

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JUNE 7 and 14, 1935.*

I.—GENERAL; PLANT; MACHINERY.

Heat transference by vaporisation of liquids from vertical and horizontal surfaces. M. JAKOB and W. LINKE (Physikal. Z., 1935, 36, 267—280).—The heat transference from such surfaces in contact with boiling liquids (H_2O , CCl_4 , and aq. solutions of Nekal) was determined. A. J. M.

Power used in crushing. J. S. OWENS (Bull. Inst. Min. Met., Mar., 1935, 39 pp.).—Pyrites was crushed by allowing a hammer to fall on it, and an expression for the power required in terms of the initial particle size and a dimension representing the equiv. machine setting has been derived. D. K. M.

Impact strength tester. B. MOORE (J. Sci. Instr., 1935, 12, 108—111).—A weighted specimen, guided by 3 vertical wires, is raised by a windlass and falls on to a stainless-steel plate. The apparatus is portable. C. W. G.

Paint-making machinery.—See XIII.

PATENTS.

Plate heat-exchange apparatus for fluids. A. F. LEBRE (B.P. 425,834, 18.9.33).—In apparatus comprising a no. of parallel sheets the spaces between which are divided for the different fluids, the divisions are formed by welting, various forms of folding of the plates being described. B. M. V.

Tumbling mill. G. H. JOHNSON, Assr. to ATWOOD VACUUM MACHINE Co. (U.S.P. 1,967,147, 17.7.34. Appl., 16.4.34).—A rod- or like type of tumbling mill (M) is provided with external bent passages and pockets which are not used during the grinding, but on reversal of rotation become filled with ground material, the grinding media being retained in M by means of screens. B. M. V.

Attachment for mills for grinding paint, printing inks, and like substances. B. C. J. SELIER (B.P. 426,621, 11.12.34).—An adjustable bar (B) is fixed over the last roller (R) of the mill. B has a curved under surface and a bevelled edge and is adjusted to give a definite clearance from R . A squeezing effect is produced which, it is claimed, lessens the amount of grinding required. A. WE.

Classification of solids. H. H. MCKENNA, Assr. to WONDERFUL DEVELOPMENT Co., Inc. (U.S.P. 1,966,988, 17.7.34. Appl., 24.6.29. Renewed 17.4.33).—In the pneumatic separation of ore or the like, either by screening or by classification according to sp. gr. and cryst. character, the main stream of air and comminuted material is subjected to intense jets of air in opposed directions to produce agitation. B. M. V.

Separation of materials of differing specific gravities. H. M. CHANCE (U.S.P. 1,966,609, 17.7.34. Appl., 15.12.32).—In, e.g., sand-pulp (P) flotation, the stratum of coal (or light material) is maintained several feet deep in P , affording sufficient buoyancy to support coal in a layer of H_2O and in air above P ; only the coal raised above the H_2O is allowed to discharge, being then free from sand and nearly dry. The mine coal is fed into P . B. M. V.

[Pneumatically operated] washer boxes for treating coal or other granular substances. A. A. HIRST (B.P. 425,704, 21.10.33).—A float is suspended in the bed of material in a hydraulic jig and regulates the motive air supply in such a way that increased tightness of the bed increases the stroke of the H_2O . B. M. V.

Pressure filter. A. O. WALKER, Assr. to TRU-WAY MANUFG. Co. (U.S.P. 1,967,070, 17.7.34. Appl., 12.10.31).—In a closed tank for prefill (provided with a sump for sludge) is placed a filter comprising a no. of spaced discs (D) assembled on a hollow shaft which is rotated, and through which filtrate is withdrawn. Yielding fixed scrapers to the faces of D are provided. B. M. V.

Filter-presses. SERVICE (ENGINEERS), LTD., and J. A. JOHNSON (B.P. 425,711, 28.11.33).—The drainage surface of a filter plate comprises a single set of parallel inclined grooves on each side (the inclination on opposite sides being opposite) leading to drainage grooves around all the edges and thence to holes or channels in all the corners of the plate. B. M. V.

Self-cleaning continuous filter. F. G. HENRY (U.S.P. 1,966,626, 17.7.34. Appl., 13.4.32).—A rotary drum is provided with a filter medium in the form of an endless belt (B) which is looped over rollers and washed in such a position that the washings drop into the prefill. The whole run of B is within one casing and B may be edged with metal perforations to fit the teeth of driving sprockets on the ends of one of the rollers. B. M. V.

Centrifugal filter or separator with continuous charge and discharge at full speed. J. FILLINGER (B.P. 426,182, 12.10.34).—An apparatus of the basket type provided with a differentially driven, internal helical worm is described. B. M. V.

Centrifugal separators. BERGEDORFER EISENWERK A.-G. ASTRA-WERKE (B.P. 425,753, 26.11.34. Ger., 24.11. and 30.12.33).—In a separator embodying collecting channels for 2 products and an overflow (O), a sighting device is situated in O . B. M. V.

Driving mechanism for centrifugal separators. AKTIEB. SEPARATOR (B.P. 425,656, 18.5.34. Swed.,

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

18.5.33).—An underdrive, including V-belts and a slip coupling in the motor pulley, is described. B. M. V.

Method of distillation. W. G. STONE (U.S.P. 1,966,938, 17.7.34. Appl., 14.7.28).—The sole supply of energy in a system comprising vapour compression, heat exchange, etc. is mechanical. B. M. V.

[Liquid] treating device. J. B. WADE, Assr. to H. J. MCKENZIE (U.S.P. 1,966,658, 17.7.34. Appl., 26.1.33).—An apparatus for adding a very small proportion of liquid reagent (*R*) to a varying main stream of liquid (*M*) comprises a closed tank for *R* floating in a bath (*B*) the level of liquid in which is varied by the greater or lesser impact of *M* on the end of a communicating tube. Alternatively, the pressure of air entrapped above *R* may be varied by another floating tank in communication with *M*. The outflow of *R* is adjusted by a needle valve for any one rate of flow of *M*, and remains proportional. B. M. V.

Preparation of products for preventing and removing incrustation and corrosion of boilers and the like. H. G. VENABLE (B.P. 425,619, 19.9.33).—The natural juice of the agave plant is fermented, evaporated to a plastic mass (thickening being aided, if desired, by addition of a cereal), acidulated with lactic acid, and rendered sufficiently fluid for use by addition of H_2O . The lighter vapours may be removed by digestion under heat and pressure. B. M. V.

Water softening. HALL LABS., INC., Assees. of R. E. HALL (B.P. 425,001, 25.5.33. U.S., 22.8.32 and 20.3.33).— $Na_2(Na_4P_6O_{18})$ with about 10% of $Na_4P_2O_7$ to render it neutral is added to the H_2O to repress the ionisation of the Ca and Mg. A. R. P.

Means for admitting to, and carrying off liquid or gaseous media from, the interior of a revolving hollow shaft. ESCHER WYSS MASCHINENFABR. A.-G. (B.P. 425,825, 21.11.34. Switz., 30.11.33).—Access is by radial ports; a suitable sleeve with glands is described. B. M. V.

Recovering dry products from liquids such as [heat-sensitive] solutions or emulsions. G. A. KRAUSE, and GES. F. LINDE'S EISMASCHINEN A.-G. (B.P. 425,729, 9.5.34).—(1) The bulk of the solvent is frozen out and (2) the concentrate is subjected to spray- or drum-drying. Milk powder may be manufactured by subjecting skim milk to (1), adding cream, and subjecting the mixture to (2). B. M. V.

De-liquefying a liquid suspension of solid materials [in papermaking etc.]. F. B. DEHN. From G. A. ENGERT, G. B. and G. K. GIBSON (SONBERT MACHINE Co.) (B.P. 425,985, 19.7.33).—A papermaking machine (*e.g.*) comprises a rotary vac. drum (*D*) sealed at the ends against stationary walls and provided with an arcuate cap covering the top and extending a foot or two into the bath of pulp. The paper is formed on an endless belt embracing the lower part of *D* and rubbing against the lower parts of *C*, *C* being provided with antifriction rollers at those parts. B. M. V.

Solvent-recovery plant. SPRINGFIELD MILLS (RADCLIFFE), LTD., and L. KAY (B.P. 425,621, 20.9.33).—A no. of annular masses of adsorbent are contained in perforated annular containers (*A*) in a single casing (*C*)

and are operated in parallel, the axial spaces (*S*) of *A* having communication with the outside of *C*. The steam heaters for regeneration are placed in *S*. (Cf. B.P. 415,801; B., 1934, 946.) B. M. V.

Hydrometers. CHLORIDE ELECTRICAL STORAGE CO., LTD., and H. F. ACREMAN (B.P. 426,097, 21.3.34).—A dial-shaped indicator for building into an accumulator is described. B. M. V.

Thermal treatment of gases and vapours. A. CAMBRON and C. H. BAYLEY (B.P. 425,606, 11.8.33).—For the conversion, *e.g.*, of paraffins above C_1 into olefines, the gases are passed through an externally heated, tubular, reaction chamber in which are a no. of disc baffles perpendicular to the flow, producing alternate zones of high-speed flow in intimate contact with the heated wall and of eddying-mixing flow. B. M. V.

Thermostats for controlling the flow of gas. SOUTH METROPOLITAN GAS CO., D. CHANDLER, and A. J. SKINNER (B.P. 426,619, 6.12.34).—A siphon bellows is placed in an expansion thermostat to prevent any gas entering between the rod and the outer casing. Cracking of gas with subsequent deposition of soot, which would impair the working, is prevented. A. WE.

Delivering liquefied gases. RUHRCHEMIE A.-G. (B.P. 426,031, 2.7.34. Ger., 17.7.33).—The metering of a partly liquefied compressed gas, *e.g.*, fuel gas, during delivery to a vehicle (*V*), is effected by pumping it first into a balanced weighing chamber and thence into *V*, the pump being reversible to effect previous emptying of *V*. B. M. V.

Apparatus for humidifying and cooling dust-laden gases. R. HEINRICH, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,966,859, 17.7.34. Appl., 13.2.32. Ger., 21.2.31).—In the centre of an upward stream of dirty gas (*G*) is a pipe (*P*) containing coarse liquid sprays superposed upon a jet of clean gas, the very fine spray emerging from the end of *P* and mixing with *G*. *P* may be provided with a drain to prevent drowning out, and *G* may first impinge upon the surface of a pool. B. M. V.

Production of fire-extinguishing foam. MERRYWEATHER & SONS, LTD., J. H. OSBORNE, and L. C. MILLER (B.P. 426,513, 17.1.34).—Foam is produced by forcing air (or gas) (*A*) and liquid containing foam stabilisers through a Venturi orifice, both being under pressure. It is claimed that the use of *A* under pressure avoids the use of gas-forming chemicals. A. WE.

Pulverising mills. BABCOCK & WILCOX, LTD. From BABCOCK & WILCOX Co. (B.P. 426,193, 7.12.34. Addn. to B.P. 402,244; B., 1934, 80).

Dissolving alkaline-earth compounds.—See VII. **Heat-insulating composition.**—See IX. **Detecting suspended matter in fluids.**—See XI. **Kneading machines for fat.**—See XII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Inert dust used in coal mines. A. M. BRYAN *et al.* (J. Roy. Tech. Coll., 1935, 3, 493–504).—Various kinds of inert dust (*D*), such as are used for preventing propagation of the explosive wave in coal mines, were

studied in order to elucidate the effects of moisture and particle size. Since the desired action depends on the formation of a cloud of *D* mixed with the coal dust, experiments were also carried out on the dispersability and buoyancy of the *D* in a special apparatus, which is described. H_2O content and absorption of the various *D* samples varied appreciably, and H_2O absorption decreased in all cases with rise of temp. H_2O content had less influence on normal dispersion than the presence of very fine sizes and particle shape, but real increase of H_2O resulted in decreased dispersability and buoyancy, whilst drying out a wetted *D* did not restore these factors. None of the *D* samples tested, however, is likely to become ineffective by absorbing atm. moisture unless there is actual deposition of H_2O .

D. M. M.

Ignition of firedamp by compression. R. V. WHEELER (Trans. Inst. Min. Eng., 1935, 88, 447—458).—Visible flames were produced on rapid compression of CH_4 -air mixtures over the range 3–75% CH_4 . Ignition in the pressure cylinder (*P*) was found to take place only when the aperture communicating with the low-pressure chamber (*L*), containing similar mixtures, was ≥ 2.25 mm. in diam., but though flames were shot into *L* they were not capable of igniting its contents. In another series of experiments each hole was covered with a thin Cu diaphragm (*D*) which delayed the escape of gas until pressure had been built up sufficiently to burst *D*. Under these conditions, with a hole 4.75 mm. diam. and *D* 0.10 mm. thick (breaking pressure 110 atm.) ignition took place in *L* with mixtures ranging from 8% to 11% CH_4 in *P*. D. M. M.

Classification of coals. R. LESSING (Nature, 1935, 135, 642—644).

L. S. T.

British fuels. W. T. K. BRAUNHOLTZ (Chem. & Ind., 1935, 328—334).—A review of the properties of natural and artificial fuels with reference to their uses in industry.

G. M.

Determination of the correct weight of sample in coal sampling. L. S. KASSEL and T. W. GUY (Ind. Eng. Chem. [Anal.], 1935, 7, 112—115).—Mathematical.

E. S. H.

Nomograph for the thermal value of bituminous coal. D. S. DAVIS (Chem. Met. Eng., 1935, 42, 158—159).—A chart for determining this val. from the proximate analysis of the coal is given.

D. K. M.

Determination of gas, coke, and by-products of coal. Evaluation of laboratory assay tests. W. A. SELVIG and W. H. ODE (Ind. Eng. Chem. [Anal.], 1935, 7, 88—93).—Two small-scale, high-temp. assay tests and one low-temp. assay test for the determination of yields of gas, coke, and by-products of coal have been applied to several coals and the results compared with those of the BM-AGA carbonisation test. The factors for converting the results vary appreciably with different coals.

E. S. H.

Distillation and extraction of peat. O. ASCHAN (Tek. Fören. Finland Förh., 1934, 54, 285—288).—A 5% yield of tar [H_2O 3.4—6.8, acid oils 10—15, basic oils 1.2—2.0, neutral oils 50—60, paraffins 2—5 (1st

fraction) and 1—2 (2nd fraction), pitch 1.5—5%] is obtained by steam- and dry-distillation of peat.

CH. ABS. (r)

Carbon black. C. W. SWEITZER (Off. Digest, 1935, No. 143, 74—83).—The manufacture, properties, and use of C black are discussed from the practical and economic viewpoints.

D. R. D.

Comparison of extraction processes as applied to distillation residues from crude oil of Grabownica. M. GODLEWICZ and K. LAIDLER (Petroleum, 1935, 31, No. 15, 6—7).—Tables give the yields and physical properties [*d*, η , η index (*I*), η -*d* const. (*K*), setting and flash points] of the raffinates (*R*) obtained by treating a residual oil from Grabownica crude with $PhNO_2$, cresol, $PhOH$, Chlorex (*I*), and furfuraldehyde (*II*), respectively. The Air Ministry oxidation test (D.T.D 109) was carried out on *R*, whilst *d*, *I*, and *K* were determined on the extracts. It is concluded that under the conditions of the tests $PhOH$ gives the best results. Although (*I*) and (*II*) give high yields of *R* (66 and 72%), the products are inferior, showing particularly high η increase after oxidation.

C. C.

Analyses of Texas crude oils. G. WADE (U.S. Bur. Mines Rept. Invest. 3252, 1934, 4 pp.).—308 analyses of Texas crude oils have been tabulated in 6 groups according to the geographic subdivision of the State. In addition to data on the origin of each sample, the information given includes the characteristics of the crude together with the proportions and sp. gr. of the usual fractions from gasoline to the C residue. Four intermediate groups have been introduced for classifying crude oils. The new classification is as follows: paraffin (*I*), (*I*)-intermediate, intermediate-*I*), intermediate, intermediate-naphthene (*II*), (*II*)-intermediate, and (*II*).

C. C.

Direct determination of total oxygen in oils. M. E. MARKS (Ind. Eng. Chem. [Anal.], 1935, 7, 102—103).— $CaSO_4$ is used to absorb H_2O , and the catalyst is reduced at 450° (cf. A., 1934, 1239).

J. L. D.

Increase in uses of anhydrous ammonia in [petroleum oil] refining practice. B. T. BROOKS (Nat. Petroleum News, 1934, 26, No. 45, 53—54, 56).—A review and bibliography.

CH. ABS. (e)

Application of pearlitic alloy steels to specific [petroleum] refinery problems. A. E. WHITE, C. L. CLARK, and R. L. WILSON (Iron Age, 1934, 134, No. 22, 14—17, 74; Nat. Petroleum News, 1934, 26, No. 45, 31—32, 34—36, 38—39).—A review.

CH. ABS. (e)

Superheating and foaming phenomena in dehydrating emulsified oils. G. EGLOFF and (Miss) S. BERKMAN (J. Physical Chem., 1935, 39, 265—275).—The heat-dehydration of emulsified crude petroleum is accompanied by priming or puking, and foaming, as a result of the superheating of H_2O . The phenomenon of superheating is discussed in relation to a no. of different liquids. The significance of the interfacial phase for foaming, and also the influence of variation in conditions, such as depth of oil in the container etc., are discussed.

M. S. B.

Estonian oil shales and their application in industrial furnaces. P. KOGERMAN (Naturwiss., 1935, 23, 301—305).—A review.

Humic substances. VI. Action of atmospheric oxygen on cookersite. N. A. ORLOV and O. A. RADTSCHENKO (J. Appl. Chem. Russ., 1934, 7, 1476—1479; cf. B., 1934, 563).—Cookersite (shale) undergoes oxidation when exposed at 105° to atm. O₂, with the production of humin-like substances. R. T.

Standard specification for creosote fuel oil for use in glass works. ANON. (J. Soc. Glass Tech., 1935, 19, 24—25 P).—A specification intended to supplement that issued by the British Standards Institution.

J. A. S.

Volatility of fuels containing ethyl alcohol. III. Total and partial vapour pressures of mixtures of ethyl alcohol and cyclohexane. IV. Calculation of starting temperature of an engine when using ethyl alcohol-cyclohexane mixtures as fuel. Y. NAGAI and N. ISHII (Proc. Imp. Acad. Tokyo, 1935, 11, 23—25, 26—27; cf. B., 1935, 342).—III. Measurements of the total and partial pressures have been made by Zawidziki's method (cf. A., 1901, ii, 6) at 0—30°, and partial pressures have been calc. by the method of Bose, with good agreement with experiment.

IV. From approx. 0 to 0.3 mol.-% of cyclohexane (I) the starting temp. (*T*) decreases rapidly, and then becomes approx. const. up to 1.0 mol.-% of (I). *T* is a min. for approx. 0.7 mol.-% of (I), at approx. -18°.

R. S. B.

Synthesis of higher paraffins from water-gas. Use of promoters for activating iron-copper catalyst. J. C. GHOSH and S. SEN (J. Indian Chem. Soc., 1935, 12, 53—62; cf. A., 1934, 489).—Fe-Cu catalysts containing Ni, Ce, and Th have been studied. There is a periodic variation in the composition of the effluent gas, H₂ and CO₂ increasing as CO decreases, and *vice versa*. The max. conversion (43.3%) was obtained with a catalyst having the composition Fe 4, Cu 1, Ni 0.25, Ce 0.0041, and Th 0.0296 g., and a space velocity of 59.

R. S.

Synthesis of benzene from carbon monoxide by catalytic reduction under atmospheric pressure. III. Influence of gas velocity. S. WATANABE, K. MORIKAWA, and S. IGAWA (J. Soc. Chem. Ind., Japan, 1935, 38, 70—73 B; cf. B., 1934, 867).—Using a catalyst prepared by Fischer's method (Co : Cu : ThO₂ = 9 : 1 : 2) at 197°, the yield of benzene and H₂O decreases with increasing gas velocity above 1.1 litres per hr. per 1 g. of Co, the effect being probably due to the time required for gas diffusion through the layer of reaction products around the catalyst. The reaction is also varied by increasing gas velocity, as is shown by increases in the yield of gaseous olefines and the *d* of the condensate. The effect of raising the temp. from 197° to 227° is much more marked.

C. I.

Refining benzol and hydrocarbons. C. A. HAHN and H. NIELSEN (Gas J., 1935, 210, 41—44).—Darkening and gum-forming constituents of benzol can be removed by treatment with a new reagent (I) (not described). The effect of different concns. of (I) on the I val., S content, and *d* was observed. The I val. was determined by means of I + ICl₃ dissolved in CCl₄. Gum is formed in inhibited benzol, but escapes with the vapours on evaporation.

E. H. M. B.

Determination of mercaptans in hydrocarbon solvents. Improvement of the silver nitrate method. W. M. MALISOFF and O. E. ANDING, JUN. (Ind. Eng. Chem. [Anal.], 1935, 7, 86—88).—The technique of Borgstrom *et al* (B., 1929, 1004; A., 1931, 1393) is modified to give more accurate and reproducible results (±2.4%). Prolonged exposure of the solutions to light gives low results because of oxidation to disulphides (I), but the procedure is applied satisfactorily if (I) are first reduced (Zn-AcOH) to thiols. J. L. D.

Refining of lubricating oils by selective extraction. H. BURSTIN (Petroleum, 1935, 31, No. 15, 1—6).—The application of solvent extraction to the production of lubricating oil (I), particularly from Polish petroleum distillates and residues (II), is discussed. Using crude cresol (b.p. 180—200°) as solvent, a paraffinic fraction can be separated which, after removal of solid paraffins (III) by usual methods, gives a refined (I) similar to Pennsylvanian oils. By treating heavy (II), asphalt of low paraffin content and consequent high ductility is obtained from the cresol extract, (III) being first separated by maintaining the extract at 3°.

C. C.

Viscosity of diluted [lubricating] oils and of oil mixtures. E. ERDHEIM (Petroleum, 1935, 31, No. 15; Motorenbezt., 8, 3—5).— η has been determined (using the Steiner viscosimeter) on mixtures of each of 3 lubricating oils (I) (η index +87, +60, -20) with 1, 2½, and 5% of each of 3 fuels (*d* 0.695, 0.780, 0.819). The steeper is the η -temp. curve of (I), the greater is the decrease in η on dilution, the effect being proportionately greater at lower temp. The η index of diluted (I) is > that of the original (I). The Arrhenius formula (II) does not hold for these mixtures. Mixtures 1:1 were prepared from two paraffinic base oils and one naphthenic oil. In two cases the determined η agreed with that calc. from (II), but in the third case (a mixture of paraffin and naphthene base oils) observed and calc. results did not agree. It is suggested that in the former case simple mixing occurs, but in the latter case dissolution.

C. C.

Nitric acid in used motor oils. C. EHLERS (Petroleum, 1935, 31, No. 15; Motorenbezt., 8, 2—3).—In the determination of H₂O in used lubricating oils (with xylol), brown vapours were observed and HNO₃ was identified in the aq. distillate. Free acid (I) is present and, when conditions are favourable, also NO-compounds (II) which readily decompose. (I) and (II) are conc. in the sludge and residues found in the crankcase and oil leads. In general, N compounds and H₂O are present together, but the nature of the fuel and lubricating oil does not affect the formation of (II). Similar phenomena were observed in used Diesel lubricating oils.

C. C.

Boundary friction of oxidised lubricating oils. E. R. REDGROVE (Oil Col. Trades J., 1935, 87, 1232).—Theoretical. The mechanism of lubricating action and the influence of polar groups are discussed. D. R. D.

Oxidation of transformer oil. L. S. ORNSTEIN, C. JANSSEN, Czn., C. KRYGSMAN, and D. T. J. TER HORST (Physica, 1935, 2, 201—220).—The energy of activation (*E*) and the reaction const. (*K*) do not remain const. during the oxidation. The *K*-*T*⁻¹ curves for different periods of oxidation form straight lines which intersect

at one point (*P*). *P* is significant in that if it corresponds with a temp. $>$ that of the oil in the transformer the reaction velocity decreases with time of ageing, whereas if it is $<$ the oil temp., this velocity increases with time. The variation of *E* and *K* with time of ageing can be explained by supposing that different types of hydrocarbons are oxidised simultaneously. J. W. S.

Coarsely cryst. $(\text{NH}_4)_2\text{SO}_4$. Conc. $\text{Ca}(\text{OCl})_2$ [for oil-sweetening]. CO testing device. Thermochemical measurements.—See VII. **Fillers in road-making.**—See IX. **Greases.**—See XII. **Bituminous Al paints.**—See XIII. **Medicinal charcoals.**—See XX.

PATENTS.

Improvement [drying] of coal material. A. RUŽIČKA (U.S.P. 1,965,513, 3.7.34. Appl., 13.7.32. Bulg., 21.8.31).—Brown coal is dried by partly immersing it in H_2O , heating the H_2O to 150–250° under the corresponding pressure of saturated vapour, and thereupon releasing the pressure. A. B. M.

Coal-distillation apparatus. E. KROPIWNICKI (U.S.P. 1,964,639, 26.6.34. Appl., 27.4.31. Fr., 13.1.31).—The apparatus comprises a series of vertical retorts (*A*) below which is a fuel container (*B*) wherein the coal supply is maintained under a H_2O -seal. The coal is fed continuously from *B* into the bottom of *A* by means of screw conveyors. *A* are enclosed in a combustion chamber (*C*) so designed that as the coal passes up through *A* it is subjected to zones of rising temp.; the hydrocarbons evolved during carbonisation are thereby cracked before leaving *A*. An elbow pipe at the top of each *A* discharges the coke into a chamber (*D*) adjacent to *C*. Before being discharged from the apparatus the coke is steamed, the water-gas so formed mixing with the coal gas and leaving through an offtake at the top of *D*. A. B. M.

Low-temperature carbonisation apparatus. C. E. LESHER (U.S.P. 1,964,955, 3.7.34. Appl., 30.4.30).—The apparatus is a modification of that of Illingworth (U.S.P. 1,645,861; B., 1927, 868) and comprises a rectangular refractory shell the interior of which is divided into alternately arranged heating chambers and carbonising chambers (*C*). The latter are subdivided into a no. of relatively narrow, vertical, upwardly tapering compartments by means of removable metallic channel sections, which rest on a support in such manner that they are free to expand or contract. The *C* are provided with removable covers and hinged bottom doors, permitting, respectively, the coal to be charged into and the coke discharged from *C*. A. B. M.

Gas-generating apparatus. J. H. CORDES (U.S.P. 1,964,315, 26.6.34. Appl., 12.2.30).—Gas consisting of air and the vapour of a volatile liquid fuel is generated in a carburettor (*C*) comprising a vertical tank provided with a series of horizontal baffles arranged to form a circuitous path for the air which enters at the bottom and passes countercurrent to a descending stream of the liquid fuel simultaneously sprayed in at the top. The rate of supply of air to *C* is controlled by the rate of withdrawal of the gas, which is effected by means of a suction pump operated by the same motor (*M*) that

drives the pump supplying the liquid fuel to *C*. The gas is passed through a seal to the storage tank, the pressure in which controls the operation of *M* by known means. A. B. M.

Apparatus for generating water-gas. O. NYGAARD, Assr. to BERNITZ FURNACE APPLIANCE CO. (U.S.P. 1,964,073, 26.6.34. Appl., 10.5.27).—The generator is provided with a hollow refractory lining so designed that it can be used for (*a*) preheating the secondary air supplied to the carburettor for burning the blast gases, and (*b*) superheating the steam used for the "make." A. B. M.

One-shell gas-manufacturing set with marginal blast. E. L. HALL, Assr. to UNITED GAS IMPROVEMENT CO. (U.S.P. 1,964,285, 26.6.34. Appl., 28.11.30).—The lower part of the shell contains a fuel bed (*F*) and the upper part is filled with chequer brick (*C*). *F* is air-blasted and the blast gases are burned with secondary air supplied as a marginal air blast to the top of *F*, and are passed through *C*. During the subsequent steam up-run heavy oil is sprayed on to the hot marginal zone of *F*, the resultant oil vapours being fixed by passage through *C*. This step is followed by a steam down-run, and, after a short up-run to purge the apparatus, the cycle is repeated. A. B. M.

Manufacture of carburetted water-gas. H. O. LOEBELL, Assr. to H. L. DOHERTY (U.S.P. 1,964,293, 26.6.34. Appl., 30.7.30).—A standard water-gas plant is provided with a regenerative recuperator which utilises the sensible heat of the gases leaving the plant for preheating the air and superheating the steam used in the process. A. B. M.

Manufacture of carburetted water-gas by the use of high-carbon and low-carbon oil. J. A. PERRY, Assr. to UNITED GAS IMPROVEMENT CO. (U.S.P. 1,964,299, 26.6.34. Appl., 20.11.29).—The gas is carburetted by introducing a "high-C" oil on to the top of the generator fuel bed during the water-gas run, restricting the amount, however, to the quantity that can be efficiently vaporised during the run, and completing the carburetion by introducing a "low-C" oil into the carburettor in the normal manner. A. B. M.

Refining of [mineral] oil. R. T. HOWES, Assr. to BRUCITE PROCESSES, INC. (U.S.P. 1,966,010, 10.7.34. Appl., 6.6.31).—A mixture of petroleum oil, *e.g.*, gasoline or kerosene, and H_2SO_4 is passed at high velocity through a vessel containing lumps of contact material, *e.g.*, opaline- SiO_2 . The acid and sludge are separated and the oil is neutralised by flowing through a bed of brucite [MgO or $\text{Mg}(\text{OH})_2$], dried, and decolorised by passage through a bed of opaline- SiO_2 (about 30-mesh). D. K. M.

Stable white oil. R. G. SLOANE, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,966,050, 10.7.34. Appl., 19.11.29).—Refined petroleum oils are rendered non-oxidisable by air by the addition (0.05–0.1%) of a mercaptan with $< \text{C}_7$, *e.g.*, $\beta\text{-C}_{10}\text{H}_7\text{SH}$. D. K. M.

Soluble oil. A. L. BLOUNT and D. W. BOARDMAN, Assrs. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,965,935, 10.7.34. Appl., 4.3.32).—The sol. oil consists of a mixture of a Na soap, *e.g.*, Na corn oil soap (14), H_2O (6), mineral

oil (64), H_2O -white rosin (10), a polyhydric alcohol, *e.g.*, $C_2H_4(OH)_2$ (4), and a monoalkylated dihydric alcohol, *e.g.*, $C_2H_4(OH) \cdot OEt$ (2%). D. K. M.

Lubricating oil. ALLGEM. ELEKTRICITÄTS-GES. (B.P. 424,578, 23.8.33. Ger., 24.8.32).—An ordinary cutting or drawing oil is ground with S in a stainless-steel ball mill with WC balls until the particles of S are 5–20 μ . A. R. P.

Improvement of mineral or lubricating oil by treatment with solvents. W. J. TENNANT. From STANDARD OIL Co. (B.P. 426,221, 8.11.33).—Mineral or lubricating oils (I) are refined by extraction with chloroaniline (II). (I) may first be diluted with a light hydrocarbon product, *e.g.*, liquefied normally gaseous hydrocarbons, C_5H_{12} , or petroleum naphtha. When liquid C_3H_8 (III) is used, asphalt may be pptd. from (I) before treatment with (II), by the cooling produced by flashing part of (III). C. C.

Production of [colloidal] graphite lubricants. E. KRAMER (B.P. 426,237, 19.6.34).—Graphite is dispersed in oil by repeated impact with balls or the like of small (3–5 mm.) diam. After each impact the media and material are separated by a screen and returned, the one by an elevator, the other by a pump. B. M. V.

[Gum inhibitors for stabilised] motor fuel oils. E. I. DU PONT DE NEMOURS & Co. (B.P. 424,582, 24.8.33. U.S., 24.8.32).—See U.S.P. 1,957,134; B., 1935, 216.

[Rotary circular] firegrates for gas producers, furnaces, and the like. WHITFIELD GAS PRODUCER PATENTS, LTD., and H. L. ALSOP (B.P. 426,352, 6.10.33).

Natural gasoline recovery. H. S. COLE, JUN., and E. R. COX, ASSRS. to TEXAS Co. (U.S.P. 1,969,207, 7.8.34. Appl., 30.9.30).

Recovery of gasoline from natural gas. (A) H. S. COLE, JUN., and E. R. COX, [B] E. R. COX, ASSRS. to TEXAS Co. (U.S.P. 1,972,060—1, 28.8.34. Appl., [A] 24.10.30, [B] 18.10.30).

Heating [of hydrocarbon oil]. K. M. WATSON and L. A. MEKLER, ASSRS. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,971,925, 28.8.34. Appl., 9.4.31).

Pyrolysis of hydrocarbons. F. X. GOVERS, ASSR. to INDIAN REFINING Co. (U.S.P. 1,971,748, 28.8.34. Appl., 2.5.31).

Production of low-b.p. hydrocarbons from high-b.p. hydrocarbons. J. C. BLACK, ASSR. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,971,248, 21.8.34. Appl., 21.11.22).

Conversion of petroleum hydrocarbons. H. E. WIDDELL, ASSR. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,971,244, 21.8.34. Appl., 21.5.24).

Coking of [hydrocarbon] oil. A. FISHER, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,971,906, 28.8.34. Appl., 2.10.31).

Cracking of hydrocarbon. N. MAYER, ASSR. to A. OBERLE (U.S.P. 1,974,683, 25.9.34. Appl., 29.9.30. Austr., 8.10.29).

Cracking of hydrocarbon oils. J. C. MORRELL and G. EGLOFF, ASSRS. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,973,498, 11.9.34. Appl., 8.2.30).

Cracking of oils in vapour phase. P. C. KEITH, JUN., ASSR. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,972,149, 4.9.34. Appl., 1.12.28).

Treatment of hydrocarbons. W. M. CROSS, ASSR. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,971,252, 21.8.34. Appl., 29.10.23. Renewed 27.9.33).

Treatment of hydrocarbon oils. (A) W. M. CROSS, (B) C. H. ANGELL, (C) J. B. HEID, (D) J. G. ALTHER, (E) A. FISHER, and (F) N. G. DE RACHAT, (A) ASSR. to GASOLINE PRODUCTS Co., INC., (B–F) ASSRS. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,969,502, 1,972,914, 1,972,936, 1,974,295, 1,974,303, and 1,974,797, [A] 7.8.34, [B, C] 11.9.34, [D, E] 18.9.34, [F] 25.9.34. Appl., [A] 1.9.26, [B, D] 19.12.31, [C] 11.12.31, [E] 25.1.32, [F] 17.11.30).

Treatment of hydrocarbon gases. G. EGLOFF, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,972,926, 11.9.34. Appl., 28.11.30).

Treatment of [mineral] oil. G. A. BEISWENGER, ASSR. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,970,796, 21.8.34. Appl., 21.1.30).

Treatment of mineral oils by heat. W. J. PERELIS, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,969,321—2, 7.8.34. Appl., [A] 20.3.25, [B] 23.9.26. Renewed [A, B] 4.1.34).

Refining of petroleum. S. TIJMSMA, ASSR. to SHELL PETROLEUM CORP. (U.S.P. 1,969,956, 14.8.34. Appl., 9.7.27).

Rotary apparatus for resolving emulsions. W. F. VAN LOENEN, ASSR. to L. BLAKE-SMITH (U.S.P. 1,974,698, 25.9.34. Appl., 18.3.33).

Dehydration of oil [emulsions]. R. E. MANLEY and A. F. KNOSS, ASSRS. to TEXAS Co. (U.S.P. 1,972,454, 4.9.34. Appl., 26.12.31).

Mixing of oils. E. S. PEARCE, ASSR. to RAILWAY SERVICE & SUPPLY CORP. (U.S.P. 1,971,379, 28.8.34. Appl., 24.4.30).

Distilling and conversion process [for hydrocarbon oils]. C. P. DUBBS, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,969,782, 14.8.34. Appl., 7.8.24. Renewed 12.11.29).

Apparatus for distilling hydrocarbons. W. O. KEELING (U.S.P. 1,971,073, 21.8.34. Appl., 21.7.30).

Chilling of lubricating oils for dewaxing. E. ELLSBERG, ASSR. to TIDE WATER OIL Co. (U.S.P. 1,974,398, 18.9.34. Appl., 15.8.31).

Separation of materials. Washer boxes for coal etc. Treating gases and vapours. Gas-flow control thermostats. Delivering liquefied gases.—See I. By-product NH_3 .—See VII. Road-covering materials.—See IX. Fertilisers.—See XVI.

III.—ORGANIC INTERMEDIATES.

Identification of solvents by the xanthate reaction. Application to alcohols. W. F. WHITMORE and E. LIEBER (Ind. Eng. Chem. [Anal.], 1935, 7, 127—129).—Alcohols with CS_2 -KOH afford alkali xanthates which are titrated directly with I. *K xanthates* (I) of the following alcohols are described: Me, darkens at 195–215°; Et, m.p. 215–3°; Pr^s,

darkens at 236°; Bu^a, m.p. 223.9°; Bu^b, m.p. 244.1°; amyl, m.p. 225°, *sec.*-amyl, m.p. 211.7°, and *sec.*-hexyl, darkens at 199°; β-hydroxy-, m.p. 185.7°, -methoxy-, m.p. 202.5°; and -butoxy-ethyl, m.p. 167.9°; allyl, darkens at 178°; furfuryl, m.p. 154.4°; tetrahydrofurfuryl, m.p. 213.2°; cyclohexyl, darkens at 242°; Et₁ and Bu₁ ethers of diethylene glycol, oils. (I) of *tert.*-alcohols are unstable (cf. A., 1922, i, 104) and cannot be titrated. J. L. D.

Determining mercaptans in solvents.—See II. **Detergents and washing.**—See XII. **Polybasic acids and their derivatives.**—See XIII. **Org. acids by fermentation.**—See XVIII. **Pine oil [emulsions].**—See XX.

PATENTS.

Preservation of glycol ethers. CARBIDE & CARBON CHEMICALS CORP., and H. L. COX (B.P. 425,728, 8.5.34).—Aldehydes if present are removed, *e.g.*, by boiling with a trace of acid (H₂SO₄), neutralising, and distilling, and the product is preserved against discoloration by addition of a hydroxyalkylamine [0.1 vol.-% of N(C₂H₄OH)₃]. H. A. P.

Manufacture of condensation products [from polypeptides and chloroformic esters]. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 425,370, 2.10.33).—Degradation products of proteins (except simple NH₂-acids) or synthetic polypeptides are condensed with alkyl, cycloalkyl, or aralkyl chloroformates having < C₅. The solubility of the products may be improved by condensing them or the starting materials with (CH₂)₂O. *E.g.*, gelatin is hydrolysed with 3% NaOH at 100° for 18–24 hr., and cetyl or mixed C₈–C₁₈ chloroformate(s) is/are added slowly to the product at 40–50°. The products form colloidal solutions in H₂O, are stable to hard H₂O, and are used as textile assistants (vat-dyeing). H. A. P.

Production of sulphonic acids. H. FLESCHE, C. FLESCHE, and L. E. ABELMANN (FARB- u. GERBSTOFFWERKE C. FLESCHE, JUN.) (B.P. 425,942, 29.5.34. Ger., 29.5.33).—Acetals are condensed with aldehyde- or ketone-di- or poly-sulphonic acids. *E.g.*, methylene di-cetyl or -methylcyclohexyl ether is condensed with CHO·CH(SO₃H)₂ at 35°, or CH₂(O·C₁₉H₃₉)₂ is condensed with acetonetrisulphonic acid in H₂SO₄ at 25–30°. The products are used as textile assistants. H. A. P.

Manufacture of vinyl formate. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 425,673, 30.8.34. Ger., 1.9.33).—A higher ester is heated with HCO₂H, a Hg salt, and an inorg. acid; an antioxidant, *e.g.*, *p*-C₆H₄(OH)₂, may be added. Thus CH₃·CH·OAc is heated with HCO₂H, HgO, and H₃PO₄, and the product distilled. H. A. P.

Manufacture of amines. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 425,486, 18.9.33).—*sec.*- and/or *tert.*-Amines (+ primary amines) are passed with NH₃ over a dehydrating catalyst at 300–500° (300–450°). *E.g.*, NMe₃ (1 pt.) and NH₃ (5 pts.) are passed over Al₂O₃ gel at 380°/150 atm.; NH₂Me and NHMe₂ are formed. Similarly, NPhMe₂ and NH₃ at 400°/200 atm. give NHPhMe, and *n*-NH(C₁₈H₃₇)₂ and NH₃ at 380°/200 atm. give NH₂·C₁₈H₃₇. H. A. P.

Hydrogenation of amides [to amines]. W. W. TRIGGS. FROM RÖHM & HAAS CO. (B.P. 425,927, 2.1.34).—The amide or the corresponding NH₄ salt is heated with H₂ and a catalyst in an inert medium (dioxan). The catalysts are chromates, vanadates, or molybdates of Cu, Zn, Cd, or Ag, containing alkalis or alkaline earths as promoters. *E.g.*, laurylpiperidine with H₂ and Cu chromate at 200–250°/200–300 atm. gives 92% of theory of *n*-dodecylpiperidine; lauramide gives approx. equal amounts (50% of theory) of mono- and di-dodecylamine. H. A. P.

Manufacture of washing, wetting, dressing, and like agents. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 425,680, 14.8.33).—The use of mixtures of H₂O-sol. condensation products of (CH₂)₂O (I) with fatty OH- or NH₂-compounds with alcohols, amines, or amides having an alkyl group of < C₆ is claimed. *E.g.*, the condensation product of *n*-C₁₈H₃₅·OH with 20 equivs. of (I) (2 pts.) mixed with NH₂·C₂H₄·OC₁₂H₂₅ (1 pt.) is used for scouring wool, and its mixture with the amide from the fatty acids of coconut oil and triethylenetetramine (2.4 pts.) disperses Ca soaps. H. A. P.

Preparation of washing agents. H. T. BÖHME A.-G. (B.P. 425,804, 22.5.34. Ger., 28.7.33).—Higher alkyl pyrophosphates having < C₈ or corresponding products from alkyl H sulphates and Na₄P₂O₇ are treated with H₂O₂ or inorg. per-salts. *E.g.*, crude dodecyl alcohol (from coconut oil) (4 pts.) is heated at 100–110° with H₄P₂O₇ (1.8 pts.), the product is neutralised (NaOH), and the pure salt, R₂Na₂P₂O₇, isolated by crystallisation from EtOH and Et₂O, caused to react with H₂O₂ in aq. EtOH. H. A. P.

Production of 1-chloro-2-methylantraquinone. I. G. FARBENIND. A.-G. (B.P. 425,774, 23.10.33. Ger., 16.5.33).—The calc. amount of Cl₂ (1 mol.) is added gradually to 2-methylantraquinone (or the cyclisation product of 2-*p*-toluylbenzoic acid) in oleum containing a Cl₂ carrier (I) in a closed vessel at room temp. The HCl liberated is converted into ClSO₃H. (Cf. B.P. 335,232; B., 1931, 13.) H. A. P.

Manufacture of 3-chloro-2-acetamidoanthraquinone. I. G. FARBENIND. A.-G. (B.P. 425,456, 17.9.34. Ger., 20.9.33).—The product of cyclisation (10% oleum at 20–25°) of crude 4'-chloro-3'-amino-2-benzoylbenzoic acid is acetylated, *e.g.*, with AcCl in PhNO₂ or by addition of Ac₂O to the cyclisation reaction mixture. H. A. P.

Manufacture of compounds of the anthraquinone series. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 425,854, 3.4.34).—Interaction of 2:3-dichloroanthraquinone (I) with 5% aq. NH₃ and CuSO₄ gives 3-chloro-2-aminoanthraquinone, m.p. 300°; with 50% aq. NH₃ 2:3-diamino-, m.p. 353°, and with 5% aq. NHMe₂ at 160° 3-chloro-2-dimethylamino-anthraquinone are formed. Interaction of (I) with excess *p*-NH₂·C₆H₄Me, Cu(OAc)₂, NaOAc, and Cu at the b.p. gives 3-chloro-2-*p*-toluidinoanthraquinone. H. A. P.

Solvent recovery.—See I. **Tanning substances.**—See XV.

IV.—DYESTUFFS.

Imperial agricultural report [on indigo].—See XVI. Dyes for injection.—See XX.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Halogenation of wool. C. COURTOT and A. BARON (Compt. rend., 1935, 200, 675—676).—Prolonged action of aq. Cl_2 or Br effects morphological changes in wool, rendering 60% of it sol. (no oxidation of the S appears to be involved), whereas aq. I is absorbed but causes little modification. The liquors from the Cl_2 and Br treatment, after removal of excess halogen, show equal laevorotations. Both the H_2O -sol. and the H_2O -insol., Na_2CO_3 -sol. portions of the wool give aliphatic aldehydes (derived from *N*-halogenated α - NH_2 -acids) on steam-distillation from aq. Na_2CO_3 solution. The oxidising power of chlorinated wool after long washing with H_2O is 30 times that which would be produced by the Cl_2 present. J. W. B.

Iodine value of wool. R. W. MCKAY (Amer. Dyestuff Rep., 1934, 23, 697—698).—The relation found by Harris, Neville, and Fritz between the I val. and free NH_2 -N is shown to be fortuitous. Wool samples treated with HNO_2 do not show a const. difference in I val. from untreated samples, when soaked in Wijs solution under the same conditions. CH. ABS. (e)

Tensile strength of jute fibre. P. B. SARKER (J. Indian Chem. Soc., 1935, 12, 23—30).—The tensile strength (*T*) decreases with increasing H_2O content, but raw jute stored in a dry place retains its *T*. Removal of the lignin scarcely affects *T*, in agreement with the view that the lignin and cellulose are not chemically combined. *T* is improved by treatment with CH_2O , which also renders the jute resistant to the action of bacteria. R. S.

Revivifying used [silk] boil-off liquor for additional degumming purposes. H. H. MOSHER (Rayon and Melland Text. Month., 1935, 16, 143—145, 226—230).—The diminished utility of the boil-off liquor after use is due to the conversion of soap into free fatty acid (I) and insol. soaps (II). The liquor is best revived by neutralising (I) with NaOH and dispersing (II) with phosphoboro-esters of fatty alcohol sulphonates; the p_{H} must be ≥ 10.5 . A. G.

Crêpes. VI. Numerical representation of crêped state. Y. KONISI (J. Soc. Chem. Ind., Japan, 1935, 38, 112 B; cf. B., 1935, 221).—Mathematical. A. G.

Moisture relations of aircraft fabrics. G. M. KLINE (J. Res. Nat. Bur. Stand., 1935, 14, 67—84).—In a saturated atm., aircraft fabric coated with cellulose nitrate dope shows a max. gain of 12 wt.-% under standard conditions (21° and 65% R.H.). Fabrics coated with cellulose acetate dope show similar behaviour up to 97% R.H., but in a saturated atm. are more hygroscopic, absorbing 20% in 1 week and 40—55% of H_2O after some weeks. Gas-cell fabric (balloon cloth coated with a mixture of gelatin and rubber latex containing polyglycerol as plasticiser) is very hygroscopic, absorbing 50 wt.-% in 7 days and 100 wt.-% in 4 weeks, in a saturated atm. Paraffin retards absorption of H_2O ,

but also retards its desorption. A fungicide should be added to fabrics with a gelatin-latex coating, to prevent mould attack. J. W. S.

Penetration of water into the crystal lattice of cellulose. I. SAKURADA and K. HUTINO (Bull. Inst. Phys. Chem. Res., Japan, 1935, 14, 171—176).—Cellulose fibres from soda pulp swelled in alkali-free H_2O and not dried give a new, sharp, X-ray diagram, due to penetration of H_2O into the lattice, which on drying passes gradually into that of hydrated cellulose. R. S. B.

Viscose. LVIII. Influence of the carbonate content of sodium hydroxide. G. KITA, S. JIMBO, R. RIKO, and H. TAKADA. LIX. Influence of hemicellulose. G. KITA, S. MONDEN, and H. KIZU (J. Soc. Chem. Ind., Japan, 1935, 38, 123 B, 123—124 B).—LVIII. $< 3\%$ of Na_2CO_3 does not affect the strength or extensibility of the rayon, the η or ripeness of the viscose, or the uniformity of xanthation; more CS_2 is consumed.

LIX. The addition of hemicellulose (I) (1—5% of the α -cellulose) lowered the strength and regularity of the rayon, but assisted ripening; the η of the viscose was a min. at 3—4% of (I). A. G.

Dry spinning of cuprammonium rayon. E. SCHURZ (Textilber., 1935, 16, 195—197).—Threads, finer and stronger than those obtained by the usual wet-spinning process (I), can be produced by spinning a cuprammonium solution of cotton into cold dry air; the threads are unsatisfactory if ordinary air made H_2O -unsaturated by heating to $> 35^\circ$ is used instead. A dry-spinning plant is described in which the air is circulated in a closed system which includes an air-dryer using conc. H_2SO_4 . In (I) 2000 litres of soft H_2O are required to produce 1 kg. of rayon. A. J. H.

Rayon yarn conditioning. H. R. MAUERSBERGER (Rayon and Melland Text. Month., 1935, 16, 211—212).—A system is recommended in which humidified air is passed through perforated partitions on to and through the yarn arranged as cops, tubes, etc. on pin boards. A. G.

Cause of formation of "milky spots" in viscose silk. S. POZNAŃSKI (Przemysł Chem., 1935, 19, 42—47).—Loss of lustre after drying is due to evaporation of CS_2 bubbles in the fibres, with their replacement by air; the dimensions and no. of these bubbles diminish with increasing maturity of the viscose, and vary according to the conditions of manufacture of the latter. R. T.

Alkaline hydrolysis of cellulose acetate rayon. M. W. VAN ESS and R. EDGAR (Iowa State Coll. J. Sci., 1934, 8, 397—408).—Results are recorded for hydrolysis at 60° by 0.02—0.22N-NaOH. CH. ABS. (e)

Adsorption of organic liquids by cellulose products. J. WIERTELAK and I. GARBACZÓWNA (Ind. Eng. Chem. [Anal.], 1935, 7, 110—111).—Cellulose, viscose-, nitrate-, and cuprammonium-rayons adsorb alcohols, $\text{C}_5\text{H}_5\text{N}$, and especially C_6H_6 -EtOH mixtures. The adsorbed liquid is not removed by prolonged heating at 105°, but is removed by washing with Et_2O or H_2O . Et_2O , C_6H_6 , and petrol are not adsorbed. E. S. H.

New stains and their use for fibre identification.

J. H. GRAFF (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 203—208).—By the use of 6 stains [Herzberg, "A" (modified Sutermeister), "C," "D" (modified Jenk), "E," and "F"] the prep. and use of all of which are described in detail, it is possible to distinguish between practically all the common papermaking fibres. Indeed, only "C" and "F" stains are necessary in the great majority of cases. These two stains (both composed of AlCl_3 , CaCl_2 , ZnCl_2 , and I in different proportions) and "E" stain (NaCl and I) are new. The colours developed are fully listed, by comparison with Ridgway's "Colour Standards and Colour Nomenclature." "C" stain differentiates not only between the coniferous fibres, bast and leaf fibres, and rag and hardwood fibres, but also between the various classes of the coniferous and hardwood fibres. It also clearly differentiates between unbleached, lightly bleached, and fully bleached sulphite; between European and Eastern American bleached sulphites as against West Coast bleached sulphites; between unbleached, lightly bleached, and bleached α -fibres; and between kraft, semi-bleached kraft, and refined kraft. Among the hardwood fibres, "F" stain differentiates between kraft, semi-bleached kraft, refined kraft, sulphite-, soda-, and α -fibres. It is sometimes difficult to differentiate between hardwood bleached krafts and bleached and unbleached soda fibres with both "C" and "F" stains, in which case either "D" or "E" stain must be used. Only thorough familiarity with these stains gives satisfactory results.

H. A. H.

Use of jute rags in the composition of copying papers.

S. S. KHARAZ and S. E. GORNOSTAIPOLSKI (Bumazhn. Prom., 1934, 13, No. 8, 47—50).—Stock containing $\geq 5\%$ of lignin was obtained by pulping jute waste with 5% of NaOH and 10% of CaO at 3.5—4 atm. for 10 hr., and subsequent 2-stage bleaching with 3 and 2% of active Cl with an intermediate washing (1—1.5 hr.). Paper with 35% of the pulp gave satisfactory pale cream copying sheets.

CH. ABS. (e)

Chemical investigation of *Pinus radiata* in relation to its paper-making qualities. I. Distribution and nature of non-volatile ether extractives.

W. E. COHEN (J. Coun. Sci. Ind. Res., Australia, 1935, 8, 27—36).—Investigation of the resin (*R*) in the inner and outer rings of *P. radiata*, grown extensively in S. Australia, Victoria, and in New Zealand, and of the influence of heartwood (*H*) on *R* content showed no definite relationship between yield of extractives from the whole log section and the age of tree or the presence of *H*. Sulphite-pulping tests indicated that pitch trouble arises when pinewood contains appreciable amounts of *H*.

D. A. C.

Determining the technical value of Finnish peat fibres for preparing paper or pulp.

H. KOMMONEN (Suomen Pap. Puutav., 1934, 226—232, 472—488; Chem. Zentr., 1934, ii, 1706).—Peat from *Eriophorum vaginatum* is valuable for preparing (paper) board or cartons. Residues from sphagnum mosses may be used as fillers. Peat-grass and straw residues are of no val., owing to their lack of homogeneity.

H. J. E.

Effect of temperature on beating of rag stock.

H. F. LEWIS and L. A. GILBERTSON (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 189—195).—Beating tests on rag stock carried out at 6°, 25°, 45°, and 85° show that beating degree, folding, tearing, bursting, and tensile strengths are all very adversely affected by rise in temp., fold being particularly sensitive. Chemical consts., such as α -cellulose, Cu no., and η , are unaffected.

H. A. H.

"Stock-Maker" precision laboratory [pulp] beater.

C. W. MORDEN and G. H. MCGREGOR (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 26—28).—A laboratory model of a new type of commercial vertical beater (cf. B., 1932, 673) is described. The construction follows closely that of the original except that instead of having the conical bedplate made adjustable, the vertical conical rotor may be fixed to give a definite clearance between the bars of the beating elements (cf. B., 1935, 16). Its action is claimed to be very rapid.

H. A. H.

Kollergang beating method for pulp evaluation.

J. D'A. CLARK (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 136—144).—A new laboratory beating apparatus is described in detail, which differs markedly from previously used methods of treating pulp. It consists essentially of three kollergangs rotating in a trough, supplementary agitation of the pulp being secured by the use of propellers. The capacity is about 150 g. of pulp at 5% consistency, at which most wood pulps may be treated. The apparatus will beat rope and rag materials also, but at a lower consistency. Several advantages are claimed for the apparatus, chiefly among which are: (a) its positive action on the pulp, the effect thus being independent of the degree of slipperiness; (b) the accuracy of standardisation and ease of maintenance of its effective working edges; and (c) its ability to deal satisfactorily with pulp on a "revolution per g." basis, thus enabling samples to be withdrawn at different stages of beating without affecting the treatment of the remainder; this much reduces the time taken for a complete test. A no. of variables have been investigated, and details of a suggested method are included, the accuracy of which is claimed to be satisfactory for standard equipment and independent of the personal element. A no. of graphs and photomicrographs are given.

H. A. H.

Paper stock treatment, mixing, and beating with rods.

S. D. WELLS (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 176—181).—A no. of advantages of beating pulp and waste paper in rod mills are described. In particular, both short- and long-fibred pulps develop their strength with less loss in freeness, absorbency, and tearing strength and with less power consumption than in any other beating process. Saving of power is also claimed in dealing with waste-paper stock and straw-board. The application of rod-milling to the de-inking of paper enables low-consistency processes, with their many advantages, to be employed. Bleaching of pulp can be effected during the milling process; alternatively, pretreatment with rods ensures lower and more uniform bleach consumption.

H. A. H.

Evaluation of the heat input into alkaline pulping digesters.

H. R. MURDOCK (Paper Trade J., 1935, 100

T.A.P.P.I. Sect., 181—182).—A Committee report. A method of calculation and some data are given.

H. A. H.

Slow and rapid pulping of wood for production of viscose rayon. F. KHYTER (Bumazhn. Prom., 1934, 13, No. 9, 18—24).—Experimental pulpings are described with 3.5, 5.5, and 7.5% of SO_2 and 1% of CaO . The use of 5.5% of SO_2 gave a 3—4% loss in pulp yield compared with slow pulping (3.5% of SO_2), but a 25—30% economy in time. The pulp was satisfactory for viscose production.

CH. ABS. (e)

Refining [wood-]pulp screen tailings. A. J. HAUG (Pulp and Paper Canada, 1935, 36, 231—233).—The Haug refiner (B., 1934, 90) is capable not only of treating screened tailings, but also of being used in conjunction with coarse wood-pulp grinders by refining the higher % of coarse pulp thus produced to a controllable degree of fineness; in this way output is increased. It is claimed that clean paper can be made from sulphite-pulp tailings by its use.

H. A. H.

Sulphonation of pinewood lignin. XXVII. Chemistry of sulphite-cellulose cooking. E. HÄGGLUND and T. JOHNSON (Suomen Pap. Puutav., 1934, 282—288; Chem. Zentr., 1934, ii, 1867—1868; cf. B., 1934, 316).—Data are recorded for the dependence of the rate of sulphonation (I) on p_{H} . During (I) approx. half of the Ac groups are split off readily and the rest more slowly.

H. J. E.

Importance of high lime content of the cooking acid in sulphite-pulp cooking. E. HÄGGLUND and H. NIHLÉN (Zellstoff u. Papier, 1935, 15, 92—94, 137—139).—The yield (Y) of pulp rises with increasing CaO content (L), when $\text{SO}_2\%$ is const., but sugar content falls with rise in L, for a given Y. Y rises with L: (i) for pulp containing 3—4% of slivers, (ii) when cooking to a definite Cl no., (iii) for sliver-free pulp, and (iv) for varying degrees of cooking. With high L, tensile and bursting strengths rise appreciably, tearing strength is scarcely affected, the pulp becomes easier to beat, and the whiteness increases considerably.

D. A. C.

Mill test for exact determination of combined sulphur dioxide [in sulphite-pulp cooking]. G. V. PALMROSE (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 28—29).—A method, using KIO_3 in presence of KI , is described in detail, for determining combined SO_2 in sulphite cooking liquor. A correction is made for reversible SO_2 , and accuracy is claimed to be within 0.01%.

H. A. H.

Sizing [of paper] and capillary flow. R. M. COBB (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 200—203).—A no. of unknown factors are discussed. It is estimated that 2% of rosin size is sufficient to coat the total area of pulp with a uniform layer about 1000 Å. thick, but no evidence is available to show whether size is so distributed. Several equations of capillary flow are cited. The hypothesis that internal sizing raises the contact angle of some liquids against the cellulose fibre is supported; surface sizing in addition reduces their flow by closing the fibre pores. The relationship between air permeability and moisture-, ink-, and grease-resistance is considered to be a doubtful one. The difficulties of experimentally measuring ink-

receptivity and contact angles of liquids against paper are indicated.

H. A. H.

Special types of rosin size and their physical properties. J. A. DECEW (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 144—146).—Recent advances in the manufacture of special types of rosin size for use in the beater are reviewed, and a no. of such types are classified in order of stability. It is suggested that methods of application are more important than is the composition of the size used, and that there is no one type of size which will treat all kinds of paper more efficiently than any other type.

H. A. H.

Use of sludge from the causticising of green liquors in [paper] filling. N. Y. MARKOV (Bumazhn. Prom., 1934, 13, No. 8, 35—41).—The filter cake (raw or calcined) is unsuitable for the production of paper fillers. It may be used in refining waste paper.

CH. ABS. (e)

Paper testing for printing quality. J. BEKK (Papier-Fabr., 1935, 33, 137—143, 145—151).—Factors affecting printing quality (Q) are discussed and a description is given of the design and application of the author's instruments for evaluating Q, e.g., smoothness and hardness testers.

D. A. C.

Optical characteristics of paper. F. A. STEELE (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 151—156).—The relationship between basis wt., reflectance (brightness), contrast ratio, and other optical properties are investigated mathematically. The equations of Kubelka and Munk (Z. tech. Physik, 1931, 12, 593) are simplified by means of charts, from one of which reflectivity can be read directly if the reflectance vals. over white and over black are known, thus making it possible to determine printing opacity when only a small sample of paper is available.

H. A. H.

Factors influencing the brightness of paper as recorded by the General Electric reflection meter. E. R. LAUGHLIN and O. KRESS (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 106—118).—A no. of factors in papermaking which might influence the brightness (B) of the resulting paper are critically examined, using a Valley sheet mould for making test sheets (conditions specified) and the General Electric reflection meter for testing them. Variations in freeness, turbidity of the H_2O supply, beater sizing, and calendering, and also in paper-machine formation, are relatively without effect on B, the most important variables being uniformity of furnish and of filler retention. The effect of a range of dyes on B is also examined. It is considered possible to control B sufficiently accurately for all commercial purposes.

H. A. H.

Determining the rigidity, stiffness, and softness of paper. J. D'A. CLARK (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 169—172).—Methods for determining the flexibility of paper and paper board are briefly reviewed, and a new simple method is described for measuring rigidity, rigidity factor, stiffness, and softness. The overhang of a strip of paper which, when its clamped end is rotated through a right angle, will just fall over in the direction turned, is measured, and given formulæ (involving only effective overhang, thickness, and

basis wt.) are applied. Accuracy of duplication is within 5%, except for the softness test, which is within 10%. Some modifications for routine work are given.

H. A. H.

Water-resistance of paper. ANON. (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 159–161).—The latest modifications to the T.A.P.P.I. standard method of determining the H₂O-resistance of paper, including thick paper and boards, using a "dry indicator" protected from atm. moisture, are given. Penetration is allowed to continue until the rate of change in the colour of the indicator is at a max. Reproducibility of the average test results is within 10–15%. Three other methods are also mentioned.

H. A. H.

Pseudo-salicylic acid reaction [for testing bread-wrapping papers]. J. J. HANSMA (Chem. Weekblad, 1935, 32, 226–227).—Al-coated parchment paper containing salicylic acid (I) failed to protect rye bread against mould. In testing for (I), paper in which bread has been wrapped and sterilised the method described previously for testing bread (B., 1932, 398, 525) must be employed.

D. R. D.

Physical properties of parchment. N. J. SOLECHNIK (Bumazhn. Prom., 1934, 13, No. 8, 24–29).—The degree of parchmentsation is best determined from the transparency, using a Se photoelement. Parchment (I) is opaque in the entire ultra-violet and infra-red. After atm. exposure for 2.5 months a 15 and 30% decrease in tensile strength in the dry and wet state, respectively, was observed. Increased transparency results from a preliminary mercerisation with 18% NaOH solution and subsequent treatment with 80% H₂SO₄. Other methods of improving the physical properties are described. (I) may be substituted for glass in the hot-house cultivation of vegetables.

CH. ABS. (e)

Colouring matter from rubber ware.—See XIV.
Trees for pulp wood.—See XVI.

PATENTS.

Manufacture of artificial filaments. G. F. J. BOUFFE (B.P. 425,743, 15.11.33).—An oscillating cleaning arm with remote control is arranged below the spinneret to ensure a uniform flow of the cellulose solution.

F. R. E.

Drying of spun cakes of artificial silk. ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 425,754, 18.12.34. Ger., 21.12.33. Addn. to B.P. 358,847; B., 1931, 1137).—The spun cakes (I), given a polygonal shape, are dried while assembled in honeycomb-like layers with covering plates having holes corresponding to the free passages through (I).

F. R. E.

Production of sponge-like regenerated cellulose structures particularly for electric insulation. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 426,099, 11.4.34. Ger., 12.4.33).—An alkaline or acid org. protective colloid (alkaline latex, rosin, tannic acid) is added to the mixture of viscose and solid, H₂O-sol. salt (Na₂SO₄) before extrusion, to prevent premature coagulation.

F. R. E.

Manufacture of photographic supports from cellulose derivatives. I. G. FARBERIND. A.-G. (B.P. 426,023, 5.3.34. Ger., 4.3.33).—The cellulose derivative

(nitrate, acetate) is incorporated with softeners consisting of derivatives or conversion products of fatty acids (mainly C₈₋₁₄) which have little or no odour, e.g., esters, ethers, alcohols, or monochlorides derived from coconut oil fatty acids.

F. R. E.

Apparatus for manufacture of paper pulp. E. & M. LAMORT FILS (B.P. 426,096, 19.3.34. Fr., 17.3.33).—An apparatus for disintegrating highly-compressed sheets of wood pulp or the like comprises two superposed shafts carrying beaters in a U-shaped perforated casing, the whole being contained in a tank with a sloping bottom.

B. M. V.

Papermaking. J. E. BOND (B.P. 425,644, 12.2.34).—Thick pulp stock (*T*) (> 10–14%) is subjected to the whirling and tearing action of high-speed rotary blades, in a chamber free from baffles, whereby fibre bundles are completely disintegrated, further treatment being carried out in a conical refiner. Stronger paper is obtained with less power consumption. Bleaching and de-inking are more effective with *T* owing to the greater consens. used.

D. A. C.

Manufacture of paper or the like. H. H. NELSON and G. BECKEN (B.P. 425,666, 19.7.34. Fr., 19.7.33).—A thixotropic form (*T*) of cellulose is made by treating a fresh, highly viscous cellulose thiocarbonate solution with just sufficient coagulant (*C*) to discharge the colloidal aggregates. *C* may be H₂SO₃ and Na₂SO₃, AcOH, HCl, etc., alone or mixed. *T* is added to the pulp stock, preferably adjusted to *p*_H 5.8 with, e.g., alum, the resulting gel depositing on the fibres. Strong, translucent, water- and grease-proof webs are obtained, which may be softened with soap or glycerin, or applied to board before drying.

D. A. C.

Manufacture of printing paper. C. WINKLER (B.P. 425,820, 31.8.34. Ger., 31.8.33. Addn. to B.P. 424,839; B., 1935, 448).—Three-ply paper is made with the outer layers of ordinary loaded or coated thin paper, and the thicker middle layer sized or parchmentsed to be impervious to printers' inks and colours and filled or coated with cork dust, which may be incorporated in the adhesive.

D. A. C.

Manufacture of carbon papers. M. BANDI (B.P. 424,495, 15.8.33. Ger., 16.8.32 and 27.10.32).—A coating for copying papers comprises a dye dispersed in a fatty acid, e.g., oleic acid, a cellulose ester, e.g., the nitrate dissolved in C₆H₆-EtOH, an insulating medium, e.g., C black, a thickened vegetable or mineral non-drying oil, e.g., a polymerised, oxidised, or sulphurised oil, a filler, and a plasticiser, e.g., Ph₃PO₄.

A. R. P.

Manufacture of a hard [wood fibre] product. O. W. SANDELL, ASSR. to AKTIEB. MO OCH DOMSJO WALLBOARD CO. (U.S.P. 1,953,832, 3.4.34. Appl., 1.3.33. Swed., 8.11.32).—Moist wood fibre is mixed with 0.1–10 (5)% of urea or CS(NH₂)₂ and compressed into sheets at 160–185°/60 kg. per sq. cm.

A. R. P.

Colloidising cellulose esters and manufacture therefrom of highly flexible sheeting. KODAK, LTD., ASSEES. OF C. J. MALM (B.P. 426,942, 8.7.33. U.S., 10.9.32. Addn. to B.P. 406,011; B., 1934, 371).—See U.S.P. 1,960,185; B., 1935, 266.

Papermaking.—See I. **Insulation compositions.**
Fireproofing [paper].—See IX. **Oilproofed fibrous material.**—See XIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Dyeing. I. Change in dye concentration in the dyebath. Y. KONISI (J. Soc. Chem. Ind., Japan, 1935, 38, 110—112 B).—Mathematical. A. G.

Thiourea improves fastness of acetate [dyeings]. C. H. S. TUPHOLME (Text. Col., 1934, 56, 689).— $\text{CS}(\text{NH}_2)_2$ (I) increases the colour-fastness of dyeings on cellulose esters or ethers, especially with anthraquinone dyes containing NH_2 - or arylamino-groups. (I) is fixed in the fabric with steam. CH. ABS. (e)

Fireproofed textiles. W. F. BROSNAN (Text. World, 1934, 84, 2399—2400).—Compounds of Fe, Cr, Pb, and Cu accelerate the rate of burning. Mixtures of NH_4 salts, $\text{Na}_2\text{B}_4\text{O}_7$, and H_3BO_3 are efficient and inexpensive. Vals. for the min. quantity of various compounds to flameproof cotton are tabulated. CH. ABS. (e)

Aircraft fabrics.—See V. **Conc. $\text{Ca}(\text{OCl})_2$ [for laundries].** **Stability of bleaching solutions.**—See VII.

PATENTS.

Washing or laundering processes and compositions therefor. HALL LABS., INC., Assees. of R. E. HALL (B.P. 424,959, 25.5.33. U.S., 22.8.32 and 20.3.33).—The use of Na hexametaphosphate [$\text{Na}_2(\text{Na}_4\text{P}_6\text{O}_{18})$] to prevent formation of Ca and Mg soaps in laundering operations is claimed. A. R. P.

Dyeing of leather. SOC. CHEM. IND. IN BASLE (B.P. 425,433, 20.4.34. Switz., 22.4.33).—Leather, other than chrome- Al_2O_3 -tanned leather, is dyed with a H_2O -sol. complex metallic derivative of a monoazo dye of the type $o\text{-NH}_2\text{-ArX}$ (I) \rightarrow (m)- $\text{C}_6\text{H}_4(\text{OH})_2$, X being a lake-forming group (OH) and Ar being free from CO_2H in *ortho* position to X. Examples of (I) are 2:1:4- $\text{NH}_2\text{-C}_6\text{H}_3(\text{OH})\text{-NO}_2$ (U, yellow-brown), 2:1:5- $\text{NH}_2\text{-C}_6\text{H}_3(\text{OH})\text{-NO}_2$ (Co, bordeaux; Ni, rose; Mn, brown-orange), and 2:4:1:5- $\text{NH}_2\text{-C}_6\text{H}_2\text{Cl}(\text{OH})\text{-SO}_3\text{H}$ (Ni, Mn, red-brown). Use as (I) of 1:2:4:6- $\text{NH}_2\text{-C}_{10}\text{H}_4(\text{OH})(\text{SO}_3\text{H})_2$ is excluded. (Cf. B.P. 401,544; B., 1934, 138.) H. A. P.

Washing etc. agents.—See III. **Fireproofing [fabrics].**—See IX. **Dyeing films on Al.**—See X.

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

Contact sulphuric acid manufacture. III. Silver-vanadium on silica gel. M. MATSUI, K. ODA, and T. NAKA (J. Soc. Chem. Ind., Japan, 1935, 38, 80—81 B; cf. B., 1934, 716).—A SiO_2 gel catalyst containing 15–20% V_2O_5 as Ag_3VO_4 gave unimpaired conversion in presence of As_2O_3 (added to the catalyst). The optimum temp. was 500°. The Ag catalyst was slightly less active under corresponding conditions than a previously used Ba vanadate catalyst. C. I.

Determination of sulphuric acid in clouds, as present in burner gases etc. R. KRAUS (Angew. Chem., 1935, 48, 227—228).—The gas current containing H_2SO_4 is saturated with H_2O vapour at 100° and then

passed through a condenser. In this way the gas is freed from SO_3 while retaining the whole of the SO_2 . Two distilling flasks and condensers are actually used and the gas is drawn through at the rate of 50—150 c.c. per min. with an aspirator. Tests with this apparatus confirm that with pyrites-lump burners 3.1% of the S is burned to SO_3 and with pyrites fines 3.5%. C. I.

Calculation of mixtures of oleum and sulphuric acid. J. W. FICKENSCHER (Chem. Met. Eng., 1935, 42, 159).—Pearson's square is adapted for calculating the proportions of oleum and H_2SO_4 of any concns. to produce mixtures of any desired intermediate concn.

D. K. M.

Determination of nitrogen trioxide in nitrosyl-sulphuric acid. S. D. BESKOV and O. A. SLIZKOVSKAJA (J. Chem. Ind. Russ., 1935, 12, No. 1, 56—57).—1.5—3 g. of $\text{NO}_2\text{SO}_3\text{H}$ in an open tube are introduced into excess of 0.1N- KMnO_4 (I) and 15—20 c.c. of 20% H_2SO_4 in a closed vessel, 0.1N-Mohr's salt (II) is added, and excess of (II) determined by titration with (I), when $\text{N}_2\text{O}_3\%$ = $0.19(a-b)/m$, where a is the total no. of c.c. of (I) used, b that of (II), and m is the wt. of the sample. R. T.

Determination of moisture in liquid ammonia. N. V. ILJIN, G. L. LIVSCHITZ, and E. I. TICHVINSKAJA (J. Chem. Ind. Russ., 1935, 12, No. 1, 54—55).— NH_3 is allowed to evaporate from a Dewar flask (D), and the gas is passed through weighed U-tubes containing NaOH, and absorbed by H_2O ; $\text{H}_2\text{O}\%$ = $100(a-b)/m$, where a is the increase in wt. of the U-tubes, b is NH_3 in g. remaining in D, and m is the wt. of NH_3 taken. R. T.

Refining of common salt. J. A. LEE (Chem. Met. Eng., 1935, 42, 124—128).—An illustrated review of the production of NaCl at the Silver springs (U.S.A.) works of the Worcester Salt Co. D. K. M.

Manufacture of ammonium sulphate from gypsum and phosphogypsum. A. A. SOKOLOVSKI (Trans. Sci. Inst. Fert., Leningrad, 1933, No. 101, 12—20).—The reaction between $(\text{NH}_4)_2\text{CO}_3$ or NH_3 and CO_2 and phosphogypsum (a by-product of superphosphate manufacture) in aq. suspension is examined.

CH. ABS. (p)

Production of ammonium sulphate from Don gypsum. A. A. SOKOLOVSKI and L. M. GUREVICH (Trans. Sci. Inst. Fert., Leningrad, 1933, No. 101, 21—26).—Gypsum is completely decomposed in 3—5 hr. by $\text{CO}_2\text{-NH}_3$ treatment, using 10—24% excess of the reagents. CH. ABS. (p)

Preparation of coarsely crystalline ammonium sulphate. G. BERKHOFF (Chem. Weekblad, 1935, 32, 186—197).—The influence of physical conditions (temp. etc.) and the presence of impurities on the crystal size and habit of $(\text{NH}_4)_2\text{SO}_4$ crystallised from aq. solution has been investigated. To obtain large crystals, Fe, Al, and Cr salts should first be pptd. as phosphates, and the temp. of the solution should be kept as uniform as possible during crystallisation. D. R. D.

Decomposition of ammonium nitrate during evaporation of its solutions. V. A. KLEVKE (J. Chem. Ind. Russ., 1935, 12, No. 1, 53—54).— \rightarrow 0.05% decomp. of NH_4NO_3 takes place during the evaporation

of its solution in Fe vessels, and the product contains only traces of Fe. R. T.

Roasting, grinding, and magnetic separation of phosphorites. F. N. BELASCH (J. Chem. Ind. Russ., 1935, 12, No. 1, 50–53).—Phosphorites containing Fe_2O_3 are conc. by a combination of methods, involving conversion of Fe_2O_3 into Fe_3O_4 , which is separated magnetically. R. T.

Citric acid-soluble phosphate in phosphorites. S. N. ROSANOV (Phosphorsäure, 1934, 4, 641–666).—The effects on the vals. for citric-solubility of phosphorites of varying the time of contact, concn. of solvent, and proportion of solid to liquid are recorded. The citric acid test is unsatisfactory for determining availability in these materials, vals. being generally higher than culture methods indicate. It serves, however, to determine the proportions of cryst. and non-cryst. constituents present. CH. ABS. (p)

Condensation of phosphorus from gases containing it. K. I. ZAGVOZDKIN and N. N. POSTNIKOV (J. Chem. Ind. Russ., 1935, 12, No. 1, 44–50).—Laboratory and technical apparatus are described, serving for the condensation of P from vapours containing 24–481 g. of P per cu. m.; 90% condensation is attained within 75 sec., without the addition of steam. Preliminary experiments with an electro-filter indicate the possibility of its application, at 100–120°. R. T.

Ammoniation of U.S.S.R. superphosphates. L. BERLIN (J. Chem. Ind. Russ., 1935, 12, No. 1, 37–44).—The product (I) obtained by treating superphosphates with NH_3 should contain $\geq 4\%$ NH_3 ($\text{NH}_3/\text{P}_2\text{O}_5 = 0.25$); it contains no free acids, and is not hygroscopic. A product containing 8% N ($\text{NH}_3/\text{P}_2\text{O}_5 = 0.8$) is obtained by adding NH_4NO_3 (II) to (I); a less satisfactory product is obtained when urea (III) is substituted for (II), whilst (II)–(III) mixtures appear to be the most advantageous. R. T.

Water-solubility of basic slag. C. KRÜGEL, C. DREYSPRING, and W. HEINZ (Superphosphat, 1934, 10, 97–103).—The fertiliser val. of basic slag is unrelated to its H_2O -sol. P content. Its efficiency results from its favourable physiological action on the plant and the fineness of grinding. CH. ABS. (p)

Willard and Winter's method for determination of fluorine [in phosphatic material]. D. S. REYNOLDS (J. Assoc. Off. Agric. Chem., 1935, 18, 108–113; cf. B., 1934, 959).—In the determination of F in slag, phosphate rock, and calcined phosphates by Willard and Winter's method (A., 1933, 242) serious errors may arise unless the coating of pptd. SiO_2 , which tenaciously retains F, is removed by boiling with conc. aq. NaOH . When H_3PO_4 is used for the distillation, results for F are too high owing to H_3PO_4 passing over and being pptd. as Th phosphate in the subsequent titration. When HClO_4 is used, the error with 0.1-g. samples is negligible, but with ≤ 3 -g. samples either the pptd. PO_4^{3-} must be corr. for, or the distillate conc. and redistilled with HClO_4 . E. C. S.

Conversion of gypsum by aqueous ammonium sulphate. S. PERELMAN and V. ROZLER (J. Chem. Ind.

Russ., 1935, 12, No. 1, 28–37).—92–93% conversion of gypsum (I) and 96–98% utilisation of $(\text{NH}_4)_2\text{CO}_3$ is obtained from powdered (I) (28-mesh; 5% excess) and 40% aq. $(\text{NH}_4)_2\text{CO}_3$ (2 hr. at 40–60°). The resulting 40% aq. $(\text{NH}_4)_2\text{SO}_4$ (II) contains 0.2–0.25% of NH_3 , which should be neutralised with H_2SO_4 . The ppt. contains CaCO_3 65, (I) 10, mechanical admixtures 4–6, (II) 0.8–1, and H_2O 20%. R. T.

[Manufacture and uses of] concentrated calcium hypochlorite. L. L. HEDGEPEETH (Trans. Electrochem. Soc., 1935, 67, 157–160).— CaO slurry is chlorinated at a temp. and H_2O content such that CaCl_2 remains in solution and $\text{Ca}(\text{OCl})_2$ in the solid state. The product is filter-pressed, dried, and ground. It contains 70–74% of available Cl and about 14% of $\text{Ca}(\text{OH})_2$ with $\geq 8\%$ of CaCl_2 . Possible applications are in mineral oil-sweetening, laundries, and for H_2O sterilisation. C. I.

[Chlorine] content and stability of commercial chlorinated alkaline bleaching solutions. J. J. HANSMA (Chem. Weekblad, 1935, 32, 226).—The available Cl in 38 samples of commercial NaOCl and $\text{Ca}(\text{OCl})_2$ solutions was determined over a period of 3 months. There was considerable variation in Cl content (0.1–9.4%, bearing no relation to the price) and in the stability, most samples showing hardly any loss during this time. D. R. D.

Small-scale production of [calcium] carbide. G. REINBERG (Chem. Met. Eng., 1935, 42, 150–152).—A description with illustrations of the plant of Cerro de Pasco Copper Co. in Peru; the daily output is 1.2–1.5 metric tons. D. K. M.

Conversion of waste ferrous sulphate into sulphuric acid. S. F. SPANGLER (Chem. Met. Eng., 1935, 42, 139–141).—Aq. $\text{FeSO}_4 + \text{H}_2\text{SO}_4$, e.g., waste liquor from pickling Fe or liquor obtained in the manufacture of TiO_2 , is neutralised with Fe_2O_3 (produced in a late stage of the process) and evaporated in a rotary dehydrator. The anhyd. Fe sulphate is mixed with pulverised coal or pyrites, heated in a rotary roaster, and the SO_2 evolved converted into H_2SO_4 by the contact process, using a V catalyst. D. K. M.

Decomposition of bauxite by sodium sulphate. C. SLONIM (Chem. Listy, 1935, 19, 60–63).— NaAlO_2 is obtained in 97% yield when 1:1 Na_2SO_4 – Al_2O_3 is heated at 950° in presence of H_2O . R. T.

Analysis of aluminosilicates. R. I. BORODITZ, KAYA (Keram. i Steklo, 1934, 10, No. 8, 20–24).— SiO_2 is determined gravimetrically by pptn. in presence of EtOH , Al_2O_3 volumetrically with 8-hydroxyquinoline- and CaO volumetrically. Fe_2O_3 and TiO_2 are determined by decomp. the sample with H_2SO_4 . CH. ABS. (e)

Solutions of basic salts of aluminium. A. W. THOMAS (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 120–123).—A summary of the phenomena of ololation and oxolation as applied to basic Al salts. H. A. H.

Simple carbon monoxide testing device. A. R. DUNHAM (Gas Age-Rec., 1934, 74, 145–146).—A paper moistened with aq. Pd salts is used. CH. ABS. (e).

Source of error in thermochemical measurements making use of commercial oxygen. L. J. P.

KEFFLER (J. Physical Chem., 1935, **39**, 277—282).—A previous observation (A., 1934, 860), that the concn. of a combustible impurity present in compressed O_2 may vary with the pressure in the cylinder at the time of delivery into the bomb, has been confirmed with other samples. The total variation in the vals. of the H_2O equiv. of the bomb may be 5—7 pts. per 10,000, which is too large to be ignored. A small amount of N_2 present as impurity is shown to cause a variation in H_2O equiv. with pressure. M. S. B.

Anhyd. NH_3 in oil refining.—See II. NH_4OAc for free CaO determination.—See IX. Corrosion of Fe by H_2SO_4 . Al vessels for HNO_3 .—See X. MnO_2 for dry cells.—See XI. Ti pigments.—See XIII. Caliche. Determining K in fertilisers.—See XVI.

PATENTS.

Manufacture of sulphuric acid by the contact process. NAT. PROCESSES, LTD., S. ROBSON, and P. S. LEWIS (B.P. 425,179, 18.9.33).—Roaster gases with, e.g., SO_2 5 and O_2 11% are passed through a chamber packed with a sintered pyrites catalyst at 500—600°, whereby 50—60% of the SO_2 is converted into SO_3 , which is absorbed in 98% H_2SO_4 . The scrubbed gases containing 2—2.5% of SO_2 are then passed through a series of glass-packed towers down which are sprayed, respectively, 60% H_2SO_4 , 16% H_2SO_4 , and 0.1% aq. $MnSO_4$, the effluent from the last tower being returned to the previous one, and so on. The product from the first tower containing about 82% H_2SO_4 is electrolysed at 50° at a high c.d. between Pb electrodes to remove the Mn as MnO_2 . A. R. P.

Activation of catalysts [for ammonia synthesis]. F. J. DE REWAL, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,952,911, 27.3.34. Appl., 13.11.30).—Granular CoO catalysts are activated by digestion with 5% HCl at 85—90°, washing to remove chlorides, moistening with HNO_3 , and roasting at 300—450°. A. R. P.

Temperature control [in ammonia synthesis]. J. W. DAVIS, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,952,909, 27.3.34. Appl., 28.11.30).—The temp. of the reaction mixture is controlled by withdrawing a portion of the gases after passing the catalyst chamber (I), but before removal of the NH_3 , and reintroducing this part into the gases entering (I) as required to maintain a steady temp. therein. A. R. P.

Purification of by-product ammonia. A. O. JAEGER, Assr. to SELDEN CO. (U.S.P. 1,953,938, 10.4.34. Appl., 22.10.29).—Crude NH_3 from coke-oven gas is freed from C_5H_5N , S, etc. by passage at 370° over a catalyst comprising a zeolite in which $FeVO_4$ is suspended, and condensation of the NH_4 salts formed by the reaction. A. R. P.

Treatment of materials containing lithium phosphate [e.g., amblygonite]. H. HEINRICH HÜTTE GES.M.B.H. (B.P. 424,757, 10.7.34. Ger., 13.7.33 and 9.7.34).—The finely-powdered mineral is heated at 80—200° with H_2SO_4 slightly > equiv. to the Li, other alkalis, and alkaline earths until a viscous mass is obtained, which is then heated in a reverberatory furnace at 700—850° until Al and Fe^{III} sulphates are

converted into insol. compounds, chiefly phosphates. Extraction of the product with hot H_2O yields aq. Li_2SO_4 , which is treated with Na_2CO_3 to ppt. Li_2CO_3 and yield a solution from which $Na_2SO_4 \cdot 10H_2O$ (I) is recovered by crystallisation. The phosphate residue from the leaching is mixed with (I), sand, and coke breeze and fused to yield a product from which Na_3PO_4 can be recovered by leaching. A. R. P.

Dissolution of deposits of alkaline-earth compounds. HALL LABS., INC., Assees. of R. E. HALL (B.P. 424,677, 25.5.33. U.S., 22.8.32 and 20.3.33).—Deposits of Ca or Mg compounds from hard H_2O are readily dissolved by treatment with dil. aq. $Na_2(Na_4P_6O_{18})$ or the corresponding NH_4 compound. Addition of these substances to boiler feed-water prevents deposition of scale in the boilers. A. R. P.

(A) Crystallisation of sodium metasilicate hydrates. (B) Manufacture of sodium pyrosilicate hydrate. M. C. WADDELL, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,953,839—40, 3.4.34. Appl., 25.10.32).—(A) $Na_2SiO_3 \cdot 5H_2O$ is obtained by cooling a hot conc. solution of Na_2SiO_3 containing < 25 g. of $NaOH$ per 100 c.c. to between 55° and 25°. For every 5° below 55° in the crystallising temp. a further 2 g. of $NaOH$ per 100 c.c. are required to produce the desired hydrate. (B) $Na_6Si_2O_7 \cdot 10H_2O$ is obtained by cooling a hot conc. solution of the salt in aq. $NaOH$ containing < 23 g. of $NaOH$ per 100 c.c. A. R. P.

Production of carbamates of the alkali metals other than potassium. MATHIESON ALKALI WORKS, Assees. of R. B. MACMULLIN (B.P. 422,908, 15.6.33. U.S. 6.7.32).— $NH_2 \cdot CO_2Na$ is prepared by adding $NaCl$ and $NH_2 \cdot CO_2NH_4$ or $2NH_4HCO_3$, $(NH_4)_2CO_3$ to a mixture of liquid NH_3 and H_2O containing < 10% of H_2O . A. R. P.

Manufacture of sodium dichromate. I. G. FARBERIND, A.-G. (B.P. 424,281, 18.8.33. Ger., 17.9.32).—Aq. Na_2CrO_4 containing 475 g. of CrO_3 per litre is treated with CO_2 at 60—80°/6—8 atm., and allowed to cool without releasing the pressure; in this way the conversion into $Na_2Cr_2O_7$ (I) is 90%. After removing the $NaHCO_3$ the filtrate is evaporated until it contains 800—820 g. of CrO_3 per litre and again treated with CO_2 as before to complete the conversion into (I). A. R. P.

Production of beryllium compounds from beryllium-bearing minerals. C. ADAMOLI (B.P. 423,543, 6.2.34).—Finely-divided beryl is intimately mixed with $NaHF_2$ equiv. to the BeO content and the mixture is sintered at 550—800° for 2—3 hr. The Na_2BeF_4 is extracted from the sinter with hot H_2O , and the solution treated with (a) $NaHCO_3$ to recover BeO , or (b) $(NH_4)_2SiF_6$ to ppt. Na_2SiF_6 and yield aq. $(NH_4)_2BeF_4$ from which $BeO \cdot BeF_2$ can be obtained by evaporation and heating. A. R. P.

Production of colloidal aluminium hydroxide. P. S. MOYER (B.P. 424,734, 22.3.34. U.S., 23.3.33).—Aq. $Al_2(SO_4)_3$ is treated with aq. $NaAlO_2$ and with a small amount of $Ca(OH)_2$ slurry to give pH 8, whereby a readily filterable $Al(OH)_3$ having a high absorptive power is obtained. A. R. P.

Production of aluminium hydroxide of low water content. M. TOSTERUD, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,953,201, 3.4.34. Appl., 3.9.26).— $\text{Al}(\text{OH})_3$ is heated at $> 120^\circ$ (170°) for 1 hr. in 12% aq. NaOH to produce a coarse-grained product, which is then heated similarly in 16% aq. NaOH to produce finely-divided $\text{AlO}(\text{OH})$. A. R. P.

Production of aluminium fluoride. BRIT. ALUMINUM CO., LTD., A. C. COATES, and G. B. BROOK (B.P. 423,601, 5.8.33).— Al_2O_3 is made into a cream with H_2O and HF added to give $\text{Al}_2\text{F}_6 \cdot 2\text{HF}$; the solution is neutralised with aq. NH_3 and a small excess added to ppt. $(\text{NH}_4)_2\text{Al}_2\text{F}_6$, which is collected, dried, and calcined at 700° to yield Al_2F_6 and NH_4F . Alternatively, hydrated Al_2F_6 is dried until it contains 10% H_2O and then mixed with conc. aq. NH_4F ; the ppt. is treated as above. A. R. P.

Preparation of copper compounds and fungicide mixtures obtained with such compounds. P. F. J. SOUVIRON, P. E. BIGOURDAN, and P. BEBIN (B.P. 425,395, 15.3.34. Fr., 15.3.33).—Cu scrap is immersed in a solution (S) containing a 15:1 mixture of CaCl_2 and NH_4Cl and air is blown through the liquid until the solution turns first blue and then colourless while a ppt. of $4\text{CuO} \cdot \text{CaCl}_2 \cdot 6-9\text{H}_2\text{O}$ (I) forms. Alternatively, the reaction between the Cu and the S may be completed in absence of air and the liquid removed from the Cu and aerated to produce (I). A. R. P.

Obtaining pure zinc oxide [from roasted blende etc.]. E. STERKERS and L. C. HUMBERT (B.P. 424,146, 9.2.34. Fr., 10.2.33).—The material is treated with CO at > 1 atm. in a retort at 1200° , whereby Zn practically free from Pb distils and is oxidised to ZnO in the usual way. A. R. P.

Fluorescent substances [for X-ray screens]. L. A. LEVY, D. W. WEST, and ILFORD, LTD. (B.P. 424,195, 11.7.33).—Very pure ZnS, with or without a small proportion of CdS, is mixed with 8–50 p.p.m. of Ag and with 0.3–2 p.p.m. of Ni in the form of sol. salts and the mixture is heated either alone or with NaCl at $1200-1300^\circ$. Fluorescent screens prepared from the product are free from after-phosphorescence phenomena. A. R. P.

Production of metallic carbonyls. A. H. STEVENS. From CATALYST RESEARCH CORP. (B.P. 423,907, 21.7.34).—Fe, Co, or Ni is deposited into an agitated Hg cathode by electrolysis of the sulphate solution, the amalgam is washed, dried without exposure to the air, and heated at 350° in vac. to remove the Hg, and the residual, highly reactive, very porous, sponge metal is treated with CO at $60^\circ/\leq 1$ atm. A. R. P.

Recovery of molybdenum [from spent catalysts]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 424,916, 30.12.33).—The Mo is extracted from the roasted material by heating with 20% H_2SO_4 and pptd. from the solution by saturation with H_2S under pressure. A. R. P.

Treatment of (A) metallic sulphides, (B) pyrites and like sulphur ores, to recover sulphur therefrom. (A) I. R. MCHAFFIE, and (A, B) D. TYRER, and IMPERIAL

CHEM. INDUSTRIES, LTD. (B.P. 425,364—5, 13.9.33).—(A) Molten FeS material, e.g., Cu-Fe matte, is blown with a mixture of air and SO_2 in a converter or rotary furnace into which SiO_2 is charged to flux the FeO formed, and a small amount of coke is added to assist in the reduction of SO_2 to S. The gases evolved are cooled by preheating the incoming gas and, after condensation of the S, the SO_2 is absorbed in a suitable material and utilised for further blowing operations. (B) Air and SO_2 are passed through a heated ($1200-1400^\circ$) mixture of FeS_2 , Fe_7S_8 , or FeS, with sufficient SiO_2 and fuel to prevent fusion of the charge; the gases are treated as in (A). A. R. P.

Recovery of sulphur and/or sulphuretted hydrogen, or mixtures of sulphuretted hydrogen, sulphur dioxide, and sulphur, from materials containing sulphur [e.g., pyrites or anhydrite]. METALLGES. A.-G. (B.P. 423,451, 29.9.33. Ger., 3.10. and 30.11.32).—Pyrites is passed through a rotary furnace divided into 3 zones: in the first, S is liberated by the hot gases from the later zones; in the second, combustible gas, e.g., water-gas, and a deficiency of air are admitted to heat the ore and liberate H_2S by the action of the steam formed by combustion; in the third, air and steam are introduced to roast the residue to Fe_2O_3 and liberate the rest of the S as SO_2 , which reacts with the H_2S to give S. Anhydrite is treated similarly except that it is mixed with finely-ground coal to reduce the CaSO_4 to CaS, which is then decomposed by the steam. A. R. P.

Recovery of phosphorus from gases. METALLGES. A.-G. (B.P. 423,262, 20.10.33. Ger., 25.10.32).—See U.S.P. 1,951,984; B., 1935, 452.

Laundering compositions.—See VI. **Fireproofing preps.**—See IX. **Recovering ore vals.** **Hydraulic CaO.** Se.—See X. **Electrolysis of brine.**—See XI. **Zn and Ti pigments.**—See XIII. **Fertilisers.** **Plant protectives.** **Prep. for eradicating weeds.**—See XVI.

VIII.—GLASS; CERAMICS.

Phenomenon of dissociation: accelerating the process of glass-melting. L. K. KOVALEV (Keram. i Steklo, 1934, 10, No. 10, 32–34).—To improve and accelerate glass-melting in tank furnaces, the $[\text{CO}_2]$ of the atm. over the batch is lowered by introducing air and other gases. Accelerators lower the amount of CO_2 evolved. CH. ABS. (p)

Karabugaz sulphate in glass-making. N. N. KHOLODININ (Keram. i Steklo, 1934, 10, No. 10, 4–6).—Use of metasilicates of Ca and Na in melting glass is discussed. CH. ABS. (p)

Introducing [sodium] sulphate into the batch in the mechanical production of Bohemian and bottle glass. A. A. TRUSSOV and S. V. RODIN (Keram. i Steklo, 1934, 10, No. 2, 12–16).—From 30 to 35% of Na_2SO_4 (I) ($\leq 96\%$ purity) may be added to the batch. The sulphate is reduced with charcoal or anthracite. The ratio Na_2CO_3 : (I) must be controlled to ensure homogeneity. CH. ABS. (p)

Glass from blast-furnace slag. L. SPRINGER (Keram. Rundsch., 1934, 42, 255–256; Chem. Zentr.,

1934, ii, 1829).—Satisfactory results were obtained in producing brown bottle glass from this source.

H. J. E.

Specification for sands for making colourless glass. ANON. (J. Soc. Glass Tech., 1935, 19, 26—32 P).—A provisional specification for best and ordinary colourless glasses is presented, and details are given of methods of sampling and physical and chemical testing.

J. A. S.

Influence of some batch constituents on the colour of glass. E. J. C. BOWMAKER (J. Soc. Glass Tech., 1935, 19, 40—42 P).—Substitution of 2% of BaO for an equiv. of CaO and addition of 30% of cullet each necessitated an increase in Se of 25—30% in order to maintain the decolorisation of a Na_2O -CaO- SiO_2 glass. Addition of borax in the ratio 40 lb./1000 lb. of sand caused a decrease of 25% in the Se requirement.

J. A. S.

Selenium decolorising [of soda-lime-silica glass]. E. J. GOODING and J. B. MURGATROYD (J. Soc. Glass Tech., 1935, 19, 43—97 P).—The literature is critically discussed. A comprehensive study was made of the effect of minor constituents of a Na_2O -CaO- SiO_2 glass on the decolorising action of Se. The behaviour of the glasses in sunlight was examined. The increasing blue-green colour of glasses melted at higher temp. is due to the reaction $6\text{Fe}_2\text{O}_3 \rightarrow 4\text{Fe}_3\text{O}_4 + \text{O}_2$, Fe_3O_4 being the coloured Fe^{II} - Fe^{III} compound. It is unlikely that a Fe^{III} silicate is present. The (pink-yellow-brown) colour of a Se glass is due to the varying concn. of the dispersed Se and is less intense in presence of oxidising agents, owing to the formation of colourless SeO_2 . At the same time, SeO_2 is less volatile than Se and oxidising agents may tend to increase the colour by decreasing the amount of Se volatilised. The blue-green colour of a glass containing Fe is reduced by the presence of Se, due to the reaction $2\text{Se (red)} + \text{Fe}_3\text{O}_4 \text{ (blue)} \rightarrow 2\text{FeSe (yellow-brown)} + 2\text{Fe}_2\text{O}_3 + \text{O}_2$. The action of As in reducing the blue-green colour of a glass containing Fe + Se is due to the reaction $\text{Fe}_3\text{O}_4 \text{ (blue)} + \text{As}_2\text{O}_3 \rightarrow \text{FeAs}_2\text{O}_4 \text{ (colourless)} + \text{Fe}_2\text{O}_3 \text{ (red-brown)}$. The action of sunlight on decolorised glasses is explained by the removal of an electron thus: $\text{FeAs}_2\text{O}_4 \text{ (colourless)} \rightarrow \text{Fe}^{++} \text{ (brown)} + \text{As}_2\text{O}_4^- + \ominus$. As reduces the Se colour of a glass above 700° , but the colour is intensified below this temp., probably due to the formation of a complex containing As and Se.

J. A. S.

Analysis of glass by treatment of thin films in the autoclave. I. Determination of soda. A. R. WOOD (J. Soc. Glass Tech., 1935, 19, 22—34 P).—Glasses containing 9—22% of Na_2O were blown into thin films (1 μ), treated with various solutions at pressures up to 300 lb./sq. in. (217°), and the extracted Na_2O was titrated with 0.02N- H_2SO_4 (Me-orange). It was possible to determine, within 0.2%, the Na_2O content of a commercial window glass by treating 0.08 g. of glass in 50 ml. of H_2O for 1 hr. Quick filtration of the solution is essential, to prevent hydrolysis of the silicates. After extraction of the Na_2O , the film retained much of its original structure.

J. A. S.

Use of the pipette method in the fineness test of moulding sand. C. E. JACKSON and C. M. SAEGER,

JUN. (J. Res. Nat. Bur. Stand., 1935, 14, 59—65).—50 g. of moulding sand are dispersed by stirring for 5 min. in 475 c.c. of distilled H_2O , 25 c.c. of 1% aq. NaOH are added, and the whole is transferred to a cylinder and made up to 1 litre. It is then agitated for 1 min. and set upright. After a definite period (e.g., 5 min.) a pipette is introduced to a definite depth (5 in.) in the liquid, and a sample withdrawn and evaporated to dryness. The amount of residue, corr. for the NaOH present, indicates the amount of clay substance (material $< 20 \mu$). Sieving tests give the proportions of material $> 50 \mu$, and the amount of pan material or silt (20 — 50μ) is calc. by difference.

J. W. S.

Effects of microbiological activity during the ageing of some moist ceramic materials. D. P. GLICK (J. Bact., 1935, 29, 79—80).—The improved workability of clays during ageing was much more rapid in unsterilised than in sterile substances and was greater at 28° than at 5° . The increased transverse strength resulting from additions of tannic acid was markedly reduced by bacterial activity.

A. G. P.

Action of carbon monoxide on fireclay. P. P. BUDNIKOV and D. NIRENSHTEIN (Stal, 1934, 4, No. 7, 48—52).—At 400 — 500° FeO in fireclay brick catalyses the reaction $2\text{CO} \rightarrow \text{CO}_2 + \text{C}$. Disintegration (I) of the brick follows deposition of C. The reaction does not occur at higher temp. Addition of small amounts of CuSO_4 hinders (I).

CH. ABS. (p)

Impact strength tester [for quartz etc.].—See I. **Fuel oil for glass works.**—See II. **Analysis of aluminosilicates.**—See VII.

PATENTS.

Preparation of fused glass-ceramic joints. PORZELLANFABR. KAHLA (B.P. 424,442, 23.11.33. Ger., 23.11.32 and 31.7.33).—The glass used has a coeff. of expansion 10 — 30% $<$ that of the porcelain or other ceramic material.

A. R. P.

Refractory glasses. GEN. ELECTRIC CO., LTD., G. F. ADAMS, R. W. DOUGLAS, and J. H. PARTRIDGE (B.P. 426,129, 28.8.33).—A glass with good working properties, not attacking the refractory in which it is founded, and having softening point $< 800^\circ$, sp. resistance < 2 megohms/c.c. at 600° , and coeff. of expansion 4.4 — 5.0×10^{-6} , contains $\text{SiO}_2 > 60$, Na_2O , K_2O , etc. > 2.5 , $\text{CaO} > 12$, $> 15\%$, and $\text{Al}_2\text{O}_3 > 15\%$, the remainder preferably consisting of MgO , BaO , B_2O_3 , ZnO , or P_2O_5 etc.

J. A. S.

Melting glass or quartz.—See XI.

IX.—BUILDING MATERIALS.

Iron cement. I. S. NAGAI, I. YOSHIDA, and K. MATSUOKA (J. Soc. Chem. Ind., Japan, 1935, 38, 47—49 B; cf. B., 1930, 1030).—Two samples of slag from Cu refineries contained, respectively, Fe_2O_3 47, CaO 5.6% and Fe_2O_3 29, CaO 21%. Either can be mixed with ganister and limestone to give a suitable mix for Fe cement. A mix composed of Fe_2O_3 6.5, CaO 43, SiO_2 14% requires heating at 1400 — 1500° to give a product satisfactorily low in free CaO. Addition of 0.5—1.0% of CaF_2 lowers the necessary temp. by 50 — 100° .

C. I.

Ore cement or iron cement. II. S. NAGAI, K. MATSUOKA, and I. YOSHIDA (J. Soc. Chem. Ind., Japan, 1935, 38, 96—97 B; cf. preceding abstract).—The clinkering behaviour of mixtures containing $\geq 9\%$ of Fe_2O_3 was studied. The amount of uncombined CaO was reduced in some cases from 6.0 to 0.2% by adding 0.5—1% of CaF_2 . J. A. S.

Clay of Portland cement. XX. Iron oxide of high-alumina Portland cement. XXII—XXIII. Iron oxide in high-silica Portland cement. Y. SANADA (J. Soc. Chem. Ind., Japan, 1935, 38, 99—101 B, 101—103 B, 103—105 B; cf. B., 1935, 357).—XXI. Full physical tests are reported for fresh cement (strength and setting time increased as the Fe_2O_3 modulus decreased) and cement exposed to the air for 15—20 days. Formulae are given for a normal high-strength and a rapid-hardening cement.

XXII. Various types of clinker were calcined in a small oil-fired rotary furnace. With an Fe_2O_3 modulus of 1.50, an increase of hydraulic modulus (2.00—2.09) decreased the output and increased the fuel consumption. With a hydraulic modulus of 2.14, an increase of Fe_2O_3 modulus (1.17—1.83) increased the output and decreased the fuel consumption. Fe_2O_3 was found in celite.

XXIII. Physical data similar to those given in Part XXI are recorded. J. A. S.

Is the hardening of cement mortars a chemical or an electrostatic phenomenon? W. MACHU (Petroleum, 1935, 31, No. 14, 17—20).—Before hardening, cement pastes are not in electrical equilibrium and the attainment of the isoelectric state corresponds also with the attainment of setting. T. W. P.

Effect of water and aqueous solutions on the hydration and heat effect during the setting of ground cement clinker. H. E. SCHWIETE (Veröff. Kaiser-Wilh. Inst. Silikatforsch., 1934, 6, 153—191; Chem. Zentr., 1934, ii, 1830—1831).—In cements containing CaSO_4 the max. solubility of CaO is reached after a longer time than when CaSO_4 is absent. Retardation in setting is also due to this retarded dissolution of CaO. The reaction of Portland cement (I) with H_2O occurs in two stages: the first, which is hindered by CaSO_4 , normally occurs rapidly; the second sets in in approx. 4 hr. Other salts (e.g., NaCl , BaCl_2) have a similar action to CaSO_4 . Reaction with H_2O is accelerated by 0.1N-NaOH. Measurements of the heat effect (II) on mixing (I) with H_2O are recorded. These also show the process to occur in two stages. The effect of electrolytes on (II) was studied. H. J. E.

Opacity factor in specific surface determinations [on cements]. H. R. BRANDENBURG (Rock Products, 1935, 38, No. 4, 42—45).—The opacity factor (I) in using the Klein turbidimeter varies with cements having the same chemical composition but subjected to different heat-treatments. For the optimum burning conditions, (I) is a max. Air-cooled clinker gave a higher (I) and better physical properties than chilled clinker. T. W. P.

Standardisation of ammonium acetate solution for free lime determination. E. TAYLOR (Rock Products, 1934, 37, No. 10, 47).—Addition of powdered

clinker containing no free CaO to the flask containing the CaO for standardisation improves the ease and accuracy of the titration. CH. ABS. (e)

Fillers in road-making. F. J. NELLENSTEYN (Verfkroniek, 1935, 8, 96—97).—A discussion of the function of fillers in asphaltic compositions for roads. D. R. D.

Determination of the particle size of fillers. R. HOUWINK (Verfkroniek, 1935, 8, 96).—A review. D. R. D.

Wood preservation. W. G. CAMPBELL (Forestry, 1932, 6, 82—89).—Discussion. CH. ABS. (p)

Fibre saturation point of wood. W. W. BARKAS (Nature, 1935, 135, 545).—Methods for determining this val., i.e., the min. moisture content of the wood in equilibrium with a saturated atm., are discussed and the behaviour of Sitka spruce is described. L. S. T.

Primers for wood.—See XIII.

PATENTS.

Manufacture of diatomaceous earth products. A. F. ECHBERG (B.P. 424,110, 2.5.34. Can., 3.5.33).—Claim is made for bricks etc. made from a mixture of kieselguhr (90—85) and a 90—95:10—5 mixture of crushed slag and limestone (10—15%) bonded with 5% of NaCl and 2.5% of glucose in aq. solution. The pressed bricks are subjected to steam at 100 lb./sq. in. for 8 hr., then dried at 42—60° in a current of warm air. A. R. P.

Compositions for use as insulation for heat and sound. J. E. AUBANEL and G. H. ALABASTER (B.P. 426,067, 17.11.33).—A plaster or like composition is formed of waste material from the manufacture of paper, e.g., CaO-sludge grouts, and a substance to evolve gas when the composition is placed in position, e.g., Al powder, with optional additions of infusorial earth, asbestos, Na silicate, MgSO_4 , and/or bleaching agents. B. M. V.

Heat- and sound-insulation. N.V. INTERNAT. ALFOL-MAATSCHAPPIJ and W. G. MÜLLER (B.P. 425,756, 11.1.35).—A laminated construction of inorg. fibre coated with silicate solution and flat or crumpled metallic foil is claimed. B. M. V.

Production of road-covering materials. MASCHINENFABR. KOMNICK G.M.B.H. (B.P. 426,162, 4.6.34. Ger., 31.7.33).—Moulded blocks (B) of CaO and sand with initial compression strengths of 10—50 kg./sq. cm. are impregnated with liquid bitumen. The granular material is selected to give B a porosity of 10—15% before impregnation. Steam-strengthening treatments may be introduced. T. W. P.

Antiseptic fireproofing preparations [for wood etc.]. SOC. ITAL. RUEPING PER L'INIEZIONE DEL LEGNAME (B.P. 425,945, 21.6.34. Ital., 10.10.33).—Wood, fabrics, paper, etc. are treated with a metallic (or metal NH_4) phosphate, with the addition of a borate or chloride in H_2O or aq. NH_3 solution. T. W. P.

Wood-fibre product.—See V. **Blast-roasting fine materials.** **Portland cement.**—See X.

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

Freezing of iron ores and methods for its prevention. D. A. BRAUN (Domez, 1934, No. 9, 1—15).—Freezing (F) will not occur with $<$ a min. H_2O content (4—8% for Krivorog ore). F during transport is prevented by mixing with cement or NaCl. CH. ABS. (e)

Direct reduction of Krivorog fine ore. Z. I. NEKRASOV and K. N. SHEPILIT (Domez, 1934, No. 9, 16—28).—The ores used had (a) Si 3.8, FeO 1.1, Fe_2O_3 94.67, P 0.015%, and S trace; (b) Si 18.96, FeO 0.46, Fe_2O_3 78.31, P 0.063%, and S trace. Optimum conditions were: temp. 980—1000°, low rate of current of gases (neutral or reducing), a mixture of 1 pt. of ore with 0.27—0.4 pt. of coal (ore 6—8- and coal 12—15-mesh). Methods of cooling the hot sponge-Fe to prevent reoxidation were studied. CH. ABS. (e)

Perrin process of steelmaking. W. P. PUGH (Iron and Steel Ind., 1935, 8, 275—279).—This process aims at rapid dephosphorisation (A) and deoxidation (B) of molten steel. A is effected by pouring the steel into a bath of molten slag consisting of CaO 60—65, FeO 30, and SiO_2 \geq 10%, with additions of fluorspar to increase fluidity. B is effected in a similar manner, but the composition of the slag is SiO_2 70, Na_2O 25, and CaO 5%. Intimate mixing of slag and metal is necessary if the reactions are to take place quickly. The steel is deoxidised by actual removal of FeO, and the resulting product is free from oxide inclusions. W. P. R.

Behaviour of fluorspar in open-hearth slags. E. DIEPSCHLAG and E. BRENNER (Feuerungstechn., 1934, 22, 65—70; Chem. Zentr., 1934, ii, 1677).—CaO and SiO_2 form, respectively, CaF_2 and SiF_4 . Some F is lost as HF formed by H_2O in the furnace gas. The removal of S increases with increasing basicity of the slag and addition of fluorspar (I). The lowering of the softening temp. in acid slags is due, not to the F of (I), but to the CaO added with (I). In such slags (e.g., with 68% SiO_2) the fluxing action can be obtained by adding CaO. H. J. E.

Solubility of sulphur in blast-furnace slags as a function of composition and temperature of the latter. N. V. RULLA and B. A. HESS (Domez, 1934, No. 8, 23—34).—Formation of a slag rich in CaO favours a high S content. The solubility (I) of S in slag decreases with increasing [MgO] from 4 to 6.8%, and then increases. Al_2O_3 does not act as a desulphuriser. The lowest (I) of S was found in slags with Al_2O_3 9.7—10.5, MgO 5—7%. Other data on the effect of [CaO], [MgO], and [Al_2O_3] are recorded. Increase in [MnO] up to 3.2—3.5% increases, but further additions decrease, the (I) of S. CH. ABS. (e)

Decarburisation of white cast iron. I. I. NAITO (Tetsu-to-Hagane, 1933, 19, No. 12).—The mechanism of decarburisation of the cast Fe has been studied. The action of CO— CO_2 may be explained by the equilibrium of the system Fe—C—O. CH. ABS. (e)

Corrosion of iron dykes in river- and sea-water. C. HOLTHAUS (Arch. Eisenhüttenw., 1934—5, 8, 379—388).—Examination of Fe dykes which have been in sea- and river- H_2O for $>$ 20 years has shown that most

severe corrosion takes place at the H_2O -line; relatively little corrosion has occurred in the parts completely immersed in H_2O , and still less in the parts completely above H_2O -level. In the case of Fe breakwaters there is a line of severe corrosion at the sand level; this is accentuated by erosion due to the movement of the sand. Examples of these two types of corrosion are discussed. A. R. P.

Effect of arsenic on corrosion of iron by sulphuric acid. O. P. WATTS (Trans. Electrochem. Soc., 1935, 67, 193—200).—0.5 g. of As_2O_3 per litre in 0.5N- H_2SO_4 reduces the rate of corrosion of pure Fe to 5—10% of its normal val. It has no effect on corrosion of Cu and increases that of Cd and Zn. As as a couple with Fe has no protective effect. As in solution under the above conditions protects cast Fe. Sb in the electrolyte has no effect. The above refers to short-time experiments, or to those in which air is excluded. Long-period tests in presence of air, in which corrosion is by O depolarisation, show no beneficial effect of As either in solution or as a couple. Hg dissolved in the electrolyte in absence of air has also some protective effect, as also has Sn. It is probable that these metals form a film on the Fe surface which, though not impervious, prevents H_2 liberation, but allows the slower process of O depolarisation to continue. C. I.

Structure of welds in malleable iron and grey iron. N. N. A. AFANASIEV and F. E. SOROKIVSKI (Vestn. Metalloprom., 1934, 14, 98—102).—In welding malleable Fe (I) the amorphous C dissolves at $>$ 800°, giving a layer of metal with the structure of white Fe (II). For grey Fe the graphite dissolves in the mass of metal only at or near the m.p. and (II) forms only near the weld. Subsequent rapid cooling hardens the intermediate zone as well as the weld, rendering the metal brittle. Cooling conditions are more important than for (I). CH. ABS. (e)

Pickling of iron with mineral acids in presence of regulators. L. V. STEPANOV and A. A. TIMOKHIN (Vestn. Metalloprom., 1934, 14, No. 1, 102—111; No. 2, 61—75).—In pickling the polar mols. of the regulator are adsorbed on the metal surface and protect it from attack by the acid. They are not adsorbed on the oxide. The loss of metal by pickling is reduced from 3—4% to 1—1.5% by addition of a regulator. CH. ABS. (e)

Cyaniding of iron for separators. V. V. TSCHERNUISHEV and I. P. SELISKI (Vestn. Metalloprom., 1934, 14, No. 1, 118—119; Chim. et Ind., 1934, 32, 586).—Increasing the [CN $^-$] above 30% increases the depth of the cyanided layer only slightly, decreases the resistance of the bath to exhaustion, and increases the hardness of the Fe. When the articles to be cyanided are introduced cold into the bath there is first a nitridation. By quenching in H_2O from 820° a "nitrided" tetragonal martensite is formed, which has the max. hardness. Cementation occurs only superficially (optimum cementation temp. 840—850°). CH. ABS. (e)

Deoxidation of steel. E. GREGORY (Iron and Steel Ind., 1935, 8, 279—281).—Deoxidation of molten steel should be accomplished in such a manner that the products of the reaction are formed in the proportions to yield low-m.p. compounds. W. P. R.

The P-F characteristic of steel. B. F. SHEPHERD (Trans. Amer. Soc. Metals, 1934, 22, 979–1002).—The P-F characteristic is defined as the relationship between the depth of hardening after quenching and the notched-bar fractures. It is proposed to use this relationship as a control of the manufacturing processes of C steels. W. P. R.

Influence of composition of carbon-steel castings on their mechanical properties. J. A. NEKHENDZI and A. I. VOLKOV (Metallurg, 1934, 9, No. 5, 17–33).—A formula is given for the relation between % composition and tensile strength. CH. ABS. (e)

Conditions of formation of Widmanstätten structure in plain carbon steels. P. JALOVOI (Stal, 1934, 4, No. 6, 53–61; No. 7, 53–62).—Steels with < 0.6% C tend to form Widmanstätten structure (*W*); those with > 0.6% C do not. The temp. of pouring, rate of cooling, and size of the ingot have no effect on its formation. *W* is destroyed by normalising, but on subsequent overheating or quick cooling secondary *W* may form. CH. ABS. (e)

Defects in chromium automotive steels and their elimination. P. UMRICHIN (Stal, 1934, 4, No. 6, 1–10; No. 7, 19–25).—Hair lines and cracks which appear after rolling and forging in the Krasnui Putilovetz plant are due to insufficient deoxidation, addition of Fe-Cr before deoxidation, high [MgO] in the slag, addition of insufficient CaCO₃ during the oxidation period, and lack of temp. control. CH. ABS. (e)

M.p. of some chromium-iron resistance alloys. A. SCHULZE (Z. Metallk., 1935, 27, 45–46).—The recently introduced Fe-Cr alloys, megapyr, kanthal, permatherm, and alsichrom, all melt within the range 1495–1505°. A. R. P.

Spectrographic examination of flocks in chromium-nickel steels. H. ESSER, W. EILENDER, and A. BUNGEROTH (Arch. Eisenhüttenw., 1934–5, 8, 419–423).—X-Ray and spectrographic examination of the white spots or "flocks" (*F*) which appear in Cr-Ni steels after heat-treatment has shown that they have a thin surface film (*I*) in which Cr, Ni, and Mn are enriched. Since H₂ is evolved when the (*I*) is subjected to X-rays or sparked it is concluded that the alloy elements in it are combined with H and that the formation of *F* is to be attributed either to an embrittlement of the ground-mass by the pptn. of hydrides, or to the decomp. of pptd. hydrides into the free metals with the liberation of H₂, which produces internal pressure and, in combination with the embrittling effect of the undecomposed hydrides, causes fractures to develop having the silvery-white appearance of *F*. A. R. P.

Determination of chromium and nickel in ferrous alloys containing manganese and more than 1% of carbon. T. CICHOCKI (Przemysł Chem., 1935, 19, 1–2).—0.1–0.5 g. of alloy is heated for 20 min. with 30 c.c. of HClO₄ (*d* 1.12), 40 c.c. of H₂O are added to the orange-red solution, containing CrO₃, and it is titrated with standard aq. Mohr's salt (NHPh₂ indicator); the mean error is 0.01–0.03%. Ni is determined in a similarly prepared solution by Tschugaev's method. Si, if present, is pptd. in a readily filterable form from the solution. R. T.

Production of bridge steel containing a moderate amount of manganese. P. A. KUDRYATZEV and L. M. SINAISKI (Domez, 1934, No. 8, 38–43).—A steel with C 0.25–0.35, Mn 1.4–1.8, Si 0.15–0.25, P < 0.05, and S < 0.05% had satisfactory properties. The ingots were rolled at a finishing temp. of 825–875°. CH. ABS. (e)

Determination of ferrous and manganous oxides in steel by means of mercuric chloride. E. MAURER, P. KLINGER, and H. FÜCKE (Arch. Eisenhüttenw., 1934–5, 8, 391–398).—Steel turnings can be dissolved readily in aq. HgCl₂ in an atm. of CO₂ or N₂, leaving a residue of MnO and FeO, provided that the S, P, and N are < 0.05% in each case and the Cr is < 0.4%; analysis of the residue for Fe and Mn gives satisfactory results for the oxide content of the metal. A. R. P.

Comparison of high-speed steels made in a coreless induction furnace and an arc furnace. E. HOUDREMONT, H. KALLEN, and K. GEBHARD (Stahl u. Eisen, 1935, 55, 228–234).—Steels containing W 19, Cr 4.5, V 1.0, and C 0.7% made in a high-frequency (*I*) and an arc furnace (*A*) are compared in regard to hardness (*H*) at room and elevated temp., condition and distribution of carbides, and cutting properties. Although the carbides are finer and more uniformly distributed in the *I* steels, other properties are similar. *H* at 550–600° are almost identical, but at 650° the *I* steels are softer than the *A* steels, probably owing to the greater ease with which the fine carbide particles are dissolved in the α -solid-solution matrix. W. P. R.

(A) **Leaching copper ores: oxidation of iron solutions used as a solvent.** E. K. PRYOR, J. D. SULLIVAN, and G. L. OLDRIGHT. (B) **Dissolution of various copper minerals.** S. L. BROWN and J. D. SULLIVAN. (C) **Hydrometallurgy of copper sulphide ores and its relation to mineral structure.** W. A. SLOAN and C. W. DAVIS (Bur. Mines, Rept. Invest., 1934, No. 3228, 23–31, 37–51, 53–56).—(A) Oxidation of Fe^{II} solutions when trickled over granular material in contact with air was inappreciable in the time used for confined leaching. Better results were obtained with a counter-stream of SO₂ and air.

(B) Data are given for the rate of dissolution of chrysocolla, diopside, enargite, tennantite, tetrahydrite, chalcophyrite, and Cu in H₂SO₄, Fe₂(SO₄)₃, and their mixtures. The oxidised minerals dissolve most readily and the complex sulphides slowly.

(C) Data are recorded for the increase in solubility of various Cu ores on treatment with salt solutions, Cl₂, MnO₂ + HCl, mixtures of H₂SO₄ and oxidising agents, ICl + aq. H₂SO₄, and S₂Cl₂. CH. ABS. (e)

Endurance limit of cold-drawn copper and pure aluminium wires under vibrational stresses. W. SCHWINNING and E. DOGERLOH (Z. Metallk., 1935, 27, 33–37).—The change in tensile properties, electrical conductivity (*C*), and endurance limit (*L*) (Wöhler test) with the % reduction (*R*) during drawing are shown in tables and graphs for Cu and Al. The graphs consist of several sections all of which are straight lines differently inclined to the *R* axis; for Cu the changes in inclination occur at about 41, 82, 93, and 97% *R* and for Al at 62, 88, 96, and 98% *R*. The ratio *L*/*S* (*S* = tensile strength)

is 0.38 for 99.5% Al and 0.22 for Cu irrespective of R ; with increasing R the C of Al rises slightly, whereas that of Cu decreases up to $R = 82\%$, then increases up to $R = 93\%$. Hard-drawn Cu or Al wires for free transmission lines should be annealed at 100° for 2 hr. to remove internal stress due to work-hardening, since this tends to reduce L . A. R. P.

Use of scrap copper, bronze, and brass in the foundry. E. R. THEWS (Z. ges. Giessereipraxis, 1934, 55, 245—247; Chem. Zentr., 1934, ii, 1679).—A discussion. H. J. E.

Age-hardening of brass. K. TAMARU (Bull. Inst. Phys. Chem. Res., Japan, 1935, 14, 139—145).—Brass containing 59.11% of Cu was quenched from 870° , aged at different temp. in a vac., and studied by measuring hardness (h) and electrical resistance (r), and by thermal analysis. There is no induction period with h and r ; r for the quenched is $>$ for the annealed state, in disagreement with Hansen (B., 1933, 716). During ageing, a small absorption of heat occurs at 130° and 460° , a small evolution at 260° , and a larger one at 310° . These are due, respectively, to at. rearrangement, transformation $\beta' \rightarrow \beta$, separation of α from β , and transformation $\beta \rightarrow \beta'$. R. S. B.

Corrosion-resistance of bronzes. O. DAHL (Ber. Korros.-Tag., 1934, 1933, 23—35; Chem. Zentr., 1934, ii, 1838).—Corrosion-resisting properties of Sn- and Al-bronzes and of Ni-Cu, Si-Cu, and Be-Cu alloys are described and compared with those of Cu. H. J. E.

Annealing of copper alloys. R. S. PRATT (Met. and Alloys, 1935, 6, 1—10).—To determine the degree of annealing, tensile strength (S), elongation (E), and grain size (G) are determined. High-brass wire softens and recrystallises between 250 — 300° , but the highest E and lowest S are obtained at 750° . G and rate of increase of G increase with temp. Increased amount of cold-work lowers recrystallising temp. (R), but the largest G is obtained by small amounts of cold-work. Annealing below 250° increases S . Fe is effective in retarding grain growth. In duplex Cu alloys, e.g., α - β -brass, G does not bear so close a relation to the hardness as in the α -solid-solution alloys. Max. ductility in α - β -alloys is obtained at temp. sufficiently low to stop development of β , provided sufficient time is allowed for the absorption of excess β . The presence of Ni in Cu-Zn alloys raises R , and replacement of Zn by Sn lowers R . Pack- and bright-annealing in reducing atm. is recommended for Cu alloys with high Ni content. W. P. R.

Action of hydrogen sulphide on copper-lead-sulphur alloys. W. GUERTLER and G. LANDAU (Metall u. Erz, 1934, 31, 269—272; Chem. Zentr., 1934, ii, 1837—1838; cf. A., 1934, 965).— H_2S diffuses through the upper sulphide layer and reacts with Cu at the surface of the lower Cu_2S -Cu-Pb layer, the Cu_2S rising and Pb sinking. Below 942° Pb protects Cu which has crystallised from attack by H_2S . At $> 942^\circ$ the reaction with H_2S proceeds to completion. H. J. E.

Treatment of low-grade gold ores. I. N. PLAKSIN and N. A. SUVOROVSKAJA (Sovet. Zolotoprom., 1934, No. 3—4, 34—39).—The ore (6 g. of Au and 8.5 g. of Ag per ton) was ground, and agitated for 36 hr. with

0.2—0.3% cyanide (I) solution, using a liquid:solid ratio of 3. Aeration of the ore in an alkaline medium lowered the (I) consumption by 64%. CH. ABS. (e)

Comparison between the methods of pan-washing and chemical analysis for gold determination. V. S. DOMAREV (Sovet. Zolotoprom., 1934, No. 3—4, 14—18).—Comparison gave variable results. CH. ABS. (e)

Gold recovery by mercury on dredges. A. P. SVIRIDOV (Sovet. Zolotoprom., 1933, No. 1—2, 32—41).—A historical review. CH. ABS. (e)

Cyanidation. I. G. BARSKY, S. J. SWAINSON, and N. HEDLEY (Amer. Cyanamid Co., Tech. Paper No. 21, 1933, 8 pp.).—The max. rate of dissolution of Au is with 0.05% NaCN solution. The rate \propto the amount of dissolved O_2 . Thorough aeration is important. CH. ABS. (e)

Improving the precipitation [of gold and silver] on zinc shavings. J. B. KASEY (Mining J., Ariz., 1934, 18, No. 14, 5, 26).—The amount of shavings required for pptn. is reduced by removing the ZnO film by treating for 5 min. with cold aq. NaOH and NaCN. Refinements in pptn. equipment are described. CH. ABS. (e)

Preparation and physico-chemical properties of silver, tin, and zinc amalgams. K. DUCZKO (Przemysł Chem., 1935, 19, 10—13).—Hardness, d , conductivity, potential, and microstructure data are recorded for the amalgams. The physical consts. of Ag amalgams (I) vary according to the method of prep.; in all cases the (I) consist of 2 solid phases, of which one is AgHg. Sn amalgams contain Sn_2Hg or Sn_6Hg . Zn amalgams consist of a series of mixtures without compound formation. R. T.

Properties of platinum metals. I. Strength and annealing characteristics of platinum, palladium, and several of their commercial alloys. E. M. WISE and J. T. EASH (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1934, Tech. Publ. 584, 12 pp.).—Data are recorded for the mechanical properties of cold-drawn Pt, Pt annealed at 1100° , an alloy of Pt with 20% Ir, cold-drawn Pd, Pd annealed at 800° , and Pd hardened by 4% of Ru and 1% of Rh. CH. ABS. (e)

Smelting in the lead blast furnace—handling zinciferous charges. G. L. OLDRIGHT and V. MILLER (Bur. Mines Rept. Invest., 1934, No. 3242, 11 pp.).—Operating conditions at Trail are described and discussed. The Pb content of slags rich in metallic Pb may be reduced by adding SiO_2 . The Pb content of the slag increases as the furnace smelts faster. CH. ABS. (e)

Age-hardening of lead alloys. H. HARIBA (Sum.-Densen Iho, 1934, 1, No. 2, 49—57).—Age-hardening (I) of Pb-Ca alloys is a max. at 0.1% Ca. There is a small vol. contraction with (I). In Pb containing Sb expansion is shown. CH. ABS. (e)

Tensile tests on antimonial lead tubes. H. SIEGLERSCHMIDT and G. FIEK (Z. Metallk., 1935, 27, 38—40).—The yield point (Y) and tensile strength (S) of Pb tubes increase with increase of Sb content up to 0.8%, when they are about twice those of pure Pb. Further addition of Sb up to 1.4% has no effect on S , but decreases Y by $> 20\%$. The elongation of the

0.8% Sb alloy is about 65% of that of pure Pb. The rate of loading in the tensile test has little effect on the results so long as the total time taken in the test is 2.5–10 min.

A. R. P.

Investigating the performance of bearing metals. J. R. CONNELLY (Trans. Amer. Soc. Mech. Eng., 1935, 57, 35–39).—In a bath of lubricant a steel cylinder is rotated on the plane surface of a machined specimen of bearing metal (*B*). By using a standard *B* the wear-reducing properties of lubricants can be determined, and by using one lubricant the effect of composition and grain size of a *B* can be investigated.

W. P. R.

Volumetric determination of lead in alloys containing tin, antimony, and copper. N. A. TANANAEV (Z. anal. Chem., 1935, 100, 394–396).—The alloy is dissolved in H_2SO_4 and the liquor diluted with hot H_2O and digested on a H_2O -bath. $PbSO_4$ is filtered off and washed with saturated aq. $PbSO_4$ until free from acid. The ppt. is boiled with 0.1*N*- Na_2CO_3 , forming $PbCO_3$, and the excess Na_2CO_3 titrated back. The error is between –0.7 and +0.28%.

J. S. A.

Vanadium in industry. F. RAVIER (Chim. et Ind., 1935, 33, 817–822).—A review.

Ductile tungsten. S. L. HOYT (Met. and Alloys, 1935, 6, 11–18).—A historical review of the development of processes for the production of ductile W wire etc.

W. P. R.

Practice of flotation. G. B. O'MALLEY (J. Soc. Chem. Ind. Victoria, 1933, 33, 812–834).—A review.

Recovery of bromoform [in heavy-mineral separation]. (A) S. BRACEWELL, (B) F. SMITHSON (Geol. Mag., [A] 1933, 70, 192, [B] 1934, 71, 240; Chem. Zentr., [A, B] 1934, ii, 1812).—(A) The sandy material used in separating the minerals is washed with MeOH, the solution mixed with H_2O , and the $CHBr_3$ (I) which separates is dried.

(B) 85% of the (I) may be washed from the sand with H_2O , separated, and dried with $CaCl_2$.

H. J. E.

Hardness testing machine for metals. R. GUILLET (Rev. Mét., 1935, 32, 49–53).—With the machine described hardness is determined by the difference in penetration of the same steel ball under two different loads. For very hard metals a sintered carbide material is used for the ball.

W. P. R.

Modulus of elasticity [of metals]. L. GUILLET (Rev. Mét., 1935, 32, 61–67).—Several equations relating the modulus of elasticity (*E*) of metals to other physical properties have been proposed; the most satisfactory is: $E = KT/V^2$, where *T* = the m.p. and *V* the at. vol.

W. P. R.

Corrosion of metals. M. T. GLAYMAN (Sci. et Ind., 1935, 18, 48–50).—The mechanism of corrosion is explained by the electrolytic theory; apparent anomalies are caused by a change of p_H in the electrolyte, brought about by the reaction of the corrosion products with salts present in the corroding medium.

W. P. R.

Influence of grain size on high-temperature characteristics of ferrous and non-ferrous alloys. A. E. WHITE and C. L. CLARK (Trans. Amer. Soc. Metals, 1935, 22, 1069–1088).—The influence of grain size of

ferrous alloys with Mo 0.5 and with Mo 0.25 + Mn 1.25%, and of Cu–Zn–Sn alloys has been determined by means of Charpy impact tests up to 650°, and creep tests up to 650° for ferrous and 300° for non-ferrous alloys. At temp. < the lowest recrystallising temp. fine-grained material has a greater creep strength, but at higher temp. the reverse is the case. Elongation is greater in the coarse-grained alloys, especially at the lower temp.

W. P. R.

Theory and use of the metallurgical polarisation microscope. R. W. DAYTON (Rensselaer Polyt. Inst. Bull., 1935, 50, 1–32).—The detection of anisotropy, the identification of inclusions, and possible improvements in the instrument are discussed.

C. W. G.

Reflecting properties of aluminium and its alloys as dependent on surface treatment. HASE (Aluminium, 1934, 17, 20–25).—Reflection data are recorded and discussed.

CH. ABS. (e)

Effect of increase of purity on properties and workability of aluminium. H. RÖHRIG (Aluminium, 1934, 17, 79–84).—The tendency for the formation of coarse crystals during solidification increases greatly with purity. Fe reduces grain size and increases hardness more than does Si. To avoid coarse structure traces of Ti are added. Tensile strength and hardness decrease and plastic properties increase with increasing purity. High electrical conductivity requires high purity. Si, which is harmful, may be pptd. as CaSi by addition of Ca. The chemical resistance is increased by very finely-distributed Fe and Si grains.

CH. ABS. (e)

Welding of aluminium vessels for transport and storage of nitric acid. G. ECKERT (Aluminium, 1934, 17, 84–88).—Only autogenously welded vessels should be used. The seams (*S*) must be well annealed and may be slightly hammered afterwards. *S* must not be left in the welded condition or roughly hammered.

CH. ABS. (e)

Colouring of aluminium. K. VOLLRATH and G. LAHR (Aluminium, 1934, 17, 91–92).—Org. colouring materials capable of compound formation with Al (e.g., morin and alizarin) are described. Tints from golden-yellow to red-bronze are obtained.

CH. ABS. (e)

Simple means of distinguishing different aluminium qualities. A. VON ZEERLEDER (Aluminium, 1934, 17, 88–90).—To distinguish between pure Al, Cu-free Al alloys, and those containing Cu the tests recommended are: (1) to use a scratch needle of Al wire (Brinell hardness 70–80), whereby Al is scratched but its alloys are not; (2) to put a few drops of 20% NaOH on the bright surface for 10 min. Alloys containing Cu show a blackening of the spot; Cu-free alloys remain white or become slightly grey or brown.

CH. ABS. (e)

Electrical resistance of heat-treated aluminium alloys containing a small quantity of iron. S. KISHINO (J. Chem. Soc. Japan, 1934, 55, 1139–1142).—The resistance was unaltered by various heat-treatments, suggesting that Fe is insol. in Al.

CH. ABS. (e)

Silumin-gamma. J. DORNAUF (Aluminium, 1934, 17, 26–31).—Silumin- γ (an Al–Si alloy with a small addition of Mn and Mg) has good castability, high

corrosion-resistance, and great toughness. The alloy is annealed for 3–4 hr. at 530° and quenched in cold H₂O. It is then tempered for 20 hr. at 150±5°.

CH. ABS. (e)

Corrosion-protective films on the surface of light alloys. H. ENDÔ and M. TAGAYA (Kinz. no Kenk., 1933, 10, 179–199, 227–242).—For Al and its alloys protective surface films were formed by immersing for 30–40 min. in boiling solutions of (a) KMnO₄ 2, H₂SO₄ 2, and MnO₂ 2%, or (b) CaO 1, CaSO₄ (or ZnO) 1, and KMnO₄ 0–1%. For Mg and its alloys immersion for several hr. in aq. Na₂HPO₄ 10 and NaOH 3%, saturated with Mg₃(PO₄)₂, or in Na₂HPO₄ 0–10, NaOH 0.5–5, Mg₃(PO₄)₂ 0–3, K₂Cr₂O₇ 1–3, and Al₂(SO₄)₃ 0.5–3%, or in H₂SeO₃ 1 and Na₂CO₃ 1%, was beneficial. The metal surface was treated finally with lanoline, bakelite varnish, or special rubber.

CH. ABS. (e)

Electrolytic surface treatment of light metals for constructional use. H. FISCHER (Z. Metallk., 1935, 27, 26–32).—The surface oxidation of Al and its alloys by the Eloxal process is described and an account given of the properties of the film with especial reference to corrosion-resistance.

A. R. P.

Anodic oxidation of aluminium and its alloys. S. WERNICK (Metal Clean. Finish., 1934, 6, 573–577).—A discussion.

CH. ABS. (e)

Electrolytic production of lithium. S. A. PLETENEV and A. N. IVANOVA (Redk. Met., 1934, 3, No. 3, 40–43).—In the electrolysis of a fused LiCl–KCl mixture (1:1), 9 kg. of LiCl, 0.4 kg. of KCl, and 66 kw.-hr. were consumed per kg. of Li produced. Chlorite stone was best for the diaphragms.

CH. ABS. (e)

Influence of trivalent chromium on chromium [-plate] hardness. R. J. PIERSOL (Metal Clean. Finish., 1934, 6, 522–525).—The hardness of Cr-plate at different rates of deposition varies with the [Cr^{III}] in the bath. The optimum val. (5–7 g. per litre) increases the resistance of the solution 50%.

CH. ABS. (e)

Throwing power of zinc sulphate solutions. M. NAKAJIMA (J. Electrochem. Assoc., Japan, 1934, 2, 176–181).—The throwing power (*P*) increased with the c.d. and with the *p_H* of the solution at the same concn. 1.5–2.5N-ZnSO₄ (*p_H* 3.4) had the max. *P*.

CH. ABS. (e)

Electrometallurgy of cadmium as applied to electrolytic zinc-plant purification residues. R. M. MILLER (State Coll. Wash., Metallurg. Res. Bur., 1934, Bull. No. A, 30 pp.).—Methods for recovery of Cd are reviewed. A leaching cycle described comprises: (1) leaching in acid filtrate from (5), whereby the most sol. oxides dissolve; (2) adding excess Zn dust to ppt. Cu and Cd; (3) filtering, and then pptg. Cd from the filtrate; (4) leaching the filter-cake with H₂SO₄ to dissolve Cd and Zn and leave Cu; (5) filtering, and pptg. Cd from the filtrate.

CH. ABS. (e)

Acid tin-plating. P. R. PINES (Month. Rev. Amer. Electroplaters' Soc., 1934, 20, No. 10, 49–52).—The solution contains Sn^{II} and Sn^{IV} as sulphates (> 6 oz. per gal. and 6–8 oz. of H₂SO₄ per gal.). With a c.d. of 5–50 amp. per sq. ft. at 23.9–29.4° (70 amp. per sq. ft. with agitation) and 0.3–1.5 volts for a 4-in.

anode to cathode distance adherent deposits up to 0.005 in. in thickness were obtained. A proprietary agent was added to the bath to control crystal growth.

CH. ABS. (e)

Analysis of alkaline tin-plating solutions. M. R. THOMPSON (Month. Rev. Amer. Electroplaters' Soc., 1934, 20, No. 10, 16–22).—In determining free alkali, stannate and CO₃²⁻ are removed by pptn. with N-SrCl₂ at 70°, and NaOH is titrated in the cooled filtrate with 0.2N-HCl.

CH. ABS. (e)

Alkaline plating baths for cobalt and nickel with high throwing power. F. C. MATHERS, G. F. WEBB, and C. W. SCHAFF (Metal Clean. Finish., 1934, 6, 412, 418–419).—The best Co bath contained (in g. per litre) CoSO₄·7H₂O 10, Na K tartrate 100, and Na₂CO₃ 100, and gave bright deposits at a c.d. of 0.03 amp. per sq. dm. The Co anodes did not corrode, necessitating addition of Co salts. At 70° a ppt. formed, causing dark deposits. The throwing power (*P*) was 65 at a 3:1 ratio (room temp.). The best Ni bath contained (in g. per litre) NiCl₂·6H₂O 20, ethanolamine 200, NaCl 100, and Na₂CO₃ 100. *P* was 40–60 at a 3:1 ratio. A c.d. of 0.24 amp. per sq. dm. was used. Addition of Ni salts was necessary because of a gradual pptn.

CH. ABS. (e)

Possibilities and limits of taking large photographs [of faulty steel] with X-rays. R. BERTHOLD (Arch. Eisenhüttenw., 1934–5, 8, 425–426).—With a suitable intensifying screen it is possible to take X-ray photographs of welds in steel at a distance of > 3 m., using a tube operated at 200–250 kv. Faults in welded metal up to 20 mm. thick can be detected in this way.

A. R. P.

X-Ray study of the fine-structure of metals. W. E. SCHMID (Z. Metallk., 1935, 27, 49–62).—Recent advances in X-ray technique and apparatus as applied to the study of the structure of metals and the effect thereon of thermal and mechanical treatment are reviewed.

A. R. P.

Effect of alternating currents on corrosion of metals in aqueous solutions. M. SMALOWSKI (Korros. u. Metallschutz, 1934, 10, 166–168; Chem. Zentr., 1934, ii, 1680).—With a Pt cathode and a polished Armco-Fe anode in 0.1N-KCl it was shown, in agreement with Glasstone and Reynolds (cf. A., 1933, 230), that the use of a.c. facilitates access of O₂ to the cathode. The effect is greater at lower frequencies.

H. J. E.

Power used in crushing.—See I. Alloy steels in petroleum refining.—See II. H₂SO₄ from waste FeSO₄.—See VII. Glass from blast-furnace slag. Moulding sand.—See VIII. Fe cement.—See IX. X-Ray screens.—See XI. Antifouling and Al paints.—See XIII.

PATENTS.

Recovering ore values. L. M. HUGHES (B.P. 424,375, 16.5.33).—Ores of Zn, Pb, Cu, etc. are mixed with pyritic material and ground wet with CaO ≡ > the theoretical amount necessary to decompose sulphates of the valuable metals, the mixture is dried, broken up to pea size, and roasted to produce a porous mass of CaSO₄ and metal oxides, the valuable constituents of which are then extracted by treatment with a suitable gas, e.g., Cl₂, HCl, or NH₃.

A. R. P.

Blast-roasting or sintering of fine materials. METALLGES. A.-G., and H. WENDEBORN (B.P. 423,280, 20.2.34).—Material, *e.g.*, flotation concentrates, raw cement meal, etc., finer than 10 mm. from a previous blast-roasting operation is moistened with H_2O in a mixer and fine raw material (I) and pulverised fuel (II) are sprayed as dry dust on to the moistened mass so that the individual particles are uniformly coated with (I) and (II). A series of charges with different proportions of the constituents is then built up in layers to a thickness of 20–30 cm. on the usual Dwight-Lloyd roasting grate.

A. R. P.

Duplex puddling [of iron]. C. HART, ASSR. to W. S. JACKSON (U.S.P. 1,954,172, 10.4.32. Appl., 10.3.30).—Mn and Si are removed from pig Fe by treatment of the molten metal with Fe_2O_3 under an acid slag so that the C is not oxidised; P is removed by similar treatment under a basic slag, and the metal is then blown to remove C and puddled with a basic slag.

A. R. P.

Production of molten iron or steel by the direct method. "SACHTLEBEN" A.-G. F. BERGBAU U. CHEM. IND. (B.P. 424,663, 6.10.33. Ger., 6.10.32).—A preheated mixture of fuel, fluxes, and silicious Fe ore containing $SiO_2 = 20-50\%$ of the Fe present is heated in a rotary gas- or oil-fired furnace so that part of the FeO is reduced to sponge Fe (I) and the remainder to $FeSiO_3$ (II); the temp. is then raised to promote reaction of the (II) with the CaO in the charge to form $CaSiO_3$ and FeO , which is immediately reduced by the C and melted together with the (I). Additional fluxes such as cryolite, CaF_2 , or, if Zn or Pb is present, $CaCl_2$ may be added to thin the slag and/or volatilise the Zn and Pb.

A. R. P.

Manufacture of a cast iron annulus [pipe]. F. C. LANGENBERG and H. G. REDDICK, ASSRS. to UNITED STATES PIPE & FOUNDRY Co. (U.S.P. 1,953,180, 3.4.34. Appl., 20.8.32).—Cast Fe of the composition C 3–3.85, Si 1.5–2.5, S 0.05–0.10, Mn 0.35–0.80, and P 0.30–1.5% is cast centrifugally into an externally cooled mould to produce a structure of concentric layers, annealed at 925° until carbide decomp. commences, slowly cooled to 760° , held at this temp. until the combined C is $\geq 0.15\%$, slowly cooled to 650° , and then allowed to cool to room temp. in air. In this way the P content is distributed almost equally between the solid solution and eutectic forms.

A. R. P.

Recovery of vanadium from pig iron. N. J. WARK (B.P. 422,592, 14.12.33. Ger., 14.12.32 and 22.5.33).—Molten pig Fe is treated with a very acid slag to remove the greater part of its Si content and is then poured from a considerable height into a molten, very fluid, and highly basic slag, *e.g.*, CaO 20, MnO 20, FeO 20, K_2O or Na_2O 5, and SiO_2 30%, whereby the V is removed as alkali vanadate.

A. R. P.

Simultaneous manufacture of iron or steel and Portland cement or hydraulic lime. L. P. BASSET (B.P. 423,104, 21.7.33. Fr., 25.7.32).—The process claimed in B.P. 368,312 (B., 1932, 470) is carried out at a temp. at which the metal and cement fuse, so that they can be withdrawn separately from the rotary furnace.

A. R. P.

(A, B) Deoxidation of steel. (c) Acid slags for deoxidising steel. SOC. D'ELECTROCHIM., D'ELECTRO-MÉTALL., ET DES ACIÉRIES ELECTR. D'UGINE (B.P. 423,584 and 423,731—2, 1.5.33. It., 13.5.32).—In the deoxidation of Fe by pouring the metal from a height into a very fluid acid slag, the slag consists of (A) SiO_2 45–65, Al_2O_3 4–25, MgO 4–25, and CaO 4–20%, (B) SiO_2 58–80, Na_2O 0–25, CaO 0–20, MgO 0–15, and Al_2O_3 0–3%, (C) SiO_2 45–65, Al_2O_3 4–25, MgO 4–25, CaO 4–20, and TiO_2 17% or TiO_2 70 and CaO 30%. [Stat. ref. to (B).]

A. R. P.

[Bright] annealing of metals. ELECTRIC RESISTANCE FURNACE Co., LTD., and A. G. E. ROBIETTE (B.P. 423,931, 12.7.33).—The furnace atm. consists of flue gases or other waste gases the reducing or oxidising constituents of which are removed by passing them with the requisite quantity of air or H_2 over Pt- or Pd-asbestos and through SiO_2 to remove H_2O vapour. A small quantity of a hydrocarbon or $MeOH$ vapour may be added to the gases after purification before they enter the furnace, to provide a slightly reducing atm.

A. R. P.

[Case-hardening] treatment of metal [iron]. W. A. DARRAH (U.S.P. 1,953,647, 3.4.34. Appl., 11.11.31).—The metal is made the anode in fused $NaOH$ containing a cyanide or cyanamide, whereby a nitride case is produced.

A. R. P.

Composite metal [case-hardened steel] article. A. B. KINZEL, ASSR. to ELECTRO METALLURG. Co. (U.S.P. 1,953,859, 3.4.34. Appl., 20.6.31).—Mild-steel articles are coated with a thin layer of a steel containing Cr 2, C 0.3, V 0.4, Mn + Si 1% by thermal fusion and then case-hardened in NH_3 at $450-500^\circ$.

A. R. P.

Thermally hardening steels and alloy steels. R. E. ELLIS, FROM UNITED STATES STEEL CORP. (B.P. 424,124, 15.5.33).—Steel wire, rope, cable, or the like is quenched from $>$ the A3 point to $540-150^\circ$ and maintained at the quenching temp. until the austenite is converted into a structure other than martensite, so as to improve the impact strength and ductility. [Stat. ref.]

A. R. P.

Surface hardening of austenitic steels and alloy steels. LIMITED Co., FORMERLY SKODA WORKS (B.P. 419,057, 31.1.33. Czechoslov., 18.2.32).—The surface austenite is rendered unstable by removal of C, Mn, Ni, or Co, or by diffusing into the surface Si, Al, P, As, Cr, Mo, V, Ti, or Sn which limit the range of existence of the γ -phase. *E.g.*, a 14% Mn steel (I) is case-hardened by heating at $900-1200^\circ$ in Si powder or in 20% Si-steel powder; in the latter case the Mn diffuses out of, and the Si into, the (I).

A. R. P.

Heat-treatment of steel rails. G. B. ELLIS, FROM ILLINOIS STEEL Co. (B.P. 422,954, 11.7.33).—The rails are hot-rolled to finished sections at $925-1065^\circ$, cooled to $500-700^\circ$ (500°), and reheated at $800-850^\circ$ (850°), then allowed to air-cool. The preferred composition is C 0.2–0.9, Mn 0.3–1.6, P \geq 0.08, S \geq 0.08, Si \geq 2, and Cr \geq 3%. [Stat. ref.]

A. R. P.

Cementation of iron and steel and their alloys. DEUTS. GOLD- U. SILBER-SCHNEIDANSTALT VORM. ROESSLER (B.P. 424,003, 9.8.33. Ger., 13.8.32).—In the case-

hardening of ferrous metals in salt baths containing cyanides (C), the retarding effect of the bases liberated by decomp. of the C is overcome by addition of SiO_2 , B_2O_3 , H_3PO_4 , or acid salts thereof. A. R. P.

Manufacture of iron alloys of very low carbon content. SOC. D'ELECTROCHIM., D'ELECTROMÉTALL., ET DES ACIÉRIES ELECTR. D'UGINE (B.P. 423,048, 25.7.33. Fr., 29.8.32).—Ferrochromium (I) produced by reduction of chromite with Si and having a high content of Si is allowed to fall in a thick stream into a ladle containing a very fluid, highly basic slag with a high Cr_2O_3 content, whereby the Si and C in (I) are reduced to $< 0.1\%$. A. R. P.

(A) **Welding rod.** (B) **Welding [steel].** J. M. KEIR, ASSR. TO OXWELD ACETYLENE CO. (U.S.P. 1,954,296—7, 10.4.34. Appl., 26.3.31).—(A) An Fe welding rod comprising an alloy of Fe with Si 0.5—1.5, Mn 0.5—3, Ti and/or Al 0.25—4 (in all), and C 0.5% is claimed. (B) Plain C steels are arc-welded with a rod of Fe containing Si 0.3—1.5, Mn 0.5—3, C < 0.6 , and V and/or Zr $\geq 1\%$. A. R. P.

Manufacture of chromium steel. K. M. SIMPSON (B.P. 421,856, 24.11.33).—A mixture of chromite and ferrosilicon is rapidly melted down in an open-hearth furnace to produce a viscous mass of ferrochromium (I) and a fluid Fe silicate slag which is tapped off and replaced with the requisite amount of refined low-C steel to produce with the (I) a Cr steel of the desired composition. A. R. P.

Corrosion-resisting [chromium] steel. W. W. TRIGGS. FROM STAINLESS STEEL CORP. (B.P. 423,798, 4.8.33).—Steel containing Cr 4.27, Ni 6.36, and C $< 0.1\%$ is melted in the high-frequency induction furnace, a finely powdered mixture of CaO and ZrO_2 (e.g., baddeleyite) is sprinkled on the surface, and, after this has been thoroughly mixed with the metal, a little ferrotitanium is plunged below the surface, the slag skimmed off, and the metal cast. The alloy is not subject to intercryst. corrosion after heat-treatment and is more readily machinable than ordinary stainless steel. A. R. P.

Refining alloys [containing chromium]. HERAEUS VACUUMSCHMELZE A.-G. (B.P. 424,226, 21.11.33. Ger., 22.11.32. Addn. to B.P. 401,044; B., 1934, 66).—The C content is reduced to 0.8—0.5% by a refining treatment with metal oxides in air, then to 0.15—0.25% by treatment of the melt with water-gas, and finally to 0.02—0.04% by treatment with pure H_2 . The whole of the refining is carried out in a high-frequency induction furnace lined with fused MgO at 1750—2200°, the higher temp. being required with high-Cr alloys. The process is applicable also to the refining of Cu, Ni, Co, and Fe alloys with Cr, Mo, W, U, V, Ta, Ti, or Zr. A. R. P.

[Cobalt-iron alloys [for precipitation-hardening]. F. KRUPP A.-G. (B.P. 423,960, 9.10.33. Ger., 13.10.32).—The alloys contain Fe ≤ 25 , Co 3—50, W 10—30, Mo 2—12, Co 0.1—0.55, and V, Ti, or Ta $\geq 10\%$ and \leq is sufficient to combine with all the C. Heat-treatment comprises rapid cooling from 1150—1350° and reheating at 400—800°. A. R. P.

Heat-treatment of [high-speed steel] articles. C. L. STEVENS, ASSR. to H. S. PIERCE (U.S.P. 1,953,445, 3.4.34. Appl., 25.4.32).—Destruction of the surface layers of the cutting edges of W-steel tools during hardening is prevented by plating them with a thin coat of Cr which is burned off during the heat-treatment. A. R. P.

Corrosion-resisting steel and iron alloys. VEREIN. STAHLWERKE A.-G. (B.P. 424,781, 17.5.33. Ger., 20.5.32).—The resistance of steel or cast Fe to corrosion by sea- H_2O or moist earth is considerably increased by alloying with 0.05—5% of As, Sb, or Sn (singly or together), Ti 0.1—1, V 0.1—0.5, Cu ≥ 1 , Mg 0.1—5, Ni 0.2—1, and Al 0.05—5%. [Stat. ref.] A. R. P.

Magnetic materials. [Aluminium-nickel-iron alloys.] BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 424,746, 29.5.34. U.S., 3.6.33).—Alloys of Fe with Al 6—15 (12), Ni 12—30 (25), and Co 0.5—10 (5%) are normalised at 1000—1500° immediately after casting and subsequently aged at 500—700 (600°). A. R. P.

[Aluminium-nickel-iron] alloys for manufacture of permanent magnets. F. KRUPP A.-G. (B.P. 425,455, 7.9.34. Ger., 11.9.33).—The alloys consist of Fe with Ni 10—35, Al 5—20, Co 0.5—15, Cu 0.5—15, and $\geq 5\%$ of ≤ 1 of the following: Cr, Mn, Mo, Si, Ti, U, V, W. The Co:Cu ratio is 10—1:2 and the Cu may be wholly replaced by Ag and/or Sn. A. R. P.

Improving the magnetic properties of iron and iron alloys. ALLGEM. ELEKTRICITÄTS-GES. (B.P. 425,320, 15.9.33. Ger., 15.9.32).—The sheet metal is heated in moist H_2 at 850° for 4 hr., sprinkled with a mixture of As and Al_2O_3 , CaO, or MgO, and heated in dry H_2 slowly from 500° to 700° and finally for 4 hr. at 850° to produce an outer layer of Fe arsenide which increases the electrical resistance. A. R. P.

Galvanisation or zinc-coating of iron or steel articles. RYLANDS BROS., LTD., and G. K. RYLANDS (B.P. 422,512 and 424,373, 24.1.34).—(A) The articles, e.g., wires, are passed through a bath of molten Pb, then through a tube (T) containing NH_3 , CO, or CH_4 to nitridise or carburise the surface before immersion in the usual molten Zn bath. Alternatively, the Pb is covered with a fused salt mixture containing NaCN or CaCN_2 . (B) The wires undergo treatment in T containing the gas, as in (A), and are then passed directly, or after treatment with a flux or pickle, into the molten Zn. A. R. P.

Deoxidation of copper. SOC. D'ELECTROCHIM., D'ELECTROMÉTALL., ET DES ACIÉRIES ELECTR. D'UGINE (B.P. 423,697, 6.6.33. It., 6.6.32).—The metal is deoxidised in an induction furnace under an acid slag containing, e.g., (a) SiO_2 35, TiO_2 45, MgO 10, FeO 6, Al_2O_3 3, and MnO 1%, or (b) SiO_2 55, TiO_2 5, CaO 15, Al_2O_3 15, and MnO 10%. The slag is regenerated by addition of C, which reduces its Cu_2O content to metal. A. R. P.

Separation of metals by vacuum distillation. ZINNWERKE WILHELMSBURG G.M.B.H., and K. LEIPALT (B.P. 423,699, 14.4.34).—Bi is removed from Cu by heating the metal at 1400°/3.8 mm. in a C-resistance furnace with condenser, the whole being enclosed in the

vac. chamber. Similarly Pb may be removed from Sn-Pb alloys to leave a residue of pure Sn. A. R. P.

Copper alloy for chill and die casting. E. VADERS (U.S.P. 1,954,003, 10.4.34. Appl., 29.5.30. Ger., 31.3.30).—The alloy consists of Cu 65–94, Si 2–6, Zn 3–28, and Al \geq 2%.

A. R. P.

[Phosphor-copper] solder. O. W. ELLIS, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,954,168, 10.4.34. Appl., 26.3.29).—Claim is made for alloys of Cu with 2.5–6 (4–5)% P which are rolled into strip at 350–650° (500°).

A. R. P.

Reduction of oxygenous nickel or nickel-copper compounds. FALCONBRIDGE NIKKELVERK A/S. (B.P. 423,951, 15.8.33. Norw., 27.8.32).—NiO or roasted and leached Ni-Cu matte is passed through a mechanically rabbled, multiple-hearth furnace up which is passed a current of water-gas preheated to 500–700° so that the temp. on the lowest hearth is \geq about 500°.

A. R. P.

Manufacture of pulverulent metal alloys [for dust cores]. I. G. FARBENIND. A.-G. (B.P. 423,823, 13.1.34. Ger., 24.1.33).—Ni-Fe, Ni-Co, or Co-Mo alloy powders are made by thermal decomp. of mixtures of the carbonyls, and the resulting powders are mixed with aq. colloidal Al_2O_3 , aq. $Al(NO_3)_3$, or similar material and heated at 800–1000° in H_2 so that the metal particles become coated with a film of Al_2O_3 which acts as an insulator in making cores for pupin coils.

A. R. P.

Gold separator. [Amalgamating device.] R. F. BERRY and R. L. MOON (U.S.P. 1,948,781, 27.2.34. Appl., 31.12.31).—An apparatus is claimed in which (a) the ore pulp containing free Au is conveyed below an agitated bath of Hg by means of a screw conveyor under pressure, and (b) various devices are arranged to prevent loss of fine Hg in the overflow.

A. R. P.

Amalgamation [process for recovering Au from ores]. J. C. RAMSEY and C. CAMBLIN, Assrs. to "R.C.W." Co. (U.S.P. 1,953,364, 3.4.34. Appl., 24.9.29).—The apparatus comprises a large trough (T) the bottom of which is covered with Hg into which a partition dips dividing T into two equal parts; in one of these is aq. NaCl in which are suspended an anode (A) and a cathode (C) not touching the Hg, and in the other is a funnel-like feed hopper through which the ore pulp is passed down to the Hg through a large porous-rubber pad which serves to distribute it over the surface. Passage of a current from A to C is said to cause Na to enter the Hg and to pass into the amalgamating compartment, thus keeping the Hg clean.

A. R. P.

Treatment of ores, metallurgical by-products, and the like to effect a separation of selenium from precious metals. E. L. W. BYRNE, From AMER. SMELTING & REFINING CO. (B.P. 425,648, 16.3.34).—The material, e.g., anode slimes from electrolytic Cu refining, is roasted at a low temp. and leached with H_2SO_4 to extract the Cu, the residue is fused with NaOH and sufficient $NaNO_3$ to convert the Se into Na_2SeO_3 , the product leached with hot H_2O , and the filtered solution neutralised with H_2SO_4 to ppt. TeO_2 , $PbSO_4$, and

SiO_2 and then acidified with H_2SO_4 and treated with SO_2 to ppt. Se.

A. R. P.

[Collector for] flotation of oxidised ores [e.g., lead or copper carbonate ores]. L. J. CHRISTMANN, Assr. to AMER. CYANAMID CO. (U.S.P. 1,952,907, 27.3.34. Appl., 1.11.28).—The use of glycines, e.g., $NHPh \cdot CH_2 \cdot CO_2H$, is claimed.

A. R. P.

Refining white-metal scrap. G. W. THOMPSON and E. H. SHEAFF, Assrs. to NAT. LEAD CO. (U.S.P. 1,954,463, 10.4.34. Appl., 19.7.30. Renewed 3.8.33).—Sb, Cu, As, and Fe are removed from Pb and/or Sn alloys by stirring the molten alloys with Al to form compounds of the impurities, which crystallise on cooling to just $>$ the m.p. of the Pb or Sn, and then filtering off the purified metal by pressure, using a filter of the "mush" produced in an earlier operation.

A. R. P.

Cast type-metal alloy. W. S. YERGER and L. S. SOMERS, Assrs. to IMPERIAL TYPE METAL CO. (U.S.P. 1,953,844, 3.4.34. Appl., 15.7.32).—The alloy consists of Pb with Sb 10–28, Sn 2–16, and Cd 0.05–7%.

A. R. P.

Flotation process for non-sulphide [tin and tungsten] ore. J. M. PATEK (U.S.P. 1,953,431, 3.4.34. Appl., 24.9.31).—Wolfram is floated with oleic acid and pine oil in a pulp to which is added a mixture of Na aluminate and silicate. Cassiterite is floated similarly with the addition of the product obtained by adding $Ca(OH)_2$ to a mixture of aq. Na silicate and H_2SO_4 .

A. R. P.

Production of hard sintered carbide materials. SIEMENS & HALSKE A.-G. (B.P. 422,961, 19.7.33. Ger., 19.7.32).—Claim is made for a sintered product consisting practically entirely of a complex carbide made from finely-divided mixtures of (a) a carbide of B, Ti, Si, Zr, Ce, or Th and (b) V, Nb, Ta, Mo, or W in stoichiometric proportions.

A. R. P.

Manufacture and moulding of hard metal alloys and articles, especially cutting tools, draw tools, or the like, made therefrom. G. BOECKER (B.P. 422,784, 14.6.33. Ger., 14. and 16.6.32).—Claim is made for moulded articles made from finely-powdered mixtures of Ti 40–80, Si 10–50, and Co \geq 15%. If desired, Be \geq 2 or Mg, Al, or V (in all) \geq 10% may be added. The articles are sintered at 1300–1700° for 2–10 hr. after being embedded in a metal or other powder which prevents oxidation.

A. R. P.

[Hard chromium-cobalt] alloys [for cutting tools]. HAYNES STELLITE CO., Asses. of W. A. WISSLER (B.P. 424,463, 26.6.34. U.S., 15.7.33).—Alloys for drills etc. contain C 1–4 (2–3), Cr 10–35 (25–35), W and/or Mo 5–30 (W 10–25), B 0.2–2.5 (0.2–0.6), V 0.25–20 (1.5–6), Fe $<$ 5, Ni $<$ 5, Mn 0.1–1, Si 0.1–1, and Co 25–65%.

A. R. P.

Treatment of metal. [Melting of aluminium.] B. H. JACOBSON, Assr. to KLIPSTEIN CHEM. PROCESSES, INC. (U.S.P. 1,953,936, 10.4.34. Appl., 17.1.31).—Scrap Al is melted in a rotary drum furnace by the introduction of Cl_2 containing a little Br, the heat of the reaction volatilising the $AlCl_3$ formed and giving a clean melt of the remainder of the metal.

A. R. P.

Colouring [dyeing] of oxide films on aluminium or on its alloys. SOC. CHEM. IND. IN BASLE (B.P. 423,467, 6.2.34. Switz., 16.2.33).—The metal after surface oxidation by electrolytic or chemical means is immersed in a solution in a suitable solvent of a metal complex with a dye. Numerous examples are given.

A. R. P.

Soldering of aluminium or aluminium alloys. C. BANSCHER (B.P. 424,370, 4.1.34).—The surfaces to be joined are "tinned" with a eutectic Cd-Zn solder while being rubbed with a sharp tool to remove the Al_2O_3 film. Excess of solder and oxide are then brushed off and the parts placed in position and soldered with any suitable alloy.

A. R. P.

Froth flotation. O. C. RALSTON, ASSR. to UNITED VERDE COPPER CO. (U.S.P. 1,952,727, 27.3.34. Appl., 26.10.29).—The upper surface of the froth is sprayed with pulp from another part of the cell to break the top bubbles and cause the mineral therein to displace the gangue in the lower layers.

A. R. P.

Flotation concentration of minerals. MINERALS SEPARATION, LTD. (B.P. 422,569, 15.7.33. U.S., 27.7.32).—Claim is made for the use of free xanthic acids (I) (< 50 g./ton of solids in the pulp) as collectors. (I) may contain an aliphatic ($> \text{C}_3$), an aromatic, a cyclic, or a heterocyclic group. Examples are the Bu, amyl, CH_2Ph , cyclohexyl, and furfuryl derivatives.

A. R. P.

Drawing compound [for deep-drawing metal sheets]. W. B. CRAIG, ASSR. to PACKARD MOTOR CAR CO. (U.S.P. 1,952,973, 27.3.34. Appl., 26.2.31).—A mixture of maize syrup 70, kieselguhr 15, and H_2O 15% is claimed.

A. R. P.

Production of metal casts from gelatin and like heat-developable reliefs. KODAK, LTD., ASSEES. OF A. MURRAY (B.P. 419,368 and 419,412, 11.5.33. U.S., 16.5.32).—Paper or other backing material is coated with a mixture of gelatin 30, $\text{Fe}^{\text{III}} \text{NH}_4$ oxalate 10, NaH_2PO_4 4, NH_4NO_3 8 g. in 120 c.c. of H_2O , then, after drying, with a mixture of cellulose nitrate 4 and $(\text{C}_6\text{H}_4\text{Me})_3\text{PO}_4$ 1 g. in EtOAc 95 g.; (A) the relief is then developed by heating and a metal cast simultaneously made therefrom; (B) these operations are carried out in two stages.

A. R. P.

Production of smooth electroplated [steel] sheets or the like. ASSOCIATED APPLIANCES, LTD., and S. and H. R. DEUTSCH (B.P. 424,724, 12.1.34).—The sheets are roughened by pickling and sandblasting, and then plated with Cu (10–25 μ thick) and finally with Ni (10–30 μ thick). The sheets are then rolled to obtain a smooth, bright surface, and, if desired, annealed in a non-oxidising atm.

A. R. P.

Galvanic deposition of copper and other metals. W. KOEHLER (U.S.P. 1,952,850, 27.3.34. Appl., 6.10.31).—For the recovery of, e.g., Cu from mine waters, pickling solutions, etc. (L), the L is fed continuously to a central cathode compartment (I) containing a Cu cathode (C) and having on both sides anode compartments (II) containing dil. acid FeSO_4 and scrap Fe as anode material (A). The C and A are connected outside the cell and a connexion between (I) and (II) is made by means

of blankets or like capillary material hanging over the intervening walls, or by means of siphons. Pure Cu is deposited in (I) with a min. consumption of Fe.

A. R. P.

Electrolytic process [for metal deposition]. KUPPEL & SIMÉANT, ASSEES. OF H. KUPPEL and L. SIMÉANT (B.P. 423,310, 9.8.33. Fr., 11.8.32).—In the building up of heavy deposits of Cu, Fe, and Zn, the voltage of the cell is raised progressively until the e.m.f. tends to fall while the c.d. and the temp. of the bath rise considerably; the voltage is then decreased until the temp. remains const. at an optimum val. for obtaining smooth, bright deposits.

A. R. P.

Anodic coating of zinc-base metals. (A, D) E. C. TRUESDALE, E. J. WILHELM, and (C) C. E. REINHARD, ASSRS. to NEW JERSEY ZINC CO. (U.S.P. 1,953,997—1,954,000, 10.4.34. Appl., 14.11.32).—The electrolyte comprises (A) 0.2–1N-NaOH or saturated aq. $\text{Ba}(\text{OH})_2$, $p_H > 13.3$, to produce a thin, dense, blue-black coating, (B) aq. NH_3 or $< 0.2\text{N-NaOH}$, $p_H < 13.3$, to give a thin, dense, light-coloured coating, (C) aq. $\text{K}_4\text{Fe}(\text{CN})_6$, $\text{K}_3\text{Fe}(\text{CN})_6$, KMnO_4 , K_2CrO_4 , $(\text{NH}_4)_2\text{C}_2\text{O}_4$, or $(\text{NH}_4)_2\text{MoO}_4$, p_H 6–8, to produce coloured coatings containing insol. Zn compounds of the electrolyte anion, or (D) aq. Na_2ZnO_2 , Na_2SnO_3 , NaAlO_2 , Na_2BeO_2 , or Na_2WO_4 , p_H 10–13, to produce white coatings.

A. R. P.

Electroplating of chromium. D. T. EWING (U.S.P. 1,952,793, 27.3.34. Appl., 12.3.28).—The electrolyte comprises 20–30% aq. CrO_3 containing $\text{Ce}_2(\text{C}_2\text{O}_4)_3$ 10 and $\text{Na}_2\text{S}_2\text{O}_8$ 10 g. per litre. The bath is operated at 20° under the same current conditions as in the ordinary Cr-plating bath.

A. R. P.

Chromium-plating [tungsten or molybdenum wire]. C. V. IREDELL, ASSR. to WESTINGHOUSE LAMP CO. (U.S.P. 1,953,484, 3.4.34. Appl., 11.12.28).—The wire is passed continuously through aq. 25% CrO_3 containing 2.5–4% of H_2SO_4 at a c.d. of 8.5–33 amp./sq. in. at 20–30°.

A. R. P.

Preparation of electrolytically produced nickel plates for use as anodes in electrolytic plating baths. FALCONBRIDGE NIKKELVERK A./S. (B.P. 423,370, 15.8.33. Norw., 27.8.32).—Ni cathode plates from the electrolytic refinery are annealed in a fused alkali chloride bath containing acid borates as solvents for any oxide or basic Ni salt present, and then quenched in H_2O to produce a metal suitable for anodes in Ni-plating.

A. R. P.

Production of metallic catalysts by electrolytic methods. TECHNICAL RESEARCH WORKS, LTD., E. R. BOLTON, K. A. WILLIAMS, and H. R. MITCHELL (B.P. 422,353, 10.7.33).—Cu, Ni, or Ni-Cu alloy turnings, shot, gauze, wire, or the like is anodically oxidised in a monel cage immersed in an alkaline bath, e.g., 3% aq. Na_2CO_3 , using current at 3–4.5 volts; the oxide film is then reduced to finely-divided metal by heating at 350° in H_2 .

A. R. P.

Recovery of selenium [from electrolytic slimes]. A. R. LINDBLAD (B.P. 423,084, 12.6.34. Swed., 4.9.33).—The slimes are roasted with NaOH or Na_2CO_3 to form NaSeO_3 and/or Na_2SeO_4 which are/is recovered by H_2O -leaching; the solution is evaporated to dryness,

the residue fused with C to reduce the Se compounds to Na_2Se , and the filtered aq. extract of the melt treated with a current of air or O_2 to ppt. Se. A. R. P.

Classifying solids [ores.]—See I. Cu compounds.—See VII. [Alloys for] spark-plug electrodes.—See XI.

XI.—ELECTROTECHNICS.

Progress in electrothermal industries. A. SCHLEICHER (Chem.-Ztg., 1935, 59, 353–355).—A review.

Manganese dioxides for dry cells. I. S. OKADA, K. WATANABE, and O. NAKAMURA (J. Electrochem. Assoc., Japan, 1934, 2, 213–216).— MnO_2 products prepared by heating $\text{Mn}(\text{NO}_3)_2$ and MnO , and by oxidation of a dil. weakly acid aq. Mn solution, were decomposed thermally; they showed differences in O_2 liberation depending on the method of prep. The type of product influences its use in dry cells.

CH. ABS. (e)

Alkali zincate storage battery with the cathode filled with zinc powder. I. S. TANAKA (J. Electrochem. Assoc., Japan, 1934, 2, 207–212).—Addition of HgO to the cathode (C) filling increases the deposition of Zn during charging. Fe has no marked effect if Zn powder is present, but affects the deposition of Zn when CdO or $\text{Cd}(\text{OH})_2$ is present. Dissolution of Zn cannot be prevented when the battery is idle. $\text{Ni}(\text{OH})_2$ counteracts this reaction. Zn is best deposited out on charging from a C filled with a mixture of powdered Zn and $\text{Cd}(\text{OH})_2$.

CH. ABS. (e)

X-Ray screens. R. BERTHOLD, N. RIEHL, and O. VAUPEL (Z. Metallk., 1935, 27, 63–65).—The val. of fluorescent screens for the direct visual detection of faults in light-metal castings depends on the brightness with which they fluoresce, the fineness of the grain-size of the fluorescent substance, and the thickness of the film. Very thin films of fine-grained substances which fluoresce yellow or green, e.g., ZnSiO_4 or $\text{ZnS} + \text{CdS}$, are superior to other types of films; generally speaking, blue-fluorescing substances, e.g., CdWO_4 , are unsatisfactory.

A. R. P.

[Effect on conductivity of] ageing of a mica surface. J. G. STRACHAN (J. Roy. Tech. Coll., 1935, 3, 343–352).—The phenomenon of decrease of conductivity (C) of a freshly split mica surface with time was investigated and earlier results were confirmed. Experiments on photoelectric fatigue of a fresh mica surface at 240–1500 volts and v.p. from 1 atm. to 1 in. of Hg showed no simple relationship between this and C ageing. Increase in insulation (I) resistance with time was accelerated by storing in the room atm. rather than in the apparatus and increased also with the size of the storage vessel. The I of the fresh surface was high in *vacuo*, but decreased immediately in presence of H_2O vapour, and then slowly increased as ageing proceeded. Explanations are offered. D. M. M.

Diffusion of water through organic insulating materials. D. B. HERMAN (Rubber Age [N.Y.], 1934, 36, 73–74).—Means of determining rates of diffusion are described and data for a no. of materials recorded.

CH. ABS. (p)

Transformer oil.—See II. CaC_2 .—See VII. Resistance alloys. Resistance of Al-Fe. Surface treatment of light metals. Oxidation of Al. Li. Cr-, Zn-, Cd-, Sn-, Co-, and Ni-plating. Fine structure of metals.—See X. Applications of the photoelectric cell.—See XIII. Determining ash in sugar beet.—See XVII. Aërating sewage.—See XXIII.

PATENTS.

Induction electric furnace [for melting glass or quartz]. E. F. NORTHROP, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,951,881, 20.3.34. Appl., 17.7.29).—The glass or quartz is melted in two induction furnaces (F) at either end of a rotatable steel arm (A) and gas bubbles are eliminated by revolving A at a high speed so that the F are swung outwards with their vertical axes in line with A.

A. R. P.

Manufacture of thermionic cathodes. A. GEHRTS, Assr. to SIEMENS & HALSKE A.-G. (U.S.P. 1,952,854, 27.3.34. Appl., 9.9.31. Ger., 22.10.30).—A Ni-Pt alloy core or wire is coated with a colloidal mixture of Ni, Ir, or Rh and BaO or SrO, and then heated in *vac.*

A. R. P.

Electrode for luminous positive-column gaseous-conducting devices [neon tubes]. R. E. MIESSE, Assr. to GEN. SCIENTIFIC CORP. (U.S.P. 1,953,625, 3.4.34. Appl., 4.4.30).—The electrode consists of a Ni cup oxidised by heating in the air, then coated internally with a mixture of C and $\text{Ba}(\text{OH})_2$, and finally heated in *vac.* to give BaC_2 .

A. R. P.

[Anode for] X-ray tubes. K. MATSUSHIMA, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,953,813, 3.4.34. Appl., 14.11.31. Jap., 29.11.30).—The Cu anode in which the refractory-metal target (T) is embedded is plated with Ni and then with Fe, and coated with C to prevent secondary radiation outside T.

A. R. P.

Spark-plug electrode. S. D. HERON, Assr. to G. CHARLTON and R. L. SHUMAKER (U.S.P. 1,953,228–9, 3.4.34. Appl., [A] 9.12.33, [B] 1.5.31).—Alloys resistant to corrosion by the products of combustion of petrol containing antiknock components consist of Fe with (A) Cr 6–18, Al 2–10, and Si 0–6%, or (B) Cr 6–18, Ni 8–30, W \geq 6, and Si \geq 4%.

A. R. P.

Photoelectric cells and the like. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of ALLGEM. ELEKTRICITÄTSGES. (B.P. 426,205, 27.9.33. Ger., 28.9.32).—A metal oxide layer, e.g., an oxide of Ag or Ni, is deposited by glow discharge in an atm. containing O_2 , between a semi-conducting layer, e.g., of Cu_2O , and the counter- or collecting-electrode.

J. S. G. T.

Electrical treatment of mineral and other material for separating different constituents thereof from one another. W. M. MORDEY (B.P. 426,860, 21.8.34).—In a process of separation utilising a multiphase electric current, as described in B.P. 165,822, the windings are constructed without a magnetic core, whereby the efficiency of separation is greatly increased.

J. S. G. T.

[Electro-optical] apparatus for detecting suspended matter in fluids. W. KIDDE & Co., INC. (B.P. 425,872, 28.8.34. U.S., 1.9.33).—In an ordinary electro-

optical smoke detector, a drop in line voltage will have the same effect as presence of smoke, *i.e.*, will give a false alarm. This apparatus is provided with means, on any change of voltage, to put the alarm device out of action until other automatic device has restored the voltage to the standard val. B. M. V.

[Constant-potential] electrical batteries. P. R. MALLORY & Co., INC. (B.P. 427,098, 14.9.33. U.S., 17.9.32, 22.4.33, and 22.7.33).—A battery for use as a grid-bias cell in vac.-tube systems, and comprising an electropositive cathode, *e.g.*, of Al, Mg, Be, Cd, or alloys thereof, an electronegative anode, *e.g.*, of Cu_2O , Fe_3O_4 , PbO_2 , carbonised Fe, and a viscous conducting material composed of a glycol, glycerol, or compounds thereof, *e.g.*, $\text{C}_2\text{H}_4(\text{OH})_2$, a fractional % of a weak org. acid, *e.g.*, lactic, malic, or tartaric, together with, if desired, a small proportion of a salt of a weak org. acid, is claimed. J. S. G. T.

[Portable] electrolytic cells [for electrolysis of brine]. D. J. EVANS (B.P. 425,703, 20.10.33).—The cell (C) comprises an insulating container, *e.g.*, of ebonite, having interspaced, vertical, perforated C electrodes arranged so that the electrolyte follows a sinuous path within C and through the electrodes. J. S. G. T.

Electrolytic condenser. M. BERGSTEIN, Assr. to MICAMOLD RADIO CORP. (U.S.P. 1,951,720, 20.3.34. Appl., 18.5.31).—The condenser comprises a roll of superficially oxidised Al sheet, the individual coils being separated from one another by a film of an NH_4 soap mixed with a fatty acid, *e.g.*, NH_4 linoleate and stearic acid. A. R. P.

Insulating and cooling dielectric liquids for use in electrical apparatus. WESTINGHOUSE ELECTRIC & MANUFACTG. Co., Assees. of H. M. ELSEY (B.P. 425,920, 21.10.33. U.S., 5.11.32. Cf. U.S.P. 1,953,216; B., 1935, 30).—The larger constituent may be mineral insulating oil. B. M. V.

Fluorescent screens. SIEMENS-REINIGER-WERKE A.-G. (B.P. 426,789 and 426,797, [A] 5.10.33, [B] 10.10.33. Ger., [A] 6.7.33, [B] 5.9.33).—(A) The luminescent material (M) is protected against the action of light by a screen, *e.g.*, of Pb glass, or by a protecting medium incorporated with M, *e.g.*, a binding medium, or by a layer attached to M. (B) A colour filter, preferably interchangeable, which is not substantially opaque to the radiation causing fluorescence, is arranged in front of M. J. S. G. T.

[Ribbed accumulator plates for] electric batteries. L. VENTRELLA (B.P. 425,236, 11.9.33. Ger., 12.9.32).

Hydrometers [for accumulators].—See I. Cellulose for insulation.—See V. Contact H_2SO_4 . X-Ray screens. Metal carbonyls.—See VII. Refractory glasses.—See VIII. Case-hardening Fe. Treating high-speed steel. Magnetic alloys. Permanent magnets. Dust-core alloys. Recovering Au from ores. Separating Se from precious metals [in Cu anode slimes]. Dyeing films on Al. Plated steel sheets. Deposition of metals. Coating Zn-base metals. Cr-plating. Ni anodes. Catalysts. Se from slimes.—See X.

XII.—FATS; OILS; WAXES.

Improvement of technical fats and oils. R. STRAUSS (Chem.-Ztg., 1935, 59, 373—375).—A review.

Detection of traces of nickel in hydrogenated fats. M. STRUSZYŃSKI (Przemysł Chem., 1935, 19, 48—49).—Crude (2—10 g.) or edible fat (100—200 g.) is melted, an equal vol. of conc. HCl and a drop of HNO_3 are added to the clarified product, the flask is heated at 100° with const. shaking, the aq. layer evaporated to dryness, the residue ignited and dissolved in HCl-HNO_3 (2—3 drops), the solution diluted to 2 c.c., tartaric acid, aq. NH_3 , and 1% dimethylglyoxime in EtOH are added, the solution is extracted with CHCl_3 , and the extract evaporated to dryness, when a red spot or ring indicates $< 2 \times 10^{-5}$ mg. of Ni. Fe^{III} does not interfere. R. T.

Use of the quinhydrone electrode with fat emulsions. A. UNMACK (Kong. Vet.-Landsb. Aarskr., 1934, 175—190; Chem. Zentr., 1934, ii, 1862—1863).—The unequal distribution of quinone and quinol between the fat and H_2O causes errors when the quinhydrone electrode is used, for which corrections are given. H. J. E.

Colloid-chemical basis of detergents and washing. W. PROSCH (Angew. Chem., 1935, 48, 243—245).—A lecture.

Germicidal and detoxifying properties of soaps. M. BAYLISS and H. O. HALVORSON (J. Bact., 1935, 29, 9—10).—Pneumococci (I) are especially sensitive to the action of unsaturated soaps, notably Na oleate, linoleate, linolenate, and clupanodionate. The order of germicidal action of soaps is similar in the case of *S. lactis* (II), but the general level of resistance of the organism is $>$ that of (I). Na stearate, palmitate, α - and β -elaeostearate are exceptional in being effective against (I) but not against (II). Detoxication tests of soaps against diphtheria toxin show the action of the former to be influenced by their spatial configuration, constitution, and functional groups. The introduction of C:C into a saturated soap mol. increases its detoxifying power, but additional double linkings produce no further change. OH and C:C have little effect. A. G. P.

Mechanical stability of lime and soda greases. V. WILLIAMS (Ind. Chem., 1935, 11, 116—117).—Greases containing Na or Ca soap show the greatest separation of oil (details of test are given) when the free Na_2O or CaO is greatest. With Na-soap greases those which do not separate contain free fat. Ca-soap greases should, however, contain only a small quantity (0.2%) of free fatty acid. D. K. M.

Empire production of tung oil. L. A. JORDAN (J. Soc. Arts, 1935, 83, 539—566).—A lecture.

Iodine value of tung oil. Effect of time, excess of Wijs' reagent, and temperature. K. Ho, C. S. WAN, and S. H. WEN (Ind. Eng. Chem. [Anal.], 1935, 7, 96—101).—The I val. (I) of tung oil varies (166.8—199.6) when halogenation (II) proceeds for 0.5 hr.—12 days at room temp. (I) varies directly as the amount of available I per g. of oil and not as the % excess of Wijs' solution. (I) increases with rise in temp.; a rise

of 10° nearly doubles the rate of (II). An empirical formula is deduced which expresses these relations.

J. L. D.

Action of sulphur monochloride on linseed oil.

F. FRITZ (Farbe u. Lack, 1935, 170—171, 183—184).—A review.

S. M.

Nature of losses in linseed oil. E. M. YAKIMETZ (J. Tech. Phys. U.S.S.R., 1934, 4, 499—503).—The sp. resistance increases with the degree of polymerisation. The max. val. of the angle of loss and dielectric const. occurs at a frequency of 3×10^6 . CH. ABS. (e)

Evaluation of olive oil foots. M. J. HAUSMAN (Soap, 1935, 11, 21—24, 67, 69).—Determination of the proportion of matter in the oil insol. after dilution with light petroleum (I) (b.p. < 75°) and of the oxidised fatty acids [insol. in similar (I), after saponifying the oil and acidifying] gives a more reliable evaluation of CS_2 -extracted olive oil than does the customary determination of Et_2O -insol. matter.

G. H. C.

Adulteration of arachis oil with coconut oil.

H. RUEBENBAUER (Przemysł Chem., 1935, 19, 9—10).—Arachis oil containing 10% of coconut oil can be distinguished from the pure product by its higher d , sap., Reichert—Meissl, and Polenske vals., and by its lower n and I val.

R. T.

Constituents of vegetable oils. H. A. BOEKENOOGEN (Chem. Weekblad, 1935, 32, 230—239).—A review dealing particularly with the lesser known constituents.

S. C.

Varieties of fish oils and their uses. L. J. REIZENSTEIN (Off. Digest, 1935, No. 144, 126—133).—A lecture.

D. R. D.

Cooling arrangement for saponification value determinations. W. HEYNE (Chem.-Ztg., 1935, 59, 327).—A readily made reflux condenser is described.

J. S. A.

Lubricating oils.—See II.

PATENTS.

Kneading machines for fats. A. E. NIELSEN (B.P. 426,315, 21.12.34. Denm., 3.2.34).—A conveyor worm is formed hollow to permit the use of heating medium and is divided into sections between which are grids or the like to effect disintegration. B. M. V.

Sol. oil. Lubricating oil.—See II. **Washing etc. agents.**—See III. **Zn pigments.**—See XIII. **Shortenings.**—See XIX. **Vitamin prep.**—See XX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Paint-making machinery. N. N. MAAS (Oil Col. Trades J., 1935, 87, 1226—1231).—Various types of mixing, grinding, straining, and centrifuging machines are described.

D. R. D.

Protection of metal structures with bituminous aluminium paints. J. ROUX (Rev. Aluminium, 1935, 12, 2745—2752).—The addition of Al powder to bituminous paints (I) prevents their deterioration on prolonged exposure to sunlight and atm. influences; such paints retain their gloss and do not become powdery for a much longer period than do ordinary (I). A

satisfactory mixture consists of coal-tar pitch 62.5, C_6H_6 25, and Al 12.5%; this should be applied to steel structures above 1 or 2 coats of ordinary (I).

A. R. P.

Antifouling paints containing no mercury. IV, V. S. ŌSIMA (J. Soc. Chem. Ind., Japan, 1935, 38, 69 B; cf. B., 1935, 277, 319).—Submergence tests over 6 months showed that Ph_2 compounds (I) containing As give excellent results. Paints containing such org. As compounds (I) together with Cu_2O give fair protection against fouling, but the film condition was not good. Paints containing (I) with Paris-green are unsatisfactory.

C. I.

Stability of paint against atmospheric influences.

A. V. BLOM (Verf. kroniek, 1935, 8, 89—91).—The different types of breakdown are described and their causes discussed.

D. R. D.

Causes of "chalking" of white exterior paints.

W. LUDWIG (Farbe u. Lack, 1935, 125).—Chalking (C) is caused by the penetration of pigment particles from below into the film surface. Hence the finishing coat (I) should have low pigment and high oil content. Undercoats may absorb oil from (I) if their binder content is low. Plaster and old paint surfaces are also oil-absorbent and should be primed with pigment-free linseed oil varnish. The defect develops when (I) begins to disrupt through the action of ultra-violet light, bacteria, excess of drier, and those pigments, e.g., TiO_2 , which possess high reflective power. Addition of ZnO to TiO_2 reduces C by formation in the film of a Zn soap; lithopone should be mixed with 30% of a basic pigment, e.g., ZnO, white-Pb. Addition of linseed stand oil to (I) is also advantageous.

S. M.

Primers for wood. H. A. GARDNER (Ind. Eng. Chem., 1934, 26, 1272—1273).—For "difficult" types of wood used in house construction, e.g., Douglas fir, Norway pine, the use of extremely H_2O -resistant primers, e.g., of the metal powder-spar varnish type, may not be good practice. Slow passage of H_2O towards the outside may lead to blistering etc. More porous "straight" linseed oil priming paints heavily pigmented with white Pb, and containing in addition 10% of diatomaceous earth and some Zn and Ti pigments, have given good results, allowing the escape of internal H_2O vapour but resisting rain. This view is supported by the result of some $4\frac{1}{2}$ -year exposures (described and illustrated), a "porous" graphite paint here showing up well.

S. S. W.

Preparation and properties of titanium pigments.

Properties of titanium sulphate solution. L. T. WORK, S. B. TUWINER, and A. J. GLOSTER (Ind. Eng. Chem., 1934, 26, 1263—1266).—The system TiO_2 - SiO_2 - H_2O was studied, various concns. being prepared, hydrolysed, and the resulting ppts. calcined and evaluated for obscuring power (O) by the Jackson turbidimeter. The ppts. are of indefinite chemical composition, properties, e.g., particle size and O, varying with mode of prep. and, to a smaller extent, with degree of calcination. Such "pure" solutions do not give ppts. comparable with commercial Ti pigments in O. Analysis of the solution from the partial-vol. aspect shows that dil. solutions are hydrolysed appreciably to

an extent depending on the acid content. The residual concn. after pptn. is complete also affects the state of the ppt., and this angle is treated mathematically.

S. S. W.

[Preparation and properties of titanium pigments.] Effects of precipitation, calcination, and subsequent treatment. L. T. WORK and S. B. TUWINER (Ind. Eng. Chem., 1934, 26, 1266—1268).—Commercial ppts. [as distinct from ppts. from pure solutions (cf. preceding abstract)] were calcined and examined. Significant factors in production of high-hiding pigments are presence of seeding nuclei and dry milling. The latter reduces oil absorption by agglomeration, no reduction in primary particle size occurring. This aspect is illustrated by photomicrographs. The effect of calcining temp. is of limited importance over a normal range of 700—850°, but varies appreciably at > 850°.

S. S. W.

White, black, and coloured pigments. A. F. BROWN (Amer. Paint J., 1935, 19, No. 23, 17—18, 40).—A review.

D. R. D.

Applications of the photoelectric cell in the paint and varnish industries. R. FRITZ (Chim. et Ind., 1935, 33, 541—545).—Gloss is measured by comparing specular reflexion at 45° incidence and scattered reflexion at 55° incidence by means of an apparatus in which the illuminating beam and the photoelectric cell system are fixed with their axes at right angles. Covering power is estimated from absorption curves plotted after using a wedge-shaped film between glass plates.

G. H. C.

Influence of pigments in paints and lacquers, in comparison with that in rubber. H. W. TALEN (Verfkroneik, 1935, 8, 92—94).—There is a close correlation between the behaviour of pigments in paint and rubber, pigments which show exceptional properties in the one case behaving similarly in the other (e.g., C black inhibits the action of both paint driers and vulcanisation accelerators). Wolff's theory of the crit. oil content of paints is expounded.

D. R. D.

Recent developments in natural resin varnishes. II, III. C. H. ALLEN and K. M. SPRINKEL (Off. Digest, 1935, No. 143, 54—65; No. 144, 111—124).—Exposure tests with a no. of varnishes containing natural resins and others in which PhOH-CH₂O resins are present demonstrate the superior durability of the former.

D. R. D.

Cellulose lacquers. W. F. LOATES (Oil Col. Trades J., 1935, 87, 1223—1225).—The functions of the different constituents of cellulose nitrate lacquers and the principles involved in lacquer formulation are explained, with special reference to the use of triangular diagrams for representing the properties of mixed solvents. A no. of new plasticisers (Bu₃PO₄, Bu oleate, amyl phthalate) are described.

D. R. D.

Use of semi-drying oils in nitrocellulose lacquers. K. BUSER (Farben-Chem., 1935, 6, 125—126).—Linseed and other drying oils in nitrocellulose (I) lacquers have the disadvantages of slow drying and, when boiled or converted into stand oil, of incompatibility with (I). Poppy, sunflower, rape, and other semi-drying oils can be substituted (particularly for indoor exposures and

ground-coats) because they are more compatible with (I), especially when blown, and their reduced drying rate and resistance are less pronounced when incorporated with (I). A blown semi-drying oil is also advantageous (a) in admixture with a drying oil, e.g., it reduces the brittleness of a tung oil-(I) lacquer, (b) as a plasticiser, (c) as a constituent in oil-modified alkyd resins.

S. M.

Properties of plasticisers for nitrocellulose lacquers. IV. A. KRAUS (Farbe u. Lack, 1935, 111—112, 123—124, 137—138; cf. B., 1934, 684).—Exposure tests of low- η nitrocellulose films (free from resin) show that the weather-resistance (*W*) is generally improved by addition of commercial plasticisers (27 examples). Ph₂ phthalate (I) and ditolyl carbonate (II) imparted max. *W* as well as excellent elasticity (*E*) and adhesion. With "glyacol," cetyl acetate, amyl stearate, and lauryl and octyl phthalates (i.e., long-chain compounds) failure was rapid. (C₆H₄Me)₃PO₄ and two chlorinated aromatic phosphates gave good protection, but discoloration ensued. The exposure results (tabulated) together with *E*-tensile strength data of films show that *W* is dependent on the ability of the film to accommodate itself to temp. changes, i.e., on the maintenance of its free *E* during weathering, rather than on its extensibility as a plastic material, which is indeed reduced by addition of those plasticisers affording improved *W*. Irradiation with ultra-violet light of films containing (I) and (II) reduced their *E* only slightly. Of 5 non-yellowing plasticisers, Sipalin M.O.M. gave max. *W* in presence of TiO₂ and dewaxed dammar; with a urea-CH₂O resin, however, triamyl citrate was best. No general conclusions could be drawn concerning the constitution of a plasticiser and *W*.

S. M.

Viscosity data for commercial rosin and abietic acid. G. S. PARKS, M. E. SPAGHT, and L. E. BARTON (Ind. Eng. Chem. [Anal.], 1935, 7, 115—116; cf. B., 1932, 314).— η for two samples of rosin and abietic acid is determined in abs. units between 28° and 135°.

J. L. D.

Esterified copal resins and their application in the varnish industry. H. ULRICH (Farbe u. Lack, 1935, 135—136).—By heating copal resins in large batches (> 5000 kg.) local overheating and volatile loss are reduced and the product gives harder and less coloured films; heating with rosin is also recommended. In either case esterification with glycerol gives films which are resistant to H₂O, acids, and Na₂CO₃ and possessing improved gloss, elasticity, and hardness; since less drier is required, the durability is also improved and there is less tendency to after-yellowing and blooming. Details are given of the use of commercial products ("Kopols") for interior and exterior decoration and food containers.

S. M.

Acraldehyde resins. R. TREVY (Rev. gén. Mat. Plast., 1934, 10, 453—456; 1935, 11, 13—15, 47—49, 80—81).—Methods of preparing acraldehyde (I) and of effecting its polymerisation to diacryl, metacraldehyde, and a resin (II) are reviewed. (II) prepared in presence of Na₂SO₃ has m.p. 75—80°, decomposes at 140°, and is sol. in polar solvents, giving glossy but brittle films of poor adhesion. Resins formed by condensing (I) with

PhOH (cf. B., 1932, 806) are compared with those from glycerol and PhOH (B., 1927, 147). (I) also condenses with urea in presence of both acids and alkalis.

E. L. H.

Polybasic acids and their derivatives used in paint products. J. M. SANDERSON (Off. Digest, 1935, No. 143, 66—72).—The manufacture and utilisation of maleic and phthalic anhydrides and succinic acid and their industrially used derivatives are described.

D. R. D.

Phenolic and alkyd resins of today. W. KRUMHAAR (Off. Digest, 1935, No. 144, 136—138).—A review.

D. R. D.

C black.—See II. **Rosin size.**—See X. **Particle size of fillers.**—See IX.

PATENTS.

Production of solutions of water-insoluble naphthenates, linoleates, and abietates. W. J. TENNANT. From NUODEX PRODUCTS CO., INC. (B.P. 426,643, 6.10.33).—An aq. solution of a soap, *e.g.*, Na naphthenate, is fed into a vigorously agitated mixture of an aq. solution of a metallic salt, *e.g.*, CoCl_2 , and an immiscible liquid, *e.g.*, a petroleum distillate, which dissolves the naphthenate produced. 19 examples are given. The product can be used directly as a paint drier.

S. M.

Manufacture of [zinc] pigments. J. T. BALDWIN, ASSR. to SANDURA CO., INC. (U.S.P. 1,946,052—5, 6.2.34. Appl., [A, B] 27.9.30, [C] 18.1.32, [D] 21.10.32. Renewed [B] 13.6.33).—(A) Lithopone (L) is treated at 280—300° with air and the vapours obtained by the steam-distillation of a fatty acid (A), so that the surface of the particles becomes coated with the Zn compound of the oxidised A. (B) L or ZnO is treated with blown soyabean oil to produce on the particles a film of the Zn soap of the oxidised A. (C) L or ZnO is suspended in a solution of a soap of oxidised linoleic acid, and a Zn or Ba salt is added to ppt. the corresponding soap on the pigment particles. (D) Claim is made for the product of process (C), *i.e.*, a Zn pigment with a H_2O -repellent coating comprising a soap of a fatty acid above C_7 .

A. R. P.

Manufacture of a titanium phosphate pigment. B. D. SAKLATWALLA, H. E. DUNN, and A. E. MARSHALL, ASSRS. to SOUTHERN MINERAL PRODUCTS CORP. (U.S.P. 1,953,777, 3.4.34. Appl., 8.8.32).—Nelsonite is heated with 80% H_2SO_4 at 175°, the product dissolved in 1.2 pts. by wt. of H_2O , the insol. removed by decantation, the Fe^{++} reduced to Fe^{+} with scrap Fe, the $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ separated by crystallisation, and the solution boiled to ppt. a hydrated Ti sulphate-phosphate which, on calcining at 815°, yields a white pigment containing TiO_2 72 and P_2O_5 26%.

A. R. P.

Manufacture of [bronze] printing inks. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 426,805, 14.10.33).—Bronze powders are incorporated with vehicles comprising polymerides of aliphatic vinyl compounds giving solutions of high η in EtOH, together with small amounts of glycerol, tannin, cellosolve, etc. as required (to increase flexibility of ink and uniformity of prints).

S. S. W.

Production of polychrome high-gloss printed matter. W. K. R. and C. P. E. HARTMANN (CHEM. FABR. HALLE-AMMENDORF GEBR. HARTMANN) (B.P. 426,753, 29.6.34. Ger., 15.7.33).—The picture etc. as first printed is overprinted with a transparent gloss varnish containing either an oil-sol. dye, *e.g.*, rhodamine, and/or a pigment possessing high gloss.

S. M.

Varnishes. F. F. SCHWARTZ (B.P. 426,154, 21.3.34. Fr., 28.4.33).—3 solutions in aq. NH_3 are mixed: (a) a hydroxide of Cu, Ni, Co, Cd, Sn, Sb, Zn, or Mg, (b) a resin, *e.g.*, sandarac, and a fatty acid, *e.g.*, linoleic, (c) albumin or a cellulose ether, *e.g.*, methylcellulose, or Schweizer liquor. The product may be diluted with H_2O and gives heat-resistant glossy coatings.

S. M.

Oil-proofing of [fibrous] material and product therefor. B. CLAYTON, ASSEC. of B. H. THURMAN, A. W. THOMAS, and M. MATTIKOW (B.P. 425,986, 20.9.33. U.S., 21.9.32).—One side of the paper or other porous material is coated with an aq. solution of a soap prepared by treating a vegetable oil, their free acids, rosin, shellac, etc. with KOH, $\text{N}(\text{C}_2\text{H}_4\text{OH})_3$, etc. The oil may be sulphonated and plasticisers and casein also incorporated.

S. M.

Liquid coating compositions. GOODYEAR TIRE & RUBBER CO. (B.P. 426,565, 4.7.33. U.S., 1.10.32).—Rubber is treated with a halide of an amphoteric metal or derivative thereof, *e.g.*, chlorostannic acid, and petroleum solvents, *e.g.*, solvent naphtha, pigments, *e.g.*, TiO_2 , ZnO, plasticisers, *e.g.*, tung or linseed oil, Bu stearate, chlorinated Ph_2 , driers, *e.g.*, linoleates or oleates of Mn, Pb, Zn, and Co, and ageing resisters, *e.g.*, quinol, are incorporated.

S. S. W.

Preparation of oil-soluble hardening phenol-aldehyde resins. H. HÖNEL, J. EHRENFELD, and O. REICHHOLD (B.P. 426,249, 26.8.33. Addn. to B.P. 417,122; B., 1934, 1071).—The resinous products obtained by the prior process possess good oil solubility when the phenol used contains, per OH group, ≤ 1 aralkyl group, the aliphatic part of which contains $\leq \text{C}_3$, *e.g.*, *p*-cumylphenol. Dihydric phenols containing alkyl groups similarly constituted (prepared by the condensation of monohydric phenols with carbonyl compounds) may also be used.

S. M.

Manufacture of compounds [resins] of the pyridine series. CHEM. FABR. VON HEYDEN A.-G. (B.P. 425,435, 24.5.34. Ger., 27.5.33).—What appear to be 2-(*N*)-acylated quaternary pyridinium and quinolinium salts are prepared by interaction of *N*-substituted 2-pyridone-alkyl(aryl etc.)imides with acylating agents (equimols.). The products are yellow to pale brown resins sol. in H_2O and inert org. solvents. Examples are: *N*-methyl-2-pyridonemethylimide + BzCl or stearyl chloride (I); *N*-methyl-2-pyridonebenzylimide + AcCl or (I), *N*-methyl-2-pyridonephenyl-, *p*-anisyl-, β -naphthyl-, or *p*-phenetyl-imides + (I), palmityl, or oleyl chlorides, and *N*-methyl-2-quinolonephenylimide + (I).

H. A. P.

Production of mother-of-pearl effects in artificial plastic substances and paints and lacquers. H. HUNSDIECKER (B.P. 426,554, 1.9.33).—The iridescent agent to be incorporated is finely-cryst. PbHPO_4 , pptd.

from appropriate solutions in presence of H_2O -sol. org. liquids, e.g., EtOH, AcOH. S. S. W.

Grinding paint etc.—See I. C papers.—See V. Coating leather.—See XV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Specific gravity of rubber in latex. O. DE VRIES (India-Rubber J., 1935, 89, 343–345).—Recent calculations of the d of rubber in latex give a val. 0.902, considerably < that (0.914) obtained earlier. The former figure is shown to be erroneously low, but the corr. figure, 0.9065, still reveals a serious margin of difference which may be attributable to alteration in conditions, e.g., with respect to age of the trees, system of tapping, and effect of preservatives in latex.

D. F. T.

Specific gravity of preserved [rubber] latex. E. RHODES (India-Rubber J., 1935, 89, 397–400; cf. preceding abstract).—Making the correction indicated by de Vries (*loc. cit.*), calculation gives a val. d 0.9064 for the rubber phase in preserved latex. This adjustment does not seriously affect the accuracy of the figures tabulated earlier (cf. B., 1934, 1111) for preserved latex in the unconc. range and does not necessitate any change in the deductions then made.

D. F. T.

Chemical constitution of rubber in the light of Staudinger's work. I. ALLEN, JUN., and E. R. SAUTER (J. Chem. Educ., 1935, 12, 135–138). L. S. T.

p-Nitrophenol in crêpe [rubber] manufacture. T. E. H. O'BRIEN (1st Quart. Circ. [1934], Rubber Res. Scheme, Ceylon, 1934, 11, 1–2).—Use of *p*-NO₂·C₆H₄·OH in the prep. of crêpe is unsatisfactory owing to its staining properties. It is suitable as a mould preventive in smoked sheet.

CH. ABS. (p)

Determination of free sulphur in rubber. A. F. HARDMAN and H. E. BARBEHENN (Ind. Eng. Chem. [Anal.], 1935, 7, 103–104).—The S extracted by COME₂ from rubber samples is deposited quantitatively on Cu. Reaction with hot conc. HCl gives H₂S, which is determined volumetrically (I'–IO₃') after absorption in CdCl₂ solution.

J. L. D.

Enrichment of volatile colouring matters from rubber-ware in paper and wood. H. HÄRDTL (Chem.-Ztg., 1935, 59, 327).—The emission of volatile org. substances may cause rapid red or yellow discoloration of paper placed in contact with coloured rubber ware.

J. S. A.

Manufacture in Italy of [vulcanisation] accelerators and antioxidants for rubber. A. BERETTA (Chimica e l'Ind., 1935, 17, 163–171).—A review.

Combined use of two different [vulcanising] accelerators. V. Mercaptobenzthiazole and hexamethylenetetramine. I. AOE and H. KITAYAMA (J. Soc. Rubber Ind. Japan, 1934, 7, 482–503).—Mixtures of equal quantities of the two substances gave greatest acceleration. On heating the mixture with S, (CH₂)₆N₄ (I) reacts with S and this action is increased in presence of mercaptobenzthiazole (II). (I) and S yield CS₂, NH₄GNS, H₂S, and NH₃, neither of which alone has any accelerating effect. Combined action of

(II) and NH₃ or NH₄ polysulphides causes acceleration as a result of the formation of a mol. compound.

CH. ABS. (p)

Oxidation of rubber by hydrogen peroxide. B. KAGAN and N. SUKHAREVA (J. Rubber Ind. U.S.S.R., 1934, 11, 46–53).—On oxidation in CHCl₃–AcOH in sealed tubes at 43° with H₂O₂ light crêpe yields an amorphous alcohol C₁₀H₁₅O₂·OH (I) and synthetic rubber C₁₆H₂₆O₂(OH)₂ (II). (I) is saturated and (II) unsaturated with respect to H and Br. (II) absorbs 2Br.

CH. ABS. (p)

Chlorination of disaggregated rubber. B. V. BUZOV, V. S. MOLODENSKI, and N. I. MIKHAILOV (J. Rubber Ind. U.S.S.R., 1934, 11, 44–46).—Rubber must be disaggregated (e.g., by CuCl₂ or Cu oleate), but not oxidised, in order to give a good chlorination product.

CH. ABS. (p)

Influence of fillers on vulcanised rubber. D. J. VAN WIJK (Verfkroniek, 1935, 8, 95).—A brief review.

D. R. D.

[Compression tests on plasticity of unvulcanised rubber.] A. SPEEDY (India-Rubber J., 1935, 89, 342).—Results are given of tests made in 1918.

D. F. T.

Particle size of fillers.—See IX. Pigments in rubber.—See XIII.

PATENTS.

Treatment of rubber and latex. DEUTS. HYDRIERWERKE A.-G. (B.P. 426,745, 29.12.33. Ger., 31.12.32. Addn. to B.P. 351,356; B., 1931, 854).—For the improvement of flexibility and better distribution of compounding ingredients, the alcohols of high mol. wt. (*loc. cit.*) can be replaced by < 1 of the following derivatives of aliphatic or alicyclic alcohols < C₈: ethers, H₂SO₄ reaction products, esters, acid esters, or neutralisation products of any of the foregoing. Examples are specified.

D. F. T.

Drying, with or without smoking, of rubber sheets. E. G. NISBET and A. L. DREW. From SOCFIN Co., LTD. (B.P. 427,045, 7.11.33).—Drying by heat is effected in two stages, the bulk of easily evaporable H₂O (94–96%) being removed first at a low temp. (38–49°) and the remainder at a higher temp. The sheets may be smoked, if desired, during the first stage. Apparatus is claimed.

J. S. G. T.

Production of strong and impervious rubber materials. R. F. MCKAY. From INTERNAT. LATEX PROCESSES, LTD. (B.P. 426,402, 3.10.33).—The gas-impermeability and tear-resistance of goods containing rubber (R) deposited from aq. dispersion are increased by diffusing into the R, with the aid of pressure and after superficial drying if so desired, a fluid hygroscopic material such as glycerol. The material may then be dried and vulcanised.

D. F. T.

Production of goods of or containing rubber or similar material [from aqueous dispersions]. INTERNAT. LATEX PROCESSES, LTD., R. F. MCKAY, and J. KAYE (B.P. 426,226, 4. and 13.1.34).—A predetermined or limited proportion of an aq. dispersion (D) of rubber containing one or more reagents, e.g., ZnO, inactive towards D, is brought in contact with an aq. medium (which may also contain rubber) containing one or

more other reagents, *e.g.*, $(\text{NH}_4)_2\text{SO}_4$, similarly inactive, but which by chemical interaction with the earlier reagents in the cold or on application of heat produce, *in situ*, active coagulating or gelling agents. The process can be applied to manufacturing processes, *e.g.*, by dipping a hot former coated with the aq. medium into the prepared latex, by gelling a quantity of mixture of *D* and medium inside a heated mould, or by forming rubber thread by streaming *D* into the medium. D. F. T.

Vulcanisation of rubber. J. R. INGRAM, and RUBBER SERVICE LABS. CO. (B.P. 426,649, 7.10.33).—Vulcanisation of a mixture of rubber, *S*, and an accelerator, *e.g.*, the reaction product of $(\text{CH}_2)_6\text{N}_4$ and mercaptobenzthiazole, is retarded, at least during its initial stages, by the presence of an aromatic monoketone [COPhMe , COPh_2 , $o\text{-C}_6\text{H}_4\text{BzCO}_2\text{H}$, $o\text{-C}_6\text{H}_4\text{MeCOPh}$, $p\text{-CO}(\text{C}_6\text{H}_4\text{Me})_2$]. D. F. T.

Coating compositions.—See XIII.

XV.—LEATHER; GLUE.

Chromatographic [fluorescence] adsorption analysis of [natural and synthetic] tanning materials. W. GRASSMANN and O. LANG (Collegium, 1935, 114—118).—A glass tube (15 cm. long, diam. 0.75 cm.) is filled with an adsorbent, *e.g.*, Al_2O_3 , CaCO_3 , SiO_2 gel, $\frac{1}{3}$ filled with an aq.-EtOH solution of the tanning material, and the "chromatograms" (I) or the colours of the different layers are observed in ultra-violet light before and after washing with EtOAc, EtOAc-MeOH, or ligroin. The (I) of different non-tans, vegetable tanning materials, and synthetic tannins have been determined. D. W.

Non-parasitic eczema damage to hides and leather. L. S. STUART and R. W. FREY (J. Amer. Leather Chem. Assoc., 1935, 30, 124—127).—Photographs and photomicrographs of the crusty patches and scabious damage caused to infected hides are given for 2 hides before and after tanning. The keratinous layer was reduced and the sebaceous glands were enlarged. D. W.

Effect of heat on vegetable-tanned leather. F. STATHER and H. HERFELD (Collegium, 1935, 118—126).—Vegetable-tanned leather (*L*) is easily damaged by heat as evidenced by diminished tensile strength, weakened grain, and, at high temp. (*T*), by diminished stretch. This damage (*D*) is the greater the higher is the H_2O content of *L*, the longer is the heating period, and the higher is the *T* at which *L* is heated. *D* is unaffected by the fat content of *L*, increased by both inorg. and org. fillers, and much increased by strong free acids in *L*. D. W.

PATENTS.

Manufacture of tanning substances. J. R. GEIGY A.-G. (B.P. 425,527, 14.9.34. Ger., 16.9.33. Addn. to B.P. 375,160; B., 1932, 951).—A SO_3H -free dihydroxydiphenylsulphone is condensed with CH_2O and a phenol-sulphonic acid in aq. alkaline medium. H. A. P.

Coating absorbent materials [e.g., leather]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 387,736, 4.6.32).—The leather is brushed with a 20% aq. suspension of the product made by polymerising a vinyl deriv-

ative, *e.g.*, Me acrylate, at 70—95° in presence of H_2O , H_2O_2 , Turkey-red oil, and Na diisopropylnaphthalene-sulphonate or similar catalyst. After drying, the leather is finished with a cellulose lacquer or synthetic resin varnish. A. R. P.

Production of glued or stuck materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 426,265, 20.9.33. Addn. to B.P. 387,736; cf. preceding abstract).—Monomeric vinyl compounds are polymerised while emulsified in a liquid (H_2O) in which they are insol. Mixtures of acrylic acid and an ester thereof are particularly useful; the η is increased by adding an alkali. Adhesives, *e.g.*, glue, softeners, and fillers may be incorporated. The glued articles (*e.g.*, leather) are hot-pressed. S. M.

[Glue] preservative. E. C. BRITTON and L. E. MILLS, Assrs. to DOW CHEM. CO. (U.S.P. 1,946,057, 6.2.34. Appl., 26.10.31).—Polychlorophenols, *e.g.*, the 2:4:6- Cl_3 - or 2:3:4:6- Cl_4 -compounds, are claimed. A. R. P.

Dyeing leather.—See VI.

XVI.—AGRICULTURE.

Variations in soil reaction. D. FEHÉR (Z. Pflanz. Düng., 1935, 37, 312—314).—The author's observations (B., 1932, 1095) are not essentially different from those of Nehring (B., 1935, 197). A. G. P.

Seasonal fluctuations in the p_{H} of the soil. P. BRUIN (Chem. Weekblad, 1935, 32, 218—224).—Similar fluctuations are shown by soils of widely different types, with and without fertilisers. D. R. D.

Effects of lime on the hydrogen-ion concentration and base-exchange complex of Grundy silt loam. R. H. WALKER and P. E. BROWN (Iowa Agric. Exp. Sta. Res. Bull., 1935, No. 178, 171—196).—The greatest change in soil reaction due to application of CaO , $\text{Ca}(\text{OH})_2$, or CaCO_3 occurred during the first month of treatment. The p_{H} change increased with the fineness of grinding (max. 100-mesh) and with the amount applied up to double the CaO requirement. The latter amounts produced in soil a degree of saturation with bases (*S*) of approx. 80%. Close correlation is established between the [H^+] of the soil and the exchangeable H^+ , and also between p_{H} and *S*. A. G. P.

Is hydrogen-ion concentration in all cases a practical criterion for judging reaction relationships of soils? P. KÖTTGEN (Phosphorsäure, 1934, 4, 219—222).—A low-moor soil showed initial p_{H} 5.6 and high Neubauer val. for P_2O_5 . The solid phase consisted of CaCO_3 coated with humus. CH. ABS. (p)

Selenium [in soils]. H. G. KNIGHT (J. Assoc. Off. Agric. Chem., 1935, 18, 103—108).—Se is likely to occur in appreciable quantities only in arid districts in which the soils are derived from pyritiferous materials. The only solution to the problem at present is to limit production in such areas to non-edible crops. E. C. S.

Soil tests useful in determining quality of caliche. H. S. GILLETTE (Public Roads, 1934, 15, 237—243).—Caliche formations are described. Physical tests are utilised. Chemical analysis has little significance in determining quality. CH. ABS. (p)

Determination of nitrogen [in soils]. Y. V. NARAYANAYYA and V. SUBRAHMANYAN (J.S.C.I., 1935, 54, 106 T).—The soil is refluxed for $\frac{1}{2}$ hr. with 2 vols. of H_2SO_4 + 1 vol. of H_2O in presence of $\text{K}_2\text{Cr}_2\text{O}_7$ + HgO . 5 g. of pure Zn dust (for 10 g. of soil) are added, and the digest is diluted and boiled again. NH_3 is then distilled over from the same flask. J. S. A.

Nitrogen-fixation studies with fungi and *Actinomyces*. F. E. ALLISON, S. R. HOOVER, and H. J. MORRIS (J. Agric. Res., 1935, 49, 1115—1123).—No evidence was obtained of N fixation by these organisms in soils. A. G. P.

Formation of nitrates on virgin and cultivated low-moor soil. B. SWIETECHOWSKI (Polish Agric. Forestal Ann., 1934, 33, 34—47).—Nitrification in these soils is initiated by the lowering of the ground- H_2O level during the growth period and is \propto the extent of drying out, even at p_H 4.0. CH. ABS. (p)

[Imperial] bacteriological report 1932-3. N. V. JOSHI (Imp. Inst. Agric. Res. Pusa Sci. Rept., 1934, 167—185).—Distribution of various N-fixing organisms is examined. The bacteria concerned are stimulated by secretions from maize roots. The bacterial counts and nitrifying power of these soils before the rainy season was $>$ in subsequent periods. The N-fixing power of soil was not affected by rains. In culture tests nitrification was not affected by dicyanodiamide (I) in concns. of 5—10 mg./litre, but is retarded at 25 mg./litre. In soil cultures CaCN_2 is probably convertible into a compound (C) [not (I)] which is insol. in H_2O , is retained by soil, and is toxic to nitrifying organisms. C is sol. in dil. HCl and yields NH_3 when distilled with MgO. Ground apatite (II) did not support growth of *Azotobacter*. Superphosphate had a favourable effect in some cases, but promoted fungal growth in soils. The solubility of (II) was not increased by composting with green manure, S, or C, nor by treatment with H_2SO_4 . Green berseem silage was prepared in pits after addition of 0.1% HCl. Yellow diseased leaves of sugar cane were poor in plant nutrient and high in starch contents. The disease was partly overcome by treatment of soil with K_2SO_4 or $(\text{NH}_4)_2\text{SO}_4$. CH. ABS. (p)

[Sudan Government agricultural] report, 1932—1933. H. GREENE (Sudan Govt. Ann. Rept. Gezira Agric. Res. Serv., 1933, 86—106).—Nitrification of CaCN_2 in temporarily H_2O -logged soil is examined. In unheated soil nitrates (I) were formed at the expense of residual N (II) (N other than NO_2' , NO_3' , NH_3 , and protein-N). In soil receiving $(\text{NH}_4)_2\text{SO}_4$ (III) both (II) and NH_3 -N contributed to formation of (I). Addition of ground dura stalks (IV) lowered the production of (I). Treatment with (III) and (IV) permitted simultaneous formation and utilisation of (I). Treatment of cotton soils (V) with aq. Na_2CO_3 increased the sediment vols. to $>$ that of virgin soils (VI). In H_2O , (V) settle less rapidly than (VI). CH. ABS. (p)

[Sudan Government] report, 1932-3, plant physiology section. F. CROWTHER (Sudan Govt. Ann. Rept. Gezira Agric. Res. Serv., 1933, 60—85).—Within 3 days of commencing H_2O -logging (I) of soils the upper leaves of young cotton plants yellowed and the % N in them declined. The rate of increase in leaf wt. was reduced

but assimilation continued. Absorption of N was resumed a few days after (I) ceased. The NO_3' content of the surface (6 in.) soil was not reduced during 1 week of (I). In the rainy season, (I), prior to planting cotton, caused a decrease in NO_3' in the soil, followed, when (I) ceased, by a rapid increase to vals. $>$ in normal soil. Undecomposed roots of dura reduced the availability of soil-N and depressed the growth of cotton. Early pre-watering favoured decomp. of org. matter and increased nitrification and the growth and N intake of plants. Soils heavily treated with $(\text{NH}_4)_2\text{SO}_4$ had low C : N ratios. CH. ABS. (p)

Determination of potassium in citric acid extracts of soils, in [plant ash from] Neubauer tests, and in liquid manure by the cobaltinitrite method. A. NĚMEC and J. LANÍK (Z. Pflanz. Düng., 1935, 37, 257—270).—The cobaltinitrite- KMnO_4 volumetric method is utilised. It is more satisfactory than the standard HClO_4 method. A. G. P.

Report of Imperial agricultural chemist. J. N. MUKERJI (Imp. Inst. Agric. Res. Pusa, Sci. Rept. [1932—3], 1934, 108—123).—Gas production from wheat flour bleached by the Novadelax process was much $<$ that from wheat dry-cleaned and unconditioned or that conditioned and tempered for milling.

In determining sucrose in bagasse, extraction must be continued for $<$ 1 hr.

Hibbard and Stout's method for determining K is unsatisfactory for quantities $>$ 5 mg. Fe^{III} , Ca, and Mg salts do not affect the accuracy of the method. It is preferable to add KMnO_4 to the pptd. cobaltinitrite and boil till decomp. is complete. 1 c.c. of 0.01N- KMnO_4 should be taken as \equiv 0.0625 mg. of K.

Removal of stalks prior to curing tobacco leaves results in higher starch and sugar contents, slightly increased protein : amide ratio, and lowered ash : K ratio in the product.

Rotting of potatoes stored at high temp. is due to O_2 deficiency and consequent destruction of catalase.

Fermentation of indigo in sealed tins is prevented by preliminary addition of Na_2CO_3 and heating.

Apricot-seed cake was rapidly nitrified in hill soils. Initial formation of NH_3 was high and NO_2' as well as NO_3' occurred. Cake contains small amounts of HCN. CH. ABS. (p)

Biologically active humus. B. NIKLEWSKI (Polish Agric. Forest. Ann., 1934, 33, 371—381).—Hot-fermented manure provides no more N than the cold-fermented. The former contains the higher proportion of H_2O -sol. humus, which is produced in greater amounts during the first 3 days of loose stacking than under tightly packed conditions. CH. ABS. (p)

Supply of humus to soils. F. K. JACKSON, Y. D. WAD, and V. G. PANSE (Empire Cotton Growing Rev., 1934, 11, 111—120).—Composts (I) were prepared from farm waste used as cattle bedding, dung, urine, ashes, etc. During composting, 42% of the N was lost. The decomp. of (I) was increased by growing N-fixing crops on the heaps. The material was an effective manure for black cotton soils. CH. ABS. (p)

Decomposition of straw in the production of artificial manure. F. B. SMITH and P. E. BROWN (Iowa

State Coll. J. Sci., 1934, 8, 409—413).—During decomp. of oat straw with the aid of various N supplements, nearly all cellulose and furfuraldehyde-yielding material together with 60—90% of the lignin disappeared.

CH. ABS. (p)

Silo-fermentation process [for farmyard manure]. P. EHRENBURG (Z. Pflanz. Düng., 1935, 37, 340—342).—Discussion of recent investigations.

A. G. P.

Influence of artificial fertilisers and stall manure on soil productivity. O. LEMMERMANN, H. ENGEL, and W. U. BEHRENS (Z. Pflanz. Düng., 1935, 37, 270—287).—Comparison is made of the effects of artificial farmyard manure (I) and chemical fertilisers. Results are discussed in relation to existing data and current theories. Instances of an inferior action of (I) are attributable to the lower efficiency of its N constituents.

A. G. P.

Sea sludge from the Baltic and North Seas. K. UTESCHER (Z. Pflanz. Düng., 1935, 37, 288—300).—The sludge has a high proportion of easily available nutrient material (as complex Al silicates), together with CaCO_3 and well decomposed org. matter. Provided due consideration is given to its NaCl content and possible presence of sulphide-S, the material forms a valuable dressing for light or heavy soils.

A. G. P.

Determination of the fertiliser requirement of soils. G. V. JACKS (Z. Pflanz. Düng., 1935, 38, 163—169).—A review of current methods.

A. G. P.

Determination of the phosphate requirement of soils. G. TOMMASI and L. MARIMPIETRI (Z. Pflanz. Düng., 1935, 38, 161—163).—A series of soil samples (1 g.) is treated with solutions containing increasing proportions of CaHPO_4 (I). After removal of excess of (I) and washing with H_2O (centrifuge) the residual soil is examined for total sol. PO_4''' by Wrangell's double-extraction method. The appropriate dressing of fertiliser necessary to produce a prescribed proportion of extractable PO_4''' is calc. from the vals. obtained.

A. G. P.

Available phosphorus and potassium contents of surface soils and subsoils as shown by the Neubauer method and by chemical tests. S. F. THORNTON (J. Amer. Soc. Agron., 1935, 27, 46—51).—Neubauer (I) vals. for subsoils are much lower with respect to P and slightly lower with respect to K than those for corresponding surface soils. Chemical tests (II) indicate only slightly lower availability in both cases for subsoils. Little correlation is apparent between p_H vals. and available P and K by (I) tests, but (II) register, with increasing p_H , an increase in P and a decrease in K vals. Poor productivity in humid soils is frequently attributable to P deficiency in subsoils.

A. G. P.

Determination of the availability of nitrogen and phosphorus to plants. E. M. EMMERT (J. Amer. Soc. Agron., 1935, 27, 1—7).—Crop yields are correlated with the proportion of sol. N and P in the lower conducting tissues of the growing plants. Sol. N is determined in dil. AcOH extracts of tissue by oxidation with NaClO_3 -oleum and subsequent examination by the $\text{C}_6\text{H}_3(\text{OH})(\text{SO}_3\text{H})_2$ method. The interdependence

of N and P intake by tomatoes is demonstrated and optimum vals. for N, P, and N:P are considered. The above tests on plant tissue reflect manurial treatment.

A. G. P.

Nitrogen, phosphorus, and potassium requirements of Indiana surface soils and subsoils. S. D. CONNER (J. Amer. Soc. Agron., 1935, 27, 52—56).—Pot-culture tests with various crop successions are recorded. The fertiliser requirements of eroded surfaces are discussed.

A. G. P.

Gas-burner top for ignition in determination of potash in fertilisers. L. E. HORAT and O. W. FORD (Ind. Eng. Chem. [Anal.], 1935, 7, 119).—The device is designed to heat a dish at low temp. on the sides as well as the bottom.

E. S. H.

Manuring of newly cultivated soils. I. General. G. TOMMASI. II. United States of America. J. H. BEATTIE. III. Germany. (i) B. TACKE, (ii) M. POPP, (iii) F. SCHEFFER. IV. Jugoslavia. V. MANDEKIC. V. Lettland. P. KULTANS. VI. Holland. C. SMITS. VII. Austria. J. KORINEK. VIII. Scotland. W. G. OGG and I. M. ROBERTSON. IX. Sweden. (i) H. OSVALD, (ii) G. GIOEBEL. X. Spain. J. D. MUÑOZ. XI. Czechoslovakia. A. ERNEST. XII. U.S.S.R. M. W. KATALIMOV. XIII. Hungary. A. J. VON SIGMOND (Z. Pflanz. Düng., 1935, 38, 80—99, 99—104, 105—109, 109—113, 114—117, 118—121, 121—124, 124—127, 127—130, 130—138, 139—141, 141—145, 145—147, 148—153, 153—155, 155—161).—The conditioning and manuring of newly broken soils of various types are described.

A. G. P.

Manuring of soils in dry climates. I. General. F. SEKERA. II. United States of America. (i) M. J. S. COLE, (ii) W. T. McGEORGE. III. Germany. (i) F. SCHEFFER, (ii) F. ALTEN. IV. Italy. A. DE DOMINICIS. V. Jugoslavia. V. MANDEKIC. VI. Morocco. E. MEËGE. VII. Rumania. I. DOBRESKO. VIII. Czechoslovakia. A. ERNEST. IX. Turkey. F. GIESECKE. X. U.S.S.R. PERITURIN (Z. Pflanz. Düng., 1935, 38, 3—15, 15—18, 18—22, 23—28, 28—31, 31—35, 36—37, 37—58, 59—65, 65—67, 68—74, 75—79).—The various soils are described and appropriate manurial systems discussed.

A. G. P.

Action of seed dips in stimulating germination. J. HAUSER (Mezög.-Kutat., 1934, 7, 69—76; Chem. Zentr., 1934, ii, 1672).—An initially accelerated germination of wheat after treatment with certain dips is recorded. All preps. examined retarded development of seedlings at a later stage.

A. G. P.

Effect of illuminating gas on vegetation. J. LAISSUS and R. HEIM (Chim. et Ind., 1935, 33, 546—555).—No definite injury was observed in aspidistra (I), mustard, radish, or oats. Prolonged exposure of (I) to gas resulted in somewhat increased chlorophyll formation and delayed or suppressed flowering.

A. G. P.

Importance of appropriate nutrient ratios for plants. O. LEMMERMANN and W. U. BEHRENS (Z. Pflanz. Düng., 1935, 37, 300—311).—In pot cultures of oats on a light sandy soil, fertiliser treatment corresponding to a P:K ratio < 1:1.5 resulted in

proportionally decreased growth. Higher ratios (to 1:4.5) were not disadvantageous. A. G. P.

Potash starvation and the cotton plant. R. C. WOOD (Empire Cotton Growing Rev., 1934, 11, 25—29).—On K-deficient soils yields of cotton were much reduced and the lint was shorter, more irregular, and contained a larger proportion of poorly thickened hairs. These effects were intensified by use of N and P fertilisers, but masked by heavy dressings of artificial farmyard manure. CH. ABS. (p)

Sugar-beet variety protruding from soil: its [factory] "workability." O. SPENGLER, S. BÖTTGER, and C. BONNE (Z. Wirts. Zuckerind., 1935, 85, II, 177—195).—A green-topped protruding variety is described. Recorded trials show good sugar yields, resistance to disease, and workability in the factory. A. G. P.

Possibilities of improving pulping characteristics of pulp woods by controlled hybridisation of forest trees. E. J. SCHREINER (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 101—105).—Certain hybrid poplars are more useful for soda-pulp manufacture than native poplar (aspen) on account of their greater average fibre length and somewhat higher *d*. H. A. H.

Relation of root distribution to organic matter in prairie soil. J. E. WEAVER, V. H. HOUGEN, and M. D. WELDON (Bot. Gaz., 1935, 96, 389—420).—Data showing the hygroscopic coeff., H_2O -equiv., vol.-wt., pore space, and org. matter (I) and N contents (II) at varying depths of an upland (III) and a lowland (IV) loam are examined in relation to root and rhizome distribution of typical grasses. (I) and (II) of roots were higher in (III) than in (IV), and higher in rhizomes than in roots. A linear relationship is established between the amount of root material and the (I) in soil at all depths > 6 in. A. G. P.

Soils and crops. [Composts for mushroom culture.] S. A. WAKSMAN (New Jersey Agric., 1933, 15, No. 1, 6—7).—Decomp. of manure during composting affects the H_2O -sol. matter (I), carbohydrates, cellulose, hemicellulose, fats, and waxes. Removal of (I), especially urea and NH_3 , which are unfavourable to mushrooms (II), is partly effected by biological conversion into proteins. (II) utilise 75% of the lignin and 50% of the protein (III) of the compost. Half the balance of (III) is found in the mycelium. The residual compost is a valuable fertiliser for golf greens. CH. ABS. (p)

Nitrogen transformations of ammonium thiocyanate (a weed eradicator), in the soil. C. E. SKINNER and A. SANDHOFF (J. Bact., 1935, 29, 79).—In amounts commonly used in agricultural practice NH_4CNS (I) increased bacterial nos. Organisms were isolated which used CNS' as the sole source of N in glucose media. Large applications of (I) depressed bacterial counts, but not those of algae or protozoa. Half of the N of (I) serves as an available fertiliser. A. G. P.

Potato spraying: value of late applications of magnesium-Bordeaux. R. BONDE (Amer. Potato J., 1934, 11, 152—156).—Yellowing of plants due to Mg deficiency was quickly eliminated by use of Bordeaux

mixture containing dolomitic lime. Crop yields were increased. Use of high-Ca limes was ineffective. CH. ABS. (p)

Control of the cabbage root fly. E. E. EDWARDS (J. Min. Agric., 1935, 42, 34—38; cf. B., 1934, 598).—Use of $HgCl_2$ solution (1 oz. per 10 gals.) in 3 applications of 0.25 pint per plant was highly effective, but slightly inferior to concns. of 1 oz. per 8 gals. described previously. Dil. solutions of tar distillate and $MgSO_4$ showed considerable promise. A. G. P.

Celery chlorosis. W. R. ROBBINS (New Jersey Agric., 1933, 15, No. 3, 5—6).—Chlorosis (I) due to excessive liming develops in muck soils having pH 7.2—8.0. Treatment with $Al_2(SO_4)_3$, S, $(NH_4)_2SO_4$, or other acid-reacting materials corrects (I) by re-liberation of soil-Fe. CH. ABS. (p)

Toxicity of phenolic compounds to certain onion-bulb parasites. J. C. WALKER and K. P. LINK (Bot. Gaz., 1935, 96, 468—484).—The toxicity to onion fungi of phenols having OH in the *ortho*-position increases with rise in mol. wt. ($PhOH < pyrocatechol < pyrogallol$). The reverse is the case with *meta*-orientation ($PhOH > resorcinol > phloroglucinol$). $PhOH$, pyrocatechol, and salicylic acid retard growth of fungi in concns. < the inhibitive concn. (I). Guaiacol and *m*-hydroxybenzoic, veratric, and vanillic acids stimulate growth in < the (I). A. G. P.

Fruits and vegetables. [Codling moth sprays.] T. J. HEADLEE (New Jersey Agric., 1933, 15, No. 2, 4—5).—Successive treatments with white oil-pyrethrum-skim-milk preps. gave as good protection from codling moth as did Pb arsenates. Nicotine tannate (I) sprays were still more effective. 75% of the nicotine from (I) disappeared within 10 days from spraying. CH. ABS. (p)

Soils and plants of diseased sisal stock in E. Africa. K. SCHMID (Phosphorsäure, 1934, 4, 676—685).—Disease is associated with P deficiency. Affected plants had a wider Ca:P ratio and higher Mg content than normal. The Ca:K ratio was not markedly affected. CH. ABS. (p)

Microbiological activities affected in manurial control of cotton root rot. C. J. KING, C. HOPE, and E. D. EATON (J. Agric. Res., 1935, 49, 1093—1107).—On soils treated with org. manures the general microbiological population was >, and that of root-rot fungus <, on untreated soils. A. G. P.

Report on botany and plant pathology, 1932-1933. [Blackarm disease of cotton caused by *B. malvacearum*.] R. E. MASSEY (Sudan Govt. Ann. Rept. Gezira Agric. Res. Serv., 1933, 126—146).—The organism was killed by 0.2% aq. HCl. A mixture of 4 pts. of $HgCl_2$ and 1 pt. of HgI_2 in aq. solution (1 p.p.m.) inhibited the growth of *B. malvacearum* in 5 min. and was lethal in 15 min. China clay is an effective filler for disinfectant dust for cotton seed. CH. ABS. (p)

Pyrethrum extract spraying for control of *Antestia* on coffee. R. H. LE PELLEY (Kenya Colony Dept. Agric. Bull., 1934, No. 8, 15 pp.).—Successful use of kerosene extract of pyrethrum is described. CH. ABS. (p)

Chlorosis of fruit trees. V. Control of lime-induced chlorosis by injection of iron salts. T. WALLACE (J. Pomology, 1935, 13, 54—67; cf. A., 1929, 362).—Satisfactory results of injection of Fe citrate are recorded. The point of injection is an important factor. A. G. P.

Field-spraying trial of combined fungicide-contact insecticide sprays, 1933. Progress report M. H. MOORE (Ann. Rept. East Malling Res. Sta., 1933, 156—165).—Control of apple scab (I), red spider, and sawfly (III) was obtained by combination of CaO-S (IV) and nicotine (II), with sulphite lye as wetter and spreader. (II) acts as ovicide against (III). Replacement of (II) by derris lowered the efficiency against (III) but not against (II). Use of 2 pre-blossom applications of (IV) did not improve control of (I). A. G. P.

Three *Phytophthora* diseases of lilac and their pathogens. K. S. CHESTER (J. Arnold Arboretum, 1932, 13, 232—268).—Optimum growth pH vals. are determined. Bordeaux mixture (4:5:50) inhibited all zoospore germination. S was ineffective. CH. ABS. (p)

Flowers. [Root rot and soft rot of calla.] R. P. WHITE (New Jersey Agric., 1933, 15, No. 2, 3—4).—The diseases were controlled by soaking soil-free corms for 3—5 hr. in either CH_2O (1 pint of formalin in 15 gals. of H_2O) or $HgCl_2$ solution (2 oz. per 15 gals.). CH. ABS. (p)

Report of Imperial mycologist. W. McRAE (Imp. Inst. Agric. Res. Pusa, Sci. Rept. [1932—3], 1934, 134—151).—Recovery from yellowing of sugar cane was facilitated by treatment of soil with $CaSO_4$, uspulun, and especially with K_2SO_4 . Foot rot of *Piper betel* was satisfactorily treated with $PhOH$ (0.5—1.0%). CH. ABS. (p)

Report of Imperial entomologist. P. V. ISAAC (Imp. Inst. Agric. Res. Pusa, Sci. Rept. [1932—3], 1934, 161—166).—Rats in paddy fields are better controlled by bran bait containing $BaCO_3$ than with KCN baits. *Atholia proxima* is controlled by dusting with $Ca(CN)_2$. CH. ABS. (p)

Effect of resin spray on control of white fly. [Report of entomological section, 1932—1933.] J. W. COWLAND (Sudan Govt. Ann. Rept. Gezira Agric. Res. Serv., 1933, 107—125).—White-fly nymphs on pomegranate were controlled with NaOH-resin sprays. On cotton *Bemisia gossypiperda* was less easily destroyed. Castor oil-resin-aq. NH_3 preps. gave better results with nymphs, but reinfestation by adults occurred. There was considerable leaf scorch. CH. ABS. (p)

Improvements in fumigation. A. B. PAGE (Empire Cotton Growing Rev., 1933, 10, 11—16).—Use of CS_2 in concns. sufficient to ensure high toxicity is unsafe. CS_2 has little effect on insect eggs. A 6:4 mixture of $C_2H_4Cl_2$ and C_2HCl_3 is moderately toxic and non-inflammable. HCN is approx. 6 times more toxic than $(CH_2)_2O$. Methods of fumigation of stored products are discussed. CH. ABS. (p)

Derris and pyrethrum powders. A. E. BADERTSCHER and R. WOTHERSPOON (Soap, 1935, 11, 87—89, 111, 113).—Treatment by an unspecified process improved the stability of the powders to light and air (cf. B., 1932, 697; 1933, 654). G. H. C.

Parchment [for vegetable hot-houses].—See V. $(NH_4)_2SO_4$ from gypsum. Citric-sol. PO_4''' in phosphorites. Basic slag. Determining F in phosphates etc.—See VII. H_2O supply of soils. [Fertiliser from] animal wastes.—See XIX. Camphor.—See XX.

PATENTS.

Fertiliser. M. W. ST. JOHN, Assr. to JONES & LAUGHLIN STEEL CORP. (U.S.P. 1,951,742, 20.3.34. Appl., 18.1.32).—Claim is made for a mixture of $(NH_4)_2SO_4$ with sufficient 20—50-mesh limestone to neutralise most of the free acid liberated by the soil reactions. A. R. P.

Manufacture of fertilisers. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 424,260, 17.7.33).—Lignite, peat, sawdust, or the like is mixed with finely-ground pebble phosphate and the mixture is treated with N_2O_4 from the catalytic combustion of NH_3 . When absorption ceases the acid product is neutralised with NH_3 or $(NH_4)_2CO_3$, and, if desired, mixed with K fertiliser salts. A. R. P.

Production of fertilisers [from peat]. COMP. BELGE DES FERTILISANTS, A BRAINE L'ALLEUD (B.P. 424,008, 18.8.33. Belg., 19.8.32).—Peat slices moistened with H_2O are neutralised with $CaCO_3$ waste from sugar refining, treated with small quantities of $Al_2(SO_4)_3$ and NaH_2PO_4 , mixed with earth taken from land planted with *Cruciferae*, and aerated at 40° for periods of 48 hr. with intervals of 12 hr. for several days to produce fermentation. The culture so obtained is mixed with fresh peat, the mixture compressed, dried, and ground to a powder. A. R. P.

Production of phosphatic fertilisers. KALI-CHEMIE A.-G. (B.P. 424,045, 16.7.34. Ger., 29.8.33).—Natural F-containing phosphates are heated at $>1000^\circ$ (1150°) in a current of steam (and preferably after addition of SiO_2) to expel the F and the temp. is then raised above 1300° , e.g., to 1500° , for $\frac{1}{2}$ —1 hr. to render the phosphate sol. in aq. citric acid. A. R. P.

Production of [phosphate] fertilisers. W. H. MACINTIRE (U.S.P. 1,953,419, 3.4.34. Appl., 28.3.32).—Superphosphate is mixed with dolomite which has been calcined at 600 — 700° until a substantial part of the $MgCO_3$ has been converted into MgO while only a small amount of CaO has been formed. A. R. P.

Production of soluble fertilisers from tricalcium phosphate. SOC. ANON. "PRODUITS CHIM. ET ENGRAIS L. BERNARD," and G. GOORMAGHTIGH (B.P. 425,477, 11.9.33).—A mixture of phosphate rock, Na_2CO_3 , $CaCO_3$, and SiO_2 is heated at 1200° to produce a mixture of Na_2O, CaO, P_2O_5 (citrate-sol.) and 72.5 CaO, SiO_2 , 27.5 Na_2O, SiO_2 (eutectic). The product is finely ground for direct use. A. R. P.

[Non-caking] fertilising salts. H. GRAH (B.P. 425,326, 31.10.33. Ger., 29.11.32. Addn. to B.P. 401,520; B., 1934, 115).—The coagulation of the $Fe(OH)_3$ or $Al(OH)_3$ sols used for preventing caking of fertiliser salts (I) is accelerated by addition of $(NH_4)_2SO_4$ to the sol prior to spraying it on the (I). A. R. P.

[Agents for] selective destruction of adventitious plants and improvement of crops. G. TRUFFAUT and I. PASTAC (B.P. 425,295, 29.5.33. Fr., 4.6.32).—

The use of nitrophenols, nitronaphthols, etc. [*e.g.*, 1:2:4-OH·C₆H₃(NO₂)₂, 2:1:3:5-OH·C₆H₂Me(NO₂)₂, 1:2:4-OH·C₁₀H₅(NO₂)₂] in conjunction with wetting agents is claimed. [Stat. refs.] H. A. P.

Production of disinfectants and plant protectives.

C. WEIDNER (B.P. 423,462, 7.12.33. Ger., 7.12.32).—Claim is made for mixtures of persulphates with thiocyanates and, if desired, (CH₃)₆N₄, sulphites, hypsulphites, and catalysts, *e.g.*, FeSO₄. A. R. P.

Preparations for eradicating weeds. L. and F. MEYER (CHEM. FABR. L. MEYER) (B.P. 425,361, 8.9.33. Ger., 8.9.32).—Mixtures of partly dehydrated sol. Cu salts with alkali salts other than NaCl are claimed, *e.g.*, CuCl₂·H₂O 32, CuSO₄·H₂O 34, and Na₂SO₄ 32%. A. R. P.

Fungicide. M. C. GOLDSWORTHY, ded. to U.S.A. (U.S.P. 1,954,171, 10.4.34. Appl., 10.9.32).—Claim is made for a mixture of Cu₃P₂O₈ and CaO. A. R. P.

Fungicides.—See VII.

XVII.—SUGARS; STARCHES; GUMS.

Determination of ash in sugar beet by electrical conductivity measurements. E. SAILLARD and R. SAUNIER (Compt. rend., 1935, 299, 775–777).—The mineral matter in fresh beet juice may be determined by measuring the electrical conductivity of the juice obtained by extracting with H₂O alone, or with AcOH, and suitably diluted (*cf.* B., 1933, 840).

M. S. B.

Optimum working conditions for diffusion of [sugar] beet cossettes. K. FRIDMAN (Nauch. Zapiski, 1934, 11, 36–46; Internat. Sugar J., 1935, 37, 155).—Standards of working the diffusion process with the min. loss of sugar are: max. diffusion temp. 85°, average diffusion temp. 65°, temp. of barometric H₂O 45°, diffuser charge 50 kg. per hectolitre, and juice draught 130–140% (on beets). By observing these conditions, the sugar losses in diffusion may be reduced to 0.2%. When working ripe beets, the colloids (determined by the Dumanskov method) % dry substance is 0.158–0.312, but with frozen beets this increases to 0.612–1.136 and with thawed beets to 1.584–2.273.

J. P. O.

Behaviour of colloids in raw beet-sugar juice in various methods of purification. C. W. SCHONEBAUM (Chem. Weekblad, 1935, 32, 179).—The colloids are completely coagulated by addition of 0.35% of CaO (I) and warming to 85°. A certain amount of coagulation occurs in acid media (*p*_H 4.5), but addition of NaOH has practically no effect. A similar result is obtained by adding (I) to the warm solution. S. C.

Zeolitic purification of sugar juices. G. AUSTERWEIL (Sucr. belge, 1934, 53, 421–431; Chem. Zentr., 1934, ii, 1857–1858).—Using NH₄-zeolites (I), NH₄ ions pass into the sugar juice, from which NH₃ is removed and recovered by evaporation. The ash is reduced to a very small vol. by using (I). H. J. E.

Limits of sugar extraction from spent active carbon. N. N. KUDELIA (Nauch. Zapiski, 1934, 11, 54–56; Internat. Sugar J., 1935, 37, 155).—To use a min. of H₂O in washing spent active C, H₂O at 90–95°

is advised, and the thickness of the cake should be > 20–25 mm. If the sugar content of the last sweetwaters be < 0.5%, this will leave 6–10% of sugar in the C press-cakes. It is hardly economical to carry the washing further. J. P. O.

Corrosion [by sugar juices] in evaporators.

M. GARINO (Ind. Sacc. Ital., 1935, 28, 1–11; Internat. Sugar J., 1935, 37, 155).—Two types of evaporators were examined: one having a quadruple effect with pre-evaporator and a temp. gradient of 135–85°, and the other was a modern triple-effect pressure evaporator (gradient 126–108°). The degree of corrosion was a function of the Cl content of the juices and the temp. to which they were submitted. J. P. O.

Effect of removal of lime salts on crystallisation of syrup.

G. A. SOKALOV and A. I. GALION (Nauch. Zapiski, 1934, 11, 47–53; Internat. Sugar J., 1935, 37, 154–155).—Complete removal of Ca salts by Na₂CO₃ decreases the velocity of crystallisation (*C*) by 17.5%, but removal thereby to the extent of 70% can be effected without apparent decrease, and sulphuring is capable of facilitating subsequent *C*. J. P. O.

Low-grade massecuites.

D. M. GLICK (Internat. Sugar J., 1935, 37, 158–159).—It is impossible to add H₂O to the massecuites in the crystallisers without increasing the purity of the molasses, even when the massecuite is at a temp. < the point of saturation. On the other hand, the temp. of the mixers has often been raised 6–10° F. above the point determined on the saturascope with no apparent rise in purity resulting. J. P. O.

Molasses or wood sugar for preparation of bakers' yeast.

H. CLAASSEN (Deut. Zuckerind., 1934, 59, 283; Chem. Zentr., 1934, ii, 1698).—Constituents of molasses other than sugars (*e.g.*, N and K) are of sp. val. in preparing yeast. H. J. E.

Comparison of official reducing-sugar methods in analysis of raw cane sugars.

F. W. ZERBAN, W. J. HUGHES, and M. H. WILEY (J. Assoc. Off. Agric. Chem., 1935, 18, 118–122; *cf.* B., 1934, 1029).—Comparative analyses of mixtures of sucrose, glucose, and fructose show that the Herzfeld method is more reliable than either the Allihn–Browne (B., 1920, 829 A) or the Munson–Walker method. E. C. S.

Micro-organisms and raw cane-sugar deterioration.

A. F. BELL and P. J. STAUNTON (Internat. Sugar J., 1935, 37, 142–144).—Provided that during the course of manufacture the temp. is not allowed to drop much below the average, contamination with bacteria, yeasts, and moulds is of no consequence, excepting the thermophilic bacteria, which are mostly introduced in the dirt adhering to the cane. Throughout the process aseptic measures should be applied so far as is practicable; especially the use of cooling-tower H₂O for washing the sugar in the centrifugals should be abandoned, and steam-drying applied in its place. In controlling the conditions for the proper warehousing of sugar, a modification of the "safety factor" should be applied, viz., the "dilution indicator" (100 × moisture)/solids non-sucrose. Vals. for this > 40–50 indicate that the sugar is liable to deterioration. J. P. O.

Determination of reducing sugars. G. CURLI (Ind. Ital. Cons. Alimentari, 1934, 9, 4—100; Internat. Sugar J., 1935, 37, 151).—Into a 400-c.c. flask are introduced successively: 30 c.c. of a solution of cryst. CuSO_4 containing 69.278 g. per litre; 20 c.c. of glycerin solution (1:4) and 40 c.c. of $N\text{-NaOH}$; and 50 c.c. of distilled H_2O . After the addition of 25 c.c. of the sugar solution under test, the mixture is heated in the usual way; when boiling is terminated, 50 c.c. of distilled H_2O are added, and the whole is transferred to a 240-c.c. flask, cooled, and made up to the mark. An aliquot portion of the filtered liquid is then titrated (Congo-red) against $0.5N\text{-H}_2\text{SO}_4$. A table is presented showing cg. of glucose in 25 c.c. with the corresponding amounts of $0.5N\text{-H}_2\text{SO}_4$. J. P. O.

Baryta clarification method [in the double polarisation method of determining sucrose]. E. HADDON (Rev. Agric. Maurice, 1934, No. 78, 202; Internat. Sugar J., 1935, 37, 153).—To 100 c.c. of de-leaded clarified juice are added 2 g. of baryta and the mixture is boiled under reflux for about 4 min., cooled, neutralised with 5 c.c. of AcOH , made up to 200 c.c., filtered, and polarised. When juices are clarified with just the right amount of Pb and are examined before and after de-leading, the difference between the two polarisations will indicate the amount of asparagine present. J. P. O.

Control of the washing-out process in potato-starch manufacture. L. W. JIRAK (Z. Spiritusind., 1935, 58, 81—82, 93—94).—Details are given for rapidly determining starch polarimetrically in potato raspings or pulp, gelatinisation being achieved by heating the samples with 67% MgCl_2 solution in small flasks. Calculation of amounts of starch removable (R) by washing from analysis figures of unwashed and washed pulps gives results agreeing closely with the val. for R found directly. For a given degree of disintegration, the amount of R is dependent on the intensity of washing. I. A. P.

Imperial agricultural report. Sugar beet.—See XVI. **Determining lactose in mixed feed.**—See XIX.

PATENT.

Fertilisers from peat.—See XVI.

XVIII.—FERMENTATION INDUSTRIES.

Determination of diastatic power of malt by potassium ferricyanide titration. F. W. NORRIS and W. A. CARTER (J. Inst. Brew., 1935, 41, 167—171).—Simple proportionality exists between titration vals. (V) and $\text{K}_3\text{Fe}(\text{CN})_6$ concn. in titrations against invert sugar solution or conversion liquids (L) obtained from malts in diastatic power (D) determinations. In determining D , L may be titrated against 20 c.c. of boiling 1.333% $\text{K}_3\text{Fe}(\text{CN})_6$ solution + 5 c.c. of $2.5N\text{-NaOH}$, using methylene-blue as internal indicator; under these conditions V agree closely with those obtained by the Institute of Brewing standard method, and may be substituted directly in the formula for calculating Lintner val. The end-point is sharp and easily detected under all ordinary lighting conditions. It may be necessary for individual analysts to modify the

$[\text{K}_3\text{Fe}(\text{CN})_6]$ used to accord with the results of their Fehling technique. I. A. P.

Diastase and determination of diastatic power, especially in green malt. B. LAMPE and R. DEPLANQUE (Z. Spiritusind., 1935, 58, 79—80, 85—86, 92, 94, 100—102).—In the prep. of extracts of green malt, part of the amylase (A) remains undissolved owing to sisto-action (S). Dilution of the extract with H_2O before filtration through paper decreases appreciably its dextrinising power (D) (I colour change) and saccharifying power (M) (modified Windisch-Kolbach), due to increase in size of the dispersed enzyme particles. Dilution after filtration is without effect. Fineness of grinding or crushing has little effect on D . Centrifuged extract (I) has D and M > that of extract filtered bright, but < that of extract filtered through a coarse sieve (II). The difference between D of (I) and (II) decreases as extract concn. increases. The H_2O -insol. A of a filter residue can be activated by gelatin and to a smaller extent by Witte's peptone. Extracts prepared with such eluents show increased activity, but dissolution of A still remains incomplete. In measuring diastatic activity the same concn. of extract should always be prepared, increase in concn. increasing the amount of A passing into solution. In kilned malt S is small. I. A. P.

Significance of the formol-protein number in the valuation of malt. O. MENZEL (Woch. Brau., 1935, 52, 105—109).—The formol no. (F) (mg. of $\text{NH}_2\text{-N}/100$ c.c. of 12% wort) measures both the extent and manner of modification of malt-proteins. The "degree of modification" (M) (dissolved N as % of malt-N) measures the former only, and should be interpreted as indicating the excellence of modification only when taken in conjunction with the total malt-N (T). Buffering properties are given by F taken together with total acid (A). Malts with low T have smaller F and greater M than malts with high T . With increasing F , there is increase in sol. N (abs. val.), wort-extract protein (W), NH_2 -protein, A , maltose, and brightness of wort, whilst extract difference between fine and coarse grind, time of saccharification, and "protein difference" ($\frac{1}{3}T - W$) decrease. Malts with $F > 230$ are characterised as over-modified, 200—230 very well modified, 180—200 good, < 180 badly modified. I. A. P.

Areometric determination of the yeast content of wort, and its application to the separation of yeast in yeast factories. W. HELLER (Przemysl Chem., 1935, 19, 3—9).—The yeast content (I) can be determined areometrically, with a mean error of 0.25—0.5%, according to the d of the wort. A no. of formulæ are given, connecting the d of solutions with their (I); they are applicable to the control of the various stages of yeast production. R. T.

Calculation of the original wort content of beer. L. HEINTZ (Chem. Weekblad, 1935, 32, 176—178).—A discussion of the various formulæ put forward for calculating this factor. The simplified formula, $2(\text{EtOH content}) + \text{actual extract content} = \text{original wort extract}$, expressed as wt./vol.-%, is preferred for practical purposes. S. C.

Pitching temperatures of mashers for varying fermenting-room temperatures. A. FREY and E.

MALLENKE (Z. Spiritusind., 1935, 58, 123—124).—From a consideration of heat exchanges during the fermentation of a given vol. of mash in a vessel of given construction, suitable mash concn. or pitching temp. for beginning fermentations at various room temp. may be deduced.

I. A. P.

"Tourne" disease of wine. W. V. CRUICK (Fruit Products J., 1935, 14, 198—200, 219).—"Tourne" is destroyed by pasteurisation at 82.2° for 1 min. or at 60° for 5 min. Tannin in sufficient concn. to inhibit growth gives an astringent flavour. 75 p.p.m. of SO₂ checks growth.

E. B. H.

Apple wine. II. Substances of the apples and the ingredients of the apple must. G. F. WOLFF (Fruit Products J., 1935, 14, 209—210).—Average analyses, but no individual results, are given.

E. B. H.

Fermentation as a factor in producing organic acids. H. T. HERRICK and O. E. MAY (Chem. Met. Eng., 1935, 42, 142—143).—A review. D. K. M.

Prep. of yeast.—See XVII. Organisms in food.—See XIX.

PATENTS.

Clarification of beer. E. F. STANLAND (B.P. 427,231, 30.5.34. Addn. to B.P. 410,369; B., 1934, 647).—Beer from the chilling or supply tanks passes through a circuit comprising a filter-press (*F*) and a return pipe with a brine-jacketed cooling chamber, wherein the beer and brine may circulate in the same or opposite directions. The beer is thus cooled for filtering to the lowest temp. to which it has been chilled, eliminating the temp. rise due to passage to *F*, and ensuring quiet filling on the bottling machine.

I. A. P.

Manufacture of [fermented] beverages. M. WAHL, Assee. of H. L. WOHLMUTH (B.P. 426,729, 9.10.33. Ger., 10.10.32).—A new species of yeast, isolated from fruit juices by single-cell culture methods, feebly ferments glucose, fructose, maltose, and sucrose in suitable nutrient solutions, but propagation is active. Lactose is not affected. The cells are mostly elliptical and are smaller than those of *Sacch. cerevisiae* (average diam. 5.5—7 μ), but sporulate readily even in culture liquids, producing 2—4 spores per cell in 2—3 days. Beer wort may be fermented with this organism for 4—6 days; after a secondary fermentation period of 1—4 weeks the product is carbonated and may be pasteurised, the final beverage resembling beer and containing 0.2—0.3% of EtOH.

I. A. P.

Preventing boiler corrosion.—See I. Fertilisers from peat.—See XVI.

XIX.—FOODS.

Proteolysis in flours. A. K. BALLS and W. S. HALE (J. Assoc. Off. Agric. Chem., 1935, 18, 135—140).—The activity of flour (*F*) proteinase is determined by alcoholic titration (A., 1926, 174) during digestion of the *F* proteins themselves. In whole wheat *F* optima for digestion occur at *pH* 3.3 and 5.0, in white wheat *F* at 4.5, in barley *F* a broad optimum occurs between 4 and 6, and in rice *F* between 5 and 7. The enzyme in wheat *F* is activated by SH.

E. C. S.

Influence of granulation or free surface on gluten and gassing characteristics of wheat flours. I. W. GRÜNDER (Mühlenlab., 1935, 5, 17—26).—Since the chemical composition of the various stages in the reduction of coarse semolina could not be kept absolutely uniform, the abs. influence of the total free surface (*S*) on gluten and gassing characteristics (*C*) could not be determined. The gassing power (determined by the Fermentograph) and rate of dough or gluten development (determined by the Farinograph) of the reduction products, however, increase with the fineness of grind or *S*, as determined from the granulation curves.

E. A. F.

Determination of the acidity factor of [wheat-] flour fat for evaluating age of flours. N. P. KOSMIN and K. A. ALAKRINSKAJA (Mühlenlab., 1935, 5, 33—36).—The acidity factor (*A*) of flour fat (*B*) is independent of the amount of *B* extracted; hence the time of extraction can be reduced to 1 hr. (cf. B., 1930, 963). A table given shows the regular increase in *A* with the age of flour (*C*) and with rise in storage temp. Since the presence of free fatty acids improves the gluten quality, the effect of storage on the quality of a given *C* can be predicted from *A*. *A* is determined as follows: 20 g. of *C* in a paper case (*P*) are refluxed for 1 hr. with 200 c.c. of C₆H₆ in a weighed Erlenmeyer flask. The *P* is removed and rinsed with 20 c.c. of C₆H₆. After evaporating the C₆H₆, *B* is dried at 75—80° for 2 hr., the wt. of *B* being determined by difference. *B* is dissolved in 40 c.c. of 1:1 Et₂O—EtOH, and micro-titrated (phenolphthalein) with 0.01N-KOH.

E. A. F.

Influence of free fatty acids on baking quality of wheat flour. H. KÜHL (Mühlenlab., 1935, 5, 25—30).—Baking tests on flour to which wheat germ (*W*), with and without its natural free fatty acid content (*I*), had been added, showed that the presence of (*I*) leads to a firmer and more elastic gluten (*G*). Hydroxy-fatty acids (*II*), produced by the oxidation of (*I*) by the oxidase present in the *W*, do not produce the same effect. The weakening produced in *G* by germ free from (*I*) is a purely mechanical effect. Flour rancidity is due to (*II*), which further decompose to form nonaldehyde and a fatty acid with a short C chain. Even small additions of fats exhibiting aldehydic rancidity produce deterioration in *G*.

E. A. F.

Significance of moisture in bread cereals and flour. H. KÜHL (Mühlenlab., 1935, 5, 39—42).—A brief outline is given of the significance of H₂O in relation to grain and flour. The maximum R.H. for safe storage is 75%. The acidity of normal flour is due to inorg. acid phosphates formed by the action of phytase on inositolphosphoric esters (phytins). The bitter flavour of old rye flours of high extraction and rich in germ oil is due to the formation of hydroxy-fatty acids and aldehydes. None of these processes can take place without H₂O, which is also considered necessary for vitamin formation.

E. A. F.

Hoshii stored airtight for 23 years. M. KONDÔ and T. OKAMURA (Proc. Imp. Acad. Tokyo, 1935, 11, 35—38).—Storage of a polished rice prep. ("hoshii") at a height of 700 m. produces only slight physical and chemical changes (cf. B., 1933, 682).

F. O. H.

Diacetyl in milk products. H. MOHLER and E. HERZFELD (Mitt. Lebensm. Hyg., 1935, 26, 34—41; cf. B., 1934, 425).—A method of determination based on the Ni dimethylglyoxime test is described. The normal % of Ac_2 in aromatic butter (B) is 0.0002—0.0004, and in cream thrice this amount. Buttermilk contains appreciable amounts, but Ac_2 could not be detected in milk. Other aroma substances were repeatedly observed in butter. Ageing of a solution of Ac_2 in C_6H_{14} resulted in the disappearance of the band in the visible region of the spectrum. E. C. S.

Acetylmethylcarbinol and diacetyl in dairy products. M. B. MICHAELIAN and B. W. HAMMER (Iowa Agric. Exp. Sta. Res. Bull., 1935, No. 179, 203—227).—The sum of the contents of ($\text{CHAcMe}\cdot\text{OH} + \text{Ac}_2$) (S) in fresh buttermilk is always >, and in butter <, that of cream from which the butter is prepared. Amounts in sour cream are relatively high, whereas those in sweet cream may be low. Milk cultures of citric acid (I)-fermenting *Streptococci* (II), killed by heat, CH_2O , or CHCl_3 , produced no S when treated with citric acid (0.15%) and H_2SO_4 (0.30%). The nos. of (II) added to milk treated with (I) were rather closely related to the amounts of the usual fermentation products formed. S produced in milk by (II) disappears again at a later stage, but is not transformed into volatile acids. A. G. P.

(A) **Nutritive value of powdered milk produced by spray-drying.** (B) **Nutritive value of powdered milk mixture as a substitute for maternal milk.** U. SUZUKI, S. HIRAO, and R. IKEDA (J. Agric. Chem. Soc., Japan, 1934, 10, 1039—1042, 1043—1045).—Experiments with mice indicate that dried milk may be substituted for maternal milk. CH. ABS. (p)

Microscopy of food products. VIII. Milk, cheese, and suet, and vegetable powders. C. H. BUTCHER (Food, 1935, 4, 276—278; cf. B., 1935, 378).—Details of technique are given. Fortified milks are centrifuged for 10 min. at 2000 r.p.m. in tubes closed at the bottom with rubber stoppers, smears from which are stained with methylene-blue; 1 pt. of condensed milk in 60 pts. of normal milk is detectable. Vegetable powders are best mounted in a mixture of PhOH 20, lactic acid 20, glycerol 40, and H_2O 20. In addition to NH_2Ph -blue or hæmatoxylin for cellulosic tissue and safranin for woody tissue, corallin (in 25% aq. Na_2CO_3) is recommended for the callus plates of sieve tubes (e.g., in barks) and Ru-red in 20% aq. $\text{Pb}(\text{OAc})_2$ for mucilage (e.g., in cacao shell). Lignified PhOH, which does not attack starch, is the best clearing and mounting medium for non-oily powders. J. G.

Comparative composition and colour of commercial tomato juice. J. S. MITCHELL (J. Assoc. Off. Agric. Chem., 1935, 18, 128—135).—The total (I) and sol. solids, NaCl, total acid, n, and colour of a no. of samples of tomato juice (II) are recorded. A formula is given by means of which (I) may be calc. from n. Results of determinations of p_{H} by the glass, quinhydrone, and H electrodes, and colorimetrically, give good agreement. (II) packed late in the season are poor in flavour and colour. E. C. S.

Tests for natural organic pigments added to foodstuffs. P. RUGGLI, A. STOLL, and O. WALKER (Mitt. Lebensm. Hyg., 1935, 26, 1—14).—The pigments are classified and the tests reviewed. E. C. S.

Heat-resistance [of bacteria]. E. J. CAMERON, J. YESAIR, and C. C. WILLIAMS (Canning Trade, 1934, 56, No. 27, 30—32).—Spores were more resistant to heat when exposed in butter oil free from, than in that containing, H_2O . CH. ABS. (p)

Bacteriology of [food] canning. VI. Cultural details of the more commonly occurring organisms. S. LANCEFIELD (Food, 1935, 4, 286—289; cf. B., 1935, 379).—Organisms dealt with and illustrated are: *B. prodigiosus* (from vegetables, bread, and milk), *B. viscosus* (H_2O , milk), *R. ramosus* or *cereus* (H_2O), *Mycoderma aceti* (vinegar, beer, and canned tomatoes), *B. putrificus* (canned beef). Although the usual thermal death point of a particular organism (I) may be about 60° , (I) may be found in canned food which has been processed at $> 60^\circ$. J. G.

Silage-making in mud-walled towers. G. C. TAMBE and Y. D. WAD (Empire Cotton Growing Rev., 1934, 11, 310—313).—Analyses of satisfactorily prepared silages are given. CH. ABS. (p)

Comparison of sealed and soil-covered silos. K. GNEIST (Bied. Zentr. [Tierernähr.], 1935, B, 7, 66—83).—In soil-covered (25 cm.) silos there was considerable spoilage of the upper layers. Gross wt. losses were much higher than in steel silos, but a large proportion of this was evaporated H_2O . A. G. P.

Bacteriological and chemical aspects of A.I.V. silage. W. H. PETERSON, L. S. MCCLUNG, and H. R. BIRD (J. Bact., 1935, 29, 84).—During ensilage of green chopped lucerne acidified with mineral acid to produce p_{H} 3.5 bacterial nos. steadily declined under anaërobic and aërobic conditions. Surviving organisms were principally non-sporing, Gram-positive, and catalase-negative. Chemical changes included the production of volatile and non-volatile acids, and increased H_2O -sol., NH_2 -, and NH_3 -N. A. G. P.

Microbiological decomposition of the constituents of lucerne hay and its application to spontaneous heating. M. PHILLIPS, M. J. GOSS, E. A. BEAVENS, and L. H. JAMES (J. Bact., 1935, 29, 83—84).—During fermentation of lucerne hay under aërobic and anaërobic conditions decomp. was greatest in the $\text{EtOH}-\text{C}_6\text{H}_6$ extractives, the hot- and cold- H_2O extractives, the polyuronide fraction, crude protein, and in the OME of the unextracted material. Lignin was the least affected although substantial losses occurred. The third cutting material decomposed more rapidly than the first. The possible rôle of unsaturated lignin in spontaneous heating and ignition is considered. A. G. P.

Silage feeding. K. SCHMIDT (Bied. Zentr. [Tierernähr.], 1934, B, 6, 481—497).—The normal decline in milk yield of cows at pasture in autumn is continued when animals are brought in and fed hay and beet. Replacement of the latter by grass silage is followed by increased yields maintained for several months. The "dry" period is initiated by eliminating the silage ration. A. G. P.

Increased protein-fodder production on the farm and the demand on the water supply of soils. P. EHRENBERG (Z. Pflanz. Düng., 1935, 37, 315—340).—The more intensive production of protein feeds involves the utilisation of larger proportions of the soil- H_2O . The maintenance of H_2O supplies in soil is discussed.

A. G. P.

Composition of pasture grasses under intensive grazing systems. J. SCHMIDT, E. LAUPRECHT, and W. WINZENBURGER (Landw. Jahrb., 1934, 80, 948—967; cf. B., 1934, 1082).—Monthly mean vals. of dry-matter contents of pasture grass varied within narrow limits (average 18.6%). The crude fibre content increased from April to July and subsequently declined. Ash content and N-free extract varied in the opposite direction. During the grazing period the digestibility coeffs. of the dry matter and ash increased and those of org. matter, N-free extract, and crude protein declined. The % of digestible protein in the total dry matter showed little change during the season, but the starch val. decreased somewhat.

A. G. P.

Supplementary feeding of vitamin-D preparations to milch cows. I, II. Action of Vigantol and Vithal on yield and constituents of milk and on the chemical and morphological composition of the blood. V. HORN (Bied. Zentr. [Tierernähr.], 1934, B, 6, 441—448, 449—480).—I. Free range and young grass pasturage cannot be entirely replaced by stall-feeding (S) with vitamin-D preps. During S in winter, -D supplements do not affect milk and fat yields or fat composition if the ration includes sufficient second-quality hay.

II. With cows receiving rations poor in -A and -D, neither prep. affected the yield, Ca, P, or fat contents of milk, although serum-Ca increased and -P decreased. Blood morphology was not significantly altered.

A. G. P.

Digestibility by pigs of nutrients in ground sweet-lupin seeds. E. MANGOLD and W. LINTZEL (Bied. Zentr. [Tierernähr.], 1935, B, 7, 84—94).—Results of digestibility trials are recorded. Protein vals. are high, and the material is comparable with barley for pig-fattening.

A. G. P.

Use of slaughterhouse blood for animal feeding. G. PFEIFFER (Bied. Zentr. [Tierernähr.], 1935, B, 7, 52—62).—Satisfactory use is described of a blood prep. obtained by low-temp. drying after admixture with ground cacao husk, grain husk, etc. and appropriate mineral matter.

A. G. P.

Conservation of wastes from the small-scale slaughter of meat animals. G. P. WALTON and R. F. GARDINER (U.S. Dept. Agric. Circ., 1934, No. 63, 23 pp.).—Fertiliser may be prepared from rendered offals by admixture with ground CaO and drying in air. Loss of NH_3 is small and the product may be stored without putrefaction. Alternatively, rendered or raw offals may be mixed with superphosphate and dried.

A. G. P.

Determination of lactose in mixed feed. D. A. MAGRAW and C. W. SIEVERT (Ind. Eng. Chem. [Anal.], 1935, 7, 106—109).—An aq. extract of the sugars (I) in the sample is fermented (conditions described; several

enzymes) to remove interfering (I), and then treated with neutral $Pb(OAc)_2$, $HgCl_2$, and H_2S . Lactose is determined ($\pm 0.25\%$) in the filtrate by Munson and Walker's method.

J. L. D.

Proportions of certain poisonous substances in feeding-stuffs and their effect on livestock. J. F. TOCHER (Vet. Rec., 1935, 15, 477—481).—The effects of $NaCl$, phaseolunatin, and ricin on livestock under various conditions are described.

R. N. C.

Phosphorus requirements of laying hens. M. W. MILLER and G. E. BEARSE (Wash. Agric. Exp. Sta. Bull., 1934, No. 306, 19 pp.).—Egg production is influenced by the level of P in the ration (max. 0.8% P), but egg-shell quality, egg wt., and mortality are not so affected. Ca in bone meal may be utilised for shell production. Factors related to the thickness and quality of shells are examined.

A. G. P.

Foot disorders in battery-reared chicks. A. SOLUN and A. ARSENEW (Bied. Zentr. [Tierernähr.], 1934, B, 6, 498—514).—Enlarged hock results from excessive feeding of minerals. Nutritional paralysis is the outcome of vitamin- B_2 deficiency. The - B_2 requirement of chicks increases with the protein content of the ration. A mixed grain-casein-fish meal ration has insufficient - B_2 for growing birds. Yeast is a valuable - B_2 supplement.

A. G. P.

Testing bread-wrapping papers.—See V. Use of quinhydrone electrode with fat emulsions.—See XII. Imperial agricultural report.—See XVI. Effect of warfare gases on foodstuffs.—See XXII.

PATENTS.

Manufacture of baked goods containing sugar.

PROCTER & GAMBLE Co. (B.P. 425,982, 13.6.33. U.S., 4.2.33).—The ratio of sugar to flour may be increased, and the texture, lightness, and vol. of a cake improved, by adding to the mixing a proportion of fat containing mono- and/or di-glycerides sufficient to produce an excess of combined glycerin, over that required for triglyceride formation, of $\leq 0.3\%$, and \geq about 15% of the wt. of total shortening.

E. B. H.

Plastic [A] shortening agents, [B] shortenings.

PROCTER & GAMBLE Co. (B.P. 425,980—1, 13.3.33. U.S., 4.2.33).—(A) A suitable natural or (especially) partly hydrogenated fat is treated with glycerol (G), or blended with a superglycerinated hard fat [cf. (B)] so that the final product (P) shall contain an amount of combined G which shall be \leq that corresponding to a diglyceride, but $>$ that corresponding to a triglyceride by $\leq 0.3\%$ (e.g., 1.5% of the wt. of P. Increased amounts of sugar (e.g., $1\frac{1}{2}$ — $1\frac{3}{4}$ times the wt. of flour) and H_2O can be incorporated in cakes made with P. [Stat. ref.] (B) A soft fat or oil is blended with 2—6% of a hard artificial fat (F) obtained by treating a hydrogenated (cottonseed) oil with G until it consists chiefly (but not entirely) of mono-glyceride, and contains $>19\%$ of G. (A, B) Small amounts (e.g., 2%) of free fatty acids or soap may be incorporated in the shortenings produced.

E. L.

Preservation of fresh whole milk. B. H. WEBB (U.S.P. 1,964,279, 26.6.34. Appl., 30.4.34).—Milk is conc. in vac. to $\frac{1}{3}$ vol. and stored frozen (-12°). The

flavour and appearance of this milk on reconstitution with H_2O are comparable with those of normal milk.

E. B. H.

[Treatment of fresh] cream. D. S. ROBSON (B.P. 426,049, 15.9.33).—Cream after leaving the separator is dispersed in H_2O at 38° and recovered again as cream. The H_2O -sol. materials are thus removed and the cream is not adversely affected (physical nature, flavour, etc.). It can be stored longer than untreated cream and may be used for butter without souring.

E. B. H.

Production of meat extract from whales, seals, and other mammiferous sea-animals. J. O. NYGAARD (B.P. 426,357, 24.10.33. Norw., 25.10.32).—To prevent the extraction of excess glue in the prep. of meat extract from whale flesh etc., the flesh is first dried by heating it in an animal oil.

E. B. H.

Refining of chocolate, and similar, masses. A. BECK (B.P. 425,863, 10.7.34. Ger., 19.1.34).—Chocolate or the like is spread in a thin layer on a moving surface and subjected to currents of fresh air, warm enough at first to remove H_2O and later cool to develop the odour.

B. M. V.

Preservation of perishable foodstuffs. J. T. S. RYAN (B.P. 425,903, 19.9.33. Austral., 31.5.33).—Storage is effected in flue gas obtained, e.g., from ships' boiler furnaces and preferably having the composition O_2 8, CO_2 12, N_2 etc. 80 vol.-%, cleaned (e.g., by oiled plates), humidified (by open vessels of H_2O), held at $5-27^\circ$, and continuously renewed.

B. M. V.

Manufacture of cereal food products [biscuits]. LOOSE-WILES BISCUIT Co., Assees. of K. D. LOOSE (B.P. 425,853, 27.3.34. U.S., 27.3.33).

[Tempering machine for] treatment of chocolate and the like masses. C. B. K. BØGGILD and M. JACOBSEN (BØGGILD & JACOBSEN) (B.P. 426,541, 1.9.34).

Dry products from liquids.—See I. Fermented beverages.—See XVIII. Vitamin prep.—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Standardisation of medicinal materials. III. Particle size and degree of dispersion. R. DIETZEL and K. SAXHOLM (Arch. Pharm., 1935, 273, 170—176; cf. B., 1933, 845).—The particle size and degree of dispersion of a no. of roughly dispersed and colloidal medicines have been determined.

H. G. M.

Determination of adsorptive power of charcoals for medicinal purposes. A. RAUSCH (Arch. Chem. Farm., 1935, 2, 182—196).—Determinations of the adsorptive power (I) of a no. of preps. for I, $HgCl_2$, C_6H_6 , H_2S , methylene-blue, R-salt, and peptone (P) indicate that the (I) of each C diminishes, in general, in the order given for the above substances, but that preps. having a high I val. do not necessarily possess the highest P vals. The use of P is recommended as a standard procedure.

R. T.

Determination of copper in [pharmaceutical] specialities containing copper and iron. E. KÄLLSTRÖM (Svensk farm. Tidskr., 1934, 38, 185—189; Chem. Zentr., 1934, ii, 1659—1660).—Org. matter is destroyed by evaporation with conc. H_2SO_4 , the residue is dissolved in hot H_2O , and citric acid (a 5-fold excess for the Fe

present) and aq. NH_3 (5—10 c.c. in excess) are added to the filtered solution. The mixture is then shaken with 20 c.c. of a 0.5% solution of diphenylthiocarbazon in $CHCl_3$, the $CHCl_3$ extract being washed with H_2O , filtered, distilled to remove $CHCl_3$, and the residue heated with conc. H_2SO_4 and fuming HNO_3 . The residue is heated with saturated aq. $(NH_4)_2C_2O_4$, diluted with H_2O , KI, KCNS, and starch solution are added, and the liberated I is titrated with $Na_2S_2O_3$.

H. J. E.

Dyestuffs for injection purposes. J. C. PEIRIER (J. Pharm. Chim., 1935, [viii], 21, 389—403).—Gentian-violet (I) and methylene-blue (II) for injection must be free from As, Pb, and Zn (tests described). Tolerable isotonic solutions (1%) are made with sucrose (9.4—9.5%) and sufficient Na_2CO_3 with (I) or NaOH with (II) to give pH 7.4. NaCl is not suitable because of flocculation and alterations in pH . The effect of NaOAc, Na citrate, Na_2HPO_4 , and Na glycerophosphate buffers is described. Isotonic solutions of (II) with Na cacodylate can be made, but Na chaulmoogrates are incompatible with (II) and must be injected separately.

S. C.

Camphor from *Ocimum canum*. A. ROTERMEL (Pharm. Ztg., 1935, 80, 337—340).—The plants, seeds, soil, and methods of rearing used in the experimental cultivation of *O. canum* in 3 districts of the U.S.S.R. during 1933—4 are described. 1.90—2.83% of essential oil containing 42.37—60.80% of camphor (d_{15}^{25} 0.993, m.p. 175° , b.p. 204°) was obtained.

E. H. S.

Digitalis leaves from Dr. Kerbosch [Government Quinine Undertaking, Java]. U. G. BIJLSMA (Pharm. Weekblad, 1935, 72, 255—261).—The Javanese product (I) differs from the European particularly in its relatively low digitoxin (II) content. An infusion of (I) contained (II), gitalin, and digitalin fractions in the ratios 23.6 : 22.9 : 53.5. The differences in composition between leaves from Europe and Java are probably due to different rates and conditions of drying.

S. C.

Essential oils from Seychelles. ANON. (Bull. Imp. Inst., 1934, 32, 511—539).—The oils have been distilled experimentally in Seychelles during the last few years. *Cymbopogon Nardus* (L.), Rendle: 2 samples had, respectively, d_{15}^{25} 0.9042, 0.9012; α_D -14.20° (22°), -14.15° (21°); n_D^{20} 1.4800, 1.4790; aldehydes (as citronellal) 7.1, 7.7%; ester val. after acetylation 211.5, 205.5; sol. in 1.1 and 1.0 vols. of EtOH at 15.5° . No. 2 is very similar to Ceylon citronella oil in odour. *C. citratus* (DC), Stapf.: d_{15}^{25} 0.9026, α_D^{19} -0.15° , n_D^{20} 1.4844, aldehydes 86.5%, sol. in 0.7 vol. of 80% EtOH, insol. in 10 vols. of 70%. *C. confertiflorus* (Steud.), Stapf., 3 samples: d_{15}^{25} 0.9209, 0.9125, 0.9014; α_D^{24} -5.31° , -1.47° , -0.33° (26°); n_D^{20} 1.4876, 1.4862, 1.4762; aldehydes ($NaHSO_3$) 23.5, 62, 39 vol.-% (as citronellal by NH_2OH , [22.4, —, 46.8 wt.-%]); ester val. after acetylation 222.0, —, 295.3; sol. in 0.9, 0.7, and 0.9 vol. of 80% EtOH at 15.5° . *C. Martini*, var. *motia* (palmarosa oil), 3 samples: d_{15}^{25} 0.8960, 0.8968, 0.9083; α_D $+0.03^\circ$ (24°), -0.22° (18°), $+3.1^\circ$ (20°); n_D^{20} 1.4715, 1.4722, 1.4796; acid vals. 1.2, 1.0, 1.4; ester vals. 97.2, 90.3, 46.1; ester vals. after acetylation 276.1, 273.5, 262.3; sol. in 1.8, 1.6, and 1.6 vols. of 70% EtOH at 15.5° . Gingergrass oils, 2 samples: d_{15}^{25} 0.9479, 0.9525;

α_D^{21} —, +26.02°; n_D^{20} 1.4920, 1.4930; acid vals. 3.1, 0.3; ester vals. 45.4, 20.5; ester vals. after acetylation 200.9, 166.0; sol. in 1.7 and 1.8 vols. of 70% EtOH at 15.5°. *Eucalyptus citriodora*, 6 samples: $d_{15.5}^{15.5}$ 0.8655—0.8710, α_D^{20} +0.84° to +1.36°, n_D^{20} 1.4506—1.4520, acid vals. 2.5—5.5, ester vals. 7.9—11.0 (after acetylation 281.9—289.7), aldehydes (as citronellal) 78.7—82.6%, sol. in 2.9—3.5 vols. of 70% EtOH at 15.5°. Oil from the dried leaves was the best. *Ocimum basilicum*, Linn. (?), 2 samples: $d_{15.5}^{15.5}$ 0.9616, 0.9746; α_D^{20} —0.64° (24°), —0.4° (19°); n_D^{20} 1.5160, 1.5180; acid vals. 0.2, —; ester vals. 6.3, —; sol. in 6.7 and 4.6 vols. of 80% EtOH at 15.5°. *O. viride*, Willd.: $d_{15.5}^{15.5}$ 0.9362, α_D^{19} +1.01°, n_D^{20} 1.5039, phenols 48%. *O. americanum*, Mill. forma: $d_{15.5}^{15.5}$ 0.9181, α_D^{20} —3.63°, n_D^{20} 1.4878, acid val. 12.4, aldehydes and/or ketones (NaHSO₃) 71 vol.-%, aldehydes (as citral by NH₂.OH) 62.3 wt.-%, acids and phenols (by absorption) 8%, sol. in 2.2 vols. of 70% EtOH at 15.5°. *O. sanctum*, Linn.: $d_{15.5}^{15.5}$ 0.9840, α_D^{20} —29.37°, n_D^{20} 1.5210, phenols (chiefly eugenol) 33%. "Ocimum oil No. 3": $d_{15.5}^{15.5}$ 0.9385, α_D^{20} —9.93°, n_D^{20} 1.4871, acid val. 6.5, ester val. 1.2 (after acetylation 175.7), apparent cineole content (o-cresol) 17.7%, sol. in 1.8 vols. of 70% EtOH at 15.5°. Cinnamon root-bark oil: $d_{15.5}^{15.5}$ 0.9811, α_D^{20} +8.45°, n_D^{20} 1.5317, aldehydes (as cinnamaldehyde) 36%, phenols (as eugenol) 5%, insol. in 70% EtOH at 15.5°. Patchouli oil: $d_{15.5}^{15.5}$ 0.9368, α_D^{21} —4.48°, n_D^{20} 1.5033, sol. in 6.1 vols. of 90% EtOH at 15.5°. Commercial reports are given. E. H. S.

Essential oil industry of Seychelles. W. H. HAINES (Bull. Imp. Inst., 1934, 32, 545—559).—The position of the industry is summarised and recommendations for its improvement, with special reference to distillation technique and the yields of oil, are described. E. H. S.

Comparison of American and French pine oils. G. BRUS and BONICHON (Bull. Inst. Pin, 1935, 1—4).—Two French commercial pine oils have about the same composition as has "Yarmor" oil and all increase the wetting-power of sulphonated castor oil emulsions to the same extent. R. S. C.

Oxidation of pine oils. TERPOUGOV (Bull. Inst. Pin, 1935, 6—10).—Pine oil and the least volatile fraction thereof are oxidised to different products according to their nature and the catalyst used (Zn, Fe, or galvanised Fe). Zn leads mainly to HCO₂H. R. S. C.

Horse-radish juice. O. NOETZEL (Pharm. Zentr., 1935 76, 221—223).—Characteristics of 6 samples are given; 4 juices (1:3.3 menstruum) prepared from horse radishes [75.2—80.3% of H₂O, 0.12—0.16% of mustard oil (I) (as C₃H₅.NCS)] contained 1.56—2.30% of dry residue, 0.32—0.499% of ash, and 0.022—0.025% of (I). A characteristic reaction of (I), detecting 0.5 mg. in 5 c.c. of juice, and a modification of the D.A.B. (I) determination are given. E. H. S.

Detoxifying soaps.—See XII. **Imperial agricultural report.**—See XVI. "Merphenyl nitrate."—See XXIII.

PATENTS.

Manufacture of bacterial solutions. R. F. HUNWICK (B.P. 425,216, 7.6.33).—Bacteria are dissolved

in alkaline or neutralised aq. solution of sulphonated Lorol (cf. B., 1933, 383). E. H. S.

Manufacture of iodonaphtholdisulphonic acids. [Pharmaceuticals.] CHEM. FABR. VORM. SANDOZ (B.P. 425,752, 29.9.34. Switz., 4.10.33. Addn. to B.P. 393,238; B., 1933, 812).—The Sandmeyer reaction is applied to the corresponding NH₂-compounds. The prep. of the Na₂ salts of 8:2:3:6- and 3:2:6:8-OH·C₁₀H₄I(SO₃H)₂ is described. H. A. P.

Manufacture of [pyridyl]-substituted barbituric acids. CHEM. FABR. VON HEYDEN A.-G. (B.P. 425,570, 29.5.34. Ger., 3.6.33).—A 5-monoalkylbarbituric acid is heated with a halogenopyridine; e.g., 5-ethylbarbituric acid with 4-bromo- or 4-chloro-pyridine in xylene at the b.p. gives 5-4'-pyridyl-5-ethylbarbituric acid. The prep. of 5-4'-pyridyl-1-methyl-5-ethyl-, m.p. 150°, and 5-5'-nitro-2'-pyridyl-5-ethyl-barbituric acid, m.p. 245°, is described. H. A. P.

Manufacture of organic bismuth salts. BOOTS PURE DRUG CO., LTD., F. L. PYMAN, and A. P. T. EASSON (B.P. 425,387, 2.1. and 26.6.34).—Oil-sol. Bi salts are obtained by metathesis from a cyclohexane-1-carbalkoxy-(CO₂Et)-1-acetic acid or an alkyl H ester of cyclohexane-1:1-diacetic acid (I). E.g., the Et H ester of (I) is heated with BiO·NO₃ in olive oil with gradual addition of aq. NaOH. (Cf. B.P. 397,249; B., 1933, 939.) H. A. P.

Production of therapeutically and disinfecting active substances [containing silver]. F. FEIGL (B.P. 422,948, 14.5.34. Austr., 15.5.33).—Oligodynamic preps. of Ag are made by reaction of solutions containing AgNO₃ and Mn(NO₃)₂ with alkalis, e.g., NaOH, Na₂CO₃, or Na₂SiO₃, in presence of org. or inorg. carriers or protective colloids. A. R. P.

Manufacture of [acyl] derivatives of nucleotides. SOC. CHEM. IND. IN BASLE (B.P. 426,856, 20.7.34. Switz., 21.7.33).—Animal or vegetable nucleotides are acylated (in presence of sec.- or tert.-amines). E.g., yeast-adenylic acid (I) is heated with Ac₂O and C₅H₅N at 60°, or with Ac₂O and NaOAc at the b.p.; the former product is purified through its Pb salt, and the Ac derivative (II) isolated as its cryst. brucine salt. The benzoylation (BzCl-C₅H₅N) of yeast-(I) and acetylation of muscle-(I) to a crude product similar to (II) are also described. H. A. P.

Production of an antithyroidal substance. A. L. MOND. From SÄCHSISCHES SERUMWERK A.-G. (B.P. 425,104, 29.7.33).—Blood, liver, or spleen is treated with a neutral or acid coagulant and the separated coagulum extracted with either H₂O or aq. org. solvents. The extract, combined with the initial solution, is conc., dialysed, and evaporated. E. H. S.

Manufacture of a vitamin preparation. I. G. FARBENIND. A.-G. (B.P. 425,998, 26.9.33. Ger., 27.9.32).—A solution of a concentrate (I) of fat-sol. vitamins, e.g., from fish liver, in an inert oil, e.g., sesame oil, is emulsified with H₂O with the aid of an emulsifying agent, e.g., tragacanth and gum arabic. Vitamin-D may be added to (I). E. H. S.

Obtaining the hormone of corpus luteum. SOC. CHEM. IND. IN BASLE (B.P. 426,166, 14.6.34. Switz., 14.6.33).—A solution of the partly purified hormone in

an immiscible org. solvent (I) is treated with mineral acid (II) and the separated and diluted or neutralised (II) layer is extracted with (I) and the extract evaporated. E. H. S.

Production of [ovarian] hormones. (A) E. A. DOISY, and (B) E. A. DOISY, S. A. THAYER, and C. D. VELER, Assrs. to ST. LOUIS UNIV. (U.S.P. 1,967,350—1, 24.7.34. Appl., [A] 3.3.30, [B] 6.10.30).—(A) Cryst. ovarian follicular hormone, m.p. 248—249° (corr.) (crystallographic and solubility data given), having an activity of < 3000 rat units/mg., is isolated from crude hormone extracts, e.g., in BuOH, by extraction with aq. alkaline solutions (I) followed by continued alternate transference of the hormone from (I) to org. solvents (II), and from (II) to (I). (B) The α -hormone, $C_{18}H_{22}O_2$ (?), m.p. 249° (corr.) (I val. 93—97, mol. wt. of Ac derivative 356), is obtained by recrystallisation of the last (II) fraction and the β -hormone, $C_{18}H_{24}O_3$ (?), m.p. 282° (corr.) (I val. 85—88, mol. wt. of Ac derivative 410), the physiological action of which is similar but slower and longer sustained, by acidification of < 1 of the (I) extracts followed by recrystallisation of the ppt. E. H. S.

Treatment of tobacco. A. WIX and S. W. BUNKER (B.P. 425,695, 21.9.33).—Tobacco that tends to produce yellowish or greenish spots on cigarette paper is moistened to 17—20% H_2O while in leaf or cut form and then dried at about 65° to 10% H_2O , this cycle being effected < 2 times. B. M. V.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Photographic materials for scientific use. N. B. LEWIS (J. Soc. Chem. Ind. Victoria, 1933, 33, 836—847).—A review.

Preparation of photographic emulsions. II. Emulsions without ammonia. N. V. MAKAROV and K. V. CHIBISOV (Kino-Photo Inst. Moscow, 1934, 2, 70—92).—Excess of KBr or NH_4Br decreases γ for pure AgBr emulsions: in AgBr—AgI emulsions γ may pass through a max. with increasing excess of bromides. Addition of 5% of AgCl to a AgBr emulsion during the first ripening enables higher sensitivity to be attained in the second ripening. CH. ABS. (e)

Preparation of emulsions for reversal. K. S. LIALIKOV and A. J. SMIRNOV (Photo-Kino Chem. Ind., 1934, No. 2, 22—30).—Ordinary highly-sensitive emulsions are unsuitable for reversal, since they give too high a fog in the positive. Dilution of the emulsion before coating improves the reversal image. Dilution with gelatin has the same effect as dilution with H_2O . Increase in [Br] and [Ag] or addition of KI to the finished emulsion increases the positive fog. The second ripening of the emulsion, after washing, has no effect on the reversal characteristic. Formulæ for manufacturing emulsions of the NH_3 type are given. CH. ABS. (e)

Preparation of emulsions for optical sensitising. K. V. CHIBISOV and N. V. MAKAROV (Photo-Kino Chem. Ind., 1934, No. 2, 3—11).—With fine-grained emulsions optical sensitisers can increase the total effective sensitivity (I). Free Br' in the emulsion lowers (I) when acid dyes [e.g., Erythrosin (II)] are used. It has little

effect with other sensitisers. Increase in the iodide content is detrimental to the colour-sensitising of NH_3 emulsions with (II). CH. ABS. (e)

Optical sensitisers for use in emulsions. K. V. CHIBISOV and V. S. CHELTZOV (Kino-Photo Inst. Moscow, 1934, 2, 121—160).—A review. CH. ABS. (e)

Influence of washing on the light sensitivity of silver halide emulsions. V. J. MICHAILOV (Photo-Kino Chem. Ind., 1933, No. 4, 81—86).—A review of the influence of shredding, acidity, temp., etc. CH. ABS. (e)

Sensitising with mixtures of dyes. I. B. BLUMBERG and V. N. KHARCHENKO (Photo-Kino Chem. Ind., 1934, No. 2, 56—64).—Experiments are described. 0.07% of the grain area is covered by pinacyanol. CH. ABS. (e)

Relation between the resolving power of photographic emulsions and their preparation. S. MAKAROV and K. V. CHIBISOV (Photo-Kino Chem. Ind., 1933, No. 4, 9—12).—A discussion. CH. ABS. (e)

Dependence of the Schwarzschild effect on the preparation of the emulsion. K. V. CHIBISOV (Kino-Photo Inst. Moscow, 1934, 2, 96—120).—The Schwarzschild coeff. increases during the second ripening when active gelatin is used. CH. ABS. (e)

Physico-chemical interpretation of the ripening of photographic emulsions. K. V. CHIBISOV (Kino-Photo Inst. Moscow, 1934, 2, 61—69).—A discussion of the steps in emulsion-making. CH. ABS. (e)

Origin of coloured fog in photographic emulsions. V. A. BEKUNOV (Photo-Kino Chem. Ind., 1934, No. 1, 27—34).—Fog is attributed to labile S in the gelatin, which forms nuclei of Ag_2S , on which physical development occurs. CH. ABS. (e)

Anti-halation layers and their effect on the sensitometric properties of photographic materials. J. M. KATUSHEV, A. F. GRUBA, and I. P. TROKHIN (Photo-Kino Chem. Ind., 1934, No. 1, 54—68).—Anti-halation undercoats can be made from MnO_2 , from AgCl of high dispersion, or from rosolic acid. CH. ABS. (e)

Screens for three-colour photography. J. I. BLUMBERG (Photo-Kino Chem. Ind., 1934, No. 2, 13—21).—A review. CH. ABS. (e)

New methods for production of photographic images. J. I. BOKINNIK (Photo-Kino Chem. Ind., 1934, No. 1, 35—38).—Experiments on the bleaching of certain dyes are described. CH. ABS. (e)

Light-sensitive photographic material. I. G. FARBENIND, A.-G. (B.P. 426,866, 10.8.33. Ger., 10.8. and 26.11.32).—Ag halide or dichromated emulsions are prepared in a medium of polyacrylic acid or its salts, or other polymeric carboxylic acids, or mixtures. These compounds may be used in admixture with gelatin. The ratio of Ag salt to binder should be $> 10:17$. J. L.

Photographic plates for use in spectroscopy and astronomy. C. E. K. MEES (Phot. J., 1935, 59, 188—190; cf. B., 1932, 162, 657; 1934, 988).—Plates produced by the Eastman Kodak Co. for scientific work are designated by three figures, referring to sensitivity, contrast, and graininess. By use of tetra-

and penta-carbocyanines, improvements in infra-red-sensitive plates have been made. F. M. H.

Regeneration of [photographic] fixing baths. K. KIESER (Phot. Ind., 1934, 32, 948–950).— Ti_2SO_4 , TiOAc , and TiNO_3 may replace the less sol. TiBr as precipitant for the sol. iodide from used fixing baths.

CH. ABS. (c)

Theory of [photographic] fine-grain development. R. E. LIESEGANG (Phot. Ind., 1934, 32, 670–671; Chem. Zentr., 1934, ii, 1887).—In fine-grain development Ag separates on the AgBr grains, whereas in chemical development reduction occurs throughout the grain. H. J. E.

Deformation of [photographic] characteristic curves. F. FORMSTECHE (Phot. Ind., 1934, 32, 540; Chem. Zentr., 1934, ii, 1887).—Treatment of an exposed AgCl–AgBr paper in a bath containing aq. CuCl_2 and $\text{K}_2\text{Cr}_2\text{O}_7$ (equal vols., each 1:1000) causes displacement of the characteristic curve of the paper, resulting in an increased range of applicability in printing negatives. H. J. E.

X-Ray photographs of faulty steel.—See X.

PATENTS.

Sensitisation of photographic emulsions. I. G. FARBERNIND. A.-G. (B.P. 425,417, 14.9.33. Ger., 14.9.32).—Di- and tri-carbocyanines, unsubstituted in the polymethine chain, but with each C_6H_5 nucleus similarly substituted *para* to the N of the fused-on heterocyclic ring, show enhanced sensitising action. By the usual methods are prepared 2:2'-diethyl-4:5:4':5'-tetramethoxythiadi-, 2:2'-diethyl-4:4'-dimethoxy-5:5'-dimethylthiadi-, 2:2'-diethyl-4:5:4':5'-bismethylenedioxythiadi-, 2:2'-diethyl-4:5:4':5'-tetramethoxythiatri-, 2:2'-diethyl-4:5:4':5'-dimethoxy-5:5'-dimethylthiothiatri-, 2:2'-diethyl-4:5:4':5'-bismethylenedioxythiatri-, 2:2'-diethyl-4:5:4':5'-bisethylenedioxythiatri-, 2:2'-diethyl-4:5:4':5'-tetraethoxythiatri-, and 2:2'-diethyl-4:5:4':5'-bisethylenedioxythiatri-carbocyanine iodide. Their sensitising maxima are at 745, 735, 740, 735, 845, 845, 860, 845, 740, 865, and 855 m μ , respectively. F. M. H.

Treatment of photographic films. N. E. TITUS (U.S.P. 1,952,572, 27.3.34. Appl., 9.7.32).—Scratches and other imperfections in the emulsion coating of an exposed film are smoothed out by imposing on the developed but unfixed film non-actinic light rays (infra-red rays) to heat the emulsion sufficiently to cause a slight surface flow. A. R. P.

Screens for varying the colour and/or intensity of a beam of light. E. R. HOLIDAY (B.P. 426,269, 30.9.33).

Supports from cellulose derivatives.—See V.
Metal casts.—See X.

XXII.—EXPLOSIVES; MATCHES.

Effect of gases used in war on foodstuffs and water. C. MIHĂILESCU, I. BALABAN, and O. SCHÖBESCH (Antigaz, 1934, 8, 39–54; Chem. Zentr., 1934, ii, 1718).—Foodstuffs (I) contaminated with COCl_2 , di-phosgene, or Cl_2 becomes edible on exposure to air.

H_2O is not spoiled by these substances. Chloropicrin renders (I) useless. Infection of H_2O by yperite is detected by the Grignard–Rivat reaction (turbidity with aq. KI, CuSO_4 , and gum arabic). Arsenical gases (II) in (I) are detected by the Marsh test. Small amounts of (II) are removed by access of air. HCN renders (I) and H_2O unfit for consumption. H. J. E.

Rate of combustion of [explosive] colloidal powders in inert atmospheres under atmospheric pressure. H. MURAOUR and W. SCHUMACHER (Chim. et Ind., 1935, 33, 556–558).—The combustion of the powders in N_2 has been investigated at 70–150°. In general, the rate of combustion, V , increases very rapidly at $> 130^\circ$. The ignition temp., T , of 66/25 gallette is depressed as the % of added centralite is increased. T is raised by NHPh_2 , but is little affected by adding 8% of vaseline or 25% of xylite (I), but with (I) V increases slowly between 130° and 150°. The observed vals. at 130°/1 atm. agree approx. with those calc. from high-pressure data by means of $V = a + bP$. Propagation at 1 atm. is attributed chiefly to the thermal conductivity, C , of the powder, and at high pressure V is controlled by two factors, one of which $\propto P$ and depends on mol. collisions, and the other depends on C (which is independent of P). J. G. A. G.

PATENTS.

Blasting cap. W. DE C. CRATER, ASST. to HERCULES POWDER CO. (U.S.P. 1,951,595, 20.3.34. Appl., 29.4.33).—Claim is made for a cap containing *z*-inositol nitrate with a Hg fulminate detonator. A. R. P.

Blasting cartridges. E. P. TURNER, and CARDON (GT. BRITAIN), LTD. (B.P. 426,473, 1.7.33).

XXIII.—SANITATION; WATER PURIFICATION.

Determination of very small amounts of carbon monoxide in air. L. W. WINKLER (Z. anal. Chem., 1935, 100, 321–324; cf. B., 1934, 557).—250 c.c. of air are shaken with 10 c.c. of aq. PdCl_2 containing KBr. After 24 hr., 10 c.c. of $\text{CCl}_4 + 1$ c.c. of 0.01N-KBrO₃ are added, and the mixture is acidified with HCl. The excess of free Br is titrated with 0.01N-As₂O₃, using saturated aq. I, decolorised with NaOH, as indicator. 0.0050% of CO may be so determined within 5–10%. J. S. A.

Industrial respirators. L. LEVY and L. J. P. BYRNE (Ind. Chem., 1934, 10, 476–478, 1935, 11, 33–35, 99–102).—The construction of box respirators, the materials used to remove different gases and smokes, their life, and methods of testing are described. D. K. M.

Detection of iron, lead, and tar in dust samples. A. HELLER (Gesundheitsing., 1934, 57, 322–323; Chem. Zentr., 1934, ii, 1811).—A sample was collected on a slide coated with a gelatin (I)– $\text{K}_4\text{Fe}(\text{CN})_6$ (II) layer [10 g. of (I) in 200 c.c. of $\text{H}_2\text{O} + 3$ g. of (II) at 70–80°]. Fe was detected by blue spots formed on exposure to HCl vapour. In detecting Pb, (I) was mixed with KI, PbI_2 being formed on exposure to AcOH. Tar particles collected on (I) gave a brown ring with CHCl_3 vapour. H. J. E.

Silicate analysis in industrial dusts. F. SARTORIUS and K. W. JÖTTEN (Zentr. Gewerbehyg., 1934,

21, 65—69; Chem. Zentr., 1934, ii, 1659).—In examining siliceous dusts a mechanical phase analysis and chemical analysis should be carried out. H. J. E.

Ship fumigation by the Clayton method. M. S. PACHA (Bull. Off. internat. Hyg. Publ., 1933, 25, 1358—1366).—The [HCN] should be $\leq 2.5\%$ for 3 hr. Gas concn. at the bottoms of spaces and compartments averaged $0.7\% >$ that in upper parts. CH. ABS. (p)

Bacteriostatic and germicidal powers of "merphenyl nitrate." O. K. STARK and M. MONTGOMERY (J. Bact., 1935, 29, 6—7).—Basic "merphenyl nitrate" (double salt of $\text{HgPh}\cdot\text{OH}$ and $\text{HgPh}\cdot\text{NO}_3$) ionises in H_2O to give Hg^{++} . Tests of bacteriostatic and killing action against *S. aureus* and *B. coli* are recorded. Customary methods for determining germicidal vals. are probably not applicable to this type of substance. A. G. P.

Industrial hygiene and sanitation surveys in chemical establishments. R. R. SAYERS, J. M. DALLA VALLE, and W. P. YANT (Ind. Eng. Chem., 1934, 26, 1251—1255).—The general possible actions of air-borne contaminants on the body are classified, and quant. data on the physiological response to various concns. of common gases and vapours in air are tabulated. Occupational disease hazards and their control are discussed. S. S. W.

Sanitation in a Russian industrial city. I. W. MENDELSON (Munic. Sanit., 1934, 5, 84—99).—Details are recorded of purification plant at Rostov. CH. ABS. (p)

Sludge dewatering at the Baltimore (Maryland) sewage works. C. E. KEEFER (Water Works and Sewerage, 1934, 81, 403—407).—Dewatering by centrifuging digested sludge is unsatisfactory. Washing with H_2O favours subsequent dewatering. Coagulation with FeCl_3 or with chlorinated copperas is a suitable pretreatment for dewatering. CH. ABS. (p)

Electric furnace employed in making air-diffusers [for aerating sewage]. H. R. POWER (Munic. Sanit., 1933, 4, 159—170).—A mixture of calcined bauxite and coke is heated at 2000° , cooled, and crushed. Ferrosilicon is removed by a magnet and, after bonding and moulding, the diffuser unit is vitrified. CH. ABS. (p)

Water-purification system in Borga, Finland. G. CHRISTIERNIN (Tek. Fören. Finland Förh., 1934, 54, 295—297).—A system of aeration and CaO treatment is described for H_2O containing large proportions of Fe and CO_2 . CH. ABS. (p)

Nitrifying bacteria in water supplies. D. FEBEN (J. Amer. Water Works Assoc., 1935, 27, 439—447).—Nitrifying bacteria, usually present in surface- H_2O , multiply on sand filters after ammoniation and under suitable conditions the $\text{NH}_3\text{--Cl}_2$ process becomes costly owing to wastage of NH_3 to feed the bacteria and of Cl_2 to oxidise their products; control by Cl_2 is impracticable owing to their resistance. C. J.

Taste and odour control [in water supply] at Council Bluffs, Ia. W. T. BAILEY (J. Amer. Water Works Assoc., 1935, 27, 458—471).—Algal growths in open reservoirs which permit long detention periods may be controlled by one or more applications of $\text{NH}_3\text{--Cl}_2$ (resi-

dual $\text{Cl}_2 \leq 0.5$ p.p.m.); certain types which develop a tolerance to Cl_2 will succumb rapidly to CuSO_4 . Both treatments are liable to result in putrefactive sludge with a consequent production of offensive tastes and odours (I). Powdered activated C applied prior to coagulation and settlement removes (I), stabilises the sludge, and may reduce algal growths by shutting off some of the light. C. J.

Colour and odour removal [from water supply] at Ossining, New York. W. T. MILLER and J. E. KERSLAKE (J. Amer. Water Works Assoc., 1935, 27, 494—502).—This plant deals with an average of 800,000 gals. per day, and the treatment, which includes pre-aeration, prechlorination, activated C treatment, and finally $\text{NH}_3\text{--Cl}_2$, costs \$250 a year. C. J.

Trend of modern taste and odour control [in water supplies]. F. E. STUART (J. Amer. Water Works Assoc., 1935, 27, 503—508).—Modern treatment of H_2O for this purpose includes prechlorination, the addition of 5—10 lb. of activated C per 10^6 gals. with the coagulant, which stabilises the sludge and gives subsequent dechlorination, and the addition of $\text{NH}_3\text{--Cl}_2$ to the filter effluent in sufficient quantities to meet local conditions. If these steps prove inadequate powdered activated C (2.0 p.p.m.) is added to the filter influent. C. J.

Iron and manganese removal plant for [the water supply of] Lincoln, Nebraska. D. L. ERICKSON (J. Amer. Water Works Assoc., 1935, 27, 337—347).—Details are given of a plant which is being constructed for this purpose, at a cost of \$211,000, to deal with 12×10^6 gals. of H_2O ; it is designed on data obtained from an experimental plant, and will comprise aeration, chlorination, upward-flow contact filtration, 2-hr. sedimentation, and rapid sand filtration. C. J.

Porous plates for use in filter-bottoms for rapid filters [for water]. T. R. CAMP (J. New England Water Works Assoc., 1935, 49, 1—13).—Experimental work is described to determine the character of porous plates with which to construct a floor which would perform the functions of the gravel layer in a filter. C. J.

Preparation of reagents for the albuminoid nitrogen determination [in water analysis]. I. A. MONTANK (J. Amer. Water Works Assoc., 1935, 27, 386—388).—In the prep. of NH_3 -free H_2O it is recommended that the steam should pass through a condenser without cooling- H_2O until it has run steaming-hot for 40 min. before collecting the distillate. In the prep. of alkaline KMnO_4 , KOH is preferred to NaOH , and the liquor should be boiled down to the required vol. in a Pyrex flask instead of an open dish. The reagent is obtained NH_3 -free and a blank determination may be dispensed with if it is stored in the same well-stoppered flask which has been connected, while cooling, in series with gas-washing bottles containing acid and NH_3 -free H_2O . C. J.

Determination of traces of lead in drinking water. J. F. REITH and J. DE BEUS (Chem. Weekblad, 1935, 32, 205—210).—The following modifications of Winkler's method (A., 1913, ii, 246), for use in presence of interfering substances, are recommended. (1) For H_2O containing Fe^{++} (< 10 mg. per litre) and no coloured

org. compounds. To 80 c.c. of the H_2O are added successively 0.4 c.c. of 4*N*-HCl, 4 drops of 10% KCN (I), 10 c.c. of 20% K Na tartrate, and 10 c.c. of a 20% solution of NH_4Cl in 2*N*-aq. NH_3 (II). The colour is compared with a standard, 2 drops of Na_2S solution (10 g. of $Na_2S \cdot 9H_2O$ in 25 c.c. of H_2O , made up to 100 c.c. with glycerin) are added, and the colour is again observed. The difference gives [Pb]. (2) For H_2O containing < 10 mg. of Fe^{III} per litre, coloured yellow by org. compounds. 100 c.c. of the H_2O are boiled down to 50 c.c., with 0.5 c.c. of 4*N*-HCl and 5 c.c. of 5% $(NH_4)_2S_2O_8$ solution to oxidise the org. matter. If the solution is then clear, it is analysed by procedure (1). If cloudy, it is filtered, the ppt. being washed with 3×5 c.c. of 0.1*N*-HCl, 10 c.c. of (II) are added, and the Pb is determined as before. (3) Procedure suitable for all types of H_2O . To 1 litre of the H_2O , or to the quantity containing $50-100 \times 10^{-6}$ g. of Pb (if < 1 litre), are added 5 c.c. of 4*N*-HCl, 5 c.c. of (I), and 3 drops of 1% phenolphthalein. The solution is made just alkaline to the indicator with caustic alkali, and shaken for 1 hr. with 0.5 g. of $CaCO_3$, which adsorbs the Pb. After leaving for a few hr. to settle, the liquid is poured off through a filter and the $CaCO_3$ washed with H_2O made weakly alkaline to phenolphthalein, dissolved in boiling HCl (5 c.c. of 4*N*-HCl in 40 c.c. of H_2O), and diluted to about 150 c.c. The solution is oxidised with $(NH_4)_2S_2O_8$ as in procedure (2), and conc. to 80–90 c.c. 0.1 g. of $N_2H_4 \cdot 2HCl$ is added and the mixture boiled down to 70–80 c.c. to reduce Fe^{III} to Fe^{II} . The Pb is then determined by procedure (1). Cu does not interfere. An accuracy of 3% may be obtained. D. R. D.

Activated carbon application in water system without filters. E. J. ANDERSON (Water Works Eng., 1934, 87, 369).—Fishy tastes and odours are removed by treatment with Cl_2 followed by activated C. The latter is allowed to settle (5 days) before H_2O is used.

CH. ABS. (p)

Zeolitic nature of trass. A. STEOPOE (Tonind.-Ztg., 1934, 58, 592–593; Chem. Zentr., 1934, ii, 1664).—The base-exchange properties of Rumanian trass are described. Good results were obtained in H_2O -softening tests. H. J. E.

Determination of oxygen in water by syringe pipettes. A. KROGH (Ind. Eng. Chem. [Anal.], 1935, 7, 131–133).—By the use of syringe pipettes in the Winkler procedure, contamination with the atm. is avoided and the accuracy can be increased at least to ± 0.007 ml. O_2 per litre. E. S. H.

Germicidal properties of water containing minute amounts of silver. R. P. MYERS and J. C. MAUER (J. Bact., 1935, 29, 7–8).—Solutions containing 0.10–0.15 p.p.m. of Ag destroy *E. coli* (250,000 per c.c.) within $2\frac{1}{2}$ hr. *S. aureus* is slightly more resistant.

A. G. P.

Germicidal activity of available chlorine as measured by the o-tolidine and iodometric tests. W. L. MALLMANN and O. F. EDWARDS (Mich. Eng. Exp. Sta. Bull., 1934, No. 59, 15 pp.).—Neither test is accurate in presence of suspended matter. Both measure a proportion of inactive, adsorbed Cl_2 . The I method is the more accurate. CH. ABS. (p)

Conditioning a chloroamine-treated water supply for biological purposes. F. L. COVENTRY, V. E. SHELFORD, and L. F. MILLER (Ecology, 1935, 16, 60–66).—Satisfactory removal of residual NH_2Cl is obtained by filtration through activated C. A. G. P.

Bactericidal action of ultra-violet light [on sea-water]. (Miss) B. LLOYD (J. Roy. Tech. Coll., 1935, 3, 505–511).—Filtered sea- H_2O , with or without added *B. coli*, is sterilised more efficiently by ultra-violet light (I) than by $Ca(OCl)_2$ and the product is more suitable for use in swimming baths. The mechanism of the bactericidal action of (I) is discussed. F. R. G.

Arsenical poisoning associated with larvicidal treatment of water with Paris-green. R. MACKAY and J. C. R. BUCHANAN (Trans. Roy. Soc. Trop. Med. Hyg., 1934, 27, 517–523).—Poisoning caused by use of Paris-green in H_2O -holes is recorded. As was detected in the H_2O and in the urine of affected persons.

CH. ABS. (p)

How Paris-green [larvicide] acts. H. G. S. MORIN, H. BADER, and P. MARTIN (Bull. Soc. Path. Exot., 1933, 26, 1267–1273).—Arsenites in Paris-green (I) are much more toxic to mosquito larvæ than are arsenates. Hence evaluation of (I) should be based on AsO_3^{III} content only.

CH. ABS. (p)

Use of Paris-green in Indo-China. H. G. S. MORIN and P. MARTIN (Arch. Inst. Pasteur Indochine, 1933, No. 17, 103–140).—For larvicidal treatment of H_2O Paris-green (I) is diluted with equal parts of road dirt and powdered C and applied at the rate of 1 litre of a 1% prep. per 100 sq. m. of surface. The H_2O is not harmful to animals or fish. Transformation of (I) into ethylarsine occurs and As does not accumulate in the H_2O . Presence of (I) on H_2O is detected by adding a sample to a culture of *Penicillium brevicaulis*. A garlic-like odour is produced. In this area oil is probably more effective than (I) as a larvicide.

CH. ABS. (p)

Conc. $Ca(OCl)_2$ [for H_2O purification].—See VII. **Corrosion of Fe dykes in H_2O .**—See X. **Germicidal soaps.**—See XII. **Effect of warfare gases on H_2O .**—See XXII.

PATENTS.

Grit-removal apparatus. E. B. BESSELIÈRE, Assr. to DORR CO., INC. (U.S.P. 1,967,196, 17.7.34. Appl., 19.5.31).—In a combined sanitary and rain- H_2O sewerage system, immediately prior to entering the sedimentation plant (S) the sewage is passed over a sand trap (T) which forms the lowest point of the whole system; from S the settled grit is raked to T and the total sand and grit is lifted and cleaned by a rake classifier, the overflow from which is returned to S. B. M. V.

Treatment of red squill for use as a rodent exterminator. J. B. EDMONDS (U.S.P. 1,952,977, 27.3.34. Appl., 29.5.31).—Hot H_2O containing a little AcOH and NaOBz is circulated through crushed red squill bulbs and to the extract are added aniseed oil and a sweetening agent. A. R. P.

Disposal of household refuse. TAUPIN, MASQUÉ, ST-MARC (B.P. 425,719, 17.1.34. Fr., 20.1.33).

H_2O softening.—See I. **Disinfectants.**—See XVI and XX.