passivated before use and are electrically connected with (III). A. R. P.

Production of hydrated sodium metasilicate.

GRASSELLI CHEM. CO. (B.P. 427,496, 25.10.33. U.S., 25.10.32).—See U.S.P. 1,953,839; B., 1935, 494.

Retort [for MgCO_3]. Granulating finely-divided materials. H_2O -softener.—See I. Catalyst.—See II.

Making glass with NaCl.—See VIII. White-Pb.—See XIII. Fertilisers. Fungicidal Cu compounds.—See XVI. Fumigating salt.—See XXIII.

VIII.—GLASS; CERAMICS.

Aggregation and transformation points of glasses from measurements of the electrical resistance. W. HÄNLEIN and M. THOMAS (Glastechn. Ber., 1934, 12, 109—116; Chem. Zentr., 1934, ii, 2875—2876).—Data are recorded for a Pb glass, a Thüringian glass, and a CaO—MgO glass. The plot of the resistance against $1/T$ shows in each case a break at the transformation point, but gives no indication of an aggregation point. H. J. E.

Micro-gas analysis of gas trapped in vitreous enamels on enamelling iron during firing. S. E. FREEMAN and V. W. MELOCHE (J. Amer. Ceram. Soc., 1935, 18, 123—125).—The sample was obtained by crushing the enamel on the Fe under a solution of glycerin and H_2O (1:1) saturated with NaCl, the gas being collected in a small tube over the end of an inverted funnel. The analysis was carried out on 25 cu. mm. of gas (from three 3-in. discs) in a Leighton apparatus. H_2O was absorbed by P_2O_5 , O_2 by yellow P, CO_2 by KOH, CO by Ag_2O , and the residual gas was exploded with pure O_2 . H_2 was determined by the contraction after explosion and CO_2 formed was reported as hydrocarbon. The gases contained, e.g., N_2 20—36, H_2 7—57, CO 17—26, O_2 3—12, and small amounts (1—4%) of hydrocarbon and CO_2 . J. A. S.

Behaviour of selenium in glass. W. HÖFLER (Glastechn. Ber., 1934, 12, 117—134; Chem. Zentr., 1934, ii, 2876).—The various colours of Se glass are attributed to 4 oxidation stages of Se, and are not due to the varying degree of dispersion. H. J. E.

Action of glass on refractory building materials. O. BARTSCH (Ber. deuts. keram. Ges., 1934, 15, 281—317; Chem. Zentr., 1934, ii, 2728—2729).—The corrosive action of glass melts at 1380° on immersed test-pieces increases as Na₂O is substituted for CaO, and Al₂O₃ for SiO₂. Pb glasses cause little corrosion, Ba glasses much. J. S. A.

Titanium compounds and application thereof in vitreous enamels. C. J. KINZIE and J. A. PLUNKETT (J. Amer. Ceram. Soc., 1935, 18, 117—122).—The effects of TiO₂, Al₂O₃, ZrO₂, SiO₂, SnO₂, and Sb₂O₃ on the expansion, m.p., and fluidity of a simple enamel were studied. Addition of $\geq 13\%$ of TiO₂ increased the fluidity and resistance to attack by AcOH and produced off-white (tan) colours and a degree of opacity due to recrystallisation. Colours (green—blue) were obtained by admixture of TiO₂ with ZnO and Al₂O₃, respectively. Good white, acid-resisting enamels were made containing TiO₂ + Sb₂O₃. The opacity induced by TiO₂ is due to its compounds with other ingredients. TiO₂ is too sol. in enamels to be a good opacifier. J. A. S.

Specification for enamelled hollow-ware. J. H. COSTE and D. C. GARRATT (Analyst, 1935, 60, 215—219).—The enamel (I) on enamelled-Fe ware is dissolved to a considerable extent (*E*) by comparatively dil. aq. org. acids (*A*), *E* being determined by [*A*] and the time of contact. A specification for "acid-resistance" is formulated. Sb should be absent from all materials used in the manufacture of (I). Acid extracts of (I) may contain B and F. E. C. S.

Antimony compounds extracted from enamel-ware by citric acid solution. R. H. BURNS (Analyst, 1935, 60, 220—222; cf. preceding abstract).—Sb compounds are extracted from "hard" enamels by dil. aq. citric acid. Cleaning and scouring increases the amount extracted. A modified method for the determination of Sb in such solutions is described. E. C. S.

De-aëration of clay. J. M. WILLIS (Trans. Ceram. Soc., 1935, 34, 197—200).—The effectiveness of the process in overcoming blistering, lamination, and cracking is briefly described. J. A. S.

Influence of preheating on the technical workability of clays. R. RIEKE and J. NAUMANN (Ber. deuts. keram. Ges., 1934, 15, 127—139; Chem. Zentr., 1934, ii, 2729).—A general diminution in plasticity and working qualities is produced by heating clays to $\geq 400^\circ$. The effect may become apparent through local overheating at 100°. J. S. A.

Plastometric investigations on substances of high consistency. IV. Determination and evaluation of shear curves of clay slips. G. UNGAR (Kolloid-Z., 1935, 71, 16—22; cf. A., 1935, 579).—The dependence of the shear curves on concn., presence of dextrin, and previous history of the clay has been determined. The evaluation of the consts. is discussed. E. S. H.

Water-smoking period [of ceramic ware] and its control. J. L. CARRUTHERS (J. Amer. Ceram. Soc., 1935, 18, 113—117).—The dew point of the kiln gases must be kept slightly $<$ the temp. of the ware in order to prevent condensation of moisture, which would lead to efflorescence and scumming, cracking, surface blistering, etc. The humidity (*H*) is regulated by admitting excess air (1500% when cold, to 150% when hot) which also eliminates troubles due to "sooting." It is recommended that the firing be controlled by measuring the temp. of the ware and *H* of the gases near the bottom of the setting. The construction and use of a wet- and dry-bulb hygrometer are described. J. A. S.

Studies on the structure of ceramic diaphragms by means of electrical measurements. J. VELIŠEK and A. VAŠÍČEK (Kolloid-Z., 1935, 71, 36—48).—In three kinds of porcelain (*P*) diaphragms of const. thickness the conductivity was \propto the surface of the diaphragm. With const. surface the resistance was \propto the thickness in only one kind of *P*. The different behaviour is ascribed to the fine structure of the diaphragms. E. S. H.

Influence of additions on properties of silica bricks. Z. S. KAINARSKI (Ogneuporui, 1934, 2, No. 8, 3—9).—Effects of various mineralisers are examined. Use of open-hearth slag gives poor results.

CH. ABS. (p)

Burning of magnesite bricks. II. J. H. CHESTERS and C. W. PARMELEE (Trans. Ceram. Soc., 1935, 34, 203—215).—Electrically fused MgO was moulded at pressures (*P*) up to 50,000 lb./sq. in. and examined for "reaction-expansion" (B., 1933, 916), shrinkage, and porosity. The porosity of the unburned material was reduced to 15.5% by using high moulding *P*, an oily or mucilaginous lubricant, and a grading of 70, 10, and 20% of particles, diam. 3.59, 0.55, and 0.09 mm., respectively. An increase in *P* from 4000 to 8000 lb./sq. in. reduced the porosity of the unburned material by 5.2%, but a further equal decrement required an additional *P* of 24,000 lb./sq. in. The burning shrinkage was reduced from 6.3 to 4.0% by an increase in *P* from 4000 to 12,000 lb./sq. in., but above this val. no further appreciable change occurred. The "after-contraction" of 4 brands of magnesite brick at 1500° for 2 hr. varied from 3.2 to 0.3%, being lowest for the materials having a low Fe₂O₃ content. J. A. S.

Burning of magnesite bricks. III. Crystal size determination by the Laue diffraction method. J. H. CHESTERS, G. L. CLARK, and K. C. LYON (Trans. Ceram. Soc., 1935, 34, 243—249; cf. preceding abstract).—The average crystal diam. (I), determined as above, of the grains in a no. of dead-burned magnesites (described previously) subjected to widely different heat-treatment was found to be approx. the same (0.06—0.075 mm.). The (I) of an Austrian MgO (II) was essentially = that of the rounded units (III) in the grains, as measured microscopically; (III) thus appear generally to be single crystals. (II) dead-burned in a shaft kiln showed preferred orientation of the periclase crystals within the grains, and certain samples, notably electrically fused MgO, exhibited internal strain, which was not removed by slow cooling from 1500°.

A. L. R.

Production of magnesite brick and new kinds of brick from carbonate raw materials. Z. TABAKOV and V. BELOVODSKI (Ogneuporui, 1934, 2, No. 9, 8—13).—Raw materials and working processes are described.

CH. ABS. (p)

Constituents and properties of "Radex" magnesite brick. P. P. BUDNIKOV and B. J. PINES (J. Amer. Ceram. Soc., 1935, 18, 125—127).—Physical, chemical, X-ray, and micro- and macro-scopical examinations were made. "Radex" consists almost entirely of periclase bonded by substances very similar to forsterite, monticellite, and a $\text{MgO-Al}_2\text{O}_3$ spinel. The same type of agglomerate is formed in the hearth of open-hearth furnaces. The fusion of 90% of MgO with 10% of open-hearth slag gives a material very similar to "Radex."

J. A. S.

Variations in the pyrometric cone equivalent of refractories after reheating at elevated temperatures. D. A. DICKENS, S. S. COLE, and M. E. HOLMES (Bull. Amer. Ceram. Soc., 1935, 14, 135—138).—The above val. was determined for 20 samples each of fireclay and firebrick "as received" and after heating at 1350—1550° for 5—50 hr. In general, the val. was lowered 1—3 cones, but in some cases was raised 1 cone.

J. A. S.

Guarded radiation plate method for determination of thermal conductivity of refractories at elevated temperatures. C. A. PETERSON (J. Amer. Ceram. Soc., 1935, 18, 128—134).—Details of the use and construction of the apparatus are described, particular attention being given to the calibration of the radiation plate and the technique of welding of the thermocouple wires.

J. A. S.

Properties and applications of modern refractories. W. F. ROCHOW (Chem. Met. Eng., 1935, 42, 76—80).—A review. The temp. at which reaction between different refractories takes place are tabulated.

D. K. M.

Glass heat exchanger. Drying [of clay etc.]. Inducing crystallisation.—See I. Chemically resistant Fe alloys.—See X. Ceramic pigments.—See XIII.

See also A., May, 567, Borate glasses of low alkali content. 574, System $\text{Na}_2\text{O-B}_2\text{O}_3$. 596, Rapid test for As [in ceramic wares]. 599, Prep. of sintered glass filters.

PATENTS.

Manufacture of glass with salt. H. A. WADMAN, Assr. to HARTFORD-EMPIRE Co. (U.S.P. 1,970,112, 14.8.34. Appl., 10.8.32).—Fused NaCl is electrolysed in a minor compartment attached to a glass-melting tank, the cathode (K) being in the floor near the dividing wall, which does not extend up to bath level. Molten Na rising from K is deflected into the main bath just under a floating mass of other glass-forming materials, among which it is oxidised.

B. M. V.

Glasses for stems and flares of electric lamps. CORNING GLASS WORKS, Assees. of W. C. TAYLOR (B.P. 425,007, 23.10.33).—Claim is made for a glass containing SiO_2 56—60, PbO 19—30, K_2O 8—10, Na_2O 2.9—3.5,

Li_2O 0.1—1.2, Al_2O_3 \geq 2, BaO 6.5—7.7, and B_2O_3 \geq 2%.

A. R. P.

Grooving of laminated glass. E. H. HAUX, Assr. to DUPLATE CORP. (U.S.P. 1,966,817, 17.7.34. Appl., 8.4.33).—The effectiveness of conc. H_2SO_4 used for removing cellulosic plastic about $\frac{1}{8}$ in. deep around the edges of the glass is increased by applying an electric current to the bath, the composite sheets forming part of the anode.

B. M. V.

Preparation of ceramic raw materials. DOULTON & Co., LTD., and J. P. LORAINS (B.P. 426,662, 15.11.33 and 4.10.34).—Clay slip, after purification and addition of usual electrolytes, is subjected to heat and vac. in a jacketed vessel provided with stirrers and a piston for discharge of the plasticised clay.

B. M. V.

Manufacture of ceramic product [from ashes]. L. KERN (U.S.P. 1,967,311, 24.7.34. Appl., 18.6.30).—A mixture of \leq 50% of coal ashes, argillaceous material, and a chloride plasticiser is ground together, moulded, and fired.

B. M. V.

Manufacture of bricks or the like. G. E. ROGERS (B.P. 426,444, 17.3.34).—Apparatus for applying a sand facing is described.

B. M. V.

Manufacture of highly refractory products. E. RYSCHKEWITSCH, Assr. to DEUTS. GOLD- u. SILBER-SCHNEIDANSTALT VORM. ROESSLER (U.S.P. 1,969,099, 7.8.34. Appl., 26.3.31. Ger., 8.4.30).—The mass is composed of ZrO_2 mainly, MgO \geq 5%, and BeO 0.5—2.0%. It is shaped after moistening with a very small quantity of a hydrolysable compound, e.g., a chloride, of the above metals and fired at \leq 1400°.

B. M. V.

Manufacture of porous refractory material. G. SLAYTER, Assr. to OWENS-ILLINOIS GLASS Co. (U.S.P. 1,967,375, 24.7.34. Appl., 15.6.32).—A vitreous material of lower m.p. (ordinary glass) is melted and grains of a material of higher m.p. (SiC) are mixed in; the whole is then rapidly subjected to a vac., the dissolved gases assembling around the unfused grains as points of departure and causing the mass to be porous when solidified.

B. M. V.

Granular material.—See IX. [Prep. for] grinding etc. tools.—See X.

IX.—BUILDING MATERIALS.

Beneficiating cement raw materials by agglomeration and tabling. F. P. DIENER, J. B. CLEMMER, and S. R. B. COOKE (U.S. Bur. Mines, Mar., 1935, Rept. Invest. No. 3247, 6 pp.).—When limestone (I) contains flints (II), (II) may be separated by treating the rock with soap and oil; (I) becomes coated with oil, but (II) are unaffected and may be separated by tabling. Fine materials are best cleaned by froth flotation.

T. W. P.

Flotation solves a problem in [cement] process raw materials. T. R. OLIVE (Chem. Met. Eng., 1935, 42, 68—72).—Part of the cement plant at West Conshohocken, Pa., is described and illustrated. The cement rock is ground with H_2O and classified in a Dorr hydroseparator. Calcite particles are removed by

froth flotation, using oleic acid and cresol as collecting agents. The froth is diluted with H_2O and conc. in Dorr thickeners to give a slurry ready for use in the kiln. Micrographs of the cement rock and of the product at different stages of this process are given. The different results obtained by burning mixtures of the same analysis in cement manufacture are due to the condition of the SiO_2 present. D. K. M.

Magnesite for preparation of flooring cements. H. JORDT (Chem.-Ztg., 1935, 59, 376).— MgO for Mg oxychloride cements (I) should contain $MgO < 76$, $H_2O > 5$, $CO_2 > 6$, $CaO 4.5$, $SiO_2 > 15$, and $Fe_2O_3 + Al_2O_3 > 8\%$. A quick method for comparing the quality of two kinds of flooring (I) consists in keeping two slabs of the material at 50° in a humid atm. and observing their rate of deterioration. A. R. P.

Influence of magnesia in Portland cement clinker on the tetracalcium aluminate ferrite. The system $CaO-MgO-Al_2O_3-Fe_2O_3$. H. E. SCHWITTE and H. ZUR STRASSEN (Zement, 1934, 23, 511—514; Chem. Zentr., 1934, ii, 2878).—From X-ray evidence, $4CaO, 2MgO, Al_2O_3, Fe_2O_3$ is not formed. Separation of periclase is detectable only at high $[MgO]$. $4CaO, Fe_2O_3, Al_2O_3$ forms mixed crystals with MgO , with a colour change from yellowish-brown to olive-green. ZnO and NiO also cause colour changes to dark green and brownish-black, respectively. Spinel formation cannot occur. H. J. E.

Direct determination of alkalis in Portland cement. A. A. BERK and P. S. ROLLER (Concrete, 1935, 43, No. 3, 38—39).—The cement is treated with HCl (1:1), heated to dryness at 150° for 30—60 min., extracted with $AcOH$ (1:20), and after filtration the filtrate (I) is made up to known vol. K is determined by adding H_2PtCl_6 solution to part of (I), evaporating to dryness, taking up with $EtOH$, and filtering to obtain K_2PtCl_6 (II). Pt is pptd. from the (II) solution with Mg wire. Na is determined in a second part of (I) by concentrating and pptg. as $(UO_2)_3ZnNa(OAc)_9 \cdot 6H_2O$. T. W. P.

Effect of brand and type of cement on strength and durability of concrete. I. LYSE (Amer. Concr. Inst. J., 1935, 6, 247—271; Road Abs., 1935, 2, No. 170).—The strength (I) and durability (II) (measured by freezing and thawing tests) of different cements were directly \propto the cement/ H_2O ratio (III). No relationship existed between (I) and (II) of concretes containing different cements, or between (I) and (II) of a concrete and its chemical composition or its solubility in the Merriman sugar test. (II) increased with (III), and for lean mixes the (II) of rapid-hardening Portland cements (A) was $>$ that of standard Portland cements (B). Little differences in (II) existed with average or rich mixes of A or B. High- Al_2O_3 cements showed lowest (II). T. W. P.

Hardening of cement mortar—an electrostatic phenomenon. L. JESSER (Zement, 1934, 23, 514—518; Chem. Zentr., 1934, ii, 2877).—A discussion of the relation between hardening, cohesion, and electrical properties. H. J. E.

Measurement of heat of hydration of cement by heat of dissolution principle. S. GIERTZ-HEDSTRÖM

(IVA, 1934, 67—72; Chem. Zentr., 1934, ii, 2578).—Vals. are recorded for Portland cement. H. J. E.

Concrete from granular blast-furnace slag after exposure to sea-water for twenty-seven years. V. SEVIERI (Tonind.-Ztg., 1934, 58, 587—589, 601—602; Chem. Zentr., 1934, ii, 2578).—The material still showed satisfactory properties. CaO had dissolved away, but the material was still basic, a large part of the sol. SiO_2 having become insol. in HCl . This and other products of hydrolysis caused the strength to be retained. H. J. E.

Concrete from granular blast-furnace slag. A. GUTTMANN (Tonind.-Ztg., 1934, 58, 616—617; Chem. Zentr., 1934, ii, 2578).—In the material described by Sevieri (cf. preceding abstract) reaction between CaO and the slag was unimportant. H. J. E.

Temperature effects on compressive strength of concrete. A. G. TIMMS and N. H. WITHEY (Amer. Concr. Inst. J., 1934, 6, 165—180; Road Abs., 1935, 2, No. 169).—When concrete strength is retarded by exposure to low temp., the full potential strength is produced by curing in air at 27° followed by warm- H_2O curing at 22° . T. W. P.

Increase in plasticity [of mortars etc.] by addition of bentonite. K. ENDELL and C. WENS (Ber. deuts. keram. Ges., 1934, 15, 271—280; Chem. Zentr., 1934, ii, 2577).— Ca -bentonite (I) (1—5%) raises the plasticity (P) of non-plastic materials greatly without increasing the shrinkage on drying (S). Na -bentonite (II) increases S without altering P. The dry strength is increased by both (I) and (II). H. J. E.

Waterproofing agents for mortars. C. R. PLATZMANN (Zement, 1934, 23, 471—473; Chem. Zentr., 1934, ii, 2432).—Presence of stearate (I) reduces H_2O penetration, but in larger amounts ($> 0.4\%$) it decreases the strength of the mortar. H. J. E.

Heat of hydration of mortars. P. P. BUDNIKOV (Compt. rend., 1935, 200, 1047—1048).— $CaSO_4 \cdot \frac{1}{2}H_2O$ has max. heat of hydration (I) after ignition at 200° . Above this temp. (I) decreases progressively, disappearing at 750° , when it is no longer hydratable unless treated with a catalyst, e.g., H_2SO_4 , $NaHSO_4$, or $CuSO_4$. (I) has also been determined for various types of cements. J. W. S.

Pozzuolanic material from residues in aluminium chloride manufacture. P. P. BUDNIKOV (Zement, 1934, 23, 749—750).—The kaolin residue (I) after manufacture of $AlCl_3$ in presence of Cl_2 and CO_2 contains active SiO_2 . Admixture of 10—30% of (I) with Portland cement increases the resistance to salt solutions; mixtures containing 60—70% may be used for white cement. T. W. P.

Technical properties of roofing slates and their determination particularly as regards weather-resistance. K. STÖCKE (Z. deut. geol. Ges., 1934, 86, 7—18; Chem. Zentr., 1934, ii, 2732).—A specification for weather-resistant slate is based on the swelling in 2% aq. H_2SO_4 and in SO_2 , H_2O absorption at 1 and 150 atm. pressure, and on mechanical properties. J. S. A.

Wood substances from Manchuria. I. Wood constituents from the Sungari river district of

Kirin. K. NISHIDA, T. FUKAMIZU, and H. HASHIMA (J. Cellulose Inst., Tokyo, 1935, 11, 66—73).—Physical and chemical data are given for the woods of fourteen species of trees.
A. G.

Steam treatment of beechwood. C. G. SCHWALBE and W. ENDER (Forstarch., 1934, 10, 33—38).—Wood steaming for furniture making is described. Steamer samples contain higher proportions of H_2O -sol. matted and of reducing substances than does untreated wood.
Ch. Abs. (p)

Wood preservation. Osmosis process. F. MOLL (Forstwirts. Centr., 1933, 40, 755—757).—Freshly felled and barked wood is treated with a protective aq. paste containing an adhesive. Subcortical tissues are protected from infection by *Ceratostomella* spp. after a few days.
Ch. Abs. (p)

Testing of commercial wood preservatives. S. KAMESAM (Forest. Res. Inst. Dehra Dun, Forest Bull. [Econ. Serv.], 1933, 81, 1—40).—Best fixation of As in wood was obtained by use of a prep. containing equal proportions of Na_3AsO_4 and $K_2Cr_2O_7$. Satisfactory results were obtained against *Coniophora cerebella*, *Lenzites thermophila*, and *Fomes annosus* on pine and beech and against beetles.
Ch. Abs. (p)

Apparatus for measuring the fire-resistance of impregnated wood. V. VIRTALA (Suomen Kem., 1935, 8, A, 13—17).—Apparatus for determining combustion loss and ignition temp. of impregnated wood shavings is described.
A. G. P.

Testing the strength of glued joints in plywood. P. KRUMIN (Chem. Fabr., 1935, 8, 160—162).—In the usual method in which test-pieces are pulled apart by a tension machine, bending moments are set up which may lead to the wood cracking. For laboratory tests intended to estimate the val. of the glue it is better to use thicker wood layers outside, with a thin internal layer. Many factors are detailed which must be controlled if reproducible results are to be obtained. They include: H_2O content of the strips, time under pressure, quantity and condition of glue, dimensions of test-piece, etc.
C. I.

Road tar.—See II. Bagasse.—See V. CaO paste.—See VII. Refractory building materials.—See VIII. Paints for wood. Plastics from wood pulp.—See XIII.

PATENTS.

Production of lime-gypsum plaster. S. G. McANALLY (U.S.P. 1,967,959, 24.7.34. Appl., 11.12.30).—A mixture is made of (1) burnt CaO , (2) raw $CaSO_4 \cdot 2H_2O$, and (3) a little H_2O to start the reaction, the main reaction being transfer of H_2O from (2) to (1). (3) is preferably added as moisture absorbed in diatomaceous earth.
B. M. V.

Plastering compositions. GOTHAM CO., LTD., and C. L. HADDON (B.P. 426,343, 30.9.33).—Retarded hemihydrate plasters are intimately mixed with paper-fluff or paper-dust fillers. The products with H_2O are worked to rough, indented surfaces.
T. W. P.

Production of waterproof asbestos sheet. I. J. NOVAK, Assr. to RAYBESTOS-MANHATTAN, INC. (U.S.P.

1,967,062, 17.7.34. Appl., 19.12.31).—Asbestos is made up with a fatty acid size, e.g., oleic acid, and a stiffening agent, e.g., glue heated with CH_2O , the total combustible being < 15%.
B. M. V.

Granular [roofing] material. E. H. NICHOLS (U.S.P. 1,970,471, 14.8.34. Appl., 13.9.32).—Each granule comprises a base of porous material, an inter-fused binder (applied as an aq. solution), and an outer coating of fused porcelain.
B. M. V.

Manufacture of cement. FULLER CO., Assees. of C. H. BREERWOOD (B.P. 426,423, 24.11.33. U.S., 1.12.32 and 21.10.33).—See U.S.P. 1,931,921; B., 1934, 675.

Determining grain size [of cement].—See I.

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

Effects and avoidance of air-leaks in the open-hearth furnace. G. KÖHLER (Stahl u. Eisen, 1935, 55, 383—391).—Although the elimination of all air-leaks (A) would result in an appreciable economy of the total heat consumption, the fall in efficiency of the furnace (F) after long periods of working cannot be ascribed to A since they are sensibly const. during the working life of F.
W. P. R.

Nitrogen content of [ferrous] slags. W. EILENDER and O. MEYER (Stahl u. Eisen, 1935, 55, 491—493).—N content of cast Fe and steel varies with the method of manufacture. Bessemer and electric-furnace steels have comparatively high N contents and the slags used in their manufacture have also a high proportion of N. There is, however, no evidence to indicate an equilibrium ratio of N in slag : N in metal.
W. P. R.

Physico-chemical colloidal method for separation of carbide from the slag from steel. S. M. GUTMAN, P. A. REHBINDER, M. D. SCHULWAS, M. E. LIPETZ, and M. M. RIMSKAJA (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 308—312).—The carbide is first decomposed by neutral aq. $CuCl_2 \cdot 2NH_4Cl$ and the graphite formed is separated by selective dispersion and peptisation in aq. tannin or Na alizarinsulphonate in presence of 0.01N-NaOH or Na_2SiO_3 , when the free slag sinks to the bottom.
R. S. B.

Present status of direct production of iron and steel from ores. R. S. DEAN (Min. & Met., 1935, 16, 185—186).—Direct processes are likely to be economical only if a high-grade Fe_2O_3 concentrate (I) can be obtained, e.g., by a.-c. magnetic separation. Reduction of (I) by natural gas partly burned to CO and H_2 over a Ni or Al_2O_3 catalyst gives a good sponge Fe for making wrought Fe (II). Alternatively, a finely-ground mixture of (I) and coal affords a slag-metal mixture suitable for making (I) by heating slowly through the range 900—1450°.
A. R. P.

Determination of the change in volume of iron on solidification. G. ERICSON (Iron & Steel Inst., Carnegie Schol. Mem., 1934, 23, 13—45).—The contraction in vol. of Fe on freezing has been measured by allowing a spherical mass of the metal to cool in such a way that a crust is formed and the contraction produces a cavity;

from the apparent sp. vol. of the hollow specimen and the true sp. vol. determined after cutting the sphere in half the contraction can be calc. The val. for pure Fe is $-2.4 \pm 0.2\%$. A similar method is available for determining the expansion on cooling of grey cast Fe, but in this case the vol. of the portion of metal extruded through the solid crust is measured; the val. obtained, $+1.2\%$, is much $<$ that obtained by other methods.

A. R. P.

Aluminium-manganese-silicon cast irons.

A. L. NORBURY and E. MORGAN (Iron & Steel Inst., Carnegie Schol. Mem., 1934, 23, 107–124).—The microstructure, magnetic properties, and mechanical properties of cast irons containing Al ≥ 6 , Mn 6–19, and Si $\geq 5\%$ have been determined. The best alloy from all points of view is that containing C 3.5, Si 3, Mn 9, and Al 3%; it has a Brinell hardness of 163, is readily machinable and practically non-magnetic, and has a similar mechanical strength to ordinary cast Fe. Above 400–500° the alloys become magnetic but are stable at lower temp., can be cast into $\frac{3}{8}$ -in. sections without mottle, and have a good fluidity and low shrinkage. Reduction of the C, Si, or Al improves the strength, but increases the tendency to mottle in thin sections, increase in Si and Al makes the alloys weaker and more brittle, increase in Mn increases the tendency to mottle, and decreasing the Mn to $< 7\%$ causes the alloys to become magnetic. The properties of many of the alloys are shown in tables, graphs, and diagrams.

A. R. P.

Embrittlement of low-carbon steel. F. C. LEA and R. N. ARNOLD (Proc. Inst. Mech. Eng., 1934, 127, 299–323).—An internal change, not detectable by X-rays, in the lattice structure of steels with $< 0.5\%$ C occurs during storage at room temp. after quenching from 650° in H_2O ; this change produces a progressive embrittlement (E), which is the more marked the lower is the C content, and appears to reach an equilibrium state in 30 days, the hardness (H), tensile strength (S), and fatigue limit being considerably increased and the ductility and resistance to impact (I) much reduced. Quenching at 750° produces instantaneous E , but as the quenching temp. is raised the E effect is diminished to an extent which is greater the lower is the C content; thus a 0.12% C steel acquires a S of 40 tons per sq. in. with a (I) of 40 ft.-lb. after quenching from 800° and ageing for 50 days at room temp. E may be produced rapidly by cold-working immediately after quenching, and may be prevented by artificial ageing at 100° for 4–5 hr., which produces an increase in H without a reduction in (I). To prevent E effects in the core of case-hardened mild steel it is recommended to harden at 800° and follow with a tempering at 100–200° for several hr.

A. R. P.

Bend test, and its value as a guide to ductility [of steel]. L. W. SCHUSTER (Inst. Mech. Eng., April, 1935, Advance copy, 100 pp.).—The bend test is capable of yielding important information regarding the properties of the material tested, but since the test involves plastic deformation as well as elastic strain theoretical treatment of the problems arising from this form of test is impossible. By the use of empirical data simple formulæ have been derived, and the ductilities obtained

by means of the tensile and bend tests, respectively, have been correlated. W. P. R.

Plasticity of steels and their fracture at high temperatures. M. DE LACOMBE (Chim. et Ind., 1935, 33, 793–799).—The newer types of alloy steel often have “zones of fragility,” (Z), i.e., between certain temp. limits they become brittle. These are scarcely indicated by compression tests, and are essentially due to intercryst. fracture though their probability is not always detected by photomicrographs. In some cases the rate of deformation is important; thus a mild steel (C 0.1, Si 0.3, Mn 0.3%) is brittle to static deformation at 950–1000°, but not to impact. The forging of special steels in the light of present knowledge is thus a distinct problem for each alloy. Similarly, complicated castings may be cracked by strains due to sudden temp. changes. Laboratory- and small-scale study of the Z is possible and desirable.

C. I.

Fracture test as used for tool steel in Sweden. R. ARPI (Metallurgia, 1935, 11, 123–127).— $\frac{7}{8}$ -in. square bars of 1% C steel are quenched in salt H_2O from 800°, 850°, and 900° and fractured. Low depth of hardening and small grain size (G) in the hardened zone generally indicate well deoxidised steel with little tendency to form hardening cracks. The G is compared with standards prepared at the Metallografiska Institutet.

E. H. B.

Elastic properties of steel at high temperatures. G. VERSÉ (Trans. Amer. Soc. Mech. Eng., 1935, 57, 1–4).—The modulus of elasticity and of rigidity cannot be accurately determined at high temp. by static tests; dynamic tests should be used.

W. P. R.

Grain size of Bessemer steel. H. W. GRAHAM (Trans. Amer. Soc. Met., 1935, 22, 926–940).—There does not appear to be any correlation between machinability and grain size as determined by the McQuaid-Ehn test of Bessemer steel.

W. P. R.

Grain size in metals, with special reference to grain growth in austenite. M. A. GROSSMAN (Trans. Amer. Soc. Met., 1934, 22, 861–875).—The inherent grain size (S) of steels with $< 0.50\%$ C, as shown by the McQuaid-Ehn test, depends on several factors. Hot-work may either coarsen or refine the structure, depending on the finishing temp. Similarly, normalising may affect the austenite S , and usually causes grain growth to start at a lower temp. The effects of various treatments are considered in carburising mild steel; the austenite S of the case may differ from that of the core.

W. P. R.

Grain size, hardenability, and normality of steels. E. S. DAVENPORT and E. C. BAIN (Trans. Amer. Soc. Met., 1935, 22, 879–921).—Uniform grain size (S) in austenite (A) is quickly established as soon as all the Fe_3C is dissolved, and if this initial S is fine, grain growth may occur unless it is restrained by the presence of dispersed particles of minute size. These particles also act as nucleation centres for the transformation of A on cooling, and result in fine-grained transformation products which are tougher than those derived from coarse-grained A . Steels with fine S are shallow-hardening, and the presence of alloy elements is necessary to produce deep-hardening steels. “Normal” steels

are coarse-grained. "Abnormality" is characteristic of low-alloy C steels and appears to be related to high C diffusivity and to the initial reaction rate, which is determined by the no. of transformation nuclei and the grain-boundary surface. W. P. R.

Grain-size control of open-hearth carbon steels. S. EPSTEIN, J. H. NEAD, and T. S. WASHBURN (Trans. Amer. Soc. Met., 1935, 22, 942—972).—The grain size (S) of steels with C 0.15—0.50% can be controlled by addition of Al in the ladle, in amount depending on the degree of oxidation, which is in turn determined by the amounts of C, Si, and Mn in the steel, and the S required. The S of the non-metallic inclusions is not increased by addition of the max. amount of Al necessary to produce fine-grained steel, which has a higher yield strength, slightly higher ductility, and higher impact strength than a coarse-grained steel of similar composition. W. P. R.

Effect of McQuaid-Ehn grain-size on hardness and toughness of automotive steels. H. W. MCQUAID (Trans. Amer. Soc. Met., 1935, 22, 1017—1035).—Variations in melting practice and deoxidation methods cause alterations in the grain size (S) of the steel; S control has been accomplished in plain-C steel heats by regulating the fall in C content, FeO slag content, tapping temp., and Al or Ti additions. Fine-grained steels do not harden as deeply as coarse-grained, neither do they warp on quenching, and it is possible to harden carburised parts by quenching directly from the pot. There are, however, a large no. of exceptions to the rule that steels with fine S are more ductile than, and not so easily hardened as, those with coarse S . W. P. R.

Secondary crystallisation of steel in relation to conditions of formation of Widmannstätten structures. V. N. SVECHNIKOV and M. I. SHCHEPAK (Domez, 1934, No. 9, 29—49).—On heating the steel (C 0.48, Mn 0.85, Si 0.343, S 0.039, P 0.057%) at $>800^\circ$ some of the austenite crystals (I) tend to grow at the expense of adjacent non-growing crystals. This growth becomes more pronounced when the heating and cooling of the sample take place under conditions of artificial strain. Ferrite (II) begins to crystallise around the (I) simultaneously at a large no. of points, the thickness of the (II) layer being inversely \propto the rate of cooling. The Widmannstätten figures begin to appear among the larger and more rapidly growing crystals. They are considered as a special arrangement of layers of pearlite. Ch. Abs. (e)

Heat-resistance of chemically resistant [iron] alloys. A. LISSNER (H.D.I.-Mitt., 1934, 23, 175—182; Chem. Zentr., 1934, ii, 2894).—Data are recorded for the corrosion of 3 samples of Staybrite steel by hot H_2SO_4 , HCl, and HCO_2H and by hot streaming H_2S , illuminating gas, $SO_2 + H_2O$, and $SO_2 + SO_3$. Acid-resisting steels of this type can be used up to 1000° . Up to 1100° , Cr steel is better than Cr-Si steel. H. J. E.

Corrosion-resistance of steel to bending and its increase by additions to the corroding solution. A. JÜNGER (Mitt. Forsch.-Anst. Konz. Gutehoffnungshütte, 1934, 3, 55—84; Chem. Zentr., 1934, ii, 2585).—

Data are recorded for the corrosion of a C steel (0.30% C) and a Cr-V steel (C 0.33, Cr 1.1, V 0.12, Cu 0.15%) by sea- H_2O , and hard and soft H_2O . H. J. E.

Corrosion of steel by sulphuric acid. S. RAM (J.S.C.I., 1935, 54, 107—109 r).—When steel is suspended vertically in H_2SO_4 at const. temp., the rate of evolution of H_2 after the induction period is const. but varies with the concn., and up to a concn. of 520 g. per litre this rate is unaffected by saturating the acid with $FeSO_4$.

Penetration of steel by soft solder and other molten metals at temperatures up to 400° . L. J. G. VAN EWIJK (J. Inst. Metals, 1935, 56, Advance copy, 109—118).—A case of failure of a Ni-Cr steel axle-tube of an aeroplane was found to be due to intercryst. penetration of the soft solder (I) used in a joining operation. Tests on a no. of steels have shown that Ni-Cr steels (II) are liable to fracture when under stress in contact with molten Pb, Sn, Zn, Cd, (I), and Lipowitz alloy (III), whereas plain C steels are free from this defect. Temp. of the molten metal has little effect since some specimens of (II) fracture in 1 min. at 100° in (III), but prior tempering at 700° reduces considerably the liability to fracture. A. R. P.

Effect of heavy oils and greases on fatigue strength of steel wire. R. GOODACRE (Engineering, 1935, 139, 457—458).—The fatigue strength (F) of hard-drawn steel wire is increased by smearing the wires with grease or oil. The viscosity (η) of the oils tested ranged from 4 to 4000 (arbitrary units), and the largest increase of F occurred with oils of η 100. A possible reason for the increase in F is that in addition to keeping away atm. O_2 from the surface, the oils fill in irregularities in the surface, thus partly avoiding local stress concns. This is confirmed by experiments on polished wires. W. P. R.

Studies of the wire-drawing process. VII. Application of metal coatings as lubricants, with special reference to the drawing and properties of a lead-coated austenitic chromium-nickel steel. E. L. FRANCIS (Iron & Steel Inst., Carnegie Schol. Mem., 1934, 23, 47—62; cf. B., 1934, 721).—The chief benefit of a Pb-coating (I) in drawing Ni-steel wires is that it facilitates the formation of a thick film of the soap lubricant which is able to withstand better the combination of high temp. and high pressure in the drawing operation; its one disadvantage is to produce a slight increase in the friction and therefore of the power required. The mechanical properties of wires drawn with a (I) are similar to those of uncoated wires except at very high degrees of reduction, when a remarkably high strength and ductility are acquired. A. R. P.

Nitrogen-hardening of steels. III. Nitriding of steels containing a low content of chromium and aluminium at various temperatures, including results obtained by two-stage nitriding. IV. Nitriding of high-chromium and austenitic steels at various temperatures. B. JONES (Iron & Steel Inst., Carnegie Schol. Mem., 1934, 23, 139—178, 179—204).—III. Effective surface-hardening of steels with a low Cr and Al content can be obtained by heating in NH_3 at 460° for 48 hr., but the thickness of the hardened

layer is $<$ that obtained at 500° . With commercial Cr-V and Cr-Al-Mo steels nitriding at 460 – 500° produces a max. Vickers-Brinell hardness (H) of 895 and 1200, respectively. Rise in nitriding temp. (T) to 550° results in a lower H in low-Cr steels owing to the production of an uneven surface by growth of a layer of marginal nitride, but with steels containing 1% Al this rise in T produces a greater depth of hardening without increasing the H of the outer layer. When $T = 600^{\circ}$ steels free from Al distort and a large amount of the Fe-Fe₃N eutectic, braunite (B), is formed; the presence of Al inhibits the formation of B and prevents surface-distortion. Two-stage nitriding (first at 500° , then at 600°) increases the depth of hardening without affecting the surface- H of steels with 1% Al, but has no advantages in the case of Al-free steels; by this method a case 0.01 in. thick can be obtained on nitralloy in 8 hr. and in 16 hr. the thickness is = that obtained in 48 hr. with $T = 500^{\circ}$ in one stage, but the micro-structure is much more satisfactory.

IV. With steels containing 13–18% Mn max. H is obtained with $T = 550$ – 560° and the depth of case produced in 48 hr. is = that obtained in 96 hr. at 500 – 510° ; with $T = 600$ – 610° a poor case is formed owing to growth of B at the surface, but this may be prevented by 2-stage nitriding at 500 – 510° and 600 – 610° . Austenitic Ni steel cannot be nitride-hardened at high T , but a H of 465 can be obtained with a Ni-Mn austenitic steel at 600 – 610° . Good H and micro-structure can be obtained by nitriding high-Cr and Cr-Ni austenitic steels at $> 500^{\circ}$; the best results being produced at $T = 550$ – 560° for a 13% Cr steel, at 600 – 610° for a 26% Cr steel and an 18:2 Cr-Ni steel, at 550 – 560° for an 18:8 Cr-Ni steel, at $> 550^{\circ}$ for a 14:14:2 Cr-Ni-W steel, and at 635 – 645° for 23–25:10–13 Cr-Ni steels. A. R. P.

Ferromagnetic alloys and their conformity to laws. A. KUSSMANN (Chem.-Ztg., 1935, 59, 285–287).—Recent work on the relation between ferromagnetism and constitution, and the internal stress theory of magnetisation curves, are reviewed briefly, and some technical applications of new magnetic alloys are indicated. A. R. P.

Iodine method for determination of oxides in steel. T. E. ROONEY and A. G. STAPLETON (Iron and Steel Inst., May, 1935, Advance copy, 6 pp.).—The method depends on the dissolution of the sample in a solution of I in anhyd. MeOH in an atm. of pure N₂. The N₂ is purified from CO₂ by NaOH-CaO, from O₂ by passage over heated Cu, and from H₂O by conc. H₂SO₄ and SiO₂ gel after passage over Fe turnings at 800° . Apparatus for making the tests is described and a method of analysing the small insol. residue is outlined. A. R. P.

Determination of cobalt in steel. M. A. BEHR (Ann. Chim. Analyt., 1935, [iii], 17, 117–118).—The steel is dissolved in HCl and Fe oxidised with HNO₃. A large excess of aq. NH₃ is added, and the vol. made up to 500 c.c. The liq. is filtered, and Co in an aliquot portion of the filtrate pptd. as CoS and converted into CoSO₄. Cu (if present) is pptd. as CuS from acid solution before pptg. Co. Ni is co-pptd. and weighed with the

CoSO₄ as NiSO₄, which is dissolved up and pptd. with dimethylglyoxime. J. S. A.

Spectral analysis using sensitive lines within the range of glass instruments. Measurements in the spark spectrum of a chromium-nickel-carbon special alloy containing sulphur. W. KRAEMER (Z. anal. Chem., 1935, 101, 23–27; cf. A., 1933, 1110).—Results are given for a steel containing Cr 13, Ni 0.5, S 0.2, and C 0.4%. J. S. A.

Oxidation of copper sulphide minerals in copper ore. E. D. GARDNER and J. D. SULLIVAN (Mining J., 1934, 18, No. 15, 3–4).—Tests are described on the intermittent addition of H₂O with access of air to columns of ore in wooden boxes. CH. ABS. (e)

Dilatometric study of copper- and silver-aluminium alloys rich in aluminium. H. KAWAI (J. Chem. Soc. Japan, 1934, 55, 1002–1012).—Data are recorded. CH. ABS. (e)

Determination of zinc in impure zinc ash, zinc oxide, and zinc residues. C. BOY (Metall u. Erz, 1934, 31, 357–358; Chem. Zentr., 1934, ii, 2865).—12.5 g. of the material are dissolved in 50 c.c. of HNO₃ and 100 c.c. of H₂O, gelatinous SiO₂ is removed with HF, and org. matter oxidised. Pb is separated as PbSO₄, Zn being finally determined volumetrically with Na₂S or K₄Fe(CN)₆. H. J. E.

Salt-cake process for roasting zinc ore. T. TAKEI and N. KAWAI (J. Electrochem. Assoc. Japan, 1934, 2, 252–256).—The oxidising roasting at 850° of Zn ore (Zn 40, Fe 17% approx.) treated with 10% of Na₂SO₄ gave 14.9% of H₂O-sol. Zn, 9.5% of dil.-acid-sol. Zn, and 15.2% of other Zn [chiefly ZnO, Fe₂O₃ (I)]. Na₂SO₄ prevents thermal decomp. of ZnSO₄ (with which it readily forms a melt), and formation of (I). Fe₂O₃ accelerates the decomp. of ZnSO₄. CH. ABS. (e)

Aluminium improves finish in galvanising. W. G. IMHOFF (Metal Clean. Finish., 1934, 6, 509–512).—Small additions of Al to galvanising baths (I) produce Zn coatings of a bluish, bright metallic lustre. A very thin coat of an Al alloy is formed. Small Al additions also arrest rapid formation of ZnO scum. Articles can then be withdrawn from the bath with a smooth, bright finish. Fe in (I) greatly accelerates oxidation of Zn. Small amounts of Al have little or no effect on the fluxing conditions. CH. ABS. (e).

Temperature-viscosity relations of lead slags. K. ENDELL, A. TIELSCH, and C. WENS [with G. KALB] (Metall u. Erz, 1934, 31, 353–357; Chem. Zentr., 1934, ii, 2587).—A viscosimeter for the temp. range 850 – 1450° is described. Vals. are recorded for Pb slags in this range. H. J. E.

Lead baths for hardening and tempering. A. JUNG (TZ. prakt. Metallbearb., 1934, 44, 57–60; Chem. Zentr., 1934, ii, 2885).—A discussion of the advantages of Pb baths. H. J. E.

Structure of cadmium antifriction alloys. L. LOSANA and C. GORIA (Chim. e l'Ind., 1935, 17, 159–163; cf. A., 1935, 158).—A more detailed study of the system Cd-Cu-Ag in the region rich in Cd indicates that the

most desirable properties are given by alloys containing 0.2–0.3% Cu and 1.3–1.8% Ag. D. R. D.

Type-metal alloys. F. D. WEAVER (MRS.) H. HEYWOOD (J. Inst. Metals, 1935, 56, Advance copy, 9–40).—The microstructure and properties of Pb alloys with Sb \geq 24 and Sn \geq 14% have been investigated and an equilibrium diagram (shown as a space model) has been constructed for this section of the ternary system. The ternary eutectic occurs at 239° and Sb 14, Sn 4, Pb 84%. The ternary peritectic point previously reported is shown to be the eutectic point of the pseudo-binary system Pb–SnSb and occurs at 246.5°, 90% Pb. Equilibrium diagrams for alloys with const. Sn contents of 2, 4, 6, 8, 10, and 12% and a ternary diagram of the eutectic surfaces are given, as well as numerous photographs of characteristic microstructures. Anodic etching in 10% HCl affords the best method of distinguishing the various constituents. A. R. P.

Properties of tin containing small amounts of aluminium, manganese, or bismuth. D. HANSON and E. J. SANDFORD (J. Inst. Metals, 1935, 56, Advance copy, 43–58).—Addition of 0.5% of Al to pure Sn raises the tensile strength (*S*) from 1 to 5 tons per sq. in. and reduces the elongation from 80 to 30%, but further additions up to 1% have no effect; on storage at room temp. a brittle skin forms on the surface and gradually penetrates inwards, especially if the alloys have been rolled, producing rapid embrittlement and general deterioration. Addition of 0.1–0.15% of Mn to Sn greatly refines the grain size at all temp. < the solidus, but otherwise has no effect on the mechanical properties. Addition of Bi to Sn gradually raises *S* to a max. of 4–5 tons per sq. in. with 4–5% Bi; *S* is not affected by heat-treatment except near the eutectic point. Bi has the most marked refining effect on the grain structure of Sn, even restraining grain growth at high temp. A. R. P.

Tinplate corrosion in canning. T. N. MORRIS (Sheet Metal Ind., 1934 [Mar.]).—Tinplate is sufficiently porous to permit exposure of canned food to Fe, which causes many defects and discoloration. Lacquering corrects some defects but increases formation of H₂ and perforation of the plate. Immediately after canning many fruits, Fe in the Sn–Fe couple is anodic. Reversal soon follows and the change is permanent. Corrosion and H₂ formation in tins are usually max. with low acidity. Addition of citric acid is beneficial in some cases. During corrosion H₂ is formed on both wet and dry sides of the metal and blistering may occur.

CH. ABS. (p)

Modern metallurgical practice on the Witwatersrand. T. K. PRENTICE (Bull. Inst. Min. Met., 1935, No. 367, 44 pp.).—The development of the methods used in extracting Au from Rand ores during the past 45 years is historically surveyed and a brief account is given of modern all-sliming practice, aeration of the NaCN leach liquors, and deoxygenation of the pregnant solutions passing to the pptn. boxes. A typical modern flow-sheet is compared with one of 1910 and one of 1890.

A. R. P.

Problems in the flotation of gold. R. A. PALLANCH (Min. & Met., 1935, 16, 177–180).—Difficulties in

floating Au from its ores may be due to too fine or too coarse grinding, to the presence of tarnished surfaces, to association with unfloatable minerals, and to pounding of unfloatable impurities into the Au during grinding. The results of numerous flotation tests illustrating these effects are given. A. R. P.

Alloys to replace 14-carat gold. L. STERNER-RAINER (Deuts. Goldschm.-Ztg., 1934, 37, 387–388; Chem. Zentr., 1934, ii, 2892).—Pd–Au alloys are discussed. An alloy of Pd, Ag, and Cu, with the addition of some Cd, Zn, or Sn to lower the f.p., can be hardened at 300–500°, and has properties comparable with those of Au alloys. H. J. E.

Noble metals and their alloys. O. FEUSSNER (Deuts. Goldschm.-Ztg., 1934, 37, 317–320; Chem. Zentr., 1934, ii, 2892).—The hardening of Au–Pt and Au–Pd by Mg, alkaline-earth metals, Fe, Co, Ni, Sn, and Zn is reviewed. Difficulties in melting Pd, due to gas absorption, are avoided by alloying it with Ag. H. J. E.

Limits for spectroscopic detection of cadmium and palladium in silver. G. BAIERSDORF (Sitzungsber. Akad. Wiss. Wien, [IIa], 1934, 143, 19–29; Chem. Zentr., 1934, ii, 2867).—The limits for Cd and Pd are 10^{−4}–10^{−7} and 10^{−5}–10^{−6} g., respectively, depending on conditions. H. J. E.

Cadmium–silver–copper bearing alloys developed by Fedral Mogul. A. F. DENHAM (Automotive Ind., 1934, 71, 640–642).—Advantages claimed over leaded bronzes include greater corrosion-resistance and the need for less running clearance. Hardness data are given up to 200°. CH. ABS. (e)

Metallurgy of the Haglund process, with special reference to titanium sulphide. J. KLEFFNER (Metall u. Erz, 1934, 31, 307–320; Chem. Zentr., 1934, ii, 2589).—A compound of the approx. composition TiS₂ is formed at 550° in the reaction TiCl₄ + 2H₂S = TiS₂ + 4HCl. TiS₂ when heated at 1000° in an atm. of N₂ gave Ti₂S₃, and on further heating gave Ti₂S₃–TiS solutions. Sulphides of Ti and Fe form solid solution, the Ti having a deoxidising action. TiS₂ is formed from ZnS and TiO₂ at 1200–1500°. With Sb₂S₃ the formation of TiS₂ is only 40% complete, due to the volatility of Sb₂S₃. Mixtures of FeS, TiO₂, and C react readily at 1540°, forming TiS₂. H. J. E.

X-Ray inspection of magnesium castings. N. C. HYPER (Metallurgia, 1935, 11, 151–153).—The ease of penetration of Mg and its alloys by X-rays makes it difficult to get good contrast even if the tube voltage is as low as 50,000 volts. A method of impregnating the castings with a metallic substance of high *d* is described, and by this means blowholes and intercryst. porosity are made easily detectable by means of X-rays. W. P. R.

Alloys of magnesium. II. Mechanical properties of some wrought magnesium alloys. W. E. PRYTH-ERCH (J. Inst. Metals, 1935, 56, 59–76; cf. A., 1934, 590).—Mg and its alloys are very sensitive to rolling temp., too low a temp. causing lattice distortion and producing inferior mechanical properties; rolled sheet is preferentially oriented so that the basal planes lie parallel to the direction of rolling, and annealing at 500° for 30 min.

does not remove the preferential orientation, but produces rapid grain growth. Zn improves the strength of Mg only slightly, but the ductility markedly; with $\geq 2\%$ Zn the alloys are soft and ductile and their properties are improved by cold-work, but hot-rolling becomes increasingly difficult as the Zn content is raised. Cd-Mg alloys have superior cold-working properties to those of any other binary alloy of Mg; the 6% Cd alloy after cold-rolling has properties = those of the hot-rolled 6% Al alloy. Al increases the strength and ductility of Mg, the 6% alloy being probably the best compromise. Cd-Zn-Mg alloys are suitable for hot-stamping and -pressing and the Cd-Al-Mg alloys for forging. Quaternary alloys are most suitable for extrusion, the 8:2:6 Cd-Zn-Al alloy having very good tensile properties when slightly cold-worked and then annealed at 100° to remove lattice distortion. The 8:8 Cd-Al alloy after cold-rolling to 10% reduction and annealing for 4 hr. at 100° has mechanical properties comparable with those of the high-strength Al alloys.

A. R. P.

Annealing of pure aluminium. J. J. TRILLAT and M. PAIC (Compt. rend., 1935, 200, 1037—1039; cf. B., 1935, 312).—X-Ray study shows that the recrystallisation of 99% Al containing Fe and Si is the more rapid the higher is the Si content. Commercial Al recrystallises in relatively small crystals, and refined Al in very large crystals. The latter recrystallises more rapidly than the former. The breaking strength of 99.993% Al is $<$ that of 99.0% Al.

J. W. S.

Spectrographic analysis of aluminium. D. M. SMITH (J. Inst. Metals, 1935, 56, Advance copy, 119—130).—A standardised technique for the rapid spectrographic estimation of Cu, Fe, Mn, Si, and Ti in Al by the spark method is described, using a 1% Ni-Al alloy as standard for the auxiliary spectrum method. The arc method is better for the detection of traces of Ga and Pb.

A. R. P.

Unsoundness in aluminium sand castings. III. Solidification in sand moulds under pressure. D. HANSON and I. G. SLATER (J. Inst. Metals, 1935, 56, Advance copy, 95—108; cf. B., 1931, 1055).—High- \bar{d} ingots free from visible pinholes and with much improved tensile properties may be obtained by allowing castings of Al alloys in sand moulds to solidify in an autoclave under > 50 lb. per sq. in. pressure of air or N_2 . Since numerous blisters and cavities appear when such castings are subsequently annealed at a temp. between the solidus and liquidus it appears that the action of the pressure consists simply of the squeezing up of the pinholes, which would normally be formed, to smaller dimensions; at the same time, pressure produces a more complete feeding of the mould and confines the shrinkage to one small area. Pressure-casting, in general, gives ingots of higher \bar{d} than those obtained by degassing processes.

A. R. P.

(A) Alloying of aldre-type light alloys. (B) Ageing of aldre-type light alloys made by two different melting processes. S. KISHINO (J. Soc. Chem. Ind., Japan, 1935, 38, 116—117 B, 117—118 B).—(A) Alloys prepared by adding Mg and Si separately to Al (a) and by adding Mg_2Si (b) were annealed for 50 hr. at 520° and quenched in H_2O at every 20° during gradual

cooling. The electrical resistance was measured at room temp. It is inferred that the m.p. of (a) is $<$ that of (b) for the same amount of Mg_2Si in each. The tensile strength and resistance of alloys annealed at 160° for 5 hr. are in the order (a) $<$ (b); for the elongation the order is (a) $>$ (b).

(B) Whatever the quenching temp. the rate of increase of resistance due to natural ageing increases with the % Mg_2Si with both (a) and (b). With the same % Mg_2Si the degree of natural ageing is in the order (a) $<$ (b) with any quenching temp., even when this is very high.

R. S. B.

Factors governing the heat-treatment of aluminium alloys. J. T. ROBINSON (Metallurgia, 1935, 11, 129—132).—Age-hardening is complete only after a solution anneal (S) at a temp. at which the whole alloy content is sol., but permanent damage results from fusion of eutectic constituents. The Ti content of Hiduminium alloys does not affect the S, which is carried out at the same temp. as for "Y" alloy, but the Fe and Si contents are so adjusted as to inhibit room-temp. hardness changes. One of these alloys, RR 50, may be hardened at 165—175° without prior S.

E. H. B.

[Corrosion of] duralplat. K. L. MEISSNER (Ber. Korros.-Tag., 1934, No. 1933, 68—79; Chem. Zentr., 1934, ii, 2589).—Corrosion tests in sea- H_2O are described and discussed. Magnalium is less resistant to sea- H_2O than is duralplat.

H. J. E.

Rapid test for the corrosion-resistance of aluminium and its alloys. H. CARLSOHN and W. VOIGT (Chem. Fabr., 1935, 8, 126—127).—The presence of active local elements on the surface of the metal may be detected by placing thereon a piece of filter paper moistened with 3% aq. NaCl containing 0.5 c.c. of a 0.4% EtOH solution of morin per 100 c.c. The course of the reaction is then followed by examination in ultra-violet light, the parts at which Al is dissolving producing a green fluorescence on the paper.

A. R. P.

Review of theoretical metallurgy during 1934. R. F. MEHL (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1935, Tech. Publ. No. 594, 18 pp.). CH. ABS. (e)

Flotation of non-metallic inclusions in molten metals. R. MITSCHKE (Iron & Steel Inst., Carnegie Schol. Mem., 1934, 23, 65—105).—Non-metallic inclusions (I) in molten metals may be removed or reduced in amount by addition of substances which increase or reduce the \bar{d} of (I), by treatment with slag-forming substances, by causing (I) to adhere to gas bubbles, by raising the temp. to produce melting and coagulation of (I), by providing nuclei on which the (I) can crystallise, and by various combinations of these processes. Experiments on cast Fe and on silumin based on these principles are described, the results of which indicate that the production of fine-grained castings of these alloys is conditional on the efficient removal of relatively large-grained inclusions or on breaking these up into a colloidal or semi-colloidal state so that they exist as a "slag cloud"; in either case the formation of crystallisation nuclei is retarded and the alloy passes through an undercooled state before solidifying, thereby producing a fine-grained structure. Methods of detecting (I) in Al

and silumin are discussed and a procedure for ascertaining the distribution of Al_2O_3 in Al alloys, based on the fluorescence of the morin-Al compound in ultra-violet light, is described. A. R. P.

Constructional materials [in chemical works]. [Metals and alloys.] E. RABALD (Chem. Fabr., 1935, 8, 25—31, 139—145, 155—159).—Recent publications are reviewed and summarised, the metals dealt with including Fe alloys (especially Cu steels and the Krupp range of alloy steels), Pb (including Te-Pb), Al (especially "silumin" containing 13% Si), Cu-Ni alloys (including those containing Be; Zn, Sn, Ag, and Sb are also referred to. Comprehensive tables of physical properties and resistances to corrosion are given. C. I.

Metals in the food industry. R. C. TRANENT (Chem. & Ind., 1935, 378).—The % losses in wt. of 20 sq. cm. of metal sheet immersed in a sterile solution of glucose (d 1.10, p_H 6.8) for 3 weeks were Cu 0.66, Zn 0.054, Sn 0.008, Al 0.045, and Fe 0.383. (Cf. B., 1935, 459.) J. G.

Welding of structures in chemical industry. C. O. SANSTROM (Chem. Met. Eng., 1935, 42, 94—95; cf. B., 1934, 929, 991).—The application of welding to the construction of columns, struts, trusses, towers, and frames is discussed and illustrated. D. K. M.

Prevention of weld decay. E. C. ROLLASTON (Metallurgia, 1935, 11, 159—161).—Weld decay (D) is caused by pptn. of Cr carbide in the austenite (A) grain boundaries, with subsequent impoverishment of the A , of Cr, leading to intercryst. breakdown under the action of certain corroding agents. It may be avoided by quenching from 1050°, but this heat-treatment may cause distortion. Other remedies are: to lower the C content to < 0.02%, to apply a heat treatment for 4 hr. at 800—850° to heavily cold-worked material, or to add a ferrite-forming element, e.g., Si, Mo, W, or a carbide-forming element, e.g., Ti. W. P. R.

Brittleness in ductile engineering structural materials. W. E. LEWIS (Metallurgia, 1935, 11, 147—150).—Ductility measured by the elongation and reduction in area is not always the most suitable criterion for absence of brittleness, especially in alloy and cast steels. Mild steel is sometimes embrittled by quenching from 750°, and age-embrittlement occurs at about 250° in strained material. Although such material may give an impact val. of 6 ft.-lb. at room temp., the val. may be as high as 70 ft.-lb. if tested at the ageing temp. Spontaneous cracking caused by intercryst. disintegration may occur if strained metal is exposed to certain corroding media. W. P. R.

Use of electric furnaces in industrial heat-treatment. II. A. G. LOBLEY (Metallurgia, 1935, 11, 117—120; cf. B., 1935, 360).—The applications of continuous furnaces of the rotating-hearth or drum types and furnaces employing roller, pusher, or belt conveyors to the heat-treatment of steel and non-ferrous articles are described, and reference is made to the continuous annealing of long lengths of sheet and wire. E. H. B.

Production of lattice distortions by cold-deformation, and their disappearance by crystal re-

covery and recrystallisation. F. WEVER and B. PFARR (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1933, 15, 137—145; Chem. Zentr., 1934, ii, 2737).—Recovery at 200—400° is slow, and due to crystal recovery; above 400° recrystallisation (I) sets in. Deformation at low temp. (100°) causes broadening of the Röntgen lines, due to hardening taking place more rapidly than (I). At higher temp. (700°) the line breadth decreases, (I) occurring immediately. J. S. A.

Nitridation of metals. P. LAFFITTE and P. GRADADAM (Compt. rend., 1935, 200, 1039—1041).—Variations of the electrical resistance (R) as a function of time and temp. for thin metallic wires heated in N_2 or NH_3 have been applied to the detection of nitride formation. The temp.- R curves for Cu, Ni, and W, heated in N_2 , are reversible to 900°, for Al and Mg to 600°, for Zn to 400°, and for Fe to 775°, indicating no reaction. No allotropic transformation occurs at 0—600° with 99.99% Al, but with Mg a reversible change occurs at 285°. Al in N_2 at 150° dissolves 30 times its vol. of gas. In NH_3 nitride formation begins at 120° for Al, 200° for Mg, 375° for Fe, 435° for Ni, and 146° for W. On heating in H_2 the reaction is reversed, the initial val. of R being restored. No reaction was obtained with Zn or Cu. The formation of Mg_3N_2 at 335—510° is autocatalytic. The reduction of Al, Fe, and W nitrides by H_2 is preceded by an increase in R , probably owing to amide formation before reduction. J. W. S.

Theory of chromium electrodeposition. R. R. ROGERS (Trans. Electrochem. Soc., 1935, 68, 1—22).—Effective deposition of Cr depends on the formation of a cathode film of higher p_H than that of the remainder of the solution. The first stage of electrolysis is the reduction of Cr^{VI} . The resulting Cr^{III} ions react near the cathode, forming colloidal $\text{Cr}(\text{OH})_2$ which, being positively charged, migrates towards the cathode and is there reduced by at. H to metallic Cr. If the p_H is too high the deposit (if any) is contaminated with $\text{Cr}(\text{OH})_2$. Sulphate additions increase the p_H and η and assist in maintaining the alkalinity of the cathode film. The theory is extended to the deposition of other metals. J. W. C.

Influence of iron on chromium hardness. R. J. PIERSOL (Metal Clean. Finish., 1934, 6, 557—560).—Addition of Fe to Cr-plating baths increases the hardness of the deposit (optimum, 10 g. of Fe per litre). The method is less readily controlled than are others.

CH. ABS. (e)

Detection and removal of defective chromium deposits from sheet metal. W. FRÖLICH (Metallbörse, 1934, 24, 1049—1050; Chem. Zentr., 1934, ii, 2592).—Methods of detecting pores are described. Cr deposits are best removed electrolytically at 80—95° in aq. NaOH (35—40 g. per litre). Cr forms Na_2CrO_4 at the anode (6 volts e.m.f.). The metal to be treated must be free from fats, resins, silicate, and chloride.

H. J. E.

Electrodeposition of copper-nickel-zinc alloys from cyanide solutions. II. C. L. FAUST and G. H. MONTILLON (Trans. Electrochem. Soc., 1935, 67, 299—315; cf. B., 1934, 631).—Operation with reference to the cathodic process is discussed. The complex Cu

cyanide ion is more stable and the Zn ion less stable than the Ni complex. Raising the temp. increases the degree of dissociation of the complex ions, the dissociation const. reaching a max. at 25° for the Zn ion, at 50° for the Ni ion, and above 70° for the Cu ion. The extent of ionisation of the individual complexes exerts more control on the relative metal ion concn. at the cathode than does the relative rate of ion diffusion.

J. W. C.

Cadmium-zinc alloy plating from acid sulphate solutions. C. G. FINK and C. B. F. YOUNG (Trans. Electrochem. Soc., 1935, 67, 131–156).—Satisfactory deposition is possible from solutions containing 55–75 g. of Zn, 5–30 g. of Cd, 3–6 mg. of gelatin or caffeine, and 15–20 g. of $\text{Al}_2(\text{SO}_4)_3$ per litre, operated at 25° with p_{H} 4 and c.d. 1–2 amp. per sq. dm. The Cd content of the alloy is increased by rotating the cathode and raising the temp., and is decreased by raising the c.d., increasing the acidity, and using addition agents and salts. Complex org. N addition compounds, e.g., caffeine and aloin, have a selective effect, retarding Cd deposition and thus permitting the [Cd] of the bath to be increased. Alloys containing 45–55% of Zn show most resistance to corrosion by aq. NaCl. J. W. C.

Electrodeposition of silver from iodide solutions. C. W. FLEETWOOD and L. F. YNTEMA (Ind. Eng. Chem., 1935, 27, 340–342).—After a study of a no. of baths for Ag-plating in the attempt to find a non-poisonous substitute for AgCN, a bath containing 60 g. of citric acid per litre and 520 g. of NaI with a Ag anode was chosen. With a c.d. of 1.0–1.8 amp. per sq. dm. this gave a cathode efficiency > 80%, a polarisation of 0.6 volt, and a fine-grained and coherent deposit of Ag on Cu or brass. The Ag content of the bath increases with use and the bath is very permanent. C. I.

Plating with rhodium and rhenium. H. ANDERSEN (Chem.-Ztg., 1935, 59, 375–376).—Brief notes on recent work and on the val. of Rh- and Re-plate for protecting metals against atm. tarnishing and HCl corrosion are given. A. R. P.

Electrolytic treatment of precious-metal residues. G. VOLKERT (Metallbörse, 1934, 24, 437–438).—Au and Ag may be recovered from ashes and melting dross by grinding the material finely, removing the heavier particles of metal by gravity treatment, and electrolysis the thickened slimes in 2–4% aq. NaCN in an Fe vessel (anode) containing an Fe tube (cathode), a current of air being blown through the solution from a porous diaphragm at the bottom of the vessel. In 8–10 hr. > 90% of the Au and > 60% of the Ag are dissolved with a c.d. of 0.2–0.6 amp./sq. dm. and > 75% of the Au and 50% of the Ag are deposited on the cathode. A. R. P.

Enamelled ware.—See VIII. **Concrete from blast-furnace slag.**—See IX. **Paints for steelwork.** **Metal-container finishing.**—See XIII. **Containers for fruit preserves.**—See XIX. **Half-tone etching.**—See XXI.

See also A., May, 573, Pt-Cr alloys. 576, Solid solubility of Al in Mg, of MgZn_2 in Al, and of Cu in Mg. Systems Cu-Cd, Ag-Al, Ag-In, Ni-Mn, and Pd-Mn. Ti-Bi alloys, and those with Pb and with

Cd. **Magnetism and at. state of metallic solid solutions.** **Transformations in β -brass and Fe-Al alloys.** **Ternary solid solutions containing Cu-Zn alloys.** 587, **Velocity of oxidation of Sn.** 591, **Separation of metals from solutions under pressure.**

PATENTS.

Metallurgical converters. T. LEVOZ (B.P. 427,162, 20.9.34).—The tuyères are in the form of passages formed radially in the lining and are situated in one longitudinal line. In use, the converter is tilted so that the blast is first downwards on to the surface of the metal and later submerged at increasing depth as the various constituents are burned out of the charge. B. M. V.

Mechanical furnace for roasting sulphurous ores. W. MUELLER (B.P. 426,728, 9.10.33. Ger., 18.10.32).—In a furnace comprising superposed hearths (H) alternately rotating and fixed, metallic rabble units are secured in grooves on the undersides of H and are withdrawable at will through doors provided in the outer wall. B. M. V.

[Reverberatory] melting furnace. H. PONTZEN, ASSR. to AMER. LURGI CORP. (U.S.P. 1,970,186, 14.8.34. Appl., 27.7.32. Ger., 4.8.31).—The furnace is U-shaped with the limbs normally vertical but tiltable either way through 90°. Each limb is used alternately as combustion chamber and as feed-preheater exhaust stack. B. M. V.

Apparatus for fractional condensation of metal vapours. F. KRUPP GRUSONWERK A.-G. (B.P. 427,233, 11.6.34. Ger., 29.7.33).—A rotary, refractory-lined drum is divided into compartments by transverse partitions having only axial apertures. Conduits for cooling medium may be embedded in the lining, and the supply of medium regulated to cause successive condensation. B. M. V.

Manufacture of cast iron. BRIT. CAST IRON RES. ASSOC., A. L. NORBURY, and E. MORGAN (B.P. 425,227, 9.9.33 and 9.1.34).—The molten metal is treated with a small quantity, e.g., 0.1–0.2%, of Ti added as a ferro-alloy and blown with air or preferably CO_2 to oxidise the added Ti. The metal is then treated with H_2 , steam, or hydrocarbon vapour. The resulting white-Fe castings are free from spots of grey Fe. A. R. P.

Heat-treatment of ferrous or non-ferrous materials, and particularly the annealing of metallic plates, sheets, strips, or the like. W. G. BEESTON and W. R. BROWN (B.P. 425,054, 6.9.33).—A combination of preheating, annealing, and cooling chambers through which the material is passed over a series of rotating discs carried in staggered relationship by a series of horizontal shafts is claimed. A. R. P.

Treatment of containers for reception of transformer oil. A. E. PEW, JUN., and H. F. ANGSTADT, ASSRS. to SUN OIL CO. (U.S.P. 1,969,235, 7.8.34. Appl., 6.1.30).—To prevent catalytic action by the walls the tank is freed from all oxides of Fe, painted or otherwise provided with a protective coating, and the paint washed with refined transformer, switch, or cable oil. B. M. V.

Magnetic materials [nickel-iron alloys]. ALLGEM. ELEKTRICITÄTS-GES. (B.P. [A] 425,222 and [B] 426,625, 31.8.33. Ger., 1.9.32. Addns. to B.P. 363,697; B., 1932, 272).—A low val. of the factor hysteresis const./sq. root of initial permeability for alloys with Ni 70—30 and Fe 30—70 with 8—12% Cu is obtained by annealing in H_2 at $> 700^\circ$ (1000°) and (A) quenching, reheating at 350 — 650° and cold-working, or (B) cooling slowly in the furnace and cold-working. A. R. P.

Magnetic alloys [for the cores of Pupin coils]. HERAEUS VACUUMSCHMELZE A.-G. (B.P. 427,205, 5.12.33. Ger., 6.12.32).—The cores are wound with strips ≥ 0.03 in. thick of an alloy, e.g., 50:50 Ni-Fe, or 76:5:19 Ni-Cu-Fe alloy, having an initial permeability (P) > 800 , whereby greater constancy of P in low magnetic fields is obtained. A. R. P.

Manufacture of metallic material [e.g., silicon steel]. O. M. OTTE (B.P. 422,347, 10.7.33. U.S., 13.7.32).—In the manufacture of Si-steel (I) sheets for transformer cores the sheets are given the final rolling in packs which are passed through rolls forming part of a magnetic circuit, the (I) being preferably above its crit. temp. (i.e., non-magnetic) at the beginning of the rolling and below this temp. at the end (i.e., in a magnetic condition). A. R. P.

Manufacture of articles [hydrogenation apparatus] from steel alloys. F. KRUPP A.-G. (B.P. 425,073, 26.2.34. Ger., 20.3.33. Addn. to B.P. 419,009; B., 1935, 155).—Claim is made for the use of steels containing, in addition to ≤ 1 of the following: Si, Mn, Cr, Co, Ni, W, Mo, and V, $\geq 5\%$ of ≤ 1 of the metals Ti, Th, Zr; a preferred composition is C 0.1 Si 1.43, Mn 0.48, Cr 1.22, and Zr 0.95%. A. R. P.

Case-hardening of alloy steels by nitrogenisation. E. I. DU PONT DE NEMOURS & Co., and D. A. HOLT (B.P. 426,207, 28.9.33).—The steel is heated in a fused Li-K-Na chloride bath containing 10—40% of NaCN and covered with finely-divided graphite or charcoal. Surface hardnesses of 1000 Brinell units are obtained with low-Al-Cr steels in 3—4 hr. A. R. P.

Welding [rod for ferrous metals]. A. P. THURSTON. From BABCOCK & WILCOX Co. (B.P. 424,960, 31.5.33).—Claim is made for a welding rod coated with a mixture containing silicious fluxing material, e.g., flint, Fe_3O_4 , and MnO_2 , with sufficient Fe-Mn alloy to reduce the higher oxides to FeO and MnO and to de-gas the weld metal. A. R. P.

Copper smelting. ROAN ANTELOPE COPPER MINES, LTD. From C. R. WRAITH (B.P. 426,721, 4.10.33).—In converting Cu matte, $\leq 5\%$ of FeS is left in during the reverberatory treatment, so that the heat generated in the converter is increased and the Bi more efficiently removed by volatilisation. A. R. P.

[Homogenising] treatment of copper-tin alloys. VEREIN. DEUTS. METALLWERKE A.-G. ZWEIFIGER-LEASSUNG HEDDERNHEIMER KUPFERWERK (B.P. 426,111, 2.8.34. Ger., 17.8.33).—Bronzes with 6—12% Sn are homogenised by working, e.g., extrusion at 500 — 650° preferably after a 10—20% reduction by cold-work, whereby the δ constituent is completely dissolved. A. R. P.

Tinning processes for copper wire. H. SCHERRER (B.P. 425,086, 23.7.34. Ger., 22.7.33).—The wire is drawn through a pad saturated with EtOH, then through an annealing furnace which is protected from ingress of air, and finally through molten Sn without admission of air. A. R. P.

Production of an adherent patina on copper and its alloys. J. S. WITHERS. From BATTELLE MEMORIAL INST. (B.P. 426,115, 17.8.34).—The metal is treated anodically in an alkali or NH_4 carbonate solution, e.g., 8% aq. $NaHCO_3$, using a c.d. of 18 amp. per sq. ft. for 1 min. A. R. P.

Zinc-base [die-casting] alloy. NEW JERSEY ZINC Co., Assees. of G. L. WERLEY (B.P. 427,238, 7.7.34. U.S., 9.4.34).—The alloy contains Al 1—15 (4), Cu 0—0.4, Mg 0.005—0.45 (0.04), and Ni 0.005—0.5 (0.02)%, the Zn used containing Pb ≥ 0.003 , Cd ≥ 0.003 , and Sn $\geq 0.001\%$. A. R. P.

Brazing or soldering of metal articles. ACCLES & POLLOCK, LTD., and L. HOLMES (B.P. 426,365, 2.1.34).—The articles are assembled in the positions in which they are to be united, with any suitable brazing powder or foil (I) between the abutting surfaces, and the assembly is immersed in a molten flux (II) bath at a temp. $>$ the m.p. of (I). (II) consists preferably of Na_2CO_3 and NaCN or of mixtures of alkali chlorides, borax, and reducing salts. A. R. P.

Sweating out of fusible metals. AMER. METAL Co. (LTD.) (B.P. 427,243, 31.7.34. U.S., 4.8.33).—Liquation of, e.g., solder from old radiators is effected by superheated steam at a pressure not materially $>$ atm., no other heat being supplied. B. M. V.

Refining of metals and alloys by vacuum at high temperatures. AMER. SMELTING & REFINING Co. (B.P. 426,573, 24.11.33. Ger., 1.12.32).—The volatile metal is removed from As-Sn, As-Pb, Cd-Pb, Zn-Pb, Na-Pb, Mg-Pb, Na-Sn, and Mg-Sn alloys by circulating the molten metal through a kettle in which is immersed a bell the pressure in which is maintained at ≤ 0.01 mm. Zn is removed from Pb in this way at 750 — 960° ≥ 0.07 mm. A. R. P.

(A) Cyaniding auriferous materials. (B) Treatment of gold-bearing material [containing pyrrhotite]. (A) C. W. DOWSETT, (A, B) W. E. JOHN (Assee.), and (B) E. BEYERS (U.S.P. 1,952,976 and 1,952,988, 27.3.34. Appl., [A] 2.6.32, [B] 22.7.32. S. Afr., [A] 10.7.31, [B] 31.8.31).—(A) The cyanide solution used for extracting Au from its ores contains $< 0.0018\%$ of Hg. (B) The pyrrhotite is removed by magnetic separation prior to cyaniding with the solution claimed in (A). A. R. P.

Recovery of gold and silver from ores and metallurgical products. V. T. EDQUIST (B.P. 424,997, 18.5.34. Austral., 18.12.33).—The ore is subjected to a preliminary flotation process to remove pyrite and other sulphides, and then agitated with aq. NaCN to dissolve the Au and Ag, which are re-pptd. by addition of charcoal and recovered as a high-grade concentrate by flotation. A. R. P.

Production of sintered bodies [of hard carbide alloys]. SIEMENS & HALSKE A.-G. (B.P. 426,600,

4.9.34. Ger., 6.9.33).—Shaped articles of hard alloys of, *e.g.*, WC and Co are made by slip-casting, the slip consisting of an aq. paste of the bonding metal, the carbide or other hard constituent, an electrolyte, and a plasticiser, *e.g.*, glycerin. A. R. P.

Manufacture of hard-metal alloys. GEBR. BÖHLER & Co. A.-G. (B.P. 426,506, 11.12.33. Ger., 10.12.32).—In the manufacture of sintered alloys containing a bonding metal (I), *e.g.*, Co, and a hard carbide (II), the constituents are first produced in an extremely finely-divided form by stage reduction of the oxide of (I) and stage carburisation of the metal of (II), the product being ground finely between each heating operation. A. R. P.

Production of a concentrate of chrome ores. NEPTUNIA A.-G. (B.P. 426,758, 1.8.34. Switz., 19.8.33).—Chromite is floated with the usual froth-flotation agents in presence of a heteropoly-acid or salt thereof, *e.g.*, phosphomolybdic acid. A. R. P.

Refining of [chromium] alloys. T. R. HAGLUND (B.P. 426,765, 20.9.34. Swed., 20.9.33).—Si-Cr-Fe alloys produced electrothermally are crushed and treated by gravity-separation methods to obtain heavy products (I) low in C, and lighter products with a high C content which are returned to the reduction furnace. The (I) are suitable for use in the silicothermic reduction of Cr ores to obtain Fe-Cr low in C. A. R. P.

Zirconium[–silicon] alloys. ELECTRO METALLURG. Co., Assees. of F. M. BECKET (B.P. 427,076, 13.9.34. U.S., 16.5.34).—Siliceous Zr ore containing, *e.g.*, ZrO₂ 66–69, Si 19–20, and Fe 3–5% is smelted with SiO₂, charcoal, and coal in an electric furnace to give an alloy containing, *e.g.*, Zr 55, Si 40, and Fe 4%. During this operation ZrC accumulates on the hearth of the furnace and this is periodically removed by increasing the SiO₂ content of the charge so that the resulting alloy contains more Si than Zr, *e.g.*, Zr 38, Si 51, Fe 9%. A. R. P.

Preparation, grinding, or polishing of tools. E. ELBEL and O. SUSSENGUTH, Assrs. to BAKELITE GES. M.B.H. (U.S.P. 1,968,799, 31.7.34. Appl., 21.2.31. Ger., 28.2.30).—Abrasive and polishing instruments are formed from (1) abrasive grains, (2) heat-hardenable PhOH-aldehyde resin in the resitol state, and (3) a solvent comprising hydrogenated aromatic hydrocarbons and hydrogenated (H₆) phenols and their esters and ketones. The composition is moulded and further hardened by heat. B. M. V.

Aluminium alloy. H. C. HALL, and ROLLS ROYCE, LTD. (B.P. 425,102, 7.6.33. Addn. to B.P. 350,110; B., 1931, 764).—The alloy contains Fe 1.5–3, Mg 0.7–3, Cu 0.3–2.5, Si 1–4.5, Ni 0–0.2, and Mn 0.2–2%. For pistons of internal-combustion engines the preferred composition is Cu 1.8, Si 1.5, Mg 1.2, Fe 2.0, and Mn 1.37, and for engine bearings Cu 0.6, Si 4, Mg 0.95, Fe 2.2, Mn 1.02, and Cr 0.3%. A. R. P.

[Aluminium] alloy for bearings [of high-speed internal-combustion engines]. H. C. HALL (B.P. 426,211, 5.10.33).—The alloy contains Sn 8–19, Ni and/or Mn 0.8–5, and Mg 0–1%, the preferred composition being Sn 13, Ni 1.5, and Mn 0.5%. A. R. P.

Aluminium-base alloys. ALUMINIUM, LTD., Assees. of R. T. WOOD and O. H. HEIL (B.P. 425,128, 7.9.33. U.S., 21.9.32).—Alloys for sand- or die-casting consist of Al with Mg 1–8, Zn 0.5–6, and Ca 0.01–2 (<0.1)%. A. R. P.

Treatment of aluminium–magnesium alloys [to increase their corrosion-resistance]. VEREIN. LEICHTMETALLWERKE G.M.B.H. (B.P. 425,096, 9.12.34. Ger., 15.12.33).—The alloy is maintained in a molten condition for 1–3 days in an inert (*e.g.*, CO₂) atm. A. R. P.

Solder for soldering aluminium. G. W. RITCHIE and F. S. SMITH (B.P. 426,526, 24.5.34).—The solder consists of Zn 22, Sn 14, Hg 3, Al 1, and Pb > 1 pt. A. R. P.

Electrolytic method and apparatus [for production of metal foil]. R. A. WILKINS, Assr. to INDUSTRIAL DEVELOPMENT CORP. (U.S.P. 1,969,054, 7.8.34. Appl., 6.2.31).—Metal foil is directly formed by electrodeposition on a drum-like cathode rotating against the motion of a rapidly circulating stream of electrolyte, the guiding trough being of insol. metal and forming the anode. Through perforations formed in the bottom of the trough is supplied additional electrolyte which has been passed over sol. anode material to maintain the concn. of metal. B. M. V.

Electrodeposition [of copper foil]. ANACONDA COPPER MINING Co., Assees. of C. E. YATES (B.P. 419,764, 7.7.33. U.S., 13.7.32).—In the manufacture of Cu foil by electrodeposition from aq. CuSO₄ on the surface of a slowly rotating Pb-coated drum the edges of the cathode surface (I) are insulated with rubber and secondary cathodes (II) are provided on the sides to prevent the formation of loose or sprouty deposits along the edges of the foil. The p.d. between the anodes (A) and (I) is > that between A and (II), and the electrolyte (E) around (II) is prevented from circulating through the space between A and (I). Fine bubbles of air are blown through the space between the two A to ensure efficient circulation of E. A. R. P.

Electrolyte for electroplating [with copper–tin alloys]. CITY AUTO STAMPING Co. (B.P. 425,846, 5.12.33. U.S., 14.8.33. Addn. to B.P. 412,277; B., 1934, 845).—The plating bath contains Cu(CN)₂ 10–90, Na₂SnO₃ 10–90, NaOH 0–30, free NaCN 0–60 (20), and total Na CN 15–195 g. per litre, has *p*_H 12.8–13.5 (13), and is operated at 15–70° (60°) with a c.d. of 30 amp. per sq. ft. By adjusting the Cu : Sn ratio in the baths deposits with > 35% of Sn can be obtained. A. R. P.

Hg boilers. Ore-pulp classifier.—See I. Ni(CO)₄.—See VII.

XI.—ELECTROTECHNICS.

Reactance of large rectangular three-phase electric furnaces. F. V. ANDREAE (Trans. Electrochem. Soc., 1935, 67, 175–191).—The effect of bus-bar and electrode reactance in relation to out-of-balance loading is discussed. Methods are given for calculating the external reactance necessary to correct for unbalance, and the tables supplied enable the furnace reactance and other characteristics to be determined. J. W. C.

Properties of carbon at arc temperature. N. K. CHANEY, V. C. HAMISTER, and S. W. GLASS (Trans. Electrochem. Soc., 1935, 67, 201—242).—At 1 atm. C sublimes without melting. The temp. of the positive crater approaches a limiting const. val. corresponding to the sublimation point of pure cryst. graphite, probably 3925—3970° abs. The λ of max. radiation intensity is 0.735—0.740 μ and the max. "brightness" temp. of the crater 3810° abs. This temp. may be utilised as a standard reference point provided the power input is > 40 watts/sq. mm. of crater area and that a stable arc is maintained between correctly proportioned pure graphite rods. At 3950° abs. the emissivity of C is 0.8.

J. W. C.

Uses of photoelectric apparatus in chemistry. B. LANGE (Chem. Fabr., 1935, 8, 31—35).—The semiconductor cell, in which light passes through a transparent sheet-metal electrode and then through a layer of, e.g., Cu_2O or Se to the other electrode, gives a d.c. of up to 25 milliamp. and, combined with a galvanometer, forms a compact instrument for the direct measurement of radiation. Applications to photography and colorimetry are described. In conjunction with a polarimeter or a spectrometer it replaces with advantage visual estimates of illumination intensity. The author's electric colorimeter is described (cf. A., 1933, 44; 1934, 623). A form which continuously records turbidity in H_2O or air has been adapted, in the case of smoke, to operate automatically fire extinguishers on board ship. For many purposes measurements of light fluctuations are not required, e.g., for the regulation of the height of Hg in thermometers and manometers. For such purposes a Se cell and ionic tube form a practical instrument. Another application is as an instantaneous thermostat for an electric furnace.

C. I.

Asbestos diaphragms [in electrolysis]. W. W. STENDER (Trans. Electrochem. Soc., 1935, 67, 265—284).—High-permeability diaphragms (*D*) for use in the electrolysis of alkali chloride solutions are prepared from graded asbestos (average fibre length 5.5—9.0 mm.) mixed with > 3% of cold starch solution. The permeability coeff. changes in use with time. The properties and methods of testing asbestos *D* and the ageing conditions during electrolysis of aq. NaCl are discussed.

J. W. C.

Step-up transformers for temp.—See I. Cellulose bleaching. Measuring p_{H} of dyebaths.—See VI. Structure of ceramic diaphragms.—See VIII. Ferromagnetic alloys. X-Ray tests of Mg castings. Heat treatment furnaces. [Resistance of] nitrided metals. Cr-, Cu-Ni-Zn-, Cd-Zn-, Ag-, Rh-, and Re-plating. Treating precious-metal residues.—See X. Irradiation of fats. Catalytic hydrogenation.—See XII. Shellac insulators.—See XIII. Pasteurising soil.—See XVI. Measuring photographic exposure.—See XXI.

See also A., May, 565, Luminophores and television. 567, Conductivity of borate glasses. 573, Ferromagnetism of Pt-Cr alloys. 576, Magnetism of solid-solution alloys. Conductivity of ternary solid solutions. 580, Hygroscopicity of liquid dielectrics. 589, Electrolysis of alkali fluophos-

phates. Prep. of thin layers of U_3O_8 by electrolysis. Effect of d.c. on nitration and oxidation of PhMe. 598, Photo-electric thermoregulator. 604, Dehalogenation of org. compounds.

PATENTS.

Electric furnace. V. H. SANDERS, Assr. to STACK-POLE CARBON Co. (U.S.P. 1,969,478, 7.8.34. Appl., 23.2.33. Can., 9.11.32).—A horizontal tube (*T*) of C or other high-resistance material is supported at the ends by a casing and surrounded throughout by heat insulation. Intermediately, *T* is supported by metal rods, clips, etc. which also form leads for the electric current, whereby only the middle part of *T* is heated. B. M. V.

System for electrical precipitation [of suspended particles from gases]. H. A. WINTERMUTE, Assr. to RESEARCH CORP. (U.S.P. 1,968,330, 31.7.34. Appl., 18.10.32).—Surge impedances are inserted between the single source of high voltage and a bus-bar (*B*), and in every individual lead from *B* to the electrodes, which are in parallel. B. M. V.

Production of a white luminous effect in tubes of electrified neon gas. R. DE LAMPRECHT (B.P. 425,053, 6.9.33).—A small quantity of the gas produced by decomp. of ZnSO_4 (i.e., $\text{SO}_2 + \text{O}_2$) together with a trace of Et_2O are added to the gas contents of the tube.

A. R. P.

Liquid for electrical purposes and apparatus containing same. O. MAYR, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,967,095, 17.7.34. Appl., 7.12.32. Ger., 11.12.31).—In a switch having moving contacts, an arc-extinguishing liquid is composed of mannitol and H_2O with, if desired, H_3BO_3 . B. M. V.

[Tightening-up device for] electric [primary] batteries [of the pile type]. C. J. GORDON (B.P. 426,654, 11.10.33).

Reaction chamber. H_2O -softening. Separating suspended material from gases. Detecting suspensions in fluids. Smoke-density meter.—See I. H_2S detector. Gases for Hg switches. F.—See VII. Making glass with NaCl. Glasses for electric lamps. Grooving laminated glass.—See VIII. Containers for transformer oil. Magnetic alloys. Si-steel [transformer cores]. Producing patina on Cu. Metal foil. Cu foil by electrodeposition. Electroplating Cu-Sn alloys.—See X. Treated rubber [for cables].—See XIV.

XII.—FATS; OILS; WAXES.

Report of the Oil and Fat Committee of the German Section of the I.V.L.I.C. [on sulphonated oils]. C. RIESS (Collegium, 1934, 644—647).—Determinations were made of the inorg. combined SO_3 and the free fatty acids in a Turkey-red oil, which had been neutralised with aq. NH_3 , by methods proposed by the German and Dutch Sections and the Soc. of Leather Trades Chemists, respectively. The best results for free fatty acids were obtained by the German method.

D. W.

Irradiation of fats. I. Standard method of use of ultra-violet light. L. H. LAMPITT, N. D. SYLVESTER, and P. BILHAM (Biochem. J., 1935, 29, 1167—1174).—

Butter fat is irradiated with ultra-violet light, using a standardised technique in which the light intensity is measured by a thermopile and micro-ammeter, and the Issoglio and peroxide vals. and the Kreis test are determined. The 3 determinations increase with the time of irradiation, with no strict parallelism between them. Raised temp. increases the effects. H. D.

Component glycerides of Piqui-a fats. T. P. HILDITCH and J. G. RIGG (J.S.C.I., 1935, 54, 109—111 r; cf. B., 1929, 784).—The kernel (I) and mesocarp fats (II) (sap. equiv. 284.0, 281.6; I val. 48.6, 47.8; unsaponifiable 1.7%, 0.8%; with I val. 183, 282, respectively) contain myristic 1.4, 1.5; palmitic 48.4, 45.1; stearic 0.9, 1.8; oleic 46.0, 49.6; and linoleic acid 3.3, 2.0 wt.-%, respectively. (I) has > 2.5% of fully-saturated glycerides (III). (II) contains about 2% of (III); tri-C₁₈-glycerides could not be detected. The chief components of (III) are (approx. wt.-%) tri-palmitin 2, dipalmito-oleins 42, and palmitodioleins 56; α - and β -palmitodioleins, and α - and β -oleo-dipalmitins are probably all present in considerable quantity. Either fat, as regards component acids and glycerides, closely resembles a palm oil of the usual type. Although the fats form 45—50% of the tissues in which they occur, their yield on the whole fruit (> 80% of which is hard, woody pericarp or inner shell) is only 6—7% of (II) and 1% of (I). This circumstance, and possibly the highly unsaturated unsaponifiable matter present, at present outweighs their advantage as regards colour in comparison with palm oil.

Technical possibility of the preparation of [artificial] "Leimfetten." C. STEPEL (Allgem. Oel- u. Fett-Ztg., 1935, 32, 157—159).—By successive sulphonation and desulphonation (hydrolysis), unsaturated oils can be converted into hydroxylated derivatives (cf. Gansel, B., 1929, 923) which resemble castor oil and the nut oils in yielding soaps which are not readily salted out by alkaline or salt solutions (e.g., silicates). E. L.

Hydrogenation of olive oil. T. CHRISTOPOULOS and A. KONSTA (Praktika, 1934, 9, 26—30; Chem. Zentr., 1934, ii, 2922).—Neutralised olive oil was hydrogenated at 200° for 5—6 hr. with 3% of a diatomaceous earth catalyst (18% Ni). A fat of f.p. 61.5° and I val. 2.9 was formed. Linoleic acid is first attacked, after which formation of stearic and isooleic acid begins.

H. J. E.

Effect of pigments on fluorescence of olive oil. J. GUILLOT (Ann. Falsif., 1935, 28, 75—78; cf. B., 1934, 285).—The fluorescence spectrum of virgin oil (V) illuminated close to the surface with light of λ 3650 Å. shows bands at 3800—4600 Å. (I), 5100—5900 Å. (II), and 6400—6600 Å. (III). (III) is absent from decolorised oil (D). Illuminated at a depth of 1 cm., (I) of V decreases in intensity, but (II) and (III) increase, whilst (I) of D remains const.

E. C. S.

Effect of industrial treatment on ultra-violet absorption of certain vegetable oils. J. GUILLOT (Ann. Falsif., 1935, 28, 69—75; cf. B., 1932, 1126).—The ultra-violet absorption (I) of olive oil (II) is at a max. at 2600—2800 Å. The (I) coeff. (III) of (II) of various grades and origins at λ 2700 Å. are recorded. Heating for 5 min. at 150°, 200°, and 300° causes a

progressive increase in (III). The effects of refining processes on the (III) of arachis oil are described.

E. C. S.

Soya-bean extraction. H. JOYCE (Oil and Soap, 1935, 12, 68—70).—A simple continuous extractor (using petroleum solvent) employed at the Edison Institute of Technology is described.

G. H. C.

Phosphatides in American soya beans and oil. G. S. JAMIESON and R. S. MCKINNEY (Oil and Soap, 1935, 12, 70—72).—The ppt. deposited in some soya-bean oils consists of phosphatides (I), but the tendency for pptn. to occur is not correlated with the (I) content of several species of beans grown in different localities, or with the P content of the corresponding oils. Appropriate analytical methods are described.

G. H. C.

Application of the high-tension electric discharge to the catalytic hydrogenation process. F. I. SETO (J. Soc. Chem. Ind., Japan, 1935, 38, 85—86 B).—On applying a.c. and using concentric electrodes between which Ni catalyst and soya-bean oil are subjected to a H₂ stream at 200°, the velocity of hydrogenation increases with voltage to a saturation point. The hardened oil (I) has less odour than that obtained without a.c., and is not polymerised. A.c. gives effective agitation. On applying d.c. the Ni is deposited on the anode with a separation time which increases as the I val. of (I) decreases. With a.c. followed by d.c. (I) is readily separated and replaced by a fresh batch, when the process can be repeated 38 times before the Ni is exhausted.

R. S. B.

Polymerisation of fatty oils. VI. Polymerisation of China wood oil (contd.). A. STEGER and J. VAN LOON (Rec. trav. chim., 1935, 54, 387—395; cf. B., 1934, 847).—The changes in d , n , and I val. of gelatinised Hankow wood oil are attributed to polymerisation of elaeostearin with resulting loss of unsaturation. The Et esters (I) of products gelatinised at rising temp. contain a decreasing amount of product distilling at < 100° in high vac. which has decreasing n and I val. and increasing d , with an increasing amount of undistillable residue having const. n and I val. and nearly const. d . (I) all have mol. wt. about 306.

F. R. G.

Dehydration of castor oil using Japanese acid earth as catalyst. T. YAMADA (J. Soc. Chem. Ind., Japan, 1935, 38, 120—123 B).—The oil and catalyst were heated in a stream of CO₂. The optimum conditions are 20% of earth at 200—250°. Increase beyond these limits increases splitting. Some polymerisation occurs simultaneously. The products absorb about half as much O₂ as linseed oil, but dry to hard elastic films.

G. H. C.

Manchurian oilseeds. I—III. T. INABA and K. KITAGAWA (J. Soc. Chem. Ind., Japan, 1935, 38, 73—77 B).—Analytical data are tabulated for the following seeds and their oils: perilla (white and black species), flax, hemp, sunflower, soya-bean, sesamé (black and white species), cotton (four origins), peanut (2 species), castor, and China jute.

G. H. C.

Alcohol extraction process of fatty oils. III. Extraction of cottonseed oil. M. SATÔ, T. INABA, and K. KITAGAWA (J. Soc. Chem. Ind., Japan, 1935,

38, 50 B).—Optimum conditions are the use of 85 wt.-% of EtOH in H_2O at 78°. On cooling, the miscella separates into an upper layer containing some oil and most of the colour, and a lower layer from which oil very free from colour and acidity can be obtained. G. H. C.

Thorn-apple-seed oil. C. LUTENBERG and S. IVANOV (Allgem. Oel- u. Fett-Ztg., 1935, 32, 141—146).—Unripe white (7—10 days old), partly-ripe, and mature black seeds (B) of *Datura stramonium* from Trubtschemsa (1930) yielded 10—15, 26—28.7, and 22.4%, respectively, of oil on extraction with light petroleum, the oils having, respectively: acid val. 20.4, 2—3.5, 1.5; sap. val. 227.6, 189.3—192.2, 183.7; I val. (Hübl-Waller) 131—135, 125—128, 126.3; unsaponifiable matter in each 1—2%. The proportion of saturated acids increases during ripening to about 11—12% (Bertram method; acid val. of saturated acids 197.9; solid acids separated by Twitchell's method had acid val. 224.8, I val. 4.6). From the I val. (129.5) and CNS val. (79.6) the composition of the total fatty acids from oil (B) (freed from unsaponifiable matter) is calc. as oleic 33.0, linoleic 55.1, saturated acids 11.9%. Linolenic acid is absent. Films of the oil dried in 10 days, or, after polymerisation for 1—30 hr. at 250—280°, in 4—5 days. A light-petroleum solution of the oil, containing a little I as catalyst, polymerises and thickens on exposure to sunlight. E. L.

Characteristics of train [marine-animal] oils, and the effect thereon of outside factors. J. LUND (Fettechem. Umschau, 1935, 42, 49—52).—Figures for a large no. of herring, seal, and whale oils are given, showing how the I val., which depends primarily on the particular species, also varies according to the habitat [? effect of variations in the food supply (F)] for any particular species. In general, fat which is rapidly accumulated, e.g., as the result of a sudden seasonal increase in F, has a higher I val., and it is suggested that the high I val. of seed fats from cold climates may similarly be a consequence of the necessarily rapid synthesis of the fat during the short summer. E. L.

Characters of halibut-liver oils. N. EVERS and W. SMITH (Pharm. J., 1935, 134, 417).—The ranges of the vals. for 33 oils obtained during the last 2 seasons were: blue val. 205—7100 (19 were from 900 to 2400), vitamin-A ($E_{1\text{cm}}^{1\%}$, 328 m μ) 6.8—144, $d_{15.5}^{15.5}$ 0.922—0.9286, n_{40}^{40} 1.470—1.488, I val. (Rosenmund-Kuhnhen) 111—171, sap. val. 150—175, unsaponifiable matter 8.3—21.5%. E. H. S.

Attempt to prepare drying and non-drying oils without fish odour from common sardine oil. K. KINO (J. Soc. Chem. Ind., Japan, 1935, 38, 77—79 B).—Polymerisation in an atm. of H_2 at 280—290° gave oils without fishy odour which did not dry even in presence of 1% of Co soap of linseed fatty acids. The fishy odour did not return during 3 months' exposure to air. The residue after extracting with $COMe_2$ (about 30%) dried to a soft film in presence of Co drier, but the corresponding Me esters did not dry. G. H. C.

Effect of method and degree of refining on properties of polymerised [fish] oil. I—III. M. MURATA and K. MASUMORI (J. Soc. Chem. Ind., Japan,

1935, 38, 51—52 B).—Alkali-refining of herring or sardine oil, with subsequent treatment with acid clay, has no effect on the progress of polymerisation (P) as followed by decrease of I val. or d. The acid val. always falls during P and properly refined oils become paler. Incompletely refined oil darkens. The increase in n during P is greater with high acid val. G. H. C.

Colour reactions for identification of hydro-generated fish oils. M. N. GHOSE and H. K. PAL (Analyst, 1935, 60, 240—241).—A modification of Tortelli and Jaffé's test (A., 1914, ii, 822) is described which renders the transient pink colour permanent. 5% of hardened marine oil (I) is detectable in a mixture of (I) with hardened vegetable oil. E. C. S.

Preparation and application of artificial waxes. R. STRAUSS (Angew. Chem., 1935, 48, 279—282).—A review.

Chemical examination of waxes and wax compositions. G. BUCHNER (Fettechem. Umschau, 1935, 42, 52—53).—Ley's method can be conveniently applied to the residual solution from the determination of Hübl's ratio no., in order to separate the unsaponifiable matter and fatty acids for further examination. E. L.

Bleaching of Japan wax. I. I. SAKUMA, I. MOMOSE, and J. HASEGAWA (J. Soc. Chem. Ind., Japan, 1935, 38, 124—126 B).—Relative efficiencies of decolorising C prepared by carbonising vegetable matter from 95 sources in presence of $ZnCl_2$ are tabulated. G. H. C.

Naturally occurring fatty acids of high mol. wt.
II. So-called cerotic acid of beeswax. M. MATTISSOHN (Fettechem. Umschau, 1934, 41, 235—237; 1935, 42, 5—9, 53—57; cf. A., 1930, 1557).—A very elaborate fractionation (by high-vac. distillation of Me esters or acids, recrystallisation, etc.) of the free fatty acids (I) of pure beeswax is detailed. The lowest-mol. acid to be found was identified as *n*-tetracosic acid (II) [isolated in substance, m.p. 83.7—84° (corr.)] which forms about 20% of (I), i.e., 2% of the original wax. The so-called "cerotic acid" (reported m.p. 77.5—79°) must be regarded as a mixture of (II) and higher homologues, although perfect separation of the components could not be realised. E. L.

Measurement of the oil-holding capacity of waxes. H. LUX (Allgem. Oel- u. Fett-Ztg., 1935, 32, 153—157).—The oil-holding capacities (O), i.e., the amount of solvent which can be added to 100 pts. of a given wax in order to furnish a paste of standard consistency (hardness), of a no. of different waxes is illustrated, I.G. wax OP and crude carnauba wax (C) showing particularly high vals. Admixture of very small amounts (up to 2—3%) of refined ozokerite or C greatly increases O (hardness) and also the solvent-retention of paraffin wax; greater additions (15—20%), however, reduce the vals. for O to vals. even < those calc. for the respective binary mixtures. E. L.

Linseed oil conservation.—See XIII. **Determining fat in pastry.** Milk fat as foam depressant. —See XIX.

See also A., May, 579, **Prep. of cod-liver oil emulsions.** 585, **Hydrolysis of fats and oils.** 587,

Velocity of dissolution of soaps. 607, **Unsaturated acids from oiticica oil.** 645, **Hen body-fats.** **Liver-oil of the Greek tortoise.** **Depôt-fat of vertebrates.** 646, **Wax of felted beech coccus.**

PATENTS.

Refining of vegetable and animal oils and fats. METALLGES. A.-G. (B.P. 427,680, 30.4.34. Ger., 28.4. and 16.6.33).—The soaps produced by neutralising crude oils with alkalis, together with mucins, phosphatides, etc. (which may or may not be previously coagulated by treatment with acids etc.) and bitter principles, are removed in solution by treating the neutralised oil (at 25–75°) with a conc. solution of a (neutral) alkaline salt (e.g., NaCl, Na₂SO₄, NaOAc, which does not form insol. compounds with fatty acids etc.) in 20–60% aq. EtOH (or MeOH etc.), which entrains very little neutral oil, and from which the refined oil readily separates. If impurities have been removed from the crude oil by pre-refining, high-grade fatty acids can be recovered directly from the alcoholic soap solution. E. L.

Treatment of oils of marine origin. S. SCHMIDT-NIELSEN (B.P. 426,752, 19.6.34. Norw., 20.6.33).—Products suitable for edible use or soap manufacture are prepared by heating (under pressure) marine-animal oils in an inert atm. (e.g., N₂) at about 250° for < 48 (72) hr. E. L.

Treating acid tar from oils.—See II. **Wetting etc. agents.**—See III. **Detergents.**—See VII.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Possibilities of conservation of linseed oil, especially in priming paints. G. ZEIDLER (Farben-Ztg., 1935, 40, 429–430, 452–453).—In view of possible shortage of linseed oil (I) in Germany, the following methods of economy in its use are discussed: use of oil-free primers, e.g., of nitrocellulose type, in cases where considerations of suction, durability, etc. permit; closer attention to particle size and shape of pigments; use of extenders, e.g., BaSO₄; use of darker-coloured paints to increase durability (an indirect conservation); use of stand oil, chlorinated rubber, fish oils, etc.; use of a new type of heat-treated (I) of exceptional pigment-wetting power; formulation of paints from considerations of "crit. oil content." S. S. W.

Protective paints for wood and plywood in damp atmospheres. A. HERRMANN (Farben-Ztg., 1935, 40, 451–452).—A humidity cabinet (C) wherein panels can rest on wet sand, representing most unfavourable "damp conditions," or can be so suspended that circulation of air relieves the dampness, is described and illustrated. The importance of free access of air where wood or plywood is used in building construction is stressed from aspects of mildew formation and general deterioration. This is confirmed by the summarised results of a series of tests of various types of wood-finishing systems on birch, pine, and mahogany panels in C. It is, however, also shown that the effect of "aëration" is not regular either for the various finishes or for individual types of wood. S. S. W.

Protective paints for structural steelwork. H. N. BASSETT (Ind. Chem., 1935, 11, 159–160).—An account

is given of suitable paints, their use, and precautions to be taken when applying them. D. K. M.

Metal-container finishing. H. F. FRANK (Ind. Finishing, 1935, 11, No. 6, 18–20).—The materials and processes used for coating food containers are described. D. R. D.

[Paints simulating] gold and silver bronzes. H. KAHN (Ind. Finishing, 1935, 11, No. 6, 9–12).—The composition, properties, and uses of imitation Ag and Au paints are reviewed. D. R. D.

Drying of carbon blacks. II. Effect of barium sulphate on drying time, gloss, and oil absorption. H. WOLFF and G. ZEIDLER (Farben-Chem., 1935, 6, 127–130; cf. B., 1934, 895).—Addition of 30% of BaSO₄ (I) to a sample of C black increased the min. oil absorption (O) from 70.5 to 75%. With another sample of different origin O showed only a small decrease with up to about 40% of (I), but thereafter decreased rapidly. In both cases with > 30% of (I) (a) the drying time was considerably reduced, min. vals. being obtained when the oil content (C) was > the crit. val. (cf. B., 1933, 198); (b) the gloss (G) appreciably increased for the same C, but was const. for the same crit. val. With gradual increase in C the increment in G was max. at the crit. val. With 30% of (I) the resistance of the films to accelerated weathering remained unaffected; high C gave the best results, but with low C the presence of (I) appeared to improve the durability. S. M.

Light fastness of lead chromes. J. BARKER (Oil and Col. Trades J., 1935, 87, 575).—Darkening of Pb chromes may be due to free org. matter or formation of perchromates. G. H. C.

Ceramic pigments. (A) Spinel pigments and spinels. (B) Relationships of formation and structure of spinel pigments. (C) Stability relationships of spinel pigments. O. KRAUSE and W. THIEL (Ber. deuts. keram. Ges., 1934, 15, 101–110, 111–127, 169–178; Chem. Zentr., 1934, ii, 2730–2731. (A) Crystal-lattice dimensions of pure Cr, Fe, and Al spinels are recorded.

(B) Röntgenographic investigation of pigments with varying ratios of RO to R₂O₃ showed spinel formation in all cases. Co-pptn. of oxides from mixed salt solutions gives pigments more homogeneous structurally than can be made by mixing the pptd. oxides, and possessing better colour and durability.

(C) The stability of ceramic spinel pigments depends on the strain (I) in the crystal lattice, that compound forming from a mixture for which (I) is a min. Pigment composition should be designed to give a min. contraction. J. S. A.

Relation between oil absorption [of pigments] and particle size and shape. H. WOLFF (Farben-Ztg., 1935, 40, 375–377, 405–406).—The application of the laws of colloid chemistry to paint pastes is complicated by the high concn. of the disperse phase. By mathematical treatment, depending on analogy with Einstein's η equation, the author's η equation is shown to give a calc. val. for particle size agreeing well with observed vals. in some cases. Variation from this concordance is explained by irregularity of particle shape (or, more correctly, "aggregate shape"). Support for

the view that the η relationships of oil paints is markedly affected by aggregate size and shape is drawn from the Boekhorst's results (B., 1934, 369). S. S. W.

Manufacture of shellac insulators. W. H. GARDNER (Brit. Plast., 1935, 6, 524–525).—Deformation temp. (T) of moulded shellac-asbestos compositions (I) depends on the amount and type of catalyst (II) added, the % of shellac, and the heat-treatment before moulding (III). (III) is advocated as it results in less free (II) in the final product. (I) containing 3% of phthalic anhydride, which unites with any H_2O set free during moulding, had T 113°, a breakdown voltage of 244 volts per mil, and gave > 2 years' satisfactory outdoor service. The amount of (III) must be determined for each individual case. E. L. H.

Thermo-plastic properties of shellac. W. H. GARDNER and B. CROSS (Brit. Plast., 1935, 6, 514–515, 529).—Only H_2O is lost in the heat-polymerisation (P) of shellac (I) to the "cured" state, but the sap. val. is unchanged (cf. B., 1923, 1234 A). Theories of P are criticised. Poly-reactive substances raise the softening point of (I) more than do mono-reactive ones, as is demonstrated by the deformation temp. of 24 (I)-asbestos composition bar-mouldings. An explanation is advanced. E. L. H.

Preparation of plastics from ground wood pulp. L. LOWEN and H. K. BENSON (Ind. Eng. Chem., 1934, 26, 1273).—The pentosans in wood may be utilised for production of a resinous adhesive (A) within the wood pulp, A serving as a binder for the remainder. Mixtures of commercial wood pulp (hemlock, spruce) with an approx. equal wt. of $PhOH$ or cresol, with HCl as condensing agent, were heated for 6 hr. at 70° and air-dried for 5–6 days. The ground products were heated at 80° until plasticity developed, then moulded under pressure, and hardened at $\geq 150^\circ$. The addition of glycerin improves plasticity before and strength and homogeneity after moulding. Cheap, hard, black mouldings of good electrical properties, but of moderate resistance to boiling H_2O and slightly brittle, result. (Cf. U.S.P. 1,917,038; B., 1934, 371.) S. S. W.

Sugar plastics and by-products. F. M. HESSE (Brit. Plast., 1935, 6, 503–504).—Sucrose (I) condenses with $PhOH$ (II) when refluxed for 3 hr. in presence of H_2SO_4 . Black, brittle, non-porous resins (III), m.p. 100–110°, are obtained by removing excess of (II) and of H_2O *in vacuo*, but the m.p. of the product during condensation is no guide to its mol. wt. Moulding powders are prepared by suitable incorporation of (III) with an equal wt. of filler (wood floor) and a hardening agent, and mouldings (IV) are comparable with other commercial plastics. The solubilities of (III) and (IV), and the properties of the products obtained by using starch or crude sugars instead of (I) and various phenols for (II), are tabulated. NH_2Ph condenses with about 30% of (I) in 25 min. (I) also condenses with urea and CH_2O , from which product mouldings can be prepared without fillers. E. L. H.

Ageing of cellulose nitrate films.—See V.

See also A., May, 592, Basic Pb chromate. 596, Rapid test for As [in pigments].

PATENTS.

Manufacture of white lead [from lead chloride]. W. G. WAGNER, A. R. LUCAS, F. DIETZSCH, and S. J. HOGG (B.P. 426,778, 26.10.34).—500 pts. of $PbCl_2$ (obtained from Pb ores by known methods) are slurried with 200 pts. of H_2O , and a mixture of $NaOH$ (60 pts.) and anhyd. Na_2CO_3 (160 pts.) with an amount of H_2O insufficient to dissolve all the Na_2CO_3 (e.g., 200 pts.) is agitated with the slurry, the reaction mixture being subjected to a grinding operation, whereby substantially all the $PbCl_2$ is converted into basic carbonate. The process may be worked in a cycle. S. S. W.

Production of titanium pigments [zinc orthotitanate]. TITAN CO., INC. (B.P. 426,881, 20.10.33. U.S., 28.10.32).—A mixture of suitable Ti compounds (e.g., TiO_2 , Ti hydrates, alone or co-pptd. with extenders) and a Zn compound, e.g., ZnO , in the proportions 1:2 (calc. as TiO_2 and ZnO), together, if desired, with a small amount of K_2SO_4 , Na_2SO_4 , etc. added as such or formed *in situ*, is calcined at $\geq 800^\circ$, giving a Ti pigment consisting partly or wholly of Zn_2TiO_4 . S. S. W.

Production of cellulosic pigments. E. I. DU PONT DE NEMOURS & Co. (B.P. 427,248, 24.8.34. U.S., 24.8.33).—Finely-divided cellulose (I) is regenerated from a solution of a (I) derivative, preferably an alkali salt of a (I) monoester of a dicarboxylic acid, in presence of a non-hydrolysing dye which has affinity for (I). E.g., an alkaline aq. solution of Na cellulose phthalate is heated in presence of Ponsol-blue G.D. S. M.

Coating of flexible sheet materials. E. I. DU PONT DE NEMOURS & Co. (B.P. 426,796, 10.10.33. U.S., 12.10.32).—Sheets of paper, woven fabric, etc. are coated with a non-penetrating composition containing cellulose nitrate and blown cottonseed oil, the solvent is evaporated, and a varnish applied which contains an alkyd resin modified with tung oil or its fatty acids. S. M.

Production of a flexible, transparent, translucent, or opaque liquid- and moisture-proof material, such as wrapping foil. TRANSPARENT PAPER, LTD., R. K. MORCOM, H. HALLAM, and D. L. PELLATT (B.P. 426,351, 5. and 13.10.33).—Sheets of regenerated cellulose or other material are coated with a composition prepared from nitrocellulose or other cellulose ester or ether (100), a plasticiser (15–60), CH_2Ph abietate (20–150), paraffin or apple or other wax (1–5); a metallic powder (10–200 pts.) may also be incorporated. S. M.

Non-permeable [rubber] coatings. DUNLOP RUBBER CO., LTD., D. F. TWISS, J. A. WILSON, and A. E. T. NEALE (B.P. 426,757, 17.7.34).—Diffusion of gases through heat-vulcanised rubber tyres, balls, etc. is reduced by a coating of a composition containing an alkyd resin (I) and a synthetic thermoplastic material, e.g., ethylene polysulphide (II). (II) may be formed in (I). A final coating of rubber may be applied. S. M.

Testing light-fastness of inks.—See I. Removing printing ink from paper.—See V. Glazing etc. fabrics.—See VI. Pigments.—See VII. Treating containers for transformer oil. [Prep. for] grinding etc. tools.—See X. Coating rubber.—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Physico-chemical properties of [rubber] latex and their significance in manufacture. E. W. MADGE (Trans. Inst. Rubber Ind., 1935, 10, 393—415).—

Various methods applicable to the measurement of η for latex are compared. In common with other colloids and suspensions, latex exhibits an anomalous η at low rates of shear. The influence of concn., temp., various addenda, *e.g.*, NH_3 or ionic coagulants, and of modification of the adsorption layer on η is discussed. The surface tension of latex is of importance in the impregnation of woven or spun fibres and in the frothing of latex preparatory to conversion into a coagulum with a foam-like structure. The properties characterising a stable latex are briefly indicated. D. F. T.

Colouring caoutchouc in bulk. R. BOXLER (Gelatine, Leim, Klebstoffe, 1934, 2, 184—186; Chem. Zentr., 1934, ii, 2755).—Negatively-charged colloidal pigments (*e.g.*, lithopone, Cd-yellow) may be mixed with latex, but positively-charged colloids (*e.g.*, Cr-yellow) bring about coagulation. J. S. A.

Elasticity of caoutchouc. K. H. MEYER and C. FERRI (Helv. Chim. Acta, 1935, 18, 570—589).—The tension of rubber containing 8% of S, which does not give cryst. interference rings when stretched, increases proportionally with abs. temp. The energy relations are discussed. The origin of contraction is the orientation due to the attraction of polyprene chains, which is opposed by thermal movement. The behaviour of rubber containing less S is more complicated by reason of the existence of cryst. regions. E. S. H.

Anti-oxidants. I. Tests in a rubber-sulphur mixing. J. R. SCOTT (J. Res. Assoc. Brit. Rubber Manufs., 1933, 2, 117—128).—The substances examined, *viz.*, aldol- α -naphthylamine, $p\text{-C}_6\text{H}_4(\text{OH})\cdot\text{NH}_2$, 1:8- $\text{C}_{10}\text{H}_6(\text{NH}_2)_2$, quinol, a $\text{MeCHO}\cdot\text{NH}_2\text{Ph}$ condensation product, and hydrazobenzene (I), could be incorporated (1%) in a rubber-S mixing (95:5) without any other changes than a mild softening action and a slight acceleration of vulcanisation. The antioxidant effectiveness, as judged by the alteration in tensile strength on accelerated ageing, decreases in the above order, (I) being almost inert. None markedly affects the gradual decrease in extensibility and all accelerate hardening and the decrease in permanent set. A swelling test on the vulcanised samples shows promise of being useful for detection of antioxidant activity. Many antioxidants cause rubber containing them to stain paper. D. F. T.

Hydrogenation-cracking of rubber. C. M. CAWLEY and J. G. KING (J.S.C.I., 1935, 54, 117—123 T).—Rubber (I) is amenable to treatment by hydrogenation-cracking at 200 atm. of H_2 and at $> 360^\circ$. (I) is suitably treated in a continuous plant in the form of a solution containing 50% of (I) and 50% of an oil, b.p. $> 200^\circ$, obtained by hydrogenation of (I). At a reaction temp. of $450\text{--}480^\circ$ and in presence of a Mo catalyst, 40—60 wt.-% of (I) is converted into spirit of b.p. $< 200^\circ$, which is stable, H_2O -clear, and requires very little, if any, refining. As the reaction temp. is lowered, the yield of spirit decreases while that of high-

boiling oil, which contains a lubricating oil fraction, increases. Thus at 370° , the yields of oil are: spirit to 200° 10.6, Diesel oil 46.7, lubricating oil 21.5, high-boiling residue 19.4 wt.-% of (I) solution.

Rubber in relation to foods and beverages. T. H. MESSENGER (Trans. Inst. Rubber Ind., 1935, 10, 365—392).—A review of the subject covering the use of raw rubber in chewing gum and various operations involving the contact of foodstuffs with latex, vulcanised soft rubber, and ebonite. Relevant legal regulations in different countries are indicated and advice is given as to the selection of desirable compounding ingredients. D. F. T.

PATENTS.

Coating of vulcanised rubber articles, and a coating composition particularly suitable for vulcanised rubber articles. INTERNAT. LATEX PROCESSES, LTD. (B.P. 427,228, 1.5.34. U.S., 13.5.33).—A coating composition comprising an uncoagulated aq. dispersion of, or containing, rubber and protein material rendered insol. by addition of, *e.g.*, CH_2O , and, if desired, a pigment, is claimed. Thus, *e.g.*, material of the following composition (pts. by wt.) may be used: latex 100, glue 1—5, barytes 100, TiO_2 50, rosin oil 10, casein 5—20, sulphonated castor oil 5, NH_3 (28%) 8, CH_2O (35%) 10, colouring matter 0—30, H_2O sufficient to give a final concn. of 45—50% of total solids. J. S. G. T.

Treatment of rubber. ELECTRICAL RES. PRODUCTS, INC., Assees. of J. H. INGMANSON (B.P. 426,836, 21.3.34. U.S., 31.3.33).—In the deproteinisation of rubber by heating latex with alkali, subsequent coagulation is effected by means of a non-acid coagulant, *e.g.*, EtOH or COMe_2 . This prevents the pptn. of fatty acids with the rubber and obviates chemical attack of Cu when such deproteinised rubber, with or without the addition of wax and deresinated balata, is used as an insulating or filling material in submarine cables. D. F. T.

Rubber coatings.—See XIII.

XV.—LEATHER; GLUE.

Pickling [of skins]. V. Effect of volume ratio on acid and salt adsorption by bated skin. E. R. THEIS and E. J. SERFASS (J. Amer. Leather Chem. Assoc., 1935, 30, 166—183; B., 1933, 481).—Min. vol. of the pickled skin for different % HCl (calc. on skin wt.) was obtained at the following vol. ratios (liquor/pelt), respectively: 0.5%, 10/1; 1.0%, 10/1; 1.5%, 6/1. With both 0.5% and 1.0% HCl, the p_H of the final liquor was independent of the dilution (D), but with 1.5% HCl the p_H of the final liquor was increased steadily as D was increased. 95% of the HCl was absorbed by the pelt from all dilutions containing 0.5% HCl, and 90% from the pickles containing 1.0% HCl, but the amount of HCl absorbed by the pelt from pickles containing 1.5% HCl diminished from 93% at low D to 77% at high D . HCl absorption and swelling of the skin are shown to comply with the Donnan membrane-equilibrium theory. D. W.

Peptisation phenomena in solutions of tanning extracts. J. A. SAGOSCHEN (Collegium, 1934, 621—640).—Extracts always yield more insol. matter in practice

than would be expected from their analytical figures. The amount of sediment from mangrove and quebracho extracts, respectively, has been reduced by dissolving them in admixture with chestnut (I) extract. This peptising effect of (I) is not exercised on other tanning extracts. D. W.

Chrome[-tanning] liquors. II. Determination of ololation. E. R. THEIS and E. J. SERFASS (J. Amer. Leather Chem. Assoc., 1934, 29, 543—572).—The chrome-tanning liquor (I) is diluted to approx. 0.1% Cr content and 50 c.c. of the dil. (I) are titrated with 0.1N-NaOH conductometrically to a point of inflexion. The basicity of (I) is given by $(a-b)/a$, where a = c.c. of 0.1N-Na₂S₂O₃ required in the Cr determination by 50 c.c. of dil. (I) and b = c.c. of 0.1N-NaOH as above. The "ololation" is given by: $[(a-b)-100(30-c)]/(a-b)$, in which c = c.c. of 0.1N-NaOH required to titrate back a mixture of 30 c.c. of 0.1N-HCl and 50 c.c. of dil. (I), using the conductance method. D. W.

Composition of the chrome-tanning compounds combined on the hide fibres of chrome-tanned leather. A. KÜNTZEL and C. RIESS (Collegium, 1934, 640—643; B., 1934, 689).—The shrinkage temp. of chrome-tanned leather (*L*) as determined before removal from the tanning liquor is the same as that of *L* after aq. washing. The chrome liquor contains the actual chrome-tanning compound and is not a medium for its formation. (Cf. Elöd and Cantor, B., 1935, 323.) D. W.

Specific action of vegetable-tanning extracts on the properties of the tanned leather. F. STATHER and R. SCHUBERT (Collegium, 1934, 609—621).—Leathers (*L*) tanned with sulphited quebracho, oakwood, chestnut, myrobalans, sumac, and valonia, respectively, at p_H 3.0 were stouter than *L* tanned with those materials at p_H 5.5, whereas the reverse was observed with gambier (*G*) and pine-bark extract and no difference was observed with oak bark, untreated quebracho (*Q*), and mimosa (*M*). Except for *L* tanned with *Q*, *M*, and *G*, other *L* were stronger when tanned at p_H 3.0 than at p_H 5.5. The stretch was greater and the colour of *L* brighter, yellower, and less affected by light in the case of *L* tanned at p_H 3.0 than those tanned at p_H 5.5. The colour of the latter depended on the individual tanning material used. No connexion was observed between the colour of the tanning extract and that of the *L* tanned therewith. Pale-coloured *L* were less susceptible to the action of light than dark-coloured *L*. *L* tanned at p_H 3.0 were more quickly wet back than those tanned at p_H 5.5, but no connexion was found between the time of wetting back and the η of the tan liquor, nor between the degree of tannage and the shrinkage temp. or the hot-H₂O test. D. W.

Tanning action of aluminates. E. O. WILSON, S. L. PENG, and C. F. LI (J. Amer. Leather Chem. Assoc., 1935, 30, 184—196).—Max. fixation of Na dioxalato-diaquo-aluminate (I) and Na ditartarato-diaquo-aluminate (II), respectively, by hide powder (*H*) and sheep-skin (*S*) was obtained at p_H 5.0 and 4.0. The rise in fixation with increase in p_H was very sharp. The max. Al₂O₃ fixed by *H* from (II) was much < that fixed from (I). *S* could not be tanned by (II), probably

owing to the greater stability of (II). A satisfactory tanning agent was obtained by adding mixtures of Na tartrate and NaOAc or NaCO₂H to aq. basic Al sulphate. D. W.

Effect of degree of neutralisation on dyeing of chrome-tanned leather. G. OTTO (Collegium, 1934, 597—608).—Two chrome-tanned calf leathers (*A* and *B*) were neutralised with different agents and subsequently dyed and fat-liquored. The colour was uneven on both leathers after merely washing in H₂O, and the feel of the leathers was bad after neutralising with 4% aq. NH₄HCO₃. Optimum results were obtained with *A* which had been neutralised with 2% aq. borax, and with *B* neutralised with 1.2% NaHCO₃ or 1.3% NH₄HCO₃ solution. The acid was released from *B* in two stages, whilst that from *A* was set free immediately. The slower neutralising action of aq. NaHCO₃ suited *B*, and the quicker effect of aq. borax was quite suitable for *A*. The differences in behaviour of *A* and *B* are attributed to differences in the Cr salts present. D. W.

Prevention of leather "red rot." R. W. FREY and C. W. BEEBE (J. Amer. Leather Chem. Assoc., 1934, 29, 528—543).—The effectiveness of different buffers in preventing "red rot" in vegetable-tanned leathers (*L*) which had been treated with them was: Ca(OAc)₂ (I) > K H phthalate > NaNH₄HPO₄ (II). Some *L* of initial p_H slightly > 3 were not protected by treatment with (II). *L* should have a high initial p_H and some acid buffering or neutralising power if they are to resist deterioration. More H₂SO₄ is absorbed by *L* treated with buffers than by untreated *L*. Some protective action was afforded by NaCl in conjunction with (I), probably owing to the retardation of acid hydrolysis by the NaCl. The protective action of the non-tans from different tanning materials, irrespective of their nature (e.g., pyrogallol or pyrocatechol) or their content of sugars, has been confirmed. D. W.

Influence of p_H on manufacture of glue from hides. E. GOEBEL (Gelatine, 1934, 2, 66—67, 75—80; Chem. Zentr., 1934, ii, 2935).—Hide glue (p_H 7.0—7.3) has generally a higher η and better adhesive properties than an alkaline glue. p_H determinations are described. H. J. E.

Drying [of chrome leather etc.]—See I. **Testing glued wood.**—See IX. **Sulphonated oils.**—See XII. **Activity of gelatins.**—See XXI.

See also A., May, 673, **Determining tannins in plant materials.**

PATENTS.

Manufacture of synthetic tanning agents. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 426,006, 7.10.33).—Dihydroxydiphenylsulphones are condensed (at > 100°/ > 1 atm.) with CH₂O or a substance which gives it under the conditions of reaction and a H₂O-sol. sulphite. Introduction into the nucleus of ·CH₂SO₃H occurs to give light-coloured tanning agents of good light-fastness. E.g., 4:4'-SO₂(C₆H₄·OH)₂ or its 3:3'-Me₂ derivative is heated with aq. CH₂O and Na₂SO₃ at 140—150° in an autoclave for 30 hr. H. A. P.

Adhesive. W. W. McLaurin, by OLD COLONY TRUST Co. (exors.) (U.S.P. 1,969,659, 7.8.34. Appl., 13.7.31).—

A H_2O solution of glue and a predominating amount of H_2O -asphalt emulsion are mixed together. B. M. V.

XVI.—AGRICULTURE.

Classification of German ground-water-free soil types from the viewpoint of examinations of the complex. W. LAATSCH (Z. Pflanz. Düng., 1935, 38, 193—207).—These soils should be classified according to the nature of internal processes resulting in profile formation rather than to the effects of external conditions. The status of the clay and humus complexes, the base content, and degree of saturation with bases are the principal factors in the primary classification.

A. G. P.

Soil survey of the Berri, Cobdogla, Kingston, and Moorook irrigation areas and the Lyrup village district, South Australia. T. J. MARSHALL and P. D. HOOPER (Comm. Australia, Coun. Sci. Ind. Res. Bull., 1935, No. 86, 55 pp.).—Profile descriptions and mechanical and chemical analyses of these soils are recorded and discussed in relation to drainage on irrigated areas.

A. G. P.

Kaolin, clay, loam. A. VON NOSTITZ (Z. Pflanz. Düng., 1935, 38, 208—213).—A discussion of the significance of these terms.

A. G. P.

Colloidal portion of French soils. V. AGAFONOFF (Compt. rend., 1935, 200, 1058—1060).—The SiO_2 , Al_2O_3 , and Fe_2O_3 contents of "colloidal" portions ($< 2 \mu$) of different types of French soil do not vary very widely. The coarser particles cause the differences in composition observed between soils of different origin.

J. W. S.

Inhibition and swelling of the clay of arable land and their relationships with the solid matter carried by rivers. M. PICHOT (Compt. rend., 1935, 200, 1060—1063).—The drying and shrinkage of clay soils, followed by their imbibition and swelling after rainfall, are discussed with reference to the variation in the composition of solid matters carried into rivers. Data are given for the Gers basin during 1934.

J. W. S.

Instrument for soil sampling. A. LÖDDESÖL (Soil Sci., 1935, 39, 257—261).—A cylindrical metal cylinder is described, provided with covers at top and bottom. It serves as an ordinary sampler and also as a means of determining the d of soil.

A. G. P.

Suction apparatus for complete removal of soil extracts from the soil mass. C. DREYSPRING and W. HEINZ (Z. Pflanz. Düng., 1935, 38, 213—221).—Extracts are separated by suction through a small Berkefeld filter-candle.

A. G. P.

Ammonium carbonate method of dispersing soils for mechanical analysis. A. N. PURI (Soil Sci., 1935, 39, 263—270).—The soil sample (10—20 g.) is boiled with 250 c.c. of $N(\text{NH}_4)_2\text{CO}_3$ until the liquid vol. is halved. After addition of 4—8 c.c. of $N\text{-NaOH}$ or -LiOH for each 10 g. of soil used, hot H_2O is added until the original vol. is attained, and the whole again boiled until the vol. is halved. The residue may be used directly for mechanical analysis. For soils containing much gypsum the first boiling is followed by filtration and washing with aq. $(\text{NH}_4)_2\text{CO}_3$. The

residue is suspended in H_2O , NaOH is added, and the process is continued as above.

A. G. P.

Method of expressing the mechanical analysis of many common soils. R. L. JAMES (Soil Sci., 1935, 39, 271—275).—By the hydrometer method mechanical analysis may be expressed graphically as straight lines by plotting log hydrometer reading against log time. Soil classification is thereby facilitated.

A. G. P.

Tropical soils. Increase of acidity with depth. H. C. DOYNE (J. Agric. Sci., 1935, 25, 192—197).—Acidity (I) localised in soil layers immediately beneath the surface probably results from undisturbed surface vegetation. Intermittent high rainfall and prolonged drought causes increasing (I) with depth to a particular layer with a subsequent decrease. In immature soils derived from acid rocks (I) increases steadily downwards to the parent rock.

A. G. P.

Physico-chemical composition and lime requirements of soils of Kisantu (Inkisi). J. BAËYENS (Bull. Agric. Congo Belge, 1934, 25, 271—275).—Analytical data are given and the structure and fertiliser requirements are discussed.

CH. ABS. (p)

Rôle of silicon in plant nutrition. I. Nature of interaction between soil and soluble silicates. A. SREENIVASAN (Proc. Indian Acad. Sci., 1935, 1, B, 607—632).—With increasing concn. of Na silicate solutions applied to soils the amount of silicate (I) absorbed increases, the % absorption declines, and the p_H of the soil rises. Absorption of (I) is not greatly affected by the p_H (in the range 1.0—10.6) or buffer capacity of the soil, but increases slightly with its H_2O content. Extraction of free SiO_2 from soil is best effected by a 1% solution of citric acid. The absorptive power of soil, which is associated principally with the silt and clay fractions, is not lowered by pretreatment with H_2O_2 , but decreases somewhat after extraction with 4% HCl and is lost on ignition. The quantity of (I) absorbed is unaffected by addition to soil of Fe or Al oxides (pptd. or as minerals), but decreases after addition of CaO . Interaction of (I) and soil is not accompanied by any exchange of bases nor followed by a significant increase in the $[\text{SiO}_2]$ of the expressed soil solution. The amount of (I) absorbed and the concn. of the solution applied are logarithmically related.

A. G. P.

Absorbing power of soils in relation to magnesium chloride. R. ÉCHEVIN (Compt. rend., 1935, 200, 1243—1245).—Addition of MgCl_2 to soils increased the H_2O -retaining capacity.

A. G. P.

Fixation of phosphoric acid in soils. II. Investigations in West Norway. T. GAARDER and O. GRAHL-NIELSEN (Medd. Vestl. Forstl. Försöksstat., 1935, No. 18, 107 pp.; cf. B., 1930, 833).—The effect of soil reaction on the solubility of PO_4''' is examined in various horizons of a no. of soil types. The influence is shown of different proportions of active Fe, Al, Ca, Mg, SiO_2 , and humus and of the ratio of "acidoid" to "basoid" constituents. In general, the results confirm those recorded earlier (*loc. cit.*).

A. G. P.

Phosphorus penetration and availability in soils. L. A. BROWN (Soil Sci., 1935, 39, 277—287).—The

penetration (I) and apparent availability of rock phosphate (II) in permanent pasture soils were $>$ the corresponding vals. for superphosphate (III), although (II) produced the greater yields. In some alkaline soils (III) penetrated more rapidly than (II). Applications of NaNO_3 or $(\text{NH}_4)_2\text{SO}_4$ facilitated the (I) or (II) more effectively than that of (III), especially in acid soils.

A. G. P.

Influence of humates on mobility of phosphates in soils. O. FLIEG (Z. Pflanz. Düng., 1935, 38, 222—238).—"Humatol" (I) (a lignite prep.) restricts the pptn. of Ca phosphates from a PO_4^{4-} buffer solution by CaCl_2 within certain p_{H} limits and also effects the dissolution of insol. phosphates. Drainage- H_2O from soils treated with NaNO_3 contains more PO_4^{4-} than when $\text{Ca}(\text{NO}_3)_2$ or $\text{Mg}(\text{NO}_3)_2$ is applied.

A. G. P.

Soil properties and fertiliser requirement. H. LUNDEGÅRDH (Medd. Centralanst. Försöks., Jordbruks., 1934, No. 444, 63 pp.; Chem. Zentr., 1934, ii, 2735).—The method for determining fertiliser requirements depends on the analysis of surface and subsurface layers of soil and of plants grown therein.

A. G. P.

Influence of ammonium sulphate and sodium nitrate on action of rock phosphates [in soil]. A. V. SOKOLOV (Phosphorsäure, 1934, 4, 65—78; Chem. Zentr., 1934, ii, 2881—2882).—A favourable effect of $(\text{NH}_4)_2\text{SO}_4$ (I) on the assimilability of phosphorites (II) is not general, and occurs only when the soil responds strongly to PO_4 , when the solvent action of soil and plant roots is very small, and when (I) and (II) are applied simultaneously.

A. G. P.

Decomposition of rock phosphate by root excretions of lupins. D. PRIANISCHNIKOV (Phosphorsäure, 1934, 4, 1—23; Chem. Zentr., 1934, ii, 2881).—Decomp. of rock phosphate by roots of lupins and (to a smaller extent) of peas, rape, and buckwheat depends on the increased $[\text{H}^+]$ of the liquid surrounding the roots. The PO_4^{4-} thus dissolved may be utilised by other plants grown in mixed culture.

A. G. P.

Decomposition of rock phosphate by root excretions of individual cultivated plants. J. STOKLASA (Phosphorsäure, 1934, 4, 129—148; Chem. Zentr., 1934, ii, 2881).—Acidity of the root system of plants is less when there is full absorption of mineral soil constituents. Reduced O_2 supply to roots increases their acidity. Elimination of CO_2 was high from weed roots, less for legumes, and still smaller for cereals (I). (I) remove relatively more PO_4^{4-} than K^+ , Mg^{2+} , or Ca^{2+} from soils. The reverse is the case with other plants. Root respiration is increased by atm. radioactivity, and by the presence of P, K, Fe, and Al (acting as co-enzymes), and reaches max. vals. in the seedling stage and during flowering and seeding. The PO_4^{4-} -decomp. power of cereals is $<$ that of legumes. Growth and cell multiplication in the latter is \propto the assimilability of PO_4^{4-} .

A. G. P.

Action of basic slag in two meadowland manurial trials. K. STOCKER and W. HEIL (Phosphorsäure, 1934, 4, 293—302; Chem. Zentr., 1934, ii, 2881).—Slag improved the yield and P content of hay and increased the PO_4^{4-} content of soil.

A. G. P.

Vernalisation [of grain]. G. D. H. BELL (J. Agric. Sci., 1935, 25, 245—257).—Favourable effects on early growth and (in the case of spring barley and wheat) on early earing followed low-temp. pretreatment.

A. G. P.

Differential response of maize varieties to fertility levels and to seasons. G. H. STRINGFIELD and R. M. SALTER (J. Agric. Res., 1934, 49, 991—1000).—Varietal differences in response, in respect of yield and rate of growth, to different combinations of fertilisers were influenced more by seasonal conditions than by the level of fertility obtained.

A. G. P.

Influence of amount of fertiliser in soil on growth of rice and composition of its leaves. M. F. SORIANO (Philippine Agric., 1934, 23, 295—316).—Leaves of plants fertilised with $(\text{NH}_4)_2\text{SO}_4$ contained more chlorophyll and less ash than those receiving NaNO_3 . The dry-matter contents were substantially the same. With increasing rates of fertiliser application the H_2O content of leaves increased and the ash decreased. CH. ABS. (p)

Fertilisation of cotton in a crop-rotation system. D. V. KHARKOV (Bull. Centr. Asia Sci. Res. Cotton Inst., 1934, No. 1, 5—47).—Cotton grown on soils cropped for long periods responds most markedly to N. P is a limiting factor for cotton after lucerne or on soils receiving farmyard manure only. Excessive use of fertilisers containing Na^+ or Cl^- eventually lowers yields owing to increased salinity or impoverished soil texture. Stimulation of growth of cotton in the early stages is desirable. Late dressings of fertiliser at the flowering period are recommended.

CH. ABS. (p)

Cultivation of *Andropogon citratus*, D.C. L. LUIGI (Boll. Uff. Staz. Sperim. Ind. Essenze, 1935, 10, 5—13).—*A. citratus* grows well in Calabria and may be cut thrice during the year. The extracted essence has all the characters of good verbena oil from the W. Indies and is obtained in higher yield per hectare. T. H. P.

Cultivated rhubarbs. P. MARANGONI (Sci. farm., 1934, 2, No. 1, 13—23).—Rhizomes (I) of *R. officinale* and *R. palmatum* cultivated for 2 years in Italy contain less anthraquinone derivatives (A) than do Asiatic (I). Roots contain more A than do (I). CH. ABS. (p)

Course of the nutrient intake of plants : potato. E. BLANCK and W. HEUKESHOVEN (J. Landw., 1935, 83, 43—62; cf. B., 1933, 680; 1934, 596).—The total intake of N, P, and K by the aerial parts and roots of potato increases to a max. at the time of flowering (I) and subsequently declines steadily until maturity (II) is reached. The intake by tubers (III) increases continuously until (II). In the period between (I) and (II) the increase in N, P, and K, of (III) is $>$ the loss from the haulm. In all stages of growth the total K in leaves is $>$ that of (III), but the PO_4^{4-} of leaves declines after (I) to vals. $<$ those of (III). Increasing applications of N fertilisers resulted in larger uptake of N, but that of P and K was not appreciably affected. Seed potatoes grown on soils receiving least N suffered more rapid decomp. and loss of K and N during their subsequent development.

A. G. P.

Effect of farmyard manure on starch content of potato tubers. A. NĚMEC (Z. Pflanz. Düng.,

1935, 38, 239—241).—The starch content (*S*) of the tubers decreased with increasing proportions of *Cl* applied in *K* fertilisers. The reduced *S* following use of farmyard or liquid manure is, in part, due to its high *Cl* content. A. G. P.

Manuring of hops. A. H. BURGESS (J. Inst. Brew., 1935, 41, 198—206).—The yield and quality of hops from completely manured soils was unchanged by the inclusion or otherwise of farmyard manure (*I*) in the treatment. (*I*) improved the working condition of the soil and tended slightly to prolong the life of the plants. Physiological effects of nutrient deficiencies are described. The aroma and preservative val. of hops is not affected by manuring. Roots of plants on *K*- or *N*-deficient soils contained low proportions of these nutrients. *K*-starved plants had high *N* contents in rootstocks. A. G. P.

Influence of manuring on quality and suitability of foodstuffs and fodders. A. JACOB (Angew. Chem., 1935, 48, 246—249).—Analytical data are quoted to show that the use of artificial fertilisers has no ill-effects (notably in respect of mineral balance) on food grown for man or animals. A. G. P.

Test of green-manure crops. C. S. ALONSO (Philippine Agric., 1934, 23, 543—558).—Analytical data are given for various green-manuring crops at different stages of growth. CH. ABS. (p)

Natural guano. J. BECK (Ann. Falsif., 1935, 28, 133—146).—The history of the development, and the composition and adulteration of natural guanos (*I*) from Peru, Europe, and Africa are compared and discussed. "Sol. (*I*)" are (*I*) which have been treated so as to render the P_2O_5 sol. and to raise the *N* content [by addition of $(NH_4)_2SO_4$]. "Fish-" and "whale-" (*I*) are not true (*I*), but are good fertilisers produced from the fish residues after removal of oil and gelatin; they contain, respectively, *N* 8—10, 8—9; P_2O_5 sol. in 2% citric acid 15—16, 10—11; and, in the latter case, *K* 1%. J. G.

Preservation of amino-acids in A.I.V. silage and in ordinary silage. A. I. VIRTANEN, H. KARSTRÖM, and T. LAINE (Suomen Kem., 1935, 8, B, 6).—A considerable portion of the NH_3 occurring in ordinary silage is derived from amides. The decomp. of tryptophan (*I*) by certain organisms, e.g., *B. coli*, is indicated. A.I.V. silage contains notable amounts of (*I*). A. G. P.

Damping-off of tap roots of pines. C. ROTH (Phytopath. Z., 1935, 8, I—110).—Factors influencing the occurrence and virulence of the disease are examined. The H_2O content, reaction, and temp. of the soil are concerned. A. G. P.

Pasteurising soil electrically to control damping-off. J. G. HORSFALL (New York State Agric. Exp. Sta. Bull., 1935, No. 651, 8 pp.).—Soil is heated at 45—50° in an electric pasteuriser and allowed to remain therein, without additional heating, for 12 hr. Satisfactory control of damping-off is obtained and many weed seeds are destroyed. A. G. P.

Liquid formaldehyde treatment to control damping-off of flower seedlings. C. E. F. GUTERMAN and L. M. MASSEY (Phytopath., 1935, 25, 18).—For a no. of

varieties of flowering plants, treatment of seed beds with aq. CH_2O (commercial formalin diluted with 5—6 vols. of H_2O) is preferable to use of CH_2O dusts.

A. G. P.

Weed killers : thiocyanates. B. C. ASTON, J. A. BRUCE, and F. B. THOMPSON (New Zealand J. Agric., 1935, 50, 164—172).—Better control of ragwort is obtained by use of NH_4CNS (*I*) (5—10% solution at 200 gals. per acre) in the rosette than in the mature stage. Subsequent growth of grass is improved. Dry-weather applications are the more effective. Mixtures of superphosphate and (*I*) (3 : 1) produced a 90% kill. Cutting plants prior to treatment was unsatisfactory. A. G. P.

New factor in epidemiology of tobacco leaf diseases. E. E. CLAYTON (Phytopath., 1935, 25, 11).—Infection by *B. tabacum* is facilitated by heavy storms which produce H_2O -soaked areas in the plant tissues. The organism spreads rapidly in such areas. Fertiliser practice modifies the resistance of plants to H_2O -soaking. Low topping, low-*K* or high-*N* fertilisers facilitate soaking and infection. A. G. P.

Tobacco wildfire control in Pennsylvania. W. S. BEACH (Phytopath., 1935, 25, 6).—To prevent re-infection from old tobacco soils, application of Bordeaux mixture to seedling beds is recommended. $Cu-CaO$ dusts were less satisfactory. A spray of Hg_2Cl_2 -milk powder gave effective control, but tended to injure lateral roots developing near the soil surface. A. G. P.

Control of downy mildew of tobacco. R. G. HENDERSON (Phytopath., 1935, 25, 19; cf. B., 1934, 901).—Of a no. of fungicides examined, $BzOH$, Cu_2O , and a Cu -molasses prep. were the most effective. A. G. P.

Fungicidal possibilities of red copper oxide. J. G. HORSFALL and J. M. HAMILTON (Phytopath., 1935, 25, 21).—Satisfactory control of various fungus diseases by Cu_2O is recorded. Sensitiveness of plants to Cu_2O is of the same order as that to Bordeaux mixture. Plant injury is diminished without loss of fungicidal efficiency by use in conjunction with CaO -cottonseed oil emulsions. Hop cones, succulent leaves of tomato and rose are not injured by Cu_2O , which possesses also the advantages of good adhesion, high vol. : wt. ratio, high *Cu* content, and compatibility with common insecticides. A. G. P.

Insoluble copper compounds as substitutes for Bordeaux mixture. H. C. YOUNG and J. R. BECKENBACH (Phytopath., 1935, 25, 40).—The principal limitation of basic Cu sulphate, Cu oxychloride and phosphate as fungicides is lack of adhesiveness. This may be corr. by the use of bentonite or other special clays. Toxicity of these compounds is decreased by CaO . All caused russetting of apples. A. G. P.

Copper phosphate [fungicidal] mixture. J. W. ROBERTS, L. PIERCE, M. A. SMITH, J. C. DUNEGAN, E. L. GREEN, and M. C. GOLDSWORTHY (Phytopath., 1935, 25, 32—33).—Satisfactory results are recorded in the control of apple scab, cherry-leaf spot, and leaf blight of pears by use of a prep. containing $Cu_3(PO_4)_2$ 2 lb., bentonite 2 lb., $Ca(OH)_2$ 4 lb., in 50 gals. of H_2O . A. G. P.

Fungicidal properties of certain copper-lime-arsenite preparations. G. W. KEITT and D. H.

PALMITER (Phytopath., 1935, 25, 23—24).—Mono-, di-, and tri-Ca arsenite, each used alone, was at least = CuSO_4 in toxicity (I) to a no. of plant pathogens. The (I) of CuSO_4 -Ca arsenite mixtures was < the additive vals. of the components. Tests of (I) by diffusion through agar showed higher vals. for initially acid media.

A. G. P.

Availability of copper in Bordeaux mixture residues and its absorption by conidia of *Sclerotinia fructicola*. M. C. GOLDSWORTHY and E. L. GREEN (Phytopath., 1935, 25, 17).—The available Cu in Bordeaux residues was > the lethal dose for germinating or germinated conidia (I). Growth of (I) was inhibited by even smaller amounts. Intake of Cu was slow in inactive, but very rapid in germinated, (I), and was unaffected by secretions or metabolic by-products of the fungus. Other ions are simultaneously absorbed. Replacement of available Cu removed by rain occurs only as a result of weathering.

A. G. P.

Control of aster-leaf rust. C. E. F. GUTERMAN (Phytopath., 1935, 25, 17—18).—Results of trials with proprietary S preps. (best results) and with Bordeaux mixture are recorded.

A. G. P.

***Phytophthora* wilt of black locust seedlings.** E. B. LAMBERT and B. S. CRANDALL (Phytopath., 1935, 25, 24—25).—Good control was obtained by scarifying the seed and spraying with Bordeaux mixture to protect emerging seedlings. Incidence of the disease was lowered by increasing the acidity of the surface 3 in. of soil to p_H 4.6, by treatment with $\text{Al}_2(\text{SO}_4)_3$.

A. G. P.

Sulphur as a fungicide. J. J. TAUBENHAUS and P. DECKER (Phytopath., 1935, 25, 35—36).—High toxicity to spore germination is associated with S of 300-mesh grade. The efficiency is increased by addition of small proportions of other fungicides or insecticides. On calcareous potato soils S gave fair control of scab when applied in furrows with seed, but not if broadcast. Sorghum smut was controlled by treatment of seed with S- CuSO_4 preps. Incorporation of 2—4% of S with soil or use of slabs of S formed an effective barrier to encroachment of *Phymatotrichum* root rot from infected areas.

A. G. P.

Soil treatment with sulphur and limestone for controlling bacterial wilt of potatoes. A. H. EDDINS (Phytopath., 1935, 25, 16).—The decreased % of wilted potatoes following soil treatment with inoculated S was \propto the amount applied and was most effective where the soil p_H was reduced to > 4.5. Simultaneous application of S and limestone markedly improved the yield of marketable tubers.

A. G. P.

Seed treatment for controlling kernel smut of millet. T. F. YU, H. K. CHEN, and L. HWANG (Nanking Coll. Agric. Forestry Bull., 1934, 14, 1—18).—Dusting with CuSO_4 and Cu carbonate preps., various proprietary substances, and also wet treatment with CH_2O , were effective.

CH. ABS. (p)

Value of zinc sulphate as a peach spray ingredient. K. J. KADOW and H. W. ANDERSON (Phytopath., 1935, 25, 22—23).—Addition of ZnSO_4 (I) to CaO-Pb arsenate spray does not increase its efficiency, but almost entirely eliminates all sol. As from the liquid.

Better growth of peach seedlings resulted from applications of (I) in sand cultures, but not under field conditions.

A. G. P.

Method for using zinc for brown-rot gummosis [on lemons]. D. J. THOMPSON (Calif. Citrograph, 1934, 19, 65).—A mixture of ZnSO_4 25, $\text{Ca}(\text{OH})_2$ 25, and sand 50% is placed in a band around the tree trunk and held in place by paper.

CH. ABS. (p)

Occurrence in United States of *Cryptococcus fagi* (Baer), Dougl. J. EHRLICH (J. Arnold Arboretum, 1932, 13, 75—80).—Control is effected by spraying a 1:15 oil emulsion. Kerosene-soap sprays give control in laboratory but not in field trials.

CH. ABS. (p)

Development of eradicant fungicides. G. W. KEITT (Phytopath., 1935, 25, 23).—The significance of the proper timing of spray applications is considered.

A. G. P.

EtCO_2H from agricultural by-products.—See XVIII. **Derris root.**—See XX. **Toxic val. of Derris spp.**—See XXIII.

See also A., May, 594, **Rapid test for ClO_4^- in plant extracts.**

PATENTS.

Fertilisers. J. RADCLIFFE (B.P. 426,380, 6.10.33).—Small pieces of porous material, e.g., lava, pumice, kieselguhr, are treated with steam to remove air, then soaked in a solution of a fertiliser salt (I), e.g., NH_4NO_3 . The product gives up its (I) relatively slowly, so that its fertilising action is prolonged in the soil.

A. R. P.

Manufacture of fertiliser. W. KLEMP and F. BRODKORB, Assrs. to GES. F. KOHLENTSCHN. M.B.H. (U.S.P. 1,969,650, 7.8.34. Appl., 12.4.32. Ger., 4.4.31).— $(\text{NH}_4)_2\text{S}_2\text{O}_3$ (raw gas-works liquor) is treated with HNO_3 and/or H_3PO_4 in such proportion that SO_2 is not formed; the pptd. S is preferably separated before evaporation, the cryst. salts forming the fertiliser.

B. M. V.

Complex fungicidal copper compounds. C. ARNOLD. From STANCO, INC. (B.P. 427,128, 12.12.33).— CuSO_4 , Na_2SiO_3 , and NH_3 solutions are mixed together in such proportions that the resulting liquid has p_H 6.5—8 and the Cu is all pptd. as a pale blue gel of basic Cu NH_4 silicate. The ppt. is collected, washed, and stored as a paste, which is suspended in H_2O for spraying fruit trees or plants to prevent scab formation.

A. R. P.

NH_4 salt.—See VII.

XVII.—SUGARS; STARCHES; GUMS.

Neutral copper solution for invert-sugar determination in crude sugar, molasses, etc. G. BRUHNS (Deuts. Zuckerind., 1934, 59, 662; Chem. Zentr., 1934, ii, 2760).—The sugar is boiled with $\text{Cu}(\text{OAc})_2$. The pptd. Cu_2O is dissolved in H_2SO_4 and determined iodometrically.

J. S. A.

Production of glucose colours. A. DEGBOMONT (Ann. Zymol., 1934, [ii], 1, 327—339; Chem. Zentr., 1934, ii, 2759).—Production of colouring matter from glucose takes place best at p_H 9.1. Small additions of N bases deepen the colour.

J. S. A.

Polysaccharides. VIII. K. NISHIDA, H. HASHIMA, and T. FUKAMIZU (J. Agric. Chem. Soc., Japan, 1934,

10, 1001—1005).—Prep. and purification of mucilage from stems of *Kadsura japonica* are described. It is probably xyloglucuroxide. CH. ABS. (p)

Bagasse.—See V. **Sugar plastics.**—See XIII. **EcCO₂H by fermentation.**—See XVIII. **Colour development in heated lactose solutions.**—See XIX.

See also A., May, 581, **Reactions during formation of starch paste.** 599, **Use of crucibles with a porous filtering plate in Allihn's method.** 609, **Determination of maltose in presence of sucrose and monoses.**

PATENTS.

Asphaltic product.—See II. **NH₂-alcohols from sugars.**—See III.

XVIII.—FERMENTATION INDUSTRIES.

Hop extracts. M. H. VAN LAER (Ann. Zymol., 1934, [ii], 1, No. 9; Woch. Brau., 1935, 52, 71—72).—Et₂O extracts and subsequent aq. extracts (preferably made at *p_H* 5) prepared from hops were conc. *in vacuo* and recombined to give relative proportions of α and β resins and tannin present in original hops. The extracts (*E*), added to worts to give the same calc. antiseptic power ($\alpha + \frac{1}{3}\beta$) in each case, gave a more bitter beer and greater antiseptic action than normal untreated hops (*H*); the fermentation with *E* was slower than with *H*. Using different amounts of *E*, the beer judged as best contained approx. half the standard amount of resin. Characters of hops due to age or growing district were clearly perceptible in the finished beers. An odour of C₆H₁₁·OAc developed during fermentation using *E* from old hops, and the beer tasted like stout. I. A. P.

Separation of hops and sediment [from wort]. G. JAKOB (Woch. Brau., 1935, 52, 73—76, 81—86).—Modern German processes of wort treatment (pressure-boiling, use of vertical double hop sieves, hot-filtration) and the re-utilisation of hop sediment are described, and conditions affecting the quantity of hot-sediment and the deposition and analysis of cold-sediment discussed. The importance of hot-aëration is disputed. I. A. P.

Evaluation of malt. W. PIRATZKY and R. REHBERG (Woch. Brau., 1935, 52, 89—93, 101—104).—Laboratory mashes of malts were made by a modification of Graf's method (I) (cf. B., 1934, 375), by a modified Congress method (II), and by the Congress method (III) with meal and coarse grist. Sol. N (*S*) was determined in wort from (I), (II), and (III), and formol-N (*F*) and acids (*A*) in (I) and (III). With malts prepared by different systems, low-temp. treatment (14—17°) gave better modification and higher vals. for extract (*E*), *S*, *F*, and *A* than high-temp. (18—21°) flooring. The difference in *S* between (I) and (II) measures the protein modification of the malt. The curing temp. necessary for pale malts has little effect on the composition of worts (I) and (III). The high temp. necessary for curing dark malt causes no change in *E* and *A* of (I)-wort, but these decrease in (III) due to enzyme destruction; *S* and *F* fall with both worts, owing to coagulation. Malts prepared in practical malting experiments, and investigated by (I), (II), and (III), showed that low-temp. flooring yields the most valuable products. I. A. P.

Poisoning of yeast by copper during brewing processes. R. KOCH (Woch. Brau., 1935, 52, 57—63, 65—71, 76—80, 86—88, 93—95).—Free Cu⁺⁺, and not the total Cu content of wort, is important in determining the poisonous effect of Cu on yeast. The concn. of added Cu (as CuSO₄) which remains active (*i.e.*, as free Cu⁺⁺) is dependent on the concn. of non-sugar colloids of the wort; sugar concn. has little effect in rendering Cu inactive. Definite retardation of fermentation (*F*) is produced by 12—24 mg. of Cu per litre. The effect of electrolytically dissolved Cu is > that of added CuSO₄. The action of dried yeast is retarded by Cu, but probably other factors in addition to enzyme inhibition are responsible for the full effect of Cu on live yeast. After *F* of wort containing Cu, some Cu may remain in the beer, part passes to the yeast, part to sediment etc., and part is unaccounted for. Various worts examined contained 0.3—0.9 mg. of Cu per litre, derived possibly partly from hops, but mainly from vessels and pipes; malt and brewing-H₂O were Cu-free. CuCl₂ solution of "physiological" concn. causes yeast protoplasm to coagulate with consequent contraction from the cell wall. Cu poisoning can be recognised by hamatoxylin staining only in cells the morphological condition of which is sufficiently altered for this to be observed without staining. Normal wort and beer are free from Cu⁺⁺, and possess the power of combining with added Cu up to a certain point. The uncombined excess can be determined by Warburg's cysteine oxidation method (in presence of pyrophosphate); it is this excess which affects *F*. Yeast shows evidence of poisoning if Cu⁺⁺ remains in the finished beer. Added active Cu can be removed from wort by boiling.

I. A. P.

Sulphuric acid requirement in the mashing of rye. F. WENDEL (Brennerei-Ztg., 1934, 51, 121; Chem. Zentr., 1934, ii, 2760).—The addition of 30—40 c.c. of H₂SO₄ per 150 litres of H₂O is beneficial. J. S. A.

Chemical report on spent washes and wash-diseases. E. LÜHDER (Z. Spiritusind., 1935, 58, 115—117).—Of 7 spent washes which had been used for feeding cattle which developed various disorders, 5 were chemically quite unobjectionable, 1 was objectionable only through high acidity, but 1 was quite abnormal in composition (exceptionally high extract, acid, EtOH, and fermentable matter).

I. A. P.

Evaluation of lemon vinegar. J. RUFFY (Mitt. Lebensm. Hyg., 1935, 25, 335—337).—From comparisons of the analyses of 3 lemon juices (I), 1 lemon vinegar (II), and (I) after addition of 5% of AcOH, it is concluded that genuine (II) should contain < 20.0 g. of total extract (III) per litre, as determined by the direct method, and < 2.0 g. of [(III) — (free acids + combined acids calc. as K citrate + sugar + glycerin)] per litre. Analytical methods are described. J. G.

Determination of free sulphur dioxide in wines. R. MARCILLE (Ann. Falsif., 1935, 28, 93—96).—The determination is carried out, by the usual I-fixation method, directly on 10 c.c. of wine treated with 5—6 drops of 20% aq. H₂SO₄. E. C. S.

Fruit juices prepared as alcoholic beverages. **Currant wine.** M. JONESCO (Ann. Falsif., 1935, 28,

78—88).—The prep. of must and wine from currants is described. The properties of the products are compared with those of typical grape wine, and the changes in composition on storage are tabulated. E. C. S.

Utilisation of agricultural by-products in production of propionic acid by fermentation. H. G. WOOD and C. H. WERKMAN (J. Agric. Res., 1934, 49, 1017—1024).—*Propionibacterium arabinosum* produces EtCO_2H from hydrolysed starch, whey, milk, blackstrap molasses, artichokes, potatoes, and maize meal. Maize-gluten meal and steep- H_2O may be used as sources of N. A. G. P.

Rubber and beverages.—See XIV. **Manuring of hops.**—See XVI. **Esters of $\text{CH}_2\text{Ph}\cdot\text{CH}_2\cdot\text{OH}$ as antiseptics.**—See XX.

See also A., May, 658, **Enzyme from *Acer saccharum***. 659, **Enzyme prep. Determining invertase activity. Purifying histaminase.** 661, **Yeast-phosphatase.**

XIX.—FOODS.

Influence of different time of harvesting on wheat quality. F. SCHNELLE and F. HEISER (Mühlenlab., 1935, 5, 49—56).—Tests on a no. of wheat varieties cultivated under normal weather conditions in Germany during 1931 and 1932 showed that the improvements in hectolitre and 1000-grain wt., moist and dry gluten content, gluten quality (Pelshenke test), loaf vol., and fermentation period produced by a longer ripening period were so small as to be immaterial. The extent to which chemical improves [0.002% of KBrO_3 + 0.008% of $(\text{NH}_4)_2\text{S}_2\text{O}_8$] improved baking quality varied with variety. E. A. F.

Refining and nutritive value of flour. A. BRUNO (Ann. Falsif., 1935, 28, 102—103). P. NOTTIN (*Ibid.*, 103—104; cf. *ibid.*, 1934, 27, 579).—The degree of refining of flour in relation to the loss of certain constituents is discussed. E. C. S.

Detection of soya flour. E. ZIMMERMANN and H. KLUGE (Arch. Hyg. Bakt., 1934, 112, 157—166; Chem. Zentr., 1934, ii, 2920).—Soya-proteins could be detected with a sp. pptn. reaction in various foodstuffs, but other leguminous proteins gave similar reactions. H. J. E.

Gas retention of doughs of different gluten content. N. P. KOSMIN and K. A. ALAKRINSKAJA (Mühlenlab., 1935, 5, 57—63).—The gas retention (R) of 26 flours (F) conforming to one of three types of extraction (70% laboratory, or 75% or 85% commercial) was determined by Kosmin's method (B., 1932, 77). The smaller loaf vol. (V) produced by too firm doughs (T) is due, not to the greater resistance to extension by CO_2 , but to the lower R . The mechanical properties of T are such that the gas can diffuse unhindered through its mass, without extending it, and only 50% of the CO_2 is retained by T . Increasing the amount of H_2O added to F yielding T , so as to give doughs (D) of normal consistency, increases the swelling power of the gluten (G), and, consequently, its binding capacity, elasticity, R , and V . G qualities being equal, F of higher G content yield D of higher R ; this, however, applies only to the 3rd hr. of fermentation. In general, D from higher-grade F have a higher R than D from lower-

grade F . G quality is the decisive factor in R , but the full effect of this factor is observed only when the fat is extracted from F . Extraction led, at equiv. fermentation intensities, to an increase in R of too firm gluten. E. A. F.

Do egg-doughs decrease in lecithin-phosphate content in course of time? P. BALAVOINE (Mitt. Lebensm. Hyg., 1935, 25, 322—323).—The lecithin-phosphate contents (I) of 2 egg-doughs stored under normal shop conditions for 13 months fell by only 0.007% (as P_2O_5), and the Et_2O extracts were not appreciably changed. A low (I) indicates lack of eggs, storage under adverse conditions, or careless prep. J. G.

Egg [content of egg] pastry. E. MÜLLER (Mitt. Lebensm. Hyg., 1935, 25, 313—316).—The von Fellenberg-Schmid method (separation of egg- and wheat-proteins by MgSO_4 and CuSO_4 , followed by a Kjeldahl N determination) has been tested for 9 samples of known egg content and 27 trade samples containing fresh or preserved (I) eggs; fat and P_2O_5 data are included. The method gives rapid and reliable results and is independent of the fineness of grinding; the egg content (in g./kg.) is best given by $173(0.272a - 0.1)$, where a is the no. of c.c. of 0.1N-acid used. Low vals. for (I) may be due to egg-protein (II) becoming insol. during manufacture; the supposed loss of (II) on ageing is questioned. J. G.

Analysis of pastry: determination of fat by the acid method. T. VON FELLEBERG (Mitt. Lebensm. Hyg., 1935, 25, 316—318).—Vals. obtained by 2 workers for the fat content (I), lecithin-phosphate, and I val. and n of the Et_2O extracts are compared for 5 pastry products. Et_2O gives similar results to light petroleum, and the amount extracted depends on the fineness of grinding. Results for (I) 0.43—1.03% higher are obtained by boiling 10 g. of ground sample with 100 c.c. of $N\text{-HCl}$ for 5 min., grinding the dry, filtered residue with sand and dry Na_2SO_4 , and extracting it with Et_2O . J. G.

Hortvet f.-p. process for examination of milk: correction factors and influence of stirring. II, III. J. R. STUBBS (Analyst, 1935, 60, 223—237; cf. B., 1935, 475).—II. The corrections (C) for supercooling (S) and for heat transference (T) are separately investigated. The total C for 1° of S under the conditions specified was 1.7% of the observed depression, of which 1.1% was due to S and 0.6% to T .

III. The effect of omitting EtOH from the space surrounding the freezing-tube (F), and of diminishing the clearance between F and the cooling-bath, on cooling time is discussed. E. C. S.

Influence of climate on fat content of milk. E. DEGER (Bied. Zentr. [Tierernähr.], 1935, B, 7, 63—65).—Dairy management and analytical control in the tropics are examined. A. G. P.

Relation of materials absorbed on fat globules to the richness of flavour of milk and certain milk products. L. M. THURSTON and J. L. BARNHART (J. Dairy Sci., 1935, 18, 131—137).—Phospholipins of milk contribute to the richness of flavour of milk products. A. G. P.

Action of milk fat as a foam depressant. A. LEVITON and A. LEIGHTON (J. Dairy Sci., 1935, 18, 105—112).—The action of milk fat is due, not to its ability to remove protein from the air-milk interface, but to its capacity of spreading over the surface of H_2O . A. G. P.

Simplified molecular constant, and milks from the Brussels district. V. MAINSBRECOQ (Ann. Falsif., 1935, 28, 167—172).—The simplified mol. const. (S) is $11,900CL/[1000 - (A/1.35 + G/0.94)]$. L , the hydrated lactose content in g./litre, is determined by the volumetric method, using Fehling's solution; C , the $NaCl$, by titration of the alkaline ash with $AgNO_3$; G , the fat ($d\ 0.94$), by extraction with Et_2O after acid hydrolysis; and A , the casein ($d\ 1.35$), by difference, using the dry extract. Data for 30 milks are given; it is considered that under the above conditions the usually-accepted min. val. of 70 for S may be lowered to 67. J. G.

Colour development in lactose solutions during heating, with special reference to the colour of evaporated milk. B. H. WEBB (J. Dairy Sci., 1935, 18, 81—96).—In lactose (I) solution PO_4''' has a sp. effect in causing colour darkening during heating. Production of colour (II) increases with increasing concns. of OH' , (I), NH_2 -acids (III), NH_4 salts, PO_4''' , and O_2 . Fe and Cu catalyse, and Sn retards, formation of (II). Small amounts of CH_2O increase, and larger amounts decrease, (II). $NaHSO_3$ prevents the appearance of (II). When (III) and proteins are present (II) results from the formation of a complex material by interaction of (I) and NH_2 , and also from the production of lacto-caramel. (II) in evaporated milks may be minimised by restricting the period and lowering the temp. of storage. A. G. P.

Peroxidase reaction of high-temperature and momentarily-heated milk. K. JESCHKI (Mitt. Lebensm. Hyg., 1935, 25, 324—325; cf. B., 1932, 1133).—Polemical against Zäch (cf. B., 1934, 1033). High-temp. pasteurisation is defined as ≤ 3 min. at 80° or 1 min. at 85° , and it is claimed that under such conditions a negative peroxidase reaction is always obtained. Zäch now agrees. Anomalous results may arise from variations in times and temp. of exposure according to the design of the pasteurisation apparatus. J. G.

Distribution of phospholipins in cream. J. L. PERLMAN (J. Dairy Sci., 1935, 18, 113—123).—The phospholipin (I) content of fresh cream increases uniformly with rising fat content (F) to a max. with 55—58% of fat, and subsequently declines. The (I) in fatty extracts of creams decreases with increasing F of the cream. Approx. 40% of the original milk-(I) is removed with the skim milk in producing cream having 15—20% of F . Further removal of (I) in obtaining cream with 20—55% of F is small. A reversion of the colloidal system of fresh cream corresponding to 55—58% of F is indicated. Heat alone does not destroy (I). A. G. P.

Use of citric acid and sodium citrate in butter-making. H. L. TEMPLETON and H. H. SOMMER (J. Dairy Sci., 1935, 18, 97—104).—Flavour and aroma of

butter are improved by addition of citric acid (I) or Na citrate to the cream and/or the starter. Use of (I) reduces losses of fat in buttermilk. A. G. P.

Vogt method of manufacturing flake buttermilk. E. S. GUTHRIE (J. Dairy Sci., 1935, 18, 139—140).—The process and product are described. A. G. P.

Cheese poisoning. J. STRAUB and M. M. LERNER (Chem. Weekblad, 1934, 31, 747—748).—A section of poisonous cheese was found to contain areas alkaline to bromocresol-purple, in which *B. coli* was present. Portions immediately beneath the crust, and containing moulds, were also alkaline. Inoculation of cheese with *B. coli* caused the appearance of an alkaline reaction. H. F. G.

Coloration of Dutch cheeses. P. BALAVOINE (Mitt. Lebensm. Hyg., 1935, 26, 41—42).—A method of extraction is described, and some pigments identified in the rind are recorded. E. C. S.

Quality of lactic casein. J. PIEN, R. MARTIN, M. BERGIER, and S. HERSCHDOERFER (Lait, 1934, 14, 150, [70 pp.]; Chem. Zentr., 1934, ii, 1701).—Analytical data are recorded. H. J. E.

Removal of metals from foodstuffs. J. A. F. KOK (Acta Brev. neerl. Physiol., 1933, 3, 109—110; Chem. Zentr., 1934, ii, 2410).—Metals are removed from caseinogen and starch by washing with very dil. HCl in metal-free H_2O , which is prepared by neutralising Na_2CO_3 with HCl and adding aq. NH_3 , Na_2S , and $Ba(OH)_2$; $BaCO_3$ is pptd. and carries the heavy-metal sulphides with it. R. N. C.

Vitamin-A in eggs. W. C. RUSSELL (New Jersey Agric., 1934, 16, No. 2, 6).—Hens receiving a yellow maize (I)-wheat-cod-liver oil ration produced eggs containing 260 units of vitamin-A, or 47% of the -A in the diet. With a corresponding white (I) ration eggs contained 200 units of -A or 48% of the -A fed. CH. ABS. (p)

Proteins of meat. E. C. B. SMITH (J.S.C.I., 1935, 54, 152—154 t).—The properties of myosin, myogen, collagen, and elastin are discussed in relation to the structure of meat and changes on storage. Improvements in the determination of the meat proteins (cf. A., 1935, 231) are described. E. C. S.

Post-mortem and refrigeration changes in meat. T. MORAN (J.S.C.I., 1935, 54, 149—151 t).—The chemical and physical changes in muscle during rigor mortis are reviewed. The changes in muscle and fat on further storage include denaturation of the proteins, changes in the muscle pigments, rancidity in the fat, and bacterial breakdown. The last can be reduced very considerably by clean handling of the meat, and this is probably the most important factor in the storage of meat. Changes during storage can be controlled by adjusting the conditions of temp., humidity, and the gaseous environment; this control is illustrated by consideration of storage in the frozen state and in atm. of CO_2 .

Constituents of meat acting as pointers of change. L. C. BAKER (J.S.C.I., 1935, 54, 154—157 t).—The literature of meat is reviewed with the object of showing the significance of analytical determinations used in the control of meat products.

Vitamin content of figs. A. F. MORGAN, A. FIELD, L. KIMMEL, and P. F. NICHOLS (J. Nutrition, 1935, 9, 383—394).—Frozen figs retained some vitamin-C. The latter was lost during any form of drying. Black figs contained more -A precursor than light-coloured varieties. Sulphuring (I) favoured retention in some varieties only. The -A content of dehydrated was > that of sundried fruit. Drying caused some loss of -B. (I) intensified the loss, which was demonstrated more markedly in trials with rats than in those with pigeons. Drying did not affect the -B₂ content of figs. A. G. P.

Vitamin content of sultanina (Thompson seedless) grapes and raisins. A. F. MORGAN, L. KIMMEL, A. FIELD, and P. F. NICHOLS (J. Nutrition, 1935, 9, 369—382).—Seedless grapes preserved by freezing storage, even with air evacuation, rapidly lose vitamin-A and -B₁. Sun-dried and soda-dipped raisins largely retain their -B₁ content, which, however, is almost destroyed by SO₂ treatment previous to drying. Dehydrated raisins, whether sulphured or not, lose little -A, but sun-dried fruit retain very little -A. Fresh grapes have a low, and raisins an insignificant, -C activity. A. G. P.

Vitamin-B₂ content of home-canned tomato juice. C. F. POE and E. L. GAMBILL (J. Nutrition, 1935, 9, 119—122).—The average val. recorded is 0.21 unit per c.c. A. G. P.

Storage of apples. K. NEORAL and J. BLAHA (Věstn. českoslov. Akad. Zeměd., 1934, 10, 256—258; Chem. Zentr., 1934, ii, 2762—2763).—A review of methods of storage and accompanying changes in fruit composition. J. S. A.

Corrosion of containers by fruit preserves. V. MORGENSTERN (Braunsch. Kons.-Ztg., 1934, No. 35, 3—4; Chem. Zentr., 1934, ii, 2917).—Corrosion may be due to faultily-coated containers, but is usually due to incomplete removal of O₂ and the use of insufficient sugar. H. J. E.

Bacteriology of [food] canning. VII. Cultural details of the more commonly occurring organisms. S. LANCEFIELD (Food, 1935, 4, 308—310; cf. B., 1935, 476).—Organisms dealt with are: *B. megatherium* (from canned spinach), *Staph. p. aureus* (I) and *S. albus* (II) from canned prawns, although they may also arise from infection by discharging wounds on the hand of the operator or from a boil on the skin of the animal. Unlike (II), (I) forms coloured (yellow) cultures, reduces N₂O₅ to N₂O₃, and produces a gastric toxin. *B. thermophilus* (from soil and dung) is difficult to remove by washing; NaOCl should be used. *B. coagulans* and *B. amarus* (Hammer, 1919), from condensed milk; *Lactobacillus panis* (from sour dough and condensed milk); *B. coli communis* (milk or H₂O); and *B. ichthyosmius* (condensed milk) are also discussed. J. G.

Feeding-stuff analysis and the determination of digestibility. A. C. ANDERSEN (Skand. Arch. Physiol., 1934, 69, 33—58; Chem. Zentr., 1934, ii, 2921).—A crit. discussion of analytical methods. H. J. E.

Biological value of proteins of some important feeding-stuffs in respect of growth of the organism.

F. SVOBODA (Sborn. Czechoslov. Akad. Zeměd., 1934, 9, 239—268).—Live-wt. increases in pigs were higher from animal- than from vegetable-protein foods as a result of the greater lysine content of the former. For the same reason the biological val. of lucerne-protein is > that of other plant proteins. A. G. P.

Influence of mineral-acid silage on the acid : base equilibrium [in cattle]. E. BROUWER (Bied. Zentr. [Tierernähr.], 1935, B, 7, 1—35).—Feeding of (HCl) acid silage having p_H 3—4 increased the acidity and NH₃ content of the urine, and in more extreme cases lowered the alkali reserve of the blood, decreased the plasma-p_H, and raised the Cl content. Blood-Na and -P were unchanged. These effects were counteracted by supplying appropriate amounts of NaHCO₃ or Na₂CO₃. CaCO₃ had a similar action, but was less efficient and gave better results when mixed with Na₂CO₃. A. G. P.

Dyes for foodstuffs.—See IV. **Metals in the food industry.** **Tinplate corrosion in canning.**—See X. **Metal-container finishing.**—See XIII. **Rubber and foods.**—See XIV. **Natural guano. Foodstuffs and foders.**—See XVI. **Spent washes and disease.** **Lemon vinegar.** EtCO₂H by fermentation.—See XVIII. **Esters of PhEtOH as antiseptics.**—See XX.

See also A., May, 577, Solubility of lactose [in ice cream and milk powders]. 579, Plastic properties of dough. 581, η of gluten dispersed in solvents. 638, Casein. 673, Cryst. tea-tannin from green tea.

PATENTS.

Treatment of flour. R. RÜTER (B.P. 427,261, 19.10.33).—The baking properties of flour are improved, without bleaching effect, by treatment of the flour with a halogenated alkylamine (NMeCl₂). E. B. H.

Treatment of substances for use as foodstuffs. R. G. SUMMERS (B.P. 424,508, 10.10.33).—Claim is made for mixtures of sugars and gelatin or other gelatinous substance with NaH₂PO₄, Na₂HPO₄, and NaHCO₃ to give a product of p_H 8 which is capable of retaining a large vol. of air in a foam-like suspension when beaten. A. R. P.

Phosphatides in soya beans. Treating marine [animal] oils.—See XII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Preparation of sterile solutions. E. CHIERICI (Boll. Chim. farm., 1935, 74, 145—151).—The prep. of sterile solutions of various drugs for intravenous injection by filtration through porcelain candles is described. F. O. H.

Esters of phenylethyl alcohol with organic acids. I. Action as antiseptics. II. Toxicity. T. TAKAHASHI (J. Agric. Chem. Soc. Japan, 1934, 10, 970—974, 975—982).—I. The alcohol and a no. of its esters are effective antiseptics for soy and saké, and in suitable amounts do not affect the quality of the fermentation product. II. The esters are non-toxic to white rats.

CH. ABS. (p)

Viscous fermentation of lemonades [in pharmaceutical preparations]. R. GUYOT (Bull. Trav. Soc. Pharm., Bordeaux, 1934, 72, 18—27; Chem. Zentr.,

1934, ii, 2417).—In preps. containing syrups or sugars, fermentation producing viscous matter and little CO_2 is caused by a yeast. Dextran is probably formed. The action is inhibited by free acids (including HCN) and by I, but only slightly by NaF and salicylic acid.

A. G. P.

Determination of morphine in opium by the lime method. II. E. LÉGER (Bull. Sci. pharm., 1934, 41, 385—390; Chem. Zentr., 1934, ii, 2563; cf. B., 1935, 45).—Modifications of the method are described. H. J. E.

Assay of coca extract. W. A. N. MARKWELL (Pharm. J., 1935, 134, 416—417).—In the B.P.C. 1934 assay it is suggested that: sufficient portions of Et_2O (I) to remove all alkaloids (II) from the aq. NH_3 solution and of dil. acid to remove all (II) from the (I) extract be ensured; the final (I) solution be washed with H_2O to remove NH_4 salts; the final residue be dehydrated with abs. EtOH ; and that volatile bases be excluded by heating the (II) residue at 80° for 2 hr. E. H. S.

Synthesis of new medicinal alkaloids. J. A. AESCHLIMANN (J.S.C.I., 1935, 54, 135—141 T).—The synthesis and medicinal action of the local anaesthetics Tutocaine, Larocaine, Diothane, and Percaine, the anti-malarials Plasmoguin, Plasmocid, Atebrin, the antispasmodics Perparine, Eupaverine, Mydriasin, Homatropin, Eumydrin, Navigan, and Syntropan, and the physostigmine analogues Miotine and Prostigmin are described. The use of Prostigmin in myasthenia gravis and the suggested mechanism of this action are discussed.

Adonis vernalis and methods of extraction of the active principles. G. TONI and P. FARINI (Arch. Farm. speriment., 1935, 59, 186—192).—The standard Hoffmann-La Roche methods of extracting the active glucosides are modified, a greater yield being obtained by extracting the CHCl_3 residues with H_2O containing 0.5—1.0% of COMe_2 . R. N. C.

Determination of rotenone in derris root. P. A. ROWAAN (Arch. Pharm., 1935, 273, 237—238).—Danckwortt's polarimetric method (B., 1934, 650) gives sometimes lower and sometimes higher results than do crystallisation methods and is, therefore, not a true measure of rotenone (I) content. The presence of dextrorotatory substances must be assumed to account for the lower vals. Crude toxicarol was isolated, with $[\alpha]_D +20^\circ$. The crude (I) obtained in the determinations has m.p. 155° and $[\alpha]_D -210^\circ$. R. S. C.

Umbelliferone content of Persian ammoniacum gum. K. SZÁHLENDER (Arch. Pharm., 1935, 273, 234—235).—Ten samples contained umbelliferone (fluorescence test). R. S. C.

Capillary distribution of plant constituents. A. KUHN and G. SCHÄFER (Pharm. Ztg., 1935, 80, 357—362).—Plant extracts and tinctures are examined by capillary separation, the strip (6—11 cm.) being cut into the various zones formed, which are extracted with H_2O , dil. NaOH, etc. and tested (e.g., spot tests) for carbohydrate, tannin, humin, and characteristic constituents (alkaloids, pigments, etc.); examination is also conducted in ultra-violet light. Examples are given.

F. O. H.

[Optical] dispersion of essential oils. M. DE JONG

and VAN DER WIELEN (Pharm. Weekblad, 1935, 72, 364—365).—Vals. for n_D and $n_F - n_C$ are given for a no. of essential oils. Both quantities are characteristic for a given oil. S. C.

Essential oils of the genus Calythrix. II. C. tetragona (Labillardière), var. "A." A. R. PENFOLD, G. R. RAMAGE, and J. L. SIMONSEN (J. Proc. Roy. Soc. New South Wales, 1935, 68, 80—87; cf. B., 1934, 988).—The leaves and terminal branches gave 0.66—1.1% of oil having d_{20}^{25} 0.8984—0.9073, $\alpha_D^{20} +4.4^\circ$ to $+5.75^\circ$, n_D^{20} 1.4622—1.4655, ester val. 183.3—211.4 (after acetylation 251.3—260.3), solubility in 70% EtOH 1 in 1.6—2.0 vols. It contained principally *d*- α -pinene, *d*-citronellol, *d*-citronellyl formate, and the Me esters of geranic and probably citronellic acids. *p*-Phenylphenacylgeranate, m.p. 79— 80° , *p*-bromophenacylgeranate, m.p. 67° , and *p*-phenylphenacyl citronellate, m.p. 37° , are described. E. H. S.

Essential oils from mushrooms. F. W. FREISE (Perf. & Essent. Oil Rec., 1935, 26, 91—92).—The oil exists combined with glucose, the greater part in the stems and cap and the remainder in the wax-like cover on the cap. Hydrolysis of the isolated glucosides from 5 different species with enzymes extracted from the fungi gave 1.095—2.221% (on original plant, 10.55—13.00% of H_2O) of oil consisting mainly of either CH_2Ph or $\text{C}_2\text{H}_4\text{Ph}$ thiocarbimides. $\text{OH}\cdot\text{CHPh}\cdot\text{CN}$ was also isolated from one sample. E. H. S.

Determination of ethyl phthalate [in essential oils] by the potassium phthalate method. S. SABETAY (Ann. Falsif., 1935, 28, 100—102; cf. B., 1929, 1031).—Esters of tartaric, cinnamic, and anthranilic acids, $\text{H}_2\text{C}_2\text{O}_4$, and BzOH interfere with the detection and determination of Et phthalate. E. C. S.

Halibut-liver oils.—See XII. Tobacco. *Andropogon citratus*.—See XVI.

See also A., May, 577, Solubility of morphine. 579, Prep. of cod-liver oil emulsions. 597, Determination of Pb in solutions of basic Pb acetate. 605, Determination of glycerol in presence of sugars. 609, Cardiac glucosides. (Scillarene derivatives.) 634—7, Alkaloids. 635, Tobacco bases. 655, Curare. Ca gluconate as local anaesthetic. 656, Prep. of cryptotoxic agents from NH_2 -acids. 665, Prep. of staphylococcus toxin. 666, Purifying insulin. Determining folliculin. 667, Prep. of sex hormones. 668—670, Vitamins. 672, [Alkaloids from] *Corydalis aurea*. Violet leaf-oil. 673, Alkaloids of pomegranate. 674, Drugs from Brazilian *Simaruba* bark. Alkaloid of *Cereus coryne*.

PATENTS.

Manufacture of preparations having an anti-emetic action. CHEM. FABR. VON HEYDEN A.-G. (B.P. 426,290—1, 7.3.34. Ger., [A] 8. and [B] 29.3.33).—(A) $\text{Ce}_2(\text{C}_2\text{O}_4)_3$ or CePO_4 is pptd. in presence of a protective colloid and the washed ppt. is ground with a little gum arabic in a ball mill. (B) A rare-earth metal oxalate is rendered colloidal by grinding or digesting with an alkaline solution of a polybasic org. acid, e.g., citric or tartaric. A. R. P.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Nature of photographically active gelatins. A. I. RABINOVICH and A. A. TITOV (Kino-Photo Inst. Moscow, 1934, 2, 19—29).—The photographic activity of gelatin (I) is \propto its content of labile S. Inactive (I) may be prepared by dialysis or by oxidation of (I). Removal of labile S from (I) does not affect the growth of fog.

CH. ABS. (e)

Photographic activity of gelatins. K. V. CHIBISOV (Photo-Kino Chem. Ind., 1934, No. 2, 41—46).—Vogel's reaction (I) with ammoniacal AgNO_3 is a valuable test for the quality of gelatin (II) for emulsion-making by the NH_3 process. (II) which will not pass this test tends to give rise to fog in the first ripening and desensitising in the finishing. In non-ammoniacal emulsions (I) serves as a guide to the fog-producing tendency of (II), but the effect of acidity must be considered.

CH. ABS. (e)

Determination of the resisting power of gelatin. V. A. BEKUNOV (Photo-Kino Chem. Ind., 1934, No. 2, 81—83).—The resistance of gelatins to the Vogel test is related to their resistance to fog in emulsion-making.

CH. ABS. (e)

Influence of hydrolysis of gelatin on the photographic properties of emulsions. V. A. BEKUNOV (Kino-Photo Inst. Moscow, 1934, 2, 30—48).—Hydrolysis of gelatin has little effect on the photographic qualities of emulsions made from it. Its main effect is on physical characteristics.

CH. ABS. (e)

Diffusion of dyes in gelatin in the hydropress process. L. P. KRUILOV (Photo-Kino Chem. Ind., 1933, No. 4, 35—40).—A review.

CH. ABS. (e)

Physico-chemical interpretation of the ripening of photographic emulsions. K. S. LYALIKOV (Photo-Kino Chem. Ind., 1933, No. 4, 41—42).—Optical difficulties in the microscopical study of emulsion grains may lead to misinterpretation of growth effects at the edge of crystals.

CH. ABS. (e)

Sensitometry of mixed emulsions. S. SHUVALOV and A. BROMBERG (Photo-Kino Chem. Ind., 1933, No. 2, 37—44).—Under the most suitable conditions of exposure and development the characteristic curve for the mixed emulsion approximated to that calc. additively from the proportions of the two component emulsions.

CH. ABS. (e)

Colour sensitometry. J. EGGERT (Z. wiss. Phot., 1935, 34, 54—58).—The "yellow difference" between the normal sensitivity ($^{\circ}\text{DIN}$) and the sensitivity ($^{\circ}\text{DIN}_y$) when using a yellow filter with a 100% blue absorption has been determined for various photographic emulsions, which can be divided into 3 approx. groups, viz., panchromatic, highly orthochromatic, and weakly orthochromatic. Using the last, any given yellow filter can be tested; its blue absorption will be $= [1 - 10^{-(^{\circ}\text{DIN} - ^{\circ}\text{DIN}_y)}] / [1 - 10^{-(^{\circ}\text{DIN} - ^{\circ}\text{DIN}_y)}]$, where $^{\circ}\text{DIN}_y$ is the sensitivity when using the given filter. Then for a given emulsion and filter the correction to be made to the normal sensitivity can be approx. calc.: a table is given.

J. L.

Testing of the German standard DIN 4512 for practical exposures. R. LUTHER and H. STAUDE

(Z. wiss. Phot., 1935, 34, 40—53).—14 roll-film emulsions from 8 different makers have been tested in one and several cameras simultaneously, the exposures being calc. from the DIN sensitivities, and the results compared with Scheiner vals. and by practical standards. 80—85% of the results were correctly exposed and the remainder were not unusably over- or under-exposed. For special processes, e.g., fine-grain development, highly-hardened emulsions, corrections have to be made to the normal calc. exposures.

J. L.

Measurement of photographic exposure on a photoelectric basis. F. WAIBEL and W. SCHOTTKY (Z. wiss. Phot., 1935, 34, 88—96).—The latest types of CuO_2 enclosed-layer photoelectric cells and alkali and other metal cells are discussed and compared, particularly with regard to effect of the resistance of the instruments, quant. abilities, spectral sensitivities and their relation to visual and photographic plate sensitivities, and the light sources employed.

J. L.

Chemistry of [photographic] sensitisers. W. KÖNIG (Z. wiss. Phot., 1935, 34, 15—39).—A review is given of the prep., structure, and relations of sensitisers, particularly the polymethine and the various cyanine groups; the activities of various groupings are discussed with regard to their sp. spectral sensitisations.

J. L.

Hypersensitisation. J. I. BOKINIK (Kino-Photo Prom., 1933, 2, 160—162).—1% aq. $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ increases the speed of ordinary and panchromatic emulsions. In a solution containing both AgNO_3 (I) and H_2O_2 (II), (I) is active, (II) decreasing the sensitivity.

CH. ABS. (e)

Pyrocatechol developer without sulphite. H. CUISINIER (Foto. Obzor, 1933, 41, 49—51).—A pyrocatechol (I) stock developer (A) contains 4 g. of (I), 100 c.c. of H_2O , and 10 drops of lactic acid. 10 c.c. of A, 100 c.c. of H_2O , and 5 c.c. of 3.4% aq. Na_2CO_3 are used for contrasty negatives. Too-contrasty negatives are bleached in KMnO_4 -HCl solution and developed in normal (I) developer with Na_2SO_3 . (I) can be used for hydropress prints, for intensification, or for simultaneous developing and fixing.

CH. ABS. (e)

New fine-grain developers. A. STEIGMANN (Camera, 1934, 13, 184—185).—A discussion. Formulae for $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ and $\text{N}(\text{C}_2\text{H}_4 \cdot \text{OH})_3$ developers are suggested.

CH. ABS. (e)

Fine-grain development with *p*-phenylenediamine. K. JACOBSON (Phot. Ind., 1934, 32, 1242—1244).— $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ is of val. as a fine-grain developer only when used in a formula containing SO_3^{--} and Br^- , but no alkali. Addition of Na_3PO_4 increased the rate of development, but resulted in graininess (I). Addition of metol also increased (I).

CH. ABS. (e)

[Uses of] *p*-phenylenediamine [in developers]. C. E. WEINLAND (Camera, 1934, 49, 145—159).—A discussion.

CH. ABS. (e)

Physical development after iodisation. B. CLUZEAU (Sci. ind. phot., 1934, [ii], 5, 33).—Fine-grain plates were iodised in a bath containing KI, Na_2SO_3 , and KCNS, bathed in dil. aq. Na_2SO_3 , and developed in full daylight in a developer containing the double sulphite

of either Ag and Na or of Hg and Na. A reduction in times of exposure and development was observed.

CH. ABS. (e)

Forgotten [photographic] development process. H. STAUDE (Z. wiss. Phot., 1935, 34, 72–76).—A neglected process of development in two stages, the org. developer and the alkali being in separate solutions, has been re-examined (cf. Crabtree *et al.*, Kodak Res. Lab., Comm. 517; Joannovitsch, Phot. Korr., 1907; original process by Luther). To prevent any development in the first bath, the sulphite is replaced by K metabisulphite (I), and Na₂SO₃ is added to the second solution to prevent stain. KBr is added to both solutions to stop fogging. Suitable formulæ were: (A) metol 2 g., quinol 5 g., (I) 15 g., KBr 1 g., H₂O 500 c.c.; (B) K₂CO₃ 50 g., Na₂SO₃ (anhyd.) 5 g., KBr 1 g., H₂O 500 c.c. Normally 4-min. development in each bath (A first) is suitable; shorter times give softer results, and longer times do not alter the result. The method gives very reproducible results, and for given concns. of the solutions a definite γ is always obtainable, even when A is stale (but B should be used fresh). For thick-layer emulsions, which absorb too much in A, giving too high γ , B should be diluted. Very fine-grain images are obtained. J. L.

Regeneration of fixing baths. A. STEIGMANN (Phot. Ind., 1934, 32, 590).—Accumulated iodides can be removed by adding TI' salts, the TII formed being insol. in aq. Na₂S₂O₃ or KCN.

CH. ABS. (e)

Preparation of subtractive multicolour [photographic] images (Gaspacolour process). B. GASPAR (Z. wiss. Phot., 1935, 34, 119–124).—Three layers of differently sensitised emulsions are superimposed on one base, or one of the emulsions may be on the back of double-coated film. The emulsions contain suitable polyazo dyes or vat-dye leuco-compounds which on development are destroyed or form dyes respectively at the points of the Ag image. Suitable combinations of dye-colour and colour-sensitivity of the emulsion layers are described.

J. L.

Chemistry of residual images. J. H. REINDORP (Brit. J. Phot., 1935, 82, 244–246).—The presence of Ag₂S in residual images (yellowish stain images remaining in a photographic emulsion after the Ag image has been removed with "hypo"-ferricyanide solution) can be proved by intensification by the method of Hickman and Weyerts (A., 1934, 155). The Ag is always detectable by bleaching and redeveloping. The stain consists mainly of Ag₂S, but can also partly be an oxidation product of the developer, the former being removable by addition of KI or KBr to the fixing bath. The causes and chemistry of the formation of the stain images are discussed.

J. L.

Comparative tests of etching methods. C. D. HALLAM and R. S. COX (Proc. Engravers' Month., 1934, 41, 41–45).—Tests on the etching of fine-screen work on Cu are described and discussed.

CH. ABS. (e)

Mushroom dot in half-tone etching. C. D. HALLAM and R. S. COX (Proc. Engravers' Month., 1934, 41, 247–248, 260).—In half-tone etching the Cu between the dots is first attacked from the top only. On lowering the surface, lateral etching also occurs. The production of a mushroom effect is described. After sufficient depth

has been obtained the "mushroom" may be removed with AcOH and NaCl, or with a dry brush.

CH. ABS. (e)

Determination of [light]-filter factor by the counter-wedge difference method. E. O. LANGER (Phot. Ind., 1934, 32, 818–820).—Instruments for testing various ortho- and pan-chromatic films are described.

CH. ABS. (e)

Cellulose ester films.—See V. Uses of photo-electric apparatus.—See XI.

See also A., May, 563, Dye absorption in visible spectrum. 565, Quenching of phosphorescence by infra-red rays. 580, Colloid-chemical-topographical relations in images. 590, Bleach-out images by diffuse after-exposure. 591, Recovery of Ag and I from AgI. 630 and 634, Carbocyanines.

PATENTS.

Manufacture of ground-glass surface on film support. A. D. SLACK, Assr. to EASTMAN KODAK CO. (U.S.P. 1,969,481, 7.8.34. Appl., 15.1.32).—A film of cellulose derivative, preferably the acetate, is treated at $\geq 82^\circ$ with a warm aq. solution of an alkali thiocyanate or thiosulphate and dried by heat, to render it translucent and light-diffusing.

B. M. V.

Production of photographic dyestuff images. B. GASPAR (B.P. 426,260, 23.6.33. Ger., 23.6.32).—A dye-forming substance or mixture is incorporated in the photographic layer, and the Ag image converted into a substance which locally nullifies the effect of a subsequently applied dye-forming bath. *E.g.*, if a leuco-dye be used, it is developed by an oxidising bath except where the Ag image has been made to produce a reducing effect. (Cf. B.P. 424,563; B., 1935, 382.) H. A. P.

XXII.—EXPLOSIVES; MATCHES.

Ammonium nitrate explosives in underground work. V. A. VENITZKOVSKI (Ugol, 1934, No. 105, 85–91).—Ammonites containing NH₄NO₃ 88.55, nitro-aromatic compounds 10.60, insol. matter 0.6, and H₂O 0.15% give good results in coal-mining.

CH. ABS. (p)

Determination of stabilisers in products containing nitrocellulose. F. DESCHAUX (Rev. gén. Mat. plast., 1934, 10, 147–148, 183–185; Chem. Zentr., 1934, ii, 2481).—Ellington and Beard's method for determination of NHPH₂ and centralite (cf. B., 1931, 655) was verified. It can be used for NHPHAc and its Et derivative.

H. J. E.

Cellulose nitrate.—See V.

See also A., May, 589, Nitration of PhMe electrically.

PATENT.

Production of propellant explosives. E. I. DU PONT DE NEMOURS & CO. (B.P. 427,331, 20.10.23. U.S., 27.10.32).—See U.S.P. 1,924,465; B., 1934, 605.

XXIII.—SANITATION; WATER PURIFICATION.

Self-defence against industrial gases. P. MURPHY (Ind. Chem., 1935, 11, 132–134).—The advantages of

training for self-protection against industrial gas accidents are indicated. D. K. M.

Determination of benzene in air. W. A. COOK and J. B. FICKLEN (J. Ind. Hyg., 1935, 17, 41—47).—The air is drawn through glass beads in a U-tube surrounded by solid CO_2 . The condensed C_6H_6 is subsequently expelled by heating at 80 – 90° and condensed in a suitable vessel, where it is determined by its colour reaction with FeSO_4 and H_2O_2 . F. O. H.

Toxic value of *Derris* spp. N. C. E. MILLER (Dept. Agric. Straits Settlements and Fed. Malay States, Sci. Ser., 1935, Bull. 16, 44 pp.).—Aq. extracts (I) of *Derris elliptica*, Prain, of high and low rotenone content (II) and of *D. malaccensis*, var. *Sarawakensis*, Hend., of low (II) give erratic, but approx. equal, control of *Spodoptera pecten* and *Aspidomorpha miliaris*. (II) is thus no index of toxicity. Control by dusts prepared by adding $\text{Ca}(\text{OH})_2$ or $\text{Ba}(\text{OH})_2$ to (I) and by rotenone, toxicarol, deguelin, and the total non-cryst. ingredients in COMe_2 (with tannic acid) or sulphonated castor oil is also erratic. *Derris* appears not to be a stomach poison, much rotenone being excreted unchanged and some in some form of combination by *Periplaneta americana*, but is a deterrent, since food sprayed with (I) is usually not eaten. It may contain a volatile poison, since a steam-distillate of the root and air bubbled through (I) are slightly toxic and insects confined above the fresh root show a high mortality. R. S. C.

Sewage treatment and fish life. C. L. HUBBS (Sewage Works J., 1933, 5, 1032—1040).—The dissolved O_2 and O_2 consumption of H_2O are examined in relation to pollution and safety limits for fish life. Ch. Abs. (p)

Rôle of sodium aluminate in water softening.
III. Factors influencing capacity and efficiency of lime-sodium carbonate water-softening plants. L. M. CLARK and W. R. COUSINS (J.S.C.I., 1935, 54, 143—149 t).—The effect of the use of Na aluminate (I) and of variations of temp. and time of softening on the efficiency of a CaO – Na_2CO_3 H_2O -softening plant has been studied. Curves show the relationship between residual hardness (II), rate of flow of H_2O through the plant, and the temp. of softening, with and without the addition of (I). The H_2O contained Mg salts and appreciable quantities of org. matter. At all temp. the use of (I) reduced the hardness of the purified H_2O as compared with that of H_2O produced by the CaO – Na_2CO_3 process alone, the effect being greatest in the cold. At each temp. there was a definite amount of (I) above which any further addition produced no corresponding fall in (II). With no (I), (II) fell rapidly with rising temp.; this fall was less marked when (I) was used. The use of (I) increased the effective capacity of the plant by 25%. The addition of (I) at a point in the plant subsequent to the addition of CaO and Na_2CO_3 showed no advantage over the normal procedure of mixing (I) with the other softening agents.

Flocculation of water containing bicarbonate. ARMAND and LESCOEUR (Ann. Mines, 1934, 5, No. 13, 79—81; Chem. Zentr., 1934, ii, 2571).—Tests carried out in atm. of O_2 and N_2 , and under protective paraffin

films, show that flocculation depends on an oxidation process which is related to the Fe present in the H_2O , and is not influenced by the CO_2 content of the H_2O . Before turbidity appears oxidases may be detected in the H_2O . H. J. E.

Bacterial clarification of water. F. DIÉNERT (Compt. rend., 1935, 200, 1253—1254).—The clarification process is examined in relation to the electrical charges carried by the various organisms concerned. A. G. P.

Waste- H_2O from S-black dyeing.—See VI. Uses of photoelectric apparatus.—See XI.

See also A., May, 665, Toxicity of brilliant-green for certain bacteria.

PATENTS.

Deodorant preparation for treatment of the skin, and especially the feet and hands. J. C. DUMBRECK (B.P. 425,059, 30.10.33).—A mixture of coconut oil 63, lemon oil 5.2, H_3BO_3 21, powdered starch 10.5, paraffin wax, stearin or lanolin 0.2, and perfume 0.1% is claimed. A. R. P.

Fumigating compound and method of fumigating. K. F. COOPER, Assr. to AMER. CYANAMID CO. (U.S.P. 1,967,290, 24.7.34. Appl., 2.6.24).—A mixture of $\text{Ca}(\text{CN})_2$ (I) and a dry hygroscopic salt (II), e.g., CaCl_2 , is claimed. On exposure to the air (II) absorbs moisture, which decomposes (I) with the evolution of HCN . A. R. P.

Disinfecting. H. A. GARDNER (U.S.P. 1,968,136, 31.7.34. Appl., 18.5.33).—3–5 pts. of $o\text{-C}_6\text{H}_4\text{Cl}_2$ are taken up in 1 pt. of rubber sponge to form a solid solution and exposed to the air to be sterilised. B. M. V.

Burning of wet [refuse] material and the like. BABCOCK & WILCOX, LTD. From BABCOCK & WILCOX Co. (B.P. 426,384, 18.8.34).—The refuse is dried and burned on a sloping surface (S) and fused in a pool (P) at the lower end, the whole being exposed to radiation from downwardly directed flames (F) of pulverised or fluid fuel which are most intense above P. Additional air is admitted above S and the foul gases mingle with F. B. M. V.

Treatment of sewage and the like. C. N. WINDECKER (U.S.P. 1,968,114, 31.7.34. Appl., 26.7.32).—Raw sewage is treated with approx. 10–20 p.p.m. of Cl_2 , i.e., < is necessary for complete sterilisation, coagulation is effected by CaO and gentle agitation, and after sedimentation part of the solids is returned to the agitator and the remainder fully chlorinated and converted into paper-like sheets. The clear effluent is also fully chlorinated. B. M. V.

Apparatus for clarification of sewage liquid. W. C. LAUGHLIN and A. B. ASCH, Assrs. to FILTRATION EQUIPMENT CORP. (U.S.P. 1,969,022, 7.8.34. Appl., 23.11.32).—The sewage is settled first in a circular thickener (T) having rotary rakes, and passes through an aperture in the wall of T into an elongated settling tank (S), settled slime being raked back from S into T by means of L-shaped rakes over which are situated shelf-like filter-beds upwards through which effluent must flow before discharge. B. M. V.

H_2O -softening.—See I. Fuel briquettes.—See II.