

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAR. 17 and 24, 1933.*

I.—GENERAL; PLANT; MACHINERY.

Viscous friction and the application to the theory of lubrication. P. MERCIER (J. Rheology, 1932, 3, 391—412).—Theoretical. E. S. H.

Modification and calibration of Kühl's sedimentation apparatus. (COUNT) CZERNIN (Cement, 1933, 6, 1—2).—The Kühl-Czernin apparatus is considered simpler and more effective than Koyanagi's modification of the instrument (B., 1933, 47), particularly as regards the discharging arrangement. The entry of EtOH through a side tube above the exit is preferred to rubber connexions on the sedimentation tube. The temp. effect of the method of charging is compared and the difficulty of abs. EtOH may be overcome by using a defined mixture of petroleum fractions as the sedimentation liquid, e.g., a 3:1 mixture of petrol and medium oil, though calibration is necessary with any change of medium. C. A. K.

Determination of "average particle size" from the screen-analysis of non-uniform particulate substances. T. HATCH (J. Franklin Inst., 1933, 215, 27—37).—Theoretical. The relation between frequency-distribution curves by count and by wt. is deduced, and applied to the screen analysis of crushed limestone. H. J. E.

Atomisation of liquid jets. H. B. HOLROYD (J. Franklin Inst., 1933, 215, 93—97).—Theoretical. The results are applied to oil atomisation. H. J. E.

Filtration. I. Critical analysis of filtration theory. B. F. RUTH [with G. H. MONTILLON and R. E. MONTONNA] (Ind. Eng. Chem., 1933, 25, 76—82).—The various equations applied in filtration calculations are discussed. Only for incompressible substances is it possible to derive an equation on theoretical grounds, neglecting the resistance of the cloth, but the existence of materials that show perfectly non-compressible behaviour during filtration has never been demonstrated. From a consideration of the moisture content of different layers of a cake of $\text{Fe}(\text{OH})_3$ it would appear that the larger part of the resistance to flow is located in the layer adjoining the cloth. The distribution of resistance from the deposition zone to the cloth surface is far more complex than was formerly supposed. D. K. M.

Automatic regulation of mixture relations of gases in chemical practice. MAYER-WITTEN (Chem. Fabr., 1933, 6, 61—62).—Plant and technique are described, with special reference to the reaction $(2\text{H}_2\text{S} + \text{CO}_2) + \text{O}_2 = 2\text{H}_2\text{O} + \text{CO}_2 + \text{S}$. E. S. H.

Fire protection in industrial buildings. H. G. HOLT (Ind. Chem., 1933, 9, 55—57).—A review.

Accident prevention in the chemical industry. RHEINFELS (Chem. Fabr., 1933, 6, 51—55).—A publication of a German trade association on accident prevention is summarised. Typical accidents under various headings are described and precautions which should have been taken are outlined. Various new safety devices, CO detectors, and the like are mentioned. C. I.

H₂SO₄ plant.—See VII.

PATENTS.

Disposal of fly ash of furnaces. INTERNAT. COMBUSTION, LTD., Assees. of W. R. WOOD (B.P. 384,877, 24.3.32. U.S., 26.3.31).—The fly ash from one or more furnaces (of any type) is collected by known means and delivered to a special furnace of the liquid-ash type where it is burned with the aid of additional fuel preferably supplied above the air-borne fly ash. The special furnace may either be a self-contained boiler, or deliver its products of combustion into one of the main boiler furnaces. B. M. V.

Oil-still [vertical] condenser. D. W. R. MORGAN, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. CORP. (U.S.P. 1,853,628, 12.4.32. Appl., 23.3.27).—A tubular heat exchanger is described. In the case of crude petroleum oil, the hot oil vapour traverses a nest of tubes through which the oil to be heated flows. The preheating portion of the nest contains several vertical passes, and the final or vaporising portion a single pass containing a relatively large no. of tubes. H. E. T.

Heat-abstraction. C. C. HERITAGE, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,817,983, 11.8.31. Appl., 30.7.25).—Liquids *A* and *B* are chosen such that *A* + *B* has lower m.p. than *A* or *B*. The liquids are separately partly frozen and then mixed, whereupon the solids melt, abstracting their latent heat from the system. Thus, 162 pts. of 100% H₂SO₄ at 10.5° may be mixed with 108 pts. of 85% H₂SO₄ at 8° to give a temp. of —25° to —30°, suitable, e.g., for condensation of carbazole and nitrosophenol. C. H.

Centrifugal dryer. W. V. ORR (U.S.P. 1,854,621, 19.4.32. 6.5.29).—A centrifuge is provided with a self-balancing liquid flywheel and with a brake and friction drive put in and out of action, respectively, by raising the cover. B. M. V.

De-liming of hot-water and steam installations. E. KOHN and E. GRAESER (B.P. 386,263, 2.8.32).—A portable apparatus is described by which HCl may be supplied to a heating system under pressure (which is maintained in the pipes) and at an elevated temp. (60—70°). B. M. V.

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

Manufacture of absorbent material [for ammonia refrigerating systems]. J. G. RUCKELSHAUS and N. W. KEMPF (U.S.P. 1,852,029, 5.4.32. Appl., 7.3.31).—A mixture of CaCl_2 100, NH_4Cl or NH_4NO_3 2, FeCl_3 or $\text{Fe}(\text{NO}_3)_3$ 1, and Na_2SiO_3 7–8 pts. is made into a thick homogeneous paste with H_2O and baked at 200° until all the H_2O and NH_3 are evolved, leaving a hard porous product which has a high absorptive power for NH_3 . A. R. P.

Mixing or grinding apparatus or the like. J. T. and J. BLACKETT, and BLACKETT, HUTTON & Co., LTD. (B.P. 386,453, 6.2.32).—A timing device for controlling the feed, period of mixing, and discharge of a pan or the like is described. B. M. V.

[Spraying device for] moistening of sub-divided materials, such as cereals. N. T. BRYAN, and ASSOCIATED LONDON FLOUR MILLERS, LTD. (B.P. 386,395, 18.11.31).—The material, e.g., wheat "middlings," is allowed to fall vertically into a strong horizontal current of air and H_2O is sprayed horizontally above the latter, the mixture of all three being collected in a converging pipe which leads to a cyclone or other separator, whence the air may be withdrawn for re-use and the "middlings" are collected. B. M. V.

Apparatus for separating [finely-divided] solids from liquids. E. T. WILKINS (B.P. 386,312, 4.6.31).—A settling chamber is provided with a no. of closely spaced baffles inclined so steeply that no permanent lodgment of settled solids takes place. The inlet for pulp is substantially at the same level as the overflow and the flow from the former to the latter is past or between the upper edges of the baffle plates, in a direct path. No upward-current wash is provided and the distance between the baffle plates measured horizontally is much < their height. B. M. V.

Centrifugal machine. H. SCHUBERT (B.P. 386,594, 27.8.32).—In a centrifuge adapted to the continuous discharge of solid products along a conical wall the basket is polygonal in plan, the sides being tiltable to vary the slope to the axis of the walls; the tilting sides are connected to each other by non-tilting angular cheeks. The tilting parts may be formed of foraminous belts guided over rollers at the top and bottom. B. M. V.

Operation of centrifugal machines. F. MÜLLER and O. KALDUNEE (B.P. 386,465, 29.2.32).—In a centrifugal machine provided with a fixed inner shaft in which passages are formed for the inlet of material and outlet of lighter constituent, the two fluids are caused to flow in a pulsating manner by the operation of coupled valves, one of which is opened while the other is closed. B. M. V.

Centrifugal separators [for gases]. J. HOWDEN & Co., LTD., and W. H. HOWDEN (B.P. 386,079—80, 16.11.31).—In an air cleaner of the type in which a spiral passage forms the inlet to a fan, methods of forming the apertures to skim off the conc. dust-laden layer of gases are described; the gases are freed from dust in a cyclone or other separator and returned to the eye of the fan. B. M. V.

Partial separation of gaseous mixtures. M. FRANKL (B.P. 386,205, 19.5.32. Ger., 20.5.31).—A

mixture of gases, e.g., air to be separated into N_2 and a fraction containing 42% O_2 , is supplied in two portions at different pressures: *A*, at about 2 atm., and *B*, at about 1 atm. Both are precooled in alternately-used cold regenerators (*C*), *A* exchanging heat with the outgoing N_2 and *B* with the O_2 -rich gas. *A* is passed to a high-pressure rectifier (*H*) cooled at the top by O_2 -rich gas leaving the low-pressure rectifier (*L*), liquid N_2 from *H* forms the reflux liquid in *L*, and the O_2 -rich liquid also passes to *L* at or near the bottom thereof. The inward and outward quantities of gas passing through *C* are adjusted to be equal, the balancing being effected by withdrawing a portion of *A*, subjecting it to heat interchange with itself and to compression and expansion (with work), and passing the refrigerated gases either to *L* or the cold recuperator for *B*. B. M. V.

Apparatus for scrubbing gas. R. and I. M. MACLAURIN, and BLAIRS, LTD. (B.P. 386,089, 21.11.31).—A spraying device for scrubbing liquid comprises a perforated shell (*A*) rotating at centrifugal speed about a vertical axis; *A* is provided with scoops for lifting liquid from the same tray into which it falls, and has brushes protruding from the apertures to break up the liquid. B. M. V.

Spraying devices, more particularly for use in gas scrubbers and the like. W. W. GROVES. From DR. C. OTTO & Co. G.M.B.H. (B.P. 386,397, 19.11.31).—In a spray chamber depends a vertical liquid-supply pipe of diminishing diam. downwards and formed with horizontal circumferential slots which are surrounded by collars having their lower and effective faces conical so as to deflect the issuing spray downwards; the lower collars have a steeper inclination to the conical surfaces than the upper ones, so that a series of nesting, conical sheets of spray is formed. B. M. V.

Thermostats. GEN. PLATE CO. (B.P. [A] 384,673 and [B] 384,682, [A, B] 10.6.31. U.S., 26.6.30).—Snap-action devices formed of corrugated bimetal sheet are described. In (A) the final form is conical, the corrugations running from the truncated apex to the base; actually they may conveniently be made from cylindrical strip, the corrugations being much deeper along the edge which will be nearest the apex. In (B) an elongated straight strip with transverse corrugations is used. B. M. V.

Drying plant [for strip material]. AKTIEB. SVENSKA FLÄKTFABRIKEN (B.P. 386,171, 29.3.32. Swed., 26.3.31). B. M. V.

Activating fuller's earth etc.—See II. Retort furnaces. Non-oxidising heating furnace.—See X.

II.—FUEL; GAS; TAR; MINERAL OILS.

Disintegration and total dissolution of coal in anthracene oil. A. GILLET and A. PILOT (Bull. Soc. Chim. Belg., 1932, 41, 511–520).—Coal dissolves in anthracene oil (residue about 6% at 350°), yielding viscous solutions, the viscosity varying with the time of heating, exposure to the atm., etc. 36% dissolves at $< 280^\circ$, without much decomp., whilst a further 60% dissolves at 280 – 350° with apparent depolymerisation and with development of acidic properties. The former

separates into 4 fractions with different velocities of dissolution and with compositions distinct from the average for coal, these probably corresponding to "bitumes." Two fractions dissolving above 280° have compositions near to the average for the coal. The changes observed at these temp. are attributed to the neutralisation by Fe of the acidic substances liberated in the preliminary decomp., hydrolysis of OMe groups by alkaline ions, decomp. of partly neutralised CO₂H groups with loss of CO₂ and basic ions, and to decomp. with loss of H₂O. J. W. S.

Specific differences in the combustion of brown coal and bituminous coal. AUFHÄUSER (Braunkohle, 1932, 31, 655—662; Chem. Zentr., 1932, ii, 2398).

Caking phenomena of coals and method of testing. T. SHIMMURA and H. NOMURA (J. Fuel Soc. Japan, 1932, 12, 132—140).—An investigation has been made, using Japanese coals, into the potentialities of the Lessing apparatus and embracing the prediction of coking powers and the yield of coke and by-products. The relative coking powers of good coking coals cannot be ascertained in this apparatus when used in the customary manner, but by decreasing the rate of heating the several coals swell to varying degrees and from the relative degree of swelling the coking powers of the good coking coals can be deduced. The rates of heating used were 1°, 5°, and 10° per min., whereas in the normal Lessing procedure the coal reaches 850° in 2 min. and 900° in 3 min. The coals need not be heated above 600° to measure the degree of swelling. The slower rate of heating does not affect the coke yield, but the tar yield is decreased, and the liquor and gas yield are decreased, by the slower heating. Explanations of these phenomena are offered. G. E. F.

Caking constituents and the coking property of coal. T. SHIMMURA (J. Fuel Soc. Japan, 1932, 12, 140—149).—"Caking" refers to the agglutination of coal in the laboratory test; "coking" to the quality of the commercial coke. Japanese coals have been extracted with solvents under atm. pressure and resolved into α -, β -, γ_1 -, γ_2 -, and γ_3 -compounds, the solvents used being the usual C₂H₅N and CHCl₃, whilst the γ -compounds were extracted with light petroleum followed by Et₂O. The γ_1 -compounds were found to consist of resins, saturated hydrocarbons, and unsaturated hydrocarbons in the proportion 10.68:39.06:48.24, thus confirming generally the experiments of Cockram and Wheeler on English coals (B., 1927, 401). The γ_2 - and γ_3 -compounds consisted principally of resins, γ_2 being principally acid resins, resinols, and ester resins, whilst γ_3 is chiefly resene resins. It is concluded that the γ_1 -compounds exercise the caking action, whilst the γ_2 - and γ_3 -compounds afford the swelling action, γ_3 being more potent than γ_2 . The strongly and weakly caking coals are differentiated by the γ -compound content of strongly caking coals being in most cases > 10% and of weakly caking coals < 10%. The O content of the α -compounds is believed to influence the coking property. G. E. F.

Coking of hard coal with the addition of coke dust. N. P. CHIZHEVSKI and F. A. POPUTNIKOV (Khim. Tverd. Topl., 1931, 2, No. 2, 25—30).—Satisfactory

results attended the addition of 15% of waste powdered coke. CH. ABS.

Influence of the moisture content of coal on the heat consumption during coking. K. BAUM (Arch. Eisenhüttenw., 1932—3, 6, 263—269).—The effect of the moisture content of coal on the heat requirements in coking can be determined only in large-scale tests in ovens having a thermal efficiency of 70—75%. From theoretical considerations it is shown, however, that up to 6% of moisture has practically no effect on the heat consumption in the coke oven, as the heat necessary for vaporising this H₂O can be extracted from the hot gases rising from the coal in the lower zones of the oven; if the coal is dry this heat is almost completely wasted, as the heat conductivity of the coal is so low that little preheating by the hot gases takes place. With > 6% of moisture in the coal the heat consumption in the ovens rises rapidly; the quantity of H₂O required to cool the crude gas also increases, owing to its high moisture content. A. R. P.

Yields of distillation products of brown coals. G. AGDE and R. HUBERTUS (Braunkohle, 1932, 31, 675—680; Chem. Zentr., 1932, ii, 2399).—Comparative experiments under different conditions (vac., hot air, etc.) are described. The yields depend on the manner of dehydration and heating. A. A. E.

Experiences of silica in a continuous vertical [carbonising] plant. O. A. TERNES (Gas J., 1933, 201, 146—148).—The higher temp. used with SiO₂ retorts result in greater scurfing and spalling troubles. The accumulation of C is not prevented by decreasing the throughput, working with a slight pull or pressure on the retorts, or by cutting down the steaming period. The only remedy is to lower the temp. and so diminish the throughput. Spalling is confined to the hottest part of the retort wall and is more pronounced when downward firing is used. It may, however, be reduced by using chrome-SiO₂ or sillimanite bricks, but the present cost is prohibitive. R. N. B.

Benzine recovery from brown coal low-temperature gases by washing with paraffin oil and separating the benzene therefrom by vacuum distillation. O. KREBS (Chem.-Ztg., 1932, 56, 1009—1011, 1034—1035).—Details are given of the design and operation of a plant for this purpose. A. B. M.

Determination of organic sulphur in gas. C. H. WILSON (Ind. Eng. Chem. [Anal.], 1933, 5, 20—22).—A modification of the apparatus recommended by the Amer. Soc. Testing Materials (1930, D90—30 r, p. 391), for use originally with motor fuels, is described. T. McL.

Conversion of potential energy of coal gas into radiant energy. H. HARTLEY (Gas J., 1932, 200, Suppl., 14).—Total radiation from non-luminous flames rises from 10% to 18% of the heat input as the primary air/gas ratio falls from 5 to 2.5. About 85% of the total radiation is from the outer cone and outer heated products and 15% from the inter-conal gases. Radiation from the inner cone is negligible. Both the quality and quantity of total radiation are affected by insertion of solids into the inter-conal gases. The extent depends

on the surface properties of the substance used. There are apparently large variations in the emissivities of different solids. A coating of U oxide increased and of Al_2O_3 decreased the radiant efficiency of a gas fire. Radiant efficiency depends on the degree of primary aëration and the rate of combustion of gas. The presence of CO and H_2 in the inter-conal gases may influence radiant efficiency. Radiation from flame in gas fires is only 8–10% of total radiation and only $\frac{1}{3}$ of the radiation from an open flame. G. M.

Crystalline phenols from lignite tars. F. SCHULZ and J. PRUNET (Coll. Czech. Chem. Comm., 1932, 4, 531–537).—Extraction of the oil from lignite tar with H_2O and fractional pptn. by $Pb(OAc)_2$ yields pyrocatechol and a cryst. and an oily mixture of its homologues. R. S. C.

Influence of bunker enriching oil on composition of distillates from water-gas tar. C. W. GRIFFIN (Ind. Eng. Chem., 1933, 25, 89–93).—The chief constituents (PhMe, xylene, mesitylene, pseudocumene, $C_{10}H_8$, $C_{10}H_7Me$, $C_{10}H_6Me_2$, anthracene, phenanthrene, methylanthracene), together with many of their physical and chemical properties, of a heavy and a light oil obtained by distillation of the tar formed in a water-gas plant, using an enriching oil, have been determined. D. K. M.

Action of aluminium chloride on peat-tar oil. E. V. KONDRATIEV (Khim. Tverd. Topl., 1931, 2, No. 2, 31–36).—The oil, b.p. 200–300°, afforded $\geq 25\%$ b.p. 65–200° and 30% b.p. 200–285°, both free from unsaturated and O compounds; aromatic compounds were not detected. CH. ABS.

Chemical composition of pitch distillate. K. ZERBE and F. ECKERT (Brennstoff-Chem., 1933, 14, 1–3).—The distillate obtained when pitch is destructively distilled to form coke has been fractionated under low pressure. From the fractions appreciable quantities of the following compounds have been isolated: $C_{10}H_8$, acenaphthene, fluorene, phenanthrene, carbazole, anthracene, methylanthracene, acridine, fluoranthene, naphthofluorene, pyrene, chrysene, and phenylnaphthylcarbazole. A. B. M.

Modern methods of benzol refining. Use of inhibitors for preventing gum formation. W. H. HOFFERT and G. CLAXTON (J.S.C.I., 1933, 52, 25–33 T).—Attention is drawn to new refining processes that avoid the losses (5–10%) incurred by refining with conc. H_2SO_4 . Most of these processes depend on the removal of sufficient of the unsaturated hydrocarbons to render the benzol stable. Another method, which conserves all these hydrocarbons, is to prevent their oxidation to gum by the addition of minute traces of inhibitors. These substances, of which phenols and aminophenols are the most effective, prevent the initial formation of peroxides and cause a delay or induction period in which no oxidation takes place. The gumming may be accelerated by increase of temp. or O_2 pressure, and the length of the induction period under such conditions has been used to predict the stability of the fuel on storage. Gumming may occur during the induction period, and the authors prefer a test in which the benzol is refluxed with O_2 , the gum being obtained

by evaporation after a specified period. A benzol will be stable for at least 6 months if this accelerated gum test shows stability at the end of 3 hr. The relative merits of different inhibitors are discussed as well as the action of accelerating impurities. The practical application of inhibitors to benzols is described and reference is made to supplementary treatment which may be given specifically for the removal of colour, odour, or S. Examples of the treatment are also given.

Kaluga crude oil. B. K. TARASOV (Rep. Lubr. Oil Comm., U.S.S.R., 1932, 2, 102–108).—The oil has d_4^{20} 0.9336; E^{30} 21.5, E^{40} 11.4, E^{50} 7.2; flash point 59°, pour point below -15° ; 5.04% (d_4^{20} 0.783) distilling at $\geq 200^\circ$, 9.1% (d_4^{20} 0.836) $\geq 270^\circ$, residue 85% (yielding 35% of lubricating oil). Yields are: gasoline and kerosene 15, gas oil 16, spindle oil 10, machine oil 20, cylinder stock 7, tar 32%. The lubricating oils have high oiliness and comparatively low viscosity. CH. ABS.

Crude oil in the Kalmuitzko-Salskiya district. F. F. GOLVINETZ (Neft. Choz., 1932, 21, 45–46).—Traces of oil and gas were found in the Manuich River district. CH. ABS.

Preparing bright stocks from Emba crude oil. B. E. VLASENKO, A. P. MUZUCHENKO, and V. V. MESHCHERIKOV (Rep. Lubr. Oil Comm., U.S.S.R., 1932, 2, 127–138).—Prep. and characteristics are described. CH. ABS.

Preparing bright stocks from Emba crude oils. N. D. GRAMENITZKI (Rep. Lubr. Oil Comm., U.S.S.R., 1932, 2, 109–126).—Prep. and characteristics are described. Physical properties of Russian and typical American bright stocks are compared. CH. ABS.

Cracking of crude oil gives more benzine of higher octane number. E. F. NELSON and G. EGLOFF (Petroleum, 1932, 28, No. 51, 6–10).—Comparative experiments show that direct cracking of the crude oil is preferable to (a) topping the crude oil, cracking the topped oil, and mixing the cracked and straight-run benzines, or (b) cracking both the topped oil and the straight-run benzine and mixing the two cracked benzines. Direct cracking of a Texas crude gave 70.9% of benzine having C_8H_{18} no. 70. A. B. M.

Distillation of Baku fuel oils in a laboratory pipe still. B. B. KAMINER and V. L. GURVICH (Rep. Lubr. Oil Comm., U.S.S.R., 1932, 2, 83–93).—Vac. distillation gives the best separation of fractions. Steam carries over bubbles, but permits the use of better fractionating equipment. Treatment with fuller's earth was satisfactory in all cases. CH. ABS.

Crude-oil distillation curves. B. P. VOINOV (Neft. Choz., 1931, 21, 259–260).—Conversion tables for wt.-% and vol.-% for Surakhani crude-oil distillates at ordinary and lower pressures are given. CH. ABS.

Crude-oil distillation curves. V. P. DENISEVICH and L. Y. FYURST (Neft. Choz., 1931, 21, 261).—Pole-mical (cf. preceding abstract). CH. ABS.

Production of benzine from Hodonin crude oil by hydrogenation under pressure. S. LANDA and M. LANDOVÁ (Petroleum, 1932, 28, No. 51, 10–12).—By hydrogenating a crude Czechoslovakian oil in a

2-litre rotary autoclave at 465–470°, under a max. H_2 pressure of about 200 atm., in the presence of MoS_3 or $(NH_4)_2MoS_4$, a 55% yield of benzene boiling to 230° was obtained. The heavy residue could be re-treated and it is calc. that in a continuous plant an 80% yield of benzene could be obtained. The benzene contains a high proportion of aromatic and naphthene hydrocarbons.

A. B. M.

Influence of pressure and temperature on the synthesis of benzene and synthol in a liquid medium. F. FISCHER and H. KÜSTER (Brennstoff-Chem., 1933, 14, 3–8; cf. B., 1931, 962).—The initial gas (CO 28%, H_2 59%) was passed through an electrically-heated, horizontal, cylindrical autoclave of 3 litres capacity, containing 1 litre of paraffin oil in which 200 g. of catalyst (9 Co : 2 Th : 1 Cu : 0.25 Ce on kieselguhr; cf. B., 1932, 376) was suspended. The autoclave was lined with Ag and the contents were vigorously stirred. It was necessary to work at a higher temp. in the oil phase than in the gaseous phase to bring about the same rate of conversion of gas into liquid products; this is attributed to the presence of active areas of higher local temp. on the catalyst in the gaseous phase, so that the recorded average temp. is lower than the actual reaction temp. The optimum pressure (at a temp. of 250°) for the production of benzene was about 1 atm.; the total oil production under these conditions was 179.5 c.c./cu. m., of which 33 c.c. were benzene. At higher pressures oxygenated compounds ("synthol") were formed. The activity of the catalyst fell off more rapidly in the oil phase than in the gaseous phase.

A. B. M.

Recent [developments in] petroleum distillation. R. FUSSTEIG (Brennstoff-Chem., 1933, 14, 9–12).—The design and operation of modern pipe stills are described (cf. Edmonds, B., 1931, 997).

A. B. M.

Decomposition of mineral oil on heating under pressure. S. PHILIPPIDE (Petroleum, 1932, 28, No. 51, 1–6).—An American illuminating oil, topped to 200°, was passed through an electrically heated tube at 600° at different pressures and with different rates of passage, both with and without a catalyst, e.g., clay or fuller's earth. The yields of oil boiling to 200° increased with decreased rate of passage and with increased pressure, although the latter effect appeared to be due only to the increased time of heating resulting from the compression of the gases and vapours in the tube. An increased yield of light oil, up to about 70% at 20 atm., was also obtained in the presence of the catalysts used. The boiling ranges, d , and n of the oils obtained on fractionation of the products are tabulated.

A. B. M.

Resistance of mineral oils to decomposition by sunlight. L. W. GREEN and R. E. SCHOETZOW (J. Amer. Pharm. Assoc., 1932, 21, 1286–1287).—The rate of deterioration on exposure to sunlight of liquid petroleum U.S.P. of varying geographical origin stored in flint glass bottles is very variable. The stability can be measured by comparatively short exposures of the oil contained in such bottles to ultra-violet light.

E. H. S.

Oxidation mechanism of mineral oils. IV. Effect of some alcohols, esters, and others. T. YAMADA (J. Soc. Chem. Ind., Japan, 1932, 35, 467–468 B; cf. B., 1932, 666).—The oil (switch oil [A] or technical refined oil [B]) containing 1% of an alcohol, ester, or ketone were heated in a closed bulb containing O_2 , oxidation being followed by observation of the decrease in O_2 pressure. The O_2 absorption of B was accelerated by allyl, octyl, cetyl, and decyl alcohols, glycerol, mannitol, and ethylene glycol, the induction period tending to be reduced. The last-named and naphthenic alcohol accelerated O_2 absorption of A and oleyl, allyl, octyl, and cetyl alcohols slightly retarded it. A no. of alcohols tended to prevent sludging and to increase the saponification val. of an oil. Et linoleate increased the O_2 absorption of B, and Et esters of petroleum and naphthenic acids retarded it; Et oleate and stearate had no effect. Dihydroxyacetone and glyceraldehyde accelerated the O_2 absorption of B.

H. E. B.

Mineral oil sulphonic acids. S. VON PILAT, J. SEREDA, and W. SZANKOWSKI (Petroleum, 1933, 29, No. 3, 1–11).—The sulphonic acids formed in the acid refining of petroleum fall into 3 classes. The α -sulphonic acids are found mainly in the acid tar, but partly also in the oil layer, and form Ca salts insol. in H_2O and Et_2O ; β -sulphonic acids are present mainly in the oil phase, but occur also in the acid tar when oleum is used, and give Ca salts insol. in H_2O but sol. in Et_2O ; the γ -acids occur in the acid tar only, and form H_2O -sol. but Et_2O -insol. Ca salts. The content of γ -acids depends on the source of the oil, but their nature seems invariant and two acids $C_9H_9 \cdot SO_3H$ and $C_{19}H_{20} \cdot SO_3H$ are isolated from a variety of oils as Ca salts, and characterised by conversion into Na salts, and also into Me esters, sulphonyl chlorides, and sulphonamides. Reduction of the sulphonyl chlorides gives substances with the properties of sulphinic acids or thiols (Hg salts) according to conditions. Fusion of the sulphonic acids with alkali at 200–210° gives phenolic compounds, characterised by formation of red dyes with diazobenzene- p -sulphonic acid; these do not give well-defined Bz derivatives, but in one case a substance, approx. $C_8H_8 \cdot OAc$, is formed with $AcCl$ in $AcOH$. None of these derivatives is cryst., but analyses and mol. wt. determinations confirm the formula $C_9H_9 \cdot SO_3H$, but do not agree well with analyses of the Na and Ba salts in the case of the acid $C_{19}H_{20} \cdot SO_3H$. It thus appears that the γ -acids from petroleum of varying geographical origin are similar in structure, if not identical.

H. A. P.

Removal of sulphur compounds from petroleum distillates. H. N. HOLMES, A. L. ELDER, and N. BEEMAN (J. Physical Chem., 1932, 36, 2981–2993).—The use of SiO_2 gels, impregnated with CuS , is recommended for the purpose. The process is superior to the H_2SO_4 treatment in avoiding a heavy loss of anti-knock fuel. CuS proved to be more efficient than MnS , PbS , FeS , or Ag_2S , and the efficiency is increased by distribution on SiO_2 gel. The efficiency of the adsorbent varies greatly with the activation temp. During activation Cu_2S is formed, and the S liberated should be driven off by heating. The gels described may be regenerated

and used repeatedly. An improved S lamp for the oil industry is described. E. S. H.

Hydrogenation of petroleum products under pressure. A. SACHANEN and M. TILITSCHÉEV (*Erdöl u. Teer*, 1932, 8, 317—319, 332—334, 348—350, 364—365; *Chem. Zentr.*, 1932, ii, 2265—2267).—The mechanism of the reactions is discussed. Pressure-hydrogenation was carried out with kerosene distillates, gas oil, paraffin distillates, heavy mazout, and cracking residues; the results are tabulated. The high H_2 pressure at the beginning of the process retards the decomp. processes. Rise of temp. by 10° doubles the decomp. velocity. Practically the same yields of decomp. products are obtained at 375° , 400° , and 425° if the duration ratio is 36:6:1. The presence of catalysts has little effect on the decomp. velocity or the production of benzene. The speed of decomp. of the decomp. process in the hydrogenation of heavy mazout with catalyst is the same as that of paraffin distillate without catalyst. To produce max. yields of benzene repeated hydrogenation is necessary. Condensation reactions and coke formation are much less marked than in cracking; the latter can be completely avoided. Light distillates can be hydrogenated at high temp. and moderate H_2 pressure, whilst heavy oils require a moderate temp. and high H_2 pressure. In order to avoid unnecessary loss by gas formation, the benzene yield in a single hydrogenation should not exceed 30—35%. By repeated hydrogenation mazout yields ≥ 80 wt.-% of benzene. The H_2 used (in absence of coke formation) for mazout is about 1% per 20% of benzene yield; for distillate it is 0.75%. The benzene contained aromatic hydrocarbons 5, unsaturated hydrocarbons 10, naphthenes 25, and paraffins 60%. A. A. E.

Plumbite treatment of light straight-run and cracked fractions. A. G. ZAKHARENKO, M. V. FRISH, and A. I. DUMSKAYA (*Neft. Choz.*, 1931, 21, 344—352).—The pressure distillate is pumped into "sulphators" charged with S, and then into plumbite treaters; it enters a washing column through injectors. Properties of cracked gasoline before and after treatment are recorded. CH. ABS.

Refining of petroleum. V. KOROBKIN (*Neft. Choz.*, 1931, 21, 256—260).—Conclusions reached as a result of investigations on distillation, coolers for dewaxing, manufacture of petroleum asphalt, cracking, and utilisation of acid sludge, carried out by the Soviet Technical Bureau in the U.S.A., are recorded.

CH. ABS.

Composition of gasolines. I. M. KLIGERMAN (*Azerbaid. Neft. Choz.*, 1932, No. 8—9, 59—66).—Vals. for Russian gasolines are given. CH. ABS.

Determination of benzene hydrocarbons in gasoline by the aniline-point method. G. GALPERN (*Neft. Choz.*, 1931, 21, 262—264).—Sachanov's conversion factors gave trustworthy results. An attempt to determine C_6H_6 , PhMe, and $C_6H_4Me_2$ in fractions boiling within the range of each of these compounds fractionated from the gasoline-aromatic hydrocarbon mixture in a Glinski apparatus by means of NH_2Ph points for each fraction failed owing to the inefficiency of the apparatus. CH. ABS.

Separation of aromatic hydrocarbons from aromatic gasoline by extraction with liquid sulphur dioxide. M. MIZUTA (*J. Soc. Chem. Ind., Japan*, 1932, 35, 469 B).—A gasoline from Taiwan crude oil, rich in PhMe and xylene, was treated with 80% H_2SO_4 completely to remove unsaturated hydrocarbons and separated into 3 fractions ($60-97^\circ$, $97-120^\circ$, and $120-150^\circ$) from which aromatic hydrocarbons were extracted with 98% H_2SO_4 and each residue was mixed with definite amounts of C_6H_6 , PhMe, or xylene and the mixtures were extracted with liquid SO_2 (-18°). The proportion of aromatic hydrocarbons extracted with a fixed quantity of SO_2 increased with decreasing content of aromatic hydrocarbons in the mixture and the purity of the extract was correspondingly reduced. Naphthenes and paraffins could also be extracted with the aromatic hydrocarbons. It is considered that crude aromatic hydrocarbons may be produced industrially from gasoline (containing 35% of aromatic hydrocarbons) by a continuous circulatory extraction method, using liquid SO_2 . H. E. B.

Separation of toluene from the toluene fraction of gasoline, by the formation of its azeotropic mixture with methyl alcohol. M. MIZUTA (*J. Soc. Chem. Ind., Japan*, 1932, 35, 470 B).—Sufficient MeOH is added to the PhMe fraction to give a min. b.-p. mixture and the mixture is distilled. PhMe collects in the residue and may be purified by further distillation with appropriate amounts of MeOH, which may finally be recovered. H. E. B.

Low-temperature separation of mixtures of ethane and methane. L. COPPENS (*Bull. Soc. chim. Belg.*, 1932, 41, 525—528).— CH_4 and C_2H_6 can be separated quantitatively by passing the mixture slowly into an evacuated apparatus containing in series an ordinary liquid-air trap and a similar trap containing a large excess of SiO_2 gel and also immersed in liquid air. The C_2H_6 condenses in the former and any CH_4 condensing with it distils off and is adsorbed on the gel. It is necessary to re-melt and re-solidify the C_2H_6 once with connexion between the traps closed before complete separation can be attained. J. W. S.

Lowering sodium hydroxide consumption in refining lubricating oils. B. RUIBAK (*Azerbaid. Neft. Choz.*, 1932, No. 8—9, 55—59).—The acid oil is washed with NaCl solution or with H_2O in presence of steam, spent NaOH solution is used for preliminary neutralisation, or the sludge is coagulated with $Ca(OH)_2$. CH. ABS.

Synthetic lubricating oils from gaseous olefines. A. D. PETROV, L. I. ANTZUS, and E. N. POZHILTZOVA (*J. Appl. Chem., Russia*, 1932, 5, 790—796).—Lubricating oils obtained from cracked gas by means of $AlCl_3$ contain a smaller proportion of aromatic hydrocarbons and are of higher quality when the reaction temp. is low. The synthetic are more homogeneous than the natural oils. CH. ABS.

Rôle of dissolved gases in determining the behaviour of mineral insulating oils. F. M. CLARK (*J. Franklin Inst.*, 1933, 215, 39—67).—Data are given for the effect of temp. and pressure on the solubility of N_2 , O_2 , and air in mineral oils, and for the

change of dielectric strength of the oil due to dissolved gases. Rates of re-dissolution of gases in de-aerated oil were measured. It is suggested that the usual dielectric strength of oil measures only the ease of oil "gassing," which may depend on dissolved impurities.

H. J. E.

Behaviour of sulphur compounds in cable insulating oils. P. NOWAK (Petroleum, 1933, 29, No. 2, 1—7).—The S compounds in such oils, which may amount to 1—10% of the oil, form additive compounds with alcoholic HgCl_2 which are of oily consistency and difficult to free from admixed S-free hydrocarbons. Addition of higher mercaptans, disulphides, and sulphides to the oils lowers their insulating properties but increases their resistance to oxidation. The formation of "wax" in these oils under the prolonged influence of high-tension currents (cf. B., 1929, 586) seems to be accelerated by the presence of certain S compounds; the "wax" has a higher S content than the original oil. The loss of insulating power of the oil which leads to the break-down of the cable is due, not directly to the "wax" itself, but to the gaseous by-products of the reaction. Whereas 30% of the S may be removed by treatment of the oil with adsorbents, e.g., SiO_2 gel, 50% is removed by treatment with Hg or HgO ; the insulating resistance and the resistance to oxidation of the oil are thereby increased.

A. B. M.

Ceresin and paraffin in Chelekenui ozokerite. L. G. ZHERDEVA and R. I. BERLIN (Nef. Choz., 1931, 21, 35—44).—The prep. is described. The ceresins have higher viscosity, mol. wt., PhNO_2 point, and d than paraffins.

CH. ABS.

Emulsification of paraffin oil [for skin creams etc.]. A. SALMONY (Chem.-Ztg., 1933, 57, 103).—The val. of some proprietary emulsifiers in the prep. of skin creams containing emulsified mineral and vegetable oils is discussed, and the prep. of some of these creams is described.

A. R. P.

[Oil] atomisation.—See I. Reactions between bisulphites and H_2S .—See VII. Pipe-line protection.—See XIII. Peat as fertiliser.—See XVI.

See also A., Feb., 122, Action of salts on asphaltic materials. 125, Swelling and dissolution of cellulose esters. 129, Thermo-ignition of $\text{CH}_4\text{-O}_2$ mixtures. 141—2, Origin of petroleum. 152, Transformation of C_6H_6 , PhMe, and $m\text{-C}_6\text{H}_4\text{Me}_2$ into CH_4 .

PATENTS.

[Reversible regenerative] coke ovens. F. TOTZEK, Assee. of H. KOPPER A.-G. (B.P. 383,622, 9.4.31. Ger., 10.4.30).—A regenerative system of flues is described in which the length of travel of the heating and waste gases is equal. The regenerators are parallel to the walls of the oven and are separated so that one half preheats air while the other is heated by the waste gases. Base channels controlled by dampers provided below and at right angles to the regenerators supply secondary air to and remove waste gases from the sole channels connected with each regenerator. The direction of flow of the air and waste gases is reversed each $\frac{1}{2}$ hr.

H. E. T.

Preheating coal and cooling coke. P. W. JANEWAY, JUN., Assr. to U. G. I. CONTRACTING CO. (U.S.P. 1,854,407, 19.4.32. Appl., 3.11.27).—An arrangement is described for heat exchange between a coal preheater and a coke cooler in closed circuit with an interposed steam boiler. By-pass connexions permit control of temp., and O_2 can be regulated to reduce coking of the coal if desired.

H. E. T.

Carbonisation of coal. F. C. GREENE and I. F. LAUCKS, Assrs. to OLD BEN COAL CORP. (U.S.P. 1,854,300, 19.4.32. Appl., 30.12.25).—Finely-pulverised coal suspended in a stream of gas is carbonised while traversing a vertical retort, in an upward and downward direction. The gas produced is divided and one portion used to carry fresh coal in a closed circuit. Part of the carbonised fuel collects in and is discharged from a hopper below the retort, and the remainder is pptd. from the gas stream by suitable means. Even and rapid heating of the coal and sensitive temp. control can thus be attained.

H. E. T.

Method of combustion. A. U. WETHERBEE, Assr. to AUTOGAS CORP. (U.S.P. 1,851,745, 29.3.32. Appl., 27.12.27).—The fuel (e.g., burning gas, atomised liquid or pulverised fuel) is mixed with the correct proportion of air in a mixing chamber with helical vanes, and passes at high velocity to a bowl-shaped hearth supporting a thin bed of refractory chips arranged in overlapping rings. The size of the chips decreases gradually from the centre to the outer edge of the hearth. The mixture is ignited by a sparking plug, and burns at approx. explosive rate within the refractory bed, which becomes incandescent and radiates at right angles to the direction of flame propagation.

H. E. T.

Water-flow calorimeters. A. L. NORTON (B.P. 385,084, 23.11.31).—An automatic gas cut-off, operated by a fall in H_2O -level in one leg of a U-tube, which permits the gas pressure to operate a H_2O -seal, is described.

H. E. T.

Hydrogenation of carbonaceous materials. L. KERN (U.S.P. 1,852,709, 5.4.32. Appl., 5.10.22).—For treating mixtures of carbonaceous and earthy materials, moulded into shaped objects, with nascent H_2 during distillation, H_2 -generating agents, e.g., HCl and Zn, are incorporated in the mixture. The hydrocarbons are recovered, and the residual carbonaceous material is burned off in air, leaving a hard, porous, ceramic product.

H. E. T.

Thermal treatment with hydrogen of carbonaceous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 385,433, 4.1.32).—A process is described which avoids coking and choking of the hydrogenating apparatus when carbonaceous materials (approx. 90% of which have b.p. $< 325^\circ$) are heated separately with or without H_2 . The material is preheated in a nest of tubes provided with separators at points where $> 50\%$ of the initial material is still liquid, for the removal of polymerisation products. Further heating is effected by preheated H_2 , and the mixture then brought to reaction temp. and pressure.

H. E. T.

Gas retort. F. K. ZIEGLER, Assr. to OHIO STEEL FOUNDRY CO. (U.S.P. 1,851,029, 29.3.32. Appl., 4.2.31).—A cylindrical Fe gas retort for carburising is described,

having end trunnions. The cylindrical portion is cast by a centrifugal moulding process, and the trunnion portion by sand moulding, and the two portions are welded together.
H. E. T.

Gas-producing apparatus. A. R. STRYKER (U.S.P. 1,855,034, 19.4.32. Appl., 10.9.28).—A vertical gas producer (*A*) for use with inferior grades of coal, *e.g.*, soft bituminous coal or lignite, is designed to work in the following cycle of operations: (1) a charge of fuel is introduced into *A* and is burned therein in a blast of air (secondary air being supplied to burn all CO to CO₂) until the walls of *A* reach 800–1000°, (2) pulverised coal is introduced at the top of *A* and is thereby carbonised, the gases formed being passed through the wash-box to storage, (3) the hot coke remaining from step 2 is steamed, first upwardly and then downwardly, the water-gas formed being passed to storage. *A* consists of a refractory-lined steel shell; it may be 80–90 ft. high and 11 ft. in diam. at the bottom, tapering to 4 ft. in diam. at the top. It is provided with a rotating grate, and the lower end may be water-jacketed.
A. B. M.

Means for regulating, controlling, or ascertaining the calorific value of mixed gases. C. B. WALKER and H. O. WRAITH (B.P. 383,654, 9.7. and 1.9.31).—The power developed by an internal-combustion engine fed with a small proportion of the main supply serves as a measure of the calorific val. of the gas. Variations in quality can be controlled by the r.p.m. through electrical or mechanical governors.
H. E. T.

Dehydration of gas. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,854,770, 19.4.32. Appl., 26.7.26).—Coke-oven gas, *e.g.*, is dehydrated in two stages, in the first of which it is scrubbed by a solution of CaCl₂ or other hygroscopic salt, and in the second by conc. H₂SO₄. The diluted CaCl₂ solution is reconc. by evaporation, and the diluted H₂SO₄ is used to convert the NH₃ from the gas into (NH₄)₂SO₄.
A. B. M.

Gas purification. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,854,491, 19.4.32. Appl., 9.4.25. Cf. U.S.P. 1,656,881; B., 1928, 150).—Gases are purified from H₂S etc. by washing first with a suspension of hydrated Fe₂O₃ in dil. alkali, containing, *e.g.*, < 1% of Na₂CO₃, and then with a similar suspension of higher alkalinity, *e.g.*, containing 3% of Na₂CO₃, the fouled liquids from each stage being separately revived by aëration. The low alkalinity of the solution in the first stage, in which most of the H₂S is absorbed, facilitates revivification. If desired, the fouled liquid from this stage may be neutralised or even rendered slightly acid before revivification.
A. B. M.

Gas purification. C. J. HANSEN, Assr. to KOPPERS Co. (U.S.P. 1,854,511, 19.4.32. Appl., 4.12.29. Ger., 22.10.27).—Coal-distillation gases are freed from NH₃, *e.g.*, by cooling and washing with H₂O, are then washed with a solution containing a complex compound of (NH₄)₂S₂O₃ and SO₂ to remove part of the H₂S, and are finally washed with a solution of a thionate of a metal of the Fe group to remove the residual H₂S. Part at least of the NH₃ previously separated may be added to the thionate solution.
A. B. M.

Production of a non-poisonous town gas. H. COHN (B.P. 385,401, 13.11.31. Ger., 4.2.31).—The resultant gas, after conversion of the CO into CH₄, has approx. the same calorific val., *d*, and speed of ignition as the original gas. Gas from a producer at 600–750° with CO₂ 23.0, CO 11.65, H₂ 61.5, and N₂ 3.85% is partly freed from CO₂ and catalysed, *e.g.*, over Ni at 300°, to yield a gas containing CO₂ 8.0, CH₄ 25.5, H₂ 58.0, and N₂ 8.5%.
H. E. T.

Treatment of coal tar. T. CHEESMAN (B.P. 384,761, 5.11.31).—Dehydrated coal tar is mixed with a paraffin solvent and is simultaneously agitated and heated by steam at 200° in a heated container. The contents separate on settling into (*a*) a clear supernatant liquid suitable as a pigment vehicle or wood preservative, and (*b*) a pitch-like substance suitable for the manufacture of roofing compounds.
H. E. T.

Apparatus for converting hydrocarbons. L. G. LEFFER (U.S.P. 1,853,688, 12.4.32. Appl., 1.11.28. Ger., 5.11.27).—An apparatus is described for cracking hydrocarbon oils without deposition of C, at > 360–400°/±1 atm. The oil or vapour is passed through an insulated heat-resisting container (*A*), packed with metallic, thin walled, hollow resistors of equal size and shape, in the form of sheet spirals, perforated spheres, etc., electrically heated. A proportion of the gases produced are recirculated at const. pressure, and the heavier hydrocarbons formed are removed from the bottom of *A*.
H. E. T.

[Steam]-distillation of mineral oils. M. GENSECKE (U.S.P. 1,851,093, 29.3.32. Appl., 12.7.28. Ger., 3.8.27).—A water emulsion of the oil is prepared and heated to > 400°/220 atm. in a coil, and then released through nozzles into the still.
H. E. T.

Refining of mineral oils. ATLANTIC REFINING Co., Asses. of S. S. KURTZ, JUN. (B.P. 383,801, 22.1.32. U.S., 23.1.31).—Petroleum oils of similar distillation ranges but differing in physical and chemical properties are separated by treatment with aromatic nitriles, *e.g.*, PhCN. The resulting fractions are decanted and the cyanide is removed by vac. distillation.
H. E. T.

Refining of petroleum oils. J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,853,920, 12.4.32. Appl., 28.11.27).—The cracked distillates or overhead products are treated with a S-free acid, *e.g.*, HNO₃, HCl, or a phosphoric acid etc., alone or mixed, followed by the usual treatment with conc. H₂SO₄.
H. E. T.

Refining of liquid hydrocarbons by means of liquid sulphur dioxide. W. W. TRIGGS. From EDELEANU GES. M.B.H. (B.P. 383,723, 21.10.31).—Low-pressure SO₂ arising from oils treated by the Edeleanu process is recovered by absorption at low pressure, the solvent is heated, and the liberated SO₂ is condensed with or without compression.
H. E. T.

Refining of gasoline-like products of hydrocarbon oil conversion. J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,853,921, 12.4.32. Appl., 31.10.29).—H₂SO₄ saturated with SO₂ is used for refining cracked hydrocarbon distillates or hydrocarbon oils,

with the object of avoiding the production of colour and odour-forming substances. H. E. T.

Petroleum liver fuel. J. H. SHEPARD, Assr. to STANDARD OIL CO. (U.S.P. 1,853,465, 12.4.32. Appl., 3.3.30).—The calorific val. of "liver" or hydrolysed acid sludge is increased by admixture with acid tar-still residues in proportions of approx. 1 pt. of "liver" to 0.5—1.5 pts. of still residue. A liquid fuel is formed which does not settle out and can be handled with ordinary fuel oil burning equipment. H. E. T.

Recovery of hydrocarbons by means of solid adsorptive agents, e.g., active carbon and the like. METALLGES. A.-G. (B.P. 385,257, 28.10.32. Ger., 21.12.31).—The efficiency of adsorption is increased and maintained by reducing the contact time, or the proportion of medium employed, when using gases which act injuriously on the medium. Resinification does not depend on the amount of gas passed through the media, but is a function of time. H. E. T.

Activating or revivifying finely-divided materials [e.g., fuller's earth]. G. G. BROCKWAY, Assr. to NICHOLS ENG. & RESEARCH CORP. (U.S.P. 1,852,603, 5.4.32. Appl., 16.10.28).—Spent fuller's earth which has been used in the contact process of oil filtration is freed from oil and mixed with a quantity of granular fuller's earth that has been used in the percolation process of oil filtration, and the mixture is roasted with agitation in a current of air at 425—620° until all the C is burnt out. The coarse material is then separated by screening. A. R. P.

Recovery of unsaturated hydrocarbons and their derivatives from mixtures containing them. H. S. DAVIS, Assr. to PETROLEUM CHEM. CORP. (U.S.P. 1,790,519, 27.1.31. Appl., 28.10.25. Renewed 13.6.30).—The constituents of cracked gases are separated by fractional combination with HCl. C. H.

Preparation of alcoholic derivatives of olefine-bearing substances. H. S. DAVIS, Assr. to PETROLEUM CHEM. CORP. (U.S.P. 1,790,518, 27.1.31. Appl., 13.7.25).—Butylenes, absorbed from cracked gases under pressure in liquid olefines of b.p. < 100°, are treated successively with 65% H₂SO₄ at < 30° and 70% H₂SO₄ at 35—45°; the sulphuric esters are then separately hydrolysed. C. H.

Distillation [of lubricating oils]. SHARPLES SPECIALTY CO., Assees. of L. D. JONES (B.P. 386,382, 31.10.31. U.S., 3.11.30).—In the fractionation of lubricating oil under vac. the oil is admitted to the rectification tower at a temp. just short of cracking (about 425°) and the temp. is immediately reduced by volatilisation to about 380°; to restore the temp. in the lower bubbling trays a highly heated fluid, e.g., Hg or a fusible alloy, is introduced at a point below the inlet. Claim is made for the use, for the same purpose, of a fluid of higher mol. wt. than H₂O and less susceptible to thermal decomp. than is the highest-boiling fraction desired; conveniently an oil fraction containing wax in both the amorphous and cryst. states may be withdrawn from the tower, and the slight cracking due to reheating may be of advantage in converting all the wax into the cryst. form. (Cf. B.P. 356,172; B., 1931, 1039.)

B. M. V.

Lubricating composition. E. A. NILL, Assr. to W. STRACK, A. WEST, and H. A. MONTGOMERY CO. (U.S.P. 1,853,571, 12.4.32. Appl., 1.5.30).—The m.p. and viscosity of mineral and fatty lubricating oils are increased by mixing the oil with > 5% of toluoides of fatty acids, with or without of soap. H. E. T.

Still for separating absorption oil from gasoline. M. H. KOTZEBUE (U.S.P. 1,851,849, 29.3.32. Appl., 26.11.29). H. E. T.

Oil-still condenser. Scrubbing gas. Sprays for gas scrubbers.—See I. Pure C₂H₂. Pr^oOH etc. **sec.**—Alcohols [from cracked gases]. Mercaptans etc.—See III. Gas purification. He from natural gas.—See VII.

III.—ORGANIC INTERMEDIATES.

Analysis of technical solvents. III. Colour tests for *n*-propyl, *n*-butyl, isobutyl, and isoamyl alcohols. H. H. WEBER and W. KOCH (Chem.-Ztg., 1933, 57, 73—74; cf. B., 1931, 433).—The aliphatic alcohols give characteristic colour changes when oxidised to aldehydes by Beckmann's mixture, and these are warmed with *o*-NO₂·C₆H₄·CHO and NaOH. The colours are: MeOH, green; EtOH, green, yellow, brownish-red; Pr^oOH, green, yellow, brownish-red; PrⁿOH, violet, passing rapidly into red, followed by separation into two layers; Bu^oOH, upper layer red, lower violet to steel-blue; BuⁿOH and isoamyl alcohol, colourless. In the case of PrⁿOH blue flocks separate and are sol. in CHCl₃ (characteristic). BuⁿOH after oxidation gives an intense deep violet coloration with *p*-NO₂·C₆H₄·COCl; pale colours (or none) are given by the other alcohols. A bright blue solution is given by isoamyl alcohol with piperonal and HCl (or 50% H₂SO₄ if the alcohol is pure). Greenish-blue or red solutions are also given by amyl, Bu^o, Buⁿ, and Prⁿ acetates with this reagent. H. A. P.

Potentiometric determination of free alkali hydroxide in phenoxides. V. A. KARGIN and M. I. USANOVICH (J. Appl. Chem., Russia, 1932, 5, 458—462).—Smooth Pt electrodes are used. CH. ABS.

Use of polychlorobenzenes in the synthesis of dyes. III. Preparation of *p*-chlorophenol from *p*-dichlorobenzene. A. I. KIPRIANOV and M. M. DASCHEVSKI. **IV. Preparation of *p*-aminophenol from *p*-dichlorobenzene.** A. I. KIPRIANOV, G. I. KIPRIANOV, and M. M. DASCHEVSKI. **V. Preparation of pyrocatechol from polychlorobenzenes.** A. I. KIPRIANOV and E. D. SYTCH (Ukrain. Chem. J., 1932, 7, [Tech.], 78—86, 87—93, 94—100; cf. A., 1931, 950).—III. The hydrolysis of *p*-C₆H₄Cl₂ with aq. NaOH gives a max. yield of 30% of *p*-C₆H₄Cl·OH (I); 2.5 mols. of alkali suffice for the complete removal of Cl. With NaOH—MeOH and a little Cu powder at 225° yields up to 85% are obtained, probably owing to the insolubility of the C₆H₄Cl·ONa formed in the medium.

IV. The influence of various factors on the formation of *p*-NH₂·C₆H₄·OH from (I) and aq. NH₃ in presence of CuSO₄ has been examined. The optimum yield (82.5%) was obtained by heating with 4 vols. of 33% NH₃ and 16% of CuSO₄ for 3 hr. at 185°.

V. o - $C_6H_4Cl_2$ is hydrolysed to o - $C_6H_4Cl\cdot OH$ with 2.5 mols. of $NaOH$ - $MeOH$ at 225° in a rocking autoclave. The further hydrolysis to pyrocatechol by $NaOH$ in presence of $CuSO_4$ gives yields up to 71% provided a Cu or Ag -lined autoclave is employed. $Ba(OH)_2$ and Na_2CO_3 are unsatisfactory hydrolytic agents. The concn. of alkali must not exceed 10%, but the temp. and duration of heating are of secondary importance.

G. A. R. K.

Analysis of metol. M. A. SHEHERBACHEVA (Khim. Farm. Prom., 1932, 6, 225—227).—The unmethylated material is dissolved in HCl (d 1.19); methyl- p -aminophenol is determined with standard aq. $NaNO_2$, ice, and excess of HCl .

CH. ABS.

Preparation of α -naphthylamine-2:4-disulphonic acid. V. G. GULINOV (Ukrain. Chem. J., 1932, 7, [Tech.], 64—68).—A method for the reduction of $1-C_{10}H_7\cdot NO_2$ with $NaHSO_3$, minimising the formation of naphthionic acid and α - $C_{10}H_7\cdot NH_2$, is described; the yield is 80%.

G. A. R. K.

Errata.—On p. 10, col. 2, line 17 from the bottom, for T. C. WARREN read T. E. WARREN. Also, the sentence beginning on line 13 from the bottom should read "Increase of pressure from 2—10 atm. decreases the yields of unsaturated hydrocarbons and has little effect on the yield of H_2 , which shows a tendency to decrease at higher pressures."

Cryst. phenols from tar. Pitch distillate. Separation of CH_4 - C_2H_6 mixtures. Hydrocarbons from gasoline. Mineral oil sulphonic acids.—See II. Cymene from sulphite-pulp liquors.—See V.

See also A., Feb., 130, Stability of diazo chlorides. 131, Hydrogenating and dehydrogenating efficiency of Pt catalysts. 143, Prep. of $Pr^{\beta}OH$. 152, Transformation of C_6H_6 , $PhMe$, and m - $C_6H_4Me_2$ into CH_4 . 160, Synthesis of benzanthrone and homologues.

PATENTS

(A, B) **Manufacture of intermediate oxidation products (B) and apparatus therefor.** J. H. JAMES, Assr. to C. P. BYRNES (U.S.P. 1,836,325—6, 15.12.31. Appl., [A] 18.1.26, [B] 10.8.27. Renewed [A] 27.6.27).—Hydrocarbon vapour is oxidised by finely-divided solid metal oxide, e.g., MoO_3 , in absence of air or O_2 . Suitable apparatus is described.

C. H.

Production of reduction products of carbon monoxide. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,824,896, 29.9.31. Appl., 9.9.25).—The activity of Cu , Mn , Cd , Zn , Pb , Sn , Mg , Ag , Au , and Pt catalysts is moderated by admixture with oxidation catalysts (compounds of Cr , V , Mn , Ti , Mo , W , Ce , Th , U , Zr). According to the proportion of the latter present, CH_2O or $MeOH$ is produced. A catalyst for CH_2O is made by calcining in air and then reducing a paste of NH_4VO_3 , $MnCO_3$, CrO_3 , kieselguhr, ammoniacal $AgNO_3$, $CdNO_3$, $Zn(NO_3)_2$, $Mg(NO_3)_2$, and Na_2SiO_3 .

C. H.

Purification of acetylene prepared by thermal or electrical methods. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 386,052, 3.10.31).—The crude C_2H_2 is freed from diacetylene etc. by washing with suitable org. solvents, e.g., $PhNO_2$, gas oil of d 0.88, or halogenated hydrocarbons, preferably at $20^\circ/2$ — 10 atm.

C. H.

Polymerisation of vinylacetylene. W. W. TRIGGS. From E. I. DU PONT DE NEMOURS & Co. (B.P. 385,963, 26.6.31. Addn. to B.P. 384,655; B., 1933, 182).—Vinylacetylene is polymerised, in absence of other polymerisable substances, e.g., by heat at 50 — 110° , preferably in absence of air. An aromatic hydrocarbon solvent and/or a catalyst may be used. The polymerisation is preferably stopped at 10 — 30% in absence of solvent.

C. H.

Chlorination of organic compounds. G. P. LUNT, Assr. to E. B. BADGER & SONS Co. (U.S.P. 1,824,558, 22.9.31. Appl., 14.4.27).— Cl_2 under pressure (4 — 5 atm.) and the vapour of an org. compound (C_5H_{12}) also under pressure (4 — 5 atm.) issue into a mixing chamber at lower pressure (2.6 atm.), whereby reaction is controlled and explosion avoided.

C. H.

Stabilisation of trichloroethylene. C. DANGELMAJER, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,816,895, 4.8.31. Appl., 11.1.29).— 10% of an aliphatic petroleum fraction, b.p. 40 — 232° , is added to C_2HCl_3 .

C. H.

Preservative [stabilisation of tetrachloroethylene]. E. C. ZUCKERMANDEL, Assr. to DOW CHEM. Co. (U.S.P. 1,835,682, 8.12.31. Appl., 20.11.30).— C_2Cl_4 is stabilised by addition of 0.5% of liquid paraffin.

C. H.

Preventing decomposition of halogenated hydrocarbons. E. C. ZUCKERMANDEL, Assr. to DOW CHEM. Co. (U.S.P. 1,819,585, 18.8.31. Appl., 3.8.28).—Oil-sol. azo dyes, e.g., aminoazobenzene, or NH_2Ph , or xylydine \rightarrow β -naphthol, are stabilisers for CCl_4 , $CHCl_3$, C_2HCl_3 , C_2Cl_6 , etc.

C. H.

Manufacture of aromatic derivatives of 1:2-diaminoethane [ethylenediamine]. H. A. MORTON (U.S.P. 1,836,486, 15.12.31. Appl., 3.7.28).— $C_2H_4Cl_2$ is heated at 115° with 4 mols. of NH_2Ph , a little H_2O , and much NN' -diphenylethylenediamine. The yield (m.p. 65°) is almost theoretical.

C. H.

Manufacture of organic [alkyl] chlorides. E. A. HARDING, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,816,845, 4.8.31).—Alcohols are heated with hydrated metal chlorides (e.g., $FeCl_3$), with or without HCl .

C. H.

Manufacture of alkyl chlorides in vapour phase. P. J. CARLISLE, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,834,089, 1.12.31. Appl., 14.3.28).— $MeOH$ vapour and HCl , preheated to 180° , are passed over Al_2O_3 gel at 340 — 350° .

C. H.

Purification of synthetic or substitution products such as alkyl halides. J. F. NORRIS, Assr. to PETROLEUM CHEM. CORP. (U.S.P. 1,825,814, 6.10.31. Appl., 29.10.23).—Alkyl halide is distilled from its mixture with an equal vol. of conc. H_2SO_4 .

C. H.

Dehydration of formic acid. H. T. CLARKE and D. F. OTHMER, Assrs. to EASTMAN KODAK Co. (U.S.P. 1,826,302, 6.10.31. Appl., 8.9.28).—Aq. HCO_2H is distilled with HCO_2Pr as entraining agent, leaving anhyd. HCO_2H , which is separated from excess ester by fractional distillation.

C. H.

Manufacture of acetylating mixtures. H. LE B. GRAY, Assr. to EASTMAN KODAK Co. (U.S.P. 1,836,711, 15.12.31. Appl., 24.4.28).— Ac_2O (with $AcOH$) free

from AcCl is obtained by distilling a mixture of NaOAc, AcCl, and 100% AcOH. C. H.

Separation and recovery of acetic and butyric acids. W. J. EDMONDS and I. J. KRCHMA, Assrs. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,835,700, 8.12.31. Appl., 21.6.28).—Cellulose fermentation liquors are neutralised with Na_2CO_3 and the solid NaOAc and PrCO_2Na are distilled with conc. H_2SO_4 under reduced pressure, the distillate of mixed anhyd. acids being redistilled, and the acids being extracted from the aq. residue by C_6H_6 , EtOAc, or light petroleum (b.p. 70–90°). C. H.

Manufacture of esters [e.g., ethyl acetate]. C. HANER, Assr. to PUBLICKER, INC. (U.S.P. 1,827,653, 13.10.31. Appl., 17.5.29).—In the distillation of the mixture of ester, alcohol, and H_2O , steam is added near the top of the column to reduce the alcohol content below that of the ternary mixture; the condensate separates into an ester upper layer and a dil. alcohol lower layer. C. H.

Production of acetone [from acetaldehyde]. K. RÓKA, Assr. to DEUTS. GOLD- U. SILBER-SCHNEIDENSTALT. VORM. ROESSLER (U.S.P. 1,821,324, 1.9.31. Appl., 17.7.25. Ger., 21.7.24).— MeCHO and steam are passed over rusty Fe filings coated with CaCO_3 [from aq. Ca(OAc)_2] at 450–550°; the yield of COMe_2 is 91% of theory. C. H.

Preparation of organic compounds [dihydroxyacetone from glycerol] by bacterial oxidation. A. J. KLUYVER and F. V. HOOFT (Assee.) (U.S.P. 1,833,716, 24.11.31. Appl., 26.12.30. Holl., 25.4.29).—An initial batch of glycerol is oxidised in presence of sterilised infusorial earth in a slow air current for 36 hr. and then in a strong air current for 24 hr. After settling, the supernatant liquor is decanted, fresh liquor is added, and fermentation of this and succeeding batches (the bacteria being present in bulk) may now be effected with strong aëration. C. H.

Manufacture of ethers of diacetone alcohol. C. W. SIMMS, Assr. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,823,704, 15.9.31. Appl., 4.6.28).—Mesityl oxide, MeOH , and KOH are kept for 48 hr. at 15°, neutralised with H_2SO_4 , and steam-distilled in vac. to give $\text{OMe} \cdot \text{CMe}_2 \cdot \text{CH}_2 \cdot \text{COMe}$, b.p. 154–158°. C. H.

Catalytic hydrogenation and dehydrogenation of carbon compounds. W. A. LAZIER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,829,046, 27.10.31. Appl., 21.12.29).—A mixed chromite catalyst is prepared by decomp. of double chromates of NH_4 and a hydrogenating metal (Mn, Zn + Mn, Zn, Cu, Cd, Ag, Fe). C. H.

Hydrogenation of carboxylic acids. W. A. LAZIER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,839,974, 5.1.32. Appl., 5.3.31).—The acids are reduced to alcohols by H_2 in presence of a mixed chromite catalyst (Zn, Cu, and Cd) above 200°/13.5 atm. Alcohols from AcOH, lauric, butyric, ricinoleic, oleic, stearic, sebacic, and coconut oil acids are described. C. H.

Catalytic process [alcohols from aliphatic esters]. E. I. DU PONT DE NEMOURS & Co., Assees. of W. A. LAZIER (B.P. 385,625, 2.4.31. U.S., 17.4.30).—An

ester of an aliphatic acid above C_1 is reduced with H_2 under pressure at $> 300^\circ$ in presence of a mixed catalyst, preferably a chromite of a hydrogenating metal. A suitable catalyst is obtained by adding $(\text{NH}_4)_2\text{CrO}_4$ to a solution of $\text{Zn(NO}_3)_2$ containing $\text{Cd(NO}_3)_2$ and $\text{Cu(NO}_3)_2$, neutralising with aq. NH_3 , and washing, igniting, and tabletting the ppt. Esters reduced include EtOAc, PrCO_2Et , BuOAc, Et laurate. C. H.

Manufacture of vinyl compounds, and of polyvinyl compounds. H. DREYFUS (B.P. 385,978 and 386,005, 30.3.31).—(A) Reactive groups in polyvinyl compounds are exchanged for ester or ether residues carrying acid or basic groups. (B) Polyvinyl esters are partly hydrolysed with aq. acid in presence of solvent (AcOH). The products in both cases are easily sol. or dispersible in aq. liquids. Examples are: (A) polyvinyl acetate (I) boiled with 75% lactic acid; polyvinyl alcohol heated with NaOH and $\text{CH}_2\text{Cl} \cdot \text{CO}_2\text{Na}$ at 50°; polymerised β -chloropropylene boiled with aq. Na tartrate; (B) (I) heated with 90% AcOH containing H_2SO_4 at 40–60° until sol. in 30–50% aq. EtOH. [Stat. ref. to (B).] C. H.

Manufacture of tribromoalcohols. B. CALLSEN, Assr. to WINTHROP CHEM. Co., INC. (U.S.P. 1,822,008, 18.9.31. Appl., 3.6.30).—Tribromoacetaldehyde is treated with alkyl Mg halides. Tribromo-isopropyl (b.p. 76–79°/5 mm.) and -isobutyl (b.p. 79–81°/4 mm.) alcohols are described. C. H.

Condensation of alcohols [to higher alcohols]. E. E. REID, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,821,667, 1.9.31. Appl., 13.11.28).—Alcohols are heated under pressure, e.g., 275–400°/60–200 atm., in presence of an alkali or alkaline-earth metal salt of a fatty acid, e.g., K butyrate. Examples are: β -ethylhexanol from BuOH; β -methylpentanol from PrOH. C. H.

Recovery of alcohol from alcoholic caustic fusions. C. A. LYFORD, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,824,610, 22.9.31. Appl., 1.12.28).—A limited quantity of H_2O is added to decompose alkoxides, and the alcohol is distilled off directly at 92–95% concn. The H_2O is added gradually to the hot melt until the alcohol ceases to distil over. C. H.

Manufacture of isopropyl and homologous esters of aliphatic acids and isopropyl and homologous alcohols. H. SUIDA, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,836,135, 15.12.31. Appl., 24.7.29. Austr., 21.7.28).—Olefines above C_2 are led into aq. aliphatic acid in presence of mineral or strong org. acid as catalyst at 180°/20–50 atm. C. H.

Manufacture of urea [carbamide] derivatives of $\alpha\gamma$ -butylene glycol. R. LEOPOLD and M. PAQUIN, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,817,992, 11.8.31. Appl., 7.11.29. Ger., 16.11.28).— $\alpha\gamma$ -Butylene glycol in excess is heated with carbamide at 170–180°; distillation in vac. gives butylene glycol, b.p. 145°/10 mm., and the monourethane, b.p. 170–180°/10 mm., leaving the diurethane, m.p. 152°, b.p. 260° (decomp.). C. H.

[Manufacture of] acetals of alkyl ethers of polyglycols. J. A. NIEUWALD, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,824,963, 29.9.31. Appl., 13.9.28).— C_2H_2 is led into a solution of diglycol Et

ether in EtOH containing Hg fluoroborate to give the acetal, $\text{CHMe}(\text{O}\cdot\text{C}_2\text{H}_4\cdot\text{O}\cdot\text{C}_2\text{H}_4\cdot\text{OEt})_2$, b.p. 140—145°/14 mm., a plasticiser for cellulose derivatives. C. H.

Separation of secondary alcohols. S. R. MERLEY, Assr. to DOHERTY RES. Co. (U.S.P. 1,835,571, 8.12.31. Appl., 23.12.25).—The crude mixture of alcohols from hydration of cracked gases etc. is distilled in vac. to recover C_6 -, C_7 -, C_8 -, and higher *sec.*-alcohols free from objectionable odour. C. H.

[Preparation of] esters of secondary alcohols. R. H. VAN SCHAACK, JUN., Assr. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 1,815,878, 21.7.31. Appl., 29.9.28).—A *sec.*-alcohol above C_5 is esterified with a dibasic acid to give softeners for cellulose nitrate etc. β -*n*-Octyl succinate, b.p. 228°/26 mm., and phthalate, b.p. 210°/3 mm., are described. C. H.

Preparation of (A) sulphur compounds, (B) mercaptans [from unsaturated hydrocarbons]. E. M. JOHANSEN, Assr. to GRAY PROCESSES CORP. (U.S.P. 1,836,170—1, 15.12.31. Appl., [A] 22.6.26, [B] 13.8.29).—Olefines are led with H_2S over SiO_2 gel, charcoal, or fuller's earth at 0—40°, (B) in presence of H_2SO_4 . C. H.

Production of mercaptans and mercaptides. P. S. NISSON and M. R. MANDELBAUM, Assrs. to GRAY PROCESSES CORP. (U.S.P. 1,836,183, 15.12.31. Appl., 11.1.27).—Olefine and H_2S are led over fuller's earth or SiO_2 gel, and after removal of H_2S the mercaptan is isolated as Pb salt with Na_2PbO_2 . C. H.

Manufacture of bi- or multi-valent aliphatic organic compounds. L. LILIENTHAL (B.P. 385,980, 31.3.31).—Di- or poly-halogenated aliphatic compounds are caused to react with Na_2S or NaHS (or corresponding Se or Te compounds) in quantity $<$ is equiv. to the halogen present. Examples are: $\alpha\alpha'$ -dichlorohydrin with aq. Na_2S at 60—70° to give an Et_2O -sol. viscous oil and an Et_2O -insol. "butter"; $\beta\gamma$ -dibromopropylamine and Na_2S yield a deliquescent, yellow powder or a brown gummy mass. C. H.

Manufacture of [lactic] esters from nitriles. L. J. CHRISTMANN, Assr. to AMER. CYANAMID Co. (U.S.P. 1,790,262, 27.1.31. Appl., 30.3.26).—An inert solvent (PhMe) replaces the excess alcohol in the production of lactic esters from lactonitrile, alcohols, and HCl. C. H.

Purification of esters. R. H. VAN SCHAACK, JUN. and N. BOEHMER, Assrs. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 1,836,096, 15.12.31. Appl., 20.6.27).—A crude ester of an alcohol not completely miscible with H_2O is boiled with a little H_2SO_4 and the vapours of ternary mixture, b.p. $<$ 100°, are condensed in a rectifying column, the H_2O layer being rejected and the oily layer returned to the boiling ester until all org. acid has been esterified. C. H.

Hydrogenation of crotonaldehyde. L. C. SWALLEN, Assr. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,788,896 and 1,823,865, [A] 13.1.31, [B] 15.9.31. Appl., [A] 16.9.29, [B] 7.11.27).—(A) Crotonaldehyde is passed with H_2 over a reduced Cu silicate catalyst at about 170°. (B) Pptd. Cu silicate, reduced in H_2 at 120—200°, is used as catalyst. C. H.

[Preparation of] *sec.*-butyl xanthates. L. J. CHRISTMANN and D. W. JAYNE, JUN., Assrs. to AMER. CYANAMID Co. (U.S.P. 1,810,552, 16.6.31. Appl., 14.4.30).—Na *sec.*-butyl xanthate is prepared from $\text{CHMeEt}\cdot\text{OH}$, CS_2 , and NaOH. C. H.

[Manufacture of] long-chain amine salts. [Wetting and emulsifying agents.] I. C. SOMERVILLE, Assr. to ROHM & HAAS Co. (U.S.P. 1,836,047—8, 15.12.31. Appl., 25.6.30).—(A) Trialkylamines, $\text{R}\cdot\text{NR}'\text{R}''$, in which R is C_{17} — C_{26} , and R' and R'' are Me, Et, or $\cdot\text{C}_2\text{H}_4\cdot\text{OH}$, give salts which are wetting and emulsifying agents. Examples are: $\text{C}_{18}\text{H}_{37}\cdot\text{N}\cdot\text{NEt}_2$, b.p. 178—180°/1 mm.; $\text{C}_{18}\text{H}_{37}\cdot\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_2$; diethylcetylamine, b.p. 265—268°/2—3.5 mm. (B) Where R is C_9 — C_{15} , and R' and R'' are C_1 — C_4 (including hydroxyalkyls), e.g., di-*n*-butyl-laurylamine, di-(β -hydroxyethyl)laurylamine, and diethyl(didecyl)amine, b.p. 146.5—150°/2 mm., the salts are wetting agents. C. H.

Manufacture of $\alpha\alpha'$ -[2 : 6]-diaminopyridine. K. PHILIPP, Assr. to PYRIDIUM CORP. (U.S.P. 1,789,022, 13.1.31. Appl., 30.9.27).— $\text{C}_5\text{H}_5\text{N}$ is added to fused NaNH_2 at 220°. C. H.

Manufacture of the piperidine salt of pentamethylenedithiocarbamic acid [vulcanisation accelerator]. G. LUTZ, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,823,499, 15.9.31. Appl., 11.5.29).—Piperidine is treated with CS_2 in non-benzenoid hydrocarbons, b.p. $<$ 250°, e.g., petrol, in which only the product is insol. C. H.

Manufacture of phenolic compounds. W. J. HALE and E. C. BRITTON, Assrs. to DOW CHEM. Co. (U.S.P. 1,789,071, 13.1.31. Appl., 1.9.27).—In the alkaline fusion of arylsulphonic acids, formation of Ar_2O is suppressed by adding Ar_2O initially. C. H.

Manufacture of phenols [from arylsulphonic acids]. A. HEMPEL (U.S.P. 1,820,274, 25.8.31. Appl., 7.7.30. Ger., 9.4.29).—The time of alkaline fusion is reduced by working at pressures $<$ 1 atm. in absence of O_2 . The temp. may be reduced to 300—350°. C. H.

[Manufacture of phenol by] hydrolysis of halogenated benzene. T. GRISWOLD, JUN., Assr. to DOW CHEM. Co. (U.S.P. 1,833,485, 24.11.31. Appl., 24.6.25).—PhCl and aq. NaOH are heated under pressure to 250—400° and then flow through a heat-insulated coil of such length as to complete the reaction without further heating. C. H.

Recovery of phenol from liquors containing it. C. L. MASTERS, Assr. to ELKO CHEM. Co. (U.S.P. 1,817,444, 4.8.31. Appl., 4.6.27).—Crude liquor, from which most of the PhOH has been separated, is passed through a heat exchanger against a countercurrent of steam. The PhOH is removed from the steam by means of a solution of the alkali sulphite produced in the ordinary fusion process for working PhOH. C. H.

Manufacture of thiohydroxy-organic compounds [thiophenols]. W. J. HALE, Assr. to DOW CHEM. Co. (U.S.P. 1,825,662, 6.10.31. Appl., 4.9.28).—The reaction of PhCl with NaHS is effected in presence of 10% of Ph_2S and 3% of Ph_2O , whereby formation of these by-products is diminished or prevented. C. H.

[**Manufacture of**] *n*-heptylphenol. E. C. FANTO, Assr. to McKESSON & ROBBINS, INC. (U.S.P. 1,824,426, 22.9.31. Appl., 24.4.29).—*n*-Heptyl alcohol, from castor oil, is condensed with PhOH in presence of ZnCl₂ to give *p*(?)-*n*-heptylphenol, b.p. 124—137°/8 mm.

C. H.

Manufacture of aminobenzyl-*o*-benzoic acids. E. T. HOWELL and O. STALLMANN, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,840,035, 5.1.32. Appl., 2.7.28).—The corresponding amino- or acylamino-benzoylbenzoic acids are reduced. 2-*p*-Aminobenzylbenzoic acid, m.p. 173°, and its Ac derivative, m.p. 205°, are described.

C. H.

Alkylquinolylamino-phenylcarboxylic [-benzoic] acids. K. DESAMARI, Assr. to WINTHROP CHEM. CO., INC. (U.S.P. 1,810,267, 16.6.31. Appl., 30.11.28. Ger., 7.12.27).—A 2-halogeno-4-alkylquinoline is condensed with an aminobenzoic acid or ester. 2-Chloro-4-methylquinoline gives with *o*-, *m*-, and *p*-acids compounds of m.p. 203°, 225—265° (decomp.), and 305—307° (decomp.), respectively.

C. H.

Making a solution of acetylsalicylic acid. L. WHORTON, Assr. to WHORTON PHARMACAL CO. (U.S.P. 1,787,924, 6.1.31. Appl., 31.10.27).—Equal pts. of EtOH and glycerol in absence of H₂O form a non-hydrolysing solvent.

C. H.

Manufacture of 5-phenylsalicylic acid. S. L. BASS and H. N. FENN, Assrs. to DOW CHEM. CO. (U.S.P. 1,839,526, 5.1.32. Appl., 12.5.30).—*p*-Hydroxydiphenyl is condensed with CHCl₃ and NaOH and the 5-phenylsalicylaldehyde is converted by KOH into the acid, m.p. 217—218° (Me ester, m.p. 95°; Et ester, m.p. 49°).

C. H.

[**Manufacture of**] compound esters of hydroxyaromatic acids. A. B. DAVIS, Assr. to A. B. DICK CO. (U.S.P. 1,834,686, 1.12.31. Appl., 5.2.26).—Bu and amyl tartrates are benzoylated to give softening or swelling agents for cellulose esters.

C. H.

[**Manufacture of**] flaked phthalic anhydride. H. B. FOSTER, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,817,304, 4.8.31. Appl., 21.1.26).—Crude phthalic anhydride is distilled at 285° from conc. H₂SO₄ after heating at 250° to destroy impurities.

C. H.

[**Manufacture of**] phthalic anhydride [in the form of] shot-like pellets. J. E. JEWETT and L. C. DANIELS, Assr. to SELDEN CO. (U.S.P. 1,837,869, 22.12.31. Appl., 31.1.31).—Molten phthalic anhydride is sprayed down a tower to meet a current of cold air. Glossy, dustless pellets are produced.

C. H.

[**Manufacture of**] comminuted crystalline phthalic anhydride. L. C. DANIELS and C. J. SCHWINDT, Assrs. to SELDEN RES. ENG. CORP. (U.S.P. 1,789,967, 27.1.31. Appl., 22.3.20).—Needle crystals of phthalic anhydride are readily comminuted, *e.g.*, in a mixing machine, without grinding.

C. H.

Manufacture of chemical compounds [metal salts of alkyl glyceryl phthalates]. L. C. SWALLEN and W. J. BANNISTER, Assrs. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,835,915, 8.12.31. Appl., 19.3.28).—Part of the free CO₂H in a glyceryl phthalate is esterified with BuOH, isoC₅H₁₁·OH, etc., and the product is

converted into a salt (Na, Zn, Ca, or Cu). The products are useful as plasticisers for cellulose esters etc.

C. H.

Separation of [mono- from poly-carboxylic] organic acids. L. C. DANIELS, Assr. to SELDEN CO. (U.S.P. 1,822,016, 8.9.31. Appl., 28.5.30).—The mixed acids are treated with enough alkali to neutralise 1 CO₂H of the polycarboxylic (phthalic) acid present, and monocarboxylic (benzoic) acid is extracted with org. solvent.

C. H.

Increasing the apparent density of organic compounds before fusion with caustic alkali. J. F. WAIT, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,820,684, 25.8.31. Appl., 31.12.24).—The Na salt of phenylglycine is heated at 250—700 mm. pressure above 140°, preferably at 200° for < 10 min., to remove NH₂Ph and H₂O, air being displaced by inert gas (NH₃).

C. H.

[**Manufacture of**] esters [of Δ⁴-cyclohexene-1:2-dicarboxylic acid]. B. T. BROOKS and E. J. CARDARELLI, Assrs. to PETROLEUM CHEM. CORP. (U.S.P. 1,824,068—71, 22.9.31. Appl., [A] 16.6.30, [B, C] 16.8.30, [D] 16.9.30).—Δ⁴-cyclohexene-1:2-dicarboxylic acid, from butadiene and maleic acid, is converted into its (A) Bu (b.p. 186—192°/18 mm.), (B) Et (b.p. 133—137°/5 mm.), (C) Pr (b.p. 140—141°/5 mm.), and (D) *sec*-amyl (b.p. 163—165°/5 mm.) esters. The products are plasticisers for cellulose esters.

C. H.

Manufacture of isoeugenol. T. S. CARSWELL, Assr. to MONSANTO CHEM. WORKS (U.S.P. 1,789,352, 20.1.31. Appl., 22.12.27).—The mixture of methoxymethyl ethers obtainable, *e.g.*, by alkaline fusion of safrole, is separated by addition of Ca(OH)₂, the *iso*-chavibetol derivative giving an insol. Ca salt, whilst that of the *isoeugenol* derivative is sol.

C. H.

Treatment [oxidation] of indoxyl. W. J. SPALDING, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,827,828, 20.10.31. Appl., 16.5.27).—Alkaline indoxyl solution flowing into a chamber is lifted by revolving vertical discs into contact with air and flue gas, the oxidised, carbonated product being withdrawn continuously.

C. H.

Preparation of alkali-metal derivatives of organic compounds. J. PFLEGER and E. SCHELLER, Assrs. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,816,911, 4.8.31. Appl., 25.6.28. Ger., 30.6.27).—Alkali-metal hydrides react with org. amines and imines to give *N*-metal compounds. Na compounds of NH₂Ph, NHPMe, NHPH₂, CO(NH₂)₂, guanidine, phthalimide, succinimide, diacetamide, and NH₂·CS·NHPH are described.

C. H.

Manufacture of a mercury compound of *p*-nitroaniline. M. S. KHARASCH, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,787,630, 6.1.31. Appl., 6.10.23).—*p*-Nitroaniline is treated with Hg(OAc)₂ in AcOH to give a germicide suitable for treatment of soils or vegetables.

C. H.

Purification of *p*-nitrotoluene. H. J. WEILAND and I. GUBELMANN, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,836,212, 15.12.31. Appl., 28.3.28).—Crude *p*-nitrotoluene is sweated at a temp. range at

which the pure *p*-compound is the only solid, *e.g.*, at 2–48°.

C. H.

Manufacture of aromatic amino-compounds.

W. H. WILLIAMS, Assr. to DOW CHEM. CO. (U.S.P. 1,840,760, 12.1.32. Appl., 26.8.26).—PhCl is heated at 175°/14 atm. with NH₃ (1 mol.), Ca(OH)₂ (0.5 mol.), and CaCl₂ (0.5 mol.) in presence of a Cu catalyst (Cu₂O).

C. H.

Manufacture of mono-*N*-alkanol [-hydroxyalkyl] derivatives of aromatic di- and poly-amines.

I. G. FARBENIND. A.-G. (B.P. 386,254, 21.7.32. Ger., 15.10.31).—A halogeno-alcohol (1 mol.) is condensed with an aromatic di- or poly-amine (1 mol.) in presence of solvent and acid-binding agent. Examples are products from: α -chlorohydrin with *p*-phenylene- and 4-chloro-*m*-phenylene-diamines, and 1:2:4-triaminobenzene; ethylene chlorohydrin and 2:4-tolylene-diamine.

C. H.

Production of thiocyno-derivatives. E. L. HELWIG (U.S.P. 1,816,848, 4.8.31. Appl., 3.10.29).—Aq. NaCNS is electrolysed in presence of the org. compound to be thiocyanated, *e.g.*, *o*-C₆H₄Me·NH₂, NPhMe₂, anthranilic acid, α -C₁₀H₇·NH₂, *o*-cresol, resorcinol, or PhOH.

C. H.

Halogenation of multinuclear aromatic hydrocarbons [diphenyl]. E. C. BRITTON and W. C. STOESSER, Assrs. to DOW CHEM. CO. (U.S.P. 1,835,754, 8.12.31. Appl., 24.6.29).—Ph₂ is treated with Cl₂ or Br in C₆H₆ at –10° to 40°, preferably in presence of carriers. *o*-Chloro- (b.p. 210–211°/150 mm.), *p*-chloro- (b.p. 224–226°/150 mm.), 4:4'-dichloro- (b.p. 327–329°), and isomeric dichloro- (b.p. 240–242°/150 mm.)-diphenyls are described.

C. H.

Preparation of *o*- and *p*-hydroxydiphenyls. E. C. BRITTON, Assr. to DOW CHEM. CO. (U.S.P. 1,836,307, 15.12.31. Appl., 13.11.28).—The crude tar from PhCl and NaOH is distilled in vac. and the distillate is fractionated, the *o*-compound distilling at 135°/9 mm. and the residual *p*-compound being cryst. from PhCl.

C. H.

Purification of *o*-hydroxydiphenyl. E. C. BRITTON, Assr. to DOW CHEM. CO. (U.S.P. 1,835,755, 8.12.31. Appl., 22.10.30).—The crude material dissolved in aq. NaOH is extracted with PhCl, C₆H₆, CCl₄, or C₂H₄Cl₂, evaporated to 40–60%, crystallised at 50° or below, and *o*-hydroxydiphenyl, m.p. 56–57°, liberated by acidification.

C. H.

Purification of solid aromatic hydrocarbons. J. R. HILL, Assr. to BARRETT CO. (U.S.P. 1,819,680, 18.8.31. Appl., 29.3.21).—C₁₀H₈ or other solid aromatic hydrocarbon is heated at 150° with 0.3 pt. of H₂SO₄ to sulphonate impurities, and pure C₁₀H₈ is distilled off from the melt in vac.

C. H.

Oxidation of benzene compounds [tetrahydro-naphthalene]. J. BINAPFL and W. KREY (U.S.P. 1,789,924, 20.1.31. Appl., 29.8.29. Ger., 5.9.28).—Benzenes having polymethylene closed-chain substituents are catalytically oxidised in liquid phase at 80–100° to ketones. Examples are 5-ketotetrahydro-naphthalene, b.p. 130–135°/15 mm., its 1 (or 4)-Et derivative (semicarbazone, m.p. 223°), and a chlorinated

derivative (semicarbazone, m.p. 210°), from corresponding tetrahydronaphthalenes.

C. H.

Separation of α -monosubstituted naphthalenes from their β -isomerides. H. J. WEILAND and I. GUBELMANN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,836,211, 15.12.31. Appl., 6.2.28).—Crude molten nitronaphthalenes or naphthylamines are cooled gradually to 20° or 27°, respectively; liquid is removed from the crystals while the temp. is gradually raised to 50° or 46°, respectively. The remaining crystals are pure 1-C₁₀H₇·NO₂, m.p. 54.5°, and pure α -C₁₀H₇·NH₂, m.p. 48°, respectively.

C. H.

Separation of β -nitronaphthalene-4:8-disulphonic acid from isomerides. J. M. TINKER and V. A. HANSEN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,836,204, 15.12.31. Appl., 3.11.30).—The 2:4:8-acid is separated as Ni, Co, Mn, or Zn salt from the 1:4:8-, 1:3:8-, and 2:4:7-acids.

C. H.

Making bisulphite reactions with sulphur dioxide acid solutions. [Manufacture of sulphur dioxide compound of nitroso- β -naphthol.] F. W. BINNS and J. M. LURIE, Assrs. to VIRGINIA SMELTING Co. (U.S.P. 1,822,122, 8.9.31. Appl., 15.12.26).—Nitroso- β -naphthol is treated in dil. NaOH with SO₂ to give 4-amino-3-hydroxy-1-naphthyl sulphite.

C. H.

Manufacture of *tert.*-butylnaphthol. F. KOENIGSBERGER, Assr. to DEHLS & STEIN (U.S.P. 1,788,529, 13.1.31. Appl., 22.10.28).—4-Hydroxy-2-*tert.*-butylnaphthalene, m.p. 102°, is obtained from β -naphthol, *tert.*-BuOH, and AlCl₃, and is chlorinated with SO₂Cl₂. Both products are plasticisers for cellulose derivatives.

C. H.

Manufacture of indolesulphonic acids. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 385,605, 11.6.31).—A sulphonated arylhydrazine is condensed with a ketone, R·CH₂·CO·R', where R = H or alkyl and R' = alkyl or aryl. The sulphonic acid may itself provide the necessary acidity. Examples are indolesulphonic acids from: 1:7-naphthylhydrazinesulphonic acid with COMeEt or CPhMe; the 2:7-acid with COMe₂; phenylhydrazine-4-sulphonic acid with COMeEt or COMePr; α -*o*-sulphophenyl- α -benzylhydrazine with COMeEt; α -7-sulpho-1-naphthyl- α -ethylhydrazine with COEt₂.

C. H.

Manufacture of *o*-hydroxyindolecarboxylic acids of the benzene and naphthalene series. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 385,627, 22.4.31).—A hydroxy-indole or -naphthindole is carboxylated with CO₂ and alkali. Acids from 6-hydroxy-2:3-diphenylindole, β -hydroxy-2-phenyl- and 8-hydroxy-2:3-dimethyl- α -naphthindoles are described.

C. H.

Manufacture of anthraquinones. E. A. LLOYD and V. P. GERSHON, Assrs. to W. M. GROSVENOR (U.S.P. 1,826,621, 6.10.31. Appl., 13.9.20).—The AlCl₃ additive product of *o*-benzoylbenzoic acid (or its Me or Cl-derivative) is decomposed with H₂SO₄ and the mixture, without removal of Al₂(SO₄)₃, is cyclised with oleum.

C. H.

Manufacture of aminoanthrones. E. T. HOWELL, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P.

1,840,036, 5.1.32. Appl., 2.7.28).—2-*p*-Aminobenzylbenzoic acid, or an acyl derivative, is cyclised to 2-amino(or acylamino)-9-anthrone. C. H.

Manufacture of anthraquinone bodies [acylated 1 : 5-dichloro-2 : 6-diaminoanthraquinones]. W. L. RINTELMAN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,837,837, 22.12.31. Appl., 2.7.28).—2 : 6-Diaminoanthraquinone is diacetylated and dichlorinated in AcOH. C. H.

Production of dihydroxyanthraquinone and its derivatives. J. W. ORELUP (U.S.P. 1,790,510, 27.1.31. Appl., 8.6.26).—Mixed *o*- and *p*-chlorophenols are condensed with phthalic anhydride in H₂SO₄ with H₃BO₃. C. H.

Production of anthracene derivatives. IMPERIAL CHEM. INDUSTRIES, LTD., D. A. W. FAIRWEATHER, and R. F. THOMSON (B.P. 385,984, 1.6.31).—1 : 2 : 2' : 1'-Dianthrahydroquinone-azine, -dihydroazine, or -dihydroazine tetrasulphuric ester (I) is converted by oxidants (Cl₂ with NaHCO₃) into azine disulphuric esters (3 possible isomerides) which yield with cold dil. acid 1 : 2 : 2' : 1'-anthraquinoneanthrahydroquinonedihydroazine monosulphuric esters (2 isomerides). The di- and monoesters may be developed on the fibre with warm dil. acid, giving leuco-indanthrone, which is oxidised in the usual manner. Substituted azine esters behave similarly. C. H.

Manufacture of sulphuric esters [from halogenated dianthraquinoneazines] for use in dyeing and printing textile fibres. DURAND & HUGUENIN A.-G. (B.P. 386,245, 14.7.32. Ger., 15.7.31. Addn. to B.P. 383,741; B., 1933, 141).—The process of the prior patent is applied to the production of mixed tri- and tetra-sulphuric esters from halogenated 1 : 2 : 2' : 1'-dianthraquinoneazine, e.g., the dichloroazine. C. H.

Heat abstraction.—See I. **Unsaturated hydrocarbons from mixtures.** **Alcoholic derivatives of olefines.**—See II. **Azo-dye intermediates.**—See IV. **Wetting etc. agents.**—See VI. **Carbazole anti-oxidant.**—See XIV. **Glucoside esters.**—See XVII.

IV.—DYESTUFFS.

New nitro-dye from H-acid and chlorodinitrobenzene. V. G. GULINOV (Ukrain. Chem. J., 1932, 7, [Tech.], 57—58).—A solution of H-acid in aq. Na₂CO₃ is boiled with chlorodinitrobenzene in presence of NaOAc, giving a wool dye, producing golden-yellow shades fast to light and washing from an acid bath. G. A. R. K.

Nitro-dye from aminosalicylic acid. V. G. GULINOV (Ukrain. Chem. J., 1932, 7, [Tech.], 60).—Aminosalicylic acid and chlorodinitrobenzene (cf. preceding abstract) give a dye producing bright yellow shades on wool or golden-brown on wool mordanted with Cr. G. A. R. K.

Nitro-dyes from β-naphthylaminesulphonic acids and dichloronitrobenzene. V. G. GULINOV (Ukrain. Chem. J., 1932, 7, [Tech.], 61—62).—Brenner acid, amino-G-acid, and amino-R-acid combine with chlorodinitrobenzene (cf. preceding abstracts) giving yellow wool dyes of satisfactory fastness. G. A. R. K.

Nitro-dyes from α-naphthylaminesulphonic acids and dichloronitrobenzene. V. G. GULINOV (Ukrain.

Chem. J., 1932, 7, [Tech.], 71—73).—α-Naphthylamine-2 : 4- and -4 : 7-disulphonic acids combine with chlorodinitrobenzene (cf. preceding abstracts), giving golden-yellow wool dyes, that from the former being the faster. G. A. R. K.

Preparation of crystal-violet from chloropicrin and dimethylaniline. V. G. GULINOV (Ukrain. Chem. J., 1932, 7, [Tech.], 75—77).—The yields of dye obtainable by this method do not exceed 36—40% (cf. Sytschev, J. Chem. Ind. Russ., 1928, 5, 72); the addition of Cu or Cu salts does not accelerate the reaction. G. A. R. K.

Black azo dye from α-naphthylamine-2 : 4-disulphonic acid. V. G. GULINOV (Ukrain. Chem. J., 1932, 7, [Tech.], 69—70).—The acid is diazotised, coupled with α-C₁₀H₇·NH₂, and the product diazotised and coupled with β-C₁₀H₇·OH. The new dye gives black shades on wool, which lose their violet tinge in the light, comparing favourably with naphthylamine-black for fastness. G. A. R. K.

Black monoazo wool dye. V. G. GULINOV (Ukrain. Chem. J., 1932, 7, [Tech.], 101).—The condensation product of H-acid and chlorodinitrobenzene (see above) is coupled with diazotised α-C₁₀H₇·NH₂ to a sufficiently fast brownish-black acid wool dye. G. A. R. K.

Mineral oil sulphonic acids.—See II. **Polychlorobenzenes for dyes.**—See III.

See also A., Feb., 145, **Thermal degradation of carotene dyes.** 166, **Colours from 5 : 6-diaminouracil.** **Pyrrole dyes.** 167, **Dyes from quinoxaline-2 : 3-dicarboxylic acid and from acenaphthenequinone.** 168, **Classification of S dyes.**

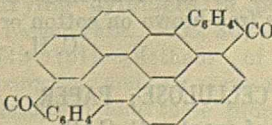
PATENTS.

Preparation of sulphur [black] dyes. A. C. BURRAGE, JUN. (U.S.P. 1,828,699, 20.10.31. Appl., 25.1.27).—Sulphur-black, heated at 100° with 35—70% of Na₂S and S, becomes H₂O-sol. and may be used for direct dyeing. C. H.

Manufacture of acridine dyes. L. P. KYRIDES, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,822,490, 8.9.31. Appl., 25.8.24).—Compounds from aminoacridines (Acridine-yellow) and aldehydes above C₁ (MeCHO) are reduced with Zn and dil. acid to give yellow-orange dyes. C. H.

Manufacture of vat dyes of the 1 : 2-benzanthraquinone series. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 386,411, 9.12.31).—The 1 : 1'-di-α-β-benzoanthraquinonyls (not carrying halogen in 4 : 4'-positions), obtained by heating 1-halogeno-α-β-benzoanthraquinones with Cu or Hg, are treated with acid condensing agents (H₂SO₄, ClSO₃H, AlCl₃) to give dibenzoyl-anthanthrenes (annexed formula), which may subsequently be halogenated, nitrated, or oxidised.

The starting materials may be used in the form of reduction products or their esters. Dibenzoylanthanthrene (violet vat dye), its Cl- and Br-derivatives (red-blue), its nitrated (grey), oxidised (red-blue), and oxidised and alkylated (blue) products are described. C. H.



Production of flavanthrone. W. M. MURCH, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,827,254, 13.10.31. Appl., 19.10.25).— β -Aminoanthraquinone is added to SbCl_5 in PhNO_2 at 50–70°, and the mixture is heated first at 155–160° and then at 210°, H_2O and HCl being removed as formed. Flavanthrone is filtered off at 110–115°. C. H.

Manufacture of indigo powder. T. L. MASTERTON, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,827,757, 20.10.31. Appl., 4.6.25).—Indigo paste is mixed with 1% of Turkey-red oil and dried. C. H.

Manufacture of azo dyes [for wool]. D. ZINNER, Assr. to NEWPORT CHEM. CORP. (U.S.P. 1,789,279, 13.1.31. Appl., 2.7.28).—4:4'-Diaminodiarlylmethanes are tetrazotised and coupled with a pyrazolone (1 mol.) and a naphthol or naphtholsulphonic acid (1 mol.). The diamine from CH_2O and *m*-toluidine gives with 1-(2:5-dichloro-4-sulphophenyl)-3-methyl-5-pyrazolone and *N*-*W*-acid an orange dye. C. H.

Manufacture of monoazo dyes [for wool and silk]. B. RICHARD, Assr. to J. R. GEIGY SOC. ANON. (U.S.P. 1,824,686, 22.9.31. Appl., 7.6.30. Fr., 4.7.29. Cf. B.P. 337,577; B., 1931, 240).—In the process of the prior patent a 1-acylamino-8-naphtholdisulphonic acid is used as end-component. Examples are: *o*-aminophenol *o*-tolyl or benzyl ether \rightarrow benzoyl-*H*-acid (red to blue-red). C. H.

Manufacture of azo dyes [pigments and ice colours] and intermediate products therefor. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 385,620, 11.6.31. Cf. B.P. 385,605; B., 1933, 220).—The indole- and naphthindole-sulphonic acids of the prior patent are converted by alkaline fusion into OH-compounds, which are coupled in substance or on the fibre with aromatic or heterocyclic diazo compounds free from solubilising groups. 8-Hydroxy-2-phenyl- α -naphthindole, m.p. 250°, is coupled with diazotised 2:5-dichloroaniline (red-brown) or 5-chloro-*o*-toluidine (red-violet); 8-hydroxy-2:3-dimethyl- α -naphthindole with diazotised *p*-chloro-*o*-nitroaniline (dark red-brown). C. H.

Production of trisazo dyes. C. S. DEWEY, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,819,080, 18.8.31. Appl., 5.6.29).—Dyes, 2:4:8- or 2:6:8-naphthylaminedisulphonic acid \rightarrow α - $\text{C}_{10}\text{H}_7\text{NH}_2$ or 2-alkoxy- α -naphthylamine \rightarrow Cleve acid \rightarrow S_2O_8 give blue-grey shades on cotton or viscose silk. C. H.

[Manufacture of] tetrakisazo dyes. C. S. DEWEY, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,819,079, 18.8.31. Appl., 5.6.29).—The dye, β -naphthylamine-6:8-disulphonic acid \rightarrow middle component of the C_6H_6 series \rightarrow 3-amino-*p*-tolyl alkyl ether, is phosphogenated. In the example, the second component is NH_2Ph and the third cresidine (red-brown on cotton or viscose silk). C. H.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Measuring the resilience of wool. C. G. WINSON (J. Text. Inst., 1932, 23, T 386–393).—A sample of the wool is enclosed in a thin, spherical, rubber membrane and submitted to the mechanical action of a surrounding

atm. the pressure of which is made to vary in a cyclic manner. B. P. R.

Detection and estimation of medullated fibre in New Zealand Romney fleeces. B. L. ELPHICK (J. Text. Inst., 1932, 23, T 367–385).—The scoured and cleaned (petrol) fibres are immersed in C_6H_6 tinted by the addition of a little discoloured NH_2Ph , when the slightest trace of air-filled medulla in the wool becomes visible. Applications of the test are described. B. P. R.

Absorption of water by sisal and manila ropes on immersion: increase of weight and girth. ANON. (Bull. Imp. Inst., 1933, 30, 407–412).—The initial rate of H_2O absorption by sisal ropes (*A*) was > that of manila ropes (*B*), but the total H_2O absorbed on immersion for 167 hr. was approx. the same for both. The rates of shrinkage on drying for *A* and *B* were almost equal, but *A* returned more nearly to their original girth than *B*. D. W.

Economics of the production of half-stuff by the Sudakov process. G. A. KAPLAN and O. G. IOFFE (Bumazhn. Prom., 1932, 11, No. 6, 26–30). CH. ABS.

Psycho-technical investigation of worsted yarns made from short wools, noils, and wastes. H. BINNS (J. Text. Inst., 1932, 23, T 394–398). B. P. R.

Structure of cellulose fibres. D. KRÜGER (Zellstoff u. Papier, 1933, 13, 9–12).—The literature is summarised. A. G.

Composition of Philippine hardwoods. IV. F. M. YENKO, L. BAENS, and A. P. WEST (Philippine J. Sci., 1932, 49, 587–593).—Analyses of ten different hardwoods are given.

Determination of furfuraldehyde produced from hardwoods. H. A. IDDLIES and P. J. ROBBINS (Ind. Eng. Chem. [Anal.], 1933, 5, 55–57).—Steam-distillation of the 12% HCl solution gives results 2.7% higher than those obtained by ordinary distillation, owing to less destruction of furfuraldehyde (*I*) taking place. (*I*) is determined by the KBrO_3 - KBr method of Powell and Whittaker (A., 1924, ii, 355). (*I*) obtained from various woods was: *Betula lutea* 18.27, *B. papyrifera* 18.83, *Acer saccharum* 14.50, *Fraxinus americana* 14.01, *Quercus borealis* 15.35%, *Fagus grandifolia* 15.8%. T. McL.

Use of 40–60-mesh sawdust in the chemical evaluation of pulpwood. B. E. LAUER and M. A. YOUTZ (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 38–39).—The use of comparatively coarse sawdust in preference to 60–80-mesh material is advocated on the grounds of convenience and easier manipulation. Vals. for solubility in various solvents, cellulose and lignin contents, etc. of the two grades are given, but they are not strictly comparable. H. A. H.

Production of cellulose from linseed straw. P. WAENTIG (Papier-Fabr., 1933, 31, 13–15).—When preparing paper pulp from linseed straw no mechanical treatment should be given before the chemical treatment, the sprit cellulose and bast fibres being separated after the latter. A. G.

Sodium hydrosulphite rag-cooking process. S. LENHER (Paper Trade J., 1933, 96; T.A.P.P.I. Sect.,

30—34).—A cooking process is described which gives a stock suitable for use in a white all-rag paper. It consists of a mild alkali treatment followed, after washing, by successive short cooks with $\text{Na}_2\text{S}_2\text{O}_4$. The strength and cuprammonium viscosity are not nearly so much impaired as by the usual alkaline cook followed by a bleaching process, and the Cu no. and α -cellulose content are but slightly affected. The process is satisfactory for rags dyed with direct, acid, and basic azo colours, and with indigo, but not with other vat dyes and only partly with S dyes. A great reduction in the cooking time of rag materials is ensured, and no special equipment is necessary. The process is being employed on a large scale.
H. A. H.

Determination of strength [of paper pulp]. VON POSSANNER (Papier-Fabr., 1932, 30, 676—682).—The measurable properties of a pulp depend on the type of hollander used. The use of an edge mill diminishes the strength if continued too long. The product of the tearing strength and the breaking length or bursting strength is nearly const. over a certain range of milling.
A. G.

Determination of total sulphur in cellulose waste liquor. M. DORENFELDT-HOLTAN (Papier-Fabr., 1932, 30, 673—676).—A sample of the sulphite spent lyes is added to 2N-NaOH in a conical flask. This is closed by a glass stopper carrying a dropping-funnel and a delivery tube which dips below dil. aq. NaOH. Successive portions of fuming HNO_3 are added through the funnel and the liquor is heated until finally the residue is white. S is then determined in the residue and in the wash-liquor as BaSO_4 after removing the HNO_3 with HCl. Other methods give low results owing to loss of SO_2 . Sulphate liquors do not require a closed apparatus.
A. G.

Thread-forming properties of cellulose acetates. F. OHL (Kolloid-Z., 1933, 62, 85—91).—The thread-forming power varies greatly in different kinds of commercial cellulose acetate. The content of AcOH has no influence, but the property increases with increasing viscosity and with concns. up to about 10%. The influence of storing, temp., change of solvent, and other conditions has been investigated and is expressed in tables and graphs, but since the viscosity is also affected, general inferences cannot be deduced.
E. S. H.

Tensile strength and fluidity in cuprammonium hydroxide solution of chemically modified rayon and cotton yarns. I. Oxidation by hypochlorite solutions. B. P. RIDGE and H. BOWDEN (J. Text. Inst., 1932, 23, T 319—366).—As a means of assessing the extent of chemical tendering, the measurement of fluidity in "cuprammonium" is equally valuable for regenerated cellulose rayons as for plain cotton materials, since increasing modification of rayons is always accompanied by an increase of fluidity, and there is a definite relation between this increase and the % strength of the modified materials. When the initial stages of oxidation are exceeded the curves expressing the relations between fluidity and the dry strength of plain cotton and the dry and wet strengths of rayons are linear over a considerable range and run parallel to one

another. Oxidation of mercerised cotton is characterised by a marked rise of fluidity for a relatively small decrease of strength, and in this case a linear relation between fluidity and strength is not obtained. The curve for spun viscose staple-fibre yarn resembles that for plain cotton in that it is not linear for the initial stages of oxidation. Cellulose acetate rayon yarns are resistant to attack by hypochlorite liquors of p_{H} up to about 11. When hydrolysis of these yarns occurs a linear relation between their fluidity and strength is obtained only when the hydrolysis is unaccompanied by dissolution of the cellulose. The effects of boiling dil. NaOH and other liquids on the strength of modified cotton and rayon yarns is discussed and a simplified procedure for determining the fluidity of regenerated cellulose rayons is described.
B. P. R.

Rapid method for distinguishing bleached sulphate from bleached sulphite [in pulp and paper]. R. W. SHAFFER (Ind. Eng. Chem. [Anal.], 1933, 5, 35—36).—Bleached sulphite is stained a wine-red colour, and bleached sulphate gives a purple colour, with a solution of Na_2CO_3 (1 g.) and brazilin (1 g.) in H_2O (175 c.c.).
E. S. H.

Sources and limits of error in the determination of ground-wood and pulp in paper. C. ANKER, K. HAUG, and E. STEPHANSEN (Papier-Fabr., 1933, 31, 61—62).—Errors arising in the analysis of unsized paper through the assumption of average vals. for the lignin content of the ground-wood and pulp are discussed, and expressions are deduced that enable the magnitude of such errors to be calc. from experimental data. The lignin content of the pulp component may be considered equal to that of the original pulp used, but that of the ground-wood component is much < that of the original ground-wood. If the size is not removed from sized papers, part of the rosin remains in the lignin residue and causes uncontrollable errors; with weighted papers the loss on igniting the filling material must be found. For china clay this is about 12%.
B. P. R.

Hydration as a strength factor in [paper] sheets. G. RUTZ (Papier-Fabr., 1933, 30, 704—706).—The development of hydration during the beating process is explained by the results of research work on the fine structure of the fibre. Cellulose is capable of swelling to a pronounced degree, but in unbeaten material such swelling is greatly restricted by the presence of the foreign membrane system and incrustants in the fibre. The cellulose is exposed only by the beating and then forms the mucous substance which adheres strongly to the fibres during drying. This accounts for the variations in strength of different half-stuffs.
B. P. R.

Removal of water from paper on the felt-covered drying cylinders of paper machines. W. MULL (Papier-Fabr., 1933, 30, 701—704, 725—729, 737—742, 749—751).—Methods of measuring the thickness, porosity, and air-permeability of felt materials are described and these properties are defined. The air-permeabilities of cloths composed of cotton, wool, asbestos, sail-cloth, and cotton-asbestos mixtures are compared, the effects of the above properties on the H_2O -absorbing capacity of the felts, and the dependence

of the drying of the paper sheets on both evaporation and the capacity of the felts to absorb H_2O , are discussed. B. P. R.

Influence of kaolin on the strength of paper. S. FOTIEV and N. PEREKALSKI (Bumazh. Prom., 1932, 11, No. 9, 40—41).—Addition of a small quantity of filler of the kaolin type improves the mechanical properties of paper. The optimum strength is reached at about 2—3% ash. CH. ABS.

Use of alumina from nephelite rocks for sizing paper. A. KOROTAEV and N. IVANOV (Bumazh. Prom., 1932, 11, No. 8, 54—57).—The rock is decomposed with waste H_2SO_4 from the prep. of parchment paper or spent sulphite liquor, affording SiO_2 gel and $Al_2(SO_4)_3$. CH. ABS.

Dyeing of paper. A. WALTER (Pulp & Paper Canada, 1933, 34, 33—35, 46, 48, 50).—A comprehensive review of suitable dyes for use in paper manufacture, whether for beater dyeing, dip dyeing, or surface dyeing, is given, and the reactions of the various papermaking fibres to the different classes of dyes are indicated. Fastness properties are also considered. H. A. H.

Developments in the microscopy of paper. J. B. CALKIN (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 39—40).—A programme of work for the differentiation of various papermaking fibres is outlined. H. A. H.

See also A., Feb., 119, **Stability of cellulose nitrate preps.** 121, **Sorption of NaOH on cellulose and wood.** 150, **Synthesis of cellulose o-chlorobenzyl ethers.** Higher fatty acid esters of cellulose. 178, **Viscosity of fibroin sol.**

PATENTS.

Manufacture of cellulose xanthate derivatives and artificial materials therefrom. L. LILIENFELD (B.P. 385,979, 31.3.31. Cf. B.P. 357,121, 357,526, and 357,551; B., 1932, 141, 60).—Viscose alone or in a solvent is made to react with 1 or more org. compounds containing S and halogen, at least 1 atom of each being attached to C, preferably to different C atoms, e.g., halogenated di- or poly-mercaptans or -sulphides, S derivatives of halogenated di- or polyhydric alcohols. Se or Te may replace S, and the reagents of the prior patents may be used in addition. The products are made into films, threads, etc. Thus, viscose in aq. NaOH is stirred with the product of Example 1 of B.P. 385,980 (B., 1933, 218), aged, filtered, and spun in 50—57% H_2SO_4 . 22 further examples are given. C. H.

Treatment of cellulose derivatives. BRIT. CELANESE, LTD. (B.P. 385,999, 8.7.31. U.S., 8.7.30. Addn. to B.P. 377,313; B., 1932, 929).—Org. derivatives of cellulose, mixed with plasticisers if desired, are heated under pressure (750 lb./sq. in.) with H_2O or an org. non-solvent liquid at a temp. sufficient to effect fusion; the resulting product may readily be ground to powder. F. R. E.

Manufacture of artificial threads. O. VON KOHORN (O. KOHORN & Co.) and A. JÄGER (Assee.) (B.P. 386,168, 22.3.32. Ger., 30.3.31).—Viscose solution containing the normal amount of cellulose (about 7%) and prepared from alkali cellulose with < the usual amount of CS_2

(< 35% of its α -cellulose content) is spun into a bath containing $MgSO_4$ at a drawing-off rate of > 75 (preferably 90—150) m./min. F. R. E.

Manufacture or treatment [packaging] of yarns containing artificial filaments. H. DREYFUS (B.P. 385,985, 4.6.31).—Cellulose derivative yarn, after stretching, treatment by suitable liquids, and drying to assist contraction, is wound slackly on to a rotating package support in such a way as to avoid strain. F. R. E.

Working up film waste, celluloid, and other products containing nitrocellulose. F. K. JAHN, Assee. of V. BLOOS and P. C. L. HAYEMAL (B.P. 386,530, 7.6.32. Ger., 20.7.31).—After removal of gelatin, metallic salts, etc., the waste is treated with H_2O at < 2 atm. in a closed autoclave. The product is then boiled under atm. pressure, preferably by passage of steam, to remove volatile solvents etc. and to stabilise the nitrocellulose, which is well washed and recovered in a partly degraded form suitable for production of varnishes. F. R. E.

Production of [rubber-coated] hard-cardboard sheets and articles. ANODE RUBBER CO., LTD., Assees. of MAGYAR RUGGYANTAARUGYAR RÉSZVÉNYTÁRSASÁG (B.P. 386,713, 11.9.31. Hung., 4.11.30).—Cardboard or other paper-like material is coated on both sides with hard vulcanised rubber, the rubber composition containing < 13% S on the rubber present. D. F. T.

Manufacture of doubled crêpe yarns. BRIT. CELANESE, LTD., W. A. DICKIE, and D. FINLAYSON (B.P. 386,339, 15.7.31).

Production of [highly twisted] crêpe yarns and fabrics. BRIT. CELANESE, LTD., W. A. DICKIE, and R. W. MONCRIEFF (B.P. 386,344 and 386,374, [A, B] 4.6.31, [B] 3.10.31).

AcOH etc. [from cellulose fermentation]. Acetals, esters, and *tert.*-butylnaphthol [as plasticisers]. Metal salts of alkyl glyceryl phthalates.—See III. Saccharification of vegetable materials.—See XVII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Substantive dyeing of cellulose fibres. W. WELTZIEN and K. SCHULZE (Kolloid-Z., 1933, 62, 46—54).—The amount of dye (Brilliant-benzo-blue 6B or Oxamine-red 3B) taken up depends on the ash content of the cellulose and on the temp. of the dye solution, but in ash-free samples the addition of Na_2SO_4 still exerts a considerable influence. The dye is readily removed by washing with completely electrolyte-free H_2O at 70°, but the addition of small amounts of electrolytes inhibits the washing out. It is inferred that the degree of dispersion and related factors play an important part in substantive dyeing. E. S. H.

Colour-absorptive power of Bemberg silk. II. Basic dyes. U. MIYAOKA and T. TSUBOTA (Shikisen, 1932, 3, 339—343).—The absorptive power for basic dyes is so small that these dyes are uneconomical unless a very clear nuance is required. For light colours 30° is a sufficiently high temp.; deep colours are obtained by boiling with 10% of neutral salt. CH. ABS.

Identification of tannin-antimony and Katanol mordants applied to cotton and viscose silk in dyeing with basic colours. K. HISHIYAMA and S. Tabei (J. Soc. Chem. Ind., Japan, 1933, 36, 11—12 B).—The presence of tannic acid is recognised by the red-brown colour which develops (due to oxidation) on shaking in contact with air a 4—6% NaOH extract of the dyed material; under similar conditions Katanol gives no coloration, but may be pptd. by acidifying the extract (the ppt. may be coloured, due to absorption of dye which has bled from the dyed material). When the extract is coloured red-brown by dissolved dye the presence of tannic acid is confirmed by an increase in colour when one half of the extract is shaken while the remainder is protected from atm. exposure. The test is sensitive with materials mordanted with \leq 0.2% of tannic acid or Katanol. A. J. H.

Dyeing of paper.—See V.

PATENTS.

Dyeing of textile materials. A. J. BELOKOPYTOFF, Assr. to K. L. MAYEHOFF (U.S.P. 1,853,654, 12.4.32. Appl., 16.1.29).—Fabric is printed in fancy multi-coloured designs by contact with a glass, metal, or other sheet surface coated with an aq. extract of Irish moss and upon which drops of dye solutions have been allowed to fall. A. J. H.

Dyeing with vat dyes [coloured resist effects]. BLEACHERS' ASSOC., LTD., C. S. PARKER, C. L. WALL, and F. FARRINGTON (B.P. 386,365, 19.9.31).—The fabric is printed with a vat-dye paste containing alkali and formaldehydesulphoxylate, aged, and padded with a paste containing a different vat dye, FeSO_4 , SnCl_2 , and weak acid. The alkali in the printed parts acts as a reserve against the second paste. The order of the pastes may be reversed if sufficient weak acid is present to reserve by neutralising the alkali of the other paste. Preferably 5% of MnCl_2 is added to the acid paste, and gum senegal or locust-bean thickening is used. Suitable pairs of alkaline and acid pastes are: Indanthrene-golden-yellow RK or Indanthrene-red FBB with indanthrene or Caledon-blue R. C. H.

Dyeing with azo dyes and vat dyes. BLEACHERS' ASSOC., LTD., C. S. PARKER, C. L. WALL, and F. FARRINGTON (B.P. 385,677, 25.9.31).—The material is padded with a leuco-vat dye and a coupling component, and the diazo compound is applied after or together with an oxidant (H_2O_2) for the leuco-compound. The diazo solution preferably contains also a Ca salt (acetate). Examples are: Caledon-jade-green or Indanthrene-golden-yellow RK and Naphthol AS/LB developed with Fast-red TR. C. H.

Dyeing [with green ice colours]. IMPERIAL CHEM. INDUSTRIES, LTD., and R. F. GOLDSTEIN (B.P. 385,613, 24.6.31).—Tetrazotised 5:5'-diaminotioindigo is coupled on the fibre with a bisacylacyldiamine of the benzidine or other series in which the 2 NH_2 groups are in different nuclei, solubilising groups being absent; e.g., bisacetoacetyl-tolidine or -4:4'-diaminostilbene. C. H.

Colour printing on textile materials. IMPERIAL CHEM. INDUSTRIES, LTD., R. TONKIN, and J. S. WILSON

(B.P. 385,666, 16.6.31).—Improved printings, especially with vat dyes, are obtained by adding to the printing paste a quaternary salt, $\text{NRR}'\text{R}''\text{X}$, where R—R'' are the same or different alkyl or aralkyl groups, of which at least one carries an OH group, and X is OH or a simple mineral acid residue. The example is choline chloride. C. H.

Cleaning of fabrics. G. E. OLSEN (U.S.P. 1,851,015, 29.3.32. Appl., 18.11.29).—Fabrics contained in a perforated basket are lowered into a vertical liquor container, thereby passing through an upper layer of benzine, naphtha, etc., and a lower layer of an aq. detergent liquor, and are then withdrawn. A. J. H.

Manufacture and use of wetting preparations. IMPERIAL CHEM. INDUSTRIES, LTD., C. DUNBAR, and W. TODD (B.P. 385,977, 6.7.31).—A wetting agent for mercerising liquor comprises cresols and/or xylenols with terpineol or pine oil and a fatty acid (oleic acid), e.g., in the proportions 90:6:4 or 91:8:1:0.9. C. H.

Sizing treatment of artificial silk yarns and threads and sizing composition for use therein. STEIN, HALL & Co., INC. (B.P. 383,999, 7.9.31. Addn. to B.P. 359,802; B., 1932, 19).—Dextrin or dextrinised starch-containing material may be omitted or replaced by an animal glue in the sizes previously described. A. J. H.

[Manufacture of] water- and fire-resistant coated [textile] material. C. ELLIS (U.S.P. 1,852,998, 5.4.32. Appl., 4.10.24).—Paper and fabric are coated with a solution in C_6H_6 , CCl_4 , etc. of chlorinated rubber containing a softener, e.g., Ph_3PO_4 , and a vegetable oil; the fireproofing properties of the rubber product are proportional to the degree of chlorination. A. J. H.

Mechanical dyeing boilers. T. JUNGNIKEL (B.P. 386,520, 23.5.32).

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

Sulphuric acid plant. III. Towers and their equipment. B. WAESER (Chem. Fabr., 1932, 5, 484—486).—A general account. H. F. G.

Sulphuric acid plant. IV. The contact process. B. WAESER (Chem. Fabr., 1932, 5, 501—503).—Bachalard's remarks (B., 1932, 338) on converter design are summarised, and the layout of a V contact plant on the Kuhlmann system is described. The economics of the use of V are discussed, and the uniting of V conversion with a modern intensive chamber plant is recommended. C. I.

Simultaneous manufacture of sulphuric and hydrochloric acids. V. F. JUFEREV and L. L. KUZMIN (J. Appl. Chem., Russia, 1932, 5, 325—331).—The reaction $\text{SO}_2 + \text{Cl}_2 + 2\text{H}_2\text{O} = \text{H}_2\text{SO}_4 + 2\text{HCl}$ was studied at 18—90° for \geq 7% SO_2 and 1—8 g. SO_2 flow per hr. The quantity of air does not affect the degree of completeness. Cl_2 catalyses the conversion $\text{SO}_2 \rightarrow \text{H}_2\text{SO}_4$, and excess of Cl_2 improves the purity of the HCl formed. CH. ABS.

Fused-silica absorber for hydrochloric acid. T. FRANTZ (Chem.-Ztg., 1933, 57, 27—28).—Intensive

HCl absorbers supplied under the trade name "Dioxsil" consist of a long shallow box in 2 pieces, upper and lower, the former carrying the gas inlet and exit. The whole is immersed in cooling-H₂O, which is sprayed in at the top; the condensed HCl is drawn off by a glass siphon in the side. Such absorbers are best placed at the front end of an absorption train of the usual kind.

C. I.

Oxidation of phosphorous acid. I. N. BUSCHMAKIN, J. R. MOLKENTIN, and F. Y. RACHINSKI (J. Appl. Chem., Russia, 1932, 5, 557—566).—H₃PO₃ present in H₃PO₄ is preferably oxidised with air for 25—30 min. at 250° in a bomb under steam pressure. CH. ABS.

Volumetric determination of calcium oxide in lime. I. TANANAEV (J. Appl. Chem., Russia, 1932, 5, 660—667).—Titration with HCl in sugar solution is accurate to 0.2—0.3%; the HgCl₂ method is satisfactory if the procedure is standardised. The KF, Na₂CO₃, and Na₂C₂O₄ methods are untrustworthy. CH. ABS.

Determination of calcium oxide in magnesium compounds. P. ACKERMANN (Chem.-Ztg., 1933, 57, 39).—The following procedure makes possible the separation of Ca from Mg in one pptn. MgCl₂ is shaken with excess EtOH (96%) with addition of aq. Na₂SO₄ and filtered; the residue contains the Ca. MgO and MgCO₃ are first dissolved in HCl and evaporated with Na₂SO₄ before proceeding as above. MgSO₄ is pptd. with Na₂CO₃ and treated as MgCO₃. In this case most of the Mg is retained in solution, but all the Ca is pptd.

C. I.

Gel formation in sodium metasilicate solutions. M. J. PRUCHA and C. A. GETZ (Ind. Eng. Chem., 1933, 25, 68—72).—Pure Na₂SiO₃ does not form a gel. Addition of lactic acid causes gel formation through a limited range of *p*_H on each side of the neutral point. Gel formation follows addition of 4% or more NaHCO₃, but not of NaOH, Na₃PO₄, or Na₂CO₃. It is also caused by the addition of sour milk and milk solids, both of which lower the *p*_H of the solution. Large amounts of the latter, however, are required, e.g., up to 50%. The optimum temp. is approx. 48.9° and agitation tends to break up the gel. The optimum concn. of Na₂SiO₃ is 1—3%. The data, considered with reference to milk bottle-washing machines, suggest that gel formation may be avoided by using solutions that contain < 3% Na₂SiO₃ and by discarding the washing solution before about 4% of milk solids-not-fat accumulates in them.

M. S. B.

Manufacture of titanium dioxide from sphene-apatites. V. E. TISCHTSCHENKO, Y. M. PESIN, A. L. KOSTRAK, and S. S. FREIDLIN (J. Appl. Chem., Russia, 1932, 5, 685—692).—Titanite is digested with 80% H₂SO₄ at 140—145° for 10—11 hr. The dry, powdered residue is extracted with H₂O at 97° for 7 hr., and the solution reduced with Fe and hydrolysed, the product being washed and ignited at 500° for 3 hr. The yield of TiO₂ is 71%.

CH. ABS.

Determination of small quantities of calcium carbide in slags. A. ALEXANDROV (J. Appl. Chem., Russia, 1932, 5, 843—848).—The slag from the CaC₂ process mixed with NaCl is decomposed with aq. Pb(NO₃)₂ and the vol. of C₂H₂ is measured. CH. ABS.

Modern large-unit cell batteries for production of electrolytic hydrogen. A. E. ZDANSKY (Chem. Fabr., 1933, 6, 49—51).—Whilst all known cells work at a c.d. of 500—1000 amp./sq. m., the new cell employs 3000 amp./sq. m. Internal resistance is reduced by the use of auxiliary electrodes close together and the construction of the asbestos diaphragm. Over-voltage is minimised by electrolysis of KOH of *d* 1.35 with the current reversed until Fe begins to dissolve, and then depositing this Fe on the cathode. By these means the cell voltage is kept down to 1.95. The diaphragm construction results in a gas purity of 99.9% H₂, and 99.5—99.7% O₂. Gas purity increases with concn. of the electrolyte. One battery consists of 100—150 cells built as one unit. Protection from corrosion is secured by electrodeposition of Ni on all parts except the cathodes, using a low c.d., high bath temp., and *p*_H 4.5. The coating should be > 0.08 min. thick. C. I.

Purification of hydrogen containing phosphine under pressure. I. N. BUSCHMAKIN and M. V. RUISAKOV (J. Appl. Chem., Russia, 1932, 5, 705—714).—H₂, obtained by oxidising P with H₂O at high temp. and pressure, can be freed from PH₃ without reducing the pressure by oxidation with steam at 300° in presence of Cu phosphide. With Cu, oxidation is incomplete.

CH. ABS.

Reaction between bisulphite solutions and hydrogen sulphide and its technical application. C. J. HANSEN (Chem.-Ztg., 1933, 57, 25—27).—The freeing of coke-oven gas from H₂S by washing with NH₄HSO₃ solution is best effected in a tower packed with rings. A tower 800 mm. high and 65 mm. diam. will treat 500 litres of gas per hr., using 500—700 c.c. of liquor. The reaction proceeds in two well-defined stages: (1) 4NH₄HSO₃ + H₂S = (NH₄)₂S₂O₃ + (NH₄)₂S₃O₆ + 3H₂O; (2) (NH₄)₂S₃O₆ + 3H₂S = (NH₄)₂S₂O₃ + 4S + 3H₂O. Reaction (2) proceeds comparatively slowly. Mixtures of sulphites and bisulphites behave similarly, the former suffering hydrolysis. Thiosulphates, however, give S immediately, the combined SO₂ in this case apparently being in the yellow tautomeric form. Thiosulphates are produced if the original liquor contains neutral sulphite: 4(NH₄)₂SO₃ + 2H₂S = 3(NH₄)₂S₂O₃ + 2NH₃ + 3H₂O. It can be readily calc. that with coke-oven gas containing NH₃ and H₂S in the ratio 2 : 1, as is usual, it is impossible to remove all the S by this method without pptn. The author's process (G.P. 476,382) proceeds in 2 stages: in the first the reaction (1), above, is carried out; in the second, additional SO₂ is supplied. C. I.

Mixing of gases.—See I. Al₂O₃ in paper sizing.—See V. Analysis of phenoxides.—See XI. F compounds as insecticides.—See XVI. Potash-factory effluents and sugar juice.—See XVII. Na₂S₂O₃ solution for injection.—See XX. Na aluminate in water softening.—See XXIII.

See also A., Feb., 123, Prep. of highly conc. sols. 130, Solubility of Al₂O₃ in fused cryolite. 131, Oxidation of SO₂ in electrodeless discharge. NH₃ formation in the silent discharge. 133, Formation and decomp. of KClO₄. Production of gaseous HCN. 134, Prep. of per-acids and their salts. 135,

Determination of iodides in mixed halides. 137, Determination of mixed Ag salts, Cl', and S₂O₃''. 140, Determination of He in Ne. 151, Cyanamide. 159, [Apparatus for sublimation of] AlCl₃.

PATENTS.

Production of potassium carbonate. A. L. MOND. FROM CHEM. FABR. BUCKAU (B.P. 386,208, 27.5.32).—An aq. suspension of K₂SO₄ and Ca(OH)₂ is treated with CO or gas mixtures containing it (*e.g.*, with producer gas at 200° and 15 atm.) to yield CaSO₄ and HCO₂K; the solution, after filtration and, preferably, after addition of K₂CO₃ or KHCO₃ to ppt. and remove Fe and Al compounds, is evaporated to dryness and the residue is calcined to convert it into K₂CO₃. L. A. C.

Manufacture of potassium bicarbonate. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 386,351, 24.8.31).—KCl is treated at 0–80° and at < 5 atm. with CO₂ or a compound of it with NH₃ in the presence of < sufficient H₂O for hydrolysis of the carbamate to bicarbonate, and more NH₃ than can be dissolved in the H₂O at room temp. and pressure. L. A. C.

Converting potassium chloride, or crude salts and mixtures containing it, into storable and readily distributable form. KALI-FORSCHUNGS-ANSTALT G.M.B.H. (B.P. 386,466, 29.2.32. Ger., 6.10.31).—Fused KCl or a natural salt mixture containing it is converted into spherical pellets, *e.g.*, by centrifugal apparatus or a rotating disc, and rapidly cooled. L. A. C.

Production of formamide [from ammonia and carbon monoxide]. B. S. LACY, ASSR. TO ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,787,483, 6.1.31. Appl., 17.11.25).—CO and NH₃ are combined in an alcohol in presence of an alkoxide (preferably NaOMe in MeOH) at low pressures, *e.g.*, at 70°/17 atm. C. H.

Manufacture of hypochlorite solutions. J. C. BAKER, ASSR. TO WALLACE & TIERNAN PRODUCTS, INC. (U.S.P. 1,850,975, 22.3.32. Appl., 11.4.27).—Cl₂ is passed into a measuring chamber until the pressure therein indicates that the necessary quantity is present to convert a measured vol. of aq. NaOH into NaOCl; the Cl₂ is then passed into the NaOH through a capillary which prevents the solution from being drawn into the Cl₂ chamber when the pressure therein falls to 1 atm. A. R. P.

Production of antimony trifluoride. KINETIC CHEMICALS, INC. (B.P. 386,654, 13.7.31. U.S., 18.2.31).—SbCl₃ is heated with excess HF in the presence of an org. solvent (*e.g.*, EtOH, CCl₄, PhNO₂) or a little H₂O. L. A. C.

Purification of gases [*e.g.*, nitrogen-hydrogen mixtures for ammonia synthesis]. F. H. SNYDER and E. D. NEWKIRK (U.S.P. 1,850,732, 22.3.32. Appl., 21.2.27).—The compressed gas mixture is mixed with an excess of NH₃ over that required to remove the impurities and passed over an Fe or Fe-Cr gauze catalyst at 350–500°, or over a Cu-gauze catalyst at 500–700°, whereby the CO is converted into HCO·NH₂ which, together with CO₂ and excess of NH₃, is removed by washing with H₂O. A. R. P.

Recovery of sulphur from spent gas-purifying masses. VEREIN. STAHLWERKE A.-G. (B.P. 386,233, 28.6.32. Ger., 18.7.31).—The masses are extracted with CS₂ and the solution, after purification by treatment with H₂SO₄, is treated with aq. H₂S, or with a gas mixture containing H₂S, to remove SO₂ before removal of the CS₂ by distillation. L. A. C.

Extraction of helium [from natural gas]. R. R. BOTTOMS, ASSR. TO HELIUM CO. (U.S.P. 1,850,529, 22.3.32. Appl., 30.7.29).—The compressed gas is cooled to liquefy the greater part of the gases and the mixture is supplied at a lower pressure to a rectifying column (A) to separate a liquid free from He and a gas mixture rich in He, which latter is further cooled, separated from any liquid (which is returned to the rectifier), compressed to 2000 lb. per sq. in., and cooled to condense the remainder of the impurities. The liquid obtained in the last operation is returned to the top of A, and the liquid which is collected at the bottom of the column is evaporated to effect the cooling necessary in the final purification of the He. A. R. P.

Separating gaseous mixtures. Absorbent material.—See I. Dehydration and purification of gas. —See II. Acid-proof cements.—See IX.

VIII.—GLASS; CERAMICS.

Testing of ampoule glasses. D. VON KLOBUS-ITZKY (Kolloid-Z., 1933, 62, 98–99).—Notes on testing are given. Glass which, when suspended in H₂O, does not raise the *p*_H above 9.5 is suitable. E. S. H.

Solvents for the safety-glass industry. T. PESCH (Chem.-Ztg., 1932, 56, 1033–1034).—Solvents used in the manufacture of safety glass should have a low v.p. Highly volatile solvents may by their evaporation lower the temp. of the cellulose ester sheet and cause the deposition thereon of moisture from the air. Other difficulties, *e.g.*, shrinkage with production of grain in the sheet, may be caused by high volatility of the solvent, and the importance of determining the comparative volatility of different solvents is emphasised. The solvents should be chemically stable and should have no deleterious physiological effects on the workers. A. B. M.

Determination of the coefficient of expansion [of enamels]. C. J. KINZIE and C. H. COMMONS, JUN. (J. Amer. Ceram. Soc., 1933, 16, 1–5).—A H₂O-cooled tubular framework carries the two thrust pieces, the movement of the upper of which is registered by a dial micrometer gauge. The linear coeff. (400°) for different enamels varied from 97.9 × 10⁻⁷ to 114.3 × 10⁻⁷ and the vals. checked within 0.5%. J. A. S.

Investigation of clays by the dissociation method. D. K. ZAVRIEV (J. Appl. Chem., Russia, 1932, 5, 753–760).—At 550° and 1 atm. H₂O pressure kaolinite releases 1 mol. H₂O; the remainder is evolved at 470–550°. The heat of formation of the H₂O-kaolinite compound is 24,000 g.-cal. per g.-mol. The plastic properties of certain clays are dependent on their ability to form solid solutions with H₂O. CH. ABS.

Refractory clays of the Moiski [W. Siberia] deposits. N. D. DAVGAL (Keram. i Steklo, 1932, 8, No. 7, 32). CH. ABS.

Commercial underclays of Indiana. G. I. WHITLATCH (J. Amer. Ceram. Soc., 1933, 16, 45—53).—Field and laboratory data are given in detail. Many clays suitable for the manufacture of pottery and refractories are available. J. A. S.

Swelling, working state, and shrinkage of clays. L. A. SHMELEV (Trans. Ceram. Res. Inst., Leningrad, 1932, No. 34, 1—20).—Gluchovetz and Chassov-Yar clays increase 40—44 vol.-%; kaolins increase 6—16 vol.-%, and Borovichi and Latnaya clays increase 12—22 vol.-%. Formulæ are given for calculating drying shrinkage. There is no relationship between shrinkage and the amount of pore-H₂O. CH. ABS.

Effect of electrolytes on clay slips. F. L. CLARK (Trans. Ceram. Soc., 1933, 32, 1—6).—By considering the adhesion tension relationships between H₂O and clay, the effect of additions of small amounts of Na₂SiO₃ on the deflocculation and viscosity of slips, plasticity of castings, and on the casting-up time and drying time may be predicted qualitatively. Good agreement between theoretical predictions and experiment was obtained in the slip-casting of non-plastics (fused Al₂O₃, fused ZrO₂, quartz, "aloxite," Pyrex glass, and C).

A. L. R.

Active components in ceramic ware. ALMAGOV-MANEVICH (Keram. i Steklo, 1932, 8, No. 7, 21—22).—The use of CaO-H₂O (> 2% CaO for the dry mass) is advantageous. CH. ABS.

Influence of the glaze layer and vitrification on the dielectric properties of insulators. I. I. YURCHAK and V. V. SUKACHEV (Keram. i Steklo, 1932, 8, No. 7, 17—21).—Insulators should be fired until the pores are minimal. The glaze increases the durability and improves the dielectric properties of underfired insulators. CH. ABS.

Experiments with zircon and zirconia refractories. G. F. COMSTOCK (J. Amer. Ceram. Soc., 1933, 16, 12—35).—The production of foundry moulds, brick, cement, ladle nozzles, and crucibles of ZrSiO₃ is described in detail. Sintered ZrSiO₃ grog was superior to that electrically fused, and bricks containing 50% of grog, bonded with 20% of milled ZrSiO₃ and fired at 1600°, showed little vol. change, a high hot-strength and resistance to spalling, but were corroded by basic slags or metallic oxides. Addition of ZrSiO₃ to MgO brick increases the refractoriness and the resistance to spalling. Very satisfactory ZrO₂ ware was made from 20% of CaO-bonded grog and 76% of ZrO₂ (both through 20-mesh) bonded with 4% of Ca(OH)₂ and fired at 1700°. ZrO₂ is more refractory and slag-resisting than ZrSiO₃. J. A. S.

Super-refractories and their technical application. C. AGTE (Feuerfest, 1933, 9, 1—4).—The nature, prep., and properties (m.p., hardness, electrical conductivity, chemical reactivity, etc.) of the high-m.p. elements and their compounds (carbides, nitrides, and borides of Ti, Zr, Hf, Nb, Ta, Mo, W) are described. A vac. resistance furnace for the determination of high m.p. is sketched. These materials are used as resistors in lamps and discharge tubes, refractory ware, abrasives, and in the prep. of hard alloys such as Widia (WC in Co). J. A. S.

Behaviour of refractory materials under torsion at different temperatures. A. L. ROBERTS and J. W. COBB (Trans. Ceram. Soc., 1933, 32, 22—44).—A torsion apparatus is described and results are given of a preliminary study of the behaviour under torsion, at temp. up to 1050°, of the following refractory materials, fired to cone 14 (approx. 1410°): kaolin alone and in admixture with calcined kaolin, quartz, and with fireclay; fireclay alone and also with "grog" (crushed firebrick) and with quartz. Transparent and translucent SiO₂ glass (Vitreosil) were also tested. In every case the addition of calcined material or quartz to kaolin or fireclay lowered the torsional strength of the fired test-piece. Materials containing free cryst. SiO₂ (i.e., all except kaolin, kaolin + calcined kaolin, and SiO₂ glass) showed an increased resistance to torsional stress as the temp. was raised (max. at 750—900°); the magnitude of this change depended on the amount of cryst. SiO₂ present. At 800—950° the torsional strength of all the materials except SiO₂ glass began to diminish; the decrease in strength pronounced at 1000°, marked the beginning of plastic flow. Corresponding temp. at which the decrease in strength occurred were approx. 1000° for Vitreosil and 1100° for transparent SiO₂ glass. Vals. of the moduli of rigidity of the materials at 20° and at 750—900° are given, and the practical applications of the results are indicated. A. L. R.

Plant experiences with the performance of the refractory lining of the grey cast-iron electric furnace. G. SPER (Feuerfest, 1933, 9, 4—5).—Trials with various brick and tamped linings of magnesite and dolomite are described in some detail. A hearth of tar-dolomite brick was the most economical, due to both higher output obtained and the lower cost of installation. J. A. S.

SiO₂ absorbers for HCl.—See VII.

PATENTS.

Manufacture of cemented carbide discs. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of G. F. TAYLOR (B.P. 386,359, 7.9.31. U.S., 8.9.30).—Thin layers, separated by C discs, of a powdered mixture of, e.g., WC and cementing material, with the addition, if desired, of diamond dust and reinforcing wires, are heated electrically under compression in the apparatus described in B.P. 385,629 (B., 1933, 196). L. A. C.

[Ceramic product from] carbonaceous materials.—See II.

IX.—BUILDING MATERIALS.

Facility of burning Portland cement. K. AKIYAMA (Cement, 1933, 6, 17—18).—Although the temp. of perfect sintering is 1450° the degree of CaO combination may be determined at 1350°. From mixtures having hydraulic moduli of 2—2.2 and SiO₂ ratios of 3.3—2.1 with Fe moduli of 3—1.5, curves show that the burning of high-CaO cement is difficult. Decrease in the SiO₂/Al₂O₃ ratio facilitates the fusion, the influence being the more marked in high-CaO cement. Reduction in the Al₂O₃/Fe₂O₃ ratio from 3.0 to 1.5 reduced the free CaO contents of low- and high-limed cements by > 1% and > 2% respectively. Hence the influence of the Fe modulus on the ease of fusion is more marked the

higher is the hydraulic modulus. Careful control of these ratios is important in the manufacture of high-CaO cement. C. A. K.

Essential flour in cement. S. RORDAM (Cement, 1933, 6, 3—16).—Cement particles coarser than 25 μ contain SO_3 derived only from the clinker. Practically all the gypsum is conc. in material $< 10 \mu$; hence, strength tests on different grades should be made on cement ground without gypsum. Such comparative tests on original cement, fraction 10—25 μ , and fraction 0—10 μ showed little difference in strength, but a marked increase in fineness was observed when mixed with sand. The fine flour has to bear the wt. of the coarser grains and is responsible for the plasticity. Also the early-hardening power of the concrete is determined by the material $< 10 \mu$, which might be termed the "backbone" of the cement. C. A. K.

Can cement be over-ground? L. R. DAVIES-GRAHAM (Rock Products, 1933, 36, 24—25).—Nine samples of cement taken from different points from the mill discharge were of almost identical composition. Results from strength tests indicate that the cement with optimum vals. leaves a residue of approx. 3% on a 180-mesh screen and is not finer than this. C. A. K.

Rôle of iron in alumina fused cement. H. RICHTER (Zement, 1932, 21, 445—449, 457—462, 471—476, 485—489; Chem. Zentr., 1932, ii, 2224—2225).—The assumption that in alumina cements SiO_2 is present as $2\text{CaO}, \text{SiO}_2$ limits the Al_2O_3 when CaO is low to $3\text{CaO}, 5\text{Al}_2\text{O}_3$; Fe_2O_3 is then present as $2\text{CaO}, \text{Fe}_2\text{O}_3$. Addition of more CaO produces $\text{CaO}, \text{Al}_2\text{O}_3$, which with the ferrite may afford $4\text{CaO}, \text{Al}_2\text{O}_3, \text{Fe}_2\text{O}_3$. Compounds of Fe_2O_3 richer in CaO are not formed. Fe compounds, particularly $2\text{CaO}, \text{Fe}_2\text{O}_3$, hinder setting; $4\text{CaO}, \text{Al}_2\text{O}_3, \text{Fe}_2\text{O}_3$ in small quantities hinders, but in larger quantities accelerates, setting. The strength of Al_2O_3 cements is diminished even by small amounts of Fe. Good fused cements should contain $> 6\%$ SiO_2 and 15% Fe_2O_3 ; the CaO should be present in such quantity as to form $2\text{CaO}, \text{SiO}_2$, $\text{CaO}, \text{Al}_2\text{O}_3$, and $2\text{CaO}, \text{Fe}_2\text{O}_3$. A. A. E.

Cementing material of sand-lime bricks. G. GRIME and G. E. BESSEY (Trans. Ceram. Soc., 1933, 32, 14—21).—A chemical, microscopical, and X-ray (powder method) examination of both commercial and laboratory-made sand-lime bricks showed that the hydrated CaSiO_3 forming the cement is present in the amorphous condition but may be converted by atm. CO_2 partly or wholly into cryst. CaCO_3 (calcite) and hydrated SiO_2 gel. A. L. R.

Water content of certain fire-protective media [for safes etc.]. M. G. MELLON and J. E. HECK (Ind. Eng. Chem., 1933, 25, 94—95).—Samples of the various cements and other mixtures employed for insulating containers such as safes against fire were tested for loss of H_2O over a period of time. There was a relatively large loss of wt. in all cases over a period exceeding 2.5 years, proportional to the amount of H_2O originally used in making up the material, but different for different materials, being largest in the mixtures containing Sil—O—Cel. The loss was evidently still continuing. The

loss on ignition at the end of 3 years was in no case so low as obtained for a sample taken from a safe 18 years old. M. S. B.

Tests of chemical treatments for control of sap stain and mould in southern [United States] lumber. R. M. LINDGREN, T. C. SCHEFFER, and A. D. CHAPMAN (Ind. Eng. Chem., 1933, 25, 72—75).—Many chemicals have been tested for the control of stain and mould on pine and hardwood, and results obtained by their use are tabulated. The most promising commercially are borax, Na tetrachlorophenoxide, Na *o*-phenylphenoxide, Et mercuri-chloride and -phosphate. D. K. M.

Condition of water in wood at low temperatures. N. NEPENIN and P. KHVIVUZOV (Bumazh. Prom., 1932, 11, No. 8, 57—61).—At 0° to -12° about 30% of the H_2O (calc. on dry lignin) is not frozen. CH. ABS.

Zircon refractories.—See VIII. **Pipe-line protection.**—See XIII.

See also A., Feb., 133, **Synthesis of Ca hydroaluminates. Solid reaction between CaO and H_2SiO_3 .**

PATENTS.

Firing, roasting, and sintering of cement, lime, or similar material. W. W. TRIGGS (From G. POLYSIUS A.-G.), LEPOL, INTERNAT. PATENTVERWERTUNGS G.M.B.H., and N.V. SOLOPOL, INGENIEURS BUREAU TOT EXPLOIT. VAN HET SYSTEEM POLYSIUS (B.P. 386,330, 9.4.31. Addn. to B.P. 288,192; B., 1929, 395).—Raw material, dried and granulated, is calcined on a travelling grid by passing hot gases through the bed. Alternatively, the material may be dried in similar manner by cooling the exhaust gases from a calcining chamber with air before they percolate through the granulated mass. C. A. K.

Manufacture of acid-proof cementing compositions. S. C. CHIGISON (B.P. 386,045, 24.9.31).— SiO_2 powder ground from grains of good strength and of sufficient purity not to be attacked by acids is mixed with a hardening agent, e.g., NaBF_4 or Na_2SiF_6 , and a solution of Na silicate in which the $\text{SiO}_2/\text{Na}_2\text{O}$ ratio is $< 3.5 : 1$. Graphite may be added as a lubricant. C. A. K.

Gluing materials together [in manufacture of plywood]. T. W. DIKE, Assr. to I. F. LAUCKS, INC. (U.S.P. 1,851,950—5, 29.3.32. Appl., [A, B] 26.5.30, [C, D] 28.5.30, [E, F] 29.9.31. Renewed [D] 9.9.31. Can., [E, F] 3.3.30).—The wood to be glued is coated with: (A) casein or soya-bean flour in a thick aq. suspension; (B) a mixture of powdered blood-albumin, soya-bean flour, Na_3PO_4 crystals, and $\text{Ca}(\text{OH})_2$; (C) casein or soya-bean flour mixed with Na_3PO_4 aq. and β -naphthol; (D) dry soya-bean flour which is sprinkled over the steamed wood at 100 — 170° ; (E, F) starch, casein, or similar dry adhesives mixed with an alkali hydroxide. In (A—D) and (F) the adhesion of the several layers of the plywood is effected by applying heat and pressure, and in (E) by applying pressure alone. A. R. P.

Sound insulation [for walls etc.]. W. W. TRIGGS. From INTERNAT. FIBRE BOARD, LTD. (B.P. 386,392, 16.11.31).

[Products from] coal tar.—See II.

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

Heat exchange in steel-treating furnaces. H. STOFFREGEN (Arch. Eisenhüttenw., 1932—3, 6, 271—276).—A discussion of the temp. differences in various parts of furnaces used for the continuous preheating of steel ingots for the hot-rolling mills. A. R. P.

Alkali silicates for briquetting iron ore fines. N. D. AVERKIEV and N. V. UDOVENKO (J. Appl. Chem., Russia, 1932, 5, 353—361).—The fines are compressed with water-glass and dried at 400—500°. CH. ABS.

Reduction of iron oxide to metallic iron with hydrogen. M. O. CHARMANDARIAN and G. V. MARCHENKO (J. Appl. Chem., Russia, 1932, 5, 350—352).—The best yield (89—90%) is obtained by reducing finely-ground Fe_2O_3 with H_2 at 370—520°, with stirring, under a pressure of 30—40 mm. H_2O . CH. ABS.

Wrought iron. J. J. CURRAN and E. A. SANFORD (Met. & Alloys, 1933, 4, 1—5).—The advantages of the special properties of wrought Fe are discounted somewhat by reason of the cost of small-scale methods of manufacture and the non-uniformity of the product. Progressive larger-scale production should replace old prejudices: *e.g.*, Aston Fe is produced by the normal methods after partly refining pig Fe as in steel practice and then intermixing slag with the metal. C. A. K.

Rendering visible the primary structure of steels by addition of radioactive thorium-B. G. TAMMANN and G. BANDEL (Arch. Eisenhüttenw., 1932—3, 6, 293—296).—Addition of $< 1 \times 10^{-6}$ % of Th-B to molten Fe or steel makes it possible to examine the distribution of submicroscopic slag particles and the primary crystallisation structure, since the Th-B collects with the slag, being insol. in molten steel, and these radioactive slag particles collect around the primary crystals formed as the steel solidifies. On placing the polished steel specimen on a photographic plate for 24 hr. the α -rays emanating from the Th-C' and Th-C'' produced by the degradation of Th-B produce black spots which show the distribution of the Th-B. The Th-B is obtained by exposing a negatively charged plate of the metal to the emanation from Ra-Th; owing to the short life of Th-B the radiogram must be taken within 24 hr. of the prep. of the specimen. U cannot be used instead of Th-B since it is insol. in molten Fe, but radiograms can be obtained with a 6% U-Ni alloy after exposure for 35 hr. A. R. P.

Simultaneous effects of heat and transformation stresses in quenched steels. H. BÜHLER and E. SCHEIL (Arch. Eisenhüttenw., 1932—3, 6, 283—288).—The stresses in quenched steel are due to two causes, *viz.*, (a) the general shrinkage produced by rapid cooling, which results in compression stresses in the outer layers and tensile stresses in the core, and (b) the expansion produced by the transformations undergone by the steel, which causes the converse stress distribution to (a). The magnitude of these two effects has been determined by drilling tests made on cylinders of mild steel with 0—27% Ni, since these can be worked readily in the quenched state and the transformation temp. falls with increasing Ni content; the results are shown in a series

of stress-distribution diagrams. The contour of the lines of equal stress is determined principally by the transformation temp. and to a smaller degree by the extent to which transformation has occurred by the time the specimen has reached room temp., and by whether the transformation occurs before or after the inversion of the heat stresses. Under controlled conditions it is therefore possible to obtain a quenched steel free from internal stress. With increasing thickness of the metal above 70 mm. the internal stress caused by quenching increases very slowly. A. R. P.

Peculiarities in the elastic limit-temperature curve of steel. J. GALIBOURG (Compt. rend., 1932, 195, 1072—1074; cf. B., 1932, 680; 1933, 152).—The variations in elastic limit and breaking stress with temp. ($> 400^\circ$) are due to increasing rapidity of ageing with temp. The min. breaking stress at 100° and max. at 300° are the combined result of diminution in elastic limit and breaking stress with rise in temp., and increase thereof due to cold-working and increased rapidity of ageing near 300°. C. A. S.

Method for studying strain-hardening susceptibility and ageing [of steel] after cold-work deformation. A. SAUVEUR and J. L. BURNS (Met. & Alloys, 1933, 4, 6).—A Rockwell hardness test is measured at the bottom of a Brinell depression and thus the effect of cold-working may be determined on a depression either under const. load or of const. depth. C. A. K.

Creep of steels. H. J. TAPSELL (Soc. Chem. Ind., Chem. Eng. Group, Feb., 1933, 8 pp.).—Proposed methods of testing for accelerated creep usually involve assumptions which are not valid, *e.g.*, the creep rate is never truly const. Short-time tests appear to be of val. chiefly as specification tests of materials the general creep characteristics of which have been already examined. The creep curve does not indicate truly the probable life or deformation, as failure may result from causes partly transcryst. and partly intercryst. Annealed or normalised 0.1% C wrought steel may be expected to have a creep limit 10% $<$, and a 0.5% C steel 20% $>$, a 0.25% C steel. The creep resistance of cast steel does not necessarily increase with the C content. C. A. K.

Heat-treatment of steel wire. ANON. (Metallurgia, 1932, 7, 69—72).—Annealing, normalising, spheroidising, patenting, and tempering are defined and their effects illustrated in photomicrographs of 0.1 and 0.4% C steel wire. Patenting (*i.e.*, the formation of coarse-grained sorbite before drawing) is essential to successful wire drawing. With no patenting treatment or an incorrect treatment the fibre length of the cold-drawn wire is short and irregular, the proportion of ferrite unduly high, and lamellar pearlite persists. Cooling from 950° in Pb heated to 500° effects the desired structure in 0.4—0.5% C steel, but in low-C steel H_2O -cooling is used. E. H. B.

Influence of time and temperature of tempering on internal stress of heat-treated steel. H. BUCHHOLTZ and H. BÜHLER (Arch. Eisenhüttenw., 1932—3, 6, 247—251).—The internal stress in steel induced by quenching after normalising may be almost completely removed by tempering for 2—5 hr. at 550°; considerable reduction in the stress is effected by tempering at

150° in 2 hr., but more prolonged heating at this temp. has no further effect. Tempering at 350–450° causes a rapid fall in the internal stress during the first 2 hr., followed by a much slower fall over the following 10 hr. Thickness of the metal between 50 and 150 mm. has no influence on these results. Steels which have been quenched from > 800°, then tempered at 600°, and again quenched retain less internal stress than annealed steels in spite of the fact that both have been cooled at the same rate. The max. surface stresses after tempering are well below the yield point at the tempering temp. No relationship could be established between magnitude of the residual stresses and the tensile properties determined by the short-time tensile test.

A. R. P.

Determination of internal stress in steel cylinders from stress-time curves. H. BUCHHOLTZ and H. BÜHLER (Arch. Eisenhüttenw., 1932–3, 6, 253–256).—The results obtained by Mailänder's stress-time curve method (Stahl u. Eisen, 1931, 51, 662) for the internal stress in steel after heat-treatment are much higher (often 100%) than those obtained by Sachs' drilling method (B., 1927, 845). From comparison of the elastic elongation due to the spatial stresses in the metal with the permanent elongation determined from the stress-time curves of tensile test-pieces it is concluded that the reduction of internal stress on tempering is of quite a different order of magnitude from that derived from the stress-time curve, and hence that this method of determining internal stress is qual. only, but is useful in ascertaining the best annealing temp. for relieving the stress.

A. R. P.

Mechanical ageing of mild ingot steel. R. WALZEL (Arch. Eisenhüttenw., 1932–3, 6, 257–262).—The ageing tendency of mild, unkilld, open-hearth steel has been determined by comparing the position of the steep fall in the temp.-notched impact strength curve of the metal in the rolled state with that of the metal after cold-forging and ageing at 250°. This tendency increases with decreasing pig-Fe content of the charge in the furnace, with increasing segregation in the ingot, and with increasing grain size. The results are shown to be in agreement, at least partly, with the pptn. theory of hardening.

A. R. P.

Progress in the heat-treatment of steels. A. SOURDILLON (Mem. Soc. Ing. Civ. France, 1932, 85, 631–686).—A review.

Recent analytical methods for steelworks. W. BÖTTGER (Angew. Chem., 1933, 46, 48–51).—Brief abstracts of recent reports of the chemical committee of the Verein deutscher Eisenhüttenleute dealing with, *inter alia*, the determination of Cr, S, C, O, and N in steel, of SiO₂ and Si in ferrosilicon, and of moisture in coal.

A. R. P.

Determination of non-metallic inclusions in plain-carbon and manganese steels. Iodine and nitric acid extraction methods. T. R. CUNNINGHAM and R. J. PRICE (Ind. Eng. Chem. [Anal.], 1933, 5, 27–29).—The sample is dissolved in FeI₂ solution and the residue washed with aq. NH₄ citrate, KOH, and then hot H₂O, ignited, and finally weighed. The residue is fused with Na₂CO₃, dissolved in HCl (1 : 1), and evapor-

ated with HClO₄ to dehydrate the SiO₂. SiO₂ is determined by volatilising with HF and H₂SO₄, MnO by the bismuthate-arsenite method, Fe₂O₃ and Al₂O₃ are determined together by pptg. with aq. NH₃ and NH₄Cl and igniting, and the Fe₂O₃ content of the ppt. is evaluated by reducing with SnCl₂ and titrating with KMnO₄.

E. S. H.

Determination of zirconium in steels. Selenious acid method. S. G. SIMPSON [with W. C. SCHUMB] (Ind. Eng. Chem. [Anal.], 1933, 5, 40–42).—Zr is determined by pptg. from dil. HCl solutions with H₂SeO₃ in presence of H₂O₂, and igniting the ppt. to ZrO₂. Fe is preferably removed by shaking the HCl solution with Et₂O. Other substances usually present in Zr steels do not interfere; C, Si, and W are removed by filtration. Ti may be determined colorimetrically or with cupferron in the filtrate from the Zr selenite ppt., but is preferably determined independently in an aliquot portion of the solution before pptg. the Zr.

E. S. H.

Influence of traces of a salt of tin in acid solution on the rate of corrosion of mild steel. T. N. MORRIS and J. M. BRYAN (Trans. Faraday Soc., 1933, 29, 395–399).—The addition of very small amounts of Sn has a strong inhibiting effect on the corrosion of Fe in aq. citric acid, 2 p.p.m. reducing the rate by nearly a half. Succeeding increments of Sn do not exert a corresponding inhibition, as has also been observed in the case of gelatin (B., 1929, 751). The effect of [H⁺] on the inhibiting effect of a given quantity of Sn (4 mg. per litre) has been determined for the *p*_H range 2.4–5.5, the citric acid being buffered by its Na⁺ salt. The inhibiting effect diminishes with increasing *p*_H. It has been observed that large quantities of H₂ may be evolved by corrosion of Fe in solutions of *p*_H > 4 without visible formation of bubbles. It is possible, therefore, that inhibitors act most efficiently when there is active evolution of H₂ as bubbles and not when the corrosion is of such a type that H₂ passes directly into solution.

M. S. B.

Alloy steels: their development and application. J. W. DONALDSON (Metallurgia, 1933, 7, 127–129).

Rust- and acid-resisting steels. Progress and future trend. W. H. HATFIELD (Metallurgia, 1933, 7, 109–110, 129).

X-Ray investigation of the iron-copper system. Corrosion of galvanised sheet iron. J. H. CARTER (Iowa State Coll. J. Sci., 1932, 6, 413–416).—Melts were annealed at 1700° for 12 hr. For Cu < 13.02%, only Fe lines appear; for Cu > 83.39%, only Cu lines appear. The annealing produced no change in X-ray diagrams, but photomicrographs indicated that a change in structure had started. Galvanised sheet Fe was exposed to CO₂, O₂, N₂, and H₂O for > 4 months at 26°. For const. CO₂ and increasing O₂, or const. O₂ and increasing CO₂ content, corrosion passes through a min. (20% O₂, 0.03% CO₂). Corrosion is most rapid where a film of Fe(OH)₃ is formed.

CH. ABS.

Electrodeposition of iron-cobalt alloys. II. S. GLASSTONE and J. C. SPEAKMAN (Trans. Faraday Soc., 1933, 29, 426–429).—The variation of c.d. with composition of the alloys deposited from buffered solutions of *p*_H 3.2, 4.0, and 5.2 has been determined at 50° and 90° for solutions containing various proportions of Fe

and Co^{++} as sulphate. As c.d. is increased the composition tends to a const. val. which is independent of η_{H} . The results are compared with those obtained at 16° (B., 1933, 24) and with those for Fe-Ni and Co-Ni alloys (B., 1931, 592). The alloys deposited at low and high c.d. show gradations in properties in agreement with the order given.

M. S. B.

Quantitative study of rolling texture [of metals].

N. AKULOV and N. BRÜCHATOV (Ann. Physik, 1932, [v], 15, 741—749).—If the moment of rotation of a circular disc cut from rolled material, when placed in a strong magnetic field, is measured as a function of the angle between the direction of the field and the direction of the rolling, it is possible quantitatively to ascertain the rolling texture from qual. X-ray results.

W. R. A.

Theoretical and practical aspects of gases in metals. J. H. SCAFF and E. E. SCHUMACHER (Met. & Alloys, 1933, 4, 7—12).—Properties of metals are usually adversely affected by the inclusion of gases. The effects of temp. and pressure on the solubility of gases are discussed and examples of absorption are given, together with the methods of measurement of gases in metals. Most metals are improved greatly by melting under vac. and commercial vac.-melting plants are described.

C. A. K.

Heat content of some metals, alloys, and slag-forming materials at temperatures up to [about] 1200° . H. ESSER, R. AVERDIECK, and W. GRASS (Arch. Eisenhüttenw., 1932—3, 6, 289—292).—The heat content of Cu, Pt, three Ni-silver alloys, three brasses, quartz, Al_2O_3 , CaO, MnO, Fe_3O_4 , magnetite, and fayalite has been determined by the use of a metal-block vac. calorimeter at temp. up to 1250° ; from the results the mean sp. heats between 0° and 800° of the above substances are as follows: Cu 0.1023, Pt 0.0348, 20:80 Ni-Cu alloy 0.1113, 70:29:1 Cu-Zn-Sn brass 0.1081, Al_2O_3 0.2481, CaO 0.2057, cryst. SiO_2 0.2582, Fe_3O_4 0.2164, magnetite 0.2059, and fayalite 0.2038, the latent heats of Cu, Ni-silvers, and brasses are 50.9, 67.8—69.1, and 42.7—43.5 cal. per g., respectively, and the heat of transformation of α - into β -quartz is 4.26 g.-cal. per g.

A. R. P.

β -Transformation in copper- and silver-zinc alloys. M. STRAUMANIS and J. WEERTS (Mitt. Materialprüf., 1932, 214).—X-Ray examination of β -Ag-Zn alloys above the transformation point at 270° has shown that the Ag and Zn atoms are statistically distributed among the lattice points as is the case in all solid solutions, and it is highly probable that the β -Cu-Zn phase has a similar structure at high temp. Whilst in both cases the transformation into the regularly oriented lattice structure cannot be suppressed by supercooling, with brass a stable, face-centred cubic lattice is produced, but with Ag-Zn alloys this state is not stable and can be found only in alloys quenched from above 280° ; on annealing below 280° or on slow cooling from above this temp. a new ζ -phase of hexagonal symmetry is produced. The ζ -phase is considerably harder than the quenched β -phase, so that the β -Ag-Zn alloys may be hardened by quenching from above 280° and annealing below this temp.

A. R. P.

Analysis of white metals and their smelter products. H. NEUBERT (Ind. Eng. Chem. [Anal.], 1933, 5, 60—61).—Pptn. of Sn as $\text{SnO}_2 \cdot x\text{H}_2\text{O}$ by HNO_3 is not recommended. It is preferable to dissolve the sample in HCl, to which NaClO_3 may be added to assist dissolution of Cu and Sb. If slag is present, it should be fused with Na_2O_2 . Standard methods are applied to determine Sn, Pb, Cu, and Sb in the product of fusion.

E. S. H.

Determination of small quantities of antimony in solder in presence of iron. C. W. ANDERSON (Ind. Eng. Chem. [Anal.], 1933, 5, 52).—The presence of Fe interferes with the determination of Sb in Sn-Pb solders by the usual bromate method. In a modified procedure, conc. HCl and KClO_3 are added to the solution in conc. H_2SO_4 , Cl_2 is expelled, and H_3PO_4 and Na_2SO_3 are added. After removing excess of SO_2 the solution is diluted and titrated with 0.033N-KBrO₃ (Me-orange).

E. S. H.

Electric furnace method for preparing manganese from manganese sulphate. A. L. DUCOURNAU (Proc. Louisiana Acad. Sci., 1932, 1, 18—21).— MnSO_4 is fused at 1800 — 2000° with twice as much C as is necessary to reduce the equiv. amount of Mn_3O_4 . The metal contained Mn 90.01, S 5.02, residue 2.00%. Mn carbide was sometimes present.

CH. ABS.

Analysis of platinum minerals. I. Rapid analysis of platinum minerals. II. Determination of certain noble metals in platinum minerals. III. Analysis of platinum minerals with determination of copper and iron. IV. Complete analysis of platinum minerals. V. Analysis of the "first insoluble residue" obtained on dissolving platinum minerals in aqua regia. INSTITUT DE PLATINE. VI. Separation of iridium from platinum. B. G. KARPOV and A. N. FEDEROVA. VII. Determination of rhodium. B. G. KARPOV. VIII. Johnson & Sons' method of determining platinum, palladium, iridium, and rhodium in alloys of high platinum content. INSTITUT DE PLATINE (Ann. Inst. Platine, 1932, No. 9, 91—93, 93—95, 96—99, 99—102, 102—105, 106—108, 108, 109—112).—I. The material (2 g.) is dissolved in aqua regia and the insol. separated from the solution. Pd is pptd. by $\text{Hg}(\text{CN})_2$ and Pt, Rh, Au, Ir, Ru, and Cu by nascent H. The last ppt. is fused with Pb, the Pb alloy treated with HNO_3 to dissolve Pb, Cu, and part of the Rh, and the residue extracted with aqua regia to obtain a residue of Ir and Ru (separable by fusion with Na_2CO_3), and a solution of Pt, Rh, and Au, with some Pb, which is removed by evaporation with H_2SO_4 . From the oxidised filtrate Pt is pptd. with NH_4Cl and then Au with $\text{H}_2\text{C}_2\text{O}_4$. The $\text{Pb}(\text{NO}_3)_2$ solution is evaporated with H_2SO_4 , and the filtrate, combined with that from Au, is treated with H_2S . The ppt. is digested with HNO_3 to dissolve PbS and CuS; the residue of PtS_2 and Rh_2S_3 is ignited in H_2 and the Pt extracted with dil. aqua regia, leaving a residue of Rh.

II. Certain modifications of the above scheme are described.

III. The precious metals are separated as in (I), Cu is pptd. as $\text{Cu}(\text{CNS})_2$ and weighed as CuO, and Fe is pptd. as $\text{Fe}(\text{OH})_3$ and weighed as Fe_2O_3 .

IV. An alternative procedure to (I) is described.

V. The residue is boiled with aq. NH_4OAc to remove AgCl and PbSO_4 , and then fused under borax with Ag . The Ag is removed with H_2SO_4 , the residue of noble metals fused with NaOH and Na_2O_2 , the melt dissolved in H_2O , and the liquid distilled in a current of Cl_2 at $70\text{--}80^\circ$, with gradual addition of HCl . The distillate, containing the Os and Ru , is made strongly alkaline and the OsO_4 distilled off, the Os being pptd. as sulphide, which is ignited in H_2 and weighed. The alkaline Ru solution is evaporated, and the residue ignited in H_2 and leached to obtain Ru metal. Pt and Ir are pptd. with NH_4Cl from the liquid left in the first distillation and the filtrate is analysed for Pd , Rh , and Au as in (I) or (IV).

VI. Digestion of the Pt and Ir chloride solution (1–2%) with Hg_2Cl_2 at 90° for 1 hr. ppts. all the Pt as metal; Ir can be recovered from the filtrate by pptn. with NH_4Cl .

VII. The metal is fused with Ag at $1000\text{--}1200^\circ$ for 2 hr. Extraction of the alloy with 33% HNO_3 and of the residue with aqua regia affords solutions from which, after removal of the AgCl , the Pt and Pd can be pptd. as $(\text{NH}_4)_2\text{PtCl}_6$ and $\text{Pd}(\text{CN})_2$, respectively; the remaining Rh is recovered and determined, together with the insol. residue from the extraction of the Ag alloy, by the method described in (I).

VIII. Analytical details are given.

R. T.

Trend of progress of aluminium. N. F. BUDGEN (*Metallurgia*, 1933, 7, 105–108).

Nepheline as raw material for production of aluminium. F. VOGEL (*Chem.-Ztg.*, 1933, 57, 101–103).—The economics of recovering Al_2O_3 from the nepheline deposits of the Kola peninsula, Russia, are discussed with especial reference to the HNO_3 , SO_2 , and HF decomp. methods and the arc-furnace method in which the mineral is fused with Fe ore, coke, and CaO to give a CaAl_2O_4 slag and Fe-Si alloy. The HF method is considered to be the most feasible in view of the remoteness of the deposits from industrial centres.

A. R. P.

Composition of anodic gases from cryolite-alumina bath. I. P. TVERDOVSKI (*J. Appl. Chem.*, Russia, 1932, 5, 307–312).—At intervals between arcing ($915\text{--}995^\circ$) the gases contained CO_2 89.93–48, CO 9.4–47.3%, and during arcing ($965\text{--}995^\circ$) CO_2 29.8–10.4, CO 64.6–86.0%. CO_2 is believed to be the primary product.

CH. ABS.

Mechanics of plastic deformation: flow of duralumin through orifices. S. I. GOUBKIN (*J. Rheology*, 1932, 3, 501–548).—A mathematical analysis of plastic deformation is given and is applied to experiments on the extrusion of duralumin.

E. S. H.

Flux for protecting, refining, and eliminating chlorides in the casting of magnesium. R. DE FLEURY and A. CAILLON (*Compt. rend.*, 1933, 196, 53–55; cf. B., 1932, 774).—To avoid the presence of any flux in cast Mg or its alloys the metal is first melted under 0.5–5 wt.-% of a "base flux" (A) MgCl_2 60% + NaCl 40%; then, after fusion, 20% (by wt. of A) of a "correcting flux" (B) B_2O_3 50% + MgF_2 50%, or B_2O_3 50% + MgF_2 35% + BaF_2 15% is stirred in, to increase the viscosity of the flux and facilitate decant-

ation and elimination of chlorides; and finally the bath is dusted with S flowers and NH_4F , HF . The metal should then be set aside for 20–25 min. before casting, a "casting flux" (B_2O_3 15% + $\text{Na}_2\text{B}_4\text{O}_7$ 85%, both strictly anhyd.) being added to protect the surface of the metal.

C. A. S.

New organic addition agents for cadmium electroplating. R. A. CLAUSSEN and H. L. OLIN (*Trans. Electrochem. Soc.*, 1933, 63, 45–52).—In the electrodeposition of Cd on steel from cyanide baths "Steffen's waste" (a by-product of the beet-sugar industry) and the conc. steep water produced by soaking maize (in starch manufacture) are successful addition agents at 3.5–5 amp. per sq. dm. The deposits have a silvery lustre and the throwing power is better than with "gulac" as addition agent. The c.-d. range is higher than with casein or "bindex."

H. J. T. E.

Linings for grey cast-Fe electric furnaces. Zircon and super-refractories.—See VIII. **Pipeline protection. Aircraft finishing. Painting Al, Zn, and Zn alloys.**—See XIII.

See also A., Feb., 118, Transformations in α - and β -brass, and in β - Ag-Zn alloys. Cu-Sn , Ga , Pd-Sb , and Sb-Au alloys. System W-Co. 119, Systems Ag-Cu-Cd and Cu-Ni-Sn . Ni-Cr steels. Hardening of steel. Martensite crystallisation. 122, Investigation of flotation reagents. Lubrication [in wire-drawing]. 126, Equilibrium between metals and slags in melts. Solid solutions of Au and Ag . 127, Electrolysis of molten Au alloys. Electro-potentials of ternary Au-Sn-Hg alloys. 128, Au amalgams. Corrosion of Fe in H_2O . Electromotive behaviour of Ni and Co . Zn deposition. Electrolytic polarisation. Po. 131, Electrodeposition of Ca and Mg . 133, Pure Ra-E.

PATENTS.

Metallurgical converters. J. LEEMANS, and SOC. GÉN. MÉTALL. DE HOBOKEN (B.P. 380,297, 23.11.31).—The converter has an outlet flue in the shape of a Π leading from the roof of the converter to the stack and independent of the charging opening. The flue moves with the converter, the axis of rotation of which is in the plane of the flue, and one end of it penetrates into a recess at the base of the stack.

A. R. P.

[Multiple-hearth furnace for] roasting ores and the like. A. L. MOND. FROM COLORADO IRON WORKS Co. (B.P. 379,286, 18.3.31).—The uppermost hearth serves for drying the ore and is provided at the periphery with hoppers for delivering predetermined quantities of ore to various hearths; all the hearths are provided with devices for preventing gases passing from one hearth to another and for supplying air to and withdrawing gases from the individual hearths.

A. R. P.

Retort furnaces [for production of sponge iron]. A. MUSSO, Assr. to W. P. DEPPE (U.S.P. 1,841,625–6, 19.1.32. Appl., [A] 6.3.28, [B] 20.3.29).—(A) The apparatus comprises a retort slightly inclined to the horizontal and rotating in a furnace chamber divided into three sections all of which can be heated separately to produce a temp. gradient in the retort, means for keeping the

reduction chamber gastight, for continuously feeding ore and coke at one end and removing the reduced product at the other without admitting air, and means for removing CO from the retort and maintaining the pressure therein below atm. (B) The retort itself is divided into a no. of chambers by means of divisions formed of a concentric series of conveyor pockets which transfer the charge from one division to the next and render the individual divisions gastight. Provision is made for withdrawing gases from any or all of the compartments without admitting air. A. R. P.

Heat-treatment and reduction of [iron] ores. H. R. BERRY (U.S.P. 1,836,005, 15.12.31. Appl., 4.6.28).—The blast furnace is fired with H_2 and CO derived from the passage of steam over the white-hot coke obtained in the destructive distillation of coal, and the ore is reduced by passing the heavy volatile products of this distillation into the zone just above the tuyères; by passing part of the water-gas into the upper zones of the furnace the ore is reduced almost completely before it enters the fusion zone. A. R. P.

[Reduction] treatment of iron ore. H. A. BRASSERT, Assr. to H. A. BRASSERT & Co. (U.S.P. 1,849,658, 15.3.32. Appl., 4.2.29).—The ore passes downwards over sloping baffle plates through a reduction chamber (A) situated above a small shaft furnace (B) in which the reduced ore is melted by the injection of hot reducing gases produced by the combustion of powdered coal in chambers situated just outside the tuyères of B. The hot gases from B serve to reduce the ore in A. A. R. P.

Non-oxidising heating furnace [for heating of metal casting moulds]. R. D. PIKE, B. P. LITTLE, and E. W. CARROLL, Assrs. to KALIF CORP. (U.S.P. 1,843,336, 2.2.32. Appl., 18.3.30).—The furnace comprises a horizontal, inverted, electrically heated, annular chamber with a rotating bottom provided with numerous receptacles for supporting the moulds and with means for introducing a non-oxidising gas into these receptacles as the bottom of the furnace rotates and for cutting off the gas supply as the receptacles approach the loading and unloading openings in the furnace. A. R. P.

Recovery of metallic wastes from gas washers for metallurgical furnaces [iron blast furnaces]. A. L. GENTER, Assr. to BARTLETT HAYWARD Co. (U.S.P. 1,847,179, 1.3.32. Appl., 6.6.30).—The effluent from the gas scrubbers is oxidised by agitation with air to convert the sol. $Fe(HCO_3)_2$ into insol. Fe_2O_3 , aq. before collecting the suspended matter. A. R. P.

Reduction of iron ore without melting. W. H. SMITH, Assr. to GEN. REDUCTION CORP. (U.S.P. 1,846,530, 23.2.32. Appl., 28.11.28).—The ore mixed with C is passed downwards through a heated retort in which 3 temp. zones are maintained: the uppermost, in which the Fe_2O_3 is reduced to Fe_3O_4 , is kept at 500° by the heat of the rising gas stream from the lower zones; the middle zone, in which the Fe_3O_4 is mainly reduced to Fe, is kept at $500-700^\circ$ while the composition of the gases therein is kept at 30–60% CO and 70–40% CO_2 ; the lowest, in which the sponge Fe is formed, is kept at $700-1100^\circ$ and the gases therein are maintained at 70–95% CO. A. R. P.

Cementation of steel and iron. DEUTS. HOUGHTON FABR. G.M.B.H., and H. HANUSCH (B.P. 386,076, 9.11.31).—The cementation baths comprise a mixture of fused NaCl and KCl with 6–8% of NaCN and 8–10% of an activated C material made by carbonising org. substances impregnated with Na_2SiO_3 . A. R. P.

Magnetic iron alloys [for transformer cores]. WESTINGHOUSE ELECTRIC & MANUFG. Co., Assees. of A. A. FREY and G. H. COLE (B.P. 386,220, 7.6.32. U.S., 17.7.31).—The alloys consist of Fe with 0.1–6 (3.5–4)% Si and 0.1–6 (1–2)% Al. A. R. P.

Coating with metals [e.g., iron with zinc] by dipping. T. K. SENDZIMIR and T. J. BOSTROEM (B.P. 385,971, 27.4.31).—The metal is annealed in a vessel packed with C and then passed through cooling zones similarly packed and into the molten Zn, which is kept covered with a layer of C to prevent oxidation. [Stat. ref.] A. R. P.

Methods of rust prevention. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of H. C. STAEBLE (B.P. 386,542, 15.6.32. U.S., 17.6.31).—Fe and steel articles are coated with an aq. solution of NH_4 oleate, which, on evaporation to dryness, leaves a film of oleic acid behind on the metallic surface. H. R.-D.

Dry concentration of ore. J. M. CLEAVER (U.S.P. 1,846,184, 23.2.32. Appl., 18.5.29).—A dry-concentrating table is described. A. R. P.

Treatment of ores and similar materials by the flotation method. L. MELLERSH-JACKSON. From F. KRUPP GRUSONWERK A.-G. (B.P. 381,776, 11.12.31).—The apparatus comprises an agitation chamber (A) between two froth-collecting chambers, the tailings settling out in which are drawn up continuously through A by means of an impeller working in the liquid at the top of A and throwing the pulp against a second impeller working above the liquid surface under a deflecting hood. A. R. P.

Concentration of ores and minerals by flotation. W. A. DOUGLASS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,816,145, 28.7.31. Appl., 9.7.28).—Sulphides (*s* or *as*) of alkylxanthyls, $(RO'CS)_2S$, prepared from metal alkylxanthates and $CNCl$ or a chloroformic ester, are used as flotation agents. C. H.

Froth-flotation of minerals, and agents therefor. R. L. PERKINS, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,819,112–3, 18.8.31. Appl., 22.4.29).— $RO'CS'SPh$ and $RO'CS'S-CH_2Ph$ ($R=alkyl$) are froth-flotation agents. C. H.

[Flotation] concentration of [copper] ores. J. L. STEVENS (U.S.P. 1,848,396, 8.3.32. Appl., 27.8.30).—Ores containing Cu as sulphide and oxidised minerals are crushed and leached with dil. H_2SO_4 or other acid solvent, and the pulp is passed through a classifier to give an overflow of fine ore suspended in $CuSO_4$ liquor and an underflow of coarse ore; the overflow is passed through steel ball mills (whereby the Cu in solution is reduced to metal) and subjected to flotation using $(EtO'CS'S)_2S_2$ (cf. U.S.P. 1,805,855; B., 1932, 190) as collector, and the underflow is ground and floated separately for recovery of the Cu sulphide minerals. A. R. P.

Pyrometallurgical process [for smelting copper ores to matte]. C. LEGRAND, ASSR. to PHELPS DODGE CORP. (U.S.P. 1,845,503, 16.2.32. Appl., 15.5.28).—The apparatus comprises a reverberatory furnace (*A*) in which a longitudinal bank of charge is maintained, an elevated collecting bin (*B*) parallel to *A* in which the product from a series of roasting furnaces disposed above *B* is collected and mixed and from which the mixture can be fed to *A* at any desired point along its length, and a series of Cottrell plants above *B* for collecting the dust from the roasters and delivering it to *B*. A. R. P.

Treatment of materials such as [electrolytic copper] metal powder. J. H. LUCAS, ASSR. to NICHOLS COPPER CO. (U.S.P. 1,852,583, 5.4.32. Appl., 10.3.31).—The wet powder is heated in a rotating horizontal cylinder containing steel balls or cylinders, to grind the powder, and closed with a valve to allow the steam to escape without permitting ingress of air. When the temp. reaches 115° the valve is closed and the temp. raised to 400° to anneal the powder without oxidation. A. R. P.

[Nickel-copper] alloys. MOND NICKEL CO., LTD., and W. T. GRIFFITHS (B.P. 386,017, 31.7.31).—Alloys of 2–40% Ni and 98–60% Cu are rendered age-hardenable by the addition of small quantities of Al with (if desired) > 10% Si and a small quantity of one or more of the elements Fe, Sn, Mo, and Mn. Max. pptn.-hardening is obtained with 2–3% Al and the max. amount of Al to obtain satisfactory working properties is 10–12%, according to the Ni content. A. R. P.

[Condenser for] condensation of zinc vapours. E. H. BUNCE, ASSR. to NEW JERSEY ZINC CO. (U.S.P. 1,848,461, 8.3.32. Appl., 30.8.28).—The condenser consists of a series of towers lined with SiC brick and of gradually decreasing internal diam. to correspond with the reduction in the vol. of gases caused by condensation of Zn vapour and fall in temp. Collecting chambers for liquid metal are disposed below the towers and so arranged that the more volatile products, e.g., Cd, are collected apart from the main quantity of Zn. A. R. P.

Manufacture of metallic lead. P. GAMICHON (B.P. 383,648, 15.6.31. Fr., 17.6.30).—PbS concentrates are roasted with a proportion of NaCl to convert the PbS into PbCl₂ and PbSO₄, the calcines are digested with HCl or H₂SO₄ to decompose any remaining PbS and remove Zn salts etc., and the PbSO₄ and PbCl₂ are extracted by digesting the residue with aq. NaOH. The solution is purified by oxidation and cementation of foreign metals and the Pb deposited by electrolysis. A. R. P.

Metallurgical heat treating [of lead products]. J. KOHLMAYER, ASSR. to AMER. LURGI CORP. (U.S.P. 1,844,428, 9.2.32. Appl., 26.4.28. Ger., 28.4.27).—Ores and products containing PbO are mixed with a carbonaceous reducing agent and the mixture is charged into a preheated revolving furnace having a length > its diam. and provided with means for condensing volatilised products and returning them continuously to the furnace. The furnace is internally heated by a flame which passes forward and backward across the surface of the charge. A. R. P.

Recovering metals, such as tin, lead, antimony, and bismuth, or alloys thereof, from substances which contain same and which may also contain more volatile metals such as arsenic, cadmium and zinc. "BERZELIUS" METALLHÜTTENES. M.B.H., Assees. of M. G. FREISE (B.P. 380,493, 11.6.31. Ger., 24.6.30).—The material, freed from sulphides by roasting if necessary, is mixed with a large excess of coal or coke and a small amount of Na₂CO₃, Na₂B₄O₇, Na₂SiO₃, or Sn slag. This mixture is passed downwards through a rotating cylindrical furnace through which hot gases are passed in such a way that the greater part of the oxides is first reduced to metal in a reducing zone and some of this metal runs out of the furnace, while practically all the remaining metal separates in the finishing zone in which the plastic slag produced adheres to the walls of the furnace. A. R. P.

[Bright] annealing of [strip] metallic materials. O. JUNKER (B.P. 382,898, 19.5.32).—The strip passes through a bin in which both sides are coated with graphite, soot, or other heat-absorbing dust, thence through the annealing furnace, and under a fan or brush which removes the dust. A. R. P.

Melting aluminium and the like. J. SCHÜFFLER, ASSR. to WIRBELSTRAHLBRENNER OFENBAUGES. M.B.H. (B.P. 383,103, 5.1.32. Ger., 5.1.31).—The furnace comprises a semicylindrical metal housing lined with refractory material and divided into 3 parts, the central portion being a rectangular trough designed to collect the molten metal, and the two end portions consisting of muffles in which the material to be melted is placed. Melting is effected by circulating hot gases direct from the burners around the muffles, and the molten metal which collects in the trough is brought to the required casting temp. by passing the waste gases from the muffles down on to the surface of the metal from flues in the roof of the trough. A. R. P.

Aluminium alloys containing silicon. LIMITED CO., formerly SKODA WORKS (B.P. 386,051, 2.10.31. Czechoslov., 3.10.30).—Claim is made for Al alloys containing Si 3–7, Zn 6–10, Cu 1.5–6, Fe 1.2–5, and Mg 0.1–0.3%, with 0.3–1.5% Mn and/or 0.9–1.5% Cr. Up to 1.5% of one or more of the following elements may also be added: Pb, Ni, Sn, Cd, Sb, Ti. A. R. P.

[Refining the grain size of] aluminium and aluminium - base alloys. NAT. SMELTING CO., Assees. of W. BONSACK (B.P. 386,028, 25.8.31. U.S., 4.9.30. Addn. to B.P. 381,668; B., 1932, 1123).—The grain size of Al alloys is refined by melting them with a small quantity of Ca, Mg, Na, K, Ba, Sr, Li, Th, or Be below a fluoride flux to which a B compound is added, so that a small proportion of B is reduced into the alloy by reaction of the flux with the previously added metal. A. R. P.

Production of oxidic layers on aluminium, aluminium alloys, and objects constructed thereof. VEREIN ALUMINIUM-WERKE A.-G. (B.P. 386,201, 11.5.32. Ger., 26.5.31).—The article is made the anode and is sprayed with electrolyte from a vessel containing a C cathode. A. R. P.

Segregation of light metal [magnesium] floating on fused electrolyte. T. GRISWOLD, JUN., Assr. to DOW CHEM. CO (U.S.P. 1,845,266, 16.2.32. Appl., 26.10.29).—An inert gas is blown into the bath below the point at which metal forms on the cathode, so that the rising gas bubbles attach themselves to the particles of metal and carry them over to a collecting well protected from ingress of air. A. R. P.

Electrolytic metal depositing. J. B. GRENAGLE, Assr. to W. W. VARNEY and UNIVERSAL ALLOYS, INC. (U.S.P. 1,854,790, 19.4.32. Appl., 24.1.30).—The apparatus used comprises (A) a Pb-lined tank containing (B) an insulated Fe electrode at the bottom of one side, (C) a plate of the metal to be deposited, and (D) the article on which this metal is to be plated. An a.c. is passed between A and C and d.c. between B (cathode) and D (anode). It is claimed that the metal of C, e.g., Cr, Ni, Cd, or Co, is thus deposited as a corrosion-resistant film on D. A. R. P.

Holders for use in electroplating. Electrically depositing metals [nickel]. B. J. R. EVANS, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 383,841—2 [A] 10.3.32, [B] 12.3.32).—(A) For plating small articles, they are placed in a tray built up of a framework of insulated conducting material and carrying on its upper surface contact strips. (B) The articles are rolled slowly without shock in a moving cathode tray below a stationary rake. A. R. P.

Electrodeposition of chromium and the like. W. A. TYRRELL, Assr. to CHEM. TREATMENT CO., INC. (U.S.P. 1,850,426, 22.3.32. Appl., 15.7.26).—In plating with Cr the insides of elongated hollow objects, the articles are continuously rotated in the bath and the H₂ evolved is removed by means of a perforated pipe extending into the article or by forced circulation of the electrolyte through the article. A. R. P.

[Sluice-box for] recovery of values from alluvial material. H. N. G. COBBE (B.P. 382,311, 24.7.31).

Cemented carbide discs.—See VIII.

XI.—ELECTROTECHNICS.

Behaviour of graphite in electrolysis. F. SIHVONEN and L. TUURA (Suomen Kem., 1933, 6, [B], 56).—Absorption of O₂ by graphite anodes during electrolysis occurs only in the altered surface layer and is associated with a definite anode potential. A. G. P.

Cable insulating oils.—See II. **Potentiometric analysis of phenoxides.**—See III. **Electrolytic H₂.**—See VII. **Electric-furnace linings. Super-refractories. Insulators.**—See VIII. **Mn. Anodic gases from cryolite-Al₂O₃ bath. Cd-plate. Electrodeposition of Fe-Co alloys.**—See X. **Dielectric properties of fatty oils.**—See XII. **Aircraft finishing.**—See XIII. **Electrodialysis in soil analysis.**—See XVI. **Dielectric properties of essential oils.**—See XX.

See also A., Feb., 128, **Electromotive behaviour of Ni and Co. Zn deposition. Electrochemistry of Po.** 131, **Oxidation of SO₂ in electrodeless discharge. Electrodeposition of Ca and Mg. NH₃**

formation in the silent discharge. 132, **Measurement of ultra-violet radiation. Pyridone derivatives in radiography.** 139, **Electro-ultrafilter. Cathode sputtering. Capillary electrometer.** 143, **Prep. of Pr³OH.** 144, **Prep. of ethers of vinyl alcohol.** 145, **Prep. of sarcosolactic acid.**

PATENTS.

Photoelectric cells and their uses. W. BARSTIES (B.P. 386,369, 25.9.31).—Electrodes are so formed and/or arranged that a highly non-uniform field is formed near the anode, and an unstable ionisation, controllable by light variation without the occurrence of a glow discharge, is produced. J. S. G. T.

Electric-discharge tubes for emission of luminous rays. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 386,586, 13.8.32. Holl., 19.9.31).—The envelope surrounding a discharge tube (A) containing metal vapour is coated, at least partly, on the side turned towards A with a thin metal layer, e.g., of Cu, covered, if desired, with Au, which transmits visible radiation produced by the discharge and reflects infra-red radiation. J. S. G. T.

Winding for electrical induction furnaces without a closed ferromagnetic circuit. ALLMÄNNA SVENSKA ELEKTRISKA AKTIEB. (B.P. 386,387, 10.11.31. Swed., 29.8.31).

Galvanic batteries [particularly for miners' lamps]. OLDHAM & SON, LTD., and W. D. WILDE (B.P. 386,400 and 386,799, [A] 30.11.31, [B] 30.11.31, 1.2.32).

Electric-discharge devices. BRIT. THOMSON-HOUSTON CO. LTD., Assees. of O. W. PIKE and A. W. HULL (B.P. 386,376, 9.10.31. U.S., 9.10.30).

Electron-discharge tubes or thermionic valves. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 386,484, 5.4.32. Ger., 9.4.31).

[Shaped] incandescence cathodes for thermionic tubes. LIGNOSE HÖRFILM SYSTEM BREUSING G.M.B.H. (B.P. 386,706, 21.8.31. Ger., 21.8.30).

Measuring the calorific val. of a gas.—See II. **Pure C₂H₂.**—See III. **Cemented carbide discs.**—See VIII. **Magnetic Fe alloys. Mg. Oxide layers on Al etc. Pb. Electroplating. Cr-plate.**—See X. **Rubber articles from latex.**—See XIV.

XII.—FATS; OILS; WAXES.

Nutmeg fat. A. HEIDUSCHKA and H. HÄBEL (Arch. Pharm., 1933, 271, 56—63).—The physical properties of nutmeg fat are recorded. It contains essential oil 2.4, trimyristin 15.9, tripalmitin 5.0, triolein 8.5, free myristic acid 9.0, free palmitic acid 6.2, and unsaponifiable matter 9.4%.

R. S. C.

Dielectric properties of fatty oils. T. G. KOVALEV and V. V. ILLARIONOV (J. pr. chem., 1932, [ii], 135, 327—334; cf. B., 1933, 250).—The dielectric const. varies under the influence of air and light, or dampness and light, and its val. may be used as an indication of staleness. Similar effects on the physical and chemical properties of cod-liver oil are described and

discussed. The effects of ultra-violet rays, X-rays, Ra emanations, and sunlight on some const. of olive oil have been measured.
A. A. L.

Composition of cow-butter. Laurobutyroazelain. G. SCHUSTER (J. Pharm. Chim., 1932, [viii], 16, 465—470; cf. Thesis, Paris, 1932).—Oxidation of butter fat by Hilditch's method yielded 35.8% of fully saturated glycerides, from which myristodipalmitin, m.p. 49—50°, and myristodistearin, m.p. 56—57°, were isolated by fractional crystallisation (cf. de'Conno and Scopinaro, B., 1929, 374). Liquid glycerides of butyric, lauric, and myristic acids were present. The isolation of (?) β -azelaodistearin, m.p. 67°, and azelaolaurobutyrin (d 0.992) is claimed (cf. Hilditch, J.S.C.I., 1931, 50, 471 T.) E. L.

Glycerides of butter. L. HOTON (Ann. Falsif., 1932, 25, 592—596).—At certain periods of the year, varying according to the locality, the *n* of butter fat is uninfluenced by a rise or fall in the sol. volatile acids.
T. McL.

See also A., Feb., 122, Lubrication by soap solutions. 131, Pt catalysts for hydrogenations and dehydrogenations. 195, Vitamins in Norwegian cod-liver oil.

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Lubricants.—See II. Wetting etc. agents.—See III. Revivifying fuller's earth.—See II.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Turpentine from *Pinus pithyusa*. B. A. ARBUSOV, L. BASTANOVA, E. IVANOVA, L. KOZLOVSKAYA, A. MAL'TZEVA, and V. FEDOTOV (J. Appl. Chem., Russia, 1932, 5, 787—789).—Analytical vals. are given. CH. ABS.

Component distribution trend in commercial turpentine-still operation. S. PALKIN (Ind. Eng. Chem., 1933, 25, 95—97).—In large-scale distillation of turpentine carried out "in the field" with simple fire stills, rectification takes place to a limited extent only, tailings and β -pinene tending to concentrate towards the end of the run. The taking of early cuts at appropriate points in the distillation is suggested and an account is given of an experimental run, full details of component distribution and properties of three fractions taken after the first 5 gals. had been rejected—51 gals., 51 gals., and remainder (18 gals.)—being tabulated. Support is afforded for the recommended procedure.
S. S. W.

Swelling and permeability to gases of films of [boiled linseed] oil, alone and with additions of rubber, chlorinated rubber, and tung oil. DR. K. HERBERTS & Co. (Farben-Ztg., 1933, 38, 481—482).—The swelling in H₂O and permeability to SO₂, HCl, and NH₃ of films of boiled linseed oil (containing 0.5% Pb as linoleate) were found to be reduced by additions of 1, 2, and 5% of rubber, 2, 5, and 10% of chlorinated rubber, and 33% of tung oil, respectively. The results are tabulated and discussed. Rubber is more effective than chlorinated rubber in this connexion, whilst the improvement in H₂O-resistance produced by the addition of tung oil is notable. In all cases the diminution in permeability to gases was most marked with HCl, and least with SO₂; NH₃ was intermediate.
S. S. W.

Production of carbon monoxide from paint in sealed compartments. S. F. DUDLEY, F. G. EDMED, and R. C. FREDERICK (J. Ind. Hygiene, 1933, 15, 1—7).—Paints containing linseed oil, but not bituminous or grease paints free from linseed oil, absorb O₂ from the atm. and evolve CO during drying in sealed compartments.
W. O. K.

[Coating compositions for] pipe-line protection. S. GILL (Ind. Eng. Chem., 1933, 25, 49—53).—Suitable coatings for pipes buried in soil include bitumen (applied hot or cold, with or without wrappers of bitumen-saturated felt or rag), asphalt emulsions (which may be sheathed with Portland cement), lacquers, synthetic resins, bitumen with mineral (e.g., SiO₂, volcanic ash) or bituminous filler, oil paint with Pb₃O₄ (baked or otherwise), vitreous enamel, Portland cement concrete, and mortar. These are discussed in detail.
D. K. M.

Painting aluminium. J. D. EDWARDS and R. I. WRAY (Ind. Eng. Chem., 1933, 25, 23—26).—The resistance of Al and its alloys to corrosion, their surface properties, pretreatments, and protection by paint primers and finishes, are discussed in detail. Accelerated tests involving alternate wetting and drying together with continuous exposure to the weather are described. Anodic treatment is very effective for passivating the surface, whilst chromate primers, particularly ZnCrO₄ in a glyptal-resin varnish give good results. Al paint as primer and/or finishing coat is also recommended, the choice of finishing materials, however, being very wide when the metal is satisfactorily prepared and primed. Durable clear finishes for Al have not hitherto been available, but promising results are reported with synthetic resin varnishes.
S. S. W.

Aircraft finishing. M. R. WHITMORE (Ind. Eng. Chem., 1933, 25, 19—23).—Present American practice in the protection of metal parts of military aircraft by org. coatings, e.g., paints, metallic coatings, e.g., electrodeposits, and chemical treatments, e.g., anodising, Parkerising, is summarised. A final paint coating is invariably used. Apparatus for testing corrosion-resistance (intermittent immersion in aq. NaCl) and flexibility etc. (vibration test) are described and illustrated. From such considerations the necessary characteristics of paint films for this purpose are defined as: high resistance to permeability by H₂O, passivating pigments, absence of pigments of alkaline reaction, good adhesion to metal (not necessarily chemically clean), high resistance to impact and bending, and retention of these qualities on service exposure.
S. S. W.

Preparation of zinc and zinc-alloy surfaces for coating. H. A. NELSON and W. W. KITTELBERGER (Ind. Eng. Chem., 1933, 25, 27—32).—Various types of Zn-coated steel, Zn, and Zn-alloy sheet are described and their service requirements indicated. Impact and adhesion tests on pretreated and painted sheets show that mechanical and/or chemical etching give satisfactory results, but that the prep. of a suitable surface for painting by processing in the factory stage is a decided improvement.
S. S. W.

Application of finishing materials on zinc. M. H. CORBIN (Ind. Eng. Chem., 1933, 25, 32—34).—The

progressive breakdown of paint films on Zn, even when originally satisfactorily adherent, is due to chemical, and not physical, changes. Use of inhibitors in a nitro-cellulose lacquer showed increased durability on untreated Zn, but mechanical or chemical treatment of the Zn is recommended. The advantages of a deposited film of NiS are stressed. S. S. W.

Zinc white [oxide] in white enamel preparation. P. KAMP (Farben-Ztg., 1933, 38, 453—455, 479—480).—The possibility of agglomeration, sedimentation, or "fattening" when incorporating ZnO with more or less acid vehicles can be overcome by correct practice. A satisfactory procedure is to grind the ZnO in stand oil, complete wetting being essential, and subsequently to add the acid resin solution. The acidity of the stand oil as such is not significant, but since ZnO tends to remove free acid from the equilibrium, the peptising effect of the acid on the highly polymerised portions of the stand oil is nullified, and progressive gelatinisation ensues. It is essential, therefore, to select a suitable stand oil, free from excessive amounts of high poly-merides, and a method of testing is outlined in this connexion. S. S. W.

Production of Bideford mineral black. ANON. (Ind. Chem., 1933, 9, 45—48).—A description of the works of Bideford Black, Ltd.

Influence of moisture on the oil-absorbability of pigments. S. YAKUBOVICH and M. GOLDBERG (Lakokras. Ind., 1932, No. 1—2, 48—56).—The oil-absorbability, M , = $100F/P$, where F is the quantity of oil absorbed and P is the total quantity of paste formed. For earth pigments M is max. at 0—5% H_2O ; for white lead M = 5.5—5% at 0—3% H_2O and 1.5% at 7% H_2O , whilst zinc white has M 8—7.5% at 0—10% H_2O and 2% at 18% H_2O . CH. ABS.

Plastic deformation.—See X. Slate powder as filler [for resins].—See XIV.

See also A., Feb., 133, Blue ultramarine. Oxidation and reduction of ultramarine.

PATENTS.

Cleaning and paint-removing compositions. J. DIPIED (B.P. 386,531, 8.6.32).—135 g. of $Ca(OH)_2$ are boiled with 1 litre of H_2O for 35 min., then 110 g. of Na_2CO_3 crystals, 17 c.c. of HCl (d 1.18), and 100 c.c. of K silicate (d 1.27) are added, excess CaO is filtered off, and 10 times its wt. of H_2O added to the mixture. If desired, 10 vol.-% of NaOCl solution (110 g. of active Cl per litre) may be added. S. S. W.

[Manufacture of] pigments, paints, and like coating compositions and putty [from bauxite]. VICTORIA VEGYESZETI MŰVEK R.T. (B.P. 386,151, 27.2.32. Hung., 19.8.31).—When bauxite is reduced so that its Fe content is converted into Fe_3O_4 , it gives a grey paint with linseed oil and can be used for making putty etc. S. M.

Production of resins soluble in oil. CHEMICON A.-G., Assees. of H. GAMMAY (B.P. 386,179, 9.4.32. Ger., 11.4.31).—A finely-divided natural or artificial resin (other than shellac) which is insol. in oil is heated

at 260—320° with another resin, *e.g.*, dammar or rosin, which is sol. in oil, until dissolution is complete. S. M.

Manufacture of [resinous] condensation products. H. W. MATHESON and F. W. SKIRROW, Assrs. to CANADIAN ELECTRO PRODUCTS Co., LTD. (U.S.P. 1,788,772, 13.1.31. Appl., 25.2.22).—The resins from C_2H_2 and phenols in presence of H_2SO_4 and Hg are condensed with an aldehyde, preferably MeCHO, with or without removal of Hg compounds. The fusible resin first produced may be hardened by heat. C. H.

Manufacture of urea-formaldehyde condensation products and artificial materials therefrom. FABRIQUES DE PROD. DE CHIM. ORGANIQUE DE LAITRE, and R. ARMENAUULT (B.P. 386,146, 23.2.32. Fr. 23.2.31).— CH_2O and $CO(NH_2)_2$ are condensed together in an aq. solution the p_H of which is controlled by the action of a metallic oxide or carbonate (*cf.* B.P. 340,114; B., 1931, 213) and heating is continued until a stable syrup is obtained, fillers etc. being incorporated, if desired. S. S. W.

Preparation of compositions containing synthetic resins and soluble alginates. V. LEFEBURE (B.P. 386,328, 2.4.31).— H_2O -sol. alginates, *e.g.*, Na alginate, are incorporated with H_2O -sol condensation products of CH_2O with excess of $CO(NH_2)_2$ or $CS(NH_2)_2$, in the presence, if desired, of accelerators which do not coagulate the algin, *e.g.*, org. acids, $KHSO_4$. The ingredients may be mixed in solid form or the mixture obtained as a solid from mixed solutions. The product is for use in varnish stains, powder distempers, impregnating agents for fibre boards, etc. S. S. W.

Manufacture of shaped articles from polyvinyl alcohols. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 386,161, 9.3.32. Ger., 10.3.31).—Relatively conc. aq. solutions of polymerised vinyl alcohols are extruded at raised temp. and allowed to solidify to threads, ribbons, etc. H_2O -resistance of the product is improved by incorporation of hydrophobic substances or by subsequent treatment, *e.g.*, with CH_2O vapour at raised temp.; fillers etc. may be incorporated. S. S. W.

[Manufacture of] mixed esters of benzophenone-polycarboxylic acids [resins and coating compositions]. H. A. BRUSON, Assr. to RÖHM & HAAS Co. (U.S.P. 1,829,038, 27.10.31. Appl., 10.3.31).—Benzophenone-di- and -tri-carboxylic acids are heated with colophony and glycerol or other di- or poly-hydric alcohol. Resins from the 2:4', m.p. 235°, 4:4', m.p. > 360°, 3:4', m.p. 326°, and 2:2'-dicarboxylic acids, 2:4:2'-tricarboxylic acid, m.p. 247—248°, and 4:4'-diphenylbenzophenone-2:2'-dicarboxylic acid are described. C. H.

[Cellulose ester] cementing compositions. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of A. G. HOVEY (B.P. 386,385, 3.11.31. U.S., 5.11.30).—From 26 to 22 wt.-% of a cellulose ester, *e.g.*, low-viscosity nitrate or acetate, is added to 11—20 wt.-% of a reaction product of glycerol, phthalic anhydride, and linseed oil fatty acids, with or without ethylene glycol, tung or castor oil, and rosin, both components being in solution in suitable solvents. S. S. W.

Protective colloids for organophobic suspensions. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of R. H. KIENLE (B.P. 385,970, 22.4.31. U.S., 23.4.30).—Unstable suspensions of resinous condensation products, e.g., "alkyds," $\text{PhOH-CH}_2\text{O}$, in org. liquid dispersion media are stabilised by addition of organophilic protective agents, e.g., rubber, nitrocellulose. [Stat. ref.]

S. S. W.

[Manufacture of polyhydric alcohol-polybasic acid] resin. H. A. BRUSON, Assr. to RÖHM & HAAS Co. (U.S.P. 1,813,838, 7.7.31. Appl., 8.7.30).—Benzophenone-2:4'-dicarboxylic acid is condensed with glycerol, glycol, diglycol, trimethylene glycol, pentaerythritol, mannitol, or other polyhydric alcohol to give H_2O -fast resins. C. H.

[Products from] coal tar.—See II. **Acetals, sec.-alcohols, esters (various), and tert.-butyl-naphthol [as plasticisers].** Metal salts of alkyl glyceryl phthalates.—See III. **Azo pigments.**—See IV. **[Varnishes from] film waste etc.**—See V.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Production of sponge rubber. G. L. BARRON (India-Rubber J., 1933, 85, 47—50).—Using an air-jacketed graduated glass tube, heated in a glycerin bath, experiments were made with cylindrical test-pieces, 2.5 cm. long and 1 cm. diam., of a mixture of rubber 100, stearic acid 1, vaseline 1, ZnO 0.5, CaCO_3 30, S 3; NaHCO_3 , NH_4HCO_3 , or commercial NH_4 carbonate 10, was also introduced together with a choice of org. accelerator of vulcanisation. The curve relating increase in vol. to rise in temp. is dependent on the gas-evolving agent used. With NaHCO_3 the pores produced tend to be small and regular; with NH_4 carbonate the pores are larger, and more regular for NH_4HCO_3 than for the commercial carbonate. The increase in vol. during vulcanisation is influenced not only by the amount of gas generated, but also by the ease of diffusion of the gas through hot rubber. Mixes containing an org. accelerator show a greater increase in vol. than similar but unaccelerated mixtures, probably because earlier vulcanisation of the cell walls tends to prevent loss of gas; the vol. increase is also greater the lower is the crit. temp. of the accelerator. "Maturing" before vulcanisation causes decrease of inflating power in NH_4 carbonate mixtures, probably on account of loss of inflating agent by diffusion; the NaHCO_3 mixtures are free from this defect. In order to obtain the essential degree of plasticity in the rubber, softeners such as mineral oil or vaseline should be used and over-mastication should be avoided. D. F. T.

Properties of clone rubber. I. J. L. WILTSHIRE and R. G. FULLERTON (J. Rubber Res. Inst. Malaya, 1932, 4, 140—148).—The rubber from 4 clones of known history and prepared under comparable conditions showed tensile differences about one half as great as those between ordinary rubbers from various estates, each using its own method of prep. The daily variations within each clone are of the same order as for a series of samples of ordinary rubber from one estate and are attributed mainly to factors external to the trees. D. F. T.

Variability of sheet [rubber] prepared under laboratory conditions. J. L. WILTSHIRE (J. Rubber Res. Inst. Malaya, 1932, 4, 149—152).—Using a standardised method for the prep. of experimental batches of sheet rubber from latex, results are cited showing the degree of variation observed in the H_2O content after dripping for 6 hr., the area of the sheet, and the load necessary to produce 650% elongation after standard vulcanisation. D. F. T.

Slate flour in rubber mixings. J. R. SCOTT (J. Res. Assoc. Brit. Rubber Manuf., 1932, 1, 115—126).—Slate powder in a rubber 95, S 5 mixture shortens the time of vulcanisation necessary for optimum mechanical properties and increases the hardness and permanent set. Judged by tensile strength and resilient energy, ordinary slate powder is a little inferior to whiting as a compounding ingredient, whereas the air-floated powder is slightly superior. Some samples give satisfactory ageing properties. D. F. T.

Slate powder as filler in the rubber industry. J. F. SACHER (Gummi-Ztg., 1933, 47, 439).—Rhenish slate powder on account of its fineness of division, chemical inertness, low μ , and appreciable colouring power is of use as a cheap ingredient and also as a dusting powder. It is also used as a filler in the manufacture of moulded products from synthetic resins. D. F. T.

Alterations of rubber by atmospheric oxygen. C. DUFRAISSE (Rev. Gén. Caoutchouc, 1932, Nos. 85 and 86. Reprint, 27 pp.).—Present knowledge of this problem is reviewed and discussed, the consideration including the character of the products, the nature and outward signs of the changes, influences affecting the rate of change, stability tests, and the aspect of technical mastication as part of an oxidation process. D. F. T.

Control rubber testing. T. L. GARNER (Ind. Chem., 1933, 9, 61—63).—A summary.

Mechanical mixing of asbestos and rubber. B. W. WETHERBEE (India-Rubber J., 1933, 85, 128—130).

PATENTS.

Manufacture of indiarubber articles [from latex]. J. AUMARÉCHAL and G. ROBRIEUX (B.P. 386,464, 26.2.32).—In order to cause rapid non-reversible coagulation in conc. latex pastes, e.g., containing 60—65% of rubber, and so to reduce the danger of distortion, the paste, which may conveniently contain additional substances such as NaF , quinoline acetate, or colloidal metals, is subjected to an intense electric current. This electro-coagulation may be facilitated by bringing the paste previously to the isoelectric point and by a preliminary addition of a sensitiser such as BaWO_4 or PbSO_4 with subsequent irradiation by X-rays. D. F. T.

Manufacture of plantation rubber products. L. GATSMAN (B.P. 386,846, 29.4. and 5.5.32).—Plantation rubber is treated with oils or the like with the addition of other ingredients such as C black or ZnO , so as to make it equiv. to "reclaimed rubber" in plasticity. The additions can conveniently be made while the rubber is still in the form of latex, coagulation being

effected subsequently. The product can be used as a substitute for reclaimed rubber. D. F. T.

[Manufacture of] vulcanisation accelerator. J. TEPPEMA (U.S.P. 1,838,062, 22.12.31. Appl., 11.3.29).—2-Chlorobenzthiazole (I), or its 6-NO₂-derivative (II), is condensed with alkali dithiocarbamates to give accelerators. Compounds from (I) or (II) and Na diethyl-, dibenzyl-, and pentamethylene-dithiocarbamates are described. C. H.

Rubber compositions and their preservation. A. H. STEVENS. From B. F. GOODRICH Co. (B.P. 386,469, 1.3.32).—Rubber is treated with an arylamino-polyaryllkane, e.g., 4-anilinetetraphenylmethane. C. H.

tert.-Amine antioxidants [for rubber]. L. J. CHRISTMANN, Assr. to AMER. CYANAMID Co. (U.S.P. 1,825,654, 6.10.31. Appl., 28.8.28).—Alkyldiaryl- or dialkylaryl-amines (including aralkylamines), e.g., NPhMe₂, NPhEt₂, NPh₂Me, N(CH₂Ph)₃, are used as antioxidants for rubber. C. H.

Carbazole antioxidant [for rubber etc.]. L. J. CHRISTMANN, Assr. to AMER. CYANAMID Co. (U.S.P. 1,836,702, 15.12.31. Appl., 18.10.28).—Carbazole and its N-alkyl or -aryl derivatives free from NO₂-groups are antioxidants for rubber etc. C. H.

Vulcanisation accelerator.—See III. Rubberised cardboard.—See V.

XV.—LEATHER; GLUE.

Wattle bark [*A. mollissima* and *A. decurrens*] from South Africa. ANON. (Bull. Imp. Inst., 1933, 30, 440—444).—The following analytical vals. (%) were given by mature and immature samples of Natal black wattle (*A. mollissima*) and green wattle (*A. decurrens*) barks, respectively: tannin 35.6, 33.5, 38.1, 29.5; sol. non-tans 12.6, 13.6, 10.7, 11.6; ash 2.8, 2.6, 1.9, 1.9; H₂O 12.9, 11.8, 11.7, 11.1; degrees red 4.1, 3.1, 4.4, 4.3; degrees yellow 6.2, 4.6, 6.8, 6.5. The leathers tanned with green wattle barks (*A*) were more pink in colour and not so close-grained as those tanned with black wattle bark (*B*). A sample of *B* from Southern Rhodesia contained (%): tannin 33.2, sol. non-tans 8.1, H₂O 11.9, ash 1.9, degrees red 4.7, and degrees yellow 8.7, and yielded a fairly soft, close-grained, pale-coloured leather. D. W.

Stability of vegetable tan liquors. J. A. WILSON (J. Amer. Leather Chem. Assoc., 1933, 28, 24—34).—No quant. relationship was observed between the vol. of sediment formed and the insol. matter as determined by the official method of tannin analysis in infusions of different vegetable tan liquors at various *p*_H vals. and with different additions of NaCl after they had been allowed to remain for 48 hr. The amount of sediment was > that of insol. matter, but the order of increasing amounts was the same, viz., cutch, wattle bark, mango extract, chestnut, quebracho, hemlock, and oak barks. D. W.

Diffusion of chestnut and quebracho tannins into animal hide. F. STATHER (Collegium, 1933, 9—22).—The diffusion of the two tannins into raw pelt was increased as the concn. or *p*_H val. of the tannin solution

was increased or the temp. raised, and slightly increased as the *p*_H val. of the pelt was increased. The increase in the diffusion was greater on the grain than on the flesh side of the pelt. The diffusion was not affected by variations in the tans/non-tans ratio in the tanning solution. D. W.

So-called "rope damage" [on raw skins] and the question of "stippen." M. BERGMANN, W. HAUSAM, and E. LIEBSCHER (Collegium, 1933, 2—5).—Photomicrographs show that such damage is due to hair fungi, which have been prevented by the rope from developing on the surface of the skins and consequently have penetrated the skins. "Stippen" are thus proved to be a fault arising during the preservation of the skins, and not present on the living animal. D. W.

Gluing plywood.—See IX.

XVI.—AGRICULTURE.

Chemical composition of Hungarian lowland [alkali] soils. A. ARANY (Z. Pflanz. Düng., 1932, 27A, 193—226; cf B., 1931, 216).—In H₂O extracts of these alkali soils prepared with increasing H₂O : soil ratios, the rise in titratable acidity (Me-orange) bore no relation to the *p*_H, degree of saturation with bases, or CaCO₃ content of the soil. Similar variations in alkalinity to phenolphthalein occurred only in soils containing CaCO₃ and alkali salts. Alkalinity was greater in soil suspensions than in filtered extracts. The total dry matter and loss on ignition of the extracts increased with the H₂O : soil ratio used. Vals. for total salt content in the extracts determined analytically were not closely paralleled by those calc. from conductivity measurements, although a general qual. similarity existed. In the soil profiles, *p*_H and CaCO₃ content increased with depth. In extracts from all horizons Na was the dominant base (70—98% of the total base equiv.). The high ratio Mg equiv. : Ca equiv. observed in extracts from a no. of soils was not indicative of a relatively high Mg content in the soils, but resulted in part from the reduced solubility of Ca salts in the alkaline solution. The condition and amelioration of the soils is discussed on the basis that they represent the resultant of 2 opposing processes, viz., degradation (downward leaching) tending to deepen the zone of accumulation, and regradation (salt addition due to rising ground-H₂O level) in which the zone of accumulation is at or near the surface. A. G. P.

Characterisation of humic acids and alkali-soluble lignins. K. SIMON (Z. Pflanz. Düng., 1932, 27A, 130—143).—The isolation and general properties of humic acid prepared from a special brown coal stratum (Kasseler Braun) and of lignin and humolignates from wood rotted by *Polyporus sulphureus* are described. The interrelations of these substances are discussed in relation to the process of humus formation in soils. A. G. P.

Relation of water to soil. A. F. LEBEDEV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 6, 65—88).—In all cases examined the R.H. of the soil atm. was maintained at 100% so long as the total H₂O content exceeded the max. hygroscopicity. Distillation of H₂O within the soil mass, evaporation from the surface, together

with the movement of film- H_2O are examined and discussed. A. G. P.

Water properties of soils in relation to their structure and drying. A. I. ACHROMEIKO (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 71—75).—Reduction in the max. H_2O capacity of soils on drying is ascribed to the coagulation of colloids and the formation of aggregate particles, resulting from the increased concn. of electrolytes. Hence, non-capillary porosity increases and capillary porosity decreases. Colloid coagulation following drying also decreases hygroscopicity by lowering the total surface area exposed. Evaporation of H_2O from drying soils occurs in 3 definite stages, viz., 100—60% of the total H_2O capacity, in which powdery and crumb-structured soils show approx. the same ratio of evaporation; 60—35%, in which evaporation is faster from powdery soils; and < 35%, in which structural soils show the more rapid evaporation. A. G. P.

“Unfree water” in soils. K. YAMANAKA (J. Imp. Agric. Exp. Sta. Nishigahara, 1932, 2, 59—70; Proc. Internat. Soc. Soil Sci., 1932, 7, 220).—Relationships of the “unfree” H_2O of soils with max. H_2O capacity, hygroscopic H_2O , and clay content (0.01 mm.) were linear in mineral soils, but in humus soils were indefinite except in the case of “unfree” H_2O —hygroscopic H_2O which could be represented by a logarithmic curve. H_2O retained by humic acid separated from soil does not freeze at -12° . Field soils retained more “unfree” H_2O than air-dried samples, especially in the case of humus soils. The relationship between “unfree” H_2O content and f.p. in soils is a logarithmic one within the range 0° to -10° . A. G. P.

Freezing and thawing and the water content of forest and field soils. N. A. KACHINSKY (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 161—164).—The effects of variations of H_2O content, of vegetation, and of the thickness of the snow-covering on the depth of freezing and on the nature of the thawing process are described. A. G. P.

Existence of two equilibrium series in soil-capillarity phenomena. W. B. HAINES (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 8—13).—The curve showing the relationship between the soil- H_2O content and the H_2O -pressure deficiency in a column of soil held over a free H_2O surface, obtained during the intake of H_2O by a relatively dry soil, differs from that representing the drainage of H_2O from a wet soil. A. G. P.

Nature of soil colloids. Dialysis. L. SMOLÍK (Bull. Czechoslov. Acad. Agric., 1932, No. 1; Proc. Internat. Soc. Soil Sci., 1932, 7, 237).—Dialysis of ultra-filtered clay (< 0.002 mm.) removes only traces of Al, Fe, or Si. Of the total base content of the colloid, the following % removal by dialysis is recorded: Na 90—98, K 33—52, Mg 16—36. A. G. P.

Variations in the exchange capacity and the exchangeable bases in soil. L. SMOLÍK (Bull. Czechoslov. Acad. Agric., 1931, No. 9; Proc. Internat. Soc. Soil Sci., 1932, 7, 223—224).—The exchange capacity of soils was decreased by heating at 100° , 300° , and dull red heat. Remoistening of heated soil resulted in a partial return to the initial exchange-capacity vals. Grinding

increased the exchangeable base contents of soils in the relative order $Mg > K > Na > Ca$, the last-named being but little affected. A. G. P.

Soil acidity in the Minsk area, and liming. G. J. PROTASSENJA (Arb. Agrochem. Zentrallab. Minsk, 1932; Proc. Internat. Soc. Soil Sci., 1932, 7, 253).—In the soils examined, hydrolytic acidity is associated principally with the org. colloids and exchange acidity with the mineral complex. Hydrolytic acidity was reduced more effectively by $Ca(OH)_2$ than by $CaCO_3$. Oat yields were increased by the application of CaO in proportions rising to double the equiv. of the hydrolytic acidity. In still larger amounts the effect of CaO declined and finally became negative. In the calculation of CaO requirements of field soils from hydrolytic acidity measurements ($NaOAc$ extraction) the factor 5.5 is suggested for sandy loams and 3.5 for lighter soils. A. G. P.

Lime requirement of mineral soils of Finland. B. AARNIO and H. LÖNNROTH (Agrogeol. Inst. Finland Bull., 1932, No. 31; Proc. Internat. Soc. Soil Sci., 1932, 7, 252—253).—Details of method used are recorded. A. G. P.

Effect of lime on pastures. J. FEATHERSTONE (J. Min. Agric., 1933, 39, 1008—1016).—Liming considerably increased the Ca content of herbage in many instances where no difference in growth or quality was apparent to the eye. The Ca requirement of milch cows is discussed and the importance of maintaining adequate supplies in pastures emphasised. A. G. P.

Alkali soils in Manchuria and Mongolia. K. TSUKUNAGA (Proc. 2nd Internat. Cong. Soil Sci., 1932, 5, 344—349).—The sol. salts of these soils are examined and methods of reclamation described. A. G. P.

Leaching of alkali soils at Sarkand-Sind with different calcium salts. V. A. TAMHANE and P. G. KRISHNA (Proc. 2nd Internat. Cong. Soil Sci., 1932, 5, 352).—Permeability in these soils was increased by treatment with $CaSO_4$ but reduced by $CaCO_3$, CaO , and $CaCl_2$. The rate of removal of Na by leaching the $CaCl_2$ -treated soil was > when $CaSO_4$ was used. All treatments except that with $CaSO_4$ caused loss of PO_4^{3-} during leaching. A. G. P.

Soluble salts in non-irrigated vineyards. A. R. HICKINBOTTOM and J. L. WILLIAMS (J. Dept. Agric. S. Australia, 1932, 36, 427—433).—Vines fail in certain areas as a result of an excessive accumulation of sol. salts in the surface soil. Applications of CaO , $CaSO_4$, green and cattle manures are recommended to produce a looser texture and increase permeability. A. G. P.

Determination of chloride in soils. A. ITANO and A. MATSUURA (J. Agric. Chem. Soc. Japan, 1931, 7, 43; Proc. Internat. Soc. Soil Sci., 1932, 7, 273).—The electrometric method gives results agreeing with those of the standard chromate method and is not affected by the presence of org. matter. Slight discrepancies occur when the Cl^- content is very low. A. G. P.

Removal of soluble salts from virgin black alkali soil. W. L. POWERS (Proc. 2nd Internat. Cong. Soil Sci., 1932, 5, 335—343).—Treatment with S, especially in conjunction with manure, effectively reduced alkalinity

and improved the growth of lucerne on deep-drained and irrigated soils. Combined use of S and gypsum was more effective than that of either alone. Displacement of Na by Ca proceeded rapidly when the p_H was reduced to 7.8. Salt removal is aided by flocculation of colloids at this p_H range. A. G. P.

Catalytic power of soils. K. SCHARER (Landw. Versuchs-Stat., 1932, 114, 301—302).—In a criticism of remarks by Radu (B., 1931, 773), work of other investigators is cited in support of the author's views (B., 1929, 182). A. G. P.

Value of soil inoculation. M. DÜGGELI (Z. Pflanz. Düng., 1933, 12B, 38—43).—A discussion of bacterial activity in soil as regulated by customary cultural practice and by artificial inoculation. A. G. P.

Pretreatment of soils for mechanical analysis. V. NOVÁK (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 14—39).—Comparative analyses of 6 soils by various methods carried out at a no. of centres are recorded and discussed. A. G. P.

Oxidation of organic matter in the pretreatment of soil for mechanical analysis. E. M. CROWTHER and K. E. TROELL (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 48—51).—10 g. of soil are treated overnight with NaOBr solution (5 c.c. Br in 200 c.c. *N*-NaOH). Aq. NH_3 is added to destroy the excess of NaOBr, and the soil is washed on a filter in turn with *N*-NaCl, 0.1 *N*-NaCl, and H_2O until the washings become slightly turbid. The residue is shaken with 500 c.c. of H_2O and examined in the customary manner. Structureless humus is completely removed by this process, partial dissolution of sesquioxides is avoided, and in the final suspension the flocculating effect of $CaSO_4$ is minimised. A. G. P.

Use of electro dialysis for the pretreatment of soil samples for mechanical analysis. L. SMOLÍK (Proc. 2nd Internat. Soc. Soil Sci., 1932, 1, 70).—Mechanical analyses carried out with completely electro dialysed soils yielded lower proportions of clay than were indicated by the customary methods. A. G. P.

Fractionation of the polydisperse system [of soils] by centrifugal power. A. I. MOSHEV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 66—69).—The use and advantages of the centrifugal method are described. A. G. P.

Size distribution of soil particles in several Ohio soil profiles. G. W. CONREY and E. E. BARNES (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 60—65).—A modified Wiegner apparatus is described, which is particularly suitable for the examination of particles 0.05—0.002 mm. in diam. A. G. P.

Determination of some physical properties of soils. N. A. KACHINSKY (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 129—160).—Methods and apparatus are described for determining the *d*, porosity, and compactness of undisturbed soil samples, and the hygroscopicity, viscosity, and vol. increase on moistening. Data for a podsol profile are recorded. A. G. P.

Determination of a single-value constant of soils. M. J. BOURDELLE (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 124—128).—The technique of aggregate analysis is described. Results obtained are characteristic for

each soil. A high proportion of aggregates $> 20 \mu$ diam. is not associated with a high Ca content in soils, but occurs principally in those containing much humus.

A. G. P.

Calorimeter for determining the heat of wetting of soils. P. I. ANDRIANOV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 53—58).—Apparatus and technique are described. A. G. P.

Heat of wetting of soils. H. JANERT (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 99—123).—A suitable calorimeter is described. Relationships between the heat of wetting of soils, saturation capacity, mechanical composition, hygroscopicity, H_2O capacity, and ceramic properties are examined. A. G. P.

Interpretation of the physical properties of soil affecting tillage by means of the Atterberg consistency constants. M. L. NICHOLS and L. D. BAVER (Proc. 2nd Internat. Cong. Soil Sci., 1932, 6, 175—188).—Methods for determining friction, compression, and resistance of soil to tillage instruments are recorded. Interrelationships between adhesion, plasticity, compressibility, and H_2O content are examined. A. G. P.

Drainage of heavy podsols. L. P. ROZOV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 6, 26—37).—Drainage prolonged the growing period of plants in these soils and crops were improved in yield and quality. The p_H of the soils was lowered somewhat. The porosity was decreased by applications of $CaHCO_3$ and increased by $CaSO_4$. A. G. P.

Importance of the use of copper, manganese, and zinc salts in the agricultural development of the low-moor soils of the Florida Everglades. R. V. ALLISON (Proc. 2nd Internat. Cong. Soil Sci., 1932, 6, 257—275).—Marked increases in crop yields follow the application of $CuSO_4$ (30 lb. per acre) and of $MnSO_4$. The latter was particularly effective on burnt-over soils. $ZnSO_4$ reduced crop yields to some extent and caused etiolation of leaves. Treatment with Cu and Zn together resulted in larger crops and earlier maturity as compared with Cu alone. Mixtures of Cu and Mn were more effective than was either constituent alone. A. G. P.

Study of the difference in assimilability of inorganic and organic forms of phosphorus by the seedling method. E. NEUBAUER (Landw. Versuchs-Stat., 1932, 114, 225—294).—The seedling method is adapted for examination of org. P by the use of a cork dust-sand mixture as diluent. From this medium plants utilise org. P (cattle manure, nucleic acid, yeast, etc.) almost as easily as inorg. P. Addition of permutit markedly reduced the assimilation of P from all materials, KH_2PO_4 being more affected than cattle manure, grass, or straw. Phytin was rendered almost completely unutilisable. $CaCO_3$ also reduced assimilability but to a less extent; KH_2PO_4 in this case was only slightly affected, but phytin became unassimilable. The action of $CaCO_3$ on org. forms of P is in part attributable to the injurious action on plant roots of NH_3 liberated. The pptn. of phosphates by Ca requires not only a sufficiently high p_H but the requisite $[Ca^{++}]$ in the solution. A. G. P.

Relations between the reaction of soils and their root-soluble potassium and phosphate contents.

M. KLING and O. ENGELS (Z. Pflanz. Düng., 1933, 12B, 32—38).—Among many soils examined, the average % of assimilable P (Neubauer) was highest in those having p_H 6.0—5.5. Vals. fell slightly in the range p_H 7.0—6.0 and sharply with increasing acidity $< p_H$ 5.5. High % of assimilable K was most marked in soils of p_H 7.0—5.5, the average being lower at p_H 5.5—5.0 and falling sharply below p_H 5.0. A. G. P.

Availability [for plants] of phosphates in bone meal. P. E. LANDER and D. SINGH (Agric. Live-Stock India, 1932, 2, 627—633).—The effect of fermentation in the presence of cattle manure, $(NH_4)_2SO_4$, urine, and of S, on the solubility of the PO_4''' of bone meal is examined. Steamed meal ferments much more rapidly than raw meal and shows a correspondingly larger increase in sol. PO_4''' . The max. sol. PO_4''' varied with the supplementary material added, viz., S + bacterial inoculum 36, $(NH_4)_2SO_4$ 28, urine 26.5, and cattle manure 26%, of the total PO_4''' present. Except in the case of S the rate of decomp. is very rapid in the early stages of fermentation, more especially with finely-ground meals. A. G. P.

Solubility of iron and aluminium phosphates [as fertilisers] as influenced by alkalis. Y. KIDA (Proc. 2nd Internat. Cong. Soil Sci., 1932, 5, 353—354).—The solubility of natural phosphates of Fe and Al is increased by treatment with NaOH, Na_2CO_3 , and $NaHCO_3$. NaH_2PO_4 and complex $Na Fe'''$ (and Al) phosphates are formed. Excess of alkali must be avoided since the formation of Fe aluminate is an essential intermediate step in the reaction. The resulting mixture of phosphates proved a satisfactory fertiliser in pot trials with rice and barley. A. G. P.

Peat as a fertiliser and soil improver. B. TACKE (Z. Pflanz. Düng., 1933, 12B, 1—11).—Direct incorporation of peat with soil leads to variable results and is seldom profitable. Peat should be used as litter in cattle stalls prior to application to soil. A. G. P.

Organic nitrogen compounds as plant nutrients. A. I. VIRTANEN and S. VON HAUSEN (Suomen Kem., 1933, 6, [B], 55—56).—Plants can utilise org. sources of N and do so under natural conditions. N compounds (probably NH_2 -acids) elaborated in the nodules of legumes serve as N nutrients for cereals. In sterile cultures legumes (uninoculated) and barley assimilated sol. org. N from NH_3 - and NO_3' -free extracts of low-moor soils. Both the N and C from aspartic and glutamic acids were utilised without change in the reaction of the media. A. G. P.

Manurial action of some potash salts, used alone and in admixture. H. LIESEGANG (Landw. Versuchs-Stat., 1932, 114, 295—297; cf. B., 1929, 757). H. NOLTE (*Ibid.*, 299—300).—A reply to Nolte (B., 1930, 208), and a rejoinder. Each author maintains his previously expressed view. A. G. P.

Influence of phosphate manuring on the yield and quality of brewing barley. C. KRÜGEL, C. DREYSPRING, and H. KURTH (Z. Pflanz. Düng., 1933, 12B, 12—32).—Application of sol. P fertilisers to barley increased grain size, wt. per 1000 grains, hectolitre wt., wt. per ear, starch content, and yield of extract.

The grain : straw ratio was improved and the N content of the grain decreased. The length of straw and H_2O content of the grain were not appreciably affected.

A. G. P.

Power of assimilation and requirement of potash of buckwheat, barley, oats, and yellow lupin. H. LIESEGANG (Landw. Versuchs-Stat., 1932, 114, 303—320).—The general order of intake of K from untreated or fertilised soils was barley $<$ buckwheat $<$ lupins $<$ oats. The P intake was in the order barley $<$ oats $<$ buckwheat $<$ lupin. The intake of K from K salts averaged 2—6 times that from finely-ground phonolith when the latter was applied in quantities containing HCl-sol. K equiv. to 3 times the K content of the K salts. The P intake of plants receiving K salts was $>$ that of those receiving phonolith.

A. G. P.

Fertilisers for sweet potatoes. J. J. SKINNER, C. B. WILLIAMS, and H. B. MANN (U.S. Dept. Agric. Tech. Bull., 1932, No. 335, 46 pp.).—On heavy soils mineral N was as effective as org. N, but on lighter soils large dressings caused some injury to young plants. KCl and K_2SO_4 produced practically the same yields. Kainit was inferior and also injured newly set plants. Losses of young plants due to heavy applications of fertilisers are correlated with the concn. of sol. salts in the soil zone immediately adjacent to plant roots, and may be minimised by broadcasting the fertiliser or applying it as a top-dressing after the plants are established.

A. G. P.

Relationships of potash fertilisation and varieties of potatoes to table value. M. WHITTEMORE and B. M. KUSCHKE (Rhode Is. Agric. Exp. Sta. Bull., 1931, No. 231, 16 pp.).—Fertilisers rich in K produced more mealy potatoes than those of low K content. KCl was more effective than K_2SO_4 in causing mealiness. No relationship was apparent between mealiness and starch content.

A. G. P.

Factors influencing growth and fruiting of tomato. V. M. WATTS (Arkansas Agric. Exp. Sta. Bull., 1931, No. 267, 47 pp.).—Increased light intensity or period of exposure produced corresponding increases in dry matter and carbohydrate content and a decrease in N content (especially of NH_2 -acids). Under conditions restricting carbohydrate formation an increased N supply may lead to increased vegetative growth, but lowered fruit production, whereas a decreased N supply has the reverse effects. With a restricted N supply, growth conditions tending to reduce carbohydrate production favour fruitfulness. High carbohydrate and low NH_2 -acid contents of plants are associated with weak, woody growth, whereas low carbohydrate and high NH_2 -acid contents are characteristic of very succulent growth. In both cases fruiting is poor. Heavy fruiting occurred in plants having moderate proportions of both constituents.

A. G. P.

Effect of certain chemicals on rice production and their effect on the rice soil. L. C. KAPP (Arkansas Agric. Exp. Sta. Bull., 1932, No. 277, 35 pp.).—Yields of grain from soils treated with $(NH_4)_2SO_4$ were higher than those with $NaNO_3$. Chlorotic plants occurred on soils receiving fertilisers but no $CaCO_3$.

Addition of Fe salts did not always effect an improvement. Chlorosis is probably the result of an unsuitable Fe : Mn ratio in the soil solution. Improved growth resulting from treatment with CaCO_3 may be due to a relatively greater reduction of sol. Mn than of sol. Fe. Air-drying of rice soils improves their productivity and also increases the Fe content of the soil solution.

A. G. P.

Experiments with padi in Malaya, 1931—32. II. Padi manuring. III. Experimental error of field trials. IV. Experimental padi tanks. W. N. C. BELGRAVE (Malay. Agric. J., 1932, 20, 631—638, 639—641, 641—644).—II. Results of field trials are recorded. Positive correlation is shown between manuring and tillering, but not between tillering and yield.

IV. Trials with rice grown in concrete tanks emphasised the beneficial effects of green manuring in conditioning new rice soils, especially those which had not been flooded for a considerable period. A. G. P.

Nutrient requirements and histology of the cranberry with special reference to sources of nitrogen. R. M. ADDOMS and F. C. MOUNCE (Plant Physiol., 1932, 7, 643—656).—Growth of cranberry was compared in sand cultures in which N was supplied as $\text{Ca}(\text{NO}_3)_2$, $(\text{NH}_4)_2\text{SO}_4$, and glycine at varying p_{H} levels. Best growth resulted from $(\text{NH}_4)_2\text{SO}_4$ at p_{H} 6 and 8 and glycine at p_{H} 4 and 6. All $\text{Ca}(\text{NO}_3)_2$ cultures (optimum p_{H} 4.0) were inferior to these. Stunted and chlorotic plants were obtained with $(\text{NH}_4)_2\text{SO}_4$ at p_{H} 4 and glycine at p_{H} 8. Cranberry can utilise NH_4 at a lower p_{H} in bog soils than in sand cultures. The plants absorbed glycine as such. In bog-soil plants a correlation is shown between the degree of vegetative vigour and the fat and lipin content of the leaves. The proportion of Et_2O -sol. matter was low in the most vigorous plants. A. G. P.

Cause of unproductivity in a certain volcanic calcareous soil for paddy rice. Y. KAMOSHITA (J. Imp. Agric. Exp. Sta. Nishigara, 1932, 2, 37—48; Proc. Internat. Soc. Soil Sci., 1932, 7, 251—252).—Failure of rice is attributed to excessive alkalinity which retards or inhibits the growth of rice in the early stages. Older plants are able to withstand this condition. A. G. P.

Artificial light and plant growth. J. M. ARTHUR (Agric. Eng., 1932, 13, 288—291. Reprint).—The effect on the growth of plants of light varying in intensity and wave-length is examined. Marked differences occur in the flowering response of plants to short- or long-period exposures. A. G. P.

Sulphuric acid treatment of sugar-beet seed. F. H. GARNER and H. G. SANDERS (J. Min. Agric., 1933, 39, 986—987; cf. B., 1932, 855).—Treatment with H_2SO_4 improved the rate and % of germination, the growth of the crop, and the yield both of roots and tops. Milled seed was somewhat inferior to untreated controls. A. G. P.

Silage investigations at Bangalore. IV. Ensilage of Jowar straw. T. S. KRISHNAN (Agric. Live-stock India, 1933, 2, 619—626; cf. B., 1933, 163).—Good-quality "acid-brown" silage was prepared from Jowar straw. Loss of dry matter, org. matter, and

carbohydrates corresponded with those occurring during the ensilage of the green plant in prime condition. Protein decomp. was, however, smaller in the case of straw, loss of crude fibre was less, and the removal of mineral matter (especially alkalis) in the drainage liquor relatively greater. The high Et_2O -sol. matter of the product was largely due to org. acids produced from carbohydrates. A. G. P.

Root systems of plants in soils of the podsol type. N. A. KACHINSKY (Proc. 2nd Internat. Cong. Soil Sci., 1932, 1, 165—166).—The extent of the development of plant roots in podsoles changes abruptly with the passage from one horizon to another. In general, the ratio of root to aërial growth decreases with improving soil conditions. Roots are a more important source of humus in subsoils than is the sol. org. matter leached from the surface layers. A. G. P.

The yield equation in pineapple culture. C. A. FARDEN and O. C. MAGISTAD (J. Amer. Soc. Agron., 1932, 24, 964—975).—A simplified method of determining the consts. of the yield equation from the results of field fertiliser trials is presented and its use in ascertaining the optimum economic fertiliser treatment described. A. G. P.

Cold-resistance in evergreens with special reference to the possible rôle of bound water. B. S. MEYER (Bot. Gaz., 1932, 94, 297—321).—The total H_2O content of leaves of *Pinus rigida*, Mill., was greater in summer than in winter, but no evidence was obtained of seasonal differences in the relative proportions of free and bound H_2O . A. G. P.

Rotenone as an insecticide. N. TURNER (J. Econ. Entom., 1932, 25, 1228—1237).—Rotenone deteriorates in the presence of soaps, whether contained in a soap solution or incorporated with an oil which is emulsified with soap. Solutions in oil-sol. sulphonates, and oil solutions emulsified with dried skim milk, are stable. Rotenone is highly toxic to insects as a contact or stomach poison. A. G. P.

Relative toxicity of pyrethrins and rotenone as fly-spray ingredients. C. B. GNADINGER and C. S. CORL (J. Econ. Entom., 1932, 25, 1237—1240).—Solutions of rotenone in oil are less toxic to flies than pyrethrin solutions of the same concn. Addition of rotenone to a pyrethrin solution does not increase the toxicity as much as does the addition of a similar amount of pyrethrin. A. G. P.

Composition of commercially available fluorine compounds [insecticides]. R. H. CARTER (J. Econ. Entom., 1932, 25, 1224—1227).—Data concerning numerous samples of 15 different substances are recorded. A. G. P.

Use of kainit for control of poison ivy. O. BUTLER (J. Amer. Soc. Agron., 1932, 24, 979—981).—Several applications of kainit mixed with peat to the moist foliage proved successful. A. G. P.

Toxicity and permeability. I. Toxicity of acid and basic solutions of sodium arsenite to mosquito pupæ. W. M. HOSKINS (J. Econ. Entom., 1932, 35, 1112—1224).—The toxicity to immersed pupæ of Na_3AsO_3 solutions in the range 0.01—0.03M was

much greater at p_H 5 than at p_H 11. This is ascribed to the greater ease of penetration of mol. H_3AsO_3 than of AsO_3''' . Although penetration of As is relatively rapid, the toxic action is exerted slowly. Where pupæ remained immersed in the solution till dead, the actual intake of As per insect was the same irrespective of the concn. of the solution or the period of exposure.

A. G. P.

Codling moth bands in Pennsylvania. H. N. WORTHLEY (J. Econ. Entom., 1932, 25, 1133—1143).—Complete control was obtained with bands treated with a solution of β -naphthol (1 lb.) in red engine oil of viscosity 300 sec. ($1\frac{1}{2}$ pints) to which is added 0.5 oz. of Al stearate.

A. G. P.

Sod webworms and their control in lawns and golf greens. W. B. NOBLE (U.S. Dept. Agric. Circ., 1932, No. 248, 4 pp.).—Satisfactory control was obtained by water control was obtained with pyrethrum preps. or with kerosene emulsion (0.75%).

A. G. P.

Catalase activity in army cutworm moths. (*Chorizagrotis auxiliaris*, Grote). J. H. PEPPER (J. Econ. Entom., 1932, 25, 1128—1133).—Catalase activity of the tissues increased markedly towards the period of oviposition and subsequently declined.

A. G. P.

Control of the cattle louse (*Bovicola bovis*, Linn.). W. E. SHULL (J. Econ. Entom., 1932, 25, 1208—1211).—Dusting with NaF, with diatomaceous earth, or with a 1:1 mixture of these proved efficacious.

A. G. P.

Control of the raspberry beetle. F. R. PETHERBRIDGE and I. THOMAS (J. Min. Agric., 1933, 39, 1017—1028).—A reduction in the no. of beetles to approx. 10% of the controls was obtained by dusting with derris powder (0.2%) once prior to and once at the opening of the flowers. The use of derris sprays at 10 and 20 days after blooming was rather less satisfactory. Nicotine sulphate-soap sprays were equally effective.

A. G. P.

Control of the tobacco flea beetle (*Epitrix parvula*). E. G. BEINHART (J. Econ. Entom., 1932, 25, 1187—1190).—A Bordeaux mixture—Pb arsenate—nicotine sulphate prep. is recommended.

A. G. P.

Effects of certain "inert" and toxic substances on the twelve-spotted cucumber beetle (*Diabrotica duodecim-punctata*, Fab.). C. H. RICHARDSON and L. H. GLOVER (J. Econ. Entom., 1932, 25, 1176—1181).—The effectiveness of materials examined, based on the time to kill 50% of the insects, was in the order $Na_2SiF_6 > Ca$ arsenate $>$ acid Pb arsenate $>$ $Ca(OH)_2 =$ kaolin $>$ gypsum $>$ bentonite. Beyond the point of 50% mortality survival curves indicate greater effectiveness under these conditions of $Ca(OH)_2$ relative to kaolin. "Inert" substances passed into the posterior half of the digestive tract, but As and Na_2SiF_6 were not identifiable in the tract.

A. G. P.

New developments in treating Pecan Rosette with chemicals. A. O. ALBEN, J. R. COLE, and R. D. LEWIS (Phytopath., 1932, 22, 979—981).—Treatment with Fe salts previously recorded (B., 1932, 954) gave erratic results unless small amounts of Zn were present. Spraying with Zn—CaO (2—2—50) proved beneficial, the optimum proportion of Zn being 0.18% as $ZnSO_4 \cdot 7H_2O$

or 0.012% as $ZnCl_2$. Higher proportions caused scorching. The safe limit of Zn as sulphate was approx. 7 times that as chloride.

A. G. P.

Tea yellows disease. H. H. STOREY and R. LEACH (Nyasaland Dept. Agric. Bull., 1932, No. 3, 12 pp.; Proc. Internat. Soc. Soil Sci., 1932, 7, 255).—Characteristics of the disease, which is ascribed to S deficiency, are recorded. Applications of S or of sulphate-containing fertilisers checked the disease.

A. G. P.

Spike disease of sandal. S. RANGASWAMI and A. V. V. IYENGAR (Indian Inst. Sci., Bangalore. Report VI, 1932, 7—8).—Trees are girdled at the base and bark is removed. The exposed wood is painted with arsenical preps. K arsenites are more effective than the Na salts. Boring holes in trees and plugging with NaCl, $CuSO_4$, $KClO_3$, or $C_6H_4Cl_2$ was less satisfactory.

A. G. P.

Spike disease of sandal. A. V. V. IYENGAR (Indian Inst. Sci., Bangalore. Report VI, 1932, 11—12).—Tissues of spiked plants have 2—3 times as much tannin as healthy plants. The org. P in tissue fluids from spiked leaves represents approx. 35% and in healthy leaves 60% of the total present. In trees treated with As (cf. preceding abstract) small amounts of As occurred in some cases in the heart wood, but As was absent from the oil extracted therefrom by solvents.

A. G. P.

Spike disease of sandal. Y. V. S. RAO (Indian Inst. Sci., Bangalore. Report VI, 1932, 10).—Susceptible sandal plants with *Acacia farnesiana* as host are characterised by high basic N contents. With other hosts, e.g., *Melia indica*, the non-basic N fraction is high.

A. G. P.

Killing perennial weeds with chlorates during winter. W. C. MUENSCHER (Cornell Univ. Agric. Exp. Sta. Bull., 1932, No. 542, 8 pp.).—Late-autumn application of $NaClO_3$ (200—600 lb. per acre) was effective.

A. G. P.

Distribution of the cotton root-rot fungus in soil and in plant tissues in relation to control by disinfectants. C. J. KING and C. HOPE (J. Agric. Res., 1932, 45, 725—740).—Various attempts to control the fungus by injection of CH_2O into soil are described.

A. G. P.

Red oxide of copper as a dust fungicide for combating damping-off by seed treatment. J. G. HORSFALL (New York State Agric. Exp. Sta. Bull., 1932, No. 615, 26 pp.).—Red oxide compared favourably with other Cu compounds on tomatoes, but was slightly less effective than $CuSO_4$ (soaking) for the post-emergence phase of damping-off. Cu_2O adheres well to seeds and may be diluted with talc (1:4) without loss of efficiency.

A. G. P.

Rotenone in plant material. Colour test for rotenone.—See XX.

See also A., Feb., 188, Influence of K salt anions on mycelium growth of *Aspergillus niger*. 189, As fungi of Gosio. 198, Nutritional experiments on peach etc.

PATENTS.

Stimulants and fungicides for seeds. V. CASABURI (B.P. 386,694, 27.7.31).—Mixtures of sulphonated

hydrocarbons containing, if desired, sulphonated aromatic OH-compounds are treated with aldehydes or compounds yielding them, or with substances containing the OMe group, *e.g.*, alkaline wood pulp. The products may be converted into their alkali or other metal salts, or mixed with other insecticides or fungicides, *e.g.*, As compounds, $p\text{-C}_6\text{H}_4\text{Cl}_2$. L. A. C.

Seed disinfectant composition. M. S. KHARASCH, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,820,001, 18.8.31. Appl., 9.8.29).—Olefines and their Cl-, CN-, and OH-derivatives are mercurated. Examples are: C_2H_4 , vinyl chloride or acetate, allyl cyanide, styrene, C_3H_6 , anethole, cyclohexene, isobutylene, etc. C. H.

KCl [pellets].—See VII.

XVII.—SUGARS; STARCHES; GUMS.

Influence of potash-factory effluents on [beet-] sugar-factory juices. O. SPENGLER and P. KESSLER (Z. Ver. deut. Zucker-Ind., 1932, 82, 969—991).—The effluents in question contain salts consisting mainly of MgCl_2 with some MgSO_4 and alkali chlorides. The presence of 1% of this salt mixture in H_2O used for diffusion was found to lower the purity of the final juices by several degrees, to increase their residual Ca content, and to increase the colour of the juices after evaporation. J. H. L.

Effect of reversion products and amino-compounds on sucrose determinations in cane products. F. W. ZERBAN and C. A. GAMBLE (Ind. Eng. Chem. [Anal.], 1933, 5, 34—35).—For polarimetric determinations sucrose should be inverted by invertase. According to the time and temp. of the reaction HCl hydrolyses protein degradation products and NH_2 -acids, thereby yielding high results. T. McL.

Detection of glucose and sucrose in lactose. J. ROSIN and F. C. HITCHCOCK (J. Amer. Pharm. Assoc., 1932, 21, 1282—1286).—Powdered lactose (5 g.) is shaken with 25 c.c. of 70 vol.-% aq. EtOH for 30 min., filtered, and 5 c.c. of the filtrate are evaporated. To a solution of the residue in 5 c.c. of H_2O are added 5 c.c. of Barfoed's reagent and, after heating to 100° for 3 min., the mixture is kept at room temp. for 25 min. The presence of glucose is indicated by the formation of a red ppt. For the detection of sucrose, 10 c.c. of the alcoholic filtrate are evaporated and to the residue dissolved in 9 c.c. of H_2O are added 1 c.c. of 25% HCl and 0.1 g. of resorcinol. The development of a yellow or reddish-yellow colour on heating the liquid at 100° for 8 min. indicates the presence of sucrose. The U.S.P. test for starch in lactose is also applicable for the detection of dextrin, but is improved by dilution of the I solution. E. H. S.

Determination of small amounts of invert sugar in presence of sucrose. A. H. EDWARDS and S. J. OSBORN (Ind. Eng. Chem. [Anal.], 1933, 5, 42—49).—The methods of Quisumbing and Thomas (A., 1922, ii, 92) and Bruhns (B., 1931, 176) have been standardised. In the presence of much invert sugar the former method is preferred, whilst with traces only that of Bruhns is employed. Sugar solutions are

best clarified by $\text{Pb}(\text{OAc})_2$, followed by treatment with $\text{NH}_4\text{H}_2\text{PO}_4$ and $\text{Na}_2\text{C}_2\text{O}_4$. After reduction the Cu_2O is dissolved and determined by the volumetric thiosulphate process. T. McL.

Determination of moisture in syrups and viscous materials [e.g., honey]. E. W. RICE and P. BOLER-ACKI (Ind. Eng. Chem. [Anal.], 1933, 5, 11—12).—0.25—0.30 g. of the sample is pressed between 2 thin Ag plates (10×15 cm.). The plates are separated and dried *in vacuo* at 70° for 2—4 hr. During weighing the plates are placed together and held in an Al frame to prevent access of H_2O . T. McL.

Dextrin: its properties and manufacture. A. E. WILLIAMS (Ind. Chem., 1933, 9, 52—54).

Addition agent for Cd-plating.—See X. **Acid treatment of sugar-beet seed.**—See XVI. **Sugars in wheat and flour.**—See XIX. **Sterile invert sugar solutions.**—See XX.

See also A., Feb., 147, Colour tests for hexoses. 150, Higher fatty acid esters of starch.

PATENTS.

Preparation and handling of sugar syrups containing invert sugars. D. V. WADSWORTH and L. WICKENDEN, Assrs. to J. J. NAUGLE (U.S.P. 1,850,427, 22.3.32. Appl., 3.7.29).—Raw cane sugars, directly or after affination or recrystallisation, are melted to form syrups of 60—80° Brix, the p_{H} vals. of which are then so adjusted that after a predetermined period, *e.g.*, that of transport, at an approx. known average temp., the invert sugar content will have attained a required val. The syrups may then be purified and decolorised (Suchar). (Cf. B.P. 366,525; B., 1932, 397.) J. H. L.

Saccharification of vegetable material containing pentosans. E. FÄRBER, Assr. to HOLZHYDROLYSE A.-G. (U.S.P. 1,851,822, 29.3.32. Appl., 25.6.30. Ger., 21.5.29).—Before conversion of the cellulose with 40% HCl the pentosans are extracted, at room temp. or slightly above, by acid of lower concn., *e.g.*, 26% for oat-husks, 28% for cane bagasse, or 37% for oakwood. The acid extract may be displaced from the treated material either by 40% HCl preparatory to the cellulose hydrolysis, or by H_2O and the material dried before further treatment. In one form of the process the pentosans are extracted in a diffusion battery with 36—39% HCl for a limited time; in the case of oat husks $\frac{1}{2}$ hr. suffices. The removal of the pentosans facilitates the subsequent hydrolysis of cellulose. J. H. L.

Production of sulphuric acid esters of glucosides. H. T. BÖHME A.-G. (B.P. 384,230, 6.7.32. Ger., 13.7.31).—Sulphonation and glucoside formation are carried out in one operation, the sugar and alcohol being mixed with the sulphonating agent together or in any desired sequence. After completion of the reaction the mass is neutralised, either directly or after addition of an org. solvent and removal of the aq. acid thereby separated. In an example a mixture of glucose and lauryl alcohol is sulphonated. After cooling the product on ice, BuOH is added to the clear liquid until the aq. acid separates; the latter is then removed and the mass neutralised with conc. aq. NaOH and dried.

Application of the products as foaming or detergent agents is claimed. J. H. L.

Production of starches swelling in cold water. A. L. MOND. From METALLGES. A.-G. (B.P. 383,786, 8.1.32).—A conc. aq. suspension of starch (*e.g.*, wheat starch) is atomised in hot air containing moisture the partial pressure of which is maintained at such a val. that evaporation from the atomised particles does not occur until their temp. exceeds that of gelatinisation, and then desiccation follows almost instantaneously, so that the gelatinised starch is not thinned by exposure to high temp. in the moist state. Gelatinising agents may be added to the starch suspension or introduced into the gaseous medium, to lower the temp. of gelatinisation. J. H. L.

Manufacture of modified starches, dextrins, and British gums. NAT. ADHESIVES CORP., ASSEES. OF A. D. FULLER (B.P. 383,778, 4.1.32. U.S., 5.1.31).—Raw starch, in aq. suspension, is first treated, cold or warm, with about 0.5% of CaOCl_2 or other alkaline chlorinating agent, in the form of a clear solution, until all active Cl has disappeared. This facilitates subsequent modification or dextrinisation, and also enables impure starches to yield superior products if washed and screened at this stage. The starch thus sensitised is adjusted in aq. suspension to a suitable p_{H} , according to the type of product required, and after removal of most of the H_2O , and addition of catalysts if necessary, is modified or dextrinised by heating. Lower acidities and/or temp. can be used than when the preliminary "chlorination" is omitted. J. H. L.

XVIII.—FERMENTATION INDUSTRIES.

Determination of the activity of commercial invertase preparations. R. WEIDENHAGEN (Z. Ver. deut. Zucker-Ind., 1932, 82, 992—999).—Gore's method (B., 1932, 1101) has several disadvantages. The author expresses the activity of invertase preps. in terms of "enzyme units" per g. or per 100 c.c., the unit being that amount of enzyme which will effect 50% inversion in 1 min. under "normal conditions," *i.e.*, acting on 2.375 g. of sucrose in 50 c.c. at p_{H} 4.62 and 30°. In practice, any suitable amount of the enzyme prep. is used and portions of the liquid are withdrawn at intervals and polarised to determine the average unimol. reaction coeff., from which the time in min. for 50% inversion, t_{50} , is calc.; $1/t_{50}$ = the no. of enzyme units in the amount of prep. used. For a solid prep. the no. of enzyme units per g. is termed the "enzyme val.," whilst $t_{50} \times$ no. of g. of prep. used for the inversion is the so-called "time val." of the prep. J. H. L.

Proteins in white wine. III. Artificial removal. J. RIBÉREAU-GAYON (Ann. Falsif., 1932, 25, 602—609; cf. B., 1933, 89).—There is a time-temp. factor for the pptn. of protein (and Cu) from wines by heat. Heating at 75° for 15 min. provided the most satisfactory results, but the flavour of the wine is frequently adversely affected. Charcoals, though possessing high adsorptive powers, affect the bouquet, mellowness, body, and colour considerably. 2.5—10 g. of kaolin (HCl-extracted) combined with 0.1 g. of charcoal was found to be the best adsorbent. T. McL.

Distinction between raisin and natural wines. J. KHOURI (Ann. Falsif., 1932, 25, 583—591).—The usual chemical reactions may indicate the presence of raisin wine, but do not prove it. A strong blue fluorescence in ultra-violet light, supported by the characteristic odour of the first fraction of the distillate, is the most satisfactory evidence. A weak fluorescence is indicative of a mixture of raisin and natural wines. The most sensitive "nitromolybdic" reagent is that of the Pharm. Helv. (cf. Moredod, B., 1930, 212), and the blue colour given by certain wines with this reagent is also given by fructose and raffinose, but not by other carbohydrates. T. McL.

See also A., Feb., 187, Amylase in barley and malt.

PATENTS.

Sterilisation of beer. A. L. MOND. From BERN-DORFER METALLWARENFABR. A. KRUPP A.-G. (B.P. 386,148, 26.2.32).—Beer is sterilised at 70—100°/10—15 atm. and can be carbonated during the process. The beer is passed over bactericidal metallic surfaces and its pressure gradually reduced in issuing from the sterilising apparatus. Beer so treated exhibits a compact and stable "head" when poured out. R. H. H.

Treatment of [fermented] beverages [beer or wine]. G. GEBHARDT (B.P. 386,217, 4.6.32).—The beverages are pasteurised outside the transport container by heat-treatment and then passed, after cooling, through a sterilised filter into the sterilised container. R. H. H.

AcOH etc. [from fermentation of cellulose]. Dihydroxyacetone.—See III.

XIX.—FOODS.

Sugar content of wheat and flour. R. GEOFFROY (Bull. Soc. chim., 1932, [iv], 51, 1491—1492).—Wheaten flour contains the following amounts of fermentable sugars: glucose + fructose (I) 0.12%, sucrose and fructosides (II) 0.5%, and in addition laevosin (III) 0.5%; bran contains 0.1% of (I), 5% of (II), and 1% of (III); the wheat germ has doubtful traces of (I) and (III), and 12% of (II). The fructoside accompanying sucrose in flour is very sol. in EtOH, and is much less readily fermented. More yeast has to be used in bread-baking than is necessary to ferment the sugars present. H. A. P.

Relation between total protein, peptisable protein, and loaf volume as obtained by successive increments of potassium bromate. R. H. HARRIS (Cereal Chem., 1932, 9, 147—156).—Standard baking tests with Canadian hard red spring wheat flours, with malt additions, show the following responses: with 9.4—13.3% of crude proteins, addition of 1 mg. KBrO_3 gave the optimum vol.; with 15.6% there was a full response with 2 mg. and up to 20.2% the highest vol. with 4 mg. KBrO_3 , as a rule. Vol. stimulation was below the max. for 9.4—11.0% flours with 2 mg. KBrO_3 , as it was with 11.7—14.0% flours with 3 mg. Additions of 1% of malt extract, with KBrO_3 gave larger vols. than with KBrO_3 alone. The baking response of these flours to oxidation was found to be roughly proportional to the crude protein content.

Peptisable protein determinations by flour extractions (1 hr.) with distilled H_2O , 0.5*N*- $MgSO_4$, 0.5*N*- $NaCl$, or 0.5*N*- KBr gave average protein solubilities of 21.5, 15.6, 19.7, and 26.9%, respectively. For sound flours and those of low protein content, the last vals. are the highest. The % non-extracted proteins increases as total protein increases, but peptisation vals. present no advantage over total protein as vol. indexes.

H. R. J.

Fermentation in breadmaking. A. DANGOUMAU (Bull. Soc. Chim. biol., 1932, 14, 1552—1554).—This is defined as an alcoholic fermentation of sugar present in the flour, and formed during breadmaking by certain hydrolytic enzymes. Starch is not acted on.

H. G. R.

Detection of phosphatides in complex mixtures. O. FERNÁNDEZ and R. FOLCH (Anal. Fís. Quím., 1932, 30, 849—850).—An aq. extract (of a cereal product) is treated with 1% solutions of $p-C_6H_4(NH_2)_2$ and of $\alpha-C_{10}H_7\cdot OH$, a few drops of H_2O_2 , and amyl alcohol. The formation of indophenol-blue in the amyl alcohol layer indicates the presence of phosphatides. R. K. C.

Extraction of gluten. Determination of dry gluten and of alcohol-soluble substances. D. MAROTTA and A. VERCILLO (Annali Chim. Appl., 1932, 22, 777—782).—To obtain gluten, flour is pasted and the paste treated, after 30 min., with a 0.1% solution of Na phosphate (p_H 6.8) in 2% $NaCl$ solution. When rapidly dried *in vacuo* at 80°, the gluten forms an elastic mass with H_2O . The dry gluten dissolves in 70% EtOH to the extent of 42.6—55.5%.

T. H. P.

Products of hydrolysis of gluten. A. PIERONI [with M. G. FERRARI] (Annali Chim. Appl., 1932, 22, 787—793).—The products obtained by hydrolysing dry gluten with 10% $NaOH$ solution or by its dry distillation *in vac.* give reactions for pyrroles and, in the latter case, for C_5H_5N . Oxidation of gluten with Beckmann's mixture at 50—60° yields succinimide, which is formed similarly from Dennstädt's tripyrrole (cf. Plancher and Cattadori, A., 1904, i, 770).

T. H. P.

Residual nitrogen of milk. O. SMEJKAL (Milch. Forsch., 1932, 14, 251—261).—For the determination of non-protein N Kopatschek's uranyl acetate serum (B., 1931, 1119) is suitable for normal and pathological milks. A mean val. of 0.02423% was found in milk known to be from normal cows, and in herd milks 0.02858%. Higher vals. were obtained in samples from diseased udders. The increase can be traced to the action of proteolytic bacteria.

E. B. H.

Irradiated milk. A. K. ANDERSON and H. O. TRIEBOLD (J. Dairy Sci., 1932, 15, 469—474).—Irradiation has little effect on the composition of milk. Butter from irradiated milk has a shorter induction period for oxidation and very slight differences in fat const. in comparison with that from untreated samples. Slight increases in the rates of peptic and tryptic digestion of milk are induced by irradiation.

A. G. P.

"Oily-rancid" milk. CSISZAR (Milch. Forsch., 1932, 14, 288—341).—Milk with an oily flavour developing into rancidity was found to be contaminated with milk containing an original lipase. Such milk is obtained

for the most part in January and February and was found to be due to the stall-life of the cow rather than to the fodder consumed. Although bacteria with lipolytic characteristics were found, these were not responsible for the deterioration. Heating at 63° for 20 min. of lipolytic milk while still of normal flavour prevented the change. 0.2% NaF or 0.1% H_2O_2 were also effective in this way. Increase in rancidity can be followed by titration and p_H determination. The conductivity is as for normal milk. The P_2O_5 : CaO ratio shows a marked displacement and the acidity of the fat and contents of H_2O -sol. fatty-acids and volatile fatty acids are considerably increased. The flavour develops, but these may accentuate the action of lipases. A method for sorting out lipolytic milks is given.

E. B. H.

Quantitative changes in microflora during manufacture and storage of butter. H. MACY, S. T. COULTER, and W. B. COMBS (Minnesota Agric. Exp. Sta. Tech. Bull., 1932, No. 82, 36 pp.).—During storage the nos. of moulds, yeasts, and bacteria tended to increase in fresh and decrease in salted butters. With increasing $NaCl$ contents the decrease in yeast and bacteria was more marked than that of moulds.

A. G. P.

Effect of prolonged holding at pasteurisation temperature on properties of an ice-cream mix. W. H. MARTIN (J. Dairy Sci., 1932, 15, 481—487).—Ice-cream mixes may be heated at 65.5° for 3.5 hr. without appreciable change in whipping properties or quality.

A. G. P.

Definitions of honey colour grades. E. F. PHILIPS (J. Agric. Res., 1932, 45, 757—770).—Transmission of red, yellow, and blue light (480, 580, 680 $m\mu$) by honey samples is utilised as a basis of grading.

A. G. P.

Determination of diastatic activity of honey. H. A. SCHUETTE and R. J. PAULY (Ind. Eng. Chem. [Anal.], 1933, 5, 53—54).—The quality and age of a sol. starch seriously affect the results. The need for a standard starch is pointed out.

T. McL.

Chemical changes in the fat of frozen and chilled meat. V. Effect of smoking and influence of atmospheric humidity on keeping properties of bacon. C. H. LEA (J.S.C.I., 1933, 52, 57—63 τ).—Oxidation of the fat of green bacon after storage for 3 months at -10° is greatest at the surface and decreases rapidly on passing into the interior. Certain regions in the fat which are not normally exposed until the side is cut across are particularly susceptible to oxidation. Smoking prevented oxidation of the superficial layers of the fat during storage for 28 days at 15° or for 3 months at -10° . In the latter case, however, the fat oxidised to a slight extent in the interior beyond the limit of effective penetration of the smoke. At 15° and 60 or 75% R.H. the fat oxidised, but was not attacked by micro-organisms. At 90 and 100% R.H. taint rapidly developed but in presence of the organisms oxidation was prevented.

Presence of sulphur dioxide in Boulogne sausage. R. BAETSLÉ, H. VAN DEN ABEELE, and C. DE BRUYKER (Ann. Falsif., 1932, 25, 598—601).—The skins of sausages

dried over coke fires may contain 665 and the interior meat 320 p.p.m. of SO_2 . Those not dried over coke fires do not contain SO_2 . The flavour of these sausages is due partly to the action of *B. cretalis*. T. McL.

Extraction and composition of organic phosphorus products from rice husk and oil-seed cakes. D. MAROTTA and A. CALÒ (Annali Chim. Appl., 1932, 22, 763—776).—Extraction with 0.25% HCl, followed by neutralisation with NaOH, gives better results than treating the phytic acid with a Cu salt or with MgO. The P in the products amounts to (%): rice husk or maize cake 20, sesamé or coconut cake, soya, sunflower, or colza flour 18, and arachis cake 14.6. The % of Mg and Ca also varies in the different products. T. H. P.

Effect of feeding sunflower seed on the quality of bacon. C. A. MURRAY (Rhodesia Agric. J., 1932, 29, 699—707).—A pig ration in which 50% of the concentrates consisted of sunflower seed produced, without exception, very soft and oily fat rendering; it is impossible to use the carcasses for bacon manufacture.

NUTR. ABS.

Pampas grass and toetoe. Experience with pampas as winter fodder. B. C. ASTON (New Zealand J. Agric., 1932, 45, 212—214).—Pampas grass grown on good swamp land was readily grazed by cattle, being preferred to hay, and the animals thrive very well on it. It grows rapidly and each clump in 12 months produces about 1 cwt. of fodder. It resembles toetoe in chemical composition and both compare fairly favourably with green maize or green oats in composition.

NUTR. ABS.

Na_2SiO_3 gels.—See VII. **Addition agent for Cd-plating.**—See X. **Cow butter. Glycerides of butter.**—See XII. **Rice soil.**—See XVI. **Disinfectants for foodstuffs.**—See XXIII.

See also A., Feb., 145, **Prep. of sarcosolactic acid.** 173, **Reactions of caffeic and chlorogenic acids. Identification and determination of caffeine.** 182, **Nutrient val. of certain animal protein concentrates.** 195—6, **Vitamins (various).** 198, **Food val. of *Phaseolus vulgaris*. Determination of I in foods.**

PATENTS.

Improving flour for manufacture of foodstuffs. W. J. TENNANT. FROM TRES GYOGYSZER-VEGYEZETI IPARI ES KERESKEDELMI R. T. (TRES CHEMISCH-PHARMAEUT. IND. U. HANDELS A.-G.) (B.P. 385,796, 11.3.32).—The milled products of seeds of *Ceratonia siliqua* or related plants of the *Casalpiniaceae* and *Mimosaceae* groups, or parts of these seeds which contain an edible hemicellulose, are added to wheat, rice, rye, potato flours, etc. in order to supplement the dough-forming properties of the flours and improve their baking qualities. The milled seeds may be added dry, or the hemicellulose may be extracted with H_2O and added to the flour in solution when the dough is made; such addition renders suitable for baking such flours as legume, rice, or potato flour which cannot be used alone for this purpose. E. B. H.

Treatment of milk or cream. B. A. CLEMMEDSON and H. V. ABRAHAMSSON (B.P. 386,259, 29.7.32. Swed.,

28.5.32).—To increase the viscosity and improve the consistency of milk or cream, the material is heated to 40—42° in 20—30 min., cooled to 2—3° in 20—30 min., and held at 2—3° for 1—2 days. E. B. H.

Milk preparations. G. E. LEWIN (B.P. 385,654, 24.7.31).—A solid combination of milk and I is prepared either by mixing dried milk with I at 70° or spraying a mixture of I or compound of I with liquid milk on to dried milk. E. B. H.

Disembittering and improving soya beans or like legumes. E. C. WINKLER and H. GOLLER (B.P. 385,657, 28.7.31).—The glucosides and galactosides, forming the bitter principle of soya beans, are removed by dialysis under pressure or in vac. at 65—80°, the husks of the beans acting as semi-permeable membranes. E. B. H.

Vacuum process for dehydration of substances sensitive to temperature, in particular for manufacture of foodstuffs, feeding-stuffs, and medicines. P. SCHLUMBOHM (B.P. 386,178, 8.4.32. Ger., 11.4.31).—An edible oil of low v.p. (< 1 mm. Hg at 0°) mixed with the material facilitates heat transfer during vac. dehydration. E. B. H.

Spraying of cereals.—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Injection therapy. IV. Preparation and sterilisation of sodium thiosulphate solution for injection purposes. S. A. SCHOU and I. BENNEKOU. **V. Preparation of sterile invert sugar solutions.** S. HANSEN, S. A. SCHOU, and G. TONNESEN (Dansk Tidskr. Farm., 1933, 7, 17—26, 26—32).—IV. $\text{Na}_2\text{S}_2\text{O}_3$ solutions can be sterilised without decomp. only when the p_{H} is > 7.0, a condition conveniently effected by the presence of Sørensen's phosphate buffer (p_{H} 7.4).

V. A sucrose solution (760 g. per litre, containing 0.001N-HCl) is filtered, distributed into ampoules, and heated at 120° for 30 min., thus effecting sterilisation and inversion simultaneously. W. O. K.

A new product: hexamethylenetetramine + acetylsalicylic acid. F. PANINI (Boll. Chim. farm., 1932, 71, 959—960).—A mol. compound (1:1), yellow crystals, m.p. 146—149°, is isolated from aq. solution. R. K. C.

Rotenone content of *Derris* root, cube root, and other plant materials. H. A. JONES (J. Wash. Acad. Sci., 1933, 23, 36—46).—The rotenone content of 45 samples of *Derris* root ranged from nil to 7% (average of 31 samples by CCl_4 method 2.5%) and of 23 samples of cube root from < 1 to 11% (average of 22 samples 5.4%). Fine *Derris* roots have a slightly higher content than coarse roots and there is no relationship between the rotenone content and the total extractive material, but in the case of cube root (all the same species and from the same region) there was close correlation between the two vals. One sample of Brazilian timbo roots contained 5% of rotenone. E. H. S.

Assay of plant material for its rotenone content. Extraction method. H. A. JONES (Ind. Eng. Chem. [Anal.], 1933, 5, 23—26).—The powdered, air-dried sample is extracted with CCl_4 . After evaporation of most of the solvent, rotenone, CCl_4 crystallises out and is

filtered and weighed, allowance being made for the CCl_4 in the crystals. Results indicate the superiority of this method over that using Et_2O . T. McL.

Colour test for rotenone. H. A. JONES and C. M. SMITH (Ind. Eng. Chem. [Anal.], 1933, 5, 75—76).—Rotenone in COMe_2 (0.1%) is treated with an equal vol. of HNO_3 (1:1). After 30 sec. the mixture is diluted with H_2O , neutralised with NaHCO_3 , and made alkaline with aq. NH_3 . A blue colour is produced which is sufficiently stable for rapid determinations. Deguelin, dihydrorotenone, and isorotenone give similar colours, but dehydrorotenone, rotenonone, the pyrethrins, and tephrosin do not. Modifications of the test for use on plant material and spray residues are described. T. McL.

Commercial psyllium seeds. H. W. YOUNGKEN (J. Amer. Pharm. Assoc., 1932, 21, 1265—1273).—Seeds of *Plantago ovata* (Blonde variety) and *P. psyllium* (French or Black) have higher mucilage contents and demulcent properties than those of *P. lanceolata* (German). Reactions of the mucilages are given. E. H. S.

“Etrates,” a new highly-active type of drug. III. Determination of the active constituents. IV. Evaluation of present standards. V. Etratum *Salviae*. C. GRIMME (Pharm. Zentr., 1933, 74, 17—23; cf. B., 1931, 697).—III. Methods for the determination of the active principles of Etrates from bearberry leaves (arbutin; 24-hr. method), rhubarb root (anthraquinone; 1 colorimetric, 4 gravimetric methods), valerian root (baldrianic acid), and cinchona bark (alkaloid by D.A.B. method) are given.

IV. A review of publications on the composition, stability, and clinical efficiency of Etrate preps.

V. The vals. for the aq. extracts of 7 preps. of sage leaves are discussed. E. H. S.

Effect of various conditions of storage on the potency of tincture of *Digitalis*. H. M. EMG (J. Amer. Pharm. Assoc., 1932, 21, 1273—1277).—Raising or lowering the p_H of the menstruum in the prep. of the tincture by the U.S.P. X method produces an inferior product. The rate of deterioration of the tincture is the same at 6° as at room temp. and also if stored in sealed or unsealed containers. Replacement of air in the container by CO_2 has a slight retarding effect on the rate. E. H. S.

Air-conditioning in the drug-manufacturing industry. W. A. HANLEY (Ind. Eng. Chem., 1933, 25, 9—12).—The advantages of air-conditioning in the manufacture of capsules and gland products, the coating of tablets, the drying and labelling of bottles, and the conditioning of animal quarters are discussed. The equipment in use at the laboratories of E. Lilly & Co. is described. D. K. M.

Essential oil from leaves of *Litsæ Zeylanica*, Linn. B. S. RAO (J. Indian Inst. Sci., 1933, 15A, 71—74).—The oil contains α -pinene (3.5%), ocimene (60.0%), bicyclic sesquiterpenes (*dihydrochloride*, m.p. 100—101°; ? α -caryophyllene) yielding cadalene, and terpene (1%) and sesquiterpene (3%) alcohols. A. A. L.

Essential oil from leaves of *Thymus Serpyllum*, Linn. J. SINGH and B. S. RAO (J. Indian Inst. Sci., 1933, 15A, 78—81).—The oil from leaves collected in India

contains phenols (mainly carvacrol) (53%), *p*-cymene (17%), terpenes (γ -terpinene) (8%), sesquiterpenes (zingiberene) (4%), and terpene alcohols (? borneol and α -terpineol). A. A. L.

Essential oil from leaves of *Cinnamomum Zeylanicum*, Breyn. V. P. SHINTRE and B. S. RAO (J. Indian Inst. Sci., 1933, 15A, 84—87).—The oil from the variety examined contained terpenes (*l*- α -pinene and *l*- α -phellandrene) (4%), sesquiterpenes (α -caryophyllene) (62%), terpene (γ -terpineol) (3%) and sesquiterpene (7%) alcohols, and eugenol (15%). A. A. L.

Essential oil from flower-heads and stalks of *Andropogon Kuntzeanus*, Hack, var. *Foveolata*, Hack. B. S. RAO (J. Indian Inst. Sci., 1933, 15A, 75—77).—The oil contains α -pinene, *l*-camphene (10%), (? an isomeride of *l*-camphene, borneol, and dicyclic tert. sesquiterpene alcohols (40%) yielding cadalene. A. A. L.

Some essential oils from Samoa. J. R. HOSKING (Perf. Ess. Oil Rec., 1933, 24, 2).—The oils were obtained by steam-distillation of the fresh leaves. *Citrus Limetta* (Kramer): 0.34% oil, d_{20}^{20} 0.8714, n_D^{20} 1.4833, α_D +39.62°, acid val. 1.3, ester val. 13.8. *Citrus Medica*: 0.24% oil, d_{20}^{20} 0.8559, n_D^{20} 1.4770, α_D +52.08°, acid val. 1.4, ester val. 10.1, aldehydes 40%. *Citrus Aurantium*: 0.39% oil, d_{20}^{20} 0.8594, n_D^{20} 1.4725, α_D +37.88°, acid val. 0.5, ester val. 5.7. *Citrus Hystrix*: 0.14% oil, d_{20}^{20} 0.8559, n_D^{20} 1.4727, α_D +35.08°, acid val. 1.6, ester val. 11.4. *Cinnamomum elegans*: 0.73% oil, d_{20}^{20} 1.034, n_D^{20} 1.5423, α_D +1.05°, acid val. 17.1, ester val. 2.5, eugenol 78%, aldehydes trace. *Ocimum Basilicum*: 0.2% oil, d_{20}^{20} 1.000, n_D^{20} 1.5240, α_D +1.01°, acid val. 10.2, ester val. nil, phenols 61%. *Andropogon aciculatus*: 0.41% oil, d_{20}^{20} 0.888, n_D^{20} 1.4879, α_D +0.24°, aldehydes 80%, acid val. 2.6, ester val. 12.3. *Cananga odorata*: oil from flowers, first 4-hr. distillate: d_{20}^{20} 0.9441, n_D^{20} 1.4929, α_D +8.26°, acid val. 1.8, ester val. 96.1, ester val. after acetylation 179.8; second 4-hr. distillate: d_{20}^{20} 0.9499, n_D^{20} 1.5002°, α_D +5.50°, ester val. 96.3, ester val. after acetylation 226.1. EtOH-solubilities of the oils are given. E. H. S.

Dielectric properties of essential oils in relation to their constitution and composition. T. G. KOVALEV and V. V. ILLARIONOV (J. pr. chem., 1932, [ii], 135, 305—327; cf. B., 1933, 236).—The measurement of the dielectric consts. of essential oils is recommended as a means of diagnosis of the constituents, on account of the greater numerical variations obtainable as compared with other physical consts. Examples are given showing the effect of sunlight and air, and of sunlight, air, and dampness, on the dielectric consts. and other properties of the following oils: Russian aniseed, balm mint, Russian peppermint, lavender, Italian citronella, Russian turpentine (purified and unpurified), Italian bergamot, cassia, clove, East Indian sandalwood, and eucalyptus. A. A. L.

Skin creams.—See II. Analysis of metol.—See III. Ampoule glass.—See VIII. Tobacco flea beetle.—See XVI.

See also A., Feb., 130, Arylarsenoxides as trypanocides. 144, Prep. of Lumière's compound. 156, Synthesis of substances related to ephedrine.

166, Optically active 5:5-disubstituted hydantoins. 168, Actinodaphnine. 169, Homoneurines of the *Cinchona* alkaloids. Lupin alkaloids. 170, *Strychnos* alkaloids. 171, Alkaloid from potato sprouts. 173, Identification of alkaloids. 176, Active substance from the lung. 180, New Cu-Fe-protein prep. 191, Pure diphtheria toxin. Antiseptic properties of thymol. 193, Determination of thyroxine. 194, Cryst. hormone from urine of pregnancy. Progestin. 195—6, Vitamins (various).

PATENTS.

Production of opium preparation. A.-G. VORM. B. SIEGFRIED (B.P. 386,038, 10.9.31. Switz., 28.10.30).—Morphine and narcotine are first pptd. from an EtOH solution of opium by aq. NH_3 , separated, and transformed into the hydrochlorides. The alkaloids in the mother-liquor are also converted into the hydrochlorides either by addition of HCl to the liquor itself followed by purification by treatment with $\text{Fe}(\text{OH})_3$, or after removal of the alkaloids by extraction with CHCl_3 . The two HCl solutions of the hydrochlorides are mixed and purified, e.g., with the aid of PhOH, the purifying agent is removed, and the solution is evaporated. E. H. S.

Manufacture of reaction product of salicylic acid and hexamethylenetetramine. L. PINK, Assr. to H. MEFFERT (U.S.P. 1,825,636, 29.9.31. Appl., 8.3.29. Ger., 29.12.26).—The ingredients are mixed in EtOH at 70—75° to give a viscous product used as an embrocation against rheumatism. C. H.

Production of sebamic acid dinitrile. P. WILCKE, Assr. to SCHERING-KAHLBAUM A.-G. (U.S.P. 1,828,267, 20.10.31. Appl., 11.10.28. Ger., 14.10.27).—Sebamic diamide is treated with POCl_3 in C_6H_6 . C. H.

Production of β -methylamino- α -m-aminophenyl-*n*-propyl alcohol. M. OBERLIN (U.S.P. 1,829,452, 27.10.31. Appl., 26.4.30. Ger., 14.5.29).— β -Methylaminopropiophenone is nitrated below 10° to give the *m*- NO_2 -derivative (nitrate, m.p. 160—161°), which is reduced with H_2 and Pt to β -methylamino- α -*m*-aminophenyl-*n*-propyl alcohol, m.p. 107—108.5° [B.HCl, m.p. 214—215° (decomp.); B. 2HCl , m.p. 239—240° (decomp.)]. C. H.

[Manufacture of] quinoline-benzoic-carboxylic [2-*o*-carboxyphenylquinoline-4-carboxylic] acid. W. L. VOGEL, Assr. to P. W. PRUTZMANN (U.S.P. 1,810,261, 16.6.31. Appl., 22.5.28).—Atophan, heated with Na salicylate in MeOH or EtOH at 60°, is said to give 2-*o*-carboxyphenylquinoline-4-carboxylic acid. C. H.

[Manufacture of] iodine addition products of quinoline carboxylic acids and derivatives thereof. J. EBERT, Assr. to FARASTAN Co. (U.S.P. 1,828,525, 20.10.31. Appl., 30.12.29).—Cinchonic acids and esters form additive products with I (e.g., the I or I₂ compounds). Products from 2-phenyleinchoninic acid, its 6-Me, 6-MeO, 6-EtO derivatives and Me and Et esters of these, from 2-*o*-hydroxyphenylcinchoninic acid and its 6-Me derivative, and from 2-styrylcinchoninic acid, are described. C. H.

[Manufacture of] ethyl-*n*-amylbarbituric acid and its intermediates. H. A. SHONLE, Assr. to E. LILLY &

Co. (U.S.P. 1,813,867, 7.7.31. Appl., 20.7.28).—Et ethyl-*n*-amylmalonate is condensed with $\text{CO}(\text{NH}_2)_2$ to give a barbituric acid, m.p. 135—136°. C. H.

Manufacture of an azo compound from 2-amino-6-benzenediazoaminopyridine. I. OSTROMISLENSKY, Assr. to PYRIDIUM CORP. (U.S.P. 1,820,483, 25.8.31. Appl., 9.6.28).—Diazobenzene is coupled with 2:6-diaminopyridine and the hydrochloride of the resulting diazoamino-compound is boiled with H_2O to give 2:6-diamino-3(or 4)-benzenediazopyridine. C. H.

Manufacture of stable salts of dialkylamino-arylphosphinous acids. I. G. FARBENIND, A.-G. (B.P. 386,575, 23.7.32. Ger., 24.7.31).—The Na salts are heated in vac. at 70—120° for from 2 hr. to 4 days. Examples are Na 5-dimethylaminotoluene-*o*-phosphinate and 4-dimethylaminobenzenephosphinate. C. H.

Manufacture of salts of aminoacridine compounds. I. G. FARBENIND, A.-G. (B.P. 382,889, 4.5.32. Ger., 4.5.31).—The salts of amino-acridines or -acridiniums with the sulphonic acids of B.P. 366,916, 367,585, or 372,005 (B., 1932, 540, 592, 793) are sol. in essential oils; 25% solutions, e.g., in santal oil, suitable for capsules, can be prepared. Examples are salts of 3:7-diamino-10-methylacridinium and 3:7-diamino- and 7:10-diamino-2-ethoxy-acridines with lauryloxy- or stearyl-oxyethanesulphonic acid. C. H.

Manufacture of complex metal [organic] compounds. A. CARPMAEL, From I. G. FARBENIND, A.-G. (B.P. 385,973, 26.6.31).—A compound of a metal of at. no. > 26, other than alkali and alkaline-earth metals, is combined with a monocarboxylic sugar acid or its lactone and enough Ca or Sr base to form the sol. Ca or Sr salt of the complex compound. Examples are: gluconic acid with $\text{Ca}(\text{OH})_2$ and As_2O_3 ; Ca gluconate with La carbonate and HCl, neutralised with CaCO_3 ; Ca gluconate with SbCl_3 and $\text{Ca}(\text{OH})_2$; gluconolactone with $\text{Pb}(\text{OAc})_2$ or SnCl_2 and $\text{Ca}(\text{OH})_2$. Other suitable acids are arabonic, galactonic, gluco- and manno-heptonic, and β -methylpentanetetrollic acid. C. H.

Manufacture of heavy-metal compounds of thio-substituted carbohydrates. SCHERING-KAHLBAUM A.-G. (B.P. 386,562, 11.7.32. Ger., 3.8.31. Addn. to B.P. 293,363; B., 1928, 692).—Alkali or alkaline-earth metal compounds of thioglucose etc. are treated with heavy-metal salts, e.g., KAuBr_4 , SbCl_3 , BiCl_3 , AgNO_3 . C. H.

[Manufacture of] alkali salts of mercuri-bromofluorescein. W. L. VOGEL, Assr. to P. W. PRUTZMANN (U.S.P. 1,789,204, 13.1.31. Appl., 24.9.29).—Fluorescein is treated with Br in AcOH, and the Br-compound, m.p. 110°, is mercerated with $\text{Hg}(\text{OAc})_2$. C. H.

[Manufacture of] arsine oxides of phenylazo- α -[benzeneazo-2:6]-diaminopyridine. E. T. TISZA and B. JOOS, Assrs. to PYRIDIUM CORP. (U.S.P. 1,827,680, 13.10.31. Appl., 7.5.29).—A bactericide and trypanocide is obtained by diazotising *p*-aminophenylarsine oxide and coupling with 2:6-diaminopyridine; the hydrochloride has m.p. 225—235° (decomp.). C. H.

[Manufacture of] *p*-aminoamide derivative of arsonic acid [β -phenylaminopropionamidearsinic

acids]. C. S. HAMILTON, Assr. to PARKE, DAVIS & Co. (U.S.P. 1,839,848, 5.1.32. Appl., 19.3.28).—An amino-benzenearsinic acid, *e.g.*, arsanilic or 2-amino-*p*-toluene-arsinic acid, is condensed with β -bromo- or -iodo-propionamide. C. H.

Manufacture of bismuth salts of arseno-compounds. I. G. FARBENIND, A.-G. (B.P. 386,537, 13.6.32. Ger., 11.6.31).—Arseno-compounds containing $\leftarrow 1 \cdot O \cdot CH_2 \cdot CO_2H$ group are treated with a Bi salt. Examples are arseno-compounds produced by reduction of the following arsinic acids: 4-acetamido-2-carboxymethoxy- and 3-acetamido-4-hydroxy-benzenearsinic acids; 4-acetamido-1-(*p*-arsinophenyl)-2:3-dimethylpyrazolenone and 2-carboxymethoxy-1-methylbenzimidazole-5-arsinic acid; 3-hydroxybenzaldehydesemicarbazone-4-arsinic and 3-acetamido-4-carboxymethoxy-benzenearsinic acid, etc. C. H.

Acetylsalicylic acid solution. Alkylquinolylbenzoic acids.—See III. **Vac. dehydration of medicines.**—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Variation of photographic sensitivity with development time. R. DAVIS and G. K. NEELAND (J. Soc. Motion Pict. Eng., 1932, 18, 742—751).—No one val. satisfactorily expresses the speed of an emulsion; sensitivity-development curves are necessary.

CH. ABS.

Mechanism of hypersensitisation. B. H. CARROLL and D. HUBBARD (J. Soc. Motion Pict. Eng., 1932, 18, 600—608).—The excess of Ag left after hypersensitisation with NH_3 is equiv. to the Br' extracted in excess of the free Br' originally present. The behaviour of dye-sensitised emulsions is the same whether they are treated with NH_3 or whether sol. Ag salt is added.

CH. ABS.

New method for reducing hard negatives. W. J. HICKMAN (Brit. J. Phot., 1932, 80, 59).—Negatives that are over-developed with extremes of contrast can be satisfactorily reduced by bleaching out with KBr and $K_3Fe(CN)_6$, washing in running H_2O for 3—5 min. (which clears the bleacher from the shadow portions of the image only), and redeveloping in a metol-quinol developer. The negative is rinsed and then treated in 5% $Na_2S_2O_3$ for a very short time, till the heavy Ag deposits are sufficiently reduced. J. L.

Analysis of metol.—See III.

See also A., Feb., 125, **Solubility of Ag_2CrO_4 in gelatin solution.** 132, **Latent image formation.** 137, **Determination of mixed Ag salts, Cl', and S_2O_3 '.**

PATENTS.

Film waste.—See V. **Photo-electric cells.**—See XI.

XXII.—EXPLOSIVES; MATCHES.

Non-corrosive priming. P. WOLF (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 397—399).—The replacement in cap compositions of the $KClO_3$ by other O-carrying salts does not entirely prevent corrosion in the barrel, since this may be caused as well by the fused residues

from the priming composition. By the use of suitable compositions and careful incorporation of the ingredients, these residues may be confined to the cap or cartridge case and prevented from reaching the barrel.

W. J. W.

Preparation and properties of incendiary, illuminating, and detonating compositions for displays and signals, and their employment in fireworks' manufacture. F. LENZE [with SELLEN and KOENEN] (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 325—328, 366—371, 406—409; 1933, 28, 14—17).—The compositions of various mixtures are given. Results are tabulated for (1) inflammability, as determined with the flame pendulum, the spit from safety fuse, and sparks from Ce-Fe; (2) ignition temp., determined by heating in a bath of Wood's metal; (3) sensitiveness to shock and friction; (4) velocity of detonation; (5) brisance ("stauchprobe"); and (6) explosive effect in closed gas-pipes, when initiated by gunpowder, and in the Pb block. W. J. W.

Stability test for smokeless powder, based on a determination of the volumes at constant pressure and temperature of the gases evolved on decomposition. (FHR.) I. VON MEERSCHIEDT-HÜLLESSEM (Z. ges. Schiess- u. Sprengstoffw., 1933, 28, 6—8).—The apparatus consists of a funnel-necked vessel containing liquid paraffin, in which is inserted an open test-tube, the whole being placed in a thermostat filled with aq. glycerin and provided with a reflux condenser. A bent tube, open at both ends, passes from the bottom of the vessel containing the paraffin, through the thermostat door, to the exterior. The thermostat is heated to 120° , a weighed amount of powder is introduced into the test-tube, a thermometer is inserted, and the vessel is closed with a cork and sealed with paraffin. The paraffin displaced through the bent tube by the evolved gases is collected and weighed at intervals of $\frac{1}{4}$ — $\frac{1}{2}$ hr., the corresponding vols. of the gases being obtained by calculation. W. J. W.

Variation of the exchange coefficient [of nitrocellulose] with temperature. CHENEL (Mém. Poudres, 1932—33, 25, 97—99).—The rate of liberation of acid from nitrocellulose varies exponentially with temp. between 40° and 130° . H. F. G.

Manufacture of nitroglycerin. A. FOULON (Z. ges. Schiess- u. Sprengstoffw., 1933, 28, 8—11).—Various patents relating to the manufacture of nitroglycerin are reviewed. W. J. W.

New explosives. A. FOULON (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 399—401).—Patent literature on the manufacture of nitroglycerin substitutes and nitrocelluloses is reviewed. W. J. W.

Temperature of explosion of nitroguanidine. H. MURAOUR and G. AUNIS (Mém. Poudres, 1932—3, 25, 91—96).—The max. temp. resulting from the explosion of nitroguanidine is 2098° ; the co-vol. is 1.077. The lower temp. reported by earlier observers is attributed to the use of too high compression. H. F. G.

Theory of the pressure impulse in gases and the detonation wave. A. SCHMIDT (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 184—188, 225—228, 264—267,

299—302).—Following a comparison of shock and sound waves in air, the theory of detonation in explosive gases and gas mixtures is discussed, data being given for H_2-O_2 mixtures. The application of the theory to the detonation of solid and liquid explosives is considered, with a discussion of effects produced at a distance by such detonation. W. J. W.

Explosibility of systems of base metals and halogen compounds. F. LENZE and L. METZ (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 255—258, 293—296, 337—340, 373—376; cf. B., 1933, 33).—Mixtures of K and (a) $C_2H_2Cl_4$ or C_2HCl_5 are liable to explode spontaneously; (b) $C_2H_4Cl_2$, $C_2H_3Cl_3$, $C_2H_2Cl_2$, C_2HCl_3 , or C_2Cl_4 react with evolution of gas; and (c) CCl_4 , $EtBr$, $PhCl$, or CH_2PhCl do not react. Heat may accelerate the reactions and cause explosion. The sensitiveness under the fall-hammer of mixtures of halogeno hydrocarbons and alkali or alkaline-earth metals is tabulated; it increases with increasing halogen content. K and Ba give the most sensitive mixtures. Pb-block results of various mixtures are given. Staudinger's hypothesis of the intermediate formation of a labile mol. compound is not confirmed. Decomp. takes place in various stages, probably as chain reactions. It is probable that C_2Cl_2 or C_2HCl is formed, which initiates explosion of the remainder of the mixture. W. J. W.

Rise of temperature in tubes [for testing explosives] at 110°. J. DESMAROUX (Mém. Poudres, 1932—33, 25, 100—103).—Since the rate of decomp. of an explosive is dependent on the temp., the no. of times the specimen is heated should be taken into account in addition to the total duration of heating. Experiment shows that sufficiently accurate results are obtained if from the no. of hr. of heating is subtracted one half the no. of times of heating. H. F. G.

See also A., Feb., 153, **Dinitrodiphenyldiethyl-carbamide**.

PATENT

Preparation of [explosive] diazonium perchlorates of aminodiphenyl [detonators]. T. L. DAVIS and E. H. HUNTRESS, Assis. to SWANN RESEARCH, INC. (U.S.P. 1,828,960, 27.10.31. Appl., 27.1.30).—2:2'-Dinitrobenzidine is tetrazotised and NH_4ClO_4 is added. The dried perchlorate explodes violently when touched. C. H.

XXIII.—SANITATION; WATER PURIFICATION.

Air-conditioning for railway passenger cars. H. K. WILLIAMS (Ind. Eng. Chem., 1933, 25, 13—18).—In systems using compressors the fluid used is CCl_2F_2 and the power is obtained from a d.-c. generator which operates when the train speed exceeds about 20 m.p.h. In the ejector system, H_2O cooled to 4.4° by boiling under vac. passes through a cooler over which a mixture of air (drawn from the carriages) and fresh air passes, and the H_2O is then re-cooled. The vac. is maintained by a steam ejector and the steam is condensed in a condenser which is cooled by the evaporation of H_2O sprayed on to the pipes. The ejector system is more economical than the compressor system. Air is also conditioned by the use of ice. D. K. M.

Influence of respiration and transpiration on ionic content of air of occupied rooms. C. P. YAGLOU, L. C. BENJAMIN, and A. BRANDT (J. Ind. Hygiene, 1933, 15, 8—17).—The no. of positive and negative ions is not less in unoccupied rooms than in open air, but the no. of the smaller ions (mobility about 1.5—0.2 cm./sec./volt/cm.) rapidly falls when several persons are present in the room even although there is no overcrowding and much ventilation. Adsorption on clothing is chiefly responsible, and, to a less extent, respiration, expired air containing no ions. Humidification by means of H_2O sprays deprives the air of all small ions. W. O. K.

Regeneration of the breathing air in gas-protection apparatus by means of alkali peroxides. A. HLOCH (Angew. Chem., 1933, 46, 45—47).—Passage of the breath over Na_2O_2 alone does not regenerate 100% of the O_2 consumed by the lungs, only 1.7 mols. ($CO_2 + H_2O$) being available in the breath instead of the necessary 2 mols. Complete regeneration is effected by passing the breath over K_2O_4 or $NaKO_3$.

A. R. P.

Hypochlorites as disinfectants (disinfectants and foodstuffs). H. RAWLINSON (Chem. and Ind., 1933, 71—74).—The history, manufacture, properties, and application of hypochlorites are outlined, and their use in the sterilisation of H_2O , of milk and food utensils, and for the disinfection of fish, vegetables, and foodstuffs is also reviewed. E. H. S.

Dewatering of sludge by vacuum filtration. C. E. KEEFER and E. C. CROMWELL (Sewage Works' J., 1932, 4, 929—959).—Experiments made at Baltimore indicate that fully-digested sludge, conditioned by $FeCl_3$ (5—8%, dry) or chlorinated $FeSO_4$ (11%, dry), can be dewatered (75% H_2O) on a vac. filter at a cost of \$4.2—5.0 per ton of dry solids. The procedure adopted in operating Genter and Oliver filters is described, both filters giving similar results when using a stainless-steel cloth (70-mesh). Semi-digested sludge can also be dealt with but at a lower rate, whilst it was found impracticable to deal with raw sludge when using the above coagulants. No advantage was to be gained by preheating the sludge or coagulant, and seasonal differences were noticed in the amenability of the digested sludge to the treatment. C. J.

Anaërobic stabilisation of sewage screenings. C. S. BORUFF and A. M. BUSWELL (Sewage Works' J., 1932, 4, 973—981).—The screenings are fed into a wire-mesh-covered cylinder which is free to revolve on a horizontal axis in a gastight chamber. The material digests under anaërobic conditions; the gas produced passes through the mesh and is collected, while the sludge passes slowly through the drum into another small compartment where it rises to the surface and is removed as a harmless scum. C. J.

Digestion of bar screenings [from sewage]. A. M. RAWN (Sewage Works' J., 1932, 4, 982—985).—The putrefactive matter present in the coarse material collected on bar screens can be destroyed by treatment for about 60 days with an equal vol. of digested sludge. C. J.

Conditions favouring "bulking" of activated sludge. J. SMIT (Sewage Works' J., 1932, 4, 960—972).—Laboratory experiments indicate that although "bulking" has proved to be materially influenced by carbohydrates, these, in the proportion found in ordinary sewage, are not the prime cause. Glucose, sucrose, and lactose were found to be very deleterious and starch less so, and whilst 0.1% of sugar can be broken down by continuous-flow treatment for a short period, the sludge is spoiled by severe "bulking." When 0.05% of sugar is present the sludge deteriorates but does not "bulk," and quickly recovers when sugar-free sewage is admitted. C. J.

Conditions affecting the value of thermophilic seed sludge. H. HEUKELEKIAN (Sewage Works' J., 1932, 4, 986—992).—The val. of seeding sludge depends on its stage of digestion, thermophilic sludge being most efficient when 90—95% of the gas has been evolved. It may be stored for 3 months at 20—50° without deterioration. Low-temp. sludge is improved for use as thermophilic seed by storage at 50°. C. J.

Thermophilic digestion of municipal garbage and sewage sludge. C. G. HYDE (Sewage Works' J., 1932, 4, 993—1001).—The thermophilic digestion of sewage sludge is compared with the Beccari process for the destruction of garbage, in which the material is allowed to ferment in a closed cell for 30—40 days. The temp. rises to 55—70° and the final product is inodorous and harmless humus. C. J.

Nitrogen fixation in activated sludge. P. J. BEARD and L. MUNSON (Sewage Works' J., 1932, 4, 1002—1005).—No evidence of fixation of atm. N_2 was obtained from experimental plant studies on activated sludges built up from skim-milk powder or from domestic sewage seeded with *Crenothrix*. There was also little evidence of denitrification with resultant loss of gaseous N_2 . C. J.

Rôle of sodium aluminate in accelerating separation of solid phases during water-softening operations. L. M. CLARK and L. S. PRICE (J.S.C.I., 1933, 52, 35—44 T).—The separation of solid phases from solutions of Ca and Mg salts of the conens. dealt with in water-softening practice is discussed. $CaCO_3$ and $Mg(OH)_2$ ppts. formed in water-softening operations are positively charged relatively to the medium. Differences between the ease of softening waters containing Ca or Mg salts are ascribed to the hydration of $Mg(OH)_2$ as compared with the anhyd. nature of $CaCO_3$. Na aluminate in dil. solution consists of $Al(OH)_3$ partly in colloidal dispersion and partly in NaOH solution as Na aluminate. Colloidal $Al(OH)_3$ dispersed in such a medium is negatively charged relative to the medium. Na aluminate is shown to affect the rate of removal of $Mg(OH)_2$ only, and plays no part in accelerating the pptn. of $CaCO_3$. The effect of Na aluminate is ascribed to coagulation of colloidal $Mg(OH)_2$, and not to the formation of an insol. Mg aluminate. The solubilities and optical properties of Ca and Mg aluminates have been measured. For small-scale softening experiments of the type described, optimum results in accelerating the separation of $Mg(OH)_2$ are obtained by gently

agitating the complex with Na aluminate after the addition of the primary softening agents, Na_2CO_3 and $Ca(OH)_2$.

Importance of ammonia in the chlorine consumption of waters. I. M. L. KOSCHKIN (Z. Hyg., 1932, 114, 413—424).—Addition of NH_3 ($\frac{1}{2}$ equiv. of Cl_2 used) reduced the Cl_2 consumption of H_2O . Larger proportions caused relatively small reductions in Cl_2 required. NaOH was not similarly effective. The action of NH_3 is much more marked on org. matter of vegetable than that of animal origin. The observation is discussed in relation to the purification of H_2O supplies. A. G. P.

Behaviour of activated carbon with metallic water-purification equipment. A. S. BEHRMAN and H. GUSTAFSON (Ind. Eng. Chem., 1933, 25, 59—60).—Under the conditions appertaining to water purification, a relatively high potential difference is set up between certain types of activated C and the metal container. Comparative data are given showing the results obtained with various types of C and a no. of metals. In order to prevent corrosion a non-conducting lining is now inserted between the C and the metal. A relationship is suggested between the magnitude of the p.d. set up and the activity of the C in some types of adsorption phenomena. C. J.

Determination of total dissolved solids in water analysis. C. S. HOWARD (Ind. Eng. Chem. [Anal.], 1933, 5, 4—6).—The wt. of residue after evaporating and drying at 180° is approx. equal to the sum of the determined constituents. Carbonated waters containing Mg^{++} may give low residues that weigh < the sum, whilst residues from H_2O containing SO_4^{--} may give high results on account of incomplete drying. If the Cl^- content is > equiv. to the alkali present, 50—100 p.p.m. of chloride may be lost on heating, whilst residues containing much NO_3^- may lose up to 30 p.p.m. of nitrate on heating. E. S. H.

Use of Kohlrausch sugar flasks in determinations of biochemical oxygen demand. I. C. HALL (Ind. Eng. Chem. [Anal.], 1933, 5, 76).—Such flasks are preferred to stoppered bottles for the absorption tests. An improved flask having a short neck is suggested. T. McL.

Fly sprays.—See XVI. **Air-conditioning in drug factories.**—See XX.

PATENT.

Disposal of sewage. R. H. and H. H. PARSONS (B.P. 386,242, 12.7.32).—Sewage is passed into an airtight chamber which is transversely divided into two receptacles in one of which a bed of filtering medium rests on a perforated platform; the other, of somewhat greater depth, acts as a settlement tank. The solid matter collected on the filter gradually undergoes anaerobic decomp. and is washed from the filter by successive flushes of sewage. The liquor issuing from this tank passes into a larger receptacle and thence percolates into the surrounding soil. An arrangement is also shown whereby the final liquor may be led back and re-introduced into the plant at the surface of the filter. C. J.