

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

DEC. 7 and 14, 1934.*



I.—GENERAL; PLANT; MACHINERY.

Graphic instruments in chemical processes. R. N. SHREVE (Ind. Eng. Chem., 1934, 26, 1021—1027).—Examples given are: measurement of electrical conductivity; control of consistencies of pastes for storage-battery plates, of charge in cement grinding mills, and of operation of papermaking machines by wattmeters on the driving motors; and measurements of times and speeds. A. G.

Hardness tests with the pendulum impact machine. R. WALZEL (Stahl u. Eisen, 1934, 54, 954—957).—The test is made in the usual pendulum (P) impact machine by replacing the cutting edge in P with a block of steel carrying a 5- or 10-mm. ball. The true impact hardness (H_F) is obtained by dividing the work done in making the impression by the vol. of the impression; for materials having a Brinell hardness (H_B) of ≥ 400 $H_F = 2.1 \times H_B$ using a 10-mm. steel ball, and $H_F = 2.0 \times H_B$ using a hard metal ball. A. R. P.

Drying of solids. VII. Moisture movement by capillarity in drying granular materials. E. W. COMINGS and T. K. SHERWOOD (Ind. Eng. Chem., 1934, 26, 1096—1098; cf. B., 1933, 991).—When a granular material is dried in an air current, H_2O is pulled by capillarity from the larger into the smaller capillaries (I) and evaporates at the ends of the latter. When the larger (I) have been emptied the surfaces retreat down the smaller (I) into the interior of the mass, and the rate of drying decreases. A. G.

New principle of thermal measurements. K. H. REISS (Z. tech. Physik, 1934, 15, 83—85; Chem. Zentr., 1934, i, 2622).—Changes in distance of 0.1 mm. of a cold surface from a bolometer surface are recorded by changes in temp. of the latter. Applications are discussed. H. J. E.

Electrical method of steam calorimetry. J. SMALL (Engineering, 1934, 138, 404—405).—A sample of steam passes through a tube (T) inside a steam main. Inside T is an electric heater. From the temp. of the steam before and after passing through T , the electrical input, and the steam flow through T , obtained by condensing the steam and measuring the H_2O , the dryness fraction may be calc. The external heat loss may be (a) allowed for by standardising the instrument under the same conditions as those present when in use; (b) obtained by carrying out several tests with steam of the same dryness, but with different quantities passing through T , and from the graph of the results obtaining the electrical input at zero flow; or (c) reduced by adjusting the electrical input so that the steam in T is superheated with consequent lower rate of heat transmission. The

method gives more accurate results than that of the throttling calorimeter. D. K. M.

Determination of sulphate in boiler water. H. REICHALT (Chem.-Ztg., 1934, 58, 871—873).—When applied to boiler waters the presence of oxidisable org. matter leads to errors in the determination of SO_4^{--} by titrimetric methods which involve the use of CrO_3 . The best methods are: (1) the addition of excess $BaCl_2$ and back-titration with palmitate, and (2) the benzidine method; of these the first is considerably the quicker. A. G.

Catalysis in applied chemistry. V. Catalysis in analysis and works control. R. LUCAS (Chem.-Ztg., 1934, 58, 889—892).—A review.

General considerations on filtration. M. HOLDERER (Bull. Assoc. Chim. Sucr., 1934, 51, 251—266).—The influence of electrical forces between particles and filtering surface, sedimentation, temp., pressure, p_H , and rate of flow are discussed and a bibliography is given. J. H. L.

Entrainment in a bubble-cap distillation column. G. E. HOLBROOK and E. M. BAKER (Ind. Eng. Chem., 1934, 26, 1063—1067).—Measurements are recorded on an 8-in.-diam. column with movable plates, two bubble caps on each plate, and a glass observation section. The amount of entrainment is increased tenfold by doubling the vapour velocity or halving the plate spacing; it is affected to a smaller extent by the amount of reflux, the slot-velocity, and the surface tension. A. G.

Entrainment in oil absorbers. F. A. ASHRAF, T. L. CUBBAGE, and R. L. HUNTINGTON (Ind. Eng. Chem., 1934, 26, 1068—1072).—Measurements of entrainment (E) are recorded for two laboratory columns, a 12½-in. semi-commercial column, and 7 × 30-ft. commercial absorbers. E increases rapidly with increasing gas velocity (I) and decreasing plate spacing (II). At low (I) and large (II) it is due to floating mist, but at high (I) and small (II) to large drops of liquid. A. G.

Theory of designing adsorption towers. T. BABA (J. Chem. Soc. Japan, 1934, 55, 590—600).—The adsorption rate (I) is calc. for axial passage of the gaseous adsorbate (II) through a cylindrical tower containing globules of the adsorbing substance. (I) is independent of the concn. of (II). CH. ABS. (e)

Liquid film heat-transfer coefficients in a vertical-tube forced-circulation evaporator. L. A. LOGAN, N. FRAGEN, and W. L. BADGER (Ind. Eng. Chem., 1934, 26, 1044—1047).—Film heat-transfer coeffs. for liquids in forced convection through 8-ft., 0.75-in. internal diam., vertical Cu tubes are expressed within $\pm 10\%$ by the dimensionless equation $hD/k = 0.0205(D\mu/\mu)^{0.8}(C\mu/k)^{0.4}$.

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

provided that Reynolds' no. is 7500–250,000, Prandtl's no. 2–50, liquor inlet velocity 7–17 ft. per sec., and η 1–20 lb. per hr. per ft. A. G.

Available heat in industrial waste gases. O. DÖBBELE (Chem.-Ztg., 1934, 58, 841).—To render the heat available the following general rules should be observed. (1) A min. temp. of 450–500° is necessary for a waste-heat boiler to be worth while, and the gases should be cooled to \leq 225–250°. (2) Gases at lower temp. can be used for air or H₂O heating, but the temp. of the heat-transfer surface should be \leq 40–50°. For the heating of H₂O or air below this temp., the latter should pass through a heating coil as in a boiler economiser. (3) In calculating available heat, radiation and conduction losses may be taken as 10%. C. I.

Determination of small amounts of water vapour in gases. H. KAHLE (Chem. Fabr., 1934, 7, 364–366).—The H₂O is frozen out by passing through a tube cooled in liquid air, and is afterwards determined by volatilising and measuring the vol. of vapour. The procedure and apparatus described are suitable when the partial pressure of H₂O vapour is 10^{–4}–15 mm. E. S. H.

Travelling-grate stokers. Discontinuous fractionating column for gasoline.—See II. **Synthesis of NH₃.**—See VII. **Porous slags [for insulation]. Corrosion of refrigeration machinery.**—See X.

PATENTS.

Furnaces. C. J. BAKER and N. E. SKAREDOFF (B.P. 416,443, 24.5.33).—An open-hearth furnace, or one with a similar arrangement of gas and air ports, is provided with auxiliary, high-velocity jets of air, fuel, and/or steam inclined through the roof in directions such as to depress the main flame away from the roof and, preferably, to be somewhat concurrent at the inlet end and countercurrent at the outlet. B. M. V.

Gas producer and other furnaces. A. L. GALUSHA (U.S.P. 1,950,236, 6.3.34. Appl., 24.4.33).—The combustion chamber is H₂O-jacketed and has a smooth, unlined, metallic surface on the fire side, that wall being much thicker than is necessary for strength in order to reduce the rate of heat flow without permitting actual fusion; thick ribs in the H₂O space may be added for the same purpose. B. M. V.

[Mechanical stoker for] furnaces. HARTLEY & SUGDEN, LTD., and N. WIGNALL (B.P. 417,070, 4.4.33).—The solid fuel is withdrawn from a hopper by a conveyor forming its bottom, and fed on to burning fuel on an inclined grate, both being driven by variable-speed motor(s) under control of a thermostat. Primary (I) and secondary air are supplied by a fan and controlled in proportion to the fuel, and steam or other vapour is blown into (I). B. M. V.

Bottom for slag tap furnaces. B. E. BROADWELL, Assr. to REPUBLIC CARBON CO. (U.S.P. 1,940,115, 19.12.33. Appl., 8.10.30).—Claim is made for a steam-boiler furnace bottom consisting of anthracite blocks (bonded with tar or bitumen) cemented together with a similar bond and laid on sand on a metal floor. On heating, a monolithic bottom highly resistant to wear and clinkering is obtained. A. R. P.

Indicating the density and colour of smoke from furnaces. K. PETERSEN (B.P. 417,116, 15.2.34).—A sample of the gases is removed from the flue through a conduit at a velocity of flow $>$ the velocity (V_m) of the main stream and, on arrival at the testing apparatus, the flow is reduced to a velocity $< V_m$. The amount of smoke etc. is then determined, preferably by scrubbing out the solids, condensed oils, and the like and optical inspection of the stream of H₂O. B. M. V.

Filling bodies for apparatus for burning, calcining, drying, cooling, and the like. "MIAQ" MÜHLENBAU U. INDUSTRIE A.-G. (B.P. 416,953, 12.9.33. Ger., 24.5.33).—Filling rings are constructed of porcelain or Fe as circumferentially complete cylinders, but provided with large apertures in the cylindrical wall. B. M. V.

Drying of grain, seeds, and the like in vacua. A. H. McCOMB (U.S.P. 1,949,427, 6.3.34. Appl., 23.2.29).—To increase germination and adjust the H₂O to 17–5% in vac. so that storage may be prolonged, the grain is exposed to alternate and graduated steps of heating and cooling in a const. high vac., the process being effected, e.g., by downflow through a tower-like structure provided with grids formed alternately of steam- and H₂O-pipes. B. M. V.

Counterflow recuperative furnace. [Continuous kiln for decorated pottery.] F. T. COPE and W. S. BOWLING, Assrs. to ELECTRIC FURNACE CO. (U.S.P. 1,938,581, 12.12.33. Appl., 21.11.31).—An electrically heated kiln is provided with heating and recuperative chambers (R) through which two conveyor bands, one above the other, pass in opposite directions, air being passed vertically through the hot to the cold band in R. A. R. P.

Composition for fire extinguisher. G. BRAUN, Assr. to P. J. SARTAIN, R. C. SCHWOERER, and R. C. FASSNACHT (U.S.P. 1,949,857, 6.3.34. Appl., 16.5.31).—The mixture comprises CH₂Cl₂ 90–70 pts. and CCl₄ 10–30 pts., with 1–3% of an unsaturated hydro-aromatic compound, e.g., pinene, to render it non-corrosive. B. M. V.

Centrifugaliser. L. C. ERICKSON (U.S.P. 1,949,647, 6.3.34. Appl., 1.6.31).—An apparatus especially suitable for amalgamation and the separation of the amalgam comprises a bowl having T-shaped riffles formed on the interior of the wall, a discharge at the top, and feed to the lower part through an axial sleeve. B. M. V.

Filtering method and material. V. C. BENJAMIN (U.S.P. 1,949,644, 6.3.34. Appl., 10.5.32).—A filter medium is constructed of hydraulic cement rendered porous by the admixture of unaltered rice ash. B. M. V.

Filters and methods of filtration. BRIT. CELANESE, LTD. (B.P. 416,430, 14.3.33. U.S., 14.3.32).—The use of cellulose ethers, especially benzylcellulose and others insol. in H₂O, is claimed as filter medium, alone or in conjunction with charcoal, fuller's earth, zeolites, and the like. B. M. V.

Preparation of filtering material. H. S. MONTGOMERY, Assr. to H. A. BRASSERT & CO. (U.S.P. 1,939,860, 19.12.33. Appl., 22.8.29).—Slag wool or asbestos is screened and washed in H₂O to remove the

lighter particles, and these are mixed with kieselguhr which has been washed free from colloidal clay and sand and calcined.

A. R. P.

Filter. G. LIEN (U.S.P. 1,950,254, 6.3.34. Appl., 23.5.32).—A filter for insertion in a conduit comprises a filter mat and a side pocket through which sediment may be removed.

B. M. V.

Bubble-tower tray. D. IRWIN (U.S.P. 1,950,247, 6.3.34. Appl., 13.5.33).—In a bubbling tower the supports for the trays also form liquid conduits extending through the shell; each tray comprises a single large well and cap, the construction of which is described.

B. M. V.

Apparatus for washing liquids insoluble in each other. H. SCHÖNEBORN, ASSR. to KOPPERS CO. OF DELAWARE (U.S.P. 1,949,696, 6.3.34. Appl., 30.1.32. Ger., 5.3.30).—A tower-like structure is provided with conduits, in order downwards: *A*, outlet for washed lighter liquid; *B*, inlet for the heavier liquid; *C*, inlet for lighter liquid; *D*, outlet for washed heavier liquid. The spaces *A*—*B* and *C*—*D* form settling zones, and the intermediate (contact) zone *B*—*C* is provided with agitators similar to double-inlet pump runners alternating with diaphragms having central apertures.

B. M. V.

Liquid and gas separator. R. BATTLE and F. I. ROSS, ASSRS. to HANLON-WATERS, INC. (U.S.P. 1,950,285, 6.3.34. Appl., 16.10.31).—An apparatus for separating liquid (and/or solid particles) from gases, of the inward spiral-flow type, is described.

B. M. V.

Reacting gases with liquids. K. A. LINDNER, ASSR. to AMER. SMELTING & REFINING CO. (U.S.P. 1,949,392, 27.2.34. Appl., 30.7.32).—The liquid is injected tangentially into a cylindrical vessel with conical bottom and forms a continuous film to protect the walls from the reacting gas, which is supplied without excess. The product of reaction (e.g., ZnCl_2 from the purification of Pb) leaves as a core to the vortex.

B. M. V.

Moisture and dust eliminator for gas washers. H. BLEIBTREU and A. J. EBNER, ASSRS. to FREYNG ENG. CO. (U.S.P. 1,950,020, 6.3.34. Appl., 18.12.31).—In an upward extension of a hurdle tower the gas passes through the irrigation sprays and is caused to move at first tangentially, and then turn inwards with increasing sharpness to a central outlet.

B. M. V.

Dehydration of gases. I. G. FARBERIND, A.-G. (B.P. 417,309, 22.3.34. Ger., 13.4.33. Addn. to B.P. 394,086; B., 1933, 822).—The use of dehydrated CaSO_4 is applied to the drying of gases, the relative amounts of gas and CaSO_4 being such that the latter is converted into the hemihydrate.

W. J. W.

Freezing out of water vapours contained in compressed gases or gas mixtures to be liquefied. A. MESSER (U.S.P. 1,949,616, 6.3.34. Appl., 7.12.32. Ger., 16.9.30).—The feed gas (e.g., air) is passed through a compressor, a heat exchanger (*A*), and an expansion valve, whereby most of the H_2O is removed by the cooling. It then passes back through *A*, a low-temp. cooling apparatus (*B*), and a rectifier, the separated O_2 and N_2 being passed through *B*. The feed is shut off at the second pass through *A* until a predetermined

temp. condition is attained suitable to condense all the remaining H_2O .

B. M. V.

Apparatus for determining the velocity, and/or the dust, and/or the mist content, of a fluid stream. W. E. GIBBS (N. C. GIBBS, extrix.) (B.P. 416,516, 30.3.33).—A pitot head (*A*) has embodied in its casing a filter-thimble (*B*) in communication with the impact orifice (*C*) which is an axial passage and is itself provided with small orifices in the wall (perpendicular to the axis) in communication with a differential pressure gauge (*D*), the other inlet to which communicates with small orifices in the outer wall of *A*. After measuring the velocity of flow in the main flue (*E*), or other passage where the dust is to be determined, under conditions of no flow in *C*, flow through *B* and *C* is induced by a pump until *D* reads zero, i.e., when the velocities of flow in *C* and *E* are equal, and filtration is effected for a definite time.

B. M. V.

[Hydraulic brake] fluid composition. J. BEBIE and G. L. DOELLING, ASSRS. to WAGNER ELECTRIC CORP. (U.S.P. 1,949,775, 6.3.34. Appl., 29.6.32).—A liquid which does not attack rubber comprises EtOH 45%, Et derivatives of *o*- and *p*-toluenesulphonamide 10% each, castor oil 35 vol.-%.

B. M. V.

Glossimeter. A. H. PFUND (U.S.P. 1,949,619, 6.3.34. Appl., 16.9.32).—The apparatus comprises a pair of arms (*A*, *B*) swinging over a semi-circular platform and always making equal angles with the diam. of the semicircle. *A* carries a source of light and *B* a telescope embodying a prism with unsilvered streak and a photometric wedge. The sample or standard under examination is spun by a motor at the centre of the semicircle, in the form of a flat disc or cylindrical surface.

B. M. V.

Cu alloys for fireboxes.—See X.

II.—FUEL; GAS; TAR; MINERAL OILS.

Origin of coal. Petrographical and micro-chemical comparison of the structure constituents of flame and gas coal. P. POTONIE and G. BOSENICK (Mitt. Lab. preuss. geol. Landesanst., 1933, 19, 75—110; Chem. Zentr., 1934, i, 2375).—Complete data are recorded for 8 samples, and are discussed in relation to the origin and conditions of formation of the coal.

H. J. E.

Chemical study of Ukrainian lignites. A. M. GLADSHTEIN (Khim. Tverd. Topl., 1930, 1, No. 5, 36—50).—Analytical data are recorded. Low-temp. carbonisation in a Fischer retort yielded semi-coke 59 and tar 15%, together with 128—165 cu. m. of gas per ton of combustible substance. The tar contained 12% of phenols and 61% of fractions of b.p. < 350°. Hydrogenation of the heavier fractions in presence of Fe_2O_3 gave 40.8% of material of b.p. < 230°.

Ch. Abs. (e)

Installation for cleaning and drying fine coal from the Maurits mine (Holland). J. SPÉE (Chim. et Ind., 1934, 32, 787—788).—The fine coal is first washed with H_2O and then dried in centrifugal machines, whereby the H_2O content is reduced to 8%. The sludge is subjected to flotation followed by drying in rotary vac. filters, the H_2O being reduced to 22%.

The end-products in each case have essentially the same composition and are mixed to give a product with 12% of H_2O , suitable for the production of coke. C. C.

Coal cleaning by gravity methods. A. A. HIRST (J. Inst. Fuel, 1934, 8, 4–10).—The general principles of the process are discussed and some recent practical developments described. W. H. B.

Fusion of coal. Industrial applications. C. ARNU (Chim. et Ind., 1934, 32, 276–292, 530–540).—Examination of various coals by the dilatometer method shows that they can be classified on the basis of the properties thus measured. A no. of graphs depicting the behaviours of different coals are given and their characteristic features interpreted. The application of this method to the study of such problems as the oxidation and blending of coals and the fissuring, contraction, and swelling of cokes are described. It is considered that the simplicity of the apparatus and test, and the wide sphere of application, render it suitable for use in industrial as well as in research laboratories. E. S.

Method of controlling the temperatures of travelling-grate stokers. J. D. MAUGHAN, H. B. SPALDING, and B. M. THORNTON (J. Inst. Fuel, 1934, 8, 11–20).—The max. temp. attained by the links of such stokers is reduced at least to 120° above the preheated air temp. by feeding relatively inert material in a layer between the fuel and the grate. With "hot" fuels the layer must be about 1 in. thick and the material must contain a high % of inert matter. A "hot" coal is generally one with a low ash content or from which the coke has a low reactivity. The method makes it possible to use hotter preheated air and fuels of low ash content without excessive maintenance costs, and should enable the heating surface of a stoker-fired boiler plant to be more economically proportioned between the boiler, economiser, and air heater. W. H. B.

Vertical chamber ovens with water-gas chamber. W. BUËB and A. THAU (Gas- u. Wasserfach, 1934, 77, 619–624).—A disadvantage of the method of producing water-gas in vertical chamber ovens by passing superheated steam through the charge during the latter part of the coking period lies in the resulting fluctuation in the composition of the gas produced. This has been overcome by dividing the oven chamber into two compartments (C , C') by means of a vertical partition and using C as a coking chamber and C' as a water-gas chamber; the latter is charged with small coke and is so designed that the water-gas produced continuously therein mixes with the carbonisation gases from C just before the mixed gases enter the gas offtake. Some details are given of the design and operation of a plant of this type which has been erected at the Lodz gas-works. An improved thermal efficiency is claimed for the process and the possibility of similarly modifying inclined and horizontal chamber ovens is suggested. A. B. M.

New process of low-temperature carbonisation. G. KROUPA (Petroleum, 1934, 30, No. 38, 5–7; cf. Iron & Coal Trades Rev., 1933, 126, 199).—The results of tests on a Thwaite plant (cf. B.P. 326,492; B., 1930, 497) are briefly described. The plant is 59 ft. long by

14 ft. wide, contains 6 carbonising trays, and has a total throughput of about 126 tons/week. Only 3 men are required to operate the plant. The temp. of carbonisation is 300–450° and the carbonising time $3\frac{1}{2}$ –4½ hr. Satisfactory briquettes (fixed C 80–83, volatile matter 8–12, ash 6–8, H_2O 1–1.5%) were obtained by carbonising a South Wales cleaned duff and mixtures (2–4:1) of coal and coke dust. A. B. M.

Solid products of the carbonisation of coal. SOUTH METROPOLITAN GAS CO. (Rept., Chem. Dept., 1934, 123 pp.).—The investigation of such properties of coke as ignition temp. (T) and "combustibility" (C) in air, reactivities to CO_2 , steam, and H_2SO_4 (forming SO_2) (H), CO_2 adsorption (A), radiant efficiency, and electrical resistivity (R) indicates that in the region of 700° profound alteration in the properties of the coke occurs. This is characterised by vol. contraction, large decrease in R , decrease in H , loss of ability to be dispersed in H_2SO_4 , attainment of and fall from a max. A , rise in T , and fall in C . The changes of physical structure produced by any modification of the present carbonising process likely to be practicable are quite ineffective in producing substantial improvement in C . A smokeless, readily ignited solid fuel burning free in an ordinary domestic grate can be obtained by carbonisation of coal at < 700°. No high-temp. product has been found possessing properties of combustion which would cause it to be classified with such low-temp. cokes. Any departure from the true low-temp. standard of C is most easily detected by measuring R . To avoid an ash of undesirable appearance from low-temp. coke the use of small or finely-crushed coal in the production must be limited. Careful grading of the coke is not essential and sizes ranging from 1 to 3 in. are satisfactory in use. Apart from advantages of cleanliness, the high price is justified by the high thermal efficiency (E). Tests with high-temp. coke in the "Metro" coke grate show that increase in the moisture content markedly increases the time required for ignition and decreases E , although about 3% seems necessary to avoid dust nuisance. Coke graded between 1 and 2 in. is most suitable, the presence of undersize material being a definite disadvantage. Ease of ignition is dependent mainly on the volatile therm content (V), and a min. of 2.5 therms/ton (as determined by test described) is considered essential. After ignition V is of little importance and the vigour of combustion is then determined by a property of the ash expressed as ash vol. and governed mainly by the distribution of ash in the coal as carbonised. The most important property of cokes for use in domestic boilers is considered to be that of ability to burn for long periods without attention. This "flexibility" is determined mainly by bulk d and min. rate of combustion (M). M is dependent on V , for which a min. of 2.5 therms/ton again seems desirable. Coke is more efficient thermally than are more reactive fuels. A decrease in coke size and the presence of shale increase the tendency to clinker formation, whereas the fusion point of the ash is unimportant. The apparatus and methods of measuring these various properties are described in detail. E. S.

Regeneration of sulphur in the coking of coal. M. V. HOFMAN and S. G. ARONOV (Khim. Tverd. Topl.,

1930, 1, No. 6, 17—28).—S was absorbed from the gas by solution containing 50 c.c. of 15% Na_2CO_3 , 50 c.c. of 20% FeCl_3 , and 5 c.c. of 10% NiSO_4 . Up to 71% of the S was regenerated: $4\text{FeS} + 3\text{O}_2 + 6\text{H}_2\text{O} = 4\text{Fe}(\text{OH})_3 + 4\text{S}$.

CH. ABS. (e)

Adsorptive properties of carbon black. H. BARRON (India-Rubber J., 1934, 88, 457—461).—If C black (I) (or S) is shaken with a mixture of polar and non-polar liquids (e.g., C_6H_6 and H_2O) it is always retained in the non-polar layer after separation. This behaviour of (I) facilitates determination of the amount of I, BzOH, or PhOH adsorbed from the two-phase liquid system, by titration of the aq. layer. Knowledge of the partition coeff. then enables calculation of the adsorption from the non-polar liquid. The adsorption isotherms for (I), with or without previous de-gassing or heat-treatment, are investigated. The method can also be used to investigate the effect of dispersed rubber, S, etc. on the adsorptive properties of (I). The effect of S and stearic acid on the adsorptive power of (I) for PhOH, BzOH, and I is negligible, but 1% of rubber in the C_6H_6 greatly reduces the ability of (I) to adsorb PhOH or BzOH.

D. F. T.

Plants for production of gas and coke; comparative operation of the coke-oven and gas industries. K. BAUM (Gas- u. Wasserfach, 1934, 77, 596—608).—The scientific, technical, and economic lines of development of the German coke-oven and gas industries are discussed in some detail, with particular reference to the influence of the type of oven or retort on the coking process, to the factors affecting the throughput, to the "heat of coking," and to the efficient heating of ovens and retorts in general. Closer co-operation between the two industries is advocated.

A. B. M.

Formation of water-gas and behaviour of brown coal and bituminous coal cokes and semi-cokes in water-gas production. E. TERRES, G. PATSCHEKE, H. HOFMANN, S. KOVÁCS, and O. LÖHR (Gas- u. Wasserfach, 1934, 77, 585—587, 628—636, 650—654, 666—669, 681—684, 703—706).—Previous investigations of the reactions concerned in water-gas production are briefly reviewed. The rate of decomp. of steam when passed over coke or semi-coke at 400—1200° has been studied in the laboratory. The steam, diluted with N_2 , was passed (30 to > 1000 c.c./hr.) through a 5—6-cm. column of the coke (3 mm. size) contained in an electrically-heated SiO_2 (20 mm. diam.) or porcelain (12 mm. diam.) tube and the issuing gases were analysed. The cokes were produced in a laboratory-scale retort and allowed to cool in N_2 . The reaction with steam was effected in each case at 10° below the carbonising temp. With the bituminous coal cokes (A) the amounts of steam decomposed and of CO produced were considerably < the vals. calc. from the known equilibria at the same temp.; they were also < the corresponding vals. obtained with wood charcoal. The reactivity of A decreased with rising temp. of carbonisation. With the brown-coal cokes and semi-cokes (B) also the gasification equilibria were not reached under the experimental conditions used. The % of steam decomposed increased with rising reaction temp., with decreasing steam saturation of the N_2 , and with

decreasing gas velocity. The reactivity of B increased with rising temp. of carbonisation up to 700° and thereafter fell again; the possible cause of this behaviour is discussed. The % of steam decomposed increases with time of contact, at first more or less rapidly and then more slowly, without, however, attaining the equilibrium vals. within the times of contact used. Comparison of the results with those of other workers shows that the reactivity of the materials towards steam increases in the order graphite, soot, coke and semi-coke from bituminous coals, wood charcoal, and semi-coke and coke from brown coals. The water-gas equilibrium ($\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$) was established in the experiments with wood charcoal and A at > 600°; this equilibrium was also reached at 600° in an empty porcelain tube, but only with a somewhat long contact time. Boudouard's equilibrium ($\text{C} + \text{CO}_2 \rightleftharpoons 2\text{CO}$) was not reached in the gasification experiments. Representation of the results on Ostwald's gasification triangle showed that the action of steam on A and on charcoal proceeded without disturbing side-reactions, but that such side-reactions, the exact nature of which, however, was not clear, occurred with B. The "heat of wetting" of the cokes was determined to obtain a measure of their surface activity; the changes in the coke substance with rising carbonising temp. were shown by parallel changes in the heat of wetting, but a definite correlation between surface activity so determined and reactivity towards steam was not possible. The reactions involved in the gasification of the S in B are discussed. A general discussion of the course of the gasification reactions leads to the conclusion that the primary reaction between coke and steam proceeds to a considerable extent, if not entirely, in accordance with the equation $\text{C} + \text{H}_2\text{O} = \text{CO} + \text{H}_2$; this is followed by the various secondary reactions mentioned above.

A. B. M.

Production of high-hydrogen water-gas from younger coal cokes. R. E. BREWER and L. H. REYERSON (Ind. Eng. Chem., 1934, 26, 1002—1008).—The passage of dry CO_2 over heated C (water-gas reaction) results in the fixation of a part of the CO_2 as a solid C-O complex, of which many varieties are known. This decomposes during cooling with elimination of CO_2 and CO. At > 1700° its formation appears to be exothermic, and below 1700° endothermic. The fixation may, alternatively, be due to adsorption of gases on the C. The possible mechanism, equilibrium const., and reaction kinetics of the water-gas reactions are discussed.

C. L. G.

Gum deposits in gas-distribution systems. Vapour-phase gum. C. W. JORDAN, A. L. WARD, and W. H. FULWEILER (Ind. Eng. Chem., 1934, 26, 947—955; cf. B., 1933, 6).—The gum deposited in meters, valves, and pilot jets of coke-oven gas distribution systems is attributed to the polymerisation and oxidation of reaction products between the N oxides and unsaturated hydrocarbons, and probably to phenols and some cyclic N bases. The gum contains 5% N and < 20% O and consists of particles which are of mol. size when first formed and to a large extent are electrically charged. After coalescing to a size of 1—1.5 μ they are pptd. Gas containing a few tenths of a mg. per cu. m. of NO will cause the formation of 10^{12} particles of gum

per cu. m. Filtration of the particles is not feasible, but the removal of NO and O₂ will reduce the amount of gum formed. C. L. G.

Comparison of the activity of two classes of gas-purifying materials. J. E. BREWER (J. Proc. Amer. Gas Assoc., 1933, 894—897).—Seil, Heiligman, and Clark's method (Amer. Gas J., 1929, 130, No. 5, 39; No. 6, 32) is modified. CH. ABS.

Methane as a source of hydrogen. C. PADOVANI (Chim. et Ind., 1934, 32, 517—527).—CH₄ present in natural gas and in dehydrogenated coal gas can be readily oxidised to H₂ at < 1000° by CO₂, H₂O, or O₂ (air) in presence of a suitable catalyst. Ni deposited over the surface of a porous refractory is satisfactory and is not adversely affected by S compounds present in the gas or by deposition of C. This catalytic effect is increased by addition of oxides of Al, Th, Zr, and Mg. In all the reactions investigated, reaction was found to be almost complete at 850°. It is suggested that the resulting H₂-CO and H₂-CO₂ mixtures could be used as a substitute for coal gas and for the prep. of liquid fuels and various other compounds. E. S.

Test burner for determining the combustion properties of gases. E. CZAKÓ and E. SCHAAK (Gas-u. Wasserfach, 1934, 77, 587—596).—The apparatus is of the Bunsen burner type in which the primary air supply, which is controlled by the rotation of a calibrated disc, is adjusted to give an inner cone of predetermined height in the flame. A. B. M.

Assay of bituminous schists. J. BARLOT (Bull. Soc. chim., 1934, 1, [v], 1014—1016).—In earlier methods the yield of oil is low and that of gas high. The sample (100—300 g.) is heated rapidly in a current of CO₂ and steam by being pushed from the cold part of the tube into a zone at 500—600°. The volatile products are condensed in traps. J. G. A. G.

Fractionation of the oils from the shales of Creveney. J. BARLOT (Chim. et Ind., 1934, 31, Spec. No., 424—425).—By rapid distillation at approx. 500° of these shales oils containing 30—40% of light hydrocarbons are obtained. The S content of these oils is about 2% and a heat-treatment process (cf. B. 1934, 611) has been devised for reducing it to 0.5%.

H. S. P.

Chemically controlled acidation of oil wells. S. W. PUTNAM and W. A. FRY (Ind. Eng. Chem., 1934, 26, 921—924).—3000 oil wells (U.S. and Canada) in limestone formations have been treated with HCl in the last 3 years, production being increased by 448%. A 15% solution of HCl, containing an inhibitor to prevent corrosion of casing, is used in normal formations. For special formations, the following (HCl) acids have been developed: XX acid, for use in dolomitic formation, contains a catalyst to accelerate the reaction between HCl and MgCO₃; XF acid, for use in limestone formations of low rock pressure, contains reagents which reduce the surface tension of the products of reaction, making flow easier; XG acid, for use in formations containing Ca(HCO₃)₂, contains a foaming agent which increases the reaction time; and a special org. acid to remove wax from the pores of the formation as well as

to dissolve the limestone. The lower sections of the well may be blanketed off with aq. CaCl₂ (d 1.38). C. L. G.

Continuous laboratory topping apparatus. H. T. RALL and H. M. SMITH (Ind. Eng. Chem. [Anal.], 1934, 6, 373—374).—The apparatus described is designed to remove the more volatile components of crude petroleum without decomp. of the residue. The temp. of distillation is > 150°. E. S. H.

Results of distillation and general properties of Rumanian crude oils. E. E. CASIMIR (Petroleum, 1934, 30, No. 40, 1—16; No. 44, 1—16).—An analytical survey has been made of the crude oils from a no. of fields in 13 oil-bearing regions of Rumania. The proportions of benzine, kerosene, gas oil, etc. were determined by distillation, together with the usual physical properties of each product. Additional information recorded includes the amount of unsaturated, aromatic, naphthene, and paraffin hydrocarbons present in the lighter fractions, the proportion of naphthenic acids, etc. Results are tabulated also according to the geological nature of the productive strata. C. C.

Removal of lowest-boiling constituents from crude oil. N. MAYER (Öl u. Kohle, 1933, 1, 163—164; Chem. Zentr., 1934, i, 2690).—Crude oil is heated under pressure, and the low-boiling constituents are removed by passing in a vaporising substance, also under pressure. H. J. E.

Discontinuous fractionating column for separation of benzene, toluene, and xylene from the gasoline fraction of Shukoko crude. I. Method of calculating the number of plates required for the rectification desired. M. MIZUTA (J. Soc. Chem. Ind., Japan, 1934, 37, 540—542 B).—Mathematical. A. G.

Prospects of a petroleum chemical industry. C. ELLIS (Ind. Eng. Chem., 1934, 26, 826—836).—A survey, with extensive references to the lit., of the formation of chemical products directly or indirectly from petroleum. C. C.

Gases from cracking hydrocarbon oils. G. EGLOFF and J. C. MORRELL (Ind. Eng. Chem., 1934, 26, 940—944).—The results of small-scale cracking runs on a variety of stocks and analyses of the resulting cracked gases are tabulated together with an analysis of cracked gas from a commercial unit operating on W. Texas gasoline. Analyses of low- and high-pressure gases from a commercial cracking unit showed that the latter contained more H₂, CH₄, and N₂, but less C₂H₆, C₃H₈, C₄H₁₀, C₅H₁₂, propylene, and butylene. Vapour-phase cracking appears to give more olefines than the liquid-phase process. C. L. G.

Refining of mineral oils with active oxygen. J. HERZENBERG (Proc. World Petroleum Congr., 1933, 2, 30—43).—The principles of refining methods are surveyed. The constitution of unsaturated hydrocarbons in various crudes has been studied, using aliphatic per-acids, e.g., perpropionic acid, by which unsaturateds are converted into glycols. The nature of the S compounds has also been investigated by treating the various fractions with HgCl₂ solution; e.g., S compounds in Panuco crude are mainly thiophans. Saturated S compounds are selectively oxidised by at. or

active O and can be practically eliminated from petroleum fractions. Thiophenes require a large excess and high concn. of active O to break the ring. The velocity of oxidation is greatest with org. per-acids, and less with H_2O_2 and hypochlorite. Efficient desulphurisation is brought about by means of anodic oxidation, electrolysis in AcOH or acetate solution, whereby Ac_2O is formed by decomp. of Ac_2O_2 first produced. C. C.

Refining cracked gasoline by the Gray process. M. R. MANDELBAUM (Proc. World Petroleum Congr., 1933, 2, 21—29).—This process of vapour-phase refining has been widely adopted in the United States because of the selectivity of the reaction and its economies over acid-washing and re-running. Gasoline so refined has a very low gum content and is commercially stable and of good colour. There is no decrease in C_8H_{18} no. in treatment. The large throughputs obtained (1000—6000 barrels per ton of absorbent) render the recovery of the absorbent non-essential to low cost operation. Results obtained in refining cracked gasolines from American and other crudes are given, together with plant installation and operation costs. E. S.

Refining of vapour-phase cracked gasoline. W. H. THOMAS (Proc. World Petroleum Congr., 1933, 2, 44—49).—A review of the properties and treatment of cracked distillates. *o*- and *p*- $\text{C}_6\text{H}_4(\text{OH})_2$, pyrogallol, and benzyl-*p*-aminophenol are found to be the most effective inhibitors. The difficulty of their low solubility in cracked spirit is overcome by dissolving in cresol and adding the mixture to the spirit. Stabilities determined by the O_2 bomb method and storage at 100° F. are of similar degree and order. E. S.

Determination of composition of small quantities of crude benzene. L. D. GLUZMAN (Zavod. Lab., 1934, 3, 710—713).—A scheme of fractional distillation of small quantities of C_6H_6 , PhMe, xylene, and solvent naphtha mixtures is described. R. T.

Refining of crude benzol with bleaching earths. H. MAINZ and W. MÜHLENDYCK (Brennstoff-Chem., 1934, 15, 361—365).—The benzol is heated, with stirring, for 2 hr. at the b.p. with 4.5% of fuller's earth (I) and subsequently distilled. Tonsil was the most effective of the earths used, although Floridin gave equally good results after being finely ground. The product (92—95% of the original crude) had a gum content (*G*) of 3—8 mg./100 c.c., and was stable on storage. Treatment for 2 hr. at room temp. or for 1 hr. at the b.p. gave products of low initial *G* but of lower storage stability. Some variation in the conditions of treatment [amount of (I) used and time of contact] was, however, necessary to produce equally good products from different crude benzols; highly impure crudes required steam-distilling before treatment to obtain stable products. The process is economically more advantageous than acid refining. A. B. M.

Determination of sulphur in petroleum products. R. M. LILLY (Refiner Nat. Gasoline Mfr., 1934, 13, 177—179).—Modifications of the standard method of burning the sample are described. CH. ABS. (e)

Determination of sulphur in oils. E. GRAEFE (Petroleum, 1934, 30, No. 38, 2—3).—Weisselberg's observation that no sulphonic acids are formed when

hydrocarbons containing S are burned in the bomb (B., 1934, 914) is confirmed, although such acids may be formed by oxidation of the hydrocarbons at the normal temp. in presence of H_2O by the action of air and light. Loss of SO_2 or SO_3 from the bomb, which was probably the cause of the errors observed by Griffin (cf. *loc. cit.*), can be effectively prevented by using an alkaline oxidising solution, e.g., aq. Na_2O_2 , as the absorbing medium in the bomb instead of distilled H_2O . If a bomb is not available the combustion can often be successfully effected in a glass flask at atm. pressure (cf. B., 1904, 563). A. B. M.

Catalytic phenomena in cracked gasolines. (Gum formation.) A. SACHANEN (Chim. et Ind., 1934, 32, 770—772).—A survey of the problem of gum formation in cracked gasolines and the use of inhibitors. C. C.

Determination of gum in gasoline. O. C. BRIDGEMAN (Proc. World Petroleum Congr., 1933, 2, 97—102).—Using a method based on that proposed by Hunn, Fischer, and Blackwood (J. Soc. Aut. Eng., 1930, 26, 31), the gum content per unit vol. of a gasoline was found to decrease (1) with increase in air flow up to 300 ml./sec., after which further increase had little effect; (2) as the vol. evaporated decreased; (3) with decrease in concn. of gum-forming constituents; (4) with rise in temp. The relative gum contents, however, of a series of gasolines were independent of the vol. evaporated, of the concn., and of the temp. of evaporation if evaporation was assisted by sufficient air flow. C. C.

Estimation of existent gum in motor fuels. STANDARDISATION SUB-COMMITTEE ON GUM, INST. PETROLEUM TECHNOLOGISTS (Proc. World Petroleum Congr., 1933, 2, 94—96).—The experimental work on which the proposed "I.P.T." standard method is based is described. The method consists in evaporating 50 ml. of fuel in a hemispherical glass dish on a steam-bath, and projecting air from a specified jet on to the surface of the fuel. The gum is dried for 1 hr. at 150°. If the gum content is > 5 mg./100 ml., 25 ml. and a smaller dish are used. C. C.

Tests and remedies for gum formation in gasoline. T. H. ROGERS and V. VOORHEES (Proc. World Petroleum Congr., 1933, 2, 63—68; cf. B., 1933, 532).—In the Voorhees gasoline-stability test, gasoline (*G*) is heated in a glass flask with O_2 under low pressure and the induction period (*T*), as indicated by the rate of oxidation, is measured. For *G* subject to normal storage conditions it is desirable that *T* should be 400 min. Other stability tests are discussed and the conditions for the various bomb tests are tabulated. In addition to their efficiency as gum inhibitors (*I*), antioxidants should be more sol. in *G* than in H_2O , colour-stable in *G* solution, etc. *p*-Benzylaminophenol is recommended for use as *I* (it is effective in concns. < 0.005%), whilst for colour-stabilising, the butyl- and amyl-amines are most effective. The response of *G* to *I* \propto the original *T*; aged *G* is less responsive. Methods for ensuring uniform distribution of *I* are discussed. C. C.

Desirable characteristics of fuels for high-speed compression-ignition engines. J. KEWLEY (Proc. World Petroleum Congr., 1933, 2, 234—235).—A report

of the Joint Fuel and Engine Committee of the Institution of Petroleum Technologists, the Diesel Engine Users Assoc., and the Institution of Automobile Engineers. It is concluded that fuels for such engines must have good ignition quality, *i.e.*, absence of rough running (as determined by an engine test) and suitable η ; absence of solid impurities and failure of wax to separate at the lowest temp. to which the fuel may be subjected are also essential properties. C. C.

Effect of temperature on knock-rating. L. A. PELETIER (Proc. World Petroleum Congr., 1933, 2, 165—169).—Gasolines differ in their sensitivity to changes in engine conditions. The effect of cooling-liquid temp., in particular, has been studied, both by a direct method (using the Ricardo E 35 test-engine, in which H.U.C.R. is determined) and by the indirect method (using the S 30 or C.F.R. engine), whereby C_8H_{18} nos. are obtained by comparison with blends of reference fuels. In the latter case, to obtain abs. knock vals., a conversion is made by means of a direct-reading scale (relating C_8H_{18} no. and b.-h.-p.). It is shown that the drop in knock val. (V) due to rise in cooling temp. is much $>$ the relative drop among different fuels, a result confirmed on the E 35 engine. Fuels of different chemical character (with the exception of cracked spirits) show only slight differences in sensitivity to temp., amounting to $> 20\%$ of the total fall in V due to rise in cylinder-jacket temp. $PbEt_4$ has little effect on the sensitivity to temp. The adequacy of C_8H_{18} and $n-C_7H_{16}$ as reference fuels is questioned. C. C.

Knock-rating of aviation fuels. D. R. PYE (Proc. World Petroleum Congr., 1933, 2, 186—192).—Tests carried out under the auspices of the Institution of Petroleum Technologists Sub-Committee on Knock-Rating of Aviation Fuels are described. In order to correlate C_8H_{18} no. and the behaviour of the fuel in service, 9 different aviation fuels were matched against a sub-standard fuel (the knock-rating of which was varied by the addition of $PbEt_4$) in H_2O - and air-cooled aero-engine cylinders, and also under a variety of conditions in the S 30 and C.F.R. test-engines. The effect of varying the engine conditions (which differs with different fuels) is briefly discussed. Cylinder and gas temp. are the most important variables in the operating conditions which affect the fuel. The results obtained in a no. of laboratories show that aircraft fuels can be satisfactorily rated, using the C.F.R. engine at 900 r.p.m., jacket temp. 100° , and mixture temp. 127° . C. C.

Detonation rating of aviation fuels. H. K. CUMMINGS (Proc. World Petroleum Congr., 1933, 2, 193—205).—The development of the methods of specifying and measuring the knock-ratings of aviation fuels in the United States and the work of the C.F.R. Aviation Gasoline Detonation Sub-Committee are reviewed. C. C.

Knock-rating of high-speed C.-I. engine fuels. G. D. BOERLAGE and J. J. BROEZE (Proc. World Petroleum Congr., 1933, 2, 271—276).—A Thomassen engine equipped with throttling valve for inlet air and a Maihak pencil-type indicator (by which pressure and needle-valve-lift diagrams can be taken on the same card) has been used to investigate ignition quality (I) of

Diesel fuels. The delay period of such fuels is compared with those of blends of cetene and $1-C_{10}H_7Me$ (of good and bad I , respectively), the results being expressed as cetene nos. (C). A modified C.F.R. engine has also been used in which knock-intensity can be measured by the bouncing-pin method. By a modified form of the latter, ignition delay can also be measured. A scheme is outlined for measuring "delay" optically. On the normal C.F.R. engine, C can be obtained approx. by examining 25% solutions of the fuels in petrol under the petrol-testing conditions. Good correlation was found between the behaviour of various types of service engines and C , as determined in the Thomassen unit and on the modified C.F.R. Although the C.F.R. petrol engine also gives satisfactory agreement, the method is considered to be open to objection. C. C.

Measurement of injection-engine fuel ignition properties. A. W. POPE (Proc. World Petroleum Congr., 1933, 2, 266—270).—The crit. compression ratio (R) of ignition-engine fuels is measured, using the C.F.R. engine equipped with fuel-injection pump, injector, and cupped piston. The engine is motored at const. speed without injection and with inlet and jacket temp., ignition angle, pressure, and quantity controlled. Fuel is injected for 3-sec. intervals, the compression ratio being slowly decreased until ignition fails, as indicated by the noise of the exhaust. Time and temp. factors of the ignition process have a varying effect on different fuels. Changing the engine operating conditions does not affect R of all fuels alike, and rigidly standardised engine conditions are essential. C. C.

Measurement of ignition qualities of Diesel fuels. A. E. BECKER and H. R. STACEY (Proc. World Petroleum Congr., 1933, 2, 262—265).—A no. of fuels have been examined, using the method of Pope and Murdoch (J. Soc. Aut. Eng., 1932, 30, 136) on the C.F.R. engine. The crit. compression ratio (R) is lowered by increasing both the injection period and also the quantity of fuel per injection, but is not materially changed by varying either the injection angle or the pressure. (The ratio of the amount of fuel injected to the amount of air charged apparently affects the result, and the use of a single injection and variable amounts of air is recommended.) Temp. changes produce the greatest effect. R is lowered by raising the air temp. and the jacket temp., but raised by increasing the speed. Although the abs. vals. of R are affected by these changes, the order of the fuels tested is not materially altered. There is an approx. relationship between R and the NH_2Ph point (A) (as R increases, A decreases). Similarly, the spontaneous ignition temp. (T) and R show some correlation, R increasing with T . The possibility of developing T , R , or measurement of "delay" as a means of correlating laboratory tests with service conditions is suggested. C. C.

Lacquer formation in Diesel and semi-Diesel engines. C. A. BOUMAN (Proc. World Petroleum Congr., 1933, 2, 248—255).—With Diesel and hot-bulb engines, incomplete combustion of the fuel may lead to lacquer deposits (L) on cylinder liners etc. Such deposits, which are sol. in $EtOH$ and $COMe_2$, consist of

acids, *e.g.*, oxy-acids, insol. in petrol. Lubricating oil takes no part in *L* formation. With small hot-bulb engines *L* occur during misfiring when idling with fuels of low ignition quality (*I*). With air-injection engines, however, the mechanism of the air-injection at low loads appears to create the conditions necessary for incomplete combustion, and *I* of the fuel has no bearing on *L*. Load and injection pressure are of primary importance. With high-speed, solid injection engines *L* is of little significance. A moderately lacquered engine can run safely at moderate load without harmful effects. C. C.

Determination of the alcohol content and water tolerance of alcohol-petrol blends. W. R. ORMANDY, T. W. M. POND, and W. R. DAVIES (J. Inst. Petroleum Tech., 1934, 20, 913—935).—The EtOH content of EtOH-petrol blends is determined by adding excess of H₂O (5 vol.-%) and noting the vol. of the separated lower layer. A table, constructed from experimental results, gives the equiv. vol.-% of EtOH. Similarly, from the vol. separated on the addition of 0.5% of H₂O, in conjunction with the % of EtOH found as above, the residual H₂O-tolerance (*T*) (expressed in c.c. per Imp. gal.) is obtained, using appropriate tables. Special extraction vessels are described. The theoretical and experimental work on which the methods are based, including an investigation of the max. *T* of certain pure hydrocarbons and EtOH blends, are described. Although the vol. of the EtOH-rich layer decreases as the temp. rises, the influence of temp. may be ignored over the range 5—25°. *T* increases with the proportion of aromatics, and the tables given do not apply when appreciable quantities of added benzol are present. C. C.

Analytical methods for mixtures of hydrocarbons and ethyl alcohol. M. J. HERBRICH (Ann. Off. nat. Comb. liquides, 1933, 8, 1113—1133; Chem. Zentr., 1934, i, 1593).—The points at which separation into two layers occurs for changing temp. and increasing H₂O content lie on a straight line, and different hydrocarbons give parallel lines. The slope of the lines changes with the mixture ratio. This provides a method for determining the crit. H₂O quantity at 0° at which separation into two layers occurs. L. S. T.

Hydrocarbon oils. [Determination of] mol. wt. by the cryoscopic method and from thermal data. M. R. FENSKE, W. B. MCCLUER, and M. R. CANNON (Ind. Eng. Chem., 1934, 26, 976—980).—The average mol. wts. of close-cut vac.-distilled lubricating oil fractions were determined (a) by the cryoscopic method, in solution in cyclohexane, and (b) by the Hildebrand method, involving the calculation of the molal heat of vaporisation (*H*) from v.p./temp. data. *H*/sp. heat of vaporisation = mol. wt. Methods (a) and (b) gave results differing in one case by 7%. Independent determinations by method (a) usually gave varying results, owing to incomplete dissolution, but method (b) gave concordant results. An empirical relation between mol. wt., η index, and η (Saybolt Universal) at 100° is worked out. C. L. G.

Factors affecting lubricating properties of a petroleum oil. F. H. RHODES and A. W. LEWIS (Ind.

Eng. Chem., 1934, 26, 1011—1014).—Measurements of the coeffs. of static friction (*F*) of Pennsylvanian lubricating oils by the Rhodes and Allen method (B., 1933, 229) indicated the slow formation of an adsorbed film of some substance of high lubricating power on the surface of the bearing. This substance could be removed from the oil by adsorption on powdered Wood's metal, but was held so tenaciously that it could not be removed in a pure state. *F* was increased by heating and exposure to ultra-violet light, the increase being due, not to primary oxidation products, but to polymerisation or secondary reactions of the primary products (*S*). Treatment of the exposed oil with aq. NaOH largely removed *S*. Very small concns. of cyclohexanol or β -C₁₀H₇OH had useful inhibiting effects on *S* formation at high temp. and also decreased *F* at low temp. C. L. G.

Viscosity-temperature relationship for lubricating oils. C. WALTHER (Öl u. Kohle, 1933, 1, 71—73; Chem. Zentr., 1934, i, 2527).—A graphical method is described for determining the origin of lubricating oils from their η -temp. relationships. H. J. E.

Entrainment in oil absorbers and distillation columns.—See I. **Liquid org. substances from gases.** Styrene and indene from natural gas. Hydrogenation of C₆H₆. Berginisation of C₁₀H₈.—See III. **Cast Fe for internal-combustion engines.** Gas-annealing of steel.—See X. **Disposal of NH₃ liquor.**—See XXXIII.

PATENTS.

Production of water-gas. W. V. DUKE, Assr. to C. I. JOHNSON (U.S.P. 1,949,563, 6.3.34. Appl., 9.11.23).—A no. of hollow bodies, *e.g.*, refractory tubes, are heated internally by combustion gases, and outside them a mixture of pulverised fuel and steam in proportion to form water-gas is propelled by an ejector-mixer operated by a high-pressure jet of already-made water-gas. At an intermediate point of the generator liquid hydrocarbon may be sprayed in, preferably countercurrent to the gases. B. M. V.

Producing fuel gas from petroleum and other liquid hydrocarbons. CARBURETTED GAS, INC. (B.P. 416,957, 16.10.33. U.S., 26.1.33).—A CO-H₂ gas mixture (I) is formed continuously by exothermic reaction between oil and a limited O₂ supply, the temp. of (I) being controlled by introducing limited steam and further oil, whereby CO and H₂ only are formed endothermically in a second zone. The product may be enriched by hydrocarbons. C. C.

Treatment and dewaxing of petroleum. R. J. GAROFALO and C. E. SWIFT, Assrs. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,948,346, 20.2.34. Appl., 9.5.32).—Oil containing wax is dissolved in hydrocarbon solvent normally gaseous at room temp., *e.g.*, C₂H₆, C₃H₈, C₄H₁₀, and the solution treated with H₂SO₄ at 21°. The mixture (I) is immediately chilled, whereby wax and polymerised material are readily separated. Alternatively, an antisolvent for wax, *e.g.*, EtOH, COME₂, is added to (I), with or without chilling. C. C.

Dewaxing of petroleum oils. E. W. REID, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,947,359, 13.2.34. Appl., 2.4.31).—Petroleum distillates and

bottoms are dewaxed using Pr_2O as selective solvent, with or without the addition of other solvents, *e.g.*, PrOH , COMe_2 . The wax (I) is pptd. on cooling. The pour point of the recovered oil approx. equals the temp. at which (I) is separated. C. C.

Conversion of hydrocarbons into lower-boiling compounds. M. H. TUTTLE, Assr. to GYRO PROCESS Co. (U.S.P. 1,948,872, 27.2.34. Appl., 8.4.29).—Hydrocarbon oil is vaporised without appreciable decomp. and part of the vapour cracked at 537–760°, the product being mixed with the unconverted vapours to lower the temp. to 371–482° and thus prevent undue formation of gaseous hydrocarbons. C. C.

Purification of hydrocarbon oils. W. M. MALISOFF, Assr. to ATLANTIC REFINING Co. (U.S.P. 1,948,528, 27.2.34. Appl., 13.12.30).—Petroleum oils are desulphurised by treatment with 0.5–4% of metallic halide, *e.g.*, AlCl_3 , TiCl_4 , FeCl_3 , ZnCl_2 , or SnCl_4 , at 100–150° under reflux, or under pressure if the b.p. of the material is low. C. C.

Obtaining high- and low-boiling oils from heavy hydrocarbon oils. P. L. YOUNG, Assr. to STANDARD-I. G. Co. (U.S.P. 1,949,230, 27.2.34. Appl., 2.7.30).—Lubricating oils are produced by hydrogenating hydrocarbon oils in the liquid phase below 443°/20 atm. in presence of a catalyst (I) not affected by S (*e.g.*, oxides and/or sulphides of metals of group VI). Light oils are separated and subjected to destructive hydrogenation in presence of (I) above 482° to produce motor fuel of high antiknock val. C. C.

Production of solidified mineral oil preparations. E. O. ORNFELDT (B.P. 416,927, 15.3.33).—Mineral oil is mixed with 1–5% of beeswax (I) (or cerotic acid or ceryl alcohol) in presence of 2–8% of soap containing a small proportion of org. solvent, *e.g.*, EtOH . Other waxes, *e.g.*, paraffin or ceresin, may be used with < 1% of (I). The product may be converted into a pulverulent material by addition of solids, *e.g.*, MgCO_3 , talcum. C. C.

Manufacture of water-soluble petroleum sulphonates [in flakes]. L. LIBERTHSON, Assr. to L. SONNEBORN SONS, INC. (U.S.P. 1,947,861, 20.2.34. Appl., 1.4.31).—Org. acids (I) present in acid sludge from the treatment of petroleum oils with H_2SO_4 are separated from the neutral or basic solution by a suitable solvent containing H_2O and MeOH , EtOH , or PrOH . Salts (II) formed from recovered (I) and bases are dissolved in a solvent (III) and applied in a film to a smooth metal surface from which (III) is evaporated by heat. Laminar fragments of (II) are thereby formed. C. C.

Sweetening of gasoline. R. B. DAY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,948,565, 27.2.34. Appl., 27.2.31).—Gasoline is treated with (a) a dry mixture of CuSO_4 and NH_4Cl followed in some cases by earth-filtration, or (b) a solution of these salts. C. C.

Manufacture of non-knocking motor fuel. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 416,976, 19.1.33).—Hydrocarbons (I) of low H content are obtained from hydrocarbon oil, b.p. < 375°, by heat-treatment (or destructive hydrogenation) at 200–700°

in the non-vaporous or liquid phase with 0.01–3% of finely-divided catalyst. The latter is dispersed in the oil which is continuously passed through the heating zone. Pressures vary from 20 to 1000 atm. The addition of high-boiling cyclic (I) assists in maintaining the liquid phase. C. C.

Treatment of motor fuel. P. I. MURRILL, Assr. to R. T. VANDERBILT Co. (U.S.P. 1,947,219, 13.2.34. Appl., 21.5.31).—Motor fuels, *e.g.*, cracked gasoline, are stabilised against gum formation by addition of 2–10 mg./100 c.c. of aromatic di-*sec*-diamines, particularly diaryl-*p*-arylenediamines, *e.g.*, di-*o*- or -*p*-tolyl-*p*-phenylenediamine. C. C.

Motor-fuel stabilisation. F. B. DOWNING and H. W. WALKER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,945,521, 6.2.34. Appl., 31.7.30. Cf. B.P. 398,219; B., 1933, 952).—Gum formation in cracked petroleum is inhibited by addition of xlenols in which OH is *o*- or -*p*- to Me (1:3:2- and 1:3:4- $\text{C}_6\text{H}_3\text{Me}_2\text{OH}$; 0.03%). H. A. P.

Polymerisation of olefinic gases. W. B. PLUMMER, Assr. to STANDARD OIL Co. (U.S.P. 1,947,306, 13.2.34. Appl., 24.8.32).—The product from the polymerisation of olefinic gases [using preheating (I), heating, and soaking zones (II)] at 400–650° and 500–3000 lb. per sq. in., is separated into liquid hydrocarbons and gases of high (III) and low olefine content (IV). (IV) are returned and introduced prior to (I), whilst (III) are reintroduced after (I) but prior to (II). C. C.

Hydrogenation of hydrocarbon materials. C. T. HARDING, Assr. to STANDARD-I. G. Co. (U.S.P. 1,948,378, 20.2.34. Appl., 8.10.30).—In hydrogenation processes at high temp. and pressures, the temp. (*T*) of the reaction zone is controlled by adding to the feed oil (I) (when *T* is fluctuating) the correct proportion of another oil which evolves more or less exothermic heat than (I) on hydrogenation. C. C.

(A) Treatment of [asphalt-base] oils with aluminium chloride. (B) Production of lubricating oil. U. B. BRAY and C. E. SWIFT, Assrs. to UNION OIL Co. OF CALIFORNIA (U.S.P. 1,948,163–4, 20.2.34. Appl., [A] 18.5.31, [B] 23.2.32).—The oils, from which light fractions may be distilled off (below 344°), are treated with an asphalt-pptg. solvent, *e.g.*, EtOH , COMe_2 , commercial C_3H_8 , etc. The recovered oil is treated with AlCl_3 below the cracking temp. (> 344°). Unsaturated compounds thus become saturated and remaining asphalt is coagulated. The products are finally acid-treated and alkali-washed, yielding good-quality lubricating oils. C. C.

Obtaining high yields of high-grade lubricants from petroleum oil. P. L. YOUNG, Assr. to STANDARD-I. G. Co. (U.S.P. 1,949,231, 27.2.34. Appl., 19.7.30).—Unrefined, viscous petroleum fractions are treated with a selective solvent, *e.g.*, PhOH , at 51.5–65.5°. The recovered extract is hydrogenated at 371–426.5° and 50/1000 atm. in presence of a catalyst (oxides and/or sulphides of Mo, Cr, W). The hydrogenated oil is blended with the raffinate from the first stage. C. C.

Production of lubricating oil. D. R. MERRILL and P. SUBKOW, Assrs. to UNION OIL Co. OF CALIFORNIA

(U.S.P. 1,948,042, 20.2.34. Appl., 10.10.32).—Mineral oil, *e.g.*, lubricating oil, is treated with a mixture of liquid SO_2 and $\beta\text{-(C}_2\text{H}_4\text{Cl)}_2\text{O}$, as selective solvent, with or without the addition of liquefied, normally gaseous hydrocarbons, *e.g.*, C_3H_8 , whereby the η of raffinate and extract are reduced. The extraction may be carried out at -4° to -1° . C. C.

Gas producer.—See I. Hydrocarbon-sol. dyes. —See IV. Sized paper. —See V. Piston alloy. **Non-rusting radiators.**—See X. Graphite resistor bodies. Separating emulsions. —See XI. Solvents for coating compositions. Synthetic resin from coal tar. —See XIII.

III.—ORGANIC INTERMEDIATES.

Obtaining liquid organic compounds from technical gases. E. AUDIBERT (Ann. Off. nat. Comb. Liquides, 1933, 8, 757–869; Chem. Zentr., 1934, i, 978–979).—Thermodynamic conditions for the hydrogenation of CO to CH_4 , C_2H_6 , C_3H_8 , and C_6H_{14} are discussed. Equilibria for 1 and 100 atm. are recorded. The formation of MeOH from CO and H_2 is exhaustively considered. L. S. T.

Higher alkyl chlorides and their importance for technical syntheses. W. SCHRAUTH (Chem.-Ztg., 1933, 58, 877–880).—A review.

High-pressure hydrogenation of aromatic compounds. I. Hydrogenation of benzene with nickel oxide. Y. TANAKA, R. KOBAYASHI, I. ENDO, and T. FUJITA (J. Soc. Chem. Ind., Japan, 1934, 37, 538–539 B).— C_6H_6 is completely hydrogenated to C_6H_{12} when heated with Ni_2O_3 (I) and Japanese acid clay with H_2 at $180^\circ/80$ atm.; the (I) is reduced to Ni. A mixture of (I) and CuO catalyses and is reduced at 150° . A. G.

Styrene and indene from Persian natural gas. S. F. BIRCH and E. N. HAGUE (Ind. Eng. Chem., 1934, 26, 1008–1010).—Distillation of the pyrolysis products of desulphurised Persian natural gas yielded gaseous material (A), a product boiling up to 392° (B), and a tarry residue (C). From A butadiene and cyclopentadiene were isolated and identified. A $266\text{--}302^\circ$ cut from B consisted of 80% of styrene (I) and also *m*- and *p*-xylene, but not *o*-xylene. A $338\text{--}356^\circ$ cut from B was almost pure indene (II). From residue C C_{10}H_8 , anthracene, phenanthrene, and chrysene were isolated. Max. yields from the pyrolysis products were (I) 5%, (II) 2%. Using as raw material a gas rich in C_3H_8 and C_4H_{10} , the yields from a commercial-size unit would be 2.4 litres of (I) and 0.95 litre of (II) for 100 cu. m. of gas. The mechanism of the pyrolysis reaction is discussed. C. L. G.

Sulphonation of benzene vapour. R. K. EICHMAN and M. I. BOGDANOV (Anilinokras. Prom., 1934, 4, 396–405).— PhSO_3H (I) is obtained in 92–96% yield by passing C_6H_6 vapour at $150\text{--}160^\circ$ into 76–100% H_2SO_4 for 9–10 hr., 70% of the (I) being formed after 3 hr. The adsorbed C_6H_6 (4%) is removed by steam-distillation at 120° , when the product (II) contains (I) 92–94, H_2SO_4 2–3, and H_2O 5%. (II) is made neutral with 30% Na_2SO_3 , obtained as a by-product of PhOH production, and the SO_2 evolved incidentally is used for converting NaOPh into PhOH; the aq.

$\text{Na}_2\text{SO}_3\text{--PhOH}$ remaining after separation of PhOH is also used for neutralising (II). The material economies effected by this as compared with the ordinary process are: C_6H_6 244, H_2SO_4 2064, Na_2CO_3 1192, and NaOH 46 kg. per ton of PhOH produced. R. T.

Analysis of phenylenediamines. A. KOROLEV and E. ROSTOVITZEVA (Anilinokras. Prom., 1934, 4, 405–407).—3 g. of mixture are dissolved in 10–15 c.c. of AcOH, and diluted to 250 c.c. $m\text{-C}_6\text{H}_4(\text{NH}_2)_2$ is determined by titration in presence of 50 c.c. of 20% NaOAc, 3 g. of $\text{Na}_2\text{S}_2\text{O}_3$, and 100 c.c. of H_2O , with 0.1N- PhN_2Cl , and total $\text{C}_6\text{H}_4(\text{NH}_2)_2$ by titration with 0.1N- $p\text{-NO}_2\text{-C}_6\text{H}_4\text{-N}_2\text{Cl}$. The *o*-isomeride is determined by the Hinsberg method and the *p*-isomeride is calc. by difference. R. T.

Separation of diphenylene from benzidine. V. A. IZMAILOV and R. B. ROSCHAL (Anilinokras. Prom., 1934, 4, 407–412).—14 g. of crude benzidine sulphate (I) are heated at 85° with 10 g. of BaCl_2 and 5 c.c. of conc. HCl in 500 c.c. of H_2O for 2.5 hr., the ppt. is heated at 85° with 200 c.c. of the above solution for 30 min., collected, and washed with hot 0.5% H_2SO_4 . H_2SO_4 is added to the filtrate, containing NH_2Ph , benzidine, and diphenylene (II) hydrochlorides, when pure (I) is pptd. NH_2Ph is separated from the filtrate by steam-distillation, and the residual (II) determined by diazo titration. R. T.

***p*-Diazodiphenylamine.** I. I. TRUTKO and M. V. NEVREV (Anilinokras. Prom., 1934, 4, 426–428).—Metanil-yellow is reduced by Na_2S_3 at $107\text{--}110^\circ$, with exclusion of O_2 , to metanilic acid and $\text{NH}_2\text{-C}_6\text{H}_4\text{-NHPh}$ (I), obtained in 77% yield. *p*-Diazodiphenylamine sulphate (II) is obtained in 84% yield from (I) by the action of a 25% excess of NaNO_2 at room temp. Pb apparatus should be avoided, as traces of Pb catalyse decomp. of (II). R. T.

Berginisation of naphthalene. E. I. PROKOPETZ and I. I. JERU (Koks u. Chem., 1932, No. 1, 35–44; Chem. Zentr., 1934, i, 1590).—Berginisation of C_{10}H_8 (I) in presence of MoS_3 and avoiding cleavage reactions yields tetralin (II) and other hydrogenated naphthalenes; below 400° there is an 80% conversion of pure, sublimed (I) into (II). NH_3 somewhat reduces the activity of MoS_3 . Crude (I) from solvent naphtha is readily berginised to liquid hydrogenated derivatives in presence of MoS_3 , whilst that from heavy oil requires a higher temp. and more catalyst. A H_2 concn. of 62% suffices for high-pressure hydrogenation, and the vessel walls must be coated with a layer of Fe sulphide. L. S. T.

Synthesis of isatin from the economic viewpoint. M. DOMINIKIEWICZ and M. KLEWSKA (Arch. Chem. Farm., 1934, 1, 228–244).—The cost of prep. of isatin (I) in Poland by Sandmeyer's first (A., 1903, i, 486) and second (B., 1919, 456 A) syntheses is approx. the same, and is 50% > the list price of (I). R. T.

$\beta\gamma$ -Butylene glycol in fermented liquors. Abs. EtOH. Detecting MeOH in vinegar. —See XVIII.

PATENTS.

Purification of organic halo[geno]fluoro-compounds. R. A. DUNPHY, Assr. to KINETIC CHEMICALS,

INC. (U.S.P. 1,946,199, 6.2.32. Appl., 28.6.32).—Acidic impurities (COCl_2 , SO_2) formed in drying org. F compounds (CCl_2F_2) with H_2SO_4 are removed by addition of NH_3 and fractional distillation (at $18-20^\circ/65$ lb. per sq. in.). Apparatus is claimed. H. A. P.

Hydrogenation of carbon monoxide to methyl formate and methanol in liquid phase with alcoholate [alkoxide] catalysts. N. D. SCOTT, ASSR. to E. I. DU PONT DE NEMOURS & Co., INC. (U.S.P. 1,946,918, 13.2.34. Appl., 13.5.32).—The catalysts used comprise the alkoxide of an alkali metal and of another metal (Cd, Ba, Sr, Pb, Th) and an alkali iodide in an alcoholic (MeOH , EtOH) solvent. Thus, *e.g.*, CO is passed into MeOH , in which Na , CdI_2 , and KI have been dissolved, at $72^\circ/528$ lb. per sq. in. to give HCO_2Me , followed by H_2 at $72-80^\circ/1760$ lb. per sq. in. to give MeOH .

H. A. P.

Preparation of (A—C) [aliphatic] carboxylic acids, (D, E) [aliphatic] organic acids, (F) aliphatic organic acids. (A, C) J. C. WOODHOUSE, (B, D, F) G. B. CARPENTER, and (E) W. H. CAROTHERS and G. B. CARPENTER, ASSRS. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,946,254—9, 6.2.34. Appl., [A] 15.11.32, [B, C] 28.6.32, [D, E] 28.2.31, [F] 21.3.31).—An aliphatic alcohol (MeOH) (I) and CO (with H_2O) are passed (at $300-325^\circ/700$ atm.) (A) with a volatile inorg. acid formed *in situ* (HCl from Cl_2 and H_2O) over active C (IV); (B) with a volatile (H) halide (II) over a "solid acidic catalyst" (III), *e.g.*, (MnCl_2), CuCl , or ZnCl_2 ; (C) with (II) over (III) + (IV); (D) over halides of group II or Mn [ZnI_2 or CdI_2 supported on (IV)]; (E) over silico-tungstic, -molybdic, or -uronic acids (+ Cr oxide); and (F) with (II) over halides or sulphates of group II or Mn ($\text{HCl} + \text{ZnCl}_2$). The use, instead of (I), of volatile derivatives which give (I) on hydrolysis, *e.g.*, ethers, esters, halides, and alkylamines, is claimed.

H. A. P.

Separation of isomeric pentanones. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 417,101, 17.3.34. Holl., 27.3.33).—A mixture of COMePr (I) and COEt_2 (II) is shaken with excess aq. NaHSO_3 and solid NaHSO_3 . The NaHSO_3 compounds of (I) separates, whilst that of (II) remains in solution. The separated products are reconverted into ketones by distillation with H_2O alone.

H. A. P.

Manufacture of cyanuric acid. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 416,599, 8.5.33).—Chlorides obtainable from NH_2COCl (I) by removal of HCl are heated at $> 250^\circ$; *e.g.*, (I) is heated in C_6H_6 at 80° , or at 35° and the biuret and allophanic acid chlorides, respectively, formed are further heated at 300° .

H. A. P.

Manufacture of nitriles of unsaturated fatty acids. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 416,631, 1.2.34).—Hydroxy-fatty acids having $\leq \text{C}_{10}$, or their esters (glycerides), and NH_3 are passed over a dehydrating catalyst (Al_2O_3 , ThO_2 , SiO_2 gel) at $300-450^\circ$. Examples include the dehydration of ricinoleic acid or castor oil to ricinenitrile, b.p. $220-225^\circ/20$ mm., α -hydroxystearic acid to an octadecenenitrile, b.p. $190-225^\circ/11$ mm., α -hydroxylauric acid to a dodecenenitrile, b.p. $140-160^\circ/11$ mm., and δ -di-hydroxystearic acid to a nitrile, b.p. $195-222^\circ/12$ mm.

H. A. P.

[Agents for] preparation of dispersions. H. HUNSDIECKER and E. VOGT (B.P. 416,658, 14.12.33. Ger., 14.12.32).—The use of additive compounds of $(\text{CH}_2)_6\text{N}_4$ with alkyl or aryl halides, or derived salts, is claimed to give emulsions or dispersions stable to hard H_2O .

H. A. P.

Manufacture of wetting, foaming, detergent, emulsifying, and dispersing agents. CHEM. WORKS, FORMERLY SANDOZ (B.P. 416,943, 30.3.33. Switz., 4.4.32).—Alkyl, aralkyl, or aryl ethers of polyhydric alcohols are condensed with mono- or polyhydric alcohols, or their derivatives containing ≤ 1 OH, in presence of a sulphonating agent (or the product is sulphonated). Thus, *e.g.*, ethylene glycol mono-tolyl or -chlorotolyl ether is condensed with Bu°OH and conc. H_2SO_4 at $65-85^\circ$. Other starting materials condensed with Bu°OH are glycerol dixylol and α -naphthyl ethers, and ethylene glycol ditolyl ether.

H. A. P.

Manufacture of 4-amino[3-alkoxy- or -alkyl]-diphenylamine derivatives. I. G. FARBENIND. A.-G. (B.P. 416,579, 9.3.33. Ger., 9.3., 10.3., and 2.7.32).—A 3-alkoxydiphenylamine is (a) coupled with a diazonium salt (from $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{SO}_3\text{H}$) and the product reduced, (b) nitrosated and the 4-NO-compound reduced, or (c) acylated, nitrated, and the product reduced. In every case uniform 4-substitution occurs. Examples include the prep. of 4-amino-3-methoxy- (a, b, c), 4-amino-3-methyl- (a), and 3'-chloro-4-amino-3-methoxydiphenylamine, m.p. $79-80^\circ$ (Ac derivative, m.p. $136-137^\circ$). The 4-NO- and Bz, m.p. $104-105^\circ$ (4-NO₂-derivative, m.p. $166-167^\circ$), derivatives of 3-OMe- $\text{C}_6\text{H}_4\cdot\text{NHPh}$ are described.

H. A. P.

Manufacture of phenols from alkali arylsulphonates. L. S. E. ELLIS and G. B. ELLIS. From SOC. DES USINES CHIM. RHÔNE-POULENC (B.P. 416,930, 20.3.33. Addn. to B.P. 406,646; B., 1934, 444).—The arylsulphonate is added continuously to ≤ 2 (2—2.5) mols. of an alkali phenoxide (I) at $280-370^\circ$, steam being blown through the mixture to carry over the phenol formed. At the end of the reaction (I) is separated from alkali sulphite by addition of a little H_2O and filtering from the latter.

H. A. P.

Manufacture of dihydroresorcinol. F. HOFFMANN-LA ROCHE & Co. A.-G. (B.P. 416,892, 19.1.34. Ger., 3.4.33).— $m\text{-C}_6\text{H}_4(\text{OH})_2$ is hydrogenated (Pd-C at $45^\circ/1$ atm., Ni at $60-70^\circ/15-25$ atm.) in solution (in H_2O or an aq. alcohol) in presence of ≤ 1 equiv. of a strong base, *e.g.*, NaOH , $\text{Ca}(\text{OH})_2$, or NHEt_2 . A yield of 95% of theory of H_2 -compound is claimed.

H. A. P.

Manufacture of vanillin and its homologues and other p-hydroxyaldehydes such as protocatechu-aldehyde. M. F. CARROLL, and A. BOAKE, ROBERTS & Co., LTD. (B.P. 417,072, 11.4.33).—In the manufacture of vanillin, eugenol is isomerised to isoeugenol by heating in $(\text{NPh})_2$ or a homologue at $190-200^\circ$ and this is then oxidised by PhNO_2 or a homologue and alkali at $120-140^\circ$. In cases in which azoxybenzene is produced in the oxidation (*e.g.*, with 1-hydroxy-2-ethoxymethoxy-4-propenylbenzene) this may be used together with $(\text{NPh})_2$ as solvent.

H. A. P.

Manufacture of condensation products [from 3-hydroxynaphthalic anhydride and phthalic

hydride]. A. RIECHE (B.P. 417,087, 27.11.33. Ger., 3.12.32).—Condensation of 3-hydroxynaphthalic anhydride with o -C₆H₄(CO₂H)₂, its anhydride, chloride, or halogen-substituted derivatives and AlCl₃ at 150–280° (220–260°) gives 4 : 5-phthaloyl derivatives, convertible by alkaline oxidising agents into hydroxybenzanthrone-carboxylic acids, and by acids into hydroxybenzanthraquinonecarboxylic acids. The products from o -C₆H₄(CO)₂O and 4 : 1 : 2-C₆H₃Cl(CO)₂O are described.

H. A. P.

Manufacture of 1 : 4-diaminoanthraquinone-2 : 3-disulphonic acid. I. G. FARBEIND. A.-G. (B.P. 416,940, 25.3.33. Ger., 26.3.32).—The boric or boracic acid derivatives of a 2 : 3-dihalogeno-1 : 4-diaminoanthraquinone are heated with a neutral sulphite in H₂O (+ an inert org. solvent). Thus, *e.g.*, 2 : 3-dichloro-1 : 4-diaminoanthraquinone (I) is heated at the b.p. with Ac₂O and H₃BO₃ and the product heated with aq. Na₂SO₃ at 90–95° and then hydrolysed with aq. NaOH. Alternatively, (I) is heated with H₃BO₃ in H₂SO₄ at 50–60°, or in PhOH at 150–160°, prior to treatment with Na₂SO₃.

H. A. P.

Manufacture of sulphuric acid esters of leucoanthraquinoneazines. I. G. FARBEIND. A.-G. (B.P. 416,939, 25.3.33. Ger., 26.3.32).—The leuco-sulphates of β -amino- (I) or β -acylamino-anthraquinones are oxidised by PbO₂ in alkaline medium to tetrasulphuric esters of leucoanthraquinoneazines. Examples are the oxidation of (I) to leuco-1 : 2 : 1' : 2'-anthraquinoneazine tetrasulphate, and of its 3-OMe-, 3-chloro-*N*-acetyl, and 3-carboxy-*N*-acetyl derivatives to corresponding azines.

H. A. P.

Production of furfural[dehyde]. (A) G. H. BLOMQUIST and B. S. GROTH, (B) B. S. GROTH and G. H. BLOMQUIST, ASSES. to KEMISKA KONTROLLBRYÅN AKTIEB. and AKTIEB. A. HEYMAN (U.S.P. 1,946,667 and 1,946,688, 13.2.34. Appl., [A] 21.8.30, [B] 25.9.30. Swed., [A] 17.12.29, [B] 28.4.30).—(A) Pentosan-containing materials (I) are lixiviated with an aq., inorg., non-oxidising acid (0.5*N*-H₂SO₄) at 100–180° and the product is fractionally distilled. (B) (I) are heated with a medium of $p_H < 5$ (0.5*N*-H₂SO₄) at 80–110°, and the pentoses produced converted into furfuraldehyde by heating at 130–180°, and the product is fractionally distilled. Apparatus for continuous operation is claimed.

H. A. P.

Manufacture of dioxazine compounds. I. G. FARBEIND. A.-G. (B.P. 416,887, 1.1.34. Ger., 31.12.32 and 15.8.33).—A diarylaminobenzoquinone obtained by condensing an *o*-alkoxy-, -aryloxy-, or -aralkyloxy-arylamine with *p*-benzo- or tolu-quinone or chloranil (I) is heated in presence of an aromatic acid chloride. The products on sulphonation give substantive dyes, convertible into Ba, Ca, etc. pigments. Thus, *e.g.*, the product from (I) and *o*-NH₂-C₆H₄-OMe (II) is boiled with BzCl in PhNO₂ or PhCl and the product sulphonated and converted into its Ba salt (red pigment). Other starting materials are: (I) + *o*-NH₂-C₆H₄-OEt, 2-NH₂-C₆H₄-NHPh, 4:2:1-NHBz-C₆H₃(NH₂)-OMe, 2:1:4:5-NHBz-C₆H₃Me(OMe)-NH₂, 3 : 4-NH₂-C₆H₃(OMe)-CH₂Ph, 1 : 2 : 5-NH₂-C₆H₃(OMe)₂, 4 : 3 : 6-NH₂-C₆H₃Ph(OMe)₂ (violet), 2 : 1 : 4-NH₂-C₆H₃(OMe)-NO₂, and 4 : 4' : 3 : 3'-[NH₂-C₆H₃(OMe)]₂, and trichlorotoluquinone + (II).

CPhCl₃ and *p*-C₆H₄Me·SO₂Cl may be used in place of BzCl.

H. A. P.

Fire-extinguishing and hydraulic-brake compositions.—See I. Petroleum sulphonates.—See II. Separating alkali acetates.—See VII. AcOH from cellulose. Propionic fermentation.—See XVIII.

IV.—DYESTUFFS.

Theory of substantive dyes. N. A. KROTOVA (Kolloid-Z., 1934, 69, 94–102).—Cataphoretic and adsorption measurements with solutions of aniline-pure-blue FF and H have been made in presence and in absence of electrolytes. The pure sols are negatively charged. The influence of KCl, BaCl₂, and AlCl₃ on the ζ potential has been determined. A close relation exists between electrophoretic behaviour and adsorption by cotton.

E. S. H.

Preparation of anil-black E. S. F. FILIPPITSCH and M. A. TSCHERKALIN (Anilinokras. Prom., 1934, 4, 413–421).—Under technical conditions, 83% of the H-acid (I) coupled with (C₆H₄N₂Cl)₂ (II) is converted into the 2-, 6% into the 7-, and 4% into the 1-*N*-(4''-diazodiphenyl-1'-azo) derivative of (I), whilst 1.5% remains unchanged. Of the (II) taken, 11% remains unchanged and 4% is recovered as diphenol.

R. T.

Preparation of sulphur-blue. I. F. RUSSETZKI and A. I. VOLFSO (Anilinokras. Prom., 1934, 4, 421–423).—*p*-NH₂-C₆H₄-OH is condensed with NHPh₂ in 72% H₂SO₄ at 0°, and the product neutralised at < 0°. The readily filterable indophenol so obtained is boiled with Na₂S₄ at 110–115° for 30–40 hr.

R. T.

Black sulphur colours. I. Constitution of sulphide blacks. II. T. KUBOTA (J. Chem. Soc. Japan, 1934, 55, 565–569, 569–583).—I. A review.

II. Treatment of 2 : 4-(NH₂)₂C₆H₃-OH and 2 : 4-(NO₂)₂C₆H₃-OH with Na polysulphides (I) at 140° for 5–90 hr. gave 19–35% of combined S (II), the amount of (II) being inversely \propto the time of heating. Dyeing properties are discussed. Deterioration of dyed fibres is due to formation of H₂SO₄ from the decomp. of (I).

CH. ABS. (e)

Bromatological chemistry of colouring matters.—See XX.

PATENTS.

Azo dyes [for lactamisation on the fibre] and application thereof. IMPERIAL CHEM. INDUSTRIES, LTD., S. COFFEY, and W. A. SEXTON (B.P. 416,778–9, 14.2.33).—Dyes which are insolubilised on the fibre by lactamisation with mineral acid are obtained by coupling a diazo component [(B) which itself contains a lactamisable grouping] with a 2 : 3-hydroxynaphthoic arylamide in which the amide residue contains in *ortho* positions NH₂ (or a group easily convertible into NH₂) and a grouping -X·Y·CO₂H (X = S or O; Y = CH₂, CHR, or CR₂, R being alkyl). Examples include: (A) 5-chloro-*o*-toluidine \rightarrow 2 : 3-hydroxynaphthoic 3-aminoanilide-4-thioglycollic acid (I) (obtained from the nitroarylamide, m.p. 212–214°) (red); 4-benzamido-2 : 5-dimethoxyaniline \rightarrow 2 : 3-hydroxynaphthoic 3-(3'-aminobenzamido)-anilide-4'-thioglycollic acid (II) [from the 4'-chloro-3'-nitrobenzamidoanilide, m.p. 226–229°, by successive reaction with Na₂S₂, Na₂S, and CH₂Cl·CO₂Na; or from

the 3-(3'-nitrobenzamido)anilide-4'-thioglycollic acid, m.p. 222–226°] (blue); 2:5-dichloroaniline \rightarrow 2:3-hydroxynaphthoic 4-nitroanilide-5-thioglycollic acid, m.p. 225° (yellow-scarlet), or -5-glycollic acid; $p\text{-C}_6\text{H}_4\text{Cl}\cdot\text{NH}_2 \rightarrow$ 2:3-hydroxynaphthoic 2-chloro-4-aminoanilide-5-thioglycollic acid (from the 4- NO_2 -compound, m.p. 257–258°); 5-nitro-*o*-anisidine \rightarrow 2:3-hydroxynaphthoic 3-aminoanilide-4-thiolactic acid (III) (from the 3- NO_2 -compound, m.p. 190–193°) (red); (B) 2-nitro-4-aminophenylthioglycollic acid \rightarrow (I), reduced (red); or (II) (blue-red); 2-nitro-5-amino-4-methylphenylthioglycollic acid \rightarrow (III), reduced (red-blue), bordeaux on dilactamisation. C. H.

Manufacture of azo dyes [ice colours]. G. BONHÔTE, Assr. to SOC. CHEM. IND. IN BASLE (U.S.P. 1,946,010, 6.2.34. Appl., 8.5.33. Switz., 10.5.32).—Scarlet to bluish-red dyes sol. in $\text{C}_5\text{H}_5\text{N}$ are produced from diazotised *o*-aminophenyl aryl or aralkyl ethers containing a carboxylic ester group and 2:3-hydroxynaphthoic arylamides. The dyes Et ester of 4'-chloro-2-amino-3-carboxydiphenyl ether (I) \rightarrow 2:3-hydroxynaphthoic- α -naphthalide (II), Bu⁺ ester of (I) \rightarrow 2:3-hydroxynaphthoic-*p*-anisidide, and 4-chloro-2-amino-3'-carbethoxydiphenyl ether \rightarrow (II) are specifically claimed. H. A. P.

Preparation of azo [pigment] dyes. H. E. WOODWARD, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,947,028, 13.2.34. Appl., 2.9.32).—Yellow to orange pigments of good light-fastness are prepared from a diazotised halogenonitro- or nitro-alkoxy- or benzyloxy-aniline and a di-alkoxy-, -benzyloxy-, or -benzyl-anilide of a β -ketonic acid. Examples are 1:4:2- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Cl}\cdot\text{NO}_2 \rightarrow$ 2:5-dimethoxyacetoacetanilide (I) (yellow-orange) and 1:4:2- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OMe})\cdot\text{NO}_2 \rightarrow$ (I) (red-orange). H. A. P.

[Manufacture of hydrocarbon-soluble disazo dyes. H. E. WOODWARD, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,947,027, 13.2.34. Appl., 1.12.31).—Disazo dyes are prepared using as first components aminoaryl-carboxy- or -sulphon-amides, all of the components being free from SO_3H and CO_2H ; they are used for colouring petroleum and halogenated hydrocarbons. Examples are $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CO}\cdot\text{NBu}_2$ (I) \rightarrow 1:2:5- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OMe})_2 \rightarrow \beta\text{-C}_{10}\text{H}_7\cdot\text{OH}$ (II) (bluish-red), 2:1:5- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OMe})\cdot\text{SO}_2\cdot\text{NMe}_2 \rightarrow$ 1:2- $\text{NH}_2\cdot\text{C}_{10}\text{H}_6\cdot\text{OMe}$ (III) \rightarrow (II) (blue-violet), (I) \rightarrow (III) \rightarrow 2:3-hydroxynaphthoic anilide (blue), and $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CO}\cdot\text{NMe}_2 \rightarrow$ (III) \rightarrow 1:7- $\text{NH}_2\cdot\text{C}_{10}\text{H}_6\cdot\text{OH}$ (green). H. A. P.

Disazo dyes [for acetate silk] and their application. IMPERIAL CHEM. INDUSTRIES, LTD., and A. H. KNIGHT (B.P. 416,580, 11.3.33).—Grey shades are given by a nitroaniline or a chloronitroaniline \rightarrow 2:5-dimethoxy- or -diethoxy-aniline \rightarrow 1:5-aminonaphthol (in acid). C. H.

Manufacture of (A) colouring matters, (B) dyes, [of the anthraquinone series, for acetate silk]. BRIT. CELANESE, LTD., G. H. ELLIS, and F. BROWN (B.P. 416,611—2, 17.2.32. Cf. B.P. 402,392—3; B., 1934, 235).—The dyes of the prior patents are made by suitable general methods, viz., replacement of halogen or other negative group by NH_2 , NHR (R being non-

aromatic), NHAcyl (followed by hydrolysis), or NHAr (Ar being an aryl group of the C_6H_5 series); or reduction of NO_2 . The manufacture of 4-(4'-amino-2':5'-dimethoxyanilino)-1-methylaminoanthraquinone and 1-amino-4-*p*-toluidino-5-hydroxyanthraquinone is excluded. Examples are: (A) 4-aminochrysazin with NH_2Ph or *o*- $\text{NH}_2\cdot\text{C}_6\text{H}_4\text{Me}$; 1-amino-4-anilino-5-hydroxyanthraquinone with $\text{C}_2\text{H}_4\text{Cl}\cdot\text{OH}$; leuco-1:4-diamino-5-hydroxyanthraquinone with NH_2Ph ; (B) 4:8-diaminoanthrarufin, 1-amino-4-methoxy- or 4-chloro-1-aminoanthraquinone with *o*-anisidine; 1-amino-4-*o*-anisidinoanthraquinone with $\text{C}_2\text{H}_4\text{Cl}\cdot\text{OH}$. C. H.

Preparation of vat dyes of dibenzanthrone series. E. T. HOWELL, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,947,047, 13.2.34. Appl., 21.11.29).—Dihydroxydibenzanthrones are alkylated by means of esters of $\beta\beta'$ -dihydroxydiethyl ether, sulphide, or amine, or of their (mono)alkyl ethers or org. esters. The vat dyes produced are greener than the corresponding OMe-compounds. Examples of alkylating agents used are the di-*p*-toluenesulphonates of $\text{O}(\text{C}_2\text{H}_4\cdot\text{OH})_2$ and $\text{NH}(\text{C}_2\text{H}_4\cdot\text{OH})_2$, the *p*-toluenesulphonates of the Me, Et, and Bu ethers of $\text{O}(\text{C}_2\text{H}_4\cdot\text{OH})_2$, $\text{O}(\text{C}_2\text{H}_4\text{Cl})_2$, and $\text{O}(\text{C}_2\text{H}_4\text{Br})_2$. H. A. P.

Manufacture of vat dye preparations in powder form particularly suitable for printing. I. G. FARBENIND. A.-G. (B.P. 416,878, 21.7.33. Ger., 23.7.32).—A mixture of finely-divided vat dye (or leuco-compound), e.g., a thioindigo, with a wetting and/or dispersing agent and a fixation accelerator of B.P. 364,052 (B., 1932, 463) is dried by fine distribution in a hot gas current. An example is 6:6'-dichloro-4:4'-dimethylthioindigo with Na benzylsulphanilate. C. H.

Dioxazine compounds.—See III. Photographic bleach-out images.—See XXI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Changes of wool hair during its working up into cloth. II. P. KRAIS, H. MARKERT, and O. VIERTTEL (Forsch. deut. Inst. Textil. Dresden, 1933, 15, 66 pp.; Chem. Zentr., 1934, i, 1582).—The change in properties on treatment with 0.3% aq. Na_2CO_3 at 90° and on boiling with 0.5% H_2SO_4 , and the efficacy of protective agents, have been studied. A method of measuring elasticities is described. H. J. E.

Effects of dips on wool. I. Arsenical dips. H. A. HAMBROCK and T. J. WILKEN-JORDEN (Onderstepoort J. Vet. Sci., 1934, 2, 271–298).—Suint constituents are leached out, reducing the hygroscopicity of the raw wool. After scouring, the fleece contained 11.5–14 mg. of As_2O_3 per 100 g. The fibre was undamaged, but Cooper's dip deposited yellow material on the wool. The fibre is affected when p_H is > 10.3 . The primary cause of fibre damage is the ultra-violet radiation of sunlight; H_2O is more deleterious to irradiated wool than arsenite solution. The yellow stain is also protective. CH. ABS.

Action of alkaline copper solution on cellulose. Y. TAKAMATSU (J. Cellulose Inst., Tokyo, 1934, 10, 221–230).—Cellulose (I) is not disintegrated by solutions of $\text{Cu}(\text{OH})_2$ in aq. NaOH. The amount of NaOH

combining with (I) depends on the concn., but the amount of $\text{Cu}(\text{OH})_2$ is always 0.65 or 0.50 mol. per C_6 unit; the X-ray diagram of the former is the same as that of Hess' compound-II formed in a solution also containing amine. The presence of NH_3 accelerates compound formation. A. G.

Nitration of cellulose. II. Nitration with nitric acid vapour. S. ROGOVIN and K. TICHONOV (Cellulosechem., 1934, 15, 102—104; cf. B., 1934, 396).—Cotton-wool is slowly nitrated by suspension over 96% HNO_3 . R. S. C.

Mechanism of nitration and the properties of cellulose nitrates. IV. Stability of nitrated fibres. T. TOMONARI (J. Soc. Chem. Ind., Japan, 1934, 37, 511 b).—The stability of cellulose nitrate is closely related to the content of unstable by-products (I). The amount of (I) reaches a max. and then falls during prolonged nitration, and (I) is probably a H_2SO_4 ester of cellulose dinitrate or of a hydrolysis product. Instability is not directly related to a blurred X-ray diagram. A. G.

Nitrocelluloses. G. SCHIEMANN and S. KÜHNE (Cellulosechem., 1934, 15, 78—85, 93—95).—Purified cotton-wool (I), wood-cellulose, and "Transparit" (regenerated cellulose) were treated with H_2SO_4 - HNO_3 (80 pts.) containing varying amounts of H_2O at 15—17°. The N content of the product from (I) is a max. (13.5%) when the H_2O content (II) of the acid is 3.5—13%; with less H_2O much swelling and with more H_2O much dissolution occurs. The solubility of the product in Et_2O - EtOH (4:3) is approx. const. (1.5—3.7%) if (II) is 3.5—13.8%, but rises rapidly to 100% for (II) = 15.9%, falling again if (II) is 18.8%. η in 0.14% COMe_2 solution decreases greatly with increasing (II); mol. wts. of 185,000—240,000 are indicated if N is 13.4—13.7%, but falls to 25,000 if N is 9.6%. Qualitatively similar results are obtained for the other celluloses. The results indicate hydrolysis by the more dil. acids. R. S. C.

Viscosity of nitrocellulose. D. KRÜGER (Cellulosechem., 1934, 15, 85—89).—Cotton-wool and acid (55 pts.; H_2SO_4 : HNO_3 : H_2O = 42.9:47.8:9.1 and more) give products the η of which in 8% COMe_2 solution falls with increasing H_2O content. A very large, sudden decrease in η occurs when the % N in the product falls from 12 to 11, but there is no parallel break in the rate of diffusion. R. S. C.

Determination of nitrocellulose in [kinematographic] films. H. LEROUX and M. BOURDEAU (J. Pharm. Chim., 1934, [viii], 20, 289—304).—The film (I), freed from gelatin emulsion, is extracted with CHCl_3 , digested with H_2SO_4 , and treated (nitrometer) with $\text{Hg} + \text{H}_2\text{SO}_4$, the vol. of NO evolved being measured. Alternatively, (I) is dissolved in aq. KOH (d 1.33), reduced by Al-Zn-Cu alloy (A., 1893, ii, 343), and the evolved NH_3 absorbed in 0.1N- H_2SO_4 and titrated, a blank correction being necessary. (I) has an ignition temp. of 215° when practically pure nitrocellulose, rising to 500° as the % of cellulose acetate increases. Data are given for the amounts of CO and CO_2 evolved on combustion. F. O. H.

Ripening of viscose. K. ZIEGLER and W. SCHÄFER (Cellulosechem., 1934, 15, 89—92).—The salting-out point and S content of ripened viscose (I) are correlated; they are independent, within a fairly large experimental error, of the cellulose content of (I). R. S. C.

Residual solvent in threads and films from acetylcellulose. F. OHL (Kunstseide, 1934, 16, 79—83; Chem. Zentr., 1934, i, 2680).—Optimum mechanical properties were obtained with 0.5—1% of residual solvent and small amounts of H_2O . Data are recorded. H. J. E.

Elongation versus tension in fine-denier viscose-rayon yarns. H. R. MAUERSBERGER (Rayon and Mellind Text. Month., 1934, 15, 388—390).—The yield point at which viscose-rayon yarn (I) under tension commences to stretch rapidly beyond its elastic limits is reached with tensions which decrease as the R.H. of the surrounding air increases and as the denier of (I) decreases. In winding, knitting, etc. (I), variations in its stretched condition are minimised by maintaining R.H. 55% at 21°. A. J. H.

Acidity of paper. K. HAUG (Papir-Journalen, 1933, 21, 184—185, 196—198, 205—207, 240—244, 251—254; Chem. Zentr., 1934, i, 2681).—The p_H of various papers is compared by examination of the extract with cold H_2O . Hot H_2O changes the p_H . Titrimetric determination of the total acid is also proposed. H. J. E.

Fungoid and slime growth in paper-mill stocks. W. SCHMID (Papier-Fabr., 1934, 32, 430—432).—The sources of infection and optimum conditions of slime growth in pulp and paper mills are discussed, and methods of safeguarding against and of treatment with Cl_2 , NH_2Cl , CuSO_4 , etc. are briefly described. D. A. C.

Graphic instruments.—See I. Refining wool fat. —See XII. Sugar-beet pulp. —See XVII.

PATENTS.

Removal of fatty and pitchy matters from animal fibres and making them more readily feltable. V. FLUSS (U.S.P. 1,947,522, 20.2.34. Appl., 30.11.32. Austr., 10.12.31).—The fibres are treated with fat-solvents (hydrocarbons, halogenated or hydrogenated hydrocarbons) at 0° to -30° and ≥ 1 atm.; after mechanical removal of most of the solvent, the residue is evaporated in a current of air at -30° to 25°. F. R. E.

Production of artificial silk from seaweed. T. GOHDA (B.P. 417,222, 22.1.34).—A jelly-like substance containing algin, mannitol, protein matter, and crude cellulose, prepared from seaweed, is dissolved in cuprammonium solution pretreated with NaOH , spun into a solution of "furfural salt" (furfuraldehyde and NaOH), a sulphate (Na_2SO_4 , ZnSO_4), aliphatic acid (AcOH), EtOH , and CH_2O , treated with a solution of a sulphate, aliphatic acid, sulphite, and EtOH , and then washed with H_2O . The resulting thread is subsequently sized with a material obtained by dissolving brown alga in aq. NH_3 , filtering, and adding AcOH , and is finished by drying. F. R. E.

Increasing the tensile strength of cellulose. A. J. PACINI, Assr. to MILPRINT PRODUCTS CORP. (U.S.P.

1,948,276, 20.2.34. Appl., 4.5.31).—Cellulose thread or fabric is exposed to artificially produced ultra-violet radiation of such intensity and for such a time as will not form detectable oxycellulose. F. R. E.

Hydration of cellulose pulp. W. T. DOYLE, Assr. to STURTEVANT MILL CO. (U.S.P. 1,949,534, 6.3.34. Appl., 8.5.33).—The raw material is disintegrated, *e.g.*, in a slushing machine (*A*), until it can be fed as a stream, and the conc. stock is fed with diluting H_2O under pressure to a rotary hammer-mill (*B*) having a restricted discharge. The control of the H_2O is effected by the temp. of the finished pulp, being facilitated by the presence of a thickener between *A* and *B*. B. M. V.

Manufacture of pressed cellulose articles. A. NAGELVOORT, Assr. to DELAWARE CHEM. ENG. CO. (U.S.P. 1,939,404, 12.12.33. Appl., 15.11.32).—Waterproof paper is made by mixing wood pulp with S powder (cf. U.S.P. 1,939,403; B., 1934, 1058) which has been ground with a small quantity of tannin to render it miscible with H_2O , the tannin is removed by washing, and the pulp dried and sheeted. A. R. P.

Manufacture of cellulose nitrate. DU PONT VISCOLOID CO. (B.P. 416,938, 25.3.33. U.S., 25.3.32).—Cellulose nitrate is treated in the undissolved state with a base of the C_5H_5N or quinoline series to reduce its η , and is then subjected to the action of a H_2O -sol. aldehyde or of HCO_2H , preceded, accompanied, or succeeded by dil. acid ($HNO_3 + H_2SO_4$) treatment to yield a product of high stability. F. R. E.

Treatment of cellulose esters. M. MARASCO, Assr. to DUPONT FILM MANUFACTURING CORP. (U.S.P. 1,947,419, 13.2.34. Appl., 1.5.31).—Transparent film base containing cellulose nitrate, acetate, etc. is rapidly seasoned by removing low-boiling residual solvents in a bath of aq. MeOH (90% MeOH, 10% H_2O) at $<$ the b.p. of MeOH, and drying while under only enough tension to prevent wrinkling; it may then be treated with hot H_2O -saturated air at 100° and again dried as before. F. R. E.

Production of low-viscosity cellulose derivatives. C. J. STAUD and T. F. MURRAY, JUN., Assrs. to EASTMAN KODAK CO. (U.S.P. 1,946,645, 13.2.34. Appl., 24.6.29).—Air-dried cellulose ester is treated with Cl_2 gas for a longer period or at a greater concn. than that required for complete bleaching; or it is bleached with Cl_2 gas, aerated, and treated with SO_2 . F. R. E.

Cellulose organic ester compositions containing (A) derivatives of diethylene glycol, (B) an ester of trichloro-*tert.*-butyl alcohol. (A) T. F. MURRAY, JUN., and W. O. KENYON, (B) H. B. SMITH, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,946,635 and 1,946,643, 13.2.34. Appl., [A] 6.6.33, [B] 12.8.32).—(A) 20–100 pts. of β -chloro- β' -phenoxyethyl ether, (B) 10–100 pts. of trichloro-*tert.*-Bu acetate, succinate, phthalate, etc., are added as plasticiser to 100 pts. of cellulose ester. F. R. E.

Manufacture of artificial materials [from cellulose acetate]. BRIT. CELANESE, LTD. (B.P. 417,218, 20.7.33. U.S., 20.7.32).—The η and γ of solutions of cellulose esters and ethers are reduced by addition of (0.5–100%) of a saccharide ester of an acid $<$ C_5 , *e.g.*, fructose penta-acetate. The usual solvents and plasticisers may be present. S. M.

Manufacture or treatment of artificial filaments, threads, ribbons, fabrics, and like materials made from or containing organic esters of cellulose. H. DREYFUS (B.P. 417,220, 20.2.33; cf. B.P. 402,104–5; B., 1934, 91).—The stretched materials are saponified with an aq. solution of a lower aliphatic monoamine, *e.g.*, NH_2Me (15–25% concn. at 50 – 60°). The base may contain OH groups, *e.g.*, $N(CH_2 \cdot CH_2 \cdot OH)_3$, $NMe_4 \cdot OH$. Also heterocyclic bases (piperidine) and cyclic compounds (cyclohexylamine) may be employed. F. R. E.

Apparatus for production of artificial filaments and the like. H. HOFMANN, Assr. to AMER. BEMBERG CORP. (U.S.P. 1,947,159, 13.2.34. Appl., 16.12.31).—A modified form of outlet for the spinning funnel is claimed. F. R. E.

Media for regenerating viscose. W. D. WOLFE, Assr. to WINGFOOT CORP. (U.S.P. 1,948,323, 20.2.34. Appl., 18.10.29).—Viscose which has been coated on a fabric base for manufacture of gas cells is reconverted into cellulose in absence of strong mineral acid by treatment with H_2O 60–65, H_3BO_3 or $Na_2B_4O_7$ 5, and a sol. org. polyhydroxy-compound such as glycerol, glucose, fructose 35–30%; formation of gas bubbles in the coating is thus reduced to a min. F. R. E.

Manufacture of pulp. C. B. THORNE (U.S.P. 1,947,888–9, 20.2.34. Appl., [A] 23.4.32, [B] 27.4.33. Can., [B] 20.4.32).—(A) The pulp is discharged from the digester into an enclosed blow-pit containing a perforated false bottom. The hot liquor (*L*) draining initially before a mat of pulp (*M*) has been formed, and containing fibrous material, is pumped back for refiltration through *M*. (B) *L* is pumped directly through a system of heat exchangers (*E*) used to heat H_2O or fresh liquors, the temp. of which is thermostatically controlled. The pressure of *L* in *E* is automatically maintained above that of the liquid to be heated. D. A. C.

Production of (A, C, E, F) absorbent or resilient felt, (B) fibrous felting or felted paper, (D) absorbent felt. J. E. PLUMSTEAD, Assr. to JESSUP & MOORE PAPER CO. (U.S.P. 1,947,103–8, 13.2.34. Appl., [A] 22.8.31, [B] 9.9.32, [C, D] 19.8.31, [E] 4.9.31, [F] 5.9.31. Renewed [A] 27.5.33, [D] 23.11.33, [F] 8.1.34).—(A) A kink or curl is imparted to fibres prepared by the sulphite, soda, kraft, etc. process by treatment with a solution (*C*) consisting of 7–24% aq. NaOH (I) [or KOH, $Ca(OH)_2$, aq. NH_3 , Na_2S , Na_2CO_3 , etc.] in presence of CuO (II) (and/or ZnO , Al_2O_3) as an accelerator, which is held in solution by addition of aq. NH_3 , Rochelle salt, sugar, etc. Sol. and inert salts (*e.g.*, NaCl, $CaCl_2$, Na_2SO_4) having a concentrating effect on the NaOH may also be added. The reaction and extent of curling produced are controlled by varying the proportions of (I) and (II), which for optimum results will also depend on the consistency of the stock. (B) The curl in the fibre may be preserved and at the same time various colours generated by addition of suitable oxidising or reducing agents. On forming into sheets, the strength can be increased by addition of aq. NH_3 . (C) By the use of 12% aq. Na_2S at 20° a marked affinity of the sheet for waterproofing agents is obtained. (D) Treatment is effected by spraying the pulp sheets with *C*, shredding, and transferring the pulp

to an endless travelling wire belt, where it is again sprayed with *C* and subjected alternately to the action of suction boxes, presses, and wash- H_2O sprays. The back-liquor is kept separate according to its concn. (e) To accelerate curling, the pulp may be lightly beaten (e.g., in a ball mill) prior to feeding on to the forming machine. Local gelatinisation of the fibre is obtained, resulting in the subsequent use of a more dil. *C* (2—18% aq. NaOH). (f) Accelerated action is obtained by passing the pulp sheets, sprayed with *C* (1—17% aq. NaOH) and shredded, into a centrifuge with additional *C*. The excess is separated and the fibres are partly dried (e.g., with hot air) in presence of the remainder of *C* and finally washed. The production of high freeness and extreme bulk and fluffiness is claimed. D. A. C.

Manufacture of paper. MEAD CORP. (B.P. 416,814, 21.9.33. U.S., 17.10.32).—Lime containing approx. 85% of available CaO is slaked at a concn. of 24% with cold H_2O and rapidly agitated for 15 min. A 24% solution of Na_2CO_3 (*L*) as leach liquor, obtained by the recovery of spent caustic cooking liquors, is slowly added at about 80° and then boiled for 15 min. The mixture is filtered and the $CaCO_3$ sludge produced again similarly treated with a 19% *L*, the *L* after reaction being adjusted to 80% causticity by addition of Na_2CO_3 . The sludge is screened (through 200-mesh), filtered, and washed. It is claimed that a fine white sludge is thus produced which may be used as a pigment or filler. D. A. C.

Copperised paper. W. R. BARBER, A. G. NATWICK, and M. W. PHELPS, ASSRS. to CROWN WILLAMETTE PAPER CO. (U.S.P. 1,947,451—2, 20.2.34. Appl., 3.10.32).—(A) < 1 wt.-% of "Cu *o*-phenylphenate" is incorporated in the paper and produced by adding $CuSO_4$ to aq. "Na *o*-phenylphenate" in the beater. (B) < 1 wt.-% of Cu resinate is similarly incorporated by addition of resin size and $CuSO_4$ to the furnish in the beater, and maintaining pH < 6. A bactericidal effect is thus imparted to the paper. D. A. C.

Manufacture of sized paper carrying a synthetic resin of petroleum origin. C. ELLIS, ASSR. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,948,442, 20.2.34. Appl., 24.9.31).—An odourless, tasteless, oil- and asphalt-free, unsaponifiable synthetic resin of softening point 60—93°, from gas-oil resinification, is incorporated as a slightly alkaline aq. emulsion with the paper stock, and deposited on the fibres by addition of a precipitant (alum). F. R. E.

Production of coated paper. C. L. GABRIEL, ASSR. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,946,203—5, 6.2.34. Appl., [A—C] 2.7.31).—Moisture-proof, transparent wrapping papers are produced by coating with a solution of a cellulose ester (10—30% of cellulose nitrate) and (A) a mixed ester of a polybasic acid (I) with a poly- (glycerol) and mono-hydric alcohol (Bu glyceryl phthalate), (B) a similar ester from a dihydric alcohol (II) (Bu ethylene glycol phthalate), and (C) a neutral ester of (I) and (II) (ethylene glycol phthalate). H. A. P.

Drying of cellulosic or other fibrous material. C. F. BRODIN (B.P. 417,168, 21.12.33. Swed., 28.12.32).—The material in the form of webs or sheets, especially paper, board, carton, etc., is passed between pressing

rolls (I) while carried on a rubber-sponge (S) web, with or without an intermediate porous cloth; alternatively, (I) may consist wholly or partly of S.

F. R. E.

[Mechanical] splitting up or treating and spinning vegetable fibres. E. V. HAYES-GRATZ (B.P. 416,979, 21.3.33).

Manufacture [from continuous filaments] of (A) yarn from staple fibres, (B) artificial textile materials. H. DREYFUS (B.P. 417,325—6, 28.3.33).

Filters.—See I. Sandpaper.—See VIII. Adhesive for Cellophane.—See XV. AcOH and glucose from cellulose.—See XVIII. Materials [paper] for photo-sensitive preps.—See XXI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Methylene-grey for printing. V. A. BLINOV and A. A. GERN (Anilinokras. Prom., 1934, 4, 424—425).—Pastes of methylene-grey with aq. 85% HCO_2H and $(HCO_2)_3Cr$ may be used for printing, alone or mixed with hæmatin-black. R. T.

Mercerising mixed [cotton + rayon] fabrics. T. F. HUGHES (Rayon and Melliand Text. Month., 1934, 15, 395—396).—The rayon is protected by using a mercerising liquor consisting of 100 gals. of NaOH (*d* 1.27) and 1 gal. of EtOH at 5°.

A. J. H.

Sulphide blacks.—See IV.

PATENTS.

Treatment of artificial fibres, more particularly of artificial silk. HEBERLEIN & CO. A.-G. (B.P. 417,174, 5.5.34. Ger., 24.5.33. Addn. to B.P. 397,046; B., 1933, 861).—The products from the prior patent are steamed while in the form of loose unstretched skeins.

F. R. E.

Coated fabric. E. H. NOLLAU and D. A. RANKIN, ASSRS. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,940,462, 19.12.33. Appl., 27.9.30).—A washable, grease-resistant artificial leather comprises a dyed fabric with a backing of a lighter fabric cemented to it with a rubber adhesive, a coating of cellulose nitrate (I) (25), a softener (castor oil 50) and a pigment (25%), and a surface film of (I) (10.8), ceresin wax (2.7), and Bu_2 phthalate (10.8) dissolved in EtOAc (17.3), EtOH (33.6), and PhMe (24.8%). A. R. P.

Disazo dyes for acetate silk. Vat dye preps. for printing.—See IV. Alloy for washing-machine rollers.—See X. Starch paste.—See XVII.

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

Application of chemical engineering to synthesis of ammonia. A. BROWN (Chim. et Ind., 1934, 32, 759—769).—The Nitrogen Engineering Corp. "N.E.C." process utilises by-product H_2 from the manufacture of NaOH, H_2 from fermentation processes and from the cracking of natural gas, and electrolytic H_2 and water-gas. A single liquid-air unit only is supplied, stoppages of the latter being cared for by the production of the gas mixture by burning H_2 in air. Design of electrolytic cells is discussed, and it is concluded that

electrolysis at atm. pressure and subsequent compression is more economical than the use of cells working at 200 atm. Referring to the use of H_2 from water-gas or of by-product H_2 , the calculation of heat exchangers, CO_2 scrubbers, and final scrubbers for purification with ammoniacal $(HCO_3)_2Cu$, is explained. Heat-transfer problems in the catalyst vessel are discussed, and the "N.E.C." converter is described. C. I.

Separation of magnesite from dolomite. C. R. PLATZMANN (Chem.-Ztg., 1934, 58, 851—853).—In the process of G.P. 280,738 (B., 1915, 492) calcined dolomite mixed with $KHCO_3$ is treated with H_2O and CO_2 , whereby nearly all the Mg is dissolved. The solution is heated to 100° , when $MgCO_3 \cdot 3H_2O$ is pptd. Laboratory tests have given yields of 75–90% and the purity of the product is $> 99\%$, as SiO_2 and Fe_2O_3 are absent. C. I.

Brine purification. System sodium bicarbonate-sodium chloride-magnesium carbonate-water. E. O. WILSON and Y. CH'U (Ind. Eng. Chem., 1934, 26, 1099—1104).—The triple salt $NaCl \cdot Na_2CO_3 \cdot MgCO_3$ (A) was prepared experimentally at 50° and under a CO_2 partial pressure $\equiv 27.7$ vol.-% CO_2 . At this temp. it forms and settles at moderate speed, and at higher temp. very quickly. A phase-rule study was made (diagram given) of the system under the above conditions. Solid phases were identified microscopically. The field of A is very extensive and its production inevitable in the ammoniation of brine containing Mg in the Solvay process. Microscopical study of mud from various parts of such a system showed the general presence of A together with $(NH_4)_2CO_3 \cdot MgCO_3 \cdot 4H_2O$ in those places where the NH_3 partial pressure was high. Removal of Mg from solution as A is almost complete. C. I.

Determination of sulphate in common salt and pickling baths. L. M. IOLSON (Zavod. Lab., 1933, No. 10, 27—28).— $BaSO_4$ is pptd. with excess of $BaCl_2$ and the excess titrated hot with K_2CrO_4 in presence of rosolic acid. CH. ABS.

Rapid determination of sodium and potassium in saltpetre melts. S. A. GINZBURG (Zavod. Lab., 1933, No. 5, 11—12).—The $NaNO_3$ - KNO_3 mixture is ignited with anhyd. $H_2C_2O_4$ and the carbonates are converted into chlorides, K being determined as K_2PtCl_6 and Na by difference. CH. ABS.

Preparation of dry, at least 95%, sodium sulphide. P. LEY (Chem.-Ztg., 1934, 58, 859—860).—Saleable, dry Na_2S ($\geq 95\%$) can be produced in one operation by the reduction of Na_2SO_4 with H_2 . The temp. is initially 600° , and is gradually raised to 850° as the reaction proceeds, so that it is always $<$ the m.p. of the mixture. The process may be continuous or discontinuous. A. G.

Determination of perborate in washing agents. STIEPEL (Seifensieder-Ztg., 1934, 61, 108; Chem. Zentr., 1934, i, 2212).—2.5 g. of the material are mixed with 150 c.c. of H_2O , soap is pptd. with aq. $CaCl_2$, the solution filtered through glass wool, and aliquot portions of the filtrate are acidified with H_2SO_4 and titrated with $KMnO_4$. H. J. E.

Determination of titanium in natural phosphates. S. N. ROSANOV and V. A. KASARINOVA (Z.

Pflanz. Düng., 1934, A, 35, 223—230).—Weller's colorimetric method (oxidation to TiO_3 by H_2O_2) gives satisfactory results. For the complete extraction of Ti the use of HF or of NaOH and $K_2S_2O_7$ is necessary. Removal of F and PO_4''' is necessary before treatment with H_2O_2 . A. G. P.

Colorimetric determination of manganese in phosphorites and apatites. S. N. ROSANOV and D. V. VOSKRESENSKAJA (Z. Pflanz. Düng., 1934, A, 35, 140—146).—Walters' $[(NH_4)_2S_2O_8]$ method is utilised and is satisfactory if org. matter and Cl' are removed from the extract prior to oxidation of Mn to MnO_4' . The minerals are decomposed more rapidly by H_2SO_4 than by aqua regia. Complete extraction of Mn from apatite is possible only by fusion with NaOH or treatment with HF. A. G. P.

Ammoniacal and neutral ammonium citrate solution for detection of dicalcium phosphate. W. LEPPER (Z. anal. Chem., 1934, 98, 161—164).— $Ca_3P_2O_8$ in bone meal and in preps. obtained by pptn. has a high solubility in neutral NH_4 citrate solutions (I), but a relatively small solubility in ammoniacal (I). The latter should, therefore, be used for extracting $CaHPO_4$ from mixtures of Ca phosphates. A. R. P.

Determination of calcium acetate. V. P. ZEMLIANITSIN (Zavod. Lab., 1934, 3, 755—756).—5 g. of crude $Ca(OAc)_2$ (I) are dissolved in 150 ml. of H_2O , filtered, the filtrate is diluted to 250 ml., 4—6 ml. of 10% Na_2CO_3 are added to 25 ml. of solution, and the ppt. of $CaCO_3$ is collected, washed, and dissolved in 0.5N-HCl, excess of which is titrated with 0.5N-NaOH (Me-orange). Phenolphthalein is then added, and the titration continued ($FeCl_3$ and $AlCl_3$). The Ca content of (I) is calc. from the difference between the first and second titrations. R. T.

Rapid determination of sulphur in pyrites. A. V. VINOGRADOV (Zavod. Lab., 1933, No. 10, 29—30).—After oxidative alkaline fusion the aq. extract is acidified and treated with aq. $BaCl_2$, the excess of which is titrated with K_2CrO_4 , using rosolic acid as indicator. CH. ABS.

Utilisation of alunite through alkali fusion. E. O. HUFFMAN and F. K. CAMERON (Ind. Eng. Chem., 1934, 26, 1108—1110).—Alunite, $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot Al_2O_3 \cdot 6H_2O$, exists in Utah but has not been worked since 1918. Possibilities of economical extraction by fusion with (1) NaOH or (2) Na_2S have been studied. In (1) an excess of NaOH or KOH is required for complete Al recovery. This can be recovered by passing CO_2 through a suspension of $BaCO_3$ in the mother-liquor (containing K_2SO_4 etc.) at 100—120 lb. per sq. in. The K_2CO_3 produced is, however, not suitable for further use in place of KOH. (2) was carried out by sintering with a mixture of Na_2SO_4 and coal dust. A high Al recovery was obtained but the liberation of S rendered the use of Fe apparatus impossible. Al_2O_3 is separated from the leachings by saturation with CO_2 . C. I.

Gravimetric determination of lead dioxide in red lead. E. SCHÜRMANN and K. CHARISIUS (Mitt. Materialprüf., 1934, 272).—The method is based on the reaction: $3PbO_2 + 2CrCl_3 + 2H_2O = 2PbCrO_4 + PbCl_2 + 4HCl$, which proceeds completely from left to right

in dil. AcOH containing NaOAc. The PbO in the Pb_3O_4 is converted into $\text{Pb}(\text{OAc})_2$; after weighing the PbCrO_4 its purity can be ascertained volumetrically.

A. R. P.

S from coking coal. CH_4 as source of H_2 .—See II. **Determining S in roasted materials.** Action of brines on metals.—See X. $\text{K}_2\text{S}_2\text{O}_8$ as soap bleach.—See XII. **White-Pb.**—See XIII. **Effect of cyanide in H_2O .**—See XXIII.

PATENTS.

Production of dilute acids. I. G. FARBENIND. A.-G. (B.P. 416,860, 22.3.33. Ger., 24.3., 9.6., and 20.10.32. Addn. to B.P. 413,674; B., 1934, 832).—The acids are filled into airtight containers, which are subsequently punctured and immersed in H_2O .

W. J. W.

Production of caustic alkalis in a form suitable for packing and transport. I. G. FARBENIND. A.-G. (B.P. 417,465, 5.4.33. Ger., 5.4.32).—Melted caustic alkali is caused to fall through, and in countercurrent to, an indifferent gas, which may be cooled, the height of fall being regulated to produce the particular size of pellet desired.

W. J. W.

Manufacture of soda ash. A. M. MACDONALD (U.S.P. 1,940,459, 19.12.33. Appl., 9.1.29).—Native $\text{NaCO}_3 \cdot 10\text{H}_2\text{O}$ is fed on to a slowly moving belt (*B*) passing through a tank of H_2O , whereby the crystals dissolve and the impurities remain on *B* and are thus removed from the solution, from which anhyd. Na_2CO_3 is recovered by spray-drying.

A. R. P.

Production of chloroamine. C. T. HENDERSON (U.S.P. 1,940,592, 19.12.33. Appl., 4.9.29).— Cl_2 - H_2O is passed up a tower containing CaCO_3 and the effluent is mixed with aq. NH_3 to give a 1:1 mol. mixture of NH_3 and Cl_2 . The resulting aq. NH_2Cl is used for sewage purification.

A. R. P.

Electrolytic production of Carrel-Dakin [sodium hypochlorite] solution. O. R. SWEENEY, Assr. to IOWA STATE COLL. AGRIC. & MECHANICAL ARTS (U.S.P. 1,940,612, 19.12.33. Appl., 5.5.31).—In an apparatus for producing dil. aq. NaOCl for immediate use as a surgery antiseptic, aq. NaCl is passed through a tube containing perforated electrodes close together, the anode consisting of Pb and the cathode of Ir-Pt alloy.

A. R. P.

Extraction of borax from ore. T. M. CRAMER, Assr. to PACIFIC COAST BORAX CO. (U.S.P. 1,940,118, 19.12.33. Appl., 19.12.28).—The ore is heated under pressure in closed tanks containing a fine screen in the bottom so that the $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ melts in its own H_2O of crystallisation and the solution percolates through the gangue, which makes an efficient filter bed.

A. R. P.

Elimination of manganites in the production of trialkali phosphates from ferrophosphorus. G. KLEIN, Assr. to VICTOR CHEM. WORKS (U.S.P. 1,939,305, 12.12.33. Appl., 11.1.32).—An excess of 0.5–5 (1)% of ferrophosphorus is used in the charge.

A. R. P.

Separating alkali acetates. C. J. STROSACKER, C. C. KENNEDY, and E. L. PELTON, Assrs. to DOW CHEM. CO. (U.S.P. 1,940,611, 19.12.33. Appl., 21.3.32).—The

alkaline acetate solution, produced by dissolving the product (*P*) of the action of C_2H_2 and steam on $\text{NaOH} + \text{KOH}$, is treated with NaOH equiv. to the AcOH in *P* and evaporated and cooled to recover $\text{NaOAc} \cdot 3\text{H}_2\text{O}$. The mother-liquor is further evaporated to recover anhyd. NaOAc , which is returned to the first stage, and aq. $\text{NaOH} + \text{KOH}$, which is returned to the reactor.

A. R. P.

High-gelatinating colloidal compound. L. H. HEYL, Assr. to WYODAK CHEM. CO. (U.S.P. 1,934,267, 7.11.33. Appl., 26.1.32).—Claim is made for a mixture of Wyoming bentonite (*B*) (95–98) with a 1:2–4 mixture (5–2%) of CaSO_4 and MgO , which improves the gelling properties of *B*.

A. R. P.

Manufacture of zinc oxide. W. A. HANDWERK and W. REISER, Assrs. to NEW JERSEY ZINC CO. (U.S.P. 1,940,125, 19.12.33. Appl., 20.6.29).—To prevent the formation of drop-oxide in the manufacture of ZnO by the retort volatilisation process, a layer of air is interposed between the walls of the oxidising chamber and the current of Zn vapour.

A. R. P.

Manufacture of luminescent [germanium] materials. MARCONI'S WIRELESS TELEGRAPH CO., LTD., Asses. of H. W. LEVERENZ (B.P. 414,905, 30.8.33. U.S., 30.8.32).—A 2:1 mixture of ZnO (or MgO) and GeO_2 is moistened with dil. aq. MnCl_2 and sintered at 1000° to produce Zn (or Mg) germanate, which fluoresces bright greenish-yellow (or orange-scarlet) under excitation with cathode rays.

A. R. P.

Manufacture of potassium dichromate. I. G. FARBENIND. A.-G. (B.P. 417,331, 3.4.33. Ger., 4.4.32).— Cr_2O_3 , mixed with sufficient KOH to convert it into dichromate (I), is heated at $> 250^\circ$, but below the decomp. temp. of (I), at atm. pressure in presence of O_2 or a gas containing it in the uncombined state.

W. J. W.

Manufacture of lead chromate and substances containing it. HARSHAW CHEM. CO., Asses. of W. J. HARSHAW (B.P. 416,744, 24.8.33. U.S., 17.1.33).—An aq. suspension of an oxide or carbonate of Pb is treated with H_2CrO_4 in presence of HF , HBF_4 , or H_2SiF_6 , the H_2CrO_4 being added at a rate which is $>$ the rate at which the acids enter into reaction.

W. J. W.

Mineral wool. C. B. WHITE (U.S.P. 1,939,329, 12.12.33. Appl., 8.12.32).—Fibrous material is produced by "blowing" slag from a Cu-smelting furnace, containing 0.15–5% Cu.

A. R. P.

Manufacture of sulphur. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 416,852, 18.3.33).— H_2S is burned to SO_2 , the mixture of SO_2 and air, after cooling to 200 – 300° , is mixed with further H_2S , and the mixture is passed over a catalyst (bauxite). The S is collected, and the waste gas passed through a dust chamber in which residual S, present in vapour form and as $\text{H}_2\text{S} + \text{SO}_2$, is separated. Desulphurisation may also be effected by means of active C. A second catalyst chamber may be used in conjunction with the first one.

W. J. W.

Recovery of sulphur [from pyrites]. R. F. BACON (Assee.) and I. BENOWITZ (U.S.P. 1,939,033, 12.12.33. Appl., 2.8.30).—A mixture of FeS_2 and CaO ,

or, preferably, MgO, is heated at 600–800° in sufficient air to convert the Fe into Fe_2O_3 and liberate S.

A. R. P.

Miscible sulphur. A. NAGELVOORT, ASST. to DELAWARE CHEM. ENG. CO. (U.S.P. 1,939,403, 12.12.33. Appl., 2.5.32).—S is finely ground with 0.05–0.2% of tannin or sulphite-cellulose waste to produce a dry powder freely miscible with H_2O but not forming a colloidal suspension therewith.

A. R. P.

Obtaining rare gases, especially the heavy rare gases. A. WOOSNAM. From VEREIN. GLÜHLAMPEN U. ELEKTRICITÄTS A.-G. (B.P. 416,889, 11.1.34).—After removal of H_2O vapour, CO_2 , and SO_2 from flue gas, a portion of the gas is liquefied and brought into contact in counterflow with the gaseous portion. From the resultant liquid, Kr and Xe are recovered by fractional evaporation, and, if originally a large part (40%) of the gaseous mixture was employed in the liquefied form, A will be obtained in addition.

W. J. W.

Manufacture of catalysts. INTERMETAL CORP., ASSEES. of L. G. JENNESS (B.P. 414,536, 18.9.33. U.S., 1.10.32 and 25.4.33).—See U.S.P. 1,937,488–9; B., 1934, 960.

Drying of gases. Reacting gases with liquids.—See I. **Reducing oxides.**—See X. **Detergents.**—See XII.

VIII.—GLASS; CERAMICS.

Condensable vapours in a [glass-]tank furnace melting a saltcake batch. J. S. GREGORIUS and W. A. MAHAFFEY (J. Amer. Ceram. Soc., 1934, 17, 307–309).—Samples were taken on H_2O -cooled condensers from various parts of the furnace and from flues and chequer-work. Na_2SO_4 is the predominant material and rapidly corrodes the brickwork. Na_2SO_4 condenses in flues at 600–760°. More NaCl was found in condensates from the cooler parts of the furnace, where there is a lower concn. of H_2O vapour. J. A. S.

Chilled plate glass. III. Density and hardness. IV. Compression, tension, and shock-resisting properties. T. ARAKI, S. TAKAHASHI, and S. MORI (J. Soc. Chem. Ind., Japan, 1934, 37, 544 B, 544–545 B; cf. B., 1934, 321).—III. The d of chilled plate glass is < that of untreated glass; there is no difference in hardness, but the crack patterns are very different.

IV. The compressive strength and the resistance to breakage by a falling 200-g. steel ball were much greater for chilled than for untreated glass, and the tensile strengths were 250 and 70 kg./sq. cm., respectively.

A. G.

Liberation of fluorine in fluoride glass manufacture. H. H. BLAU and A. SILVERMAN (Ind. Eng. Chem., 1934, 26, 1060–1062).—Glasses of varying content of CaF_2 or NaF , but otherwise of uniform composition, were fused in Pt and the losses determined. The loss of F in all cases was about 50%, and only a relatively small proportion can have been volatilised as SiF_4 , CaF_2 , or NaF . It must presumably have been evolved either as F_2 , HF, or F_2O .

C. I.

Testing of glass ampoules for pharmaceutical products. E. BERTARELLI (R. Ist. lombardo Sci. Lett. Rend., [ii], 66, 1053–1059; Chem. Zentr., 1934, i,

2472–2473).—Tests for neutrality, fusibility, and devitrification are described.

H. J. E.

Effect of water hardness on vitreous enamel suspensions. A. I. ANDREWS and E. G. PORST (J. Amer. Ceram. Soc., 1934, 17, 292–297).—The effects of hardness on the mobility (M) and yield val. (Y) (Gardner mobilometer) of various slips were studied. No consistent results were obtained with slips containing no electrolyte or those to which Na_2CO_3 was added. The M and Y of slips containing $\text{Na}_2\text{B}_4\text{O}_7$ (I) were increased by H_2O of increased hardness. The max. increment of Y occurred with a (I) content of 0.4–0.7%. The relationship between M and (I) content showed an anomalous sigmoid form.

J. A. S.

Effect of zirconium oxide in glasses, glazes, and enamels. C. J. KINZIE and C. H. COMMONS (J. Amer. Ceram. Soc., 1934, 17, 283–287).— ZrO_2 is sol., and therefore not an opacifier, in glasses which do not contain a certain amount of Al_2O_3 (10%) or ZnO (5%). CaO and BaO also contribute towards opacity, but, like the alkalis and B_2O_3 , they are chiefly fluxes. The greatest opacity is produced when 15% of ZrO_2 is introduced as the oxide and the remaining 3–6% as a ZrO_2 compound. ZrO_2 opacity is greatly reduced at cone 9 and above. The dissolution of ZrO_2 in enamel frits increased their tensile and compressive strengths and reduced the modulus of rigidity.

J. A. S.

Graphical computation of opacity of porcelain enamels. G. H. MCINTYRE (J. Amer. Ceram. Soc., 1934, 17, 300–306).—The curve forms of a collection of data are investigated in detail.

J. A. S.

Effect of delay in enamelling pickled sheet iron. E. G. PORST and H. G. WOLFRAM (J. Amer. Ceram. Soc., 1934, 17, 297–300).—Delay increases the degree of “copperheading,” which is probably caused by the pickling acid adsorbed by the metal. H_2SO_4 gives less trouble than HCl. There is no evidence to show that the cleaning (neutralising) agent causes copperheads or that the ageing of the enamel has any effect. Fluid ground-coats are less liable to show copperheads.

J. A. S.

Effect of fluorides on the properties of white sheet-iron enamels. A. I. ANDREWS and E. E. HOWE (J. Amer. Ceram. Soc., 1934, 17, 288–291).—The annealing temp. (I) was determined by observing the bending of a horizontal fibre. The softening temp. (II) was taken as the point at which the test-piece began to contract in an interferometer expansion apparatus. (I) was not always consistent with (II), and the val. of the thermal expansion (III) calc. from the factors of Mayer and Havas showed considerable disagreement with the observed vals. New factors calc. for white sheet-Fe cover enamels were CaF_2 4.1 and NaF 10.0. Substitution of $3\text{NaF}.\text{AlF}_3$ or Na_2SiF_6 by CaF_2 decreased (III). (II) is not affected by < 9% of CaF_2 , but is increased by the substitution of $3\text{NaF}.\text{AlF}_3$ by Na_2SiF_6 .

J. A. S.

Rapid determination of the porosity of ceramic ware by the vacuum method. D. SMIRNOV (Zavod. Lab., 1934, 3, 742–744).—Porosity is determined as a function of the difference in wt. of the article before and after saturation with H_2O or kerosene. Saturation is

completed within 10–15 min. if the air is previously removed by a vac. pump. R. T.

Rapid determination of porosity of fireclay articles. A. I. SCHARFSCHTEIN and E. I. CHEJFETZ (Zavod. Lab., 1934, 3, 732–735).—Porosity is given by $100(W_1 - W)/V$, where W_1 and W are the wt. of the article saturated with H_2O and when dry, and V is its vol., given by the difference between W_1 in air and in H_2O . R. T.

Tubular cryptol oven for determining refractivity to heat. Laboratory cryptol muffle furnace. V. A. LEBEDEV (Zavod. Lab., 1934, 3, 744–750, 750–755).—Apparatus is described. R. T.

PATENTS.

Manufacture of glass and enamels. AMER. POTASH & CHEM. CORP. (B.P. 416,832, 22.3.34. U.S., 7.4.33).— B_2O_3 is introduced in the form of anhyd. $Na_2B_4O_7$ (d 1.2–1.4). Apart from the obvious advantages of the anhyd. salt, gravity segregation and scum formation are reduced and the capacity of the apparatus and brilliancy of the melt are increased. J. A. S.

Manufacture of safety glass. SOC. GÉN. D'OPTIQUE SOC. ANON. DES ANC. ETABL. HUET & CO. ET JUMELLES FLAMMARION (B.P. 416,757, 14.11.33. Fr., 20.12.32).—Occlusion of air bubbles etc. is avoided by forcing the laminating liquid upwards into the space between the plates of glass, which are held in a vertical position. J. A. S.

Tempering of glass sheets and other glassware. L. VON REIS (B.P. 416,659, 23.6.34).—The liquid chilling bath (oil, tar, wax, metal, etc.) is vigorously agitated so that optical irregularities in the glass are eliminated. J. A. S.

Colouring of vitreous articles. G. SLAYTER, ASSR. to OWENS-ILLINOIS GLASS CO. (U.S.P. 1,949,884, 6.3.34. Appl., 14.7.32).—To a cold and hard vitreous article (A) a layer of colouring material (B) is applied, the whole is heated to an annealing temp., and localised additional heat applied to desired parts to fuse B . Both A and B may be glass of different colours and m.p., B being powdered. B. M. V.

Enamel[led iron] ware. W. E. DOUGHERTY, ASSR. to O. HOMMEL CO. (U.S.P. 1,938,691, 12.12.33. Appl., 9.12.30).—A white enamel frit opacified with TiO_2 and having m.p. $< 940^\circ$ is made by fusing a mixture of borax 16.5, felspar 50.45, SiO_2 9.2, Na_2CO_3 20.25, and $NaNO_3$ 3%, quenching the resulting glass, and grinding it with 8 wt.-% of TiO_2 . A. R. P.

[Electric] firing of ceramic goods. J. E. POLLAK. From PORZELLANFABR. KAHLA (B.P. 417,166, 9.12.33).—When firing a vitreous, Fe_2O_3 -containing body at a temp. $>$ the decomp. point of Fe_2O_3 a reducing atm. must be maintained beyond a crit. temp., e.g., 950° . The use of CO alone, or of CO + CO_2 or CO + CO_2 + N_2 , is claimed to avoid the deposition of C on the ware and the heating elements. The circulation of the gas is confined to the high-fire zone by means of suitable partitions and auxiliary gas currents in the pre-fire zone. The mixing of perfume or pungent material with the gas minimises the risk of CO poisoning. J. A. S.

Manufacture of grey-burned brick. R. L. ATKINSON, ASSR. to A. D. LITTLE, INC. (U.S.P. 1,949,524, 6.3.34. Appl., 26.5.30).—A grey brick is formed from a buff-brick clay by the addition of small proportions of a silicate-forming Co compound and black Mn ore. B. M. V.

Saturating or impregnating mixtures for flexible fibrous or cellulosic bases, and methods of saturating or impregnating said bases [to produce abrasive articles, e.g., sandpaper]. A. H. STEVENS. From MINNESOTA MINING & MANUFACTURING CO. (B.P. 417,173, 22.12.32).—The composition consists of a protein (casein, glue) and a material (charcoal, SiO_2 gel, etc.) which carries an adsorbed insolubilising agent (I) such as an aldehyde or its additive compounds (with NH_3 , HCN, Na_2SO_3). (I) is liberated by the action of heat, preferably in presence of H_2O . The addition of $CaCl_2$, glycerin, glycols, etc. improves the flexibility of the product. J. A. S.

Filling bodies. Pottery kiln.—See I.

IX.—BUILDING MATERIALS.

Portland cement pastes. Influence of composition on volume constancy and salt resistance. R. H. BOGUE, W. LERCH, and W. C. TAYLOR (Ind. Eng. Chem., 1934, 26, 1049–1060).—Numerous tests in which trial bars of neat cement or of cement mortar were kept (1) under H_2O , (2) in air, (3) under salt solutions, for long periods and the length changes recorded show that in case (2) contraction increases with increased $Al_2O_3 : Fe_2O_3$ ratio (A). In case (1) expansion increases with (A) appreciably when A is $> 1 : 3$. SO_3 has little effect if A is low. MgO content produces slow excessive expansion when $> 5\%$, and free CaO content in the first week when $> 2\%$. Resistance to attack by Na_2SO_4 and $MgSO_4$ decreases with increase of A . Lean mixes and those with high H_2O :cement ratio are rather less resistant. Vol. changes may be caused by direct hydration, colloidal swelling and contraction, and interaction of $3CaO, Al_2O_3$ and H_2O with $CaSO_4$. C. I.

Magnesia-rich Portland cements. H. KÜHL and E. L. MEYER (Tonind.-Ztg., 1934, 58, 6–8, 27–29, 40–42; Chem. Zentr., 1934, i, 1542).—In Portland cement and brown millerite cement the amount of free CaO is independent of the presence of MgO, which, however, in Fe-free cement at 1260° and 1400° , favours combination of CaO. MgO facilitates sintering. L. S. T.

Setting of Portland cement. P. S. ROLLER (Ind. Eng. Chem., 1934, 26, 1077–1083).—Storage trials with powdered cement clinkers show that, if H_2O is absorbed at a greater rate than CO_2 , setting is retarded. Analysis indicates that $3CaO, SiO_2$ is hydrolysed by absorbed H_2O , giving increased $Ca(OH)_2$ in solution in the liquid phase. Overseasoning with detrimental effects on final strength is associated with “activation” of $3CaO, Al_2O_3$ in addition. If CO_2 is bubbled through the samples setting is quickened by reduction of the $[Ca(OH)_2]$. Some clinkers are susceptible to this effect even when seasoned to H_2O , but others are not, the difference depending on the composition. Reversion to quick set can also be

produced by heating to 270° to remove H_2O vapour. Reverted clinkers could be restored by subsequent exposure to H_2O vapour. C. I.

Preservation of spruce and fir wood [with mercuric chloride]. W. KINBERG (Chem.-Ztg., 1934, 58, 839—841).—Wood impregnated with HgCl_2 alone is not satisfactory in calcareous soils or against attacks of insects. Best results are obtained by combining this method with inoculation. The pole (etc.) is first inoculated in the butt which is to be in contact with the soil; the remainder is subjected to the author's process of HgCl_2 impregnation after vapour treatment (cf. B., 1933, 788), and the base is then coated with asphalt. The process is applicable to all timbers, including those which will not absorb creosote. The choice between spruce wood treated in this way and creosoted larch etc. depends on colour and dimensions required, transport costs, etc. C. I.

Moisture in wood and duration of paint films. H. CORTNUM (Farbe u. Lack, 1934, 485—486, 495—496).—A fence board was supported between stone pillars on a stone base and exposed for several years, coatings of white-Pb being applied at intervals. At the upper end penetration of rain- H_2O into the cross-grains produced rotting and the paint adhered only in fragments, but other portions of the fence remained intact. Photomicrographs of cross-sections through the wood surface show stages in the disruption of the film during weathering, and particularly in consequence of entry of H_2O into the cells by capillary attraction. Any adsorbed H_2O in the wood previous to painting is deleterious to the film; the pre-drying period should therefore be sufficient. Painting does not protect cross-grained surfaces. S. M.

Graphic instruments.—See I. **System SiO_2 - Na_2O - K_2O - CaO .**—See VIII. **[Cement from] porous slags.**—See X. **Painting on damp surfaces.**—See XIII.

PATENTS.

Manufacture of cement. SOC. DES CEMENTS FRANÇAIS ET DES PORTLAND DE BOULOGNE-SUR-MER ET COMP. DES PORTLAND DE DESVRES (B.P. 415,985, 26.4.34. Fr., 26.4.33).—White cement clinker is obtained by adding CaCl_2 2—5, CaF_2 2—5, or a mixture of CaCl_2 and CaF_2 2—6% to the usual raw materials and quenching the product from the hottest zone of the kiln directly in H_2O or steam, or cooling it in a closed vessel out of contact with the air. A. R. P.

Production of acid-proof cementing mastics or putties. N. P. STEPITCHEV (B.P. 416,966, 4.1.34).—After activation of the surface by treatment with HF (e.g., a 5% solution, at 50 — $80^{\circ}/3$ atm.) or H_3PO_4 (15% solution, at 40 — $90^{\circ}/5$ atm.), siliceous materials (e.g., quartz, granites, glass, etc.) are mixed with Na silicate and allowed to set. A. L. R.

Utilisation of by-products from the carbonating of saccharine juices [in hydraulic cement compositions]. M. ERNOTTE (B.P. 413,322, 13.1.33. Belg., 13.1.32).—The strength of mortars and concrete is increased by a proportion (e.g., 10%) of carbonation cake from sugar factories, incorporated in a dry, wet, or pasty condition. J. H. L.

[Manufacture of] artificial [paving] stone. E. REVELANT (B.P. 417,224, 2.2.34. Ger., 3.2.33).—Broken stone and sand are stirred with a mixture of aq. solutions of MgSiF_6 (I) or ZnSiF_6 (II) and Na_2CO_3 (e.g., 1 and 2.5 kg., respectively, in 103—113 litres of pure H_2O to give d 1.014), and cement is added; the mixture is moulded under pressure and the shapes are kept moist for 23—33 days. Greater hardness is secured by further impregnating the stones (preferably in an autoclave at 4—5 atm.), while still warm after heating to 50 — 60° , with aq. (I) or (II) (d 1.14—1.18), and drying in air. A. L. R.

Building and like materials [from waste fuller's earth]. E. J. WILHELM (B.P. 415,901, 19.10.33).—After extraction of the fatty oil with a suitable solvent the waste earth is compressed into bricks, using a hydraulic cement binder. The insol. oil on the earth particles renders the bricks H_2O -repellent. A. R. P.

Protecting lumber exposed to the atmosphere from damage due to storage. E. G. P. RUNBÄCK (B.P. 415,594, 11.9.33. Swed., 12.9.32).—The timber is kept continuously moist to prevent growth of fungi. A. R. P.

Filtering material.—See I.

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

Krupp direct process [for iron]. F. JOHANNSEN (Stahl u. Eisen, 1934, 54, 969—976).—The process consists in passing a charge of Fe ore and low-grade fuel through a slightly inclined, rotary cylindrical furnace (F) in such a way that the ore is preheated in the charging zone and reduced to sponge Fe in the middle zone, while in the lowest zone the sponge is melted to shots of low-C Fe (up to 20 cm. diam.) which are embedded in a semi-plastic slag (S). The discharge from F is quenched to break up S and liberate the metal, which is freed from S by screening on 1-mm. sieves. The undersize from this process is separated magnetically to give a product containing 60—75% Fe (5—15% of the ore charge), which is returned to F, and a slag containing 1—5% FeO and 0.2—0.6% Fe (metallic). The Fe recovery averages 90—96%, the P recovery in the Fe 75—80%, and the Mn recovery in the Fe only 10—15%; the S content of the shots is 0.02—1.1% according to the basicity of S, but by suitable adjustment of the charge shot low in S for steel-making can be readily obtained. Cost data and material balances for the treatment of various types of Fe ore by the process are illustrated in diagrams. A. R. P.

Production and properties of porous blast-furnace slags. A. GUTTMANN (Stahl u. Eisen, 1934, 54, 921—927).—A description is given of recent processes patented in Germany for the prep. of porous and granulated slags from the Fe blast furnace by the use of air, H_2O , and rotating toothed wheels. The products obtained (I) resemble natural pumice (II), but are generally of greater strength; the wt. varies between 290 and 650 kg./cu. m., compared with 460—490 kg./cu. m. for (II). (I) may be used for heat insulation of furnaces, for making light concrete of high strength,

and for filling towers for the purification of waste industrial H_2O . A. R. P.

Slag test in the open-hearth process. R. BACK (Stahl u. Eisen, 1934, 54, 945—954).—The characteristic appearance of slag buttons taken at various stages of the open-hearth refining process is illustrated and correlated with the composition. In acid and slightly basic slags the surface appearance and nature of the fracture provide a useful guide to the Mn, Fe, and SiO_2 contents; as the basicity increases, these characteristics disappear and are eventually replaced by a new series of a different kind from which conclusions may be drawn as to the Fe and CaO contents and the CaO: SiO_2 ratio. The use of these slag tests in controlling the processes in the furnace is described in detail. A. R. P.

Sulphur in cupola-furnace operation. I. TRIFONOV (Giesserei, 1933, 20, 497—500; Chem. Zentr., 1934, i, 925).—S (combined in the coke as CaS, MgS, and FeS) is taken up by liquid Fe only when, due to oxidation and insufficient CaO, it is not combined in the slag as CaS. CaO also forms CaO.FeO, which is stable at high temp. H. J. E.

Wall-thickness sensitivity of separately cast cast-iron test-pieces and its relation to the chemical composition. P. A. HELLER and H. JUNGBLUTH (Arch. Eisenhüttenw., 1934—5, 8, 75—82).—The tensile strength (σ) of cylindrically cast rods of cast Fe varies with the diam. (d) according to the exponential expression $\sigma d / \sigma_{30} = (d/30)^a$, where σ_{30} is the strength of a 30-mm. rod. The index a is a measure of the wall-thickness sensitivity of the metal and α the C and Si contents according to the expression: $a = 0.24 + 0.286 \times (C + 0.8Si - 4.2)^2$; hence σ can be calc. for any val. of d when the C and Si contents of a cast Fe are known. Hardness measurements give lower vals. of a than those calc. from σ . The bending strength and degree of bending at fracture are also exponential functions of d for ordinary cast Fe. A. R. P.

Effect of nickel on cast iron. E. NAMBA (Japan Nickel Rev., 1934, 2, 440—451).—Ni cast irons in practical use are limited to austenitic irons with high Ni content, and pearlitic cast irons with Ni < 2%. Ni does not form carbides, and it reduces the solubility of C at the eutectoid temp. and the eutectoid C content. It also suppresses the Ar₁ transformation. The effect of Ni on the strength of cast Fe depends on the Si content. With low Si, tensile strength (T) rapidly increases up to 1% Ni, but higher % do not further increase T . With high Si, T is lowered up to 1% Ni, and then raised by additions > 1%. The decrease in depth of chill is very marked, and this is also accompanied by greater toughness, and increased T under fluctuating stress. Increase of d and removal of porosity make Ni cast irons suitable for pressure-resisting castings. The effect on the thermal expansion \propto the amount of Ni present. Up to 5%, the coeff. of expansion is < that of plain cast Fe. W. P. R.

Nickel cast iron. T. MEZAKI (Japan Nickel Rev., 1934, 2, 374—390).—Tensile strength (S), impact (I) and wear resistance (W), hardness, and corrosion resistance of a series of 10 cast irons with C 2.6, Si 2.0, and 1—20% Ni have been investigated. T increases

with up to 3% Ni, then continuously falls with 20% Ni, but there is a continuous rise in notched-bar I vals. with up to 15% Ni. W increases rapidly with up to 5% Ni, then falls continuously. Addition of up to 10% Ni confers a martensitic structure with flaky graphite. Austenite appears when > 10% Ni is present, and with 20% Ni no martensite is present. Tempering a 3% Ni cast Fe at 300° after oil-quenching from 820° increases T by 32% without impairment of ductility, but such heat-treatment destroys W . W. P. R.

Properties of low-nickel and low-nickel-chromium grey cast iron. T. SATO (Japan Nickel Rev., 1934, 2, 360—373).—The graphitising action of Ni is $\frac{1}{2}$ — $\frac{1}{3}$ that of Si if the Ni content is > 3%. Ni, unlike Si, refines the pearlitic matrix. Cr being a carbide-forming element, its addition with Ni in proper proportions enables good control of mechanical properties of cast Fe to be obtained. Ni + Cr allow a wider range of C and Si content in the high-grade grey irons (28—32 kg./sq. mm. tensile strength). Cast irons containing relatively high Mn content (up to 1%) are softened by additions of Ni. W. P. R.

Nickel and nickel-chromium cast iron in internal-combustion engines. Y. TAJI (Japan Nickel Rev., 1934, 2, 427—439).—Ni, by reducing chill and the local formation of free Fe carbide, improves the machinability of Fe castings. Although preventing hard spots, the general hardness of cast Fe is increased by Ni, and with > 5% the structure becomes martensitic. Machinable castings with hardness vals. of 200—250 Brinell can be obtained. Cr acts in a contrary manner to Ni as regards carbide formation, and hardens cast Fe by virtue of this rather than by hardening the ferritic or pearlitic matrix. Typical compositions for cylinders, cylinder liners or blocks, pistons, and exhaust manifolds are given. A Ni-Cr cast Fe has also been used for the production of crank and cam shafts. W. P. R.

Special cast iron used in electrical machinery. H. NAKAMURA (Japan Nickel Rev., 1934, 2, 410—426).—Non-magnetic cast Fe must have the lowest permeability and the highest electrical resistance possible with good machinability (M) and good casting properties. The austenitic irons (15—20% Ni) are costly and do not machine easily. Improved M , without loss of desirable magnetic qualities, is obtained by replacing part of the Ni by Mn or by Cr and Cu. The alloy with Ni, Cr, and Cu has better casting properties than the Ni-Mn alloy. Addition of Si (up to 5%) is necessary to increase the sp. resistance to 150 microhms/cm.³; the low strength of such an alloy is improved by the addition of a small amount of Ni, which does not greatly affect the sp. resistance. W. P. R.

Non-magnetic cast iron. G. WATANABE (Japan Nickel Rev., 1934, 2, 391—409).—In order that cast Fe may become non-magnetic, 20—25% of Ni must be present. Although Mn is an austenite-forming element, it prevents graphitisation, and Mn cast irons are white, brittle irons. A ratio of 10% Ni to 5% Mn results in a non-magnetic alloy with fair casting properties and reasonable strength. Plain-Ni austenitic cast irons have non-stable magnetic properties, being influenced by temp. fluctuations at room temp. Suitable amounts

of Mn, Cu, Cr, and Al added to Ni austenitic Fe result in satisfactory alloys. Most of the non-magnetic cast irons have also good corrosion-resisting properties.

W. P. R.

Organic substances and the acid corrosion of iron. H. PIRAK and W. WENZEL (Korros. u. Metallschutz, 1934, 10, 29—38; Chem. Zentr., 1934, i, 2648).—A review.

H. J. E.

Bright annealing of steel in mixed gas atmospheres. A. L. MARSHALL (Trans. Amer. Soc. Metals, 1934, 22, 605—620).—A definite balance in the amounts of CO, CO₂, H₂, and H₂O is needed in bright gas-annealing of low-C steel to prevent etching or C deposition. The balance corresponds approx. to equilibrium conditions at 650° of $2\text{CO} \rightleftharpoons \text{CO}_2 + \text{C}$ and $\text{CO}_2 + \text{H}_2 \rightleftharpoons \text{CO} + \text{H}_2\text{O}$. Production of a suitable annealing gas by incomplete combustion of town gas is described.

CH. ABS. (e)

Microstructure and hardness of a plain 0.85% carbon-steel in the annealed and quenched states and in intermediate conditions produced by incomplete quenching. J. SEIGLE (Chim. et Ind., 1934, 32, 507—516).—On quenching a bar of steel heated at one end to > the A3 point this end develops a purely martensitic structure, whilst the opposite end is entirely pearlitic; these two zones are separated by a transitional zone (Z) in which islets of globular or lamellar pearlite (I) are embedded in the martensite (II), or in which tongues of (I) penetrate into (II). The nature of Z depends on the exact heat-treatment given; examples of the structures obtained with various treatments are illustrated and the mechanism of their formation is discussed.

A. R. P.

Quenching media for the hardening of steel. H. SCOTT (Trans. Amer. Soc. Metals, 1934, 22, 577—603).—A crit. discussion.

CH. ABS. (e)

Copper as an alloying element in steel. H. L. MILLER (Met. & Alloys, 1934, 5, 227—228).—Cu increases the strength of the ferrite and produces a normalised steel of const. yield point after varying cooling rates; Cu and Mo together in steel provide a high resistance to flaking of oxide films formed on exposure to industrial atm. The hot-shortness produced by Cu can be reduced by addition of Ni or Mo, or of both, but such steels develop a sticky oxide surface during hot-rolling; Cr-Mn-Cu steels are free from both defects.

A. R. P.

Influence of manganese on the constant K_{Si} in acid open-hearth steel. P. HERASYMENKO and F. POBOŘIL (Chim. et Ind., 1934, 32, 528—529).—From theoretical considerations it is shown that FeSi and Mn₂Si have little influence on the deoxidation equilibrium in the acid open-hearth steel process unless the Mn content of the metal bath is very much > usual (cf. B., 1934, 628).

A. R. P.

Colorimetric determination of manganese in iron and steel. V. G. FUNK (Zavod. Lab., 1934, 3, 698—699).—0.1 g. of steel is dissolved in 3 c.c. of conc. HNO₃ at 90—95°, and C is determined colorimetrically; 0.05 g. of AgNO₃, 1 c.c. of 25% aq. NH₃, 0.2—0.3 g. of K₂S₂O₈, and H₂O to 13—17 c.c. are added to the solution, which is then heated at 100°

for 15 sec., and the coloration due to KMnO₄ is compared with that obtained similarly from a steel of known Mn content.

R. T.

Potentiometric titration of molybdenum in special steels. B. A. SOSNOVSKI (Zavod. Lab., 1934, 3, 696—698).—2—4 g. of Cr-Mo steel are dissolved in 70—100 ml. of 50% HCl, KClO₃ is added, the solution is conc. to eliminate Cl₂ and excess HCl, and added to 300 ml. of 15% NaOH. The solution is diluted to 500 ml., filtered, 250 ml. of filtrate are conc. to commencement of crystallisation of NaCl, made neutral with HCl, an equal vol. of conc. HCl is added, and the solution is titrated at 70° in an atm. of CO₂ with standard SnCl₂.

R. T.

Dependence of the elongation of [steel] boiler sheet on the tensile strength, cross-section of the test-piece, and thickness of the sheet. R. HESSLER (Stahl u. Eisen, 1934, 54, 928—931).—The results of > 7000 tests on steel sheets with a tensile strength (S) of 35—44 kg./sq. mm. show that the elongation (E) increases with the cross-sectional area (A) and decreases with the thickness (T). For a 200-mm. gauge-length A should be 314 sq. mm.; curves are given for calculating E for other vals. of A and showing the relations between E , S , T , and A .

A. R. P.

Hydrogen cracking of steel. P. BARDENHEUER and H. PLOUM (Naturwiss., 1934, 22, 656—657).—The absorption of H₂ by steel is considered. The removal of the gas does not restore completely the original properties to the metal. The degree to which the metal is affected depends on the rapidity of removal of the H₂. Flaws always remain in the metal after the H₂ has been evolved. The evolution of H₂ at room temp. is accelerated by cold-working.

A. J. M.

Wear tests [on steel] with the Spindel machine. W. EILENDER, W. OERTEL, and H. SCHMALZ (Arch. Eisenhüttenw., 1934—5, 8, 61—65).—With increasing speed of the rotating disc the wear increases to a max. and then decreases, due to the effect of cold-work, to a min., after which it slowly increases again; increase in the pressure of the disc has similar effects. It is suggested therefore that a standard load of 8 kg. on the disc and a travel of 200 m. of disc surface be adopted in making wear tests with the machine, the max. of the resulting curves being used for comparing the wearing properties of steels. Wear of steel decreases with increasing hardness and grain size and is greater with steel containing granular cementite (C) than with that containing lamellar C . The presence of austenite (A) reduces the rate of wear (R), which reaches a min. with 10—15% of A . Ni, Cr, W, and especially Mn decrease R , whereas V and Co have relatively little effect.

A. R. P.

Tensile tests under plane plastic deformation. G. BARANSKI (Z. Metallk., 1934, 26, 173—180).—Apparatus for making tensile tests on flat test-pieces under such conditions that transverse elongation is prevented in one direction is described and the results obtained with steel and brass are discussed. A mathematical analysis of the stress distribution along and in the neighbourhood of the plane of fracture is given.

A. R. P.

Tensile properties of metal tubes under internal pressure. E. SIEBEL and E. KOPF (Z. Metallk., 1934, 26, 169—172).—The yield point, tensile strength (*S*), and elongation (*E*) of tubes of mild steel, laural, Cu, brass, and Pb have been determined (*A*) in the ordinary tensile test and (*B*) under hydraulic pressure applied internally. In all cases *E* is much less in *B* than in *A*, and for all the non-ferrous metals, except hard-drawn Cu, *S* is 10–20% less in *B* than in *A*. Characteristic fractures are illustrated. A. R. P.

Oxidation of sulphide minerals during fine grinding. V. A. MALINOVSKI (Tzvet. Met., 1933, No. 4, 38—45).—With Cu or pyritic Cu ores oxidation does not appreciably affect flotation results. Sol. salts formed by oxidation of Cu–Zn ores, and Pb, Pb–Zn, and Cu–Zn ores containing pyrite and chalcopyrite, are harmful. Oxidation of pyrite improves its floatability. CH. ABS.

Direct preparation of metals from sulphide copper ores with special reference to Mansfeld copper schist. C. KRUG and C. GOETZ (Metall u. Erz, 1933, 30, 469—480; Chem. Zentr., 1934, i, 755—756).—Fe–Cu sulphide is decomposed in a reducing or inert atm. at 600–800° into Cu, Cu glance, and FeS. The formation of free Cu at this temp. in an inert gas depends on the absorption of S by Fe present. Fe can be added as metal or oxide. At > 900° re-formation of CuS occurs. Removal of S from CuS by H₂ occurs at 900°, but is inapplicable in presence of Fe. A 90% yield of Cu was obtained by treatment of the schist at 600–800° in an inert gas in presence of Fe. H. J. E.

Cementation of copper by nickel matte. W. SAVELSBERG (Metall u. Erz, 1933, 30, 445—448; Chem. Zentr., 1934, i, 2188).—In the pptn. of Cu from its solutions by Ni matte it is NiS and not Ni which is the active agent. Cu is pptd. as CuS by FeS or NiS. X-Ray photographs for the ppt. show no Cu lines. H. J. E.

Corrosion caused by brines on refrigerating machinery. O. STUEBER (Food, 1934, 4, 9).—Corrosive action of brines on Fe, brass, bronze, Cu, Zn, and Al is studied. Brines are classified as (*a*) those having a const. corrosive action, (*b*) those in which this action decreases, and (*c*) those which form crusts on the metal. W. R. B.

Corrosive action of brines on metals used in dairies. A. BURR and M. MIETHKE (Food, 1934, 4, 7).—The corrosive action of commercial brines of corresponding *d* on single metals kept in movement and half immersed is examined. "Chrome Reinhartin" (*A*) [a 1:3 mixture of CaCl₂·6H₂O (I) and MgCl₂·6H₂O (II), with Na₂CrO₄] and "Dairy Brine" (*B*) are the best solutions. *A* attacks Zn most, Pb and Fe are encrusted, all other metals are unaffected; *B* attacks Pb (severely), Cu, and Cu alloys, but other metals are unchanged. "Frigisol" (*C*) [(I): (II) = 1:3.7, + NaClO₃] attacks solder and tinned sheets severely; these are, however, resistant to "Reinhartin" (*D*) [(I): (II) = 1:3, + protective colloids and buffers]. *C* and *D* corrode Pb, Zn, and Fe. W. R. B.

Action of metals and their alloys on whole milk, and of whole milk on metals and their alloys. W. MOHR, R. KRAMER, A. BURR, and H. OSTERBURG

(Food, 1934, 4, 10).—The corrosive effect of whole milk (I) on single metals (II), and the taste produced in (I) at different temp. are examined. (II) kept in movement and half immersed are corroded more rapidly than when still and fully immersed; corrosion ∝ temp. V2A steel (III), welded (III), Al, Al alloys, and tinned sheets are unaffected; Ni, Ni alloys, Cu, brass, and Zn are affected at all temp. Ni alloys, Duralumin, Cu, brass, and Zn affect the taste of (I). Fe in combination with Al is attacked at room temp.; other metals when connected to a more electropositive one appear to be stable. At 65° only (III), electrolytic Cr, chrome–Cu, Sn, tinned Cu, and tinned Fe remain unattacked when so joined.

W. R. B.

Corrosive action on metals caused by cleansing and disinfecting agents used in the dairy industry. W. MOHR and A. KRAMER (Food, 1934, 4, 10).—1% solutions of Na₃PO₄ cause corrosion if there is any considerable milk residue; alloys of Cu and Ni are not attacked. The use of O₂-free H₂O should be avoided.

W. R. B.

Corrosive action of brines on metals [and rubber]. W. MOHR and R. KRAMER (Food, 1934, 4, 8).—The corrosive effect of brines on metals arranged in pairs in electrolytic circuit at –5° is discussed. Cr, V2A steel, and chrome–Cu are not appreciably attacked. The order of increasing corrosion with most brines is: Cu, Ni, "Nicoiros," Sn, tinned Cu, tinned brass, cast and wrought Fe, Pb, Zn, galvanised Fe and Al. Hard (but not soft) rubber is resistant to all brines. W. R. B.

Lanoline rust preventers. C. JAKEMAN (Dept. Sci. Ind. Res., Eng. Res., Spec. Rept. No. 12, 2nd edn., 1934, 26 pp.; cf. B., 1929, 442; 1933, 150).—Five-year tests confirm previous results. Free acid in the lanoline is not harmful, but H₂O is. Hardening of the coating with wax is not recommended. G. H. C.

Protection from corrosion and corrosion-resistance of binary mixed crystals. L. GRAF (Metallwirts., 1933, 12, 585—587, 602—603; Chem. Zentr., 1934, i, 2190).—A crit. discussion. H. J. E.

Chlorination in the non-ferrous and gold industries. D. M. CHIZHIKOV and A. V. BRECHSTEDT (Tzvet. Met., 1933, No. 5, 24—37).—90% of the metal in calcined Pb (5–25%)–Zn (2–14%) ores can be volatilised as chloride by heating in dry Cl₂ at 1000° for 4 hr.; chlorination of oxidised ore at 900–1000° with a mixture of Cl₂ and H₂O vapour affords 95%. In presence of 20% of C at 600° 90% is converted into non-volatile chlorides. With sulphidic and mixed ore max. extraction is obtained by treatment at 700° for 4 hr. with Cl₂ + H₂O vapour. CH. ABS.

Determination of gold [in alloys] by direct parting. A. HACKL (Z. anal. Chem., 1934, 98, 166—177).—The alloy is fused on charcoal under borax with the requisite amount of Ag, and the bead cleaned by flattening and brushing, then rolled, coiled, annealed, and parted as usual, first in dil. and then in more conc. HNO₃. Sn > 0.5% and Pt > 1.5% interfere, but Ni and Zn ("white gold" alloys) do not. The results are more accurate than those obtained by cupellation since there is no loss by volatilisation or by absorption in the cupel. A. R. P.

Production of refined antimonial lead, anti-friction and printers' alloys. G. J. BRITTINGHAM (Chem. Eng. Min. Rev., 1934, 26, 415–418).—Antimonial Pb (I) is made at Port Kembla, S. Australia, directly from the antimonial litharge (II) produced in the continuous Pb refinery at Port Pirie. The (II) is smelted in low shaft furnaces with CaCO_3 , Fe_2O_3 , and coke, scrap Fe being added to form a speiss with the 6.5% As in (II). The crude (I) from the furnace is refined by agitation in a cast-Fe kettle, first with air, then with S to remove the Cu, and is finally diluted to 10% Pb by addition of pure Pb. A. R. P.

Analysis of copper-nickel-plated steel. DEISS and BLUMENTHAL (Mitt. Materialprüf., 1934, 271–272).—According to the nature of the pretreatment there is a more or less extensive diffusion of Ni into the steel surface in Ni-plated steel and this diffusion layer (I) is not dissolved by the usual solvents employed to remove the Ni layer (II) for analysis, e.g., conc. HNO_3 , ammoniacal $(\text{NH}_4)_2\text{S}_2\text{O}_8$, or AcOH and NaNO_3 . (I) can be detected under the microscope ($\times 700$). For the determination of Ni in Ni-plated steel, therefore, (II) should first be removed by any of the above solvents and (I) then dissolved by treatment for 10 min. with Br-HCl ; both solutions are then analysed for Cu and Ni. Dissolution of the whole sample gives incorrect results since most steels contain Cu and Ni. A. R. P.

Cadmium-plating of iron and steel. W. FRÖLICH (Metallbörse, 1934, 23, 1437–1438, 1470–1471, 1537–1538; Chem. Zentr., 1934, i, 1553–1554).—Cd forms a layer of oxide which, although it adheres badly, protects the metal in a dry atm. from further oxidation. In a moist atm. Cd is less permanent than Zn. The anodic protective action is less with Cd-Fe than with Zn-Fe, but is sufficient when the porosity of the ppt. is not too high. Fresh Cd baths often give porous deposits and hence should always have old electrolyte added to them. When the Cd-coated sheets are protected against rain, a layer 0.005 mm. thick is sufficient, otherwise one 0.01 mm. thick is necessary for protection against corrosion. The usual Cd electrolyte contains 40–85 g. per litre of Na Cd cyanide, 40–80 of NaCN, 20–40 of NaOH, and 35–70 of Na_2SO_4 . The NaCN checks anodic polarisation, but the cause of the favourable action of Na_2SO_4 is unknown. The addition of 1–1.5 g. of NiSO_4 per litre gives a ductile and lustrous Cd layer. The p.d. is 4–6 volts, the c.d. 3–3.5 amp./sq. dm., and the ratio of anodic to cathodic surface 1.5:1. L. S. T.

Mechanical properties of electrolytic zinc sheets. O. BAUER, J. WEERTS, and F. BECK (Metallwirts., 1933, 12, 615–618; Chem. Zentr., 1934, i, 2188).—With < 0.06% total addition of Pb, Fe, Cu, and Cd the mechanical properties are unchanged. 0.9% of Pb increases the tensile strength by 25%. H. J. E.

Gas content of electrolytic zinc. W. BURMEISTER and M. SCHLÖTTER (Metallwirts., 1934, 13, 115–120; Chem. Zentr., 1934, i, 2480–2481).—Using aq. ZnSO_4 or Zn cresolsulphonate as electrolyte at an acidity of 10^{-4} – $5 \times 10^{-2}N$, the amount of H dissolved in the electrolytically separated Zn decreased with increasing

c.d. With stirred electrolytes Zn with a very low H content may be deposited. Large amounts of H are taken up by Zn when it is distilled in H_2 at a low pressure. H. J. E.

Reduction of mist or spray from chromium-plating baths by fixed oils such as fish oil. C. M. ALTER and F. C. MATHERS (Month. Rev. Amer. Electroplaters' Soc., 1934, 20, No. 9, 11–16).—One drop per sq. in. is effective. The oils form stable foams but are not rapidly oxidised or attacked by H_2CrO_4 ; at < 10 drops per sq. in. they do not cause dark Cr deposits. CH. ABS.

Technical control of nickel-plating production. F. A. MAURER (Month. Rev. Amer. Electroplaters' Soc., 1934, 20, No. 8, 42–48).—A discussion. CH. ABS.

Sources of error in nickel plating, and their avoidance. R. G. SNELLING (Chem.-Ztg., 1934, 58, 860–862).—The causes, and methods for correcting, many types of bad deposits are given. A. G.

Test for galvanic precipitates and its application to silver- and copper-plating. K. W. FRÖHLICH (Mitt. Forsch.-Inst. Probieramts. Edelmet., 1933, 7, 37–44; Chem. Zentr., 1934, i, 758).—The quantity of falling sand needed to wear away the coating under specified test conditions is measured. Results for Ag and Cu coatings are correlated with the conditions of electrodeposition. H. J. E.

Determination of tellurium in [Cu anode] sludges. M. I. SCHUBIN (Zavod. Lab., 1934, 3, 677–685).—The sample of sludge, containing 10–30 mg. of Te, is heated almost to dryness with 1:2 HNO_3 -HCl, 25–30 c.c. of conc. HCl (I) are added, the solution is again conc., and this operation repeated to complete elimination of HNO_3 , when the syrupy residue is heated at 70° with 35 c.c. of (I) and 50 c.c. of H_2O , 50 c.c. of 20% FeSO_4 (II) are added, the solution is boiled for 10–15 min., diluted to 200 c.c., and filtered from the ppt. of Se, Au, and Ag. 100 c.c. of (I) and 10 c.c. of (II) are added to the filtrate, which is then boiled; if no further ppt. forms, H_2O is added to 550 c.c., and SO_2 passed in to complete pptn. of Te, which is collected, washed, and dissolved in 30 c.c. of 50% HNO_3 , H_2O is added to 100 c.c., and the solution boiled for 15 min. with 12 c.c. of 25% aq. NH_3 , cooled, made alkaline with aq. NH_3 and acid with HCl, 2 g. of KI are added, and the I liberated ($\text{H}_2\text{TeO}_3 + 4\text{HI} \rightarrow \text{Te} + 4\text{I} + 3\text{H}_2\text{O}$) is titrated with standard $\text{Na}_2\text{S}_2\text{O}_3$. R. T.

Testing of metals by ultrasonic waves. S. I. RAMM (Zavod. Lab., 1934, 3, 719–720).—The existence of cavities within blocks of metal is detected by means of ultrasonic waves, which are transmitted irregularly through air spaces. An apparatus is described in which intensity of transmission is indicated by the roughening of the surface of a film of oil. R. T.

Electrolysis of sulphide solutions. S. A. PLETENEV and S. L. SOSUNOV (Tsvet. Met., 1933, No. 2–3, 88–93).—By using a Pt diaphragm, Fe electrodes, and aq. NaOH (0.5%) + Na_2S (7%) as electrolyte, 85% recovery of Hg was obtained at 100 amp. per sq. m., 50° , and 30 g. of Hg per litre. CH. ABS.

Chemical and electrochemical surface treatment of aluminium. W. WIEDERHOLT (Chem. Fabr., 1934, 7, 361—364).—A lecture. E. S. H.

Production of pure aluminium. P. RÖNTGEN and H. BORCHERS (Metall u. Erz, 1934, 31, 81—86; Chem. Zentr., 1934, i, 2646—2647).—Oxidation of Al containing Fe and Si leads to preferential oxidation of Al to Al_2O_3 , which can be dissolved in a suitable flux and used for producing pure Al. This purification process may be carried out by anodic oxidation, using a fused electrolyte rich in Al_2O_3 . The process may be made continuous. H. J. E.

Hardness-testing machine.—See I. **Sheet-Fe enamels.**—See VIII. **Rust-protective paints. Protective finishes [for metals].**—See XIII. **Beer scale and Al. Al corrosion in brewing.**—See XVIII. **Action of cream etc. on metals.**—See XIX.

PATENTS.

[Shaft] furnaces for reduction of ores, refining of metals, and manufacture of alloys. H. A. BRASSERT & Co., LTD. From H. A. BRASSERT & Co. (B.P. 414,055, 19.10.32).—The hearth (*A*) of the furnace is annular and of much greater diam. than that of the shaft (*C*), the centre (*B*) of *A* being raised above the level of the molten metal and of greater diam. than that of *C*, so that unfused ore etc. does not slip into *A*. The dome-like wall surrounding *A* is preferably of metal sections lined with refractory material and all the tuyères are in it, at different levels, some being directed to the surface of the bath and all arranged to give a whirling motion to the gases around *A*. B. M. V.

Charging a blast furnace. J. K. CLUTTS (U.S.P. 1,938,580, 12.12.33. Appl., 27.3.31).—The fuel and flux are charged in layers and the scrap Fe is introduced in a series of heaps down the central axis so as to keep it clear of the lining. A. R. P.

[Iron-manganese] ore-conditioning process. G. J. HOLT, R. O. HOCKING, A. E. MATSON, and (the late) A. K. KNICKERBOCKER (U.S.P. 1,939,119, 12.12.33. Appl., 21.5.30).—For the removal of part of the SiO_2 from Fe-Mn oxide ores a process involving the following steps is claimed: (a) graded crushing with desliming and classification at various stages; (b) thickening of the slimes, followed by flotation in an alkaline circuit with Na_2SiO_3 , a fatty acid, and pine oil; (c) re-cleaning of the concentrates in a similar way; and return of the tailings from (c) to the thickener. A. R. P.

Deoxidation of iron and steel. F. G. NORRIS, Assr. to AMER. ROLLING MILL Co. (U.S.P. 1,938,716, 12.12.33. Appl., 22.1.31).—A small quantity of Na is forced through the metal in the ladle (*L*) by vaporisation from a tube entering the middle of the bottom of *L*. A. R. P.

Prevention of cleaned [ferrous] metal from rusting. J. H. GRAVELL, Assr. to AMER. CHEM. PAINT Co. (U.S.P. 1,938,961, 12.12.33. Appl., 20.11.28).—After pickling in dil. acid, the metal is immersed in alkaline Na_2HAsO_3 , whereby it becomes coated with a protective film of As. A. R. P.

[Corrosion-resistant] cast iron. AUDLEY ENG. Co., LTD., E. W. WYNN, and K. M. LEACH (B.P. 415,485,

2.3. and 18.8.33).—The alloy contains Si 4—10 (6), Ni 7—15 (14), Cu 5—12 (5), Sb \geq 2 (0.2), and C 1.5—3 (1.8)%, the free C being in a coarsely graphitic state. A. R. P.

Manufacture of heat-treated white cast iron. ALLIED PROCESS CORP., Asses. of M. P. GRAY (B.P. 415,086, 16.12.32. U.S., 17.12.31).—White-Fe castings containing Mn 0.6—1.5 and Si 1.29—0.7%, and S such that % Mn \div 2 \times % S = 0.4—1.25 are heated at $> \text{A3}$ (925°) for 18—36 hr., allowed to cool to $< \text{A3}$, and kept at $620\text{--}750^\circ$ for 10—60 hr., both heat-treatments being made in a non-oxidising atm. With 1—1.2% Mn this treatment raises the tensile strength to > 44.5 tons/sq. in. A. R. P.

Production of metallic [zinc] coatings [on iron or steel]. H. CSANYI (U.S.P. 1,939,667, 19.12.33. Appl., 19.12.30).—The ferrous article is coated with a paste of Zn or Zn-alloy dust and a readily fusible chloride flux comprising NH_4Cl and BeCl_2 , SrCl_2 , or, preferably, BaCl_2 , and heated until a smooth Zn coating is produced below a protective fluid coating of flux. A. R. P.

Furnace for heat-treatment of steels and alloys under [internal] atmosphere controlled conditions. R. HALKETT, H. A. FELLOWS, and J. BROWN (B.P. 414,428, 10.2.33).—Two superposed muffles, the lower one only being provided with heating burners, are provided with screens of combustion gases across their mouths and with an internal atm. produced as described in B.P. 397,640 (B., 1933, 951). B. M. V.

Production of steel. H. A. BRASSERT, Assr. to H. A. BRASSERT & Co. (U.S.P. 1,939,874, 19.12.33. Appl., 22.6.31).—Fe ore is smelted in a blast furnace, the pig Fe blown in a basic-lined converter, and the refined Fe transferred into an open-hearth furnace where it is mixed with molten Fe produced directly from scrap in a shaft furnace, and the mixture is refined by the usual methods. A. R. P.

Refining of steel. V. B. BROWNE, Assr. to ALLEGHENY STEEL Co. (U.S.P. 1,949,529, 6.3.34. Appl., 26.4.30).—To the slag superposed on a steel containing metallic oxides is added SiO_2 in amount $>$ is necessary to form MnSiO_3 and FeSiO_3 (e.g.), the solution pressures being thereby modified so that the FeO and MnO migrate into the slag largely from this physical cause. B. M. V.

Manufacture of chromium steel. K. M. SIMPSON, Assr. to INTERNAT. CHROMIUM PROCESS CORP. (U.S.P. 1,939,795, 19.12.33. Appl., 11.1.32).—A mixture of chromite and 82% of ferrosilicon in a finely-divided form is introduced into a gas- or oil-fired furnace at 1700° , and, when the vigorous exothermic reaction has subsided, the slag is removed and steel scrap added to give the desired composition. A. R. P.

Pickling stainless steel. M. TAYLOR, Assr. to MERRIMAC CHEM. Co. (U.S.P. 1,939,241, 12.12.33. Appl., 8.3.33).—Use of a solution containing AcOH 40—50 (50), HNO_3 10—15 (15), and HCl 4—8 (8)% is claimed. A. R. P.

[Silicon-aluminium-iron] magnetic alloys. KINZOKU ZAIRYO KENKYUSHO (B.P. 414,657, 6.2.33. Jap., 6.2.32).—Claim is made for Fe alloys containing Si 0.5—16 and Al 0.5—16%, the Al + Si being $< 7.5\%$.

The 4.5:9.5 Al-Si alloy has an initial permeability (μ) of 5500 and μ_{\max} of 80,000. Up to 2% of Mn, Cr, V, and Ti (< 8% in all) may be added. A. R. P.

Bonding of metals [steel wire] with rubber. GOODYEAR TIRE & RUBBER CO. (B.P. 415,025, 14.12.32. U.S., 1.3.32).—Steel wire for beading pneumatic tyres is coated with (a) a thin film of Cu in a bath containing CuCN 85, NaCN 99.2, Na₂CO₃ 28.35, and Na₂S₂O₃ 3.54 g. in 3785 c.c. of H₂O; (b) a hot-dipped Cd coat, and then with a flash of Cu from a bath containing CuSO₄ 5 g., K₂ tartrate 9.4 g., aq. NH₃ 2 c.c., and H₂O 100 c.c.; (c) a hot-dipped Pb coat, and a Cu flash from a solution containing 5 g. of CuSO₄ and 5 g. of H₂SO₄ in 90 c.c. of H₂O; or (d) a hot-dipped coating of Cd, Zn, Sn, or Zn-Pb alloy, and then with a Cu flash from a solution containing CuSO₄ 180 and (NH₄)₂C₂O₄ 308 g. per gal. A rubber coating is then galvanised on in the usual way. A. R. P.

[Hardenable] copper alloys and articles [locomotive fireboxes] made therefrom. H. W. BROWNSDON, M. COOK, H. J. MILLER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 414,748, 13.1.33).—Alloys of Cu with Al 0.5–5 (1–3), Ni 1.5–15, and Mn 0.5–15 (5)% are quenched from > 900° and tempered at 300–600°, preferably after cold-working. Max. hardness is obtained when % Ni = 3–4 × % Al. A. R. P.

Preventing rust and corrosion [in the radiators of internal-combustion engines]. B. D. AVIS (U.S.P. 1,940,041, 19.12.33. Appl., 30.9.31).—To prevent corrosion around the soldered joints in radiators containing an antifreeze solution a 36:30:7 mixture of Na₂B₄O₇, Na salicylate, and NaNO₂ is added (73 grains per quart). A. R. P.

Gold-saving machine. D. A. and J. W. SILVER (U.S.P. 1,939,143, 12.12.33. Appl., 17.11.31).—The apparatus comprises a rotatable conical bowl provided internally with a series of concentric grooves (*G*) carrying Hg and with a central feed-pipe for supplying ore pulp to the apex of the cone. The overflow is discharged into an annular trough surrounding the periphery, and means are provided for periodically cleaning *G* and recovering the amalgam. A. R. P.

Reduction of refractory oxides [chromium oxide]. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 417,433, 11.4.34. U.S., 11.4.33).—An inclined electric furnace encloses a central, evacuated, porous tube (*T*) of alundum, glazed at its projecting ends, into which is admitted the refractory metal oxide (Cr₂O₃), a device containing a *W* rod serving to clean *T* and to push the oxide through it. The space between *T* and the furnace walls (*W*) is filled with a metal (Ca), which occludes H₂, or with its hydride, this being heated to liberate the H₂ and reduce the oxide. The reduced metal is collected at the lower end of *T* and excess H₂ escapes by another tube through *W*. W. J. W.

Production of beryllium alloys [of copper, nickel, or iron]. HERAEUS VACUUMSCHMELZE A.-G., and W. ROHN (B.P. 415,066, 14.2.34. Ger., 17.2., 13.4., and 25.8.33).—BeO is reduced with C or a carbide in presence of the molten metal or alloy with which the Be is to be alloyed. *E.g.*, Be carbide is alloyed with Ni and the alloy decarburised with BeO, Ni or Fe containing C is

melted with BeO, or a mixture of CaC₂ and BeO is introduced into a molten metal. The process is preferably conducted in vac. or in an atm. of H₂. A. R. P.

Fusion of beryllium or alloys thereof. BERYLLIUM CORP., Assees. of H. C. CLAFLIN and C. H. MONROE (B.P. 415,542, 22.5.33. U.S., 28.5.32).—The metal is melted under a flux of NaF and Na₂BeF₄, or, in the case of Al-Be alloys, Na₂AlF₆. By avoiding the use of an alkaline-earth fluoride in the flux the hard, brittle, intercryst. constituent disappears from the metal or alloy. A. R. P.

Processing of magnesium. E. O. BARSTOW, J. A. GANN, and J. E. HOY, Assrs. to DOW CHEM. CO. (U.S.P. 1,940,619, 19.12.33. Appl., 5.1.33).—In the purification of Mg in a tilting furnace the metal is prevented from touching the walls of the crucible by using a fluid flux which is heavier than Mg and does not spread over the surface (*S*), *e.g.*, CaCl₂ 65, NaCl 25, CaF₂ 5, and BaCl₂ 5%. Oxidation of *S* is prevented by addition of NH₄BF₄. A. R. P.

Manufacture of [aluminium] alloys. A. J. WAKELIN and C. E. DENNY (B.P. 414,094, 28.10., 7. and 29.11.32).—The constituents are melted together in a closed vessel the O₂ in the atm. of which is previously consumed by combustion of a hydrocarbon; *e.g.*, equal wts. of Zn and Mg are melted in a closed vessel into which petrol, paraffin, or EtOH is injected, and the alloy, which is free from oxide, is introduced into molten Al. A. R. P.

[Aluminium] alloy [for washing-machine rollers]. L. W. KEMPF, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,940,133, 19.12.33. Appl., 27.7.33).—The alloy contains Cu 4–10 (6), Mg 2–6 (4), Fe 0.5–2 (1), and Si 0.5–3 (2)%; it resists well the action of dil. aq. alkali carbonate. A. R. P.

[Antimony-silicon-aluminium] alloys. W. JOLLEY, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 414,783, 16.2.33).—Claim is made for Al alloys containing Si 5–15 (7–8) and Sb > 3 (0.5–1)%, modified by stirring at 950–1050° with Na₂CO₃. The alloys are suitable for bearings. A. R. P.

[Oxide] coating [of aluminium]. M. TOSTERUD, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,939,421, 12.12.33. Appl., 26.5.32).—A grey, protective oxide film is produced on Al by immersing it in a boiling solution containing Na₂SnO₄ 0.1–15 (2) and K₂Cr₂O₇ 0.1–6 (1)%. A. R. P.

Protecting metals [aluminium and tin] against the corrosive action of alkaline liquids. HENKEL & CO. G.M.B.H. (B.P. 415,672, 27.3.34. Ger., 18.5.33).—Cleansing solutions for Al and Sn-plate comprise aq. Na₂SiO₃ and/or Na₃PO₄ containing a small amount of Co⁺⁺ ammine, *e.g.*, [Co en₂Cl₂] salts or [Co(NH₃)₅H₂O]Cl₃. A. R. P.

Welding flux for non-ferrous alloys [silicon-copper]. A. R. LYTLE, Assr. to LINDE AIR PRODUCTS CO. (U.S.P. 1,940,262, 19.12.33. Appl., 28.7.32).—Claim is made for a mixture of H₃BO₃ with 2–12% of NaF, KF, Li, Na, or K borate, preferably with a mixture of equal wts. of NaF and Na₂B₄O₇ (12%). A. R. P.

Purification of metal [electrolytic copper]. W. H. OSBORN and H. H. STOUT, JUN., Assrs. to COALESCENCE PRODUCTS Co., Inc. (U.S.P. 1,938,608, 12.12.33. Appl., 7.8.31).—To remove entrapped SO_4^{2-} and carbonaceous material from electrolytic Cu the metal is heated at 540–870° in steam containing 1–15 (1) vol.-% of H_2 .
A. R. P.

Anodic coating of zinc-base metals. H. G. C. FAIRWEATHER. From NEW JERSEY ZINC Co. (B.P. 414,580, 13.1.34).—The metal is anodically oxidised with a c.d. of 10–60 amp./sq. ft. for 1–15 min. in an alkaline solution of $p_{\text{H}} \leq 13.3$, e.g., in 0.2–1N-NaOH, in saturated aq. $\text{Ba}(\text{OH})_2$, or, preferably, in 0.5N-NaOH containing $\text{Ba}(\text{OH})_2$ to prevent accumulation of Na_2CO_3 in the electrolyte.
A. R. P.

Production of metal coatings on [e.g., nickel-plated] chromium and chromium alloys. WÜRTTEMBERGISCHE METALLWARENFABR. (B.P. 415,207, 24.4.33. Ger., 15.6.32).—Cr alloys, e.g., non-rusting steel, may be Ni-plated in sulphate baths containing NH_4Cl if the p_{H} is kept at > 2.5 . Cr and its alloys may also be coated with other metals by hot-dipping after passage through a fused acid flux.
A. R. P.

Electrodeposition of aluminium. D. B. KEYES and S. SWANN, JUN., Assrs. to ELLIS-FOSTER Co. (U.S.P. 1,939,397, 12.12.33. Appl., 12.4.29).—The bath is made by heating Al powder (7) and EtI (12 pts.) at 100–125° until reaction ceases, adding 38 pts. of EtI, cooling in ice, and adding 50 pts. of Et_2O . Electrolysis with 2 amp./sq. dm. at 40 volts in an atm. of N_2 produces a smooth, adherent Al coating on most metal cathodes. Other aliphatic and aromatic halides can be used in place of EtI.
A. R. P.

Filling-bodies. Centrifugaliser. Reacting gases with liquids.—See I. Mineral wool.—See VII. Enamelled Fe.—See VIII. Alloying furnace. Cu conductor. Spark-plug electrode.—See XI. Lacquering Cu.—See XIII. Fertiliser.—See XVI.

XI.—ELECTROTECHNICS.

Alkaline accumulators. The nickel-cadmium type. D. W. T. KIRKMAN and F. W. MANN (Colliery Guardian, 1934, 148, 1053–1055).—The positive plate active material is $\text{Ni}(\text{OH})_2$, the electrolyte aq. KOH (d 1.19), and the coating on the negative plate finely divided Cd. Details of operation and performance are recorded.
CH. ABS. (e)

Anomalous properties of new magnetic materials. M. KERSTEN (Wiss. Veröff. Siemens-Konz., 1934, 13, No. 3, 1–9).—Cold-worked Fe-Ni-Cu alloys show a strong increase in the characteristic potential with increase in [Cu]. The effect of annealing was examined. Tests with hardened specimens containing 12 and 15% Cu showed an extraordinarily high residual magnetism after annealing at 600°, almost equal to the saturation magnetism.
A. J. M.

Graphic instruments. Steam calorimetry. Filtration.—See I. Fe-sand concn. Roasting of Fe oxide ores. Cast Fe for electrical industries. Non-magnetic cast Fe. Titrating Mo in steels. Resistance of Mg_2Si in Al. Analysis of Cu-Ni-plated steel. Cd-plate. Electrolytic Zn. Cr-, Ni-, Ag-,

and Cu-plating. Determining Te in Cu anode sludge. Testing metals by ultrasonic waves. Electrolysis of sulphide solutions. Surface-treating Al. Pure Al.—See X. X-Rays and dairy technology.—See XIX.

PATENTS.

Electric induction furnace method [of alloying]. G. H. CLAMER, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,940,622, 19.12.33. Appl., 10.2.32).—The alloying metal is added to a crucible of molten metal in an induction furnace at a point where induced stirring currents are abnormally conc. by means of suitable electric induction devices.
A. R. P.

Induction furnace. W. O. KREBS, Assr. to YOUNGSTOWN SHEET & TUBE Co. (U.S.P. 1,940,256, 19.12.33. Appl., 6.5.32).—The furnace comprises a H_2O -cooled induction coil supplied with low-frequency a.c. surrounding a melting crucible embedded in a heat-insulating refractory sand and mounted on a H_2O -cooled plate which is covered with an airtight hood for melting in vac.
A. R. P.

Insulated [copper] electrical conductor. M. T. HARVEY, Assr. to HARVEL CORP. (U.S.P. 1,939,301, 12.12.33. Appl., 28.3.31).—Claim is made for Cu wire or rod covered with a liquid condensation product of cashew nut-shell oil and CH_2O , urea, or $(\text{CH}_2)_6\text{N}_4$; the coating is hardened to a resinous material by heating, the Cu acting as a catalyst.
A. R. P.

Forming solid [graphite resistor] bodies with predetermined arrangement of constituent particles. S. MORSE (U.S.P. 1,950,089, 6.3.34. Appl., 26.10.27).—Such bodies are formed with the flakes parallel by first forming a cake by undisturbed sedimentation in H_2O , the force of gravity causing the flakes to place themselves perpendicular to the direction of motion.
B. M. V.

Resistance device and insulator. C. O. TERWILLIGER, Assr. to WARD LEONARD ELECTRIC Co. (U.S.P. 1,938,674, 12.12.33. Appl., 31.5.29).—Claim is made for a combination of an insulating refractory support (S) carrying a metal resistance (R), both R and S being coated with a fused insulating coating consisting of talc and an alkali phosphate, e.g., amblygonite.
A. R. P.

Coating composition for electron-emitting elements. L. McCULLOCH, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,939,075, 12.12.33. Appl., 3.1.27).—A mixture of ≤ 1 of the alkaline earth oxalates or carbonates bonded with an alkaline-earth formate, acetate, or azide is claimed. The article is coated with the dry powder and then heated in vac. to activate it.
A. R. P.

Spark-plug electrode. T. G. McDUGAL, Assr. to A. C. SPARK PLUG Co. (U.S.P. 1,940,314, 19.12.33. Appl., 31.1.30).—The electrode is made of stainless steel containing a stable sulphide; e.g., the steel contains C 0.1, Cr 14, ZrS_2 0.4, and Mn 0.17%, preferably with 0.4% Ba to reduce the sparking voltage.
A. R. P.

Separation of emulsions by the combined action of magnetic and electric fields. C. H. M. ROBERTS, Assr. to PETROLEUM RECTIFYING Co. OF CALIFORNIA

(U.S.P. 1,949,660, 6.3.34. Appl., 15.5.29).—A solenoid is wound on the outer of a pair of co-axial electrostatic electrodes, the effect being that a magnetic flux is produced longitudinally of the flow of the emulsion. Either field may be alternating, unidirectional, or pulsating. B. M. V.

Pottery kiln.—See I. Carburation of liquid fuels.—See II. NaOCl solution. Luminescent materials.—See VII. Firing ceramic goods.—See VIII. Magnetic alloys. Welding rod. Uniting metals. Purifying electrolytic Cu. Coating Zn-base metals. Ni-plating Cr and its alloys. Al-plating.—See X. Cable lacquers. Insulating material. Binding mica plates.—See XIII. Ebonite.—See XIV. Photographic emulsions.—See XXI.

XII.—FATS; OILS; WAXES.

Production and refining of wool fat. Some new processes. A. FOULON (Fettchem. Umschau, 1934, 41, 174—176).—A review. E. L.

Seed fat of rue ("Weinraute"), *Ruta graveolens*. K. TÄUFEL and H. THALER [with G. A. M. A. THUM] (Fettchem. Umschau, 1934, 41, 198).—The seeds contained 5.6% of H₂O and (on a dry basis) 36.8% of Et₂O extract, N compounds 21.6% (= 6.25 × N), ash 13.8%, SiO₂ in ash 1.7%, PO₄ in ash 16.8%. The pale, fluid, Et₂O-extracted oil had d_{4}^{20} 0.9295, n_{D}^{20} 1.4723, acid val. 0.7, sap. val. 194.0, Reichert-Meissl val. 0.6, I val. (Hanus) 189.0, Ac val. (Freudenberg; cf. Täufel and others, B., 1934, 969) 14.0, unsaponifiable matter 0.9%, P 0.083%. E. L.

Modern fat-hardening. K. SCHNEIDER (Fettchem. Umschau, 1934, 41, 204—212).—Modern methods of refining the oil, preparing the H₂, and hardening the fat, using a (HCO₂)₂Ni catalyst, are described and discussed, and illustrated by photographs of Bamag-Meguín plant. E. L.

[Potassium] persulphate as a soap bleach. C. S. KIMBALL, H. J. HOSKING, and F. D. SNELL (Ind. Eng. Chem., 1934, 26, 1074—1076).—0.5% of K₂S₂O₈, calc. on the wt. of dry soap, was added to a boiling solution of palm oil soap before salting out, and the degree of bleaching determined against standards. NaOH was added to neutralise liberated acid. 0.5% was found to be the optimum concn. Temp. variation from 80° to 100° had little significance, neither had the rate of addition of K₂S₂O₈, nor the use of stabilisers for H₂O₂. A large excess of NaOH was detrimental. The optimum soap concn. was 20%. Tallow soap and cottonseed oil soap were only partly bleached. Olive oil soap was changed from green to orange. C. I.

Determination of cod-liver oil in emulsions. W. LEPPER (Z. anal. Chem., 1934, 98, 164—166).—The sample (2 g.) is heated with 8 c.c. of 10% HCl on the H₂O-bath for 30 min. and the mixture transferred to a Farnsteiner tube (I) with the aid of 10 c.c. of EtOH, rinsing out the beaker with 25 c.c. of EtOH. The solution is diluted to the mark with light petroleum (about 25 c.c.), shaken for $\frac{1}{2}$ min., and set aside for 1 hr. After reading the vol. of the top layer, 40 c.c. are evaporated to dryness and the residual oil is weighed. A. R. P.

Composition of blue shark-liver oil. I. Unsaponifiable matter and saturated fatty acids. S. UENO and H. IKUTA (J. Soc. Chem. Ind., Japan, 1934, 37, 506—507 B).—This oil contains 1.6% of unsaponifiable matter (80—85% of cholesterol and a trace of more unsaturated alcohols) and yields by hydrolysis 25—26% of fatty acids, including palmitic (approx. 60%), myristic, stearic, behenic, and (? *n*-)tetracosic acids. R. S. C.

Alleged presence of erucic acid in grapeseed oil. K. TÄUFEL and H. THALER (Fettchem. Umschau, 1934, 41, 196—198).—Further examination (by the Twitchell separation, ester fractionation, elaidinisation, and oxidation of liquid acids) of the fatty acids from Riesling and Malaga grapeseed oils as well as a consideration of published observations (cf. B., 1933, 435; 1934, 462) reveal no indications of the presence of erucic acid. E. L.

Physical and chemical constants and other properties of Greek grapeseed oil. J. D. KANDILIS (Praktika, 1933, 8, 35—41; Chem. Zentr., 1934, i, 969).—Data for 24 oils from different regions are summarised. L. S. T.

Rubberseed oil. E. STOCK (Farben-Ztg., 1934, 39, 1096).—The oil is unsuitable for varnish-making. It has I val. 131.8, sap. val. 136.1, acid matter 31.15, d_{4}^{15} 0.93059, n_{D}^{20} 1.4755, unsaponifiable matter 0.78%. The acids have acid val. 215.0, hexabromide no. 14.15, and n_{D}^{20} 1.4705. Varnishes made from raw and cooked samples of the oil with run amber and a Mn-Co-Pb drier dried in 4—5 days. G. H. C.

Analysis of sulphonated [sulphated] oils. C. RIESS (Fettchem. Umschau, 1934, 41, 199—200).—(a) The determination of inorganically-combined SO₃ is greatly facilitated if the Et₂O-amyl alcohol solution of the oil is acidified with HCl (to Me-orange) before shaking out with NaCl solution; the layers separate better, as the acid Na salts of the sulphated oils are quite insol. in saturated brine, whilst the normal salts are not easily salted out. (b) In the case of oils neutralised with NH₃, the method proposed by the Dutch and German sections of the I.V.L.I.C. (cf. Collegium, 1933, 456) for the determination of total non-esterified CO₂H is more reliable than the English and American "provisional official" methods (cf. *ibid.*, 1931, 859; A.L.C.A. "Methods of Analysis, etc."). E. L.

Determining BO₃' in washing agents.—See VII. Lanoline rust preventers.—See X. Oil from panao resin.—See XIII.

PATENTS.

Facilitating the [dis]solution of powdered and granular detergents [sulphonated soaps]. R. R. FÁBREGAS and J. M. OSTHEIM (B.P. 415,559, 11.7.33. Spain, 23.7.32 and 9.6.33).—Mixtures of NaHCO₃ or Na₂CO₃ with tartaric acid or NaHSO₄ are incorporated with the soap powder so as to produce effervescence when the soap is added to H₂O. A. R. P.

Degreasing apparatus. J. SAVAGE, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 417,188, 30.3.33).—A degreasing tank operating with heavy vapour of solvent is provided, above the usual condensing coils which determine the upper surface of the vapour, with auxiliary

cooling coils attached to the wall of the tank in a heat-conducting manner and with a gutter or the like to collect separately from the bulk of the liquid any pure solvent there condensed. B. M. V.

Manufacture of oxidised linseed oil. A. SCHWARCMAN, Assr. to SPENCER KELLOGG & SONS, INC. (U.S.P. 1,949,028, 27.2.34. Appl., 16.3.32).—If refined linseed oil is heated at about 316° for a short time (insufficient to cause any substantial change in I val. or body) and cooled to 149–77° before blowing with air at such temp., the resultant blown oil (*d* about 0.995, I val. 115) retains complete miscibility with mineral oil (thinners). E. L.

Separation of vitamins from saponifiable oils. W. O. SNELLING (U.S.P. 1,947,315, 13.2.34. Appl., 24.10.28).—The oil is emulsified and saponified by aq. alkali in presence of a sufficiency of a non-saponifiable, H₂O-insol. solvent for vitamins, e.g., liquid C₅H₁₂, C₆H₁₄, CCl₄, cyclohexane, preferably in an inert atm. E. L.

Nitriles of fatty acids.—See III. **Building materials from waste fuller's earth.**—See IX. **Stable vitamin prep.**—See XIX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Applications of air-drying phthalate resins in the paint industry. H. ULRICH (Farben-Ztg., 1934, 39, 1094–1096).—Oil-reactive phenolic resins are combined with phthalate resins to produce new durable types of finish requiring no stoving. In combination with nitrocellulose yellowing is minimised and inflammability reduced. G. H. C.

Painting on damp surfaces. H. WOLFF and G. ZEIDLER (Farben-Ztg., 1934, 39, 1071–1072).—The current view that paints other than those on aq. binders should not be applied to damp surfaces is examined. It is pointed out that on non-porous surfaces a normal superficial deposit of dew or light rain is not a serious drawback to the brush application of oil paints, since the mechanical action of the bristles emulsifies the H₂O. More serious difficulty is caused by condensed and absorbed H₂O on porous metal and more particularly on plaster and cement. The "breathing" action of paint films under damp conditions is discussed, and it is considered that swelling of a H₂O-sensitive paint during infiltration of H₂O closes the pores to a degree retarding the escape of the H₂O. A short-oil Albertol-tung oil varnish is recommended as a H₂O-resistant priming coat, and its superiority over boiled oil for use on cement is demonstrated. S. S. W.

[Exposure] trials with rust-protective paints, with special reference to their use under water. A. V. BLOM (Verfkronek, 1934, 7, 279–284).—The rust-protective efficiency of a no. of paints of different types has been compared. The best results were obtained with bituminous oil paints containing Al as pigment for the top coat. Pb₃O₄ should not be used in paints containing bitumen, but it forms the best primer for use under Al in a straight oil medium. D. R. D.

[Fine pigments.] G. A. CAMPBELL (J. Oil Col. Chem. Assoc., 1934, 17, 387–399).—Considerations regarding bulk *d* of pigments should not disregard the

shape of the particles, which can be correlated with the sp. surface of the material. G. H. C.

Century of progress in [pigment] colours. REED (Official Digest, 1934, No. 138, 245–246).—A historical review of the American pigment industry is followed by a discussion of the causes of fading. D. R. D.

Chemistry of pigment colours. E. R. ALLEN (Official Digest, 1934, No. 138, 235–245).—The chemical nature and properties of the more important pigments are discussed in detail, with special reference to org. pigments. D. R. D.

White-lead. Effect of chemical structure on physical properties. A. W. ANDERSON (Ind. Eng. Chem., 1934, 26, 1047–1049).—Samples of white-Pb (68–75% PbCO₃) all prepared by the electrolytic method were found to increase in average particle size, decrease in tinting strength, and increase in consistency (when made up into paint to a definite formula) with increasing PbCO₃ content. Durability of the paint film over 12 months' exposure is unaffected. C. I.

Factors governing the selection of organic protective finishes in relation to the base metal. ANON. (Synth. Appl. Fin., 1934, 5, 168–174).—The relative merits of different finishes for metals (rubber enamels, glyptal and other synthetic resin finishes, cellulose lacquers, Al paints, etc.) are discussed in detail, suitable specifications for these materials being given. Methods of pretreatment of metal surfaces (parkerising, bonderising, etc.) are described. Several methods of testing the weathering properties of finishes are described and results obtained thereby are recorded. D. R. D.

Copal resins. W. NAGEL and M. KÖRNCHEN (Wiss. Veröff. Siemens-Konz., 1934, 13, No. 3, 42–51).—An attempt to classify copal resins is based on the analytical data of 10 samples of various origin. Congo copals (I) were marked by the large amount (20%) of Me ester (sap. and acid vals. tabulated) obtained by treatment with MeOH and anhyd. HCl. In the case of Zanzibar products, passing steam through an alkaline suspension of the resins gave min. yield (< ½%) of ethereal oil (II) having max. *d* (0.9) and *n* (1.50); samples without the usual goose-skin appearance behaved similarly. (I) gave 1.4% of (II) the *d* and *n* of which were again remarkably high. Removal of (II) did not affect the solubility or acid and sap. vals. of the resins, but the m.p. increased considerably; hard specimens may possess lower m.p. than softer varieties. Manila copals were more freely sol. in alkalis than New Zealand kauri, Zanzibar and (I); this solubility decreased with increase in the mol. wt. of the acids present, and successive ppts. obtained by gradual addition of KOH (5*N*) to solutions in KOH (0.1*N*) possessed increasing mol. wts. The solubility of the resins in EtOH and MeOH gradually decreased with increase in the age of the resin, and was not characterised by the place of origin. S. M.

Philippine panao (dipterocarp) resin. S. S. TANCHICO and A. P. WEST (Philippine J. Sci., 1934, 54, 75–82).—The resin (average yield 307.15 g.) obtained from the sapwood of *Dipterocarpus vernicifluus*, Blanco, contains H₂O and a volatile oil, and is suitable for

making spirit varnish. The oil, removable from the resin by distillation, has $[\alpha]_D^{20} -11.03^\circ$, sap. val. (S) 51.29, acid val. (A) 1.11, ester val. (E) 50.18, $d_{40}^{20} 0.9143$. The purified resin (white powder) has $[\alpha]_D^{20} +36.41^\circ$, S 36.44, A 32.99, E 3.45. P. G. M.

Natural resinous products. II. E. ASTER (Verf. kroniek, 1934, 7, 276—279).—The chemistry and uses of rosin are reviewed. D. R. D.

Determining PbO₂ in Pb₃O₄.—See VII. **Paint on wood.**—See IX. **Anti-rust agent.**—See X. **Grape- and rubber-seed oils.**—See XII.

PATENTS.

Refining sulphate wood turpentine. W. F. GILLESPIE and D. M. WADSWORTH, Assrs. to BOGALUSA PAPER Co., Inc. (U.S.P. 1,938,693, 12.12.33. Appl., 27.6.33).—Offensive odours are removed by treating the turpentine with 0.2—0.5% of 60% C₂H₄(NH₂)₂; the oil is then distilled and washed with a solution of Ca(OCl)₂ containing 3% of available Cl₂. A. R. P.

Water paints. H. A. SCHOLZ and (A) W. S. RANDEL, Assrs. to UNITED STATES GYPSUM Co. (U.S.P. 1,947,497—8, 20.2.34. Appl., [A] 23.8.30, [B] 3.12.32. Renewed [A] 12.5.33).—(A) A dry powder containing borax (2), casein (6), mineral filler (59.7), Ti pigment (20), ZnO (3), Irish moss (0.1), Ca(OH)₂ (9), and C₆H₂Br₃·OH (0.2%) is incorporated with H₂O and linseed oil. (B) 10—15% of casein (on wt. of dry paint) is employed, stickiness being avoided by the use of suitable solvents. A preferred formula is: anhyd. borax (1.1), casein (12), mineral filler (19), specially fine filler containing Mg minerals, talc, etc. (39.8), Ti pigment (15.0), Irish moss (0.1), CaO (7.0), NaF (1.0), mica (5.0). K₂Cr₂O₇, dyes, and pigments may be added. S. M.

Painting compositions. R. F. SHAW (B.P. 417,491, 14.12.33. U.S., 19.12.32).—Paints which can be applied with the finger, preferably on wet glazed paper, are made from flour and H₂O paste, honey, glycerol, CH₂O (as preservative), and a pigment. S. M.

Production of mercurised printing plates. H. G. ZIMMERMANN (U.S.P. 1,949,233, 27.2.34. Appl., 10.12.31. Austral., 27.7.31).—To form ink-repellent areas the design is worked into a coat of a non-amalgamable metal, e.g., Ni, on a base of an amalgamable metal, e.g., Cu, the exposed parts of which are then treated with HgNO₃ solution and Hg followed by a solution of AgNO₃ and HNO₃; the Hg—Ag surface thus formed is finally rubbed with Hg. S. M.

Manufacture of (A) [phenol-aldehyde] coating composition, (B) diene resins. A. HECK, Assr. to COOK PAINT & VARNISH Co. (U.S.P. 1,947,414 and 1,947,416, 13.2.34. Appl., [A] 6.1.31, [B] 16.7.31).—(A) A molten phenol (1 mol.) is incorporated with an equal wt. of oxidised linseed or other drying oil and heated with CH₂O (0.25—1 mol.) in presence of NH₃ or other alkaline catalyst; the products are sol. in hydrocarbon solvents. (B) o-C₆H₄(CO₂H)₂ (100), glycerol (50), and the fatty acids (50—100 pts.) obtained by distilling castor oil at 260—270°/30 mm. are heated until a clear resin is formed; linseed oil (50 pts.) may be added. The product is useful for making lacquers etc. S. M.

Nitrocellulose coating composition containing an acid body. T. F. BRADLEY, Assr. to ELLIS-FOSTER Co. (U.S.P. 1,946,479, 13.2.34. Appl., 7.5.27).—o-C₆H₄(CO₂H)₂, o-C₆H₄(CO₂)₂O, or BzOH, and other non-volatile org. acids are used with suitable solvents either to increase the plasticising action of (C₆H₄Me)₃PO₄ etc. or to produce a cryst. effect in the film. S. M.

Manufacture of cellulose ester and ether compositions. BRIT. CELANESE, LTD. (B.P. 416,946, 18.4.33. U.S., 16.4.32).—The adhesion of lacquers having a base of a cellulose ester or ether is improved by incorporation of a resinous naphthalenemonosulphonamide-aldehyde (CH₂O—1-C₁₀H₇·SO₂·NH₂) condensation product. H. A. P.

[Plasticisers for] cellulose derivative compositions. E. F. IZARD, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,947,008, 13.2.34. Appl., 14.5.32).—The use of esters of polyhydric alcohols with halogenoaliphatic acids as plasticisers for cellulose esters and ethers is claimed. Examples are: (·CH₂·O·CO·CH₂Cl)₂, b.p. 165—190°/10 mm.; glyceryl trischloroacetate, b.p. 195—215°/6 mm., bisbromo-acetate, -propionate, and -butyrate, sorbitol hexachloroacetate, and pentaerythritol bischloroacetate. H. A. P.

Coating copper with cellulose acetate lacquer. E. R. TAYLOR and H. I. DAVIS, Assrs. to EASTMAN KODAK Co. (U.S.P. 1,946,647, 13.2.34. Appl., 25.5.32).—Good adhesion is obtained by heating the Cu or Cu alloy in an aq. alkali, e.g., 2% KOH, for 1 min. and incorporating an acid, e.g., H₃PO₄, H₃BO₃, or, in some cases, their lower alkyl esters, into the lacquer. S. M.

Cable lacquers. J. S. GOURLAY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 417,121, 28.2.33).—The use of 100—175% (calc. on wt. of cellulose acetate) of di-β-methoxyethyl phthalate as plasticiser is claimed. S. M.

Non-chalking coating composition. R. T. HUCKS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,948,580, 27.2.34. Appl., 5.2.31).—ZrO₂, without another white pigment, is incorporated into a nitrocellulose lacquer. S. M.

Coating material [containing linoleum]. M. CROCE, Assr. to SLOANE-BLABON CORP. (U.S.P. 1,948,959, 27.2.34. Appl., 26.10.27. Renewed 14.12.33).—A solidified drying oil is emulsified with H₂O with the aid of casein, bentonite, etc.; volatile thinners and pigments are added. The products are useful for coating asphaltic floor coverings. S. M.

[Solvents for] coating compositions. STANDARD OIL DEVELOPMENT Co., Asses. of R. T. HASLAM (B.P. 417,479, 20.7.33. U.S., 1.11.32. Addn. to B.P. 409,423; B., 1934, 591).—The distillates obtained by the prior process having flash point > 27° and b.p. > 200° possess superior solvent powers for resins; their use in varnishes is claimed. S. M.

Antioxidants. J. K. HUNT and G. H. LATHAM, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,948,582, 27.2.34. Appl., 21.2.31).—Skinning of oil varnishes etc. containing a drier is prevented by incorporating $\frac{1}{3}$ —1% of creosol. 10 examples are given. S. M.

Prepared resin. C. A. THOMAS, ASSR. to DAYTON SYNTHETIC CHEMICALS, INC. (U.S.P. 1,947,626, 20.2.34. Appl., 15.9.30).—A diolefine, *e.g.*, isoprene, is agitated with cooling at 25–35° for 6–8 hr. with PhMe, PhEt, etc. in presence of anhyd. AlCl_3 or other acid-forming catalyst, which is added gradually. The product is neutralised and extracted with C_6H_6 after removal of the catalyst. The resins are suitable for varnishes and moulding compositions and may be modified by heating with a drying oil. S. M.

Production of synthetic resin [from coal tar]. M. R. BHAGWAT, ASSR. to COMBUSTION UTILITIES CORP. (U.S.P. 1,948,465, 20.2.34. Appl., 8.4.29).—In the production of heat-convertible resins by the action of CH_2O etc. on a coal-tar distillate, the last-named is pretreated with 15% aq. NaOH; the phenoxide solution is separated from hydrocarbon oils, N bases, etc. and heated with CH_2O (> 1 equiv.) at 100–103° until, after diluting and neutralising, granular particles of the resin separate. The product is dried in vac. at 65°. S. M.

[Preparation of] condensation products of urea-formaldehyde type. K. EISENMANN and T. KOLLMANN, ASSRS. to UNYTE CORP. (U.S.P. 1,948,343, 20.2.34. Appl., 28.2.31. Ger., 27.3.30).—The initial H_2O -sol. condensation product of urea or $\text{CS}(\text{NH}_2)_2$ and CH_2O etc. is heated (100–110°) in suspension in a large proportion of an anhyd. alcohol, *e.g.*, Bu^nOH , in presence of an inorg. dehydrating agent, *e.g.*, CaCl_2 . The products may be used for moulding compositions or varnishes. S. M.

Preparation of oil-soluble hardening phenol-aldehyde resins. H. HÖNEL and J. EHRENFELD and O. REICHHOLD (BECK, KOLLER & Co.) (B.P. 417,122, 22.3.33. Austr., 30.8.32).—A substantial excess of CH_2O is condensed with phenols, or mixtures of phenols having only 2 reactive positions, in presence of a strong alkaline catalyst which is neutralised either before or after resinification, and the product heated so as to form a solid resin. < 1 of the phenols has < 1 alkyl or cycloalkyl group of < C_3 . Thus, *e.g.*, crude $\text{C}_6\text{H}_4\text{Bu}^n\text{OH}$ (166 pts.) is heated with 37 wt.-% CH_2O (130 pts.) and 40% aq. NaOH (25 pts.) for several days at 35–45° until all CH_2O is consumed. The product is pptd. by acid, neutralised, and heated at 100–120° to form a hard, clear resin of m.p. about 70°. Other starting materials are *p*-tert.-amyl-, *p*-cyclohexyl-, chlorinated and *C*-benzylated *m*- and *p*-cresols, and $\beta\beta$ -6:6'-dihydroxydi-*m*-tolylpropane. H. A. P.

Laminated [insulating] material impregnated with [phenol-aldehyde] artificial resin. DYNAMIT-A.-G. VORM. A. NOBEL & Co. (B.P. 417,011, 25.8.33. Ger., 28.11.32).—The resin used to bind the paper sheets consists of the preliminary condensation product of a phenol and CH_2O and can absorb < 18 wt.-% of H_2O at 25°. Greater penetration with improved H_2O -resistance and bending and splitting strengths are claimed. The H_2O may be partly replaced by other solvents and plasticisers. S. M.

Manufacture of phonograph record. J. E. SYMONDS, ASSR. to UNITED RESEARCH CORP. (U.S.P. 1,946,597, 13.2.34. Appl., 17.10.31).—The use is claimed

of a moulding composition containing vinyl ester polymeride (77), amorphous SiO_2 (20), Bu phthalate (0.25), dye or pigment, *e.g.*, C black (2.75%). S. M.

Composition [for binding mica plates]. G. F. HADLEY, ASSR. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 1,948,756, 27.2.34. Appl., 6.5.31).—Rosin or other resin (32), tung oil or other vegetable drying oil (22), and glycerol ($3\frac{1}{2}$ pts.) are heated at 300° for $\frac{1}{2}$ hr. and manjak, stearine, or gilsonite etc. (92 pts.) is incorporated at 250°. The product is suitable for high-insulation work. S. M.

Manufacture of moulded articles from synthetic resin and like thermoplastic materials. E. K. COLE, LTD., and E. HAHN (B.P. 417,661, 6.4.33).

Dioxazine compounds.—See III. Pigment dyes. —See IV. Sized and coated papers. Artificial materials. —See V. Coated fabric. —See VI. PbCrO_4 . —See VII. Insulated Cu. —See XI. Oxidised linseed oil. —See XII. Protective coating. Rubber plastics. —See XIV.

XIV.—INDIA-RUBBER, GUTTA-PERCHA.

Joule effect of rubber. I. Thermal effect on stretched vulcanised rubber. Y. TANAKA, S. KAMBARA, and H. FUJITA (J. Soc. Chem. Ind., Japan, 1934, 37, 522–525 B).—When rubber is heated under load it elongates and a further increase in length (Joule effect) (I) occurs when it is again cooled. The original cold elongation (II) is diminished by increased time of cure and vulcanisation coeff., and by the use of an accelerator, and is increased by increasing mastication, and by exposure to ultra-violet rays. The greater is (II) the greater is the further extension when heated (III) and the smaller is (I). A filler (C black) increases (III) but diminishes (I) and (II). A. G.

Ageing of rubber. II. Gold reaction of the products of the initial stages of oxidation of rubber. B. DOGADKIN and B. BALANDINA (J. Gen. Chem. Russ., 1934, 4, 494–497; cf. B., 1934, 72).—Aq. extracts (I) of crêpe rubber reduce AuCl_3 to an extent increasing with the duration of prior ultra-violet irradiation (II) to a max. for 30 min. The conductivity of (I) increases regularly with time after (II). The formation of peroxides and aldehydes is postulated. R. T.

Accelerated ageing of soft vulcanised rubber. T. R. DAWSON (J. Res. Assoc. Brit. Rubber Manuffs., 1934, 3, 51–62, 73–82, 83–96).—A review.

Adsorptive properties of C black.—See II. **Action of brines on rubber.**—See X. **Rubber-seed oil.**—See XII.

PATENTS.

Creaming of [rubber] latex. NAUGATUCK CHEM. Co., ASSEES. of J. MCGAVACK (B.P. 417,162, 24.11.33. U.S., 24.6.33).—Prior to forming conc. latex by creaming, the latex is subjected to violent agitation, *e.g.*, by stirring, for a brief period, before, after, or during the addition of the creaming agent. The agitation, which is equiv. to that effected by stirring 50 c.c. in a 100-c.c. bottle for \gtrsim 1 min. with a high-speed stirrer, diam. 1 in.

and with 3 triangular blades, at 13,000 r.p.m., leads to increased rate of creaming. D. F. T.

Production of rubber articles from dispersions of or containing natural rubber latex. INTERNAT. LATEX PROCESSES, LTD., E. W. MADGE, E. A. MURPHY, and F. J. PAYNE (B.P. 417,481, 25.7.33).—The desirable adhesiveness shown by a film of masticated rubber can be obtained also with a latex-rubber surface by applying to this (after drying) a thin, preferably very thin, film of substantially uncompounded natural rubber latex and coagulating the film, *e.g.*, by drying at low temp. D. F. T.

Production of goods of or containing rubber. INTERNAT. LATEX PROCESSES, LTD. (B.P. 417,563, 7.4.34, U.S., 4.5.33).—A flexible, hardened slip-finish is produced on a rubber surface, *e.g.*, that of an article formed direct from an aq. dispersion of rubber and containing preferably < 3% of combined S (rubber 100), by treating for a short time with conc. H_2SO_4 or a mixture of this with, *e.g.*, glycerol. D. F. T.

Production of compositions and goods of rubber or similar material. INTERNAT. LATEX PROCESSES, LTD., and E. A. MURPHY (B.P. 417,084, 8.11.33).—Compositions and goods with a high degree of hardness and low extensibility are produced by mixing aq. dispersions of rubber with aq. compositions of flocculent ppts. prepared from dil. aq. dispersions of rubber by formation of compounding ingredients *in situ*. D. F. T.

Manufacture of hard rubber [ebonite] dust. R. F. MCKAY. From INTERNAT. LATEX PROCESSES, LTD. (B.P. 417,031, 1.3.34).—An intimate mixture of rubber, H_2O , and vulcanising ingredients in sufficient proportion to yield ebonite (I) is heated under high pressure (*e.g.*, < 500 lb./sq. in.) at vulcanising temp. so as to produce (I). The pressure is then suddenly released. The rubber used may be in the form of compounded milled rubber or of an aq. dispersion, with or without coagulation prior to vulcanisation. D. F. T.

Manufacture of ebonites and the like. B. D. PORRITT, H. A. DAYNES, H. SPENCE, and P. SPENCE & SONS, LTD. (B.P. 417,046, 25.1.33).—Ebonite, especially suitable for use at high temp. for electrical purposes, is prepared by incorporating finely-divided, pptd., amorphous SiO_2 , particularly certain types (cf. B.P. 294,681, 299,483, and 357,993; B., 1928, 748; 1929, 17; 1931, 1094) which have been heated at 400–950°. D. F. T.

Manufacture of articles of cellular rubber and ebonite with closed cells. M. P. H. L. RAEPSTAET, Assr. to SOC. BELGE DU CAOUTCHOUC MOUSSE (U.S.P. 1,948,046, 20.2.34, Appl., 24.8.31, Ger., 7.7.31).—The roughly shaped rubber mixture in a mould (*M*) is subjected to incomplete vulcanisation in an autoclave (*A*) under high gaseous pressure, and is then removed from *A* and *M*, whereupon it expands. The material is then heated to complete vulcanisation and to develop substantially atm. pressure inside the cells. The material is maintained under const. temp. during the period between the 2 vulcanisation operations. D. F. T.

Rubber article [pneumatic tyre] and its manufacture. C. W. LEGUILLON, Assr. to B. F. GOODRICH CO.

(U.S.P. 1,949,057, 27.2.34, Appl., 31.5.30).—An inner surface layer of non-flowing rubber is provided, and during vulcanisation the article (tyre) is distended by fluid pressure applied directly to this layer. The non-flowing rubber may be of unmasticated rubber, or may consist of closely knitted rubberised fabric. This procedure dispenses with the customary H_2O -bag or other expandable core and also expedites vulcanisation. D. F. T.

Manufacture of a twisted fibrous rubber product. E. N. CUNNINGHAM, Assr. to B. F. GOODRICH CO. (U.S.P. 1,947,759, 20.2.34, Appl., 5.4.33).—Stretched and twisted rubber (or a no. of rubber threads) is vulcanised, *e.g.*, with a cold-vulcanising agent such as S_2Cl_2 , to a point at which it retains the major part of its elongation and twist together with the consequent anisotropic structure. D. F. T.

Protective coating [for rubber surfaces] and its manufacture and application. W. C. GEER (U.S.P. 1,948,292, 20.2.34, Appl., 31.1.33, Can., 3.7.28).—The surface of articles of rubber etc., *e.g.*, a golf ball, can be rendered hard and polishable, and oil- and dirt-resistant, by applying a halogen salt of an amphoteric metal, *e.g.*, a solution of $SnCl_4$ in $C_2H_4Cl_2$ or in a reactive solvent such as $EtOAc$, Bu^+OH , etc. The article may be finally washed, *e.g.*, with $COMe_2$. D. F. T.

Manufacture of compositions containing chlorinated rubber. N. BENNETT, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 417,194, 31.3.33).—Incorporation of a subordinate proportion of a sulphonamide, or a sulphonalkylamide of an aromatic hydrocarbon (*e.g.*, 1–2% of *p*-sulphonmethylanilide of *o*- $C_6H_4Cl_2$) or of a mixture of such substances (*e.g.*, 0.2–1% of the sulphonmethylanilides of polychloronaphthalenes) in chlorinated rubber, with or without the aid of a solvent, leads to properties and a degree of flexibility suitable for films, filaments, etc. D. F. T.

Production of compositions comprising chlorinated rubber and synthetic plastics. DUNLOP RUBBER CO., LTD., D. F. TWISS, and J. A. WILSON (B.P. 417,273, 26.5.33).—A solution of chlorinated rubber in a H_2O -immiscible org. solvent is emulsified with an aq. solution of an incomplete no. of the constituents necessary for forming a synthetic plastic and then incorporating the remaining essential constituents. D. F. T.

Compounding of rubber. W. S. CALCOTT and W. A. DOUGLASS, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,947,458, 20.2.34, Appl., 13.6.29).—Compounds of the formula $OH \cdot R \cdot R' \cdot Y$, where *R* and *R'* are aryl nuclei and *Y* is *H* or *OH*, *e.g.*, *p*- $C_6H_4Ph \cdot OH$ or 4:4'-($C_6H_4 \cdot OH$)₂, exert an antioxidant effect in rubber without affecting the rate of vulcanisation or causing discoloration in sunlight. D. F. T.

[Accelerators for] vulcanisation of rubber. G. L. MAGOUN, Assr. to RUBBER SERVICE LABORATORIES CO. (U.S.P. 1,946,704, 13.2.34, Appl., 7.5.32).—The use of reaction products of iminoaldehydes of carboxylic acids with (alkali salts of) mercaptothiazoles is claimed. Examples are $CPhCl \cdot NPh +$ mercaptobenzthiazole (I), m.p. 157–159°, $CMeCl \cdot NPh +$ (I), (I) + $CPhCl \cdot N \cdot C_6H_4Me$ (*p*) (II), m.p. 170–172°, $CPhCl \cdot N \cdot C_{10}H_7$ (α)

+ (I), m.p. 186—188°, (II) + mercaptotolylthiazole, m.p. 120—136°, and (II) + mercaptonaphthothiazole.

H. A. P.

Accelerator for rubber vulcanisation. O. BEHREND, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 1,946,960, 13.2.34. Appl., 2.9.31).—The reaction product of a mercaptoarylenethiazole (3 mols.) and $\text{C}_6\text{H}_5\text{Cl}_3$ (1 mol.), e.g., of the Na salt of mercaptobenzthiazole and $\text{C}_6\text{H}_5\text{Cl}_3$ in EtOH at 70—78°, is used, with or without diphenylguanidine, to expedite vulcanisation. D. F. T.

Treatment of rubber. GOODYEAR TIRE & RUBBER CO. (B.P. 416,973, 22.12.32. U.S., 18.3.32).—Rubber compositions containing a semi-ultra- or ultra-accelerator, in particular mercaptobenzthiazole (I), Zn dimethyldithiocarbamate, the reaction product of (I) and diphenylguanidine, and $\text{PrCHO}\cdot\text{NH}_2\text{Ph}$ condensation products, are protected from premature vulcanisation by incorporating a small proportion of an unsaturated aliphatic carboxylic acid $< \text{C}_{10}$, e.g., fumaric, maleic, tiglic, or crotonic acid, or a Zn salt thereof. D. F. T.

Bonding metals with rubber.—See X.

XV.—LEATHER; GLUE.

Water absorption in hide substance. V. KUBELKA (Tech. Hlídka Koželu., 1934, 10, 5—7; Chem. Zentr., 1934, i, 2536).—Two types of H_2O absorption occur, viz., (1) capillary absorption, in which such H_2O can be displaced by liquids such as glycerol or fatty oils; and (2) H_2O combined to form a gel, wherein such H_2O is not replaced by other liquids. The amount in (2) is strongly influenced by small quantities of acids, bases, and salts. Examples are discussed. H. J. E.

Protection of casein glues against moulds. A. HERRMANN (Speirholz, 1933, 5, 166—167; Chem. Zentr., 1934, i, 804).—Among antiseptics examined thymol is considered the most suitable. A. G. P.

PATENTS.

Preparation of adhesive [for Cellophane]. J. E. CLEGG, Assr. to ARABOL MANUFACT. CO. (U.S.P. 1,948,334, 20.2.34. Appl., 4.12.31).—Rosin ("G," 70—29) is melted with Venetian turpentine (29—70) and $\geq 20\%$ of $\text{OH}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{OEt}$ is added. S. M.

Coated fabric.—See VI. Starchy adhesives.—See XVII.

XVI.—AGRICULTURE.

Suction force of soils. H. GRADMANN (Jahrb. wiss. Bot., 1934, 80, 92—111).—The use of a filter-paper hygrometer is described. Suction vals. were not appreciably affected by temp. in the range 9—33°, nor by alterations in soil texture resulting from mechanical disturbance. A. G. P.

Physicochemical properties of soils affecting soil erosion. J. F. LUTZ (Missouri Agric. Exp. Sta. Res. Bull., 1934, No. 212, 45 pp.).—The stability of colloidal systems in soils examined was influenced more by the hydration than by the charge on the particles. The order of swelling of the colloids was inverse to that of the $\text{SiO}_2:\text{R}_2\text{O}_3$ ratios. Exchangeable Ca^{++} , Ba^{++} , and H^+ decreased the swelling to extents rising in the

order named. The permeability of various base-clay membranes was in the order $\text{H} > \text{Ba} > \text{Ca} > \text{K} > \text{Na} > \text{Li}$, and in the case of H, Ba, and Ca systems was in the same order as their relative viscosities. Erosion is controlled principally by factors affecting permeability and dispersion of soil colloids. A. G. P.

Soil development in the Peorian loess region of Illinois. R. H. BRAY (Amer. Soil Survey Assoc., 14th Ann. Meet. Bull., 1934, 15, 58—65).—The composition of the colloidal fraction ($< 0.1 \mu$) varies little in different horizons. Coarser fractions have slightly lower $\text{SiO}_2:\text{R}_2\text{O}_3$ ratios. Breakdown of surface coarse colloidal particles yields a finer colloid of lower K and higher Mg and Fe contents. Silicate particles high in Mg and Fe weather more rapidly than those high in Al and K. CH. ABS. (p)

Influence of various concentrations of lithium, in combination with different anions, on the degree of dispersion of soils. L. POZDENA (Z. Pflanz. Düng., 1934, A, 35, 193—201).—In the mechanical analysis of salt-free soils, the proportion of particles $< 0.02 \text{ mm.}$ is increased by Li_2CO_3 (I) and LiCl (II) in all concns. used (up to 1% during shaking and 0.2% during sedimentation). In saline soils the optimal vals. for (I) are 0.6% and 0.12%, respectively. With low concns. (I) is a better dispersing agent than (II). The reverse is the case with higher concns. (I) in certain ranges of concn. coagulates crude clay, especially in saline soils, whereas (II) has a dispersive action at all concns. used. A. G. P.

Effect of burning forest soils. H. A. FOWELLS and R. E. STEPHENSON (Soil Sci., 1934, 38, 175—181).—Ash constituents of burnt soils stimulate nitrification and add to the sol. mineral nutrients in the soil.

A. G. P.

Influence of temperature on bacterial nitrification [in soil] in tropical countries. S. P. TANDON and N. R. DHAR (Soil Sci., 1934, 38, 183—189).—The rate of nitrification in presence of CaCO_3 is $>$ that in presence of MgCO_3 . Temp. in tropical soils may exceed the optimum for nitrifying bacteria, and also the max. survival temp. for NO_2^- producers. Exposure to light is more important than bacterial activity in the nitrifying process. A. G. P.

Peculiar acidic soils. I. S. OSUGI, S. AOKI, and S. MORITA (J. Agric. Chem. Soc., Japan, 1934, 10, 443—450).—In acid soils no difference normally exists between the $[\text{Fe}^{++}]$ in KCl extracts (I) of H_2O -soaked soils and that in air-dried soils. In the soil noted, acidity and Fe^{++} content of (I) and the reducing power of the soil increased on soaking in H_2O .

CH. ABS. (p)

Lime requirement of silty soils according to the degree of saturation with exchangeable bases. G. JORET, H. MALTERRE, and M. CAZABAN (Ann. Agron., 1934, 4, 463—479).—Rapid methods for determining the degree of saturation with bases are described, together with means of calculating therefrom the CaO requirement of soils. A. G. P.

Determination of the lime status or degree of saturation of clay soils. J. G. MASCHHAUPT and J. TEN HAVE (Z. Pflanz. Düng., 1934, A, 35, 146—184).—

The T - S val. of soil is obtained by stirring the sample with finely-powdered CaCO_3 and H_2O , evaporating the mixture to dryness, and determining the residual CaCO_3 (as CO_2) and hence the amount utilised by soil. For determining S vals. soil is treated with successive amounts of $0.1N$ - HCl , portions of each extract being decanted prior to the addition of more acid. The acid neutralised by soil bases is calc. from the residual acidity of the united extracts. A single extraction with HCl removes 95% of the exchangeable base and gives sufficiently accurate S vals. for routine purposes. Results obtained with soils of various types are recorded.

A. G. P.

Nitrogen accumulation in arable soils. M. GERLACH (Landw. Jahrb., 1934, 80, 73—101).— N fixation is favoured by moist soil conditions and the presence of CaCO_3 , humus, and available P and K . Practical measures for increasing the N accumulation of soils are examined.

A. G. P.

Determination of copper and manganese in fertilisers. E. J. RAUDENBUSH (Ann. Rept. Florida Sta. Chem., 1933, 24—27).— Cu is extracted from fertiliser samples by means of HCl , pptd. as CuS , treated with H_2SO_4 - HNO_3 to remove org. matter and then with Br , and finally determined volumetrically by $\text{Na}_2\text{S}_2\text{O}_3$. Mn is determined in dil. HNO_3 extracts by treatment with $\text{K}_2\text{S}_2\text{O}_8$ and subsequent titration with Na_3AsO_3 .

CH. ABS. (p)

Changes in the refractive index of silica gel as influenced by water and fertiliser salts. J. H. HELLMERS and R. KÖHLER (Z. Pflanz. Düng., 1934, A, 35, 208—215; cf. B., 1934, 691).—The n of SiO_2 gel increases with falling H_2O content. In soil the influence of fertilisers on n is small and the latter cannot serve as an indicator of the amount of absorbed salts. K phosphates materially affect n , as a result either of strong adsorption or of chemical interaction. The free SiO_2 of soils may be calc. from n , and if Al_2O_3 gel is also present both constituents may be determined.

A. G. P.

[Behaviour of] granular cyanamide [in soil]. H. KAPPEN (Landw. Jahrb., 1934, 80, 177—193).—Granular CaCN_2 is as effective and as rapidly transformed in soil as the fine powder, and causes less injury to germinating seed.

Physiological aspects of the effect of continuous soil aëration on plant growth. W. F. LOEWING (Plant Physiol., 1934, 9, 567—583).—Moderate aëration of soil produced greater yields of sunflower and soya-bean plants, more rapid intake of nutrients, more alkaline saps, and smaller top: root ratios. Very rapid aëration tended to restrict growth to extents varying with species.

A. G. P.

Influence of fertilisers on plant nutrition. J. GAROLA (Ann. Agron., 1934, 4, 480—507).— N fertilisers reduced the absorption of P and K by oat plants and increased the N content without improving the yield. P fertilisers reduced the K intake and increased yields. In absence of P plants absorbed excessive proportions of K . P favoured tillering and showed proportionally better results when seed was sown relatively thinly.

A. G. P.

Exchangeable cations in the soil and the plant. K. K. GEDROIZ (Trans. Sci. Inst. Fertilisers, Russia, 1932, No. 109, 70—81).—Treatment of chernozem with 0.51 milliequiv. of Mn increased the yield of oats, buckwheat, mustard, and flax; ≥ 4 milliequiv. caused no injury. Addition of CaCO_3 to soil fully saturated with Mn counteracted the injurious effects. ≥ 0.1 milliequiv. of Al was beneficial; > 0.1 was injurious.

CH. ABS.

Anion exchange. I. Adsorption of phosphoric ions by soils. S. RAVIKOVITCH (Soil Sci., 1934, 38, 219—239).—Adsorption of phosphate (I) by the mineral exchange complex of soils increases with the concn. of the solution in contact with it. With increasing concn. of (I), adsorption by H -soils occurs in four, and by Ca -soils in five, stages which are related to the valencies of the various (I) ions. The mechanism of these phenomena and the influence of reaction thereon are examined. The org. complexes have little capacity for (I) adsorption.

A. G. P.

Determination of plant-assimilable phosphoric acid in soils by Dirks' method. A. NĚMEC and H. POHL (Z. Pflanz. Düng., 1934, A, 35, 201—207).—Certain unsatisfactory aspects of Dirks' method are discussed and modifications of the Mo-blue method for the colorimetric determination of PO_4^{4-} are described.

A. G. P.

Three years' field trials with potassium salts in soils exhibiting exchange acidity; supplementary treatment with dolomite. H. LIESEGAU (Ernähr. Pflanze, 1934, 30, 319—324).—"Basic potash salts" are prepared by treatment of carnallite with superheated steam. Admixture of dolomite with K salts improved their efficiency by reducing soil acidity and also by supplementing the naturally depressed reserve of Mg in these soils.

A. G. P.

Determination of titanium in soils. J. S. JOFFE and L. T. KARDOS (Soil Sci., 1934, 38, 241—243).—Modifications of the Hillebrand method render this suitable for application to soils.

A. G. P.

Cation intake, especially of potassium, of plants. H. WIESSMANN and W. LEHMANN (Z. Pflanz. Düng., 1934, A, 35, 129—140).—In Neubauer tests (I) of soils receiving varying proportions of fertilisers, the P and K intake closely follows that indicated by Vageler's equation. Extraction of soil with dil. HCl (up to $0.2N$) removes amounts of $K <$, and of $P >$, that shown in (I). Plants utilise part of the adsorbed and part of the H_2O -sol. K together with some mineral K . The K intake in (I) is substantially that found in field trials.

A. G. P.

Shortening the rest period of the potato. W. STUART and E. H. MILSTEAD (U.S. Dept. Agric. Tech. Bull., 1934, No. 415, 31 pp.).—Of various chemical treatments investigated, exposure to a 6% solution of ethylene chlorohydrin in airtight containers (24—48 hr.) gave most effective results. Dipping in NaCNS (1—2%) solution and subsequent storage in closed containers (6—48 hr.) produced good results. More conc. solutions of NaCNS caused delayed germination and injury to foliage of plants obtained. Considerable varietal

differences in the response of tubers to treatment was observed.

A. G. P.

Action of potassium ions [on plants] with deficient lighting. K. SCHARRE and W. SCHROPP (Z. Pflanz. Düng., 1934, A, 35, 185—193).—In H_2O cultures of peas the optimum dosage of K increased as the period of exposure to light was shortened. The reduced growth of plants resulting from deficiency of light was partly corr. by increased supplies of K. Variations in the chlorophyll content of the dry matter of plants with varying supplies of K and with different lighting periods are shown.

A. G. P.

Effects of nitrogen, phosphorus, and potassium on the composition and growth of tomato plants. G. JANSSEN, R. P. BARTHOLOMEW, and V. M. WATTS (Arkansas Agric. Exp. Sta. Bull., 1934, No. 310, 43 pp.; cf. B., 1934, 1025).—Earlier work is confirmed and extended. In greenhouse cultures under winter lighting conditions fruitfulness with high N supplies was < that with moderate supplies. Under spring conditions the reverse was the case. The ratio protein-N : total N was greater with lower supplies of N. K-deficient plants tended to accumulate NH_4-N and to show a lower % of H_2O -insol. N. The ratio of org. P to total P in plants approx. \propto N supply. The amount of total and reducing sugars \propto the dry matter with all nutrient conditions. The % starch was high with low N supply and low with low K supply. Interrelationships between carbohydrate and N contents are indicated. A. G. P.

Potassium and phosphorus deficiencies with fruit trees in the field. O. LILLELAND (Proc. Amer. Soc. Hort. Sci., 1932, 29, 272—276).—Application of fertilisers containing K delayed the appearance of "scorch," but did not benefit trees advanced in the "die-back" stage. Effects of other manures are examined.

CH. ABS. (p)

Effects of deficiencies of phosphate and potassium on growth and composition of fruit trees under controlled conditions. D. R. HOAGLAND and W. H. CHANDLER (Proc. Amer. Soc. Hort. Sci., 1932, 29, 267—271).—Heavy dressings of K prevented the appearance of leaf scorch and reduced other symptoms of "die-back" in prune trees. The composition of leaves reflected the available K content of soils. Increased intake of K is associated with reduced absorption of Ca or Mg or of both. The action of K is related to its influence on Ca and Mg rather than to soil reaction. In leaf saps low proportions of K and decreased pH are coincident. Effects of K and P on growth, disease, leaf colour, and fruiting are given.

CH. ABS. (p)

Factors influencing the sugar content of cane. H. W. KERR (Cane Growers Quart. Bull., 1934, 1, 133—139).—Increasing applications of $(NH_4)_2SO_4$ tended to increase the total cane yield but lowered that of sugar. Superphosphate caused slight reduction in sugar content. The latter was markedly improved by K.

CH. ABS. (p)

Absorption of arsenic by the [sugar]-cane crop. ANON. (Cane Growers' Quart. Bull., 1933, 1, 41).—Sugar cane grown on soil treated with 200 lb. of As_2O_3 per acre for grub control contained 0.16—0.33 p.p.m. of As_2O_3 .

CH. ABS. (p)

Sago palm and sago starch. A. REGNAUDIN (Bull. Assoc. Chim. Sucr., 1934, 51, 267—269).—A brief account. Agricultural costs per ton of starch are about half as great as for potato culture. Commercial sago starch has about the purity of second-grade potato starch, and tends to displace this for the manufacture of glucose.

J. H. L.

Disinfection of plants in partial vacuum or at atmospheric pressure. Addition of carbon dioxide to ethylene oxide to form a non-inflammable mixture. A. L. LEPIGRE (Bull. Soc. d'Encour., 1933, 133, 509—525).—Tables and diagrams are given correlating inflammability and % of $(CH_2)_2O$, CO_2 , and air. Jones' results (B., 1933, 600) are criticised. Safe methods of manipulating gas mixtures in autoclaves, silos, and storehouses are described.

E. C. S.

Manuring of fibre-bearing plants. F. TOBLER (Ernähr. Pflanze, 1934, 30, 313—318).—The influence of K fertilisers in facilitating the development of bast-fibre cells is discussed in relation to the H_2O economy of plants.

A. G. P.

Control of cotton wilt and "rust." J. O. WARE and V. H. YOUNG (Arkansas Agric. Exp. Sta. Bull., 1934, No. 308, 23 pp.).—Treatment of soil with KCl or kainit to prevent "rust" (K deficiency) reduces the incidence of wilt. $NaNO_3$ and superphosphate, individually or together, have no action in this respect. Stable manure prevents "rust," but has little influence on wilt.

A. G. P.

Liquid manuring. H. RHEINWALD (Landw. Jahrb., 1934, 80, 161—176).—Marked increases in crop yields followed the use of liquid manure (I), but results were further improved and rendered more dependable by supplementary applications of artificial fertilisers. On grassland (I) was more effective when applied early in the season. Nitrification of (I) was rapid in warm periods. Losses of N by winter leaching were small.

A. G. P.

Effect of inoculation and liming on soya beans grown on the Grundy silt loam. R. H. WALKER and P. E. BROWN (Iowa Agric. Exp. Sta. Bull., 1933, No. 298, 279—296).—Inoculation increased the growth of plants and the yield of seed. The effects were still further accentuated by liming. The protein content of the plants was markedly increased.

A. G. P.

Cultivation, toxic constituents, uses, chemical analysis, and extraction of derris. F. T. ADRIANO (Philippine J. Agric., 1934, 5, 1—16).—Considerable variations in the rotenone contents of roots of *Derris* varieties are recorded. Differences in vals. for coarse and fine roots are marked.

CH. ABS. (p)

[Insecticidal] dusts for Colorado beetle. M. RAUCOURT (Ann. Agron., 1934, 4, 528—553).—The As deposited per unit leaf area from $PbHASO_4$ (I) was approx. 30% of that from Ca_3AsO_4 (II) preps. Deposits > 0.1 mg. per sq. cm. of leaf surface do not persist for $> 1-2$ days, however high may be the initial dosage. Sprays produced larger deposits than dusts. Leaves covered with $9-10 \times 10^{-6}$ g. of As per sq. cm. gave 100% kill. With smaller amounts mortality was lower. (I) and (II) were equally effective.

A. G. P.

Control of leafy spurge. Review of literature on chemical weed control. H. L. BARNETT and H. C. HANSON (N. Dakota Agric. Exp. Sta. Bull., 1934, No. 277, 32 pp.).—Roots of spurge were more effectively killed by NaClO_3 (I) than by NH_4SCN . The action of (I) is not improved by previous mowing-off of tops, nor by use of elaborate spray machines. Applications of 6 lb. per sq. rod caused penetration to 2–3 ft. below the soil surface. A. G. P.

Lead arsenates [as insecticides]. R. P. TUCKER (Calif. State Dept. Agric. Mo. Bull., 1934, 23, 141–145).—The stability, in respect of hydrolysis, of Pb arsenates is confined to definite p_{H} ranges, viz., $\text{Pb}(\text{H}_2\text{AsO}_4)_2$ (I) 1.5–2.0, PbHAsO_4 2.0–5.0, $\text{Pb}_3(\text{AsO}_4)_2$ 5.0–6.5, 4:5 basic 6.5–12.5, octa-arsenate 12.5–13.0. Hydrolysis of (I) by dew etc. is slow and foliage injury small, but in coastal fog belts wind-blown NaCl may cause serious injury through the formation of a basic chloro-arsenate and liberation of free H_3AsO_4 . A. G. P.

Insect control at the Virginia Truck Experiment Station. H. G. WALKER and L. D. ANDERSON (Trans. Peninsula Hort. Sci., 1932, 20–24).—Addition of nicotine (1 in 400) improved the efficiency of various arsenate and arsenate-Cu sprays against potato flea-beetle. Foliage injury by Ca arsenate and Paris-green was prevented by additions of ZnSO_4 . Cryolite-CaO dusts severely injured foliage. CH. ABS. (p)

Report on arsenic [insecticide] inspection laboratory, 1933. L. LONGFIELD-SMITH (Ann. Rep. Florida State Chem., 1933, 28–54).—Spraying with Pb arsenate-CaO-S combinations did not affect juiciness of grape fruit and oranges, but markedly reduced that of tangerines. In general, the amounts of total solids in the juice were reduced and of total sugars were either reduced or remained unchanged. Acidity was reduced by 12–40% according to species, and the proportion of sucrose in the total sugars increased by 4–8%. Juices contained 0.02 p.p.m. As_2O_3 at picking. CH. ABS. (p)

Arsenical injury on peach. W. C. DUTTON (Proc. 42nd Ann. Meet. Conn. Pomol. Soc., 1932, 55–58).—Injury by Pb arsenate sprays was much reduced by additions of FeSO_4 (2 lb.) and $\text{Ca}(\text{OH})_2$ (3 lb.) per 100 gals. ZnSO_4 - $\text{Ca}(\text{OH})_2$ mixtures were equally effective. CH. ABS. (p)

Sprays for improved codling-moth control. L. A. STEARNS, W. R. HADEN, and D. MCCREARY (Trans. Peninsula Hort. Sci., 1932, 78–88).—Substitution of nicotine tannate or Verdol for Pb arsenate in late cover sprays did not improve control, but reduced As residue on fruit. Fish-oil and casein preps. did not increase the residue from Pb arsenate sprays. Mn arsenate caused severe defoliation when used in cover sprays. CH. ABS. (p)

Does San José scale warrant special consideration in the pest-control programme? H. N. WORTHLEY (Trans. Peninsula Hort. Sci., 1932, 102–106).—Combinations of Pb arsenate and CaO-S gave effective control. Highest proportions of scale-marked fruit came from trees treated with sprays containing Cu. CH. ABS. (p)

Mottle leaf control. J. C. JOHNSTON (Calif. Citrograph, 1934, 19, 148, 159).—On loams 10 lb. of ZnSO_4

per tree (applied to soil around roots) gave good control without injury. 5-lb. doses on light sandy soil frequently caused injury as a result of direct absorption by roots. Spraying with ZnSO_4 (5 lb. per 100 gals.) controlled mottling, but caused injury to some citrus species. Combinations of ZnSO_4 with CaO-S were more efficient than was ZnSO_4 alone and were non-injurious. ZnSO_4 -CaO preps. were ineffective. CH. ABS. (p)

Spray materials for apple-scab control. J. F. ADAMS (Trans. Peninsula Hort. Soc., 1932, 32–38).—Best results were obtained with CaO-S (1 in 40). Fish-oil spreader reduced the efficiency of this spray. Colloidal Cu sprays alone or in combination were more effective than was Bordeaux mixture. CH. ABS. (p)

Factors in the use of spreaders and stickers in relation to fungicidal efficiency. J. F. ADAMS (Trans. Peninsula Hort. Sci., 1932, 39–46).—Fish oils reduced the efficiency of CaO-S in a no. of instances. Germination of many fungus spores was favoured by casein, Na oleate, fish oil (I), and lignin pitch in customary concns. (I) did not affect the toxicity of Bordeaux mixture. Flour (4 lb. per 50 gals.) and liquid soap (2 lb. per 100 gals.) reduced the germination of spores of *M. solani*. CH. ABS. (p)

Peach defoliation in relation to zinc [sulphate]-lime spray in combination with certain sulphur sprays. J. F. ADAMS (Trans. Peninsula Hort. Sci., 1932, 113–120).—Use of ZnSO_4 -CaO sprays (4:4:50) in combination with or prior to Pb arsenate preps. reduced foliage injury on peach, improved the vigour of leaves, and favoured later ripening of fruit. CH. ABS. (p)

Stock licks—their constituents and preparation. J. W. GROENEWALD (Farming S. Africa, 1934, 9, 135–137).— $\text{NH}_4\text{H}_2\text{PO}_4$ is an effective source of P in drinking- H_2O , but should contain > a trace of F and > 0.1% As_2O_3 . CH. ABS. (p)

Detecting $\text{Ca}_3\text{P}_2\text{O}_8$. Determining Mn in phosphorites etc.—See VII. **Wood preservation.**—See IX. **Juice analyses on sugar-cane plantations.**—See XVII. **Liquid insecticides. Sewage disposal.**—See XXIII.

PATENTS.

Potassium phosphate conversion [into fertiliser]. C. B. LOCKLIN (U.S.P. 1,939,858, 19.12.33. Appl., 10.2.31).—A saturated aq. solution of a K salt containing K_2SO_4 and K_2CO_3 is mixed to form a slurry with finely-ground phosphate rock in a predetermined ratio and the product is calcined in a closed furnace. A. R. P.

Production of a fertiliser composition. A. HILL (U.S.P. 1,939,850, 19.12.33. Appl., 13.9.30).—Cast Fe, steel, and Fe ore are ground separately, the powders mixed in the ratio 50:25:20, the mixture is kept moist at 42° for 2–4 weeks, and the product mixed with 5% of Ca. A. R. P.

[Seed] disinfectant. W. L. ESTABROOKE (U.S.P. 1,938,585, 12.12.33. Appl., 31.12.30).—Claim is made for the reaction product of a urea and a heavy-metal salt, e.g., of 2 mols. of $\text{CS}(\text{NH}_2)_2$ and 1 mol. of a salt

of Pb, Ag, Cu, Zn, Cd, or Hg. The insol. ppt. is dried and mixed with talc for dusting seeds. A. R. P.

Drying seeds etc.—See I.

XVII.—SUGARS; STARCHES; GUMS.

Suggested method of juice analyses for sugar-cane plantations devoid of laboratory facilities. K. V. G. IYER and T. S. VENKATRAMAN (Agric. Live-Stock India, 1934, 4, 371—378).—Cane samples dispatched for analysis suffered no appreciable change in sucrose content or purity during rail journeys lasting up to 5 days. Each sample consisted of 20 half-canes (10 top and 10 bottom halves) with their ends sealed with paraffin wax, rolled up between two layers of straw or cane trash as a single bundle and tightly stitched around with gunny. J. H. L.

Extraction of pectin from sugar-beet pulp. G. MEZZADROLI and A. AMATI (Annali Chim. Appl., 1934, 24, 392—393).—The pulp, after extraction of the sugar, contains 15—30% of pectin. The last traces of sugar and proteins are removed by washing with EtOH or H₂O, and the pectin is extracted by means of hot dil. aq. Cl₂ or HCl and reprecipitated by addition of an aq. Al salt [Al₂(SO₄)₃ or AlCl₃] and NH₃. The final residue is a high-grade cellulose which bleaches easily. D. R. D.

Conductometric method for [determination of] moisture in bagasse. G. G. RAO (Current Sci., 1934, 3, 69).—The depression in the electrical conductivity of a NaCl solution (approx. *N*) after digestion of moist bagasse is used to measure the H₂O content of the sample. The moisture and sucrose contents can be simultaneously determined. L. S. T.

Uses of active carbon in the beet-sugar industry. S. KOROLKOV (Sovet. Sakhar, 1933, No. 7—8, 53).—A review of the effect of active C on the quality of the product, with special reference to *p_H* vals.

CH. ABS. (e)

Preparation of mannitol from sucrose. K. MIYAJI (J. Agric. Chem. Soc. Japan, 1934, 10, 517—519).—A bacterium (*B. mannicus sucra*), isolated from acid soil, produced mannitol (I) from fructose, sucrose, raffinose, etc. Addition of invertase or diastase increased yields of (I) up to 60% of sucrose used. CaCO₃ favoured the change. CH. ABS. (p)

Sugar cane. Sago palm.—See XVI. **Fermentability of molasses.**—See XVIII. **Lactose in milk. Honey. Molasses silage.**—See XIX.

PATENTS.

Purification of sugar-factory and -refinery juices. D. TEATINI (B.P. 417,075, 19.5.33).—Flocculation of colloids in raw juice at their alkaline isoelectric point is effected with CaO or equiv. alkali and if necessary SO₂ or "electrolytically equiv. substance" (CO₂, H₂SO₄, H₃PO₄), as described in B.P. 351,160 and 394,498 (B., 1931, 1152; 1933, 888). Further CaO or equiv. alkali is next added to produce the optimum alkalinity (0.11—0.13% CaO) for the subsequent removal of the flocculum, which is then effected by filtration, decantation, or centrifuging, at the optimum flocculation temp. (80—95° for beet juices). The separated juice is treated with CO₂ (e.g., boiler-flue gases), SO₂, or H₃PO₄, to

reduce its alkalinity to factory requirements (e.g., 0.01—0.02% CaO), and again filtered; the filter cake may be added as filter aid to juice which has not yet undergone the first filtration. No further defecation treatment is applied. J. H. L.

Treatment of sugar solutions [molasses]. F. B. DEHN. From CALIFORNIA PACKING CORP. (B.P. 416,483, 16.2.33).—In sugar manufacture or refining, molasses and low-purity syrups are freed from invert sugar without inversion of sucrose by diluting to 35—60° Brix and fermenting with ordinary or special yeast. The fermented liquid is treated with CaO sufficient to ppt. impurities but not sucrose, and preferably with an equal vol. of EtOH, and then filtered, neutralised with CO₂ or an acid which forms an insol. Ca salt, and distilled to recover EtOH. The distillation residue, having a much higher purity than the original molasses, is worked up for sugar by known methods. The final molasses from the process is well adapted for desaccharification by the Steffen or baryta process. J. H. L.

Manufacture of [maize] starch. A. P. BRYANT, ASSR. to CLINTON CORN SYRUP REFINING CO. (U.S.P. 1,937,543, 5.12.33. Appl., 19.1.31).—The purified starch milk, prior to its final filtration, is stirred for several hr. with an alkaline NaOCl solution slightly > sufficient to oxidise SO₂ present. The starch is well washed in the filters and dried as usual. The process, besides eliminating SO₂, assists in sterilising the starch, lowers its acidity, improves its texture, and renders it more thick-boiling. J. H. L.

Manufacture of dextrin from corn [maize] starch. A. D. FULLER, ASSR. to NAT. ADHESIVES CORP. (U.S.P. 1,937,752, 5.12.33. Appl., 17.11.32).—Starch in aq. suspension is tendered by treatment with a chlorinating or other oxidising agent and alkali, at about *p_H* 6.5, and then washed, dried, and dextrinised by heating without acid (cf. B.P. 383,778; B., 1933, 247). Preferably the warm suspension is treated slowly with alkaline aq. Ca(OCl)₂ until 0.5% of Cl (on dry starch) has been absorbed, and then screened, filtered, washed, dried, and heated for 26 hr. at 149° rising to 163°. J. H. L.

Manufacture of starch preparations for producing adhesives. HENKEL & CO. G.M.B.H. (B.P. 415,611, 1.11.33. Ger., 14.12.32).—Mixtures of potato starch with other starches or starchy materials such as cereal flours, containing insufficient H₂O (e.g., 25%) to render them pasty, are passed between heated rollers (e.g., at 180—225°) and afterwards comminuted if desired. Oxidising agents, soaps, wetting agents, or Na₂B₂O₇ may be incorporated according to known practice. The products yield pastes with cold H₂O. J. H. L.

Starch paste. S. JÓZSA and H. C. GORE, ASSRS. to STANDARD BRANDS, INC. (U.S.P. 1,947,295, 13.2.34. Appl., 11.1.30).—Highly stable pastes of low *η*, specially suitable for sizing and finishing textiles, are prepared by heating starch with H₂O and intensely agitating the gelatinised paste while still hot and preferably also after cooling, e.g., by means of a mixer working at 11,000 r.p.m. or a colloid mill. The time of outflow of the final pastes, at 5% concn. and 21°, from a standard

100-c.c. pipette, should be \geq 200 sec., compared with 53 sec. for H_2O . J. H. L.

Preparation of amylaceous products. W. E. STOKES, Assr. to ROYAL BAKING POWDER CO. (U.S.P. 1,939,236, 12.12.33. Appl., 5.12.30).—Starch or starchy materials, mixed with H_2O , are heated just sufficiently to disrupt the granules, e.g., at 60–80° for 5 min., and then frozen, thawed, separated from the H_2O , dried, and powdered. Starch so treated is soft and fluffy in texture; in cold H_2O it absorbs about 100%, swelling to 10 times its original vol., and with hot H_2O it yields, without further cooking, smooth pastes which will set and can be moulded. J. H. L.

Saccharine juices and cement.—See IX. **Glucose from cellulose.** **Propionic fermentation.**—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Determination of malt extract by washing out spent grain. J. SATAVA (Böhm. Bierbrau., 1934, 61, 47–51; Chem. Zentr., 1934, i, 2673).—Inaccuracies of the method are examined. A. G. P.

Theory of steeping [in brewing]. IV–IX. K. MÜNDLER (Z. ges. Brauw., 1933, 56, 74–76, 78–80, 82–84, 85–86, 93–95; 1934, 57, 2–4; Chem. Zentr., 1934, i, 2672–2673).—The nature of the constituents extracted (notably N compounds, tannins, and colouring matter) from barley by steeping in solutions of KOH and of HCl, together with changes in reaction, η , and surface tension of the liquor are examined. Alkalis (I) favour and acids (II) retard the swelling of the grain. Germination was injured more markedly by (II) than by (I). Grain under steeping liquor failed to germinate, owing to O_2 deficiency. Addition of H_2O_2 corr. this. A. G. P.

Volumetric determination of alcohol in beer or wine. E. J. RAUDENBUSH (Ann. Rept. Florida State Chem., 1933, 23).—10 c.c. of a solution containing 200 c.c. of NH_4Ph in 300 c.c. of 95% EtOH are titrated with the sample until cloudiness appears. Results may be calc. from vals. obtained with standard EtOH solutions. The end-point is sensitive to temp. changes. An accuracy of 0.1–0.2% is possible. CH. ABS. (p)

Beer scale and aluminium. II, III. H. SCHNEGG (Z. ges. Brauw., 1934, 57, 5–10, 13–18; Chem. Zentr., 1934, i, 2673).—Use of 10, 30, or 50% HNO_3 to remove scale did not affect Al vessels. Purity of HNO_3 is important. Other scaling agents are examined.

III. Dil. HCl of appropriate concn. is serviceable for scale removal if a suitable period of action is allowed. Protective agents, notably $(\text{CH}_2\text{Ph})_2\text{S}$, reduce the sensitivity of Al to acid attack. A. G. P.

Corrosion of aluminium in brewing. H. M. H. VAN LAER (Petit J. Brasseur, 1933, 41, 1216–1220; Chem. Zentr., 1934, i, 760).—Corrosion tests are described. H. J. E.

Ferrocyanide clarification [of wines]. C. VON DER HEIDE (Wein u. Rebe, 1933, 14, 325–335, 348–359, 400–408; 15, 5–19, 35–44; Chem. Zentr., 1934, i, 2505).—Discussion of current practice. A. G. P.

Detection and determination of β -y-butyleneglycol in fermented liquors. H. MOUREU and M. DONÉ

(Bull. Assoc. Chim. Sucr., 1934, 51, 247–250).—Under prescribed conditions Br– H_2O effects a 75.6% oxidation of $(\text{CHMe}\cdot\text{OH})_2$ (I) to $\text{CHAcMe}\cdot\text{OH}$, which may then be determined by Lemoigne's method (B., 1920, 203; A., 1930, 71, 1201; van Niel, A., 1927, 1101). The conditions are that the reaction mixture (30 c.c.), containing 0.1–0.2 g. of (I) with 8–10 times the required quantity of Br, is heated in a small closed flask for 3 min. in boiling H_2O and then allowed to cool in the dark. After excess of Br has been reduced with 20% Na_2SO_3 solution the liquid is transferred to a distillation flask, treated with 15 c.c. of aq. FeCl_3 (d 1.45), and distilled for the further determination (*loc. cit.*). Assuming a 75.6% oxidation of the (I) the results are accurate to 1%. J. H. L.

Fermentability and residual sugar content of cane molasses. F. REINDEL and A. FREY (Z. Spiritusind., 1934, 57, 237).—A Natal molasses, containing 48.46% of total sugar after inversion, yielded 21–30.1 litres of abs. EtOH per 100 kg. according to the conditions of fermentation. After as complete a fermentation as possible, the residual matter could still be partly fermented by large proportions of yeast, and osazones resembling those of galactose and glucose were obtained from it. It probably contained trisaccharides and caramel-like substances, the fermentability of which was lowered by the high salt content of the molasses. The existence of “glucose” as a definite sugar is considered improbable. J. H. L.

Apple brandy manufacture. H. P. HILL (Fruit Products J., 1934, 14, 8–11, 29).—Factors considered are quality of fruit, control of fermentation of cider, time and method of fermentation, blending of varieties of apples, filtration, rate of distillation, and capacity of stills. A diagram of plant layout is given. E. B. H.

Vacuum-pressure distillation for the preparation of absolute alcohol. W. KILP (Z. Spiritusind., 1934, 57, 258, 260).—Earlier proposals are described and their disadvantages discussed. In the improved process, preliminary dehydration (D) under reduced pressure raises [EtOH] to a little above the normal azeotropic point, and the latent heat of the final dehydration column is used for heating the column necessary for D. The apparatus and process are described. I. A. P.

Residue from distillation of fusel oil. P. N. SCHORIGIN, V. I. ISAGULIANZ, V. N. BELOV, and Z. P. ALEXANDROVA (J. Gen. Chem. Russ., 1934, 4, 372–394).—The residues (I) contain C_1 – C_5 alcohols 31, C_6 and higher alcohols 5, fatty acids 15, bases 4.5, and neutral constituents 10%. The alcohols $n\text{-C}_6\text{H}_{13}\cdot\text{OH}$, $n\text{-C}_7\text{H}_{15}\cdot\text{OH}$, $n\text{-C}_8\text{H}_{17}\cdot\text{OH}$, and $n\text{-C}_9\text{H}_{19}\cdot\text{OH}$, the acids $\text{C}_5\text{H}_{11}\cdot\text{CO}_2\text{H}$, $\text{C}_7\text{H}_{15}\cdot\text{CO}_2\text{H}$, $\text{C}_9\text{H}_{19}\cdot\text{CO}_2\text{H}$, $\text{C}_{11}\text{H}_{23}\cdot\text{CO}_2\text{H}$, $\text{C}_{13}\text{H}_{27}\cdot\text{CO}_2\text{H}$, and $\text{C}_{15}\text{H}_{31}\cdot\text{CO}_2\text{H}$, and the bases tri- and tetra-methyl-, trimethylethyl-, and diethyl-pyrazine have been identified in (I). R. T.

Detection of methyl alcohol in wine vinegar adulterated with synthetic vinegar and products of dry distillation of wood. T. PICCOLI (Atti Congr. naz. Chim. pura appl., 1933, 4, 773–775; Chem. Zentr., 1934, i, 2208).—To the sample (100 c.c.) are added a few drops of aq. KOH and the whole is repeatedly

distilled, successive distillates (75, 50, 15, and 3 c.c.) being collected. Of the last, 1 c.c. is treated with 4 c.c. of 1:2 H_2SO_4 and several small portions of powdered KMnO_4 , and the mixture cooled and filtered. 1 c.c. of the filtrate is heated till colourless. After cooling, 5 c.c. of conc. H_2SO_4 and 2.5 c.c. of a 0.2% solution of morphine hydrochloride in conc. H_2SO_4 are added. The presence of MeOH is shown by a red-violet coloration. 0.02% of MeOH can be detected.

A. G. P.

Detecting peroxidase in sour milk.—See XIX.

PATENTS.

Preparation of malt. A. E. JONSSON (B.P. 417,271, 1.5.33. Swed., 24.2.33).—Malting is carried out in a double-walled drum (*D*) capable of rotating or oscillating, and the heat of germination is removed by circulating H_2O between the walls. Just sufficient air is passed through the contents of *D* to remove the CO_2 produced, and the air supply is regulated by a system of valves (*V*) capable of independent operation. Apparatus is described to ensure that *V* admit air only when they are covered by the germinating material.

I. A. P.

Clarification of beer. R. SEIBEL (B.P. 413,541, 31.10.33. Ger., 31.10.32).—Substitutes for brewers' chips, which can be economically discarded after single use, consist of very thin sheets of Al (e.g., 0.005 mm. thick) or other non-rusting metal, or parchment, cardboard, or paper, which may be metal-coated. They may be corrugated or punched to keep them apart and/or coated with resin or varnish.

J. H. L.

Production of acetic acid and glucose [from cellulose by fermentation]. P. A. TETRAULT, Assr. to WISCONSIN ALUMNI RESEARCH FOUNDATION (U.S.P. 1,939,736, 19.12.33. Appl., 27.11.29).—Thermophile bacteria of the *Acetobacter* type, capable of converting cellulose into glucose and volatile acids without formation of gas, are isolated from soil or manure by inoculating a sterile cellulosic culture liquid at 90–100°, incubating for 4–5 days at 55–65°, then heating to 90–100° for 5–10 min. and re-seeding, these operations being repeated many times to obtain a potent culture, which is finally plated on agar. Sterilised cellulosic meshes, prepared from corn-cobs, sawdust, etc. and containing nitrogenous nutriment, e.g., the waste slop from the manufacture of COMe_2 and BuOH, are fermented in presence of CaCO_3 at 55–65° in 8–12 days, in presence or absence of air. AcOH is recovered by distillation and glucose remains in the residue.

J. H. L.

Manufacture of vinegar. C. S. ASH, Assr. to CALIFORNIA PACKING CORP. (U.S.P. 1,948,836, 27.2.34. Appl., 19.11.32).—A shallow fermenting bed of insol. material, e.g., pumice, wood shavings, is inoculated with vinegar organisms, and after flooding with EtOH solution, the excess solution is drained off to a storage tank. The films remaining around the packing material undergo intensive oxidation, after which flooding is repeated and the bed again drained, the whole series of operations being repeated until the desired min. of EtOH remains unoxidised. Suitable apparatus is described.

I. A. P.

Acceleration of propionic fermentation. J. M. SHERMAN, Assr. to WILBUR WHITE CHEM. CO. (U.S.P. 1,937,672, 5.12.33. Appl., 25.4.28).—The fermentation of molasses or other worts, containing sugar and/or lactates, by *Bact. acidipropionici* with or without *Lactobacillus casei*, is carried out in presence of finely-divided inert material by which the greater part of the bacterial crop is retained, when, after each fermentation, the major part of the wort is withdrawn and replaced by fresh. The fresh wort is thus fermented by a much larger mass of bacteria than could be produced in a single fermentation. The replacement of wort is effected before fermentation is quite complete, in order to maintain the bacteria in vigorous condition.

J. H. L.

Molasses.—See XVII. **Enzyme.**—See XX.

XIX.—FOODS.

Determination of the quality of flour from ash content. H. VIERMANN (Z. ges. Getreide-Mühlenw., 1934, 21, 4–5; Chem. Zentr., 1934, i, 2675).—Flour of high ash is obtainable by mixing. The evaluation of such a flour on Mohs' ash scale is impossible. H. J. E.

Determination of bromates in chemically treated flour. J. KULMAN (Chem. Listy, 1934, 28, 241–242).—40 g. of flour are shaken with 75 c.c. of CCl_4 , and the suspension is centrifuged in a special tube, when 3 layers form, consisting of flour, CCl_4 , and KBrO_3 and mineral impurities. The bottom of the tube is detached, the contents are filtered and washed with CCl_4 , the residue is treated with 10 c.c. of 2% KI and 10 c.c. of 10% HCl, and liberated I titrated with 0.01N- $\text{Na}_2\text{S}_2\text{O}_3$.

R. T.

Influence of sterilisation on storage capabilities of flour. H. KÜHL (Mühlenlab., 1934, 4, 115–120).—The wet (I) and dry methods (II) of cleaning wheat prior to milling are compared. In (I), external dirt is removed, but not all bacteria, and the increased H_2O content of the grain favours bacterial and mould growth. In (II), using a Jupiter excoriating machine, a more complete removal of bacteria is possible without injury to the skin of the seed provided that all dust formed is removed and the grains are of approx. equal size.

E. B. H.

Factors influencing the quality of gluten. N. P. KOSMIN (Mühlenlab., 1934, 4, 109–115).—The action of mineral acids, unsaturated fatty acids, oxidising agents, formalin, aldehydes, and heavy metal salts on gluten is similar in its effect, resulting in a progressive decrease in hydration capacity of the washed-out gluten as the concn. of the reagent is increased. In "weak" glutes characterised by excessive hydration the addition of the appropriate amount of any of these reagents (*R*) will result, by reducing the hydration, in improved gas-retaining properties in the flour, whilst normally "strong" glutes already having optimum hydration capacity are rendered tough and crumbly and finally granular by addition of *R*, and the baking quality of the flour deteriorates. Unsaturated fatty acids are formed in flour on storage by hydrolysis of the fat present, and may improve the breadmaking quality of flours with "weak" glutes. Extraction of freshly milled and of stored flours with fat solvents (*F*) may

therefore result in very different effects on their bread-making qualities, as the fatty acid will be removed by *F*.
E. B. H.

Is it possible to determine gassing power by the Göttingen method of testing wheat quality? H. ENGELKE (Mühlenlab., 1934, 4, 137—142; cf. B., 1934, 809).—Gas retention (*R*) was measured by observing the vol. increase of a dough ball under H_2O , and the gas production by the vol. increase of a similar ball surrounded by a rubber membrane. The results show that it is possible to determine gassing power (*P*) by the Göttingen method, but that it determines not the actual *P* but a const. % ($M = 88.625 \pm 0.337\%$ in the varieties investigated) of this. The remaining gas given up during the first hr. of fermentation is absorbed by the H_2O . Hence it is possible to calculate the actual *P* by multiplying *R* (preferably the vol. increase after 1 hr.) by 1.12835. A method is described whereby *P* can be followed for periods > those for max. *R*; this method also determines the proteolytic power.

E. A. F.

Fermentable sugars, alcoholic fermentation, and gas production during bread-making. R. GUILLET-MET, C. SCHELL, and P. LE FUR (Bull. Soc. Chim. biol., 1934, 16, 1211—1242).—A detailed account of work already noted (B., 1934, 553).

Determination of the ash of salt bread. F. BERNARDINI and E. A. GAUTHIER (Annali Chim. Appl., 1934, 24, 391).—Polemical (cf. B., 1934, 472). The authors' method gives satisfactory results provided that special care is taken to ensure efficient washing of the ash to remove NaCl in the case of bread containing > 2% NaCl.

D. R. D.

Catalytic oxidation of butter fat in milk. S. KENDE (Proc. World's Dairy Congr., Milan, 1934, Sect. II, 1—11).—Tallowy milk results from fat oxidation catalysed by heavy metals or a sp. enzyme ("oleinase"). Variations in susceptibility to tallowiness (I) are attributable to differences in protective substances in milk produced by different feeding-stuffs. Heating milk to 80—85° induces protection through formation of reducing substances. Cu favours (I) when present in amounts up to 4 mg. per litre; larger amounts have smaller effects. (I) is probably due to elaidin.

CH. ABS. (p)

Determination of lactose in milk by the Hagedorn-Jensen method. J. H. BLACKWOOD (J. Dairy Res., 1934, 5, 245—249).—Adaptation of the method to milk analysis yields results agreeing closely with those of the Shaffer-Hartmann method.

A. G. P.

Variations in the solids-not-fat content of milk. III. Lactation yield and factors affecting it. S. BARTLETT (J. Dairy Res., 1934, 5, 179—184; cf. B., 8933, 363).—Milk yields reach max. vals. at about the sixth lactation. The solids-not-fat content declines from the first lactation onward. Sub-normal yields during a lactation are associated with subnormal milk quality.

A. G. P.

Nutritional value of milk and milk products. S. K. KON (J. Dairy Res., 1934, 5, 250—268).—A review.

A. G. P.

Detection of peroxidase in sour milk, and in milk containing preserving substances. A. BYČICHIN (Chem. Listy, 1934, 28, 75—76).—Peroxidase in sour milk, and in presence of Na_2CO_3 , $Na_2B_4O_7$, $BzOH$, and salicylic acid, can be detected by the Storch reaction when the p_H is adjusted to 6.5—7.2.

R. T.

Influence of the material of the containers on the duration of coagulation of milk with rennet. F. SPRINGER (Food, 1934, 4, 8).—The time of coagulation \propto the material of the containers, e.g., beech: Ni = 1:2; these relative times are not affected by change of temp. The surface condition appears to be of no special significance.

W. R. B.

Factors affecting the solubility of milk powders. III. Physicochemical properties of concentrated solutions of milk solids. G. R. HOWAT and N. C. WRIGHT (J. Dairy Res., 1934, 5, 236—244; cf. B., 1933, 363).—The effect of milk solids (I) on the extent of ionisation of electrolytes cannot be found from measurements of electrical conductivity since ionic mobility is markedly influenced by the η of the sample. An approx. linear relationship is traced between the concn. of solids (< 34 g. per 100 c.c.) and the f.p. depression. More conc. solutions are supersaturated with respect to lactose, and the relationship depends on other osmotically active constituents. In solutions of (I) up to 65 g. per 100 c.c., probably no "bound" H_2O exists. A linear relationship exists between the concn. of (I) and $[H^+]$.

A. G. P.

Application of X-rays to research in dairy technology. S. L. TUCKEY, H. A. RUEHE, and G. L. CLARK (J. Dairy Sci., 1934, 17, 587—594).—Mineral constituents of milk stone are examined by X-ray analysis. In fresh-milk powders cryst. lactose does not occur. Differences are observed in the spacing of the diffracting group in milk-protein, due to varying technique in processing.

A. G. P.

Action of cream and butter fat on metals, and influence of metals on quality of butter and clarified butter. W. MOHR and A. EICHSTAEDT (Proc. World's Dairy Congr., Milan, 1934, Sect. II, 95—100).—Ni, Cu, brass, and Fe were attacked. V2A steel, tinned and enamelled metals were the most satisfactory.

CH. ABS. (p)

Relation of dry skim milk to several of the physical and chemical properties of whipped cream. W. H. E. REID and W. C. ECKLES (Missouri Agric. Exp. Sta. Res. Bull., 1934, No. 214, 36 pp.).—Whipping properties of cream (I) were improved by additions of dry skim milk. The sugar content also affected the physical properties of whipped (I). Ageing of (I) is an essential preliminary to whipping.

A. G. P.

Gelatin in ice-cream specialities and how it should be used. W. S. MUELLER and J. H. FRANDSEN (Ice Cream Trade J., 1934, 30, 17—19).—High concn. of sugar is necessary to prevent formation of ice or sugar crystals in gelatin, best results being obtained with a 30% sucrose and 30% maize-sugar mix.

CH. ABS. (p)

Apparent viscosity of ice cream. I. Sagging-beam method of measurement. II. Factors to

be controlled. **III. Effect of milk fat, gelatin, and homogenisation temperature.** A. LEIGHTON, A. LEVITON, and O. E. WILLIAMS (J. Dairy Sci., 1934, 17, 639—650).—The technique of examination is described. The influence on vals. obtained of the method of manufacture, fat, and gelatin contents are examined. A. G. P.

Relation of the freezing procedure and composition of the mixture to the physical and crystalline structure of ice cream. W. H. E. REID and M. W. HALES (Missouri Agric. Exp. Sta. Res. Bull., 1934, No. 215, 20 pp.).—Fine texture in ice cream (I) is associated with a uniformly dispersed system of small angular ice crystals and jagged tapering air-cell boundaries. Increasing proportions of fat, solids-not-fat, sugar, and gelatin change the texture of (I) from coarse to fine. A. G. P.

Disturbance in the natural oxidation-reduction equilibrium of milk, with special reference to the use of dehydrated milks in the manufacture of cottage cheese. W. H. E. REID and R. L. BROCK (Missouri Agric. Exp. Sta. Res. Bull., 1934, No. 216, 26 pp.).—The oxidation-reduction system of fresh milk is more stable than that of skim milk or reconstructed dry milk. Relationships exist between the E_h and the chemical and physical properties of milk and cottage cheese. The influence of electrolytes on E_h varies with concn. A. G. P.

Relation of dry skim milk to several of the physical and chemical properties of cream cheese. W. H. E. REID and H. R. ALLEY (Missouri Agric. Exp. Sta. Res. Bull., 1934, No. 213, 40 pp.).—Effects of varying proportions of dry skim milk, of fat, and of gelatin additions on the consistency of cream cheeses are examined. A. G. P.

Sudden changes in the rate of acid formation in milk by cultures of lactic streptococci. H. R. WHITEHEAD and G. A. COX (J. Dairy Res., 1934, 5, 197—207).—Sudden failure of cheese-starter cultures (I) is traced to the method of pasteurisation of the milk. Activity of (I) may be inhibited by aëration (e.g., during cooling in wide-mouthed vessels) as a result of disturbance of oxidation-reduction reactions by which organisms normally obtain growth energy. A. G. P.

Influence of lactic streptococci on the ripening of Cheddar cheese. I. R. SHERWOOD and H. R. WHITEHEAD (J. Dairy Res., 1934, 5, 208—222).—No relation exists between the N partition in ripened cheese and its commercial quality. The proteolytic powers of pure cultures of streptococci (I) have little effect on proteolysis (II) of cheese during ripening. (II) is influenced mainly by the rate and extent of acid formation in the process. The function of (I) is probably the production of acid, which, in turn, conditions the activity of rennin. A. G. P.

Ripening of Cheddar cheese. IV. Bacterial flora of cheese from milk of low bacterial count. V. Influence of rennet flora on flora of cheese. VI. Influence of the starter on the ripening process. L. A. ALLEN and N. R. KNOWLES (J. Dairy Res., 1934,

5, 185—196).—Many lactic streptococci and lactobacilli were unable to develop vigorously in milk in absence of appropriate nutritional N. The latter is absent from milk having low bacterial count and must be added artificially. A. G. P.

Significance of acid proteolytes in cheese ripening. C. GORINI (Proc. World's Dairy Congr., Milan, 1934, Sect. II, 23—31).—Ripening is due mainly to acidoproteolytes in symbiosis with lactic enzymes, together with other species varying with cheese type. CH. ABS. (p)

Variations in the potency of certain foodstuffs in the cure of dermatitis induced in rats by dietary egg-white. H. T. PARSONS and J. G. LEASE [with E. KELLY] (J. Nutrition, 1934, 8, 57—67).—Of various meat products examined, cooked pork kidney was the most effective in curing or preventing dermatitis due to egg-white (I). The activity, in this respect, of spleen heart, ovary, adrenal, blood, or hæmoglobin was very small. The potency of kidney or liver was increased by cooking, but not reduced by autolysis or extensive bacterial action. The injurious action of (I) does not depend on the destruction of dietary factors in the ration. A. G. P.

Effect of ammonia gas on oranges. L. LONGFIELD-SMITH (Ann. Rept. Florida State Chem., 1932, 22—34).—Exposure to NH_3 did not materially affect the % of acid or total sol. solids in oranges. Shaded halves (I) showed higher vals. than exposed halves. (I) of grape fruit and tangerines had the higher acid contents. CH. ABS. (p)

Factors affecting the quality of preserves made from Kieffer pears. H. H. MOON and C. W. CULPEPPER (Fruit Products J., 1934, 14, 12—16, 20, 25).—Fruit after harvest should be held for 16 days at 16°. The optimum proportion of fruit to sugar is 55:45. Material should be boiled to 108°. Time and rate of boiling, variation of chemical composition, and the presence of stone cells are also important. E. B. H.

Progress in tomato juice manufacture. E. F. KOHMAN (Fruit Products J., 1934, 14, 17).—Biological experiments show that the vitamin-C content of tomato juice is not reduced during canning. E. B. H.

Spoilage of olives by colon bacilli. R. L. TRACY (J. Bact., 1934, 28, 249—265).—Organisms concerned were killed by exposure to 15—19% NaCl solution in 48 hr., but resisted 20% solutions for 24 hr. The action of NaCl is greater in basic solutions. A 7% solution of NaCl in acid is bacteriostatic. A. G. P.

Composition of genuine bee-honey. T. VON FELLEBERG and J. RUFFY (Mitt. Lebensm. Hyg., 1933, 24, 367—392; Chem. Zentr., 1934, i, 785).—Analyses are recorded of honey purified by pptn. with EtOH, treatment with $\text{Pb}(\text{OAc})_2$ and aq. NH_3 , and separation from dextrins by pptn. from MeOH and Et_2O . The formation of glucose and turanose by mild hydrolysis of melezitose is examined. Undetermined matter in whole honey (average 5%) is not carbohydrate, acid, or N compound. Uronic acids and sorbitol were not detected. A. G. P.

Vitamin-A content of foods and feeds. G. S. FRAPS and R. TREICHLER (Texas Agric. Exp. Sta. Bull., 1933, No. 477, 34 pp.).—Data for 107 samples are recorded. The effect of storage on vitamin content is examined. A. G. P.

Food preservatives. I. P. SVETLOV (Izvest. Tzent. Nauch-Issledov. Inst. Pishch. Vkusov. Prom., 1932, No. 6, 20 pp.).—The properties and methods of extraction and analysis of various preservatives are examined. CH. ABS. (p)

Nutrient losses during the ensilage of green fodder with chemical and natural supplements. II. Beet leaves. W. KIRSCH and K. E. FEEDER (Bied. Zentr. [Tierernähr.], 1934, B, 6, 398—410).—Addition to fodder prior to ensilage of Defu ($\text{HCl} + \text{H}_3\text{PO}_4$) or A.I.V. ($\text{HCl} + \text{H}_2\text{SO}_4$) solutions gave equally effective results in producing an improved silage. Toro-silon ($\text{CH}_2\text{O} + \text{H}_2\text{SO}_3$) had no beneficial action. A. G. P.

Composition, digestibility, and nutritive value of pasture grass. J. SCHMIDT, E. LAUPRECHT, and W. WINZENBURGER (Züchtungskunde, 1934, 9, 139—144).—Highly intensive cultivation of small and closely grazed paddocks under favourable conditions yields a grass crop of very high protein content. The ratio of digestible protein to starch val. is narrower than for most common feeding-stuffs and narrower than that required for milk production. Hence the view that supplementary feeding of cereals or other feeds less rich in protein permits better utilisation of the excess protein of pasture is supported. NUTR. ABS. (m)

Composition and digestibility of various types of silage from native plants of Western Siberia. P. A. KORMSHCHIKOV (Siberian Inst. Agric., 1933, 1—26).—Analytical data are recorded. CH. ABS. (p)

Molasses silage process. C. E. M. CASALI (Hoard's Dairyman, 1934, 79, 140, 142).—The process consists in adding about 40 lb. of molasses (50% of sugar) to every ton of fodder. It is designed especially for the preservation of protein-rich crops and no benefit is claimed from using it with cereals and other crops rich in carbohydrates. In both tower and pit silos, lined or unlined, there is practically no loss of nutrients. The particular val. is the production of a fermentation, chiefly of lactic acid type, which suppresses proteolytic organisms. 70—90 lb. of the silage may be fed daily. The experiments indicated the practicability of providing the equiv. of green crops for stock throughout the year. NUTR. ABS. (m)

Making fodder potatoes capable of storage for the summer. E. TUSEL (Z. Spiritusind., 1934, 57, 261).—The nutrient constituents (*F*) of potatoes are unaffected by drying, and the drying process is no more costly than are acidification and other storage methods, if loss of *F* and other factors in the latter processes are taken into account. Dried potatoes also have the advantage that they are suitable for all types of animals. I. A. P.

Comparative nutritive value of different fish meals for chicks. P. R. RECORD, R. M. BETHKE, O. H. M. WILDER, and D. C. KENNARD (Poultry Sci.,

1934, 13, 259—266).—When used as protein supplements various fish meals (except cod, haddock, and crab) showed improved action when 5% of dried skim milk was added to the ration. The effect of milk was greatest in the case of low-val. meals. Fish meals were, in general, better utilised than meat meals. Vitamin-*B*₂ contents of the fish products varied considerably and served as limiting factors in many instances when meals were used as the sole supplement to the basal ration. The temp. of drying affected the nutrient val. of menhaden fish oils. A. G. P.

Method of partial regression in the analysis of comparative feeding-trial data. I. E. W. CRAMPTON and J. W. HOPKINS (J. Nutrition, 1934, 8, 113—123).—Mathematical discussion. A. G. P.

Action of brines, and whole milk, on metals.—See X. **Pectin from sugar-beet pulp.**—See XVII.

PATENTS.

Apparatus for mechanically preparing gluten from flour. P. BARBADE, ASSR. to ETABL. TRIPETTE & RENAUD FILS (U.S.P. 1,948,453, 20.2.34. Appl., 19.1.33. Fr., 24.12.32).—An apparatus comprising stationary wings wiping against the wall of a rotating washing pan is constructed so as to be easily dismantled for cleaning. B. M. V.

Drying of milk. BAYERISCHE MILCHVERSORGUNG G.M.B.H., MIT DEM SITZ IN NÜRNBERG (B.P. 417,551, 7.12.33. Ger., 3.2.33).—Roller-dried milk powder is made more sol. by previously adding to the milk NaPO_3 , NaHCO_3 , and possibly also $\text{Na}_4\text{P}_2\text{O}_7$. The flavour is unaffected. E. B. H.

Treatment of insect-infested fruit in preparation for market. B. C. SKINNER, ASSR. to BROGDEN Co. (U.S.P. 1,947,115, 13.2.34. Appl., 24.12.29).—Insect infestation of fresh fruit is destroyed by heating the fruit at 38—46° for 4—6 hr., preferably in a saturated atm. Shrinkage of fruit is avoided by previously coating with a waxy film. E. B. H.

Manufacture of unfermentable fruit juices. S. C. VANDECAVEYE, ASSR. to STATE COLL. WASHINGTON (U.S.P. 1,947,237, 13.2.34. Appl., 6.3.33).—To render fruit juice immune from fermentation after bottling it is inoculated with yeast, incubated until EtOH is formed, heated for 30—40 min. at 45°, cooled, dead yeast cells are allowed to settle, and the clear juice is siphoned off. The whole procedure is repeated 2—3 times until nearly all P and N have been used up, and the product is filtered or preserved with NaOBz and bottled in sterile bottles, filling them full. E. B. H.

Roasting of coffee. J. F. GILBREATH (U.S.P. 1,946,398, 6.2.34. Appl., 17.4.31).—AcOH or citric acid equiv. to the amount of acid present in the grade of coffee being roasted, is added, in H_2O , to the hot, freshly roasted coffee immediately before drawing it from the roaster. E. B. H.

Manufacture of a cocoa product. J. H. KELLOGG, G. L. and W. K. TELLER, ASSRS. to BATTLE CREEK FOOD Co. (U.S.P. 1,947,717, 20.2.34. Appl., 13.11.29).—Alkaloids, free and combined, are removed from cacao

products by treatment at room temp. for $1\frac{1}{2}$ –2 hr. with dil. alkali solution (e.g., 0.25–1*N*-KOH or -NaOH) in a mixture (I) of a lower monohydric paraffin alcohol and H₂O (e.g., 9:1 mixture of MeOH and H₂O), which will not dissolve any appreciable quantity of fat or fat-free cocoa solids. The liquid is separated from the remaining solids, which are washed with (I) and dried. The flavour and food val. are not materially affected.

E. B. H.

Production of stable mixtures containing vegetable lecithin, with or without soya oil. METALLGES. A.-G. (B.P. 417,552, 18.12.33).—No decomp. occurs and a stable product is obtained if oil-free lecithin (I), or the fresh sediment of lecithin (I), oil, and H₂O obtained by steaming extracted soya-bean oil, is mixed with a carrier, e.g., casein, albumin, glucose [so that the mixture contains < 25% of (I)], and spray-dried in warm air.

E. L.

Stable vitamin preparation. R. C. HUSTON and H. D. LIGHTBODY, Assrs. to STATE BOARD AGRIC., MICHIGAN (U.S.P. 1,947,432, 13.2.34. Appl., 31.1.30).—The addition of a fraction of 1% of an antioxidant of the di- or tri-hydric phenol type (quinol) to a foodstuff containing vitamin-*A* and -*D* greatly reduces the loss of potency which otherwise occurs on storage.

E. B. H.

Drying grain etc.—See I. **Vitamins from oils.**—See XII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Deterioration of drugs with duration of storage and mode of packing. F. W. FREISE (Chem.-Ztg., 1934, 58, 853–854).—Under conditions existing in Brazil changes in composition of drugs are governed mainly by the dew point. Variations in this, or too dry or too wet atm., are deleterious, as are also CO, SO₂, and CO₂. Tannins, essential oils, alkaloids, and saponin disappear most rapidly, the rate of loss increasing with time up to 2 years and then falling off. Best protection is given by chlorophyll-green packing and then by blue or violet paper. Quant. results are given. C. I.

Analytical chemical behaviour of pentamethyl-enetetrazole (cardiazol). J. J. L. ZWIKKER (Pharm. Weekblad, 1934, 71, 1170–1182).—Pentamethylene-tetrazole (I) is best isolated by extraction with CHCl₃ or CCl₄ after salting-out with (NH₄)₂SO₄. (I) gives ppts. with CrO₄^{''}, Fe(CN)₆^{'''}, Fe(CN)₆^{'''}, and MoO₃, and a bright blue perchromate sol. in Et₂O. It is stable towards conc. H₂SO₄, HNO₃, or HNO₂, but is oxidised by KMnO₄-H₂SO₄ with production of a characteristic fragrant odour. The following characteristic cryst. double compounds are described, the sensitivity of the reagent being given in parentheses: (I), HgCl₂ (1:5000); (I), Hg(CN)₂; (I), HgI₂; (I), CdCl₂·3H₂O (1:5000); (I), CdI₂·H₂O (1:5000), sol. in KI solution; (I), Cd(SCN)₂; (I), Cd(ClO₄)₂; (I), 2CuCl (II) (1:40,000). (II) is doubly refracting, which differentiates it from a similar double salt of (CH₂)₆N₄, and gives quant. yields of (I) on decomp. with NH₃. Quinine alkaloids, ephedrine, morphine, atropine, novocaine, pilocarpine, antipyrine, and pyramidone do not give ppts. with CuCl solutions. S. C.

Determination of mercury in medicinal preparations. E. SCHULEK and I. FLÓDERER (Magyar gyóg. Társ. Értes., 1934, 10, 147–159; Chem. Zentr., 1934, i, 2459).—In inorg. mixtures the Hg is extracted with HCl, Br-HCl, and HNO₃, pptd. with H₂S, the ppt. treated (Kjeldahl) with H₂SO₄ + H₂O₂, and the Hg titrated by the Volhard method. Org. Hg compounds free from halogens, cyanides, cyanates, and thiocyanates are treated directly with H₂SO₄ + H₂O₂ and titrated. In presence of halogens a special method is described to avoid loss of Hg halide vapour. The Volhard method of determining Hg in presence of Bi and halogens is inapplicable. Hg is pptd. as HgS in 20% HCl, dissolved in Br-H₂O, repptd. with H₂S, and the Hg determined as above.

H. J. E.

Bromatological chemistry of essences and colouring matters of biological and synthetic origin. M. TAVEIRA and J. E. A. FILHO (Rev. Soc. Brasil. Quím., 1933, 4, 291–306; cf. B., 1934, 75; 1933, 844).—Methods for the separation and identification of natural colouring matters and coal-tar dyes, and of various flavouring essences (esters, CHCl₃, C₅H₅N bases, etc.) are described.

E. L.

Effect of germicides at 80°. C. E. COULTHARD (Pharm. J., 1934, 133, 447–448).—Addition of brilliant-green 0.03%, HgCl₂ 0.01%, or formalin 0.2%, combined with heating for 1 hr. at 80°, gives good results for the sterilisation of aq. solutions in closed containers. For sterilisation of oils, the most efficient of the substances tried were I 1.0%, Dichloramine-*T* 1.0%, and hexylresorcinol 5%.

L. D. G.

Bulgarian rose oil and its rhodinol content. L. S. GLITCHICH and Y. R. NAVES (Parfums de France, 1933, 11, 154–169; Chem. Zentr., 1934, i, 140–141).—Analytical data for *l*-rhodinol from various sources are collected. Parry and Seager's procedure (B., 1933, 605) is criticised. Hübl's method, but not Wijs' method, gives a precise I val. for citronellol and geraniol.

A. A. E.

Testing glass ampoules.—See VIII. **Determining cod-liver oil in emulsions.**—See XII.

PATENTS.

Manufacture of halogenated ethanols [therapeutic agents]. I. G. FARBEIND. A.-G. (B.P. 416,861, 22.3.33. Ger., 23.3.32).—β-β-Dichloro-β-bromo-, m.p. 17.5°, b.p. 63–66°/18 mm., and β-chloro-β-β-dibromoethyl alcohol, m.p. about 50°, b.p. 80°/8 mm., are prepared by reducing the corresponding aldehyde with Al alkoxides (and a primary or sec.-alcohol) or organometallic compounds (Al alkyl halides).

H. A. P.

Production of opium preparations. P. CASPARIS and K. SIEGFRIED (U.S.P. 1,947,330, 13.2.34. Appl., 12.9.31. Switz., 28.10.30).—Morphine and narcotine are first separated by treatment with aq. NH₃ and then other alkaloids by extraction with CHCl₃. HCl solutions of both extracts are united, purified (with PhOH), and evaporated.

E. H. S.

Producing an enzyme for treatment of malignant growths. E. T. KREBS (B.P. 417,513, 30.3.33).—

Malignant tissues contain an abnormal glucosido-protein, the structure of which includes a β -disaccharide (I), possibly an isomaltose. An enzyme complex ["sarcacinase" (S)], obtained from the fruit of *Prunus Armeniaca* (II), has no action on normal cells when injected into the body, but causes dissociation of malignant cells with hydrolysis of (I) by the emulsin complex present, with simultaneous tryptic and oxidative action. For prep. of S, emulsin is extracted from (II), and is purified by dissolving in dil. alkali and adding successively with agitation CHCl_3 , EtOH , and Et_2O . S passes into the CHCl_3 layer; the CHCl_3 is removed from the separated layer by compressed air, the product treated with EtOH , and dried at 50° . For injection, S is dissolved in dil. alkali, and the solution may be buffered to blood pH with PO_4''' mixture. I. A. P.

Manufacture of bacterial preparations for internal use from bacteria non-pathogenic for the human body. K. NAGAO (B.P. 417,382, 27.3.33).—Bacteria from a pure culture of *B. pullorum* are floated on physiological salt solution, killed by heating, and then removed and dried. E. H. S.

[Intestinal] adsorbent. J. C. BIRD, Assr. to J. WYETH & BRO., INC. (U.S.P. 1,949,266, 27.2.34. Appl., 6.10.32).—Kaolin is dispersed in a neutral inorg. hydroxide gel, e.g., $\text{Al}(\text{OH})_3$. E. H. S.

Preparation of therapeutic agents. E. H. EISING (B.P. 417,685, 16.6.33. U.S., 13.9.32).—See U.S.P. 1,919,055; B., 1934, 428.

NaOCl solution.—See VII. **Stable vitamin prep.**—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Optical sensitising in the synthesis of photographic emulsions. K. V. CHIBISOV (Kino-Photo Ind., 1933, 3, 90—102).—The effect of erythrosin (I) on the pptn. of AgBr in increasing contrast, decreasing fog, and increasing sensitivity to yellow light is attributed to adsorption of (I) on cryst. faces of the emulsion grains. Displacement of the max. sensitivity relative to the max. absorption is due to deformation of the electronic sheaths by this adsorption.

CH. ABS. (e)

Bromide development in bright yellow and white light. H. A. VAN DER KROON (Focus, 1934, 21, 142).— AgBr paper was developed in bright yellow or dim white light using as developer a solution containing 10% aq. $\text{Na}_2\text{S}_2\text{O}_4$ 20 pts., 10% aq. $\text{K}_2\text{S}_2\text{O}_5$ 50 pts., 10% aq. KBr 1 pt. The image had a general yellow stain which could be eliminated by increasing the dilution and adding $\text{Na}_2\text{S}_2\text{O}_3$. Development is restrained by increasing $[\text{KBr}]$ or $[\text{K}_2\text{S}_2\text{O}_5]$, but KBr must be present to prevent fogging. Increase in $[\text{Na}_2\text{S}_2\text{O}_4]$ had no effect. Prevention of light fog is helped by acidity. Similar results were obtained with amidol and AcOH , but the loss of emulsion speed was high.

CH. ABS. (e)

Determining nitrocellulose in films.—See V.

PATENTS.

Production of photographic emulsions and apparatus therefor. B. CLAUS (B.P. 417,453—4, 28.3.33. Ger., [A] 29.3.32 and 23.1.33).—(A) Photographic emulsions are subjected during prep. to the action of mechanical vibrations within the frequency range 10 — 10^7 Hertz (cycles per sec.). The finished emulsion may alternatively be treated, before pouring. (B) The vibratory treatment is applied to the Ag halide from the start of the mixing operations, before any, or when only a little, gelatin has been added, and continued for 1—2 hr., when the gelatin is added and ripening etc. processes are carried out, the vibration being continued. (A, B) Apparatus is described for producing the vibration. The emulsion may at the same time be heated, and may be exposed to an electrical high-frequency field. The production of very fine-grained emulsions with higher sensitivity to light is claimed.

J. L.

Photographic printing emulsions. W. A. BERRY (B.P. 417,257, 22.3.33).—A self-toning development emulsion is made by preparing a fine-grain AgCl emulsion, to which, after washing, the self-toning ingredients NaAuCl_4 , gum arabic, $\text{Pb}(\text{NO}_3)_2$, and NH_4CNS are added, together with usual hardening, sensitising, etc. ingredients. After development in a warm-tone developer a reddish image is obtained which tones and fixes in aq. $\text{Na}_2\text{S}_2\text{O}_3$ containing NH_4CNS , to the required sepia tone according to the duration of treatment.

J. L.

Treating materials which come in contact with photosensitive preparations. H. A. EDGERTON (B.P. 417,262, 29.3. and 26.8.33).—Wrapping, backing, or packing papers, intended to make contact with photographic emulsions, are treated, to minimise fogging or desensitising effects on these emulsions, by bathing or coating with a solution of K, Ba, Ca, NH_4 , Mg, or Ca K_2 ferrocyanide.

J. L.

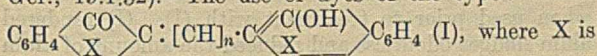
Treating photographic film. C. HOLZWARTH, Assr. to DU PONT FILM MANUFACTURING CORP. (U.S.P. 1,947,160, 13.2.34. Appl., 26.9.30).—Films of cellulose acetate are rendered free from wrinkles etc. by applying to both sides a solution of nitrocellulose, such that the total thickness of the applied layers is $\frac{1}{10}$ of the thickness of the film base, which must be thoroughly dried before coating. Such layers will not appreciably diminish the fire-resisting properties of the film. The solution has the preferred composition (by wt.): 10% of nitrocellulose, about 1% of camphor, 10% each of COMe_2 , BuOH , and $\text{OH}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{OEt}$, and about 60% of MeOH .

J. L.

Production of colour-photographic bleach-out images. B. GASPAR (B.P. 417,444, 4.1.33. Ger., 4.1.32).—The bleaching of fast dyes, i.e., acid substantive or azo dyes, is greatly increased by adding a suitable sensitiser, e.g., substituted thioureas, thiosinamine, or ethereal oils, together with an activator for the sensitiser, e.g., org. or inorg. acids, acid salts, or reducing substances, especially NaHSO_4 , Na formaldehyde-sulphoxylate, glucose, photographic developing substances, or metal sulphides or sulphites. Catalysts, e.g., V or Ti salts,

may also be added. When suitable dyes, sensitisers, and activators are incorporated in a gelatin emulsion coated on a suitable base, layers are obtained which bleach in sunlight in 5–10 min. From tripack or colour-screen images, coloured prints may be obtained. The images are fixed by washing out the sensitiser in H_2O , leaving fast-dye images. The fastness may then be increased by treatment with suitable mordants. J. L.

Sensitisation of photographic silver halide emulsions. I. G. FARBENIND. A.-G. (B.P. 416,664, 19.1.33. Ger., 19.1.32).—The use of dyes of the type:



S or Se, and n is 1, 3, or 5, is claimed. In the cases in which $n=1$, the methine H may be replaced by halogen or alkyl, and unsymmetrical dyes may be prepared by using mixed components. They are prepared from 2-hydroxy-thio (II) and -seleno-naphthen and derivatives by methods used in the prep. of mono-, di-, or tri-carbocyanines. Thus (II) (2 mols.) is condensed with $CMe(OEt)_3$ (III) and $NaOEt$ (sensitisation max. λ 605 $m\mu$), β -ethoxyacraldehydeacetal [(I), $X=S$, $n=3$; λ 660 $m\mu$], or α -anilino- ϵ -phenylimino- Δ^{α} -pentadiene hydrobromide (IV) [(I), $X=S$, $n=5$; λ 785 $m\mu$]. Other examples are: 6-chloro-4:5-benzo-2-hydroxythionaphthen + (III) (λ 650 $m\mu$), 2-acetoxy-selenonaphthen + (IV) [(I), $X=Se$, $n=5$; λ 795 $m\mu$], and 4-chloro-2-hydroxythionaphthen + β -anilinoacraldehydeanil hydrochloride (λ 505 $m\mu$). H. A. P.

XXII—EXPLOSIVES; MATCHES.

Detonation of explosives. (A) W. FRIEDERICH (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 232–234). (B) A. MAJRICH (*Ibid.*, 234–236). (C) W. FRIEDERICH (*Ibid.*, 236–237).—(A) Polemical against Schmidt (B., 1934, 604). His reference to the velocity of the explosion gases can apply only to the mean velocity and his equations show it to be $<$ the detonation velocity. Actually, these very dil. explosion gases attain double the detonation velocity. Schmidt's contention that the decomp. of propellants follows different laws from that of blasting explosives is refuted.

(B) A contribution to the discussion between Schmidt and Friederich (B., 1934, 604, and preceding abstract). Although Friederich has given useful results of measurements of detonation velocity, his subsequent conclusions are based on errors, and he has not solved the problem of the explosion gases. He confuses the translational velocity of explosion gases with the movements of their mols.

(C) A reply to Majrich.

W. J. W.

Thermochemical tables for the chemistry of explosives. A. SCHMIDT (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 259–266, 296–301).—The mol. wt., composition, heat of combustion, and heat of formation are given for a no. of compounds. For certain salts and oxides, the m.p., heat of fusion, b.p., heat of vaporisation, and crit. temp. are given. Curves show the dissociation temp. of CO_2 and H_2O vapour and the equilibrium in the water-gas reaction. The calculation of explosion temp. is discussed.

W. J. W.

Determination of brisance. P. NAOUM (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 223–229).—Haid's method of carrying out the Pb test (B., 1934, 604, 652) is criticised. It could be effective only if it enabled explosives of differing character and brisance to be compared, but this is impossible with a soft, expansible metal such as Pb. The test does not take d and detonation velocity into account, and the influence of the sensitiveness of explosives, according to the various d , is also neglected. It is essential that explosives should be tested at such d and in such a form as to have the max. sensitiveness to detonation. Explosives of different types or of different energies cannot be compared, since the expansion of the block is not \propto the effective energy. Haid's claim that there is no lack of proportionality when different amounts of explosive at const. vol. are used is incorrect. The test cannot discriminate between explosives as regards their effect in practice; it gives an idea of their sp. energy and not of their brisance. In comparing different explosives, such amounts must be used as will give equal expansions; i.e., the expansions per unit wt. must always refer to equal stresses in the block. Experimental results are given.

W. J. W.

Determination of explosive power. A. HAID and H. KOENEN (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 293–295).—A reply to Naoum (cf. preceding abstract) on the use of the Pb block. It is insisted that by Haid's method explosives reach their max. detonation velocity, provided a sufficiently strong initial impulse is given. The nature of the explosion gases and residue and the form of the block expansion are advanced as evidence.

W. J. W.

Cellulose nitrate.—See V.

PATENTS.

Explosive priming compositions. A. WEALE, A. RENFREW, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 415,779, 2.3.33).—Propagation of combustion, without excessive violence of action or loss of sensitiveness, is ensured by the use of $> 45\%$ of tetramethylenedicarbamide diperoxide (cf. A., 1915, i, 654) as an ingredient.

W. J. W.

Fuse for shells. H. E. NASH, Assr. to HERCULES POWDER Co. (U.S.P. 1,949,841, 6.3.34. Appl., 22.3.32).—The powder train for timing comprises a mixture of an oxidising agent, e.g., BaO_2 , and a right-hand element of group VI, e.g., Se or a mixture of S (2–15%) and Pb_3O_4 (98–85%); no substantial amount of gas is evolved on combustion.

B. M. V.

Production of explosives. C. WACHE (B.P. 415,806, 6.3.33).—After neutralisation of an oxide, hydroxide, or carbonate of an alkali or alkaline earth, e.g., slaked CaO , with HNO_3 , cellulose is added to the mixture and is nitrated by the excess HNO_3 . The mixture is then neutralised, if necessary, and dried. [Stat. ref.]

W. J. W.

Manufacture of explosive. L. E. D'A. CALLERY (B.P. 415,900, 17.10.33).—The product obtained from the treatment of $(CH_2)_6N_4$ (B., 1931, 319) is mixed with

NH_4NO_3 , which has been previously coated with castor oil, with or without aniline oil. To the mixture are added oil of turpentine (I) and, subsequently, Venice turpentine to prevent evaporation of (I) during storage.

W. J. W.

Explosive. N. G. JOHNSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,940,255, 19.12.33. Appl., 8.7.31).—Claim is made for a non-gelatinous dynamite mixture containing spherical pellets of a metal nitrate, e.g., a mixture of nitroglycerin 10, NH_4NO_3 30, 8—30-mesh NaNO_3 40, CaCO_3 1, and sawdust 19%.

A. R. P.

Explosive for blasting deep well holes. J. M. JEFFRIES, Assr. to ATLAS POWDER Co. (U.S.P. 1,948,583, 27.2.34. Appl., 9.12.31).—A gelatinous explosive containing $\leq 50\%$ of nitroglycerin has a central core, $\geq \frac{1}{2}$ the total wt., of a non- or semi-gelatinous granular explosive containing a liquid org. nitrate, and having a higher sensitiveness to propagation than that of the main explosive.

W. J. W.

Cellulose nitrate.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Evaluating liquid insecticides. F. C. NELSON, H. E. BUC, N. A. SANKOWSKY, and M. A. JERNAKOFF (Soap, 1934, 10, No. 10, 85, 87, 91, 105, 107).—Toxicity is determined by the direct application of the diluted insecticide to each insect by means of a capillary pipette. *Blatella germanica* (100 per test) and *Musca domestica* (300—600 per test) are used, the latter being sorted by size, and immobilised for treatment by a preliminary chilling. Abs. EtOH is recommended as a diluent.

L. D. G.

Testing pine oil [disinfectant] preparations. C. M. BREWER and G. L. A. RUEHLE (Soap, 1934, 10, No. 10, 81—83).—Phenol coeffs. as determined by the Rideal-Walker method (I) are usually $>$ by the F.D.A. method (II); in the case of pine oil preps. (I) may give a result 5 times as great as (II). Such differences are caused by enhanced osmosis, due to the higher NaCl content of the broth in which the test organism is grown, in (I). It is considered that (II) gives a closer approximation to practical conditions than does (I).

L. D. G.

Ferric sulphate coagulation [of sewage]. P. J. HOLTON, JUN., and E. L. BEAN (Water Works and Sewerage, 1934, 81, 229—232).—Anhyd. $\text{Fe}_2(\text{SO}_4)_3$ satisfactorily removes colour, Fe, and Mn. A stable floc is produced at relatively high p_{H} . After dosage, the H_2O is aerated and treated with $\text{Ca}(\text{OH})_2$ until alkalinity to phenolphthalein is slightly $> \frac{1}{2}$ that to Me-orange. Filtration follows after 2 days.

CH. ABS. (p)

Chemical composition of sludges, especially the organic constituents. Methods of examination. W. BENADE (Mitt. lab. Preuss. Geol. Landesanst., 1933, 19, 3—29; Chem. Zentr., 1934, i, 2329).—Methods of analysis are given.

A. G. P.

I. [Water-]filtration practices and filter-sands. L. V. CARPENTER. **II. Use of powdered activated**

charcoal. S. D. POARCH. **III. Disposal of ammonia liquor containing phenols.** W. W. HODGE and L. K. HERNDON (West Va. Univ. Eng. Exp. Sta. Tech. Bull., 1932, No. 5, 7—15, 19—29, 48—61).—I. Sand of effective diam. up to 0.5 mm. may be utilised in filters. 50% expansion during washing is desirable.

II. Activated C (I) (0.8 p.p.m.) completely removed the phenolic taste of H_2O from recently tarred roads. Algal odours were also removed if the H_2O temp. was $< 20^\circ$. Prechlorination with 3—4 lb. per million gals. removed colour and odour better than did large amounts when used prior to treatment with (I). (I) rendered alum sludges odourless and reduced the amount of alum required. Good flocculation was obtained at higher p_{H} when (I) was used.

III. PhOH condensate is eliminated by quenching hot coke, the liquor being subsequently aerated and clarified by sedimentation.

CH. ABS. (p)

Examination of filtered swimming-bath water. T. E. MOGG (Munic. Eng., 1934, 93, 606—608).—The presence of NO_2' is normally regarded with suspicion, but may result from the action of a reducing agent occurring in new brickwork. The protein-N is an index of urinary pollution. The O_2 consumption serves as a measure of purity, but in presence of Fe, NO_3' , or S' the test is invalidated.

CH. ABS. (p)

To what extent can the relationship between permanganate consumption and chlorine value indicate faecal contamination of waters? A. KAES (Gesundheitsing., 1934, 57, 30—32, 41—45; Chem. Zentr., 1934, i, 2634).—A large increase in Cl val. relative to O_2 consumption can occur only as a result of considerable and recent contamination of drinking- H_2O .

A. G. P.

Rôle of bacteriophage in natural purification [of water or sewage]. P. J. BEARD (J. Infect. Dis., 1933, 52, 420—426).—Bacteriophage is unlikely to participate in the reduction of bacterial nos.

CH. ABS. (p)

Effect of cyanide [in water] on Black Hills trout. A. KARSTEN (Black Hills Eng., 1934, 22, 145—174).—In the disposal of cyanamide-cyanide effluents into streams, the toxic action on trout at a distance from the point of entry may result from the formation of a cyanide cryohydrate. Acids, FeSO_4 , or KMnO_4 will not reduce CN' concns. to safe ranges, but serve to reduce the required stream: effluent ratio.

CH. ABS. (p)

Determining SO_4'' in boiler- H_2O .—See I. Porous slugs. —See X. **Germicides.**—See XX.

PATENTS.

Sewage disposal. C. L. RILEY, Assr. to INDUSTRIAL ASSOCIATES, INC. (U.S.P. 1,949,181, 27.2.34. Appl., 26.8.31).—Freshly-deposited solids from screened and detritus-free sewage are centrifugally atomised in a current of hot gases. The dry product may be used as a source of heat or as a fertiliser.

C. J.

NH_4Cl .—See VII. **Hand-cleaning composition.**—See XII.