

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

APRIL 28 and MAY 5, 1933.*



I.—GENERAL; PLANT; MACHINERY.

Thermal insulation with aluminium foil. R. B. MASON (Ind. Eng. Chem., 1933, 25, 245—255).—Al foil for insulation purposes is either supported by a framework forming a series of air cells or crumpled and then partly stretched so that the wrinkles separate the sheets. Conductivity tests show that with the former method, using 0.6-cm. spacings, the val. approximates to that of air. With spacings > 1.2 cm. convection begins to be of importance. The low emissivity of bright Al foil causes conductivity to be lower than with other similar structures. Crumpled-foil insulation is convenient for covering irregular or curved surfaces. The relation of the shape of air cells to convection is discussed. For the most efficient insulation the spacing material should be a min., but for rigidity corrugated paper separators at lower temp. and asbestos at higher temp. are desirable. Crumpled foil is slightly less efficient. In general, the insulating efficiency is fully equal to that of cork board. C. I.

Measurement of absorption and retention of vapours by solids. B. MOORE (J.S.C.I., 1933, 52, 76—78 T).—An apparatus, which may be made in glass or vitreosil, is described for measuring in a simple, accurate manner the absorption and retention of gases and vapours by solids at various temp. and at pressures $> atm.$, and for exposing solids to gases and vapours under various conditions (and measuring simultaneously the absorption) for studying the effect of the treatment on the properties of the solids. Practical examples of the use of the apparatus are given.

Materials of chemical plant construction. IV. **Iron and steel.** A. H. LOVELESS (Ind. Chem., 1932, 8, 387—390, 442—444; 1933, 9, 26—29).

Tehar viscosimeter.—See II. **Pulp-fractionating screens.**—See V. **Drying of solids.**—See VIII. **Non-rusting etc. alloy cast Fe.**—See X.

PATENTS.

Apparatus for melting, atomising, and spraying fusible substances. R. H. SCHROEDER, Assee. of K. E. MÜLLER (B.P. 385,857, 6.6.32. Switz., 3.6.31).—The substance is fed mechanically through an electrically heated cartridge, whereby it is fused immediately before being atomised or sprayed.

Drying apparatus. AKTIEB. SVENSKA FLÅKTFABR. (B.P. 387,852, 9.3.32. Swed., 11.3.31).—A chamber for the drying of a continuous strip of material is divided into sections by horizontal partitions, and a no. of fans produce circulation partly con- and partly counter-current to the travel of the material. B. M. V.

Crushing or fracturing machinery. T. A. LONG and W. W. PORTS (B.P. 387,508, 5.2.32).—The apparatus comprises a pair of discs rotating at an angle to each other on shafts that are remote from each other. Preferably only one shaft is rotated by power, and the other by the friction of the material, the latter being, if desired, provided with a brake and able to yield in an axial direction against the pressure of a spring. Projecting pins may be provided on the face of each disc. B. M. V.

Apparatus for granulating friable substances. J. G. JACKSON & CROCKATT, LTD., and J. G. JACKSON (B.P. 385,719, 1.12.31).—A vertical casing is subdivided by transverse grids into compartments, in each of which a blade-like (*e.g.*, helical) device is caused to rotate.

Grinding mills. VICKERS-ARMSTRONGS, LTD., and L. D. PARKER (B.P. 387,407 and 387,411—2, [A] 27.8.31, [B, C] 4.9.31).—Multi-stage ball or pebble mills with air transport of the fine material are described. In (A) the partly ground material from a first grinding chamber (*A*) is cascaded in a first auxiliary chamber (*B*) and the floating material conveyed in an axial pipe through the second grinding chamber (*C*) to a second auxiliary chamber (*D*) in which it is whirled tangentially and classified, only the really fine material being conveyed out of the mill in the air stream. All the oversizes unite in a third grinding chamber (*E*) and neither this nor (*C*) is subjected to air currents, so that the reground oversizes contain a considerable amount of flour when discharged without further classification. In (B) a chamber (*A*) is followed by an air-sifting chamber (*D*) and a non-air-swept second grinding chamber (*E*), from which the reground material is returned by a helical passage to some point in (*A*). In (C) an air classifier (*D*) is described in a more detailed manner. B. M. V.

Removal of solids from liquids. WHESSOE FOUNDRY & ENG. CO., LTD., and A. G. GRANT (B.P. 387,434, 2.11.31).—The solid matter is removed from the liquid in which it is suspended by means of another liquid in which it is readily sol. *E.g.*, $C_{10}H_8$ may be removed from brine solution (used in the dehydration of fuel gas) by means of oil, the lighter liquid being passed upwards through the heavier in an apparatus similar to a rectification tower, having quiescent zones (*a*) below the entry, for oil, in which pure brine settles out, and (*b*) above the entry, for the original suspension, in which the oily solution separates, and intermediately a no. of bubbling trays. B. M. V.

Distillation apparatus and the like. F. E. LICHTENTHAELER (U.S.P. 1,857,816, 10.5.32. Appl., 21.9.27).—A bubbling tower is described having alternate

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

inward and outward radial flow of the liquid over slotted decks. B. M. V.

[Still for] distilling or concentrating liquids. SOUTH METROPOLITAN GAS CO., H. STANIER, J. E. DAVIS, and F. RUMFORD (B.P. 387,459, 1.12.31).—In the distillation of liquids sensitive to overheating, the liquid is mixed with a gas in such quantity that the velocity of the mixture in the heating conduit is $\frac{1}{2}$ the crit. velocity (preferably at least 3 times that velocity), so that the flow is extremely turbulent. Coal gas may be the diluent for tar. B. M. V.

Evaporators for distilling or concentrating apparatus. W. C. MASON and W. W. HUTCHESON (B.P. 387,598, 26.7.32).—An inclined calandria is oval in cross-section with the major axis horizontal in order to reduce both the lock-up of liquid and the head the rising bubbles have to overcome. The large return tubes at the bottom are protected by a baffle from the heat of the condensed steam. B. M. V.

Apparatus for evaporating solutions and particularly for obtaining salt. ESCHER WYSS MASCHINENFABR. A.-G. (B.P. 387,631, 4.10.32, Switz., 12.11.31).—A vertical evaporator is operated with forced downward flow through the heated tubes, the upflow being in an annular passage surrounding the tube bundle. The bundle is supported mainly by the conduits for inlet of steam and outlet of H_2O and air; the separating chamber above, which contains the circulating propellor, is easily detachable. B. M. V.

Aëration of liquids or dispersion of gases or vapours therein. DISTILLERS CO., LTD., and J. LOCKEY (B.P. 387,486, 7.1.32).—The gas is emitted under the liquid through a device for forming fine bubbles, comprising a wire spirally wound on a perforated (and, if desired, screw-threaded) pipe. B. M. V.

Sterilising liquids such as beer etc. A. L. MOND. From BERNDORFER METALLWARENFABR. A. KRUPP A.-G. (B.P. 385,787, 26.2.32).—In apparatus for sterilising liquids by heating under pressure, the latter is gradually and controllably released by passing the liquid through an outlet of progressively increasing cross-sectional area, the surface area being large in relation to the max. cross-sectional area.

Stirring vessels. SOC. CHEM. IND. IN BASLE (B.P. 387,984, 14.11.32, Switz., 21.12.31).—Planetary gearing for a multi-bladed stirrer is contained in a casing which, being combined with the ring gear, rotates and forms the lid of the vessel. B. M. V.

Machines for washing gases. A. H. BURTON (B.P. 387,517, 26.2.32).—A rotary scrubber is filled with spirals of wood made either by steaming, bending, and baking, or by turning. Horsehair and other materials may also be incorporated. B. M. V.

Apparatus for washing gas. H. A. BRASSERT & CO., LTD. From C. E. DOUGAN (B.P. 387,333, 31.7.31, Addn. to B.P. 335,648; B., 1930, 1136).—Methods of irrigating the disintegrator bars are described. B. M. V.

Apparatus for examination and analysis of [small quantities of] substances having volatile constituents. E. J. CONWAY (B.P. 387,795, 1.12.31).—

A dish is divided by a circular wall into annular and inner compartments, the dividing wall being lower than the outer and the latter having a ground edge enabling the vessel to be closed by a greased plate. In, e.g., the determination of NH_3 evolved from a liquid such as blood, urine, etc., the sample is placed in the annulus and standard acid in the inner compartment. After dropping a pea, or a small quantity of solution, of K_2CO_3 into the sample, the NH_3 will be evolved and absorbed in $1\frac{1}{2}$ hr., and can then be titrated. B. M. V.

Coating and sealing composition. F. MAAS, Assr. to W. MANO (U.S.P. 1,822,536, 8.9.31, Appl., 14.9.26, Renewed 10.6.30).—Mixtures of Al_2O_3 , $MgCl_2$, MgO , dextrin, CaF_2 , and H_2O , impervious to drip oil and suitable as pipe-joint compounds, are claimed. S. S. W.

Centrifugal washing machine. F. E. KRAUSS (B.P. 386,226, 20.6.32, Ger., 18.6.31).

Apparatus for emulsifying liquids. A. R. BANISTER (B.P. 386,206, 24.5.32).

Grinding thermoplastics.—See XIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Petrographical and chemical investigations on the genesis of coals. E. BERL and H. KELLER (Annalen, 1933, 501, 84—106).—Contrary to Gropp and Bode (A., 1932, 1230), lignin does not lose its characteristic structure when "coalified" with 0.2N-NaOH at 350°/185 atm. for 580 hr. or with $CaCO_3$ at 350°/1000 atm., when heated with $ZnCl_2$ at 700°, or when lignin-coal is coked at 1000°; the structure disappears when "coalification" is effected with 0.25 pt. of solid alkali hydroxide and a little H_2O . The "coals" obtained from cellulose have no definite structure. The coking capacity (and nature of the coke), OMe content, Donath test (acid and alkaline), and microscopical structure of various coals are investigated. Of the 13 lignites examined, practically all give sandy cokes, the OMe content varies from 0.1 to 3%, all give a positive Donath test (alkaline), all except one show a positive Donath test (acid), and all show cellular structure. The 8 fusains investigated show negative Donath tests, contain 0.06—0.42% OMe, generally give powdery cokes, and possess some cellular structure (derived from lignin). The poor coking property of fusains is due to their derivation from lignin. A lignite cannot be converted (by heat) into a coal. H. B.

Examination of the banded constituents of three South Wales coal seams. J. L. LAMBERT (Gas World, 1933, 98, Coking Sect., 33—34).—Three South Wales coal seams have been separated into bright coal (vitrain and clarain), durain, and fusain. These constituents were examined separately for volatile matter, ash, S, P, and coking index. Vitrain and clarain are valuable for blending with inferior coking coals, but durain, which yields almost exactly half the coking index of the original coal, requires mixing with a stronger coking coal. Only in one seam is the P preferentially associated with the durain, whilst in another the fusain (although low in quantity) was abnormally high in P. Neither S nor P was found to be preferentially and uniformly associated with a particular

banded constituent, and from this point of view there would be no benefit from separating these coals into their banded constituents, *e.g.*, by the Lehmann mill, on a large scale. G. E. F.

Preparation of coal. E. M. MYERS (Gas World, 1933, 98, Coking Sect., 26—31).—A review of known principles and processes. G. E. F.

Tendency of coal to spontaneous ignition. XI. D. J. W. KREULEN (Chem. Weekblad, 1933, 30, 186—188; cf. B., 1933, 256).—Humic acid curves, corrected for slight precombustion, are given for a no. of the coals previously described, and other curves are given to demonstrate the application of the method to the characterisation of a coal. The classification of coals is discussed in the light of data published previously. H. F. G.

Utilisation of anthracite of La Thuile. L. VERTÙ (L'Ind. Chimica, 1933, 8, 17—21).—The characteristics of the fuel are examined in relation to its commercial exploitation. H. F. G.

Constitution of chlorinated coal. V. Solvent extraction and coke formation. H. KAY and A. McCULLOCH (J.S.C.I., 1933, 52, 47—49 T; cf. B., 1932, 708).—A Lancashire sub-meta-lignituous coal was chlorinated (yield 162%) and divided into 3 portions by extraction with CHCl_3 and EtOH. The chlorinated coal was non-caking, but the portion sol. in both solvents is readily fusible and decomposes uniformly on mild heat treatment. A fraction obtained, sol. in CHCl_3 and CCl_4 , containing more Cl than any of the other fractions, proved to be the most strongly caking material yet obtained by the authors from chlorinated coal. The carbonisation of particles of this material of various sizes below 60 I.M.M. sieve was observed under the microscope. The smallest particles were observed to swell into a unicellular globule, whilst the larger sizes formed a foam-like mass, which may have been derived from the intumescence of several minute particles. These particles differed from the cenospheres described by Sinnatt in not possessing a *tert.* structure. Incipient intumescence commenced at 110—120°. G. E. F.

Systematic fuel investigation to provide a basis for the quantitative elucidation of coal decomposition in practice. M. DOLCH (Montan. Rund., 1933, 25, 3—11; cf. B., 1930, 172).—A laboratory method of evaluating coal for carbonisation purposes has been developed in which 20 g. of the coal are carbonised in an electrically-heated V2A steel retort and the yields of tar, H_2O , and gas are determined in two stages, *e.g.*, up to 530°, and from 530° to 900°. The calorific val. of the coal, and of the gas, tar, and coke, are also determined. The results obtained with two brown coals and one bituminous coal are compared with the corresponding proximate analyses and with the results of carbonisation in Fischer's Al assay apparatus and in Strache's tube apparatus. The practical application of the results is discussed. A. B. M.

Action of water vapour on coal and coke. P. DOLCH (Z. Elektrochem., 1933, 39, 145).—A reply to criticisms by Neumann and co-workers (B., 1933, 178). F. L. U.

Action of water vapour on coal and coke. B. NEUMANN, C. KRÖGER, and E. FINGAS (Z. Elektrochem., 1933, 39, 146; cf. preceding abstract).—A rejoinder to Dolch. F. L. U.

Modern coal research and its importance in the gas industry. W. LITTELSCHIEDT (Gas- u. Wasserfach, 1933, 76, 169—175).—The relation between gas evolution and swelling power of coal, the effect of coal blending on the resulting coke, the examination of coals by pressure extraction and by photomicrography, and the importance of reactivity and ash content of cokes are discussed. R. N. B.

Gasification of coal in middle- and small-sized gasworks. ANON. (Gas- u. Wasserfach, 1933, 76, 21—25, 44—49).—The substitution of small horizontal or vertical chamber ovens for horizontal retorts results in greater flexibility, a large increase in thermal yield per ton of coal, and reduced labour costs. More coke for sale is made owing to the need of less producer fuel. Three settings of horizontal and one of vertical ovens and the results obtained from them are described. By fitting a sensitive exhaustor-house governor, the pressure on the retorts and the *d* and calorific val. of the gas can be kept const. over long periods. A novel method of carbonisation is described in which there are two adjacent vertical chambers. The smaller one is filled with coke and after 2 hrs.' heating the larger is charged with coal. The coke is steamed and the water-gas produced mixes with the coal gas in the space above the two ovens, where cracking of the tar takes place. The coal chamber is steamed for 2 hr. before discharging and the coke chamber filled with coke from time to time to keep a fuel bed of even depth. 58 cu. m. of gas of calorific val. 4450 kg.-cal. are obtained per 100 kg. of coal, compared with the average of 46 cu. m. by other methods. R. N. B.

Ten years of gas testing. E. CZAKÓ and E. SCHAACK (Gas- u. Wasserfach, 1933, 76, 153—166).—Statistics are given for calorific val., *d*, and % of inerts in gas for the period under review. The val. for the const., calorific val./ \sqrt{d} , and for a function related to the min. amount of air necessary to prevent flickering and striking back of a gas flame in a standard burner are discussed. The relation of this latter val. to the % of CO and to the ratios H_2/CO and hydrocarbons/CO in gas are given in detail. R. N. B.

Measurement of temperature of a coal-gas flame by "α-particle method." A. SHRODKAR (Phil. Mag., 1933, [vii], 15, 426—440).—The range of α-particles from Po in the flame and in cooled gases collected from the flame was measured. A flame temp. of $1845^\circ \pm 100^\circ$ was calc. from the proportionality of the range to the abs. temp. of the absorbing gas. H. J. E.

Utilisation of coke-oven tar. H. BROCHE, K. EHRMANN, and W. SCHEER (Gas- u. Wasserfach, 1933, 76, 29—33).—3—6% of viscous oil may be isolated from tars by direct distillation, 25% by previous pptn. of asphalt, and 53% by high-pressure hydrogenation at 350°. In all cases the oil is inferior to mineral oil as a lubricant. Motor spirit is obtained by hydrogenation

of tar, but the high-pressure plant and H_2 necessary are expensive. A cheaper method is to oxidise the hydrocarbons present in the tar by passing over a V_2O_5 catalyst at 1 atm./450° and then convert the carboxylic acids formed into lower hydrocarbons by removal of CO_2 . This is effected by heating them or their K salts. 46% of C_6H_6 may be obtained from $C_{10}H_8$ and 54% of a tar oil fraction (200—300°) is converted into aromatic acids, which are further treated to give hydrocarbons of the motor-spirit range. A further outlet for tar is afforded by distillation to pitch, which is then used for briquetting. Tar oils have a high spontaneous ignition temp. which precludes their use in Diesel engines. In the presence of catalysts such as V_2O_5 , ThO_2 , and Pt this is greatly lowered (e.g., for $C_{10}H_8$, 575—210°) and it is possible that by use of such materials a satisfactory fuel will be obtained. R. N. B.

Recovery of asphaltic bitumens from solutions, as far as possible without altering their properties. J. GREUTERT (J. Inst. Petroleum Tech., 1932, 18, 846—849).—EtSH has many advantages as a solvent for bitumen, but CS_2 is preferred for general use. Bitumen is recovered from solution in CS_2 by evaporating the latter at 18—25° in a stream of CO_2 . When nearly all the CS_2 has distilled off the residue is raised to a little above the softening temp. of the bitumen and the current of CO_2 reduced until the pressure falls to 7—12 mm. abs., and this pressure is maintained for 15 min. Changes in the bitumen occur if the solution is kept for > 24 hr. before evaporation. D. K. M.

Viscosity of coal tars and pitches. R. N. TRAXLER and C. U. PITTMAN (Chem. and Ind., 1933, 221).—Using a new technique (Bingham, unpublished) it is shown that, between 15° and 35°, steam-refined asphalts from Venezuelan and Mexican crude petroleums, fluxed Trinidad Epuré, and fluxed Bermudez Lake are viscous liquids. Air-blown asphalts are not in this class since their apparent viscosity decreases with increase in shearing stress. J. W. B.

Cracking of oil from Ragusa. A. MARIOTTI (L'Ind. Chimica, 1933, 8, 4—11, 162—171).—The influence of temp. and rate of flow on the yield and quality of the gas obtained by thermal decomp. of Ragusa oil has been studied. Cracking of the crude oil presents difficulties, because of the pitch and asphalt content of the oil and the quantity of dense residue. The best results are obtained by treatment of the lightest fraction, of $d > 0.91$ —0.92 and b.p. 186—360°, at temp. $> 800^\circ$; at higher temp. the lightest constituents decompose into C and H. H. F. G.

Pyrolysis of gaseous paraffins, with special reference to production of ethylene. A. CAMBRON (Canad. J. Res., 1932, 7, 646—661).—Natural gas (CH_4 89.7, C_2H_6 4.8, C_3H_8 3.4, *iso*- C_4H_{10} 0.08, *n*- C_4H_{10} 0.67, higher hydrocarbons 0.6%) passed through an electrically heated W spiral gave a max. yield of 2—3% of liquid hydrocarbons at 1050°. On passage over an electrically heated C rod 7.7% of the gas was converted into liquid and solid hydrocarbons at a rod temp. of 1050—1100° if the SiO_2 containing tube were not insulated and consequently at a rather lower temp.,

but only C if the tube were insulated. With a H_2O -cooled Pyrex tube 17% of the gas was converted into unsaturated gaseous hydrocarbons at a rod temp. of 993°. C_2H_6 passed through a H_2O -cooled tube with a rod temp. of 989° gave a 50.5% yield of C_2H_4 , this corresponding with 90% of the C_2H_6 decomposed. The reaction was accelerated by the presence of reduced Cu or of Cu-bronze, the latter with or without a coating of MoO_3 . J. W. S.

Action of water vapour on heavy petroleum oils and cyclic hydrocarbons. C. MATIGNON and M. SÉON (Compt. rend., 1933, 196, 513—515; cf. A., 1933, 254).—At about 1000°, and in contact for 0.3—2 sec. with ZrO_2 as catalyst, *m*-xylene, cyclohexane, cyclohexene, petrol, and heavy fuel oil are converted by excess of steam into gaseous mixtures containing 64, 48.5, 58.2, 76.2, and 67.9% of H_2 , respectively. The other main product is CO_2 ; small proportions of CO, CH_4 , and C_2H_4 are suppressed by increasing the time of contact and the proportion of steam. A. C.

Treatment of benzenes containing mercaptans with alkali and sulphur. F. R. MOSER (Petroleum, 1933, No. 7, 5—6; cf. B., 1931, 374).—Benzenes can be freed from mercaptans and made "doctor-sweet" by treatment with solid or aq. NaOH in the presence of free S. Less S is necessary with solid than with aq. NaOH. The amount of S required depends on the type and amount of the mercaptans present. The reaction, which apparently involves the conversion of the mercaptans into disulphides, is complete only in the presence of an excess of S. The product therefore still contains some free S. A. B. M.

Influence of various hydrocarbons, especially of the unsaturated (olefines) and aromatic type, on illuminating power of lamp oils. III. N. DANĂILA (Petroleum, 1933, 29, No. 7, 1—5; cf. B., 1932, 710).—Further experiments in which the illuminating power of five Rumanian oils were determined before and after the removal of the aromatic hydrocarbons, and also after the addition of aromatic hydrocarbons to the aromatic-free oils, have confirmed the author's previous conclusion that the presence of aromatic hydrocarbons increases the illuminating power of these oils. The results of Grote and Hundsdörfer (B., 1932, 1016) are adversely criticised. A. B. M.

Experiments with the Tehar viscosimeter. T. RUEMELE (Petroleum, 1933, 29, No. 7, Motorenbehr., 6, 4—6).—Two types of capillary-tube viscosimeter suitable for the technical examination of oils are described. The requisite vol. of oil is run into the bulb of the apparatus from a calibrated tube forming a part thereof (in one type two such tubes are provided), is then forced into the upper bulb by air pressure, and the time of flow through the capillary is determined in the same manner as in the ordinary Ostwald viscosimeter. After the determination the oil can be discharged through a cock at the bottom of the apparatus. The accuracy of the results obtained with typical viscous oils was satisfactory. It was unnecessary to clean out the apparatus between determinations when examining a no. of oils in succession, provided they were of the same character.

The viscosimeter was particularly suitable for the examination of lubricating oils by the method of Tausz and Staab (B., 1931, 187). A. B. M.

Determination of paraffin in crude oil by means of a mixture of ether, ethyl alcohol, butanone, and phenol. R. FUSSTEIG (Z. anal. Chem., 1933, 91, 418—421).—The crude oil, after refining with H_2SO_4 , is dissolved in Et_2O , and a 1 : 2 mixture of $EtOH$ and butanone containing 1% of $PhOH$ is added, the liquids being at -20° . The paraffin is pptd. in large, nearly white crystals. F. L. U.

Candles and candlemaking. D. ALLAN (J. Inst. Petroleum Tech., 1933, 19, 155—175).—Historical and descriptive.

Coal preps. and plant growth.—See XVI. **Ash determination in coal.**—See XIX. **Oil-field H_2O analysis.**—See XXIII.

PATENTS.

Coke oven. K. HUFFELMANN, Assr. to H. SCHRÖDER (U.S.P. 1,855,186, 26.4.32. Appl., 28.9.26. Ger., 28.4.26).—Longitudinal projections are provided on the upper parts of the transverse walls of the vertical heating flues of the oven. The reduction in cross-section of the flues so effected increases the rate of gas flow and hence the heat transmission to the coking chamber, which is thereby more uniformly heated. A. B. M.

Combination [coke] oven. L. F. SCHRADER and W. H. WRIGHT, Assrs. to FOUNDATION OVEN CORP. (U.S.P. 1,857,288, 10.5.32. Appl., 12.1.29).—A coke oven comprises a series of alternating coking chambers and heating walls having vertical combustion flues. Between each pair of adjacent supporting walls below the heating walls are two regenerators, for gas and air respectively, arranged one vertically above the other. The regenerators communicate with the combustion flues through up- and down-take ducts in the supporting walls. A. B. M.

Regenerative coke oven. C. OTTO (U.S.P. 1,858,229, 10.5.32. Appl., 10.3.25).—The vertical heating flues of the coke oven are of the twin-flue type. A removable brick is mounted on the top of each separating wall between adjacent flues so as to allow the passage of gas at least on one side thereof; by introducing bricks of various sizes the flow of gas from one flue to the adjacent flue may be suitably controlled. Below each oven chamber are three regenerators of which the middle one serves for preheating gas and those on either side serve for preheating air. A. B. M.

Coal-carbonising power plant and method of reducing coal. O. S. BOWMAN (U.S.P. 1,858,135, 10.5.32. Appl., 12.1.25).—A vertical retort having a deeply corrugated wall is externally heated by the exhaust gases from an internal-combustion engine. Coal is fed through the retort and the gaseous products of carbonisation, after passing through a scrubber, are utilised as fuel in the engine. A. B. M.

Carbonisation of briquettes. C. W. SEWELL (U.S.P. 1,855,950, 26.4.32. Appl., 21.10.25).—Briquettes made from pulverised coal with 8—10% of a binder consisting of coal tar and Na_2SiO_3 or dextrin emulsion are

carbonised by being passed through a furnace on a conveyor, under such conditions that the gases evolved from the briquettes ignite and burn. The carbonised briquettes are discharged on to a conveyor in a cooling chamber. A. B. M.

Distillation of coal with recovery of the gaseous distillate. E. W. KING, Assr. to SEMET-SOLVAY ENG. CORP. (U.S.P. 1,855,191, 26.4.32. Appl., 23.4.27).—During the charging operation of a coke-oven chamber one of the outlets is connected, by means of a cross-over pipe, with the outlet of an adjacent chamber, while a steam ejector in the offtake pipe at the other end of the chamber is brought into operation, so that the gases liberated during charging are discharged into the adjacent chamber or into the collector main. A. B. M.

Manufacture of carbon black. C. MILLER, Assr. to THERMATOMIC CARBON CO. (U.S.P. 1,857,469, 10.5.32. Appl., 12.3.31. Cf. U.S.P. 1,794,558; B., 1931, 1020).—A hydrocarbon gas is mixed with a diluent gas, consisting of a mixture of the gaseous decomp. products of the process and fuel-combustion gases, and is subjected to thermal decomp. at high temp. A. B. M.

Destructive hydrogenation of coal. BRIT. COLLIERY OWNERS RES. ASSOC., J. I. GRAHAM, and D. G. SKINNER (B.P. 387,415, 10.9.32).—Bituminous coals of low caking power are heated in an inert atm., and in the absence of H_2 , to a temp. considerably above the decomp. temp., but not above 470° , and are then hydrogenated in known manner. The heating may be effected in the presence of a catalyst, e.g., MoO_3 . A. B. M.

Manufacture of water-gas. HUMPHREYS & GLASGOW, LTD., and G. HELPS (B.P. 387,192, 11.5.32).—Water-gas plants comprising two or more generating sets are operated with waste steam from the auxiliary machinery, and a series of valves, each of which is connected with the steam-working cock, stack valve, or blast valve of the corresponding generator, is so arranged that the exhaust main is automatically opened to atm. when no gas-making steam is required by any of the generators. If high-pressure steam is also used, means are provided for preventing its flow through the exhaust main when the latter is open to atm. A. B. M.

Manufacture of an enriched producer gas. W. W. ODELL (B.P. 386,981, 22.5.31. Cf. U.S.P. 1,762,100; B., 1931, 287).—A hydrocarbon in the form of a gas or atomised liquid, air, in amount $<$ half that required for the complete combustion of the hydrocarbon, and steam, are injected simultaneously into an incandescent fuel bed, thereby producing a gas containing substantial proportions of CO and H_2 . A. B. M.

Dehydration of gas. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,855,615, 26.4.32. Appl., 3.11.26).—Coke-oven or other fuel gas is dehydrated by first scrubbing it with a solution of a hygroscopic salt, e.g., $CaCl_2$, and then removing the residual H_2O by passing it over coke or other porous material impregnated with solid $CaCl_2$. A. B. M.

Treatment of gases [to remove hydrogen sulphide and ammonia]. C. J. HANSEN, Assr. to KOPPERS Co. (U.S.P. 1,840,579, 12.1.32. Appl., 20.8.28. Ger., 22.10.27).—Coke-oven gases are treated with a suspension

of $\text{Fe}(\text{OH})_3$ to remove part of the H_2S (that exceeding the ratio $2\text{NH}_3:\text{H}_2\text{S}$) and then with an Fe thionate solution to remove the residual H_2S and the NH_3 . The spent solutions are mixed, about one third of the mixture is revived by aëration and returned to the first washing liquor, whilst the rest of the mixture is treated with SO_2 and, after separation of the S, is returned to the second washing liquor. If desired, the gas before treatment may be cooled, the NH_3 from the liquor so condensed being added to the Fe thionate solution. A. B. M.

Production of hydrocarbons of low b.p. by thermal decomposition of hydrocarbon oils. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 388,114, 19.10.31).—Hydrocarbon oils are cracked in the vapour phase and the constituents boiling above 400° and tending to form asphaltic deposits under cracking conditions are condensed from the cracked vapours, which are then added to the vapours of fresh hydrocarbon oils to be cracked. H. S. G.

Catalytic conversion of hydrocarbons. HOUDRY PROCESS CORP., Assees. of E. HOUDRY (B.P. 388,189, 29.1.32. U.S., 30.1.31).—The hydrocarbon is heated and subjected (if desired, with the addition of steam) successively to the action of a no. of distinct and separate catalytic masses, capable of regeneration *in situ*, the first and third units comprising an absorbent silicate maintained at $426\text{--}537^\circ$ and $150\text{--}315^\circ$, respectively, and the second an inert absorbent mass impregnated with a finely-divided active metal, e.g., Ni, Co, or Al_2O_3 , and maintained at approx. 350° . H. S. G.

Making motor fuel by cracking oils. GULF REFINING CO., Assees. of E. E. AYRES (B.P. 388,225, 22.3.32. U.S., 15.4.31).—Liquid hydrocarbons are heated in the absence of hydrogenating catalysts at $426\text{--}565^\circ$ in the presence of ≤ 0.5 wt.-% of H_2 , under pressures of 1000–5000 lb. per sq. in., and the reaction products are cooled at a rate precluding appreciable hydrogenation; the conditions and time of heating are such as normally to produce objectionable quantities of tar and C without the presence of the H_2 . H. S. G.

Refining of hydrocarbons. IMPROVED HYDRO-CARBON PROCESSES, LTD. (B.P. 387,447, 19.11.31. Fr., 29.1.31).—Crude benzols or cracked spirits etc. are treated with ozonised air and then with H_2SO_4 to which is added, either before or during the treatment, FeCl_3 or $\text{Fe}_2(\text{SO}_4)_3$. The concn. of the H_2SO_4 used is sufficiently low, e.g., 70%, to avoid attacking the ethylene hydrocarbons. The acid treatment is followed by an alkali wash and rectification of the spirit. A. B. M.

Treatment of waste products obtained in the refining of hydrocarbon material. TRINIDAD LEASE-HOLDS, LTD., and S. M. BLAIR. From A. G. V. BERRY, F. L. MELVILL, and B. G. BANKS (B.P. 386,977, 18.5.31).—The alkaline wash liquors obtained in the refining of cracked petroleum oils are acidified, e.g., with H_2S followed by H_2SO_4 , the oily layer which separates is distilled, the fraction of b.p. $180\text{--}270^\circ$ is reduced, e.g., with Fe and H_2SO_4 , to convert the disulphides therein into mercaptans, the product is fractionated, and the fractions are reoxidised, e.g., with air, and refractionated,

whereby a substantially complete separation of the phenols and the disulphides is effected. The products are suitable for use as disinfectants, wood preservatives, insecticides, etc. A. B. M.

Production of motor fuel. R. R. ROSENBAUM (U.S.P. 1,841,254, 12.1.32. Appl., 20.7.27).—Anti-knock properties are conferred on motor fuels by the addition of small quantities of an ester, and/or the Hg salt, of a naphthenic acid. A. B. M.

Catalytic treatment of the charges supplied to internal-combustion engines. SOC. ANON. LE CARBONE (B.P. 387,115, 22.1.32. Addn. to B.P. 262,407; B., 1928, 292. Cf. B.P. 377,909; B., 1932, 923).—Activated C in the form of a woven fabric or entangled mass, e.g., carbonised lamp-wick or cotton wool, is used as the catalyst in carrying out the prior invention. A. B. M.

Charging and compressing loosely charged coal within oven chambers. C. STILL (B.P. 386,129, 22.1.32. Ger., 26.1.31).

Removing solids [C_{10}H_8] from liquids. [Coal-tar] still.—See I. Road-making.—See IX. Carb-urising composition [for steel].—See X. Fertiliser from coal.—See XVI.

III.—ORGANIC INTERMEDIATES.

Amination by ammonolysis. IV. Design and construction of equipment. V. Control of ammonia-recovery system. P. H. GROGGINS (Ind. Eng. Chem., 1933, 25, 274–277, 277–279; cf. A., 1933, 396).—IV. The design of plant for the manufacture of NH_2 -compounds from the corresponding halogen derivatives and NH_3 is discussed. Autoclaves of 100–1000 gals. capacity, heated by direct fire or low-voltage electric current, but preferably by a steam-jacket for temp. $< 190^\circ$ or otherwise by hot oil, may be used in batch processes. Protection against undue rise of pressure is best secured by a thin metal diaphragm (“bursting disc”) discharging into an ordinary safety-valve. In continuous processes, pressure tubes heated by an oil- or metal-bath are used.

V. The principles underlying the recovery of excess NH_3 in a useful form from the above process are enunciated and illustrated by a description of the plant and process used in the prep. of 2-aminoanthraquinone, the NH_3 being recovered as conc. aq. solution. H. A. P.

Detection of oxalic acid in citric acid. F. NORO and F. PERCIABOSCO (Annali Chim. Appl., 1933, 23, 21–29).—The pharmacopœial methods for this test are unsatisfactory or of low sensitiveness (0.12% $\text{H}_2\text{C}_2\text{O}_4$). Treatment with Et_2O gives a solution saturated with citric acid and containing the whole of the $\text{H}_2\text{C}_2\text{O}_4$, and distillation of the filtered solution yields a residue with a much higher content of $\text{H}_2\text{C}_2\text{O}_4$ than the original acid. Addition of CaCl_2 solution (*d* 1.03) to the aq. solution of the residue produces turbidity if the citric acid contained 0.0025% $\text{H}_2\text{C}_2\text{O}_4$. T. H. P.

C_2H_4 from paraffins. Action of steam on cyclic hydrocarbons.—See II.

PATENTS

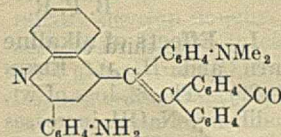
Manufacture of aliphatic [acetic] anhydrides. H. DREYFUS (B.P. 387,692, 27.7.31).—The acid vapour is preheated and/or anhydriised by contact with molten metal or other hot liquid which is non-catalytic and not a dehydrating agent. C. H.

Manufacture of dithiocarbamates. DEUTS. HYDRIERWERKE A.-G. (B.P. 387,924, 14.7.32. Ger., 11.6.32).—The amine (< 2 mols.) and CS₂ (1 mol.) are caused to react in vapour phase in presence of diluent gas, e.g., water-gas or air. The diluent may be charged with one reactant. Piperidine, mono- and di-cyclohexylamines, and NHBu₂ give good yields. C. H.

Manufacture and technical application of products from unsaturated fatty acids or their esters [stuffing and reviving agents for leather]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 387,693, 31.7.31).—An unsaturated fat-like fatty acid or ester (e.g., train oil) is treated with air and sulphite or bisulphite so as to give a mixture of partly oxidised, partly sulphited products, which yield emulsions with hot H₂O. C. H.

Manufacture of quinoline derivatives. J. J. V. ARMSTRONG. From T. VAN SCHELVEN (B.P. 388,087, 25.8.31).—An arylamine with a free *o*-position is condensed with a non-ketonic acid, R·CO₂H, and a compound, R''·CO·CH₂R', to give a quinoline having substituents R, R', and R'' in positions 2, 3, and 4, respectively. The acid arylamide may with advantage be first formed (cf. Spallino and Salimei, A., 1912, i, 723; Pictet and Barbier, A., 1895, i, 481). Quinoline is thus obtained from NH₂Ph, HCO₂H (or NHPH·CHO), and paraldehyde. Quinolines having the following substituents are described (m.p. in parentheses): 6-methoxy-4-methyl (50–52°) and its 3-CO₂H; 8-OH (75°); 6-NH₂ (114°); 8-NH₂ (70°); 5:7-(NH₂)₂ (162°); 2-CO₂H (156°) derivatives; 6-chloro-8-nitro- (158°); 8-nitro-6-methoxy- (160°) and its 4-Me (> 250°) and 4-CO₂H (decomp. 170°) derivatives; 2-phenyl-4-carboxylic acid (212°) and its 6-Me derivative (216°; Et ester, 75°); methyl 2-(3':4'-methylenedioxyphenyl)-4-carboxylate (135°); 2-(4'-hydroxy-3'-carboxyphenyl)-4-carboxylic acid (283°); 2-Ph (83°); 2-phenyl-4-methyl (64–65°); 2-*o*-aminophenyl and its 4-Me derivative; 6-amino-2-carboxylic acid (decomp. 120°). A series of linked quinolyl nuclei may be produced, e.g., by heating the product from NH₂Ph, anthranilic acid, and paraldehyde with anthranilic acid and paraldehyde, and finally with gallic acid and paraldehyde. The following reactions are described but not claimed: the aminoketone (I), b.p. 83–85°/15 mm., from COMe₂, C₂H₄Cl₂, and NHEt₂ is condensed with 6-methoxyepilidine to give MeO·C₉H₅N·CH·CMe·[CH₂]₃·NET₂, m.p. 78°; 6-chloro-8-aminoquinoline, m.p. 73° (B.HCl, SnCl₂, m.p. 284°), is condensed with (I) and then with NaOMe to MeO·C₉H₅N·NH·CHMe·[CH₂]₃·NET₂, b.p. 190°/2 mm.; 8-nitro-6-hydroxy-quinoline is reduced to amine, m.p. 185°; 2-phenyl-4-methylquinoline is nitrated and reduced to the 2-*p*-aminophenyl compound, m.p. 97°; 2-*o*-aminophenylquinoline → NPhMe₂; 2-*o*-aminophenyl-4-methylquinoline is heated with anthraquinone and CaCl₂, and the product with NPhMe₂ to give

the triarylmethane (annexed formula), which is diazotised and coupled with NPhMe₂; 6-aminoquinoline-2-carboxylic acid is condensed with quinaldic acid in H₂SO₄ to give the bisquinoline analogue of 2-amino-



anthraquinone, which on alkaline fusion gives a green azine vat dye; 3:3'-dihydroxy-4:4'-diethoxy-2:2'-diquinolyl (from oxanilide and glycollic acid in EtOH) is oxidised by CrO₃ in AcOH to the bisquinoline analogue of indigo, a green vat dye. C. H.

Production of 2-mercapto-[2-thiol-]aryltiazoles. NAUGATUCK CHEM. CO., Assees. of W. E. MESSER (B.P. 387,738, 4.9.31. U.S., 22.9.30).—A primary arylamine (NH₂Ph) is refluxed with 1.5 mols. of S, and the product is heated at <200°/6–33 atm. with excess of CS₂ (cf. Hofman, A., 1887, 823). C. H.

Production of *n*-heptylphenol. A. L. MOND. From MCKESSON & ROBBINS, INC. (B.P. 388,737, 29.7.31).—See U.S.P. 1,824,426; B., 1933, 219.

Removing solids [C₁₀H₈] from liquids.—See I.

IV.—DYESTUFFS.

PATENTS.

Manufacture of acid wool dyes of the anthraquinone series. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 387,765, 13.10.31).—The halogen atoms in 2:3-dihalogeno-1:4-diaminoanthraquinone are replaced in either order by ·SH or ·S·S·, which is oxidised to ·SO₃H, and by an aryloxy-group; preferably a peroxide or per-salt is used for the oxidation. The aryl group may subsequently be sulphonated. In the examples the aryl is Ph, *p*-C₆H₄Me, *m*-C₆H₄·OH, α - or β -C₁₀H₇. The shades are blue to blue-violet. C. H.

Quinoline derivatives.—See III. **Ice colours.**—See VI. **Dye lakes.**—See XIII.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Determination of water in wool by distillation. C. O. M. STEWARD (J. Text. Inst., 1933, 24, T 98–102).—Wool is heated in a special distillation flask with perchloroethylene (CCl₂·CCl₂) and the condensed H₂O is collected in a graduated tube of the apparatus and its vol. read off directly. Charring of the wool during the distillation is obviated because the wool floats on the solvent, the b.p. of which is close to the temp. (115°) adopted by the Bradford Conditioning House for conditioning-oven procedure (I), and the method is equally reliable with method (I) for determining H₂O in wool. B. P. R.

Estimation of damage on chlorinated knitted wool fabrics. C. H. EDWARDS (J. Text. Inst., 1933, 24, T 1–9).—Comparison is made between the microscopical and chemical methods of estimating damage in such fabrics. The chemical method is based on that due to Rimington (B., 1930, 1021). A linear relation is found between the extent of damage as estimated microscopically and the % Cl₂ absorbed by the wool, whilst a curve is established that relates the damage

as found by the microscopical count with that determined chemically.

B. P. R.

Linon-cellulose complex. I. Effects of alkaline hydrolysis. E. BUTTERWORTH and H. A. ELKIN (J. Text. Inst., 1933, 24, T 10—29).—The % loss of wt. on boiling flax cellulose with dil. aq. NaOH increases rapidly with increasing concn. of the NaOH up to 0.5%, when 18% of the sol. component is removed, but the remaining amount (about 5%) is not removed completely on increasing the NaOH concn. up to 2%. The Cu no. of the cellulose falls progressively with increasing loss of wt. and is an approx. measure of the % non-cellulosic component remaining after the alkaline hydrolysis. The viscosity in cuprammonium hydroxide solution is const. with increasing amount of the non-cellulosic component. Ageing of the samples causes a reduction of viscosity, and it is suggested that this is related to sorption of alkali by the samples which were washed but not soured after treatment with NaOH.

B. P. R.

Determination of artificial silk (viscose) in mixtures of artificial silk and cotton waste. P. MCGREGOR and C. F. M. FRYD (J. Text. Inst., 1933, 24, T 103—104).—The material, previously freed from oil and other extraneous matter, is treated with an acidified solution of $\text{Ca}(\text{CNS})_2$ at 70—80°, and the treatment is repeated after an intermediate filtration of the residue. The viscose is selectively dissolved and the remaining cotton is boiled with H_2O , dried, and weighed.

B. P. R.

Mildew on silk-cellulose acetate materials. F. V. DAVIS (J. Text. Inst., 1933, 24, T 86—89).—Patches of lighter shade on dyed fabrics composed of a real silk crêpe weft and a cellulose acetate warp contain more micro-organisms per g. than portions of normal shade. The silk is unaffected, but the cellulose acetate is affected as regards dyeing properties and appearance of the filaments. Growth of micro-organisms on a real silk crêpe weft can produce an alteration of the dyeing properties of a cellulose acetate warp in contact with it.

B. P. R.

Bisulphite process [of pulp manufacture] in Britain. D. WRAGG (Proc. Tech. Sect. Papermakers' Assoc., 1932, 13, 147—153).—The process, as practised in one of the two British mills making sulphite pulp, is described.

H. A. H.

Morterud circulation system for sulphite[pulp] digesters. H. S. KIAER (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 112—114).—The system and its advantages are described.

H. A. H.

Decomposition of grasses. I. Neutral and alkaline sulphite processes. S. HILPERT, A. WOLTER, and H. HOFMEISTER (Cellulosechem., 1933, 14, 33—40).—The highest yields of cellulose are obtained from esparto and from wheat straw by boiling with Na_2SO_3 , all the ash and much of the pentosans being retained. When the liquor is alkaline or acid the ash or the pentosans, respectively, are attacked. The consumption of sulphite increases with the amount taken. Straw is disintegrated after boiling for 2 hr. with Na_2SO_3 , but esparto requires 3—4 hr. on account of its hard, waxy epidermis. With aq. NaOH disintegration is much

more rapid, and long boiling darkens the cellulose and raises the bleach no.

A. G.

[Apparatus for studying] changes of the cell membrane of wood during sulphite-cellulose cooking. O. GERNGROSS and K. M. HOFFMANN (Papier-Fabr., 1933, 31, 127—130).—For making small-scale boils in a transparent apparatus a special glass autoclave is described. It is heated in an oil-bath, and temp. up to 170° and pressures up to 7 atm. can be attained.

A. G.

Relation between sulphur and ash contents of sulphite cellulose and a method for determining sulphur. T. SCHÜTZ and W. KLAUDITZ (Papier-Fabr., 1933, 31, 123—127).—The total ash found in pulp depends on the method of determination, and the total bases in the ash are much more than equiv. to the SO_3 . Sulphite cellulose contains salts of ligninsulphonic acid, from which S is lost during ignition. The less org. S the cellulose contains the lower is its Cl no. Lignin-sulphonic acid behaves like permutit and the composition of the ash of cellulose therefore depends largely on that of the last wash- H_2O . The ash of bleached cellulose consists largely of CaCO_3 formed from CO_2 produced during bleaching. S is determined by destructive oxidation with Cl_2 gas and NaOH at the boil, and pptn. as BaSO_4 .

A. G.

Cooking process. III. Cooking wood with sodium sulphate. S. I. ARONOVSKY and R. A. GORTNER (Ind. Eng. Chem., 1933, 25, 305—310; cf. B., 1930, 1021).—The results of cooking wood with aq. Na_2SO_4 resemble fairly closely those obtained by cooking with H_2O alone, but the residual woods are darker for the former process whilst larger quantities of volatile org. acid and smaller quantities of reducing sugars are found in the liquor. NaBr as a cooking agent has approx. the same effect in the cooking as Na_2SO_4 .

B. P. R.

Action of salt solutions on wood cellulose. E. RICHTER (Ind. Eng. Chem., 1933, 25, 316—318).—Immersion of wood for some time in sea- H_2O causes the cellulose-lignin to absorb small quantities of NaCl, which results in a decrease in yield (up to 10%), a small decrease in strength of unbleached stock, and a serious decrease in the case of bleached stock. The bleached stock has a yellow colour, high Cu no., lower α -cellulose content, etc. (Cf. Kullgren, B., 1930, 984.)

B. P. R.

Tentative standardisation of a fractionating screen for coniferous mechanical pulps. J. L. SOMERVILLE (Proc. Tech. Sect. Papermakers' Assoc., 1932, 13, 37—57).—A method is described for separating mechanical pulp into four fractions dependent primarily on differences in fibre length. The apparatus consists essentially of a screen plate, a screen box, and a motor-driven pulsating diaphragm, and is based on that of Schafer and Carpenter (Paper Trade J., 1930, 90, T.A.P.P.I. Sect., 258). Tyler wire screens of 80, 42, and 24 mesh to 1 in., are used. The factors affecting the % of material retained by the various screens are investigated, and a no. of applications are indicated.

H. A. H.

Flow of paper pulp in pipe-lines. C. A. BRAUTLECHT and J. R. SETHI (Ind. Eng. Chem., 1933, 25, 283—288).—The effects of concn. of the pulp suspension,

length of pipe-line, and the introduction of fittings etc. on the flow are discussed. B. P. R.

Recovery of lyes in the soda-cellulose process by the Wagner procedure. H. KIENZL (Papier-Fabr., 1933, 31, 130—133).—Details are given of the Wagner process in which spent liquors from soda- or sulphate-cellulose, previously conc. to d 1.32, are sprayed into a cylindrical oven and all H_2O and org. matter is removed. A. G.

Analysis of spent black liquors from the soda and sulphate pulping processes. M. A. HEATH (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 103—106).—Investigation of the accuracy of the standard method for the analysis of black liquor shows that the org. salts present act as buffers and that this buffering action is not sufficiently eliminated by pptn. with $BaCl_2$. A method is proposed which is based on the distillation of NH_3 , CO_2 , and H_2S from the solution. The two methods are compared. H. A. H.

Dispersion of cellulose during the manufacture of viscose rayon. II. Preparation of viscose rayon without ageing. S. ROGOVIN and M. SCHLACHOVER (Cellulosechem., 1933, 14, 40—42; cf. B., 1933, 263).—During ageing the micelles are loosened and dispersion then occurs during xanthation. If ageing is omitted dispersion cannot occur until the viscose is dissolved; the viscosity of the viscose is high and falls continuously for 6—8 days. A. G.

Purification of sodium cellulose xanthate. K. ATSUKI and M. FUJII (J. Cellulose Inst., Tokyo, 1933, 9, 26—30).—Purified Na cellulose xanthate is best obtained by neutralising the viscose solution with dil. AcOH (phenolphthalein), adding abs. EtOH, washing the pptd. material with abs. EtOH and with Et_2O , and drying it *in vacuo*. The product (nearly white) is sol. in H_2O , MeOH, EtOH, and saturated aq. NaCl are less satisfactory as pptg. agents since the xanthate is either partly decomposed or contains impurities that are removed only with difficulty. B. P. R.

Determining the stability of cellulose esters, acetates, and ethers, and of ethylcellulose. E. BERL and G. RUEFF (Cellulosechem., 1933, 14, 44—47).—The material is placed in an electrically heated Cu block and a current of N_2 carries the decomp. products over heated CuO. The CO_2 is absorbed and weighed at intervals, and the wt. of CO_2 plotted against the time. A. G.

Hydration of cellulose in papermaking. J. STRACHAN (Proc. Tech. Sect. Papermakers' Assoc., 1932, 13, 61—81).—The author's previous views (B., 1928, 10) are amplified. It is maintained that there is a direct relationship not only between hydration and fibrillation, but also between fibrillation and strength. Campbell's crystal theory of felting (B., 1932, 929) is held to be untenable. Factors affecting the rate of moisture imbibition and adsorption are reviewed, and a method is described for measuring the increase of imbibition due to beating. Graphs correlating Schopper-Riegler wetness with surface adsorption of a no. of inorg. compounds are given. H. A. H.

Production of parchment-like membranes from cultures of slime-forming micro-organisms. J. R.

SANBORN (Ind. Eng. Chem., 1933, 25, 288).—Species of *Oidium* and *Monilia*, isolated from paper-mill slimes, rapidly develop doughy, rubbery growths when cultivated in media rich in carbohydrate. By comminuting these growths in H_2O , depositing the particles on a sheet-forming substratum (aspirator method), and lubricating by a glycerin-mineral oil treatment, a uniform semi-transparent membrane is obtained, which is dried in a steam hot-plate sheet dryer. E. L.

Theory of rosin sizing [of paper]. R. LORENZ (Papier-Fabr., 1933, 31, 179—183).—The literature is summarised and the importance of controlling the p_H and hence the hydrolysis of the alum is emphasised. A. G.

Theory of [rosin] sizing of paper. F. ARLEDTER (Papier-Fabr., 1933, 31, 189—191).—A general discussion. Polydisperse systems of rosin size are best, and only a part of the alum in size can be replaced by H_2SO_4 . A. G.

Value of a paper stiffness test. F. W. ADAMS and J. BELLOWS (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 117—120).—Stiffness determinations give information about a sheet of paper which is not obtainable from any of the more usual tests. An instrument is described for measuring stiffness, utilising a standard tensile machine. A no. of variables are investigated. H. A. H.

Measurement of acidity of paper. S. R. H. EDGE (Proc. Tech. Sect. Papermakers' Assoc., 1932, 13, 82—91).—The unsatisfactory characteristics of the aq. extraction method are stressed. It is claimed that an electrometric method of measuring p_H , using an Sb electrode, is satisfactory in use. H. A. H.

Report to the New Zealand Government on English Leicester (38's/42's), Romney (44's/46's), Romney (46's/48's), and Corriedale (50's/56's) wools. A. F. BARKER (J. Text. Inst., 1933, 24, T 57—85). B. P. R.

Stapling of cottons. Use of a standard sheet for recording the results for the "combined stapling test." A. W. BAYES (J. Text. Inst., 1933, 24, T 90—97). B. P. R.

Examination of proposed relationship between the lea and single-thread test results [on yarns]. V. VENKATARAMAN and N. AHMAD (J. Text. Inst., 1933, 24, T 35—43). B. P. R.

Measurement of fibre and yarn diameters by diffraction method. J. A. MATTHEW (J. Text. Inst., 1933, 24, T 54—56). B. P. R.

Beater dyeing [of paper].—See VI. Steels for sulphite-pulp industry.—See X. Fatty matter [in artificial silk].—See XII. Rosin size. Resin solutions for paper.—See XIII. Rubber threads for textiles.—See XIV. Cellulose nitrates.—See XXII.

PATENTS.

Manufacture and treatment of textile materials [staple fibre]. (A, B) BRIT. CELANESE, LTD., W. A. DICKIE, and W. I. TAYLOR, and (B) A. MCGILL (B.P. 388,426—7, 26.8.31).—Filaments composed of org. derivatives of cellulose are treated with solutions or

suspensions of high-mol. wt. alkylolamines and/or their derivatives, the ω -aminoalkylamides of fatty acids, di- or poly-hydric alcohol derivatives in which some of the OH groups of the alcohols are esterified by fatty acids, or mixtures of these substances, together with roughening materials, e.g., SiO₂, BaSO₄, (A) while wound on reels etc. or continuously with their production, and are cut when in the form of wet bundles, e.g., those formed from hanks, and in (B) are cut in the wet state, both operations being performed continuously with filament production.

F. R. E.

Manufacture of [higher] cellulose esters. KODAK, LTD., Assees. of C. J. MALM (B.P. 388,303, 28.7.32. U.S., 28.7.31).—The esters are recovered in the form of soft particles by adding their solution in an org. acid to an aq. non-solvent pptn. bath, which contains initially < 50 wt.-% of org. acid, and maintaining approx. this acid concn. therein throughout the pptn.

F. R. E.

Manufacture of artificial textiles, artificial straw, tubes, strips, etc. LONZA ELEKTRIZITÄTSWERKE U. CHEM. FABR. A.-G. (B.P. 388,277, 25.6.32. Switz., 27.6.31. Addn. to B.P. 384,793; B., 1933, 143).—30–50% of softening agents (calc. on the wt. of finished product) are added to the dough-like solutions of cellulose derivatives before proceeding as in the prior patent.

F. R. E.

Manufacture of artificial silk and other artificial products. BRIT. CELANESE, LTD., H. DREYFUS, and W. I. TAYLOR (B.P. 388,400, 19.8.31).—An 18–25% solution of a high-viscosity org. cellulose derivative in a solvent mixture, containing a solvent at room temp. for the cellulose derivative, e.g., COMe₂, a smaller proportion of a more volatile liquid, preferably a non-solvent, e.g., Et₂O, and H₂O, is dry-spun with rapid evaporation in the very early stages.

F. R. E.

Spinning of artificial silk, more particularly viscose silk. ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 388,344, 31.10.32. Ger., 16.11.31).—After leaving the spinning bath and before collecting in spinning pots or on bobbins, the filaments are passed over two positively-driven rollers between which they are led back into the spinning bath in a loop by means of one or more deviating members; additional stretch is imparted to the filaments by a differential peripheral velocity of the rollers.

F. R. E.

Manufacture or treatment of products or articles having a basis of cellulose derivatives. H. DREYFUS (B.P. 387,686, 30.7. and 7.9.31).—Cyclic ether-ketones are used as solvents, softeners, or plasticisers for cellulose esters and ethers. Examples are tetrahydro-1:4-pyrone and *n*-butyl and *iso*amyl 2:6-dimethyltetrahydro-1:4-pyrone-3:5-dicarboxylate.

C. H.

Flocculating or disintegrating machine [for fibrous materials]. J. M. ARNOT (B.P. 385,864, 15.6.32).

Plastic compositions.—See XIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Dyeings on wool fast for bathing purposes. T. EGGER (Textilber., 1933, 14, 136).—Examination of bathing suits subjected to the action of prolonged

sunshine has shown the reliability of the fastness test previously described (B., 1932, 98) and that dyeings on wool with Neolan Yellow 6G (2.5), Marine Blue RL conc. (4.0), Blue GG (2.0), Orange G (2.5), Black WA extra (12), a mixture of Yellow 6G and Green BL conc. (1.2), and mixtures of brown dyes (3.6–4.0%) are perfectly satisfactory.

A. J. H.

Some variations in beater dyeing [of paper].

D. CAMERON (Proc. Tech. Sect. Papermakers' Assoc., 1932, 13, 134–138).—Some practical considerations affecting the shade of dyed papers are discussed.

H. A. H.

[Fading of] vat colours in the reduced state.

A. E. WEBER (Amer. Dyestuff Rep., 1933, 22, 157–161).—Uneven shades may result from uneven incidence of sunlight on viscose rayon materials while being dyed with vat dyes, this being due to decomp. of the vat dye while in its leuco-form. Exposure of leuco-Indanthrene Golden Orange 4R and RRT (dibromo- and trichloro-pyranthrone, respectively) to sunlight for about 5 min. results in removal of the halogen atoms with formation of Indanthrene Golden Orange G (pyranthrone). Indanthrene Blue GCD and BCS, Violet 2R, and Red Violet RRNX (chlorinated anthraquinone dyes) are not affected in the leuco-state by sunlight. Indigoid and thioindigoid vat dyes are more susceptible than anthraquinone vat dyes to the action of sunlight. Brilliant Indigo Blue 4B and B, Helindone Fast Scarlet R and Orange R, Ciba Bordeaux B, Pink B, Algol Red Violet RH, Violet B, Pink FF and FB are affected in their leuco-state by sunlight, Brilliant Indigo 4B being more affected on cotton or viscose rayon than on silk.

A. J. H.

[Dyeing of] silk-cellulose acetate materials.—See V.

PATENTS.

Bleaching of textile fabrics [with ozonised air].

T. W. HOLT and A. S. KILPATRICK (B.P. 387,668, 7.5.31).—Fabric is led continuously in open width through a chamber (A) having (i) a liquid seal at either end and containing upper and lower series of guiding rollers, and (ii) a lower trough (through which the fabric passes) containing a bleaching liquor such as aq. NaOCl; in the upper part of A the fabric is exposed to ozonised air. The bleaching effect is > that obtained with the bleaching agents applied separately.

A. J. H.

Obtaining fast tints on the fibre [ice colours].

Soc. CHEM. IND. IN BASLE (B.P. 387,823, 15.1.32. Switz., 15.1.31).—Dyeings of vat dyes of the anthraquinone, benzanthrone, pyranthrone, anthanthrone, dibenzpyrenequinone, indigoid, or Hydron-blue series are treated with diazo compounds. Examples are dyeings of: Hydron-blue R treated with diazotised 4'-chloro-5-methoxy-2-methyl-4-aminoazobenzene (I) (deep black); Ciba-red R with diazotised 4-chloro-*o*-nitroaniline (yellow red); Cibanone-blue RS with diazotised (I) (grey).

C. H.

Reserving fibres to azo dyes developed from their components.

Soc. CHEM. IND. IN BASLE (B.P. 387,922, 8.7.32. Switz., 23.7.31).—Fabric impregnated with coupling component is printed with a resist comprising (K) xanthate, which decomposes the diazo compound subsequently applied. Coloured reserves are obtainable

by adding a basic or leuco-vat dye to the xanthate paste. C. H.

Production of waterproof fabrics. JOHNSON & JOHNSON (GT. BRITAIN), LTD. From JOHNSON & JOHNSON (B.P. 387,125, 3.2.32).—Fabric is coated, during friction calendering, with a phenolic resinoid product (e.g., a PhOH-CH₂O condensation product) while in a plastic form so that only min. penetration of the fabric occurs; it is then heated to harden the coating but without rendering the fabric stiff. A. J. H.

Manufacture of waterproof and cleansable ironed linen. WICKOM AKTIEB. (B.P. 388,328, 7.9.32. Swed., 8.9.31).—Collars etc. are starched and ironed in the usual manner, coated thinly while passing between rollers with a cellulose or other suitable colourless lacquer, and finally sprayed with the same lacquer. A. J. H.

Production of coated fabric. D. CARNEGIE, JUN., ASSR. to DURATEX CORP. (U.S.P. 1,857,805, 10.5.32. Appl., 23.9.27).—Coating is effected with a composition consisting of 1 pt. of nitrocellulose, 4–5 pts. of linseed oil (blown with air at about 250° so that its viscosity at 25–30° is 60–75 sec. as measured by the time taken by a steel ball of 0.25 in. diam. to fall through 12 in.), and a pigment dissolved in a mixed solvent (e.g., EtOAc 30, C₆H₆ 30, methylated spirits 40 pts.); linseed oil may be replaced by other drying or semi-drying oils, and a drier may be incorporated. A. J. H.

Weighting of [silk] textile material. H. W. STIEGLER, ASSR. to CHENEY BROS. (U.S.P. 1,858,379, 17.5.32. Appl., 21.8.28).—Weighting is effected by a short immersion (about 5 min.) in a bath of metal salt solution (e.g., SnCl₄, ZnCl₂, and AlCl₃) containing a substance capable of furnishing sufficient negative ions (common to those of the weighting salt) to prevent substantial ionisation and hydrolysis of the weighting salt, followed by washing and treatment with a solution containing Na₂HPO₄ and Na₂SiO₃. A. J. H.

[Non-slip] finishing of artificial silk fabrics. COURTAULDS, LTD., W. H. GLOVER, and F. SHEDDON (B.P. 388,157, 15.12.31).—Fabric is impregnated with dil. Na (or NH₄) resinate solution (<4% of resinic acid) and then washed with a large vol. of H₂O, whereby the free acid is deposited within the fabric. A. J. H.

Machines for wet treatment of fabrics. MASCHINENFABR. BENNINGER A.-G. (B.P. 385,786, 25.2.32. Switz., 8.10.31).

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

Technical preparation of sulphuric and phosphoric acids. G. CALCAGNI and M. STURNAJOLO (Annali Chim. Appl., 1933, 23, 42–50).—H₂SO₄ may be prepared by the anodic oxidation of SO₂, using a Pb anode and a C (or Pb) cathode, a porous battery pot as diaphragm, and aq. MgSO₄ or NaHSO₄ as catholyte. By repeatedly saturating the anode liquid with SO₂, 43.5% H₂SO₄ solution is obtainable. Similarly, with electrodes of Pt or Cr- or Ni-steel, dil. H₂SO₄ may be conc. to 71% acid. H₃PO₄ may be made from natural phosphates on similar lines. When boiled with (NH₄)₂CO₃ solution,

all natural and artificial phosphates give up their H₃PO₄ to form NH₄ phosphates. T. H. P.

Colorimetric determination of phosphoric acid in argillaceous products. P. URECH (Z. anal. Chem., 1933, 92, 81–86).—The solution containing PO₄''' is acidified with H₂SO₄ and treated with a dil. solution of NH₄ molybdate in dil. H₂SO₄ and a trace of ZnCl₂. The blue colour of the reduction complex is compared with standards. The method is simpler and more rapid than the gravimetric method. J. W. S.

Analysis of carbonates and hydrocarbonates of magnesium. (MME.) L. WALTER-LÉVY (Bull. Soc. chim., 1933, [iv], 53, 113–115).—The compound is calcined at 750–800° in an electric furnace, CO₂ absorbed and weighed, and residual MgO also weighed. The method gives accurate results and has been applied to the analysis of artificial giberite and hydromagnesite. M. S. B.

Proposed manufacture of monopotassium phosphate at Green River, Wyo. R. D. PIKE (Ind. Eng. Chem., 1933, 25, 256–261).—In the Green River district are deposits of phosphate rock, of wyomingite (11–12% K₂O), and a supply of brine containing Na₂CO₃ and NaCl. The K₂O is present as leucite and phlogopite, and the K is replaced by Na in the leucite (yielding analcite) by treatment with NaCl solution at 180–195°. This reaction is unaffected by dilution of the brine; relatively coarse grinding of the dry rock is sufficient. The speed of digestion increases with temp. and an excess of NaCl is desirable. It is inadmissible to use Ca in place of Na or to melt the rock before extraction. It is suggested that H₃PO₄ shall be manufactured in a coal-fired blast furnace, using wyomingite rock as a flux and so producing an acid containing already a proportion of K₂O. C. I.

Reports of investigations: [Canadian] non-metallic minerals section. R. K. CARNOCHAN, R. A. ROGERS, and L. H. COLE (Canada Dept. Mines, Invest. Ore Dressing and Metallurgy, 1931, 108–137).—Details are given of tests made on the beneficiation of various non-metallic minerals, e.g., SiO₂ sand for glass making, Glauber's salt, syenite, slate, marl, and gypsum. A. R. P.

Hydrated titanium oxide. Thermal precipitation from titanium sulphate solutions. A. W. HIXSON and W. W. PLECHNER (Ind. Eng. Chem., 1933, 25, 262–274).—TiOSO₄·2H₂O, freed from Fe, was used for preparing a series of solutions of known Ti and excess acid contents. These solutions were boiled for a given time under reflux and the % Ti hydrolysed was determined by difference. The curve relating Ti concn. and % Ti pptd. in 8 hr. shows 2 maxima and 2 minima, so that the pptn.-time curves are of very various types; probably in all cases an induction period occurs, during which nuclei form. With "acidity factor" (A. F.) 0.5 [i.e., 1 pt. of excess H₂SO₄ to 2 pts. of Ti(SO₄)₂] the optimum pptn. occurs at 7.5% TiO₂. Little variation occurs in the composition of the product of hydrolysis, which contains 4–8% SO₃ on the dry basis. Attempts to elucidate the possible changes in composition of the solution by determinations of *d* led to no very clear result. A further series of tests with A.F. 0.1–3.0

gave similar curves, but with the maxima displaced. With solutions high in TiO_2 a low *A.F.* favours pptn. With *A.F.* > 2.0 crystallisation of $\text{TiOSO}_4 \cdot 2\text{H}_2\text{O}$ occurs along with hydrolysis. In these tests sealed jars of solution maintained at 100° were used. With *A.F.* > 1 , 95% pptn. is obtained in 8 hr. from solutions containing 6–10% TiO_2 . C. I.

Determination and occurrence of iodine in phosphate rock. W. L. HILL and K. D. JACOB (J. Assoc. Off. Agric. Chem., 1933, 16, 128–137).—The dry-distillation method is better than acid distillation for the determination of I in phosphate rock. The I contents of 40 samples of natural phosphates from different sources range from 0.8 to 130 p.p.m., this being much higher than the content in other rock deposits. J. W. S.

[NH_3 from] amination [processes].—See III. Lye recovery from soda-cellulose.—See V. Te-Pb [for H_2SO_4 industry]. Extraction of Ra.—See X. Chrome yellows.—See XIII. Semi-micro-determination of CO_2 in air.—See XXIII.

PATENTS.

Manufacture of alkali carbonate or alkali hydroxide and ammonia or ammonium salts. A. MENTZEL (B.P. 388,380, 21.8.31. Ger., 26.8.30).— Na_2SO_4 (or K_2SO_4) is heated with C and CaO in the presence of N_2 and the product is hydrolysed to yield Na_2CO_3 or NaOH and NH_3 . The quantity of NH_3 may be increased by repeated cyanidation and hydrolysis. The S in the residue is worked up to H_2SO_4 for converting NH_3 into $(\text{NH}_4)_2\text{SO}_4$. [Stat. ref.] L. A. C.

Manufacture of crystallised hydrates of sodium metasilicate. J. CROSFIELD & SONS, LTD. From PHILADELPHIA QUARTZ CO. OF CALIFORNIA, LTD. (B.P. 388,041, 15.8.31).—A Na_2SiO_3 solution containing sufficient H_2O to form the desired hydrate but insufficient for a higher hydrate is prepared at a temp. above the m.p. of the desired hydrate and is slowly brought to supersaturation at a temp. below the m.p. by slow cooling and/or evaporation, with or without the addition of seed crystals. The crystals formed are removed, e.g., by centrifuging, at a temp. sufficiently high to ensure low viscosity of the mother-liquor. Thus, a solution containing $\text{Na}_2\text{O}:\text{SiO}_2:\text{H}_2\text{O} = 1:0.995:5.9$ for the prep. of $\text{Na}_2\text{SiO}_3 \cdot 5\text{H}_2\text{O}$ (m.p. 71.8°) is cryst. and centrifuged at about 65° . L. A. C.

Production of dicalcium phosphate. I. G. FARBENIND. A.-G. (B.P. 388,663, 27.7.32. Ger., 31.8.31).—Crude $\text{Ca}_2(\text{PO}_4)_2$ is decomposed with a solution containing $\text{CaH}_4(\text{PO}_4)_2$ and excess H_3PO_4 , and CaHPO_4 is pptd. by boiling the solution, which is then removed. The mother-liquor, after addition of fresh H_3PO_4 or treatment with H_2SO_4 and filtration, is used for the decomp. of more crude phosphate. L. A. C.

Production of base-exchanging substances. A. L. MOND. From I. G. FARBENIND. A.-G. (B.P. 388,570, 24.2.32).—Al silicates decomposable with difficulty by HCl (e.g., shales, feldspars, glauconites) are heated, and crushed to the desired grain size, at a temp. $<$ the m.p. of the mixture, with sufficient fused NaOH or

KOH to coat the granules. Buffer salts, e.g., $\text{Na}_2\text{B}_4\text{O}_7$, NaNO_3 , may be added to the fused alkali. The product, after washing with H_2O until free from sol. constituents, has a capacity of about 1–2% CaO. L. A. C.

Extraction of water of crystallisation or hydration from salts. METALLGES. A.-G. (B.P. 388,553, 29.1.32. Ger., 16.2.31).—Cryst. salts, e.g., $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, are treated under reduced pressure with a counter-current of superheated exhaust steam under conditions such as to avoid melting of the salt. The salt may be subjected at a uniform temp. to pressure reduced progressively in stages, and dehydration may be completed by the use of superheated live steam. L. A. C.

Evaporation of NaCl.—See I. H_2S and NH_3 from gases.—See II. Fertilisers.—See XVI.

VIII.—GLASS; CERAMICS.

Manufacture of opal glass. W. M. HAMPTON (J. Soc. Glass Tech., 1932, 16, 399–407 τ).—The variation of the brightness of a sheet of glass at different angular directions to an incident parallel beam, and the light output ratio (transmission) (I) of a hollow sphere were used as criteria by which the quality of a glass could be judged. Addition of SnO_2 increased the opacity (II), but reduced (I) by 8%; substitution of Na_2O by K_2O increased (II) for a given concn. of F; and substitution of SiO_2 by B_2O_3 increased (I), but only by decreasing (II). These results are explained in terms of the size, no., and *n* val. of the diffusing particles. The diffusing power increases rapidly with increase in particle size. The importance of the form in which the F is introduced (in influencing loss by volatilisation and coloration by refractory attack) is stressed. To raise the thermal endurance of an opal glass and thus render it suitable for gas lighting its B_2O_3 content must be increased, but the higher F content necessary to maintain the diffusing power tends to increase pot attack and other manufacturing difficulties. The success of the manufacture of flashed opals depends on the use of glasses not differing too widely in thermal expansion, and as the founding conditions of an opal have a great effect on its expansion, close control is essential. The effects obtainable with coloured flashed opals are described. Variations in opacity of sheet are due to inequalities of crystal growth caused by irregular reheating. The property which "Diffusalyte" has of allowing the filament to be seen as a white hazy patch of light is due to larger particle size (3–5 μ and approx. 3×10^7 particles/c.c.). J. A. S.

Opal glass: résumé of the work of the B.S.I. Sub-Committee ELG/3/2 on light-diffusing glass. S. ENGLISH (J. Soc. Glass Tech., 1932, 16, 387–398 τ).—The National Physical Laboratory work on the laws of diffusion is briefly summarised. Hollow spheres of various thicknesses were tested for overall transmission, diffuse reflection factor, and filament invisibility. The air-glass and glass-air reflection factors were measured, and it was possible to predict from these vals. the diffuse reflection factor for a glass of any thickness. The effect of the wave-length of the light was studied. Polar curves are given showing the variation of brightness of

the transmitted collimated beam with the angle of view. The effects of surface diffusion (etching, grinding, patterning) were also examined. J. A. S.

Theory and specification of opal diffusing glasses. I. J. W. RYDE and B. S. COOPER. II. J. W. RYDE, B. S. COOPER, and W. A. R. STOYLE (J. Soc. Glass Tech., 1932, 16, 408—430 T, 430—449 T).—I. The diffusion of light by a turbid medium can be expressed in terms of (a) the refractive index ($n=1.5$ for most glasses), (b) the total scattering coeff. (q) which is a function of the no., size, and composition of the particles, (c) NB , the product of the no. of particles per unit vol. (N) and the scattering coeff. (B) depending on their diam. and composition, and (d) μ , a combined adsorption coeff. of the glass and the particles.

II. The const. μ , q , and NB are discussed and the measurement of the photometric quantities from which they may be calc. are described. A method is derived for assessing the suitability of glasses and for specifying them. J. A. S.

Electrical conductivity of sodium metasilicate-silica glasses. E. SEDDON, E. J. TIPPETT, and W. E. S. TURNER (J. Soc. Glass Tech., 1932, 16, 450—477 T).—Measurements were made on a series of glasses (SiO_2 50.21—91.6, Na_2O 49.79—8.40%) in *vacuo* (<0.001 mm. Hg) from room temp. up to 560°. D.c., commutated d.c., and 50-cycle a.c. were used (according to the resistance) in the direct, current-measuring method. For the end glasses of the series, sp. resistance varied from 2.09×10^5 to 1.31×10^9 at 100° and from 71.8 to 7.53×10^4 at 400°. The relationship between temp. and resistance is linear, but transition and transformation points are indicated by well-defined breaks in the curves. The Rasch and Hinrichsen law, $\log W = A/T + B$ (W = resistance, T = abs. temp.), is found to hold true if new consts. are used in the various temp. ranges defined by the transition and transformation points. The curves relating the composition and the sp. resistance of the glasses consist of 2 straight lines intersecting at a point corresponding with $\text{Na}_2\text{O}, 2\text{SiO}_2$. J. A. S.

Drying of solids. V. Mechanism of drying of clays. T. K. SHERWOOD and E. W. COMINGS (Ind. Eng. Chem., 1933, 25, 311—316; cf. B., 1932, 451).—Curves relating rate of drying and H_2O content under const. external conditions were constructed for SiO_2 and fireclay brick mixes, sea sand, and a porous ceramic plate. Each shows a const.-rate period to the crit. point at which a continuous surface film of H_2O no longer exists, and then a falling-rate period. They also show evidence of a further discontinuity in the falling-rate period, which may be the point where unsaturated surface drying ceases to control and is replaced by internal diffusion. For plastic clay mixes the first crit. point is the point at which shrinkage is complete. Variations between the curves for different materials are connected with particle size. Tests at different temp. support the view of the falling-rate period stated above. Newman's equations for the falling-rate period based on diffusion equations and a finite surface resistance are analysed. They cannot be harmonised with the author's results. C. I.

Colour in ceramics. Methods in the brick and tile trades. W. L. FABIANAC (Chem. Trades J., 1933, 92, 197—198).—A range of colours can be secured by adding various oxides to the red-burning clay (I) and to the moulding sand. The oxide preferably is mixed with the clay before pugging; a rough-surfaced brick enhances the colour. Black is obtained by flashing with a mixture of MnCl_2 and NaCl (as in salt-glazing technique), or, by adding 1—3.5% of MnO_2 to the clay, a range of colours from brown to black is obtainable. A purple is secured by using a sand saturated with a 5% solution of Fe^{+++} . (I) can be bleached to a buff colour by adding 25—30% of an aluminous clay (e.g., kaolin) or CaO , to give a $\text{CaO-Fe}_2\text{O}_3$ ratio of 1.5:1. Orange tans and ivories are secured with TiO_2 , a golden effect on a sand-moulded brick with a mixture of muscovite and biotite micas, and greens with Zn-vapour glazing. Details are given for making "Dutch blue smoked tiles" by introducing powdered tar at the vitrification stage. Addition of Co_3O_4 and Cr_2O_3 to buff-burning clays (II) produces blues and greens, and a small amount of SnO_2 intensifies these colours. Admixture of 1% of air-floated chromite to (II) secures a grey colour. J. A. S.

Staining of pottery. II. A. CASTIGLIONI (L'Ind. Chimica, 1933, 8, 14—16).—Evidence is adduced regarding the part played by colloidal materials in the formation of stains. It is suggested that such substances give rise to vitreous, impermeable materials which prevent satisfactory absorption of the glaze. H. F. G.

Canadian minerals [sand for glass].—See VII.

PATENTS.

Manufacture of sheet glass. A. E. EDWARDS. From N.V. MIJ. TOT BEHEER EN EXPLOIT. VAN OESTROOIJEN (B.P. 385,775, 15.2.32).

Apparatus for hardening glass. COMP. RÉUNIES DES GLACES ET VERRES SPÉCIAUX DU NORD DE LA FRANCE (B.P. 385,843, 21.5.32. Fr., 21.9.31).

Cellulosic moulded articles. Varnishing safety glass.—See XIII.

IX.—BUILDING MATERIALS.

Distribution of extractive in redwood. Its relation to durability. E. C. SHERRARD and E. F. KURTH (Ind. Eng. Chem., 1933, 25, 300—302).—The % of material extractable with hot H_2O is fairly uniformly distributed throughout the heartwood of the trunk of young, second-growth redwood trees. In old, virgin-growth trees it decreases at the centre of the trunk, and at the outer edge of the heartwood increases, with decrease in height of the tree. The durability of redwood is attributed to the nature of the extract and varies with its distribution. B. P. R.

Coloured bricks etc.—See VIII. **Façade paints. Pigments and the building industry. Wood staining.**—See XIII.

PATENTS.

Manufacture of a substance or material [emulsion] for use in road-making. R. TAGG (B.P. 388,093, 5.9.31. Fr., 5.9.30).—Tars or petroleum

derivatives heated to fluidity, Na_2SiO_3 or K_2SiO_3 , and an aq. $\text{Ca}(\text{OH})_2$ suspension are emulsified in a vessel jiggled or shaken by external means. L. A. C.

Roads, pavements, etc. SALVIAM (B.P. 387,184, 25.4.32. Fr., 5.12.31).—A layer of road metal or tarmacadam is bound with a mortar containing calcareous sand 650, fine calcareous filler 60, $\text{Na}_2\text{C}_2\text{O}_4$ 0.2, H_2O , and bituminous emulsion (about 50% bitumen) 100 pts.

Manufacture of artificial wood articles or materials. G. W. BELDAM (B.P. 388,022, 14.8.31).—Mixtures of 40–15% of rubber compound and 60–85% of waterproofed wood shavings are moulded by heat and pressure. L. A. C.

Laminated wood products. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of J. R. BROSSMAN (B.P. 387,183, 23.4.32. U.S., 24.4.31).—See U.S.P. 1,834,895; B., 1932, 889.

Magnesite composition flooring. H. L. TUCKER (B.P. 388,158, 17.12.31).

Waste products [wood preservatives].—See II. Plastic compositions. Stain etc. for timber.—See XIII.

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

Rational use of blast-furnace gas in metallurgical works. Combustion of the gas under variable pressure. J. MARTIN (Rev. Mét., 1932, 29, 485–491).—Efficient utilisation of the blast-furnace gas in regenerators and other furnaces of a steelworks can be obtained only by the use of a regulator which controls the pressure and quantity of gas and air supplied. Such a device is described with reference to illustrations and diagrams. A. R. P.

Coke consumption in the [iron] blast furnace. J. VALLET (Rev. Mét., 1932, 29, 238–240).—Mathematical. Expressions are derived for calculating the coke consumption in the blast-furnace smelting of Fe ore. A. R. P.

Rapid wear of the shafts of blast furnaces. New method of cooling. A. COUSIN (Rev. Mét., 1932, 29, 57–60).—The middle of the shaft of an Fe blast furnace suffers the most rapid wear, but its life may be considerably prolonged by artificial cooling. H_2O , which is usually used for this purpose, has many disadvantages, and recently the Cockerill Co. have devised an air-cooling arrangement which has proved very satisfactory; the air at 20–30 cm. of H_2O is passed through small pipes passing centrally into holes in the masonry regularly distributed around the shaft. The cold air penetrates the porous brickwork and keeps it at a temp. at which the wear is very small. A. R. P.

Industrial dilatation pyrometers. P. CHEVENARD (Rev. Mét., 1932, 29, 442–448).—An illustrated description of two modern types of instrument for the automatic registration of the dilatation of a metal is given. A. R. P.

Salzgitter iron ores. J. KLÄRDING (Z. Elektrochem., 1933, 39, 140–143).—Results of reduction experiments at 900° are shown in tables and diagrams. The behaviour of different specimens with the same SiO_2 content is

very variable, and is related to the irregular distribution of the other constituents. F. L. U.

Effect of "facing" on the cooling velocity of a specimen [of cutlery steel] during quenching. S. SATÔ (Sci. Rep. Tôhoku, 1932, 21, 564–574).—The Japanese method of quenching, in which the surface of the specimen to be hardened is faced with a mixture of "tonoko" (powdered clay slate) and H_2O and then allowed to dry before quenching, has been studied. By means of an apparatus (described) for recording cooling curves automatically, it is shown that the velocity of cooling is much greater in the case of a faced than in that of an unfaced specimen. The slow cooling in the latter case is due to the vapour film which forms on the surface of the specimen during the first period of immersion in the quenching liquid. O. J. W.

Dilatometric anomalies of mild and very soft carbon steels. J. SEIGLE (Rev. Mét., 1932, 29, 169–182, 252–258).—The shapes of the dilatometric curves of soft Fe at the A3 point are influenced considerably by the presence of > 0.1% P, by prolonged heating at a red heat especially in H_2 or in vac., and by torsion at a red heat, but are not affected by the presence of dissolved gases and only slightly altered by the addition of ferromanganese in the last stage of their prep. The linear dilation may vary considerably from the cubic dilation; e.g., certain steels shrink in length after subjection to a series of heatings and coolings from about the A3 point, but no vol. change occurs, the section of the rods becoming oval. A theoretical explanation of this phenomenon is given. A. R. P.

Determination of oxygen and oxides in iron and steel. R. CASTRO and A. PORTEVIN (Rev. Mét., 1932, 29, 414–421, 449–469, 492–506, 553–563).—Methods suggested, especially during the last 20 years, for the determination of total O and individual oxides in Fe and steel are described and critically reviewed. A. R. P.

Oxide analysis by iodine extraction in steel-making problems. J. J. EGAN, W. CRAFTS, and A. B. KINZEL (Amer. Inst. Min. Met. Eng., 1933, Tech. Publ. No. 498, 10 pp.).—Comparative tests have been made of the I and Al methods of determining the oxide content of steels. Both methods give identical results with plain C and Mn steels, but the I method is unsatisfactory for steels containing Cr, V, or W, the carbides of which are not decomposed by the iodide solution. The distribution of O between the Si, Mn, and Fe as determined by the I method agrees with modern ideas on the mechanism of the reactions in steel-making; the method may be used to determine the freedom of steel from inclusions by calculating the $\text{SiO}_2:(\text{FeO} + \text{MnO})$ ratio with respect to the O + S content. A. R. P.

Experimental methods for study of corrosion. J. C. HUDSON (J.S.C.I., 1933, 52, 69–76 T).—A general review is given of some of the more important methods now available for testing resistance to corrosion, and their application is illustrated by references to the work of various experimenters in this country. J. C. H.

Corrosion of iron structures. J. G. VEAR (J. Oil Col. Chem. Assoc., 1933, 16, 39–49).—Careful cleaning of the metal from rust is essential to any efficient protective coating. A primary coat of paint

should give a hard, somewhat inelastic, film; Pb_3O_4 remains the most suitable pigment. Bituminous paints are satisfactory, but graphite is of doubtful val. as a primer. The finishing coat permits a rather wider choice of both pigment and vehicle, which should dry to a bright, smooth film which is not so hard as to be brittle. C. A. K.

Corrosion of iron, chromium, and nickel. Resistant alloys of these and other metals. R. MÜLLER, G. HAHN, and H. KRATNER (Berg. hüttenmänn. Jahrb., 1932, 80, 74—78; Chem. Zentr., 1932, ii, 2521).—With MgF_2 melts at 950° Ni was the most resistant, Cr-Ni steels moderately resistant, and heat-resistant Si steels considerably attacked. A. A. E.

Non-rusting and heat-resisting 34% chromium alloy cast irons. E. HOUDREMONT and R. WASMUTH (Met. & Alloys, 1933, 4, 13—17).—Three alloys containing approx. Cr 34%, Mn 0.4%, Si 1.3%, and C 1.1 (A), 2.3 (B), and 3.1% (C) were all resistant to atm. corrosion when polished, C being less resistant than A and B as cast. Both A and B showed good resistance to the usual acids and were immune from oxidation up to 1100° . Under the proprietary name "Nirostaguss," the alloys are suitable for sea- H_2O fittings, pipes, and valves in chemical industry, etc. C. A. K.

Acid-resisting steels in the sulphite[-pulp] industry. C. M. CARMICHAEL and G. S. SHAW (Pulp and Paper Canada, 1933, 34, 177—186, 208).—Several uses for Cr-Ni steels are indicated. A no. of photomicrographs are given. H. A. H.

Properties of low-carbon medium-chromium steels of the air-hardening type. E. C. WRIGHT and P. F. MUMMA (Amer. Inst. Min. Met. Eng., 1933, Tech. Publ. No. 496, 11 pp.).—The tensile and impact properties of air-hardened steels containing 0.1—0.3% C and 1—7.2% Cr have been determined after drawing at 550 — 750° and after furnace-cooling from the air-hardening temp. Steels with 1% Cr air-harden only slightly even when the C content is 0.3%; steels with 0.2—0.3% C require 3% Cr and those with 0.1% C about 5% Cr for efficient air-hardening, further additions of Cr in both cases being without appreciable action. Alloys with 3—5% Cr can be annealed to develop properties similar to those of mild C steels, and may also be air-hardened to impart high yield point and tensile strength combined with good ductility and resistance to impact, hence they are suitable for the manufacture of shaped articles which can be subsequently hardened without undergoing excessive distortion. The yield point: tensile strength ratio is 0.5—0.55 in the air-hardened condition and 0.75—0.8% after subsequent tempering; the resistance to corrosion is much $>$ that of plain C steels. A. R. P.

Properties of chromium-molybdenum steel at room and at elevated temperatures: overheating and regeneration. A. C. PRULIÈRE (Rev. Mét., 1932, 29, 34—43, 93—100, 156—163).—The effect of heat treatment on the microstructure and mechanical properties of a steel with C 0.6, Mn 0.4, Si 0.25, Cr 1.6, and Mo 0.22% has been investigated. The hardness rises linearly with the quenching temp. from 250 at

750° to 700 at 850° for oil-quenched specimens (A) and from 240 at 750° to 540 at 950° for air-quenched (B). Tempering A causes a reduction in hardness to 713 at 200° , 532 at 400° , and 364 at 600° ; the corresponding vals. for B are 555, 471, and 351. Max. tensile strength and yield point are obtained by tempering at 400° , temp. $> 600^\circ$ causing a sudden drop in both properties; B in all cases gives higher vals. than A. For B tempered at 600° for 1 hr. the yield point is 112 kg. per sq. mm., the ultimate strength 124.5 kg. per sq. mm., the elongation 9%, and reduction in area 33%. The microstructure after prolonged heating at 950° is compared with that of a plain C steel after similar treatment; the Cr-Mo steel can be regenerated by quenching in air from 950° and reheating at 700° , and the plain C steel by annealing at 900° and air-cooling. A. R. P.

Iron-chromium-aluminium alloys. C. TAILLANDIER (Rev. Mét., 1932, 29, 315—325, 348—356).—Thermal analysis and micrographic examination of Fe-Cr-Al alloys indicate the existence of a ternary eutectic at 2% Cr, 1% Fe, and 637° ; resistivity measurements show that there is probably a small range of ternary solid solutions. Addition of $> 2\%$ Fe and 2% Cr increases the brittleness of the alloys, renders difficult the production of homogeneous castings, and imparts to the alloys an undesirable grey colour. None of the alloys can be appreciably hardened by heat treatment. The mechanical properties and hardness of many ternary alloys at temp. up to 500° are tabulated. A. R. P.

Determination of chromium, manganese, and vanadium present together in special steels. W. HILTNER and C. MARWAN (Z. anal. Chem., 1933, 91, 401—411).—The Cr, Mn, and V are oxidised to $CrO_4^{''}$, MnO_4' , and VO_3' , respectively, by $(NH_4)_2S_2O_8$, and the MnO_4' is titrated with $H_2C_2O_4$. $CrO_4^{''} + VO_3'$ are determined by titration with $FeSO_4$, and the V alone is determined by re-oxidising to VO_3' with $KMnO_4$, removing excess of the latter, and finally titrating with $FeSO_4$. All the end-points are detected potentiometrically. F. L. U.

Mechanical properties of copper. IV, V. A. KRUPKOWSKI (Rev. Mét., 1932, 29, 16—33, 74—92).—IV. When expressed as load per unit area of the impression the cone-hardness vals. for annealed Cu vary with the angle of the cone, reaching a max. with an angle of about 120° , but when expressed as load per unit area of the circular cross-section they fall parabolically with increasing cone angle. The hardness vals. decrease with increasing load, rapidly for acute-angled cones up to about 500 kg. and linearly with higher loads and with obtuse-angled cones. The amount of cold-work done on the surface layers of the metal by the cone decreases with increasing cone angle. The ratio of the cone hardness to ball hardness is a function of the hardness of the metal, which for fully annealed Cu tends towards a limiting val. of 13.5 in Meyer units. In impression-hardness tests of Cu, the shape of the impression varies with the plasticity and hardness, which are dependent on the amount of cold-work; the outer ridge of the impression may be raised above the surrounding metal or depressed below it, or it may remain at the same level.

V. The hardness of cold-worked Cu rises rapidly with increasing reduction in thickness up to 30% and then more slowly with further reduction; after about 55% reduction the hardness val. is independent of the load and of the shape of the indenting instrument. The cone-hardness curve for annealed Cu consists of two portions convex to the temp. axis and meeting at the recrystallisation temp (340°) and has a similar shape to that of the temp.-tensile strength curve. The notched-bar impact strength of cold-worked electrolytic Cu decreases with rise in temp. up to 500°, the curve having a point of inflexion at 340°, and then rising again to the val. for soft Cu at 700°. Cu annealed in N₂ gives a max. impact val. at 340°, whereas that annealed in H₂ has a const. val. between 50° and 500°. A. R. P.

Distribution of porosity in copper ingots. N. P. ALLEN (Inst. Metals, Mar., 1933. Advance copy, 21 pp.).—Porosity in ingots varies in a very heterogeneous manner, but is caused partly by impurities present in the molten metal before pouring and partly by impurities taken up during casting. The typical form follows the lines of cones from the top and bottom of the ingot with also lines parallel to the sides, the apices of the cones approximating to the heat-centre of the ingot. The flow of heat, which causes differential freezing, appears to be the chief factor in determining the distribution of porosity. The specimens examined consisted of high-conductivity tough-pitch Cu, As-Cu, Cd-Cu, and deoxidised Cu ingots. C. A. K.

Effects of hydrogen and oxygen on unsoundness of copper-nickel alloys. N. P. ALLEN and A. C. STREET (Inst. Metals, Mar., 1933. Advance copy, 21 pp.).—All Cu-Ni alloys dissolve H₂ and, if saturated, produce unsound ingots similar to hydrogenated Cu when chill-cast. The alloys may be degassed with N₂, but if traces of O₂ (< 0.001% for alloys with < 25% Ni, and > 0.01% for those with > 30% Ni) are present a small quantity of H₂ will still produce unsoundness, probably due to the production of steam. (Cf. B., 1930, 422.) C. A. K.

Application of the diamond-pyramid indentation test to copper and copper-rich alloys in the form of thin strip. M. COOK and E. C. LARKE (Inst. Metals, Mar., 1933. Advance copy, 12 pp.).—The use of light loads for thin specimens is undesirable as the degree of accuracy decreases with decreasing load. Using a hardened steel anvil, Cu can be tested under a load of 10 kg. down to 0.01 in. thick and under 5 kg. down to 0.005 in. for all ranges of temper. C. A. K.

Equilibrium of the reaction between steam and molten copper. N. P. ALLEN and T. HEWITT (Inst. Metals, Mar., 1933. Advance copy, 16 pp.).—The equilibria of the reaction between steam and Cu at 1090–1350° with a H₂O v.p. of 90–350 mm. Hg are consistent with the mass-action laws. The H content of liquid Cu in equilibrium with an atm. containing steam may be expressed as follows: $H_m = A(p_{H_2O} \cdot [O])^{\frac{1}{2}}$, where H_m is the no. of mg. of H in 100 g. of Cu, p_{H_2O} the partial pressure of the steam and [O] the wt.-concn.-% of O in the Cu. The val. of A rises from 0.0085 at 1090° to 0.034 at 1350°, the dissociation pressure of Cu₂O from 0.00037 at 1090° to 0.23 at 1350°, and

Sieverts' const. (H in Cu) from 0.555 at 1090° to 0.98 at 1350°. The porosity of small Cu ingots melted in contact with steam and cooled at similar rates is determined more by their H than by their O content, hence neither steam nor H₂ should come in contact with molten Cu if sound castings are to be obtained.

A. R. P.

Tin-rich antifriction alloys containing lead, antimony, and copper. FOURNIER (Rev. Mét., 1932, 29, 101–107).—In Sb-Sn, Sb-Pb-Sn, Cu-Sb-Sn, and Cu-Sb-Pb-Sn alloys cubes of the β -Sb-Sn phase appear only when the Sb is > 8%. In Sb-Pb-Sn alloys with < 6% Pb the Sb tends to prevent the appearance of the Pb-Sn eutectic, and addition of Cu to Sb-Sn alloys prevents segregation of the Sn-Sb cubes. In the ternary system the η -Cu-Sn phase increases the hardness due to the Sn-Sb cubes and improves the homogeneity of slowly cooled alloys.

A. R. P.

Influence of small additions of aluminium to tin-rich Cu-Sb-Pb-Sn antifriction alloys. FOURNIER (Rev. Mét., 1932, 29, 108–111).—Addition of 1% Al to Sn alloys containing 3% Pb, 3% Cu, and 8% Sb prevents the separation of the cubic β -Sn-Sb phase and produces a fine globular microstructure in the rapidly cooled alloys. The Al alloys on cooling slowly, however, tend to segregate into two layers, the upper being rich in Cu and containing all the Al as well as slightly more Sb than the lower layer; this procedure, therefore, provides a method of eliminating Al from antifriction alloys.

A. R. P.

Interpretation of the tensile test (with reference to lead alloys). B. P. HAIGH and B. JONES (Inst. Metals, Mar., 1933. Advance copy, 12 pp.).—When comparing the ductility of different metals it is unsound to rely on the elongation as measured as a ratio of length to diam. of a test-piece unless a stress-strain diagram is consulted. The stable distributed elongation should be differentiated from the local elongation. This distinction may be observed by stressing a sufficiently long test-piece marked with a no. of equidistant points. A long range of stable distributed elongation is invaluable in certain practical applications of Pb alloys.

C. A. K.

Physical properties of zinc at various stages of cold-rolling. R. CHADWICK (Inst. Metals, Mar., 1933. Advance copy, 24 pp.).—The amount of work-hardening obtained by rolling Zn is quite small, increasing to a max. and then producing a progressive softening. Alloying constituents exert little influence during rolling, but affect the extent and rapidity of subsequent changes. The improved physical properties produced by light rolling were permanent, but the twinned structure failed to persist. Heavily worked Zn commenced to soften immediately after rolling, and the change was complete in a comparatively short period. On storage Cd and Hg alloys were subject to self-annealing, but Fe and Mg did not soften, the fibrous structure being retained. The normal mechanism of lattice distortion and twinning accounts for the initial hardening with up to 30% reduction, and with further reductions the formation of amorphous material accompanied by crystal orientation is suggested. C. A. K.

Effects of variations in mould and pouring temperatures on the macro- and micro-structures of some low-m.p. metals and alloys. F. D. WEAVER (Mrs. H. HEYWOOD) (Inst. Metals, Mar., 1933. Advance copy, 14 pp.).—The primary crystal structure of common and pure Sn, pure Sn with 2% Sb, the Sn-Pb eutectic, and the 14.5:7.7:77.8 Sb-Sn-Pb alloy is the coarser the higher is the mould temp. and the casting temp. The cored microstructure within the crystal grain is either coarsened or refined by raising the pouring temp. according to whether the mould temp. is above or below a certain crit. temp. Large crystals are obtained with pure Sn cast at 400–500° in moulds heated to 200° or cast at 300° in moulds at 100°, whereas smaller crystals are obtained at intermediate casting and mould temp. A. R. P.

Determination of the impurities in tin by means of the quartz spectrograph. C. S. HITCHEN (Amer. Inst. Min. Met. Eng., 1933. Tech. Publ. No. 494, 20 pp.).—The application of the logarithmic sector to the spectrographic determination of Bi, Cu, Pb, Fe, and Zn in Sn is described; suitable sensitive lines for arc and spark spectrograms are tabulated and intensity of line-pairs-composition curves are given for these elements and also for As and Sb in Sn. The method is unsuitable for the determination of < 0.03% As and < 0.07% Sb in Sn. A. R. P.

Some effects of addition of tellurium to lead. W. SINGLETON and B. JONES (Inst. Metals, Mar., 1933. Advance copy, 10 pp.).—Addition of up to 0.06% Te to Pb raises the temp. of recrystallisation and prevents self-annealing of the work-hardened metal so that sheet can be produced from the alloy with a tensile strength up to 4000 lb. per sq. in. with an elongation of 15%. Extruded pipes of the 0.06% Te alloy have a very fine grain structure and will undergo a high degree of distortion without fracture; they therefore have a much greater resistance to bursting by frost than have ordinary Pb pipes. The fatigue limit of extruded Te-Pb alloys with > 99.9% Pb is ± 0.5 ton per sq. in. on a basis of 10⁷ reversals without fracture. Addition of Te to Sb-Pb alloys improves their physical properties and increases their resistance to corrosion, especially in Cr-plating baths. A. R. P.

Extraction of germanium from germanium-bearing spelter retort residues. H. S. GABLE (Rec. trav. chim., 1933, 52, 225–228).—The residue left after distilling the Zn contains 0.1–0.5% Ge. On boiling with HCl, GeCl₄ distils over and is converted into GeS₂ by H₂S evolved simultaneously. The Ge is easily purified. D. R. D.

Mechanical enrichment of beryllium ores. L. USONI (Giorn. Chim. Ind. Appl., 1933, 15, 13–15).—Whereas quartz is floated completely by Na oleate in solutions of $p_H > 6.5$ the % flotation of beryl increases from 0 to 100 as the p_H is raised from 5 to 9.2; the method does not, however, offer a practical means of separation. Satisfactory separation of beryl from quartz may be effected by a mixture of Na oleate (100 g.), pine oil (150 g.), and Pb(NO₃)₂ (100 g.) per ton of ore. The yield is 50% and the floated ore is completely free from quartz. H. F. G.

Magnesium: its melting, casting, founding, and uses. R. DE FLEURY (Rev. Mét., 1932, 29, 341–347).—A review of modern foundry practice with Mg and its alloys, with especial reference to the fluxes used in melting. A. R. P.

Influence of volatile chlorides on magnesium and on copper. J. D. GROGAN and T. H. SCHOFIELD (Inst. Metals, Mar., 1933. Advance copy, 6 pp.).—Treatment of molten Mg with CCl₄ or TiCl₄ vapour improves the soundness of the castings but has no effect on the grain size; no useful alloy is obtained by continued treatment of Mg with TiCl₄. Treatment of molten Cu under charcoal with either chloride does not result in sound castings; treatment with CCl₄ under Na₂B₄O₇ produces castings of high density but with a low conductivity, probably owing to the effect of a small quantity of Fe. TiCl₄ gives no useful results even under Na₂B₄O₇. A. R. P.

Dissolution of magnesium and magnesium-base alloys by natural and artificial sea-water. L. WHITBY (Trans. Faraday Soc., 1933, 29, 523–531).—H₂ evolution-time curves for Mg in 0.5N-NaCl and in sea-H₂O show that the rate of attack in the former is > in the latter, due almost entirely to the presence of SO₄²⁻ in sea-H₂O. An artificial sea-H₂O (I) has been prepared reproducing the behaviour of natural sea-H₂O (II). Addition of traces of saponin increases the rate of H₂ evolution in aq. NaCl. This is attributed to the presence of obstructive H₂ films on the Mg. The losses in wt. of three Mg-base alloys and of one type of duralumin have been obtained after both intermittent-spray and total-immersion tests in (I) and (II) and in 2.5% aq. NaCl. The results were substantially the same as for pure Mg, but the differences were less pronounced after spraying than after total immersion. M. S. B.

Protection of magnesium alloys against corrosion by the pickling process. W. O. KROENIG and G. A. KOSTYLEV (Korrosion u. Metallschutz, 1932, 8, 147–151; Chem. Zentr., 1932, ii, 2522).—The best pickle contains K₂Cr₂O₇ (4 g.) and HNO₃ (18 g.) in H₂O (100 g.), used at 80° preferably in presence of NO₃⁻. The action of the pickle on alloys of different compositions is not the same. The protective effect is greatest in sea-H₂O. A. A. E.

Graphitic silicon, heat-treatment, and the electrical conductivity of aluminium. L. H. CALLENDAR (Inst. Metals, Mar., 1933. Advance copy, 8 pp.).—Graphitic Si is determined by dissolving 10 g. of Al (10–30-mesh) in 560 c.c. of dil. (2:5) HCl and collecting on a Gooch crucible. The residue is washed, dried, and treated with 40% NaOH in a gas-volumetric apparatus. The H₂ evolved is calc. to the Si equiv. "Dissolved" or "combined" Si seems either to be volatilised during dissolution of the Al or to pass through with the filtrate as a colloid. The definition of "free" Si is that it is equiv. to graphitic Si and corresponds with mol. Si, whilst dissolved Si is defined as Si present in at. form. The first separation of graphitic Si is correlated with a rise in the electrical conductivity of the metal. C. A. K.

Electrical conductivity of aluminium wire. A. J. FIELD and J. H. DICKIN (Inst. Metals, Mar., 1933. Advance copy, 16 pp.).—The optimum conductivity

of Al is obtained by hot-rolling at 410–460° with medium rates of reduction in the breaking-down and intermediate stages of rod-rolling, and with intermittent rolling in the intermediate and finishing stages. Heat-treatment of hard-drawn wire increases the initial low conductivity to a max. at 300°, above which temp. there is a decrease of conductivity; curves showing this change are given for metal of 99.08 and 99.59% purity and showing the change in conductivity and strength on annealing for various periods at 150–300°. The conductivity is reduced by the presence of impurities, Si having a much greater effect than Fe. Recommendations are made for the best procedure for drawing Al wires of high conductivity and strength. A. R. P.

X-Rays and elastic deformation of metals. V. MONTORO (Giorn. Chim. Ind. Appl., 1933, 15, 8–13).—A review of work on the application of X-ray interference diagrams to the study of lattice distortion produced by mechanical stress. H. F. G.

Plating of metallic surfaces with aluminium in an aluminium chloride-sodium chloride melt. V. A. PLOTNIKOV and N. N. GRAZIANSKY (Z. Elektrochem., 1933, 39, 62–67).—Fe may be coated electrolytically with a smooth, adherent layer of Al, using a bath containing 1–1.5 mols. of AlCl_3 per mol. of NaCl at 200° and a c.d. of 1 amp. per sq. dm. The product resists corrosion better than pure Al. Various physical tests are described, indicating the satisfactory nature of the deposit. A layer of solid solution is formed between the Fe and the Al. D. R. D.

New form of electrolytically deposited chromium. B. RASSOW and L. WOLF (Angew. Chem., 1933, 46, 141–142).—When Cu or brass is plated with Cr from a CrO_3 bath containing H_2SO_4 and the plated article is heated at 330°, complete diffusion of the Cu or Zn or both into the Cr occurs in a few hr. If, however, the Cr is deposited from a CrO_3 bath containing a complex F acid, no diffusion occurs at 330° even after 40 hr. When the base metal is brass a considerable loss of Zn occurs by diffusion through the porous Cr membrane in the second case, whereas in the first case the loss of Zn is much less as the Cr-Zn alloy formed hinders further diffusion. A. R. P.

Al foil for thermal insulation.—See I.

PATENTS.

Carburising [case-hardening of iron or steel] and composition therefor. C. B. EDWARDS, Assr. to P. C. REILLY (U.S.P. 1,855,389, 26.4.32. Appl., 29.4.27. Renewed 9.12.30).—A composition for carburising or case-hardening Fe and steel articles consists mainly of a substantially non-porous C of low volatile content (2–12%) and low combustibility, so that the hot material does not burn appreciably on exposure to air. It may also contain chemical energisers, e.g., carbonates of Na, Ba, and Ca. A. B. M.

Production of cast metal blocks. J. E. POLLAK. FROM VEREIN. ALUMINIUM-WERKE A.-G. (B.P. 386,247, 16.7.32).—While the metal is solidifying the mould is shaken, in a direction transversely to the growth of crystals, with diminishing intensity and frequency.

Welding processes. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of G. E. TAYLOR (B.P. 386,043, 22.9.31. U.S., 22.9.30).—Successive layers or sections of the metals and/or hard metal compositions to be welded together are superimposed in powdered form in a mould and simultaneously pressed and sintered.

Production of enamel-lacquered wires. A. EHRENZWEIG (B.P. 386,102, 11.12.31. Ger., 17.11.31. Addn. to B.P. 385,730; B., 1933, 199).—The lacquers described in the chief patent are used to coat wires.

Flotation apparatus. A. C. DAMAN (B.P. 387,100, 1.1.32. U.S., 5.10.31).

Coated cathodes.—See XI.

XI.—ELECTROTECHNICS.

X-Ray studies on lead-acid storage batteries. C. S. BARRETT (Ind. Eng. Chem., 1933, 25, 297–300).—X-Ray diffraction rings of storage-batteries plates were photographed and the results compared with standards given by Pb, PbO_2 , and PbSO_4 (coarse and fine crystals). Coarse PbSO_4 gives a spotty photograph, and estimates were made of the proportion of such PbSO_4 (believed to be the sign of unhealthy sulphation) by counts of the spots. It was found that in used batteries the positive and negative plates rarely showed the same amount of sulphation. In one case sulphation of the negative plate alone was found to be due to the deposition of Sb. It is not claimed that complete correlation between the failure of cells and sulphation as measured in this way is established. C. I.

Electrolytic gas cells. J. TOBLER (Z. Elektrochem., 1933, 39, 148–167).—Cathodes consisting of various types of granulated C, graphite, or metal have been studied with reference to their use in primary cells in which air is the depolariser. Such electrodes rapidly lose their activity through the wetting effect of the electrolyte, but if they are coated with a film of paraffin before use const. potentials on open circuit can be obtained. Tables are given showing the variation of potential with load. The electrodes can be activated either by anodic polarisation or by impregnation with Fe derived from various sources. H_2 electrodes of Ni, Ni + Pt, Fe, Fe + Pt, Pt, and platinised graphite have been similarly studied. The last-named can give 0.7 amp. per sq. dm. at 0.1 volt polarisation. The electrolyte used throughout was N-NaOH. F. L. U.

[Voltaic] cells with combustible [anode]. E. BAUR and J. TOBLER (Z. Elektrochem., 1933, 39, 169–180).—A general review with full references is given. F. L. U.

Stirred and granulated electrodes. E. BAUR (Z. Elektrochem., 1933, 39, 168–169).—The development of the granulated C electrode, depolarised by an air stream, is described. F. L. U.

Measuring paper acidity.—See V. **Prep. of H_2SO_4 and H_3PO_4 .**—See VII. **Conductivity of glasses.**—See VIII. **Conductivity of Al wire.** **Plating [Fe] surfaces with Al.** **Te-Pb [in Cr-plating].** **Cr-plate.**—See X. **Sb electrode for tannin solutions.**—See XV. **Conductivity of soil fluid.**—See XVI.

Determining supersaturation of masecutes.—See XVII. Examination of waters. Electro-osmosis of H_2O .—See XXIII.

PATENTS.

Coating metal bodies with the azides of emissive metals, and manufacture of metallic or metallic oxide cathodes. EGYESÜLT IZZÓLÁMPA ÉS VILLAGMOSÁGI RÉSZVÉNYTÁRSASÁG (B.P. 388,586, 22.3.32. Hung., 22.5.31).—The metal body (*e.g.*, Mo, W, Ni), perforated if desired, is heated, prior to application of azide solution, to above 50° and preferably above the b.p. of the solution. A boiling saturated solution gives the best adhesion. J. S. G. T.

Vacuum or gas-filled electric-discharge tubes. W. L. W. SCHALLREUTER (B.P. 385,645, 9.7.31).—The electron-emitting element is composed of, or coated with, an oxide which is an electrical non-conductor when cold.

Electric-discharge devices. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of T. E. FOULKE (B.P. 385,898, 28.7.31. U.S., 2.8.30).—The electrodes in a gas-filled envelope are coated with an alkali or alkaline-earth metal preferably mixed with its oxide.

Photo-electric cells. INTERNAT. GEN. ELECTRIC Co., INC., Assees. of ALLGEM. ELEKTRICITÄTS GES. (B.P. 386,143, 15.2.32. Ger., 13.2.31).— Cu_2I_2 , applied to the electrode by pressure or fusing, forms the effective substance and is covered by a translucent electrode.

Electrolytes [for aluminium-electrode dry condensers]. AEROVOX WIRELESS CORP., Assees. of A. GEORGIEV (B.P. 388,462, 25.9.31. U.S., 9.12.30).—See U.S.P. 1,815,768; B., 1932, 514.

Electronic-discharge tubes. LA RADIOTECHNIQUE (B.P. 387,123, 1.2.32. Fr., 12.2.31).

Electric-discharge tubes for generating ultra-violet rays. C. HUMMEL (B.P. 387,130, 10.2.32. Ger., 11.2.31).

Cathode-ray tubes. INTERNAT. GEN. ELECTRIC Co., INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 385,923 and 387,275, [A] 3.10.32, [B] 9.9.32. Ger., [A] 3.10.31, [B] 12.9.31).

Gas-filled electron-discharge tubes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 386,063 and 386,111, [A] 21.10.31, [B] 29.12.31. Ger., [A] 26.1.31, [B] 20.4.31).

Electron-discharge tubes. ALLGEM. ELEKTRICITÄTS-GES. (B.P. 386,282, 24.9.32. Ger., 25.9.31).

[Insulating] artificial resins.—See XIII.

XII.—FATS; OILS; WAXES.

Erratum.—On p. 236, col. 2, lines 10—12 from bottom, for "trimyristin . . . 9.4%," read "trimyristin 42.5, tripalmitin 15.9, free myristic acid 5.0, free palmitic acid 9.0, triolein 6.2, unsaponifiable matter 8.5, and resinous residue 9.4%."

Fractional extraction applied to the analysis of fats and mixed hydrocarbons of high mol. wt. E. ANDRÉ (Bull. Soc. chim., 1933, [ii], 53, 60—72).—An apparatus is described for the continuous fractional extraction of 1 kg. of fat or oil. Extraction of castor oil

by ligroin (b.p. $60-80^\circ$), arachis oil by $EtOH-COMe_2$ (2:1), the liver oil of *Scymnorhinus lichia* by $MeOH-COMe_2$ (3:1), and of pharmaceutical vaseline (solvent not stated) gives fractions with progressively changing properties. R. S. C.

Determination of fatty matter in organic substances. A. HECQUET (Ann. Chim. Analyt., 1933, [ii], 15, 61).—Fatty matter in treated artificial silk or in casein is determined by treatment with $H_2SO_4-H_2O$ (about 2:1) at -5° , extraction of the unchanged matter by CCl_4 , and weighing of the residue left on evaporation. R. S. C.

Development of rancidity in linseed oil. A. VON BOCK (Farm. Notisbl., 1927, 175—186; Chem. Zentr., 1932, ii, 3321).—Unfiltered, filtered, and heated (100° for 1 hr.) oils were kept for 693 days in light or in the dark. Stamm's diphenylcarbazide reaction indicates the degree of rancidification. Filtered cold-pressed oil was the most resistant. Heating does not confer resistance. A. A. E.

[Ravison] rapeseed oil: air-blowing in presence of catalysts. B. P. CALDWELL and G. H. DYE (Ind. Eng. Chem., 1933, 25, 338—342; cf. B., 1932, 313).—Changes in η of the oil on air-blowing in the presence of a large no. of catalysts are detailed; in the absence of catalysts, the same results were obtained with dried or H_2O -saturated air at 160° . Blowing was accelerated by increasing the rate of air supply, raising the temp. of blowing ($154-200^\circ$), or adding Al oleate ($=0.1\%$ Al on the oil), erucic acid (1%), oleic acid (2%), blown rape oil (1%), Mn, Pb, or other metal linoleate ($=0.1\%$ of metal) (in order of decreasing effectiveness), and retarded (increasingly) by additions, respectively, of Co linoleate ($=0.1\%$ Co), $NHPh-NH_2$ (0.1%), quinol (0.025%), or anthranilic acid (1%). In the absence of catalysts, the max. formation of peroxidised compounds (KI test) occurred at the period of most rapid change of η of the oil; no peroxides were detected when catalyst was employed. Olein increased in η on blowing (without catalysts) much as did rape oil, whilst oleic acid scarcely thickened. Erucic acid of high purity was prepared in good yield by fractional distillation of rape oil fatty acids at low pressures (0.2 mm.). E. L.

Soya-bean oil: quantity and yield as affected by conditions of expression. R. L. SMITH and H. R. KRAYBILL (Ind. Eng. Chem., 1933, 25, 334—336).—Laboratory tests on two varieties of bean showed that the colour of the oil produced was only slightly increased by raising the temp. of expression. "Non-breaking" oils, which give no ppt. and become bleached when heated to 315.5° ("break test"), are obtained, when expression is performed at temp. below a certain "crit. temp. of pressing" ($T_p = 50-65^\circ$). Oils expressed above T_p darken considerably and give a dark ppt. in the break test; T_p was approx. 65° , 55° , and 50° for meals containing 4, 6, and 8% H_2O , respectively. Changes of H_2O content from 0 to 8% and pressing temp. from 20° to 100° did not affect the I val. of the expressed oil. E. L.

Halogen indices of Aleurites oils. P. LÉVY (Compt. rend., 1933, 196, 549—552).—Complete saturation of the double linkings of elaeostearic acid in varnish oils is

effected by exposing the latter in a thin film to Br vapour for 2 hr. The I val. is calc. from the wt. of Br absorbed. Vals. of 228—234 are obtained for different *Aleurites* oils. No Br is fixed by substitution of H_2 in this procedure.

A. C.

Significance of the stearin content of cod-liver oil. G. E. EWE (J. Amer. Pharm. Assoc., 1933, 22, 109—112).—Of 22 samples of oil examined, all remained clear at -7° . The viscosity did not rise in any marked degree with rise of stearin content at normal temp., and alternate pptn. and dissolution of the stearin had no effect on the oil.

E. H. S.

Presence of ether-esters of glycerol in various liver oils of elasmobranchs and certain specific analytical characteristics of these oils. E. ANDRÉ and A. BLOCH (Compt. rend., 1933, 196, 618—620).—The liver oils (I) from *Centrina Salviani* (1.2; 29.2%), *Hexanchus griseus* (2.3; 17.8%), and *Somniosus microphalus* (1.6; 18.8%) have low Ac vals. but give unsaponifiable matter (respective data in parentheses) with high Ac vals. (336, 326, and 283, respectively), indicating the presence of a large proportion of higher ether glycerides (A., 1932, 1275). This characteristic is absent when a large proportion of hydrocarbon is present. (I) are levorotatory and hydrolysis causes marked diminution in optical activity, only a very small proportion of which appears in the unsaponifiable matter, and it is concluded that the levorotation of selachyl alcohol is four times as great in its esters as it is in the free state.

J. W. B.

Analysis of sulphonated oils. E. R. THEIS and J. M. GRAHAM (J. Amer. Leather Chem. Assoc., 1933, 28, 52—63).—The free fatty acids, neutral oil, and unsaponifiable matter are removed by extracting an EtOH solution of the oil with light petroleum in a modified Soxhlet extractor. The unneutralised sulphonated oils and oxy-fats (termed "Polar₁") are extracted with CCl_4 from the alcoholic residue diluted with H_2O ; after adding HCl to the aq. residue, "Polar₂," i.e., the oils obtained by acidifying the neutralised sulphonated oils and the soaps of oxidised and unoxidised fatty acids, is extracted with CCl_4 , and "Polar₃," i.e., the highly polymerised compounds, remains as insol. matter in the extracted solution. The acid val. and unsaponifiable matter are determined on the light petroleum extract. Results based on this method of analysis have been derived for a no. of typical sulphonated oils.

D. W.

Determination of sulphate ion in sulphonated oils. F. NEUBER and H. WÄCHTER (Z. anal. Chem., 1933, 91, 425—432).—The oil, without previous drying, is dissolved in 10 times its vol. of 95% EtOH and heated at $60-70^\circ$ until the ppt. (of Na_2SO_4) has settled. The latter is then separated and dissolved in H_2O , and the SO_4^{2-} is determined in the usual way.

F. L. U.

Determination of perborate in detergent media. A. RINGBOM (Z. anal. Chem., 1933, 92, 95—101).—About 1 g. of the material is dissolved in 150 c.c. of H_2O at $35-40^\circ$ and poured with shaking into 100 c.c. of 2N- H_2SO_4 containing about 1 g. of $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$. The Fe^{3+} ion produced is titrated with 0.05N- $TiCl_3$, using KCNS as indicator.

J. W. S.

Capillary activity and adsorption of soaps. J. MIKUMO (J.S.C.I., 1933, 52, 65—68 T).—A summary of the authors' researches (cf. A., 1927, 306; 1929, 641; 1930, 287; 1931, 679).

PATENTS.

Manufacture of fatty substances miscible with water. DEUTS. HYDRIERWERKE A.-G. (B.P. 388,630, 13.6.32. Ger., 12.6.31).—Very hydrophile substances miscible with H_2O and mineral and/or fatty oils are obtained by hydroxylating the unsaturated alkyl esters of liquid waxes (sperm and bottle-nose whale oil), e.g., by treatment with H_2SO_4 at -5° to 0° (or with Caro's acid, HOCl, halogens, etc.) followed by hydrolysis with steam at $90-100^\circ$; the products are useful for the leather industry.

E. L.

Products from unsaturated fatty acids.—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Turpentine oil. M. DESALBRES (Bull. Inst. Pin, 1932, 287—288; 1933, 13—16).—The val. of turpentine oil, especially from *Pinus maritime*, as a diluent for paint is the greater the larger is the amount of residue left on evaporation, i.e., the larger is the amount of preliminary oxidation to the oxidation autocatalyst, pinene peroxide, which has occurred. Such oxidation is facilitated by storage in galvanised-Fe tanks. The oxidation products attack the metal, giving oil-sol. soaps from which by a secondary breaking down of the C chains lower fatty acids, especially HCO_2H , are produced, and a deposit of $(HCO_2)_2Zn$ results. The prep. and industrial uses of various terpineol derivatives, especially camphor and terpin, are discussed.

J. W. B.

Use of antimony white in paints. F. KOLKE (Farben-Ztg., 1933, 38, 676—677).— Sb_2O_3 paints are marked by neutrality, moderate covering power, good gloss, and absence of chalking; they are inferior to ZnO paints in durability, hardness, and drying rate. Doubt is cast on the assumed poisonous action of Sb_2O_3 .

S. M.

"Chalking" [of paint films]. VI. Practical trials of chalking of oil paints. III. R. KEMPF (Farben-Ztg., 1933, 38, 616—618, 644—646; cf. B., 1931, 895).—Comparative measurements were made at intervals during 3 years of the cracking tendency, discoloration, and durability of paint films containing Ti-white (I), TiO_2 (II), lithopone (III), and white lead (IV) and spread on priming coats of III and Al-bronze. The results (tabulated) show that the cracking and discoloration, like the chalking, are controlled by the transparency of the pigment particles to ultra-violet light. Cracking was absent with I and II, but was considerable with III and IV and increased with southerly exposures. Darkening varied inversely with the chalking; it was greatest with IV, but gradually decreased during the summer if exposed to the south. The life of the films decreased in the order IV, I, II, III and was influenced by the chemical activity of the pigment, although decreases were again observed with increasing light exposures. It is concluded that a knowledge of the chalking tendency is not sufficient for the evaluation of these pigments; comparison of them

can be made only for definite conditions of application and exposure. S. M.

Paint testing. II. P. NETTMANN (Farben-Chem., 1932, 3, 7—9; cf. B., 1931, 552).—The actinic val., red, green, and blue contents, decomp. products evolved, air absorbed, and heating effect of various sources of light are tabulated. The results are discussed from the viewpoint of comparison with sunlight for paint exposures. An actinometer is described in detail.

S. S. W.

Façade pigments and paints. W. VAN WÜLLEN-SCHOLTEN (Farben-Ztg., 1933, 38, 677—679; cf. B., 1930, 917).—The behaviour of 10 red, yellow, and green pigments in 7 proprietary aq. and oil vehicles and spread on plaster is given. Water-glass frequently causes efflorescence. Some defects in such surfaces are illustrated and discussed.

S. M.

Earth and mineral pigments in the building industry. C. R. PLATZMANN (Farben-Chem., 1933, 4, 88—92).—Pigments suitable for covering cement and plaster are discussed. Natural Fe oxides can be used for red, yellow, and brown paints; artificial Fe oxides are unsuitable. Chrome green is preferable to ultramarine green, and Mn black to C black. Zn chromes are stable only under dry conditions. The presence of barytes, gypsum, and sol. salts tends to produce streaky effects. The testing of pigments for fineness, insolubility, soundness, presence of sol. salts and org. matter, staining power, light- and weather-resistance is described.

S. M.

Manufacture of chrome yellows. S. G. RUBLJOFF (Farben-Chem., 1933, 4, 96—100).—The results of many attempts to produce chrome yellows and orange chromes, using PbCl_2 made by immersing granulated Pb in 18% FeCl_3 solution (acidified with HCl) and recrystallising from hot conc. NaCl solution, are summarised. The wet crystals are converted into neutral or basic carbonates by prolonged grinding with CaCO_3 , CaCO_3 and Ca(OH)_2 , MgCO_3 , or Na_2CO_3 . In the case of CaCO_3 the d , tone, covering and staining powers, and rate of settling in oil are best when the CaCl_2 is removed by decantation and washing with NaHCO_3 . The pptn. of the chrome should be effected in dil. solution. Of the sulpho-chromes, those having the composition $2\text{PbCrO}_4 \cdot \text{PbSO}_4 \cdot \text{PbCO}_3$ displayed optimum pigment properties; they had remained in the mother-liquor (pH 7) for 6 hr. subsequent to pptn. Equiv. proportions of NaHSO_4 can be used in place of H_2SO_4 ; excessive acidification with H_2SO_4 or HCl is disadvantageous. Tables of data are given to show the effect of some conditions of pptn. on the properties of the pigments. The solution of PbCl_2 in NaCl may alternatively be treated at 50° with either Na_2CO_3 or Na_2CO_3 and NaOH; complete hydrolysis with NaOH gives inferior chromes.

S. M.

Wood staining. H. WOLFF and I. RABINOWITSCH (Farben-Chem., 1932, 3, 6—7).—The behaviour on wood of 3 types of stains is described. Pyrocatechol gives an even penetration resulting in a clear, uniform stain. "Nut-wood stain" (Cassel brown), though showing very little penetration, produces a continuous surface film resulting in even staining but obscuring the grain.

Coal-tar dyes show irregular penetration, causing clear but uneven staining. Subsequent polishing, waxing, etc. does not alter these essential differences.

S. S. W.

Rosin and rosin size. E. SEMMELBAUER (Papier-Fabr., 1933, 31, 187—189).—The variation in composition of rosin is examined. Yellowing is due to oxidation at a double linking and can be avoided by hydrogenation. The addition of colloids to the rosins is discussed.

A. G.

Dissolution of resins in alkali. II (contd.). **Preparation of resin solutions in the paper industry.** W. GAMM (Kolloid-Z., 1933, 62, 348—350; cf. B., 1933, 276).—The significance of the solid-phase rule is discussed further in relation to technical practice.

E. S. H.

Solubility of balata resin. O. MERZ (Kautschuk, 1933, 9, 42).—On account of the possibilities of balata resin as an ingredient for cellulose lacquers, its solubility is a matter of importance. The behaviour of a sample of balata resin to a no. of org. solvents at 20° and 100° is tabulated.

D. F. T.

Solubility of cellulose nitrates. P. DEMOUGIN (Compt. rend., 1933, 196, 408—410).—If the portion of a cellulose nitrate partly sol. in a solvent, e.g., $\text{EtOH} + \text{Et}_2\text{O}$, which remains insol. therein is dissolved in a complete solvent, e.g., COMe_2 , and reprecipitated, a further portion is sol. in the partial solvent. This process may be repeated until about thrice the amount dissolved out in the first operation has been dissolved.

G. A. S.

Durability experiments with nitrocellulose lacquers. O. BRAUN (Farben-Chem., 1932, 3, 10).—By a series of accelerated exposures on lacquers based on 4 types of nitrocellulose, 2 resins, and 5 plasticisers, optimum proportions were arrived at as follows: 7.15 of nitrocellulose: 17.5 of resin: 9.3 of plasticiser, or, when using a "resin balsam," 10 of nitrocellulose: 24 of balsam. Lacquers on these formulations containing 180 pts. of high-boiling solvents and 560 pts. of diluent per 100 pts. of dry nitrocellulose showed satisfactory durability on normal exposure.

S. S. W.

Composition of "crackle" lacquers. L. KERN (Farbe u. Lack, 1933, 125—126).—The crackle effect is distinguished from deposition of crystals and is produced by actual cracks in the film in consequence of low nitrocellulose or resin content, high pigment content, the presence of a swelling agent, e.g., Al stearate, or the rapid deposition of the film from very volatile solvents or thinners. Recipes are given for lacquers for the priming, crackle, and finishing coats.

S. M.

Rosin sizing.—See V. Hydrated TiO_2 .—See VII. Corrosion of Fe.—See X. Chlorinated rubber. Chloroprene plastics.—See XIV.

PATENTS.

Accelerating the settlement of pigments [in aq. suspension]. H. GROSSMAN, Assr. to W. S. PRITCHARD (U.S.P. 1,819,462, 18.8.31. Appl., 24.2.27).—A colloidal solution of casein or other protein is added to a pigment suspension, and the protein is coagulated by the addition of $\text{Al}_2(\text{SO}_4)_3$, BaCl_2 , HCl, etc. Alternatively, Al(OAc)_3

is added to the aq. pigment suspension, and the $\text{Al}(\text{OH})_3$ so formed is coagulated together with the pigment.

S. S. W.

Manufacture of [dye] lakes. T. A. MARTONE, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,820,540, 25.8.31. Appl., 28.5.28).— β -Naphthylamine-1-sulphonic acid is diazotised in the presence of $\beta\text{-C}_{10}\text{H}_7\cdot\text{OH}$, and an aq. solution of an alkaline-earth metal salt, e.g., BaCl_2 , is added.

S. S. W.

Manufacture of printing inks. IMPERIAL CHEM. INDUSTRIES, LTD., S. HORROBIN, and A. STEWART (B.P. 388,072, 19.8.31).—An emulsion of H_2O in a mineral oil, e.g., kerosene, is prepared with the aid of wool grease, with or without an auxiliary emulsifying agent, e.g., Ca stearate or saponified rosin oil, and the C black or other pigment (org. or inorg.) is added.

S. M.

Printing ink. F. G. LASHER (U.S.P. 1,822,533, 8.9.31. Appl., 1.2.29).—Mixtures of a H_2O -in-oil type of emulsion containing H_2O -insol. metal soap, e.g., Ba oleate, xylene, gilsonite, H_2O , and pigment are claimed.

S. S. W.

Preparation of a product for deleting or obliterating inscriptions or drawings in black or red ink from tracing cloth, without leaving any trace thereon. J. M. GILBERT (B.P. 369,828, 7.7.31).—Essence of turpentine (17 pts.), finely-divided pumice stone (53 pts.), virgin wax (16 pts.), and petroleum jelly (14 pts.) are warmed together to form a paste.

S. S. W.

Coating of [safety] glass and other objects with varnish films. H. WADE. From C. W. BONNIKSEN (B.P. 388,050, 13.8.31).—An air-free cellulose ester or other varnish is fed downwardly on to a transversely moving glass sheet and the solvent removed by passing the film slowly through a hot air-free liquid of high b.p., e.g., castor oil, with which the varnish is immiscible. The solvent is recovered from the castor oil by distillation.

S. M.

[Nitrocellulose] coating compositions. C. ELLIS (B.P. 388,367, 16.6.31).—Nitrocellulose of intermediate η is used in admixture with a resin which is made by heating together a polyhydric alcohol, e.g., glycerin, a polybasic acid, e.g., phthalic anhydride, and either a fatty oil, its free acid(s), or other monobasic org. acid(s). Limited proportions of synthetic or natural resins may also be added.

S. M.

Production of surface-sealing compound or stain [for timber etc.]. F. S. VIVAS, Assr. to INTERNAT. FIREPROOF PRODUCTS CORP. (U.S.P. 1,822,253, 8.9.31. Appl., 8.10.27).—A solution of rubber (1 oz.) in C_6H_6 (4 oz.) diluted with CCl_4 to 1 gal. is added to a mixture of $\text{C}_{10}\text{H}_2\text{Cl}_6$ (4 oz.) with "fireproof varnish" (1 lb.).

S. S. W.

Purification of [wood] rosin. D. C. BUTTS, Assr. to HERCULES POWDER Co. (U.S.P. 1,820,298, 25.8.31. Appl., 16.10.26).—Wood rosin is melted and then distilled under reduced pressure, up to 300° , in an atm. of CO_2 throughout, substantial decomp. being avoided.

S. S. W.

Manufacture of (A) artificial resins, (B, C) resinous condensation products. INTERNAT. GEN. ELECTRIC

Co., INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 388,030, 388,097, and 388,451, [A] 15.5.31, [B, C] 8.9.31. Ger., [A] 15.5.30, [B, C] 8.9.30).—(A) Thermohardening resins sol. in org. liquids and suitable for insulating articles are made by stirring NH_2Ph into a solution of phthalic acid in EtOH , with or without a contact agent, and then heating with excess of CH_2O . (B) A solution of phthalic acid or anhydride in NH_2Ph is heated with CH_2O . (C) The softening point of such $\text{NH}_2\text{Ph}-\text{CH}_2\text{O}$ resins is raised by restriction of the phthalic acid to > 0.04 equiv. (relative to the NH_2Ph) and a subsequent heat treatment.

S. M.

Fluid [phenolic] condensation product. A. L. BROWN, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,820,690, 25.8.31. Appl., 30.3.21).—A phenol, e.g., cresol (4 pts.), is heated to $100-110^\circ$ with a substance containing an active methylene group, e.g., CH_2O , and a polymerisable vegetable oil, e.g., tung oil (1 pt.). H_2O and H_2O -sol. ingredients are removed, and the product is heated *in vacuo* to $50-80^\circ$ to remove uncombined CH_2O and residual H_2O , the proportions of the ingredients being such that the final product is liquid at room temp. and capable of hardening under heat.

S. S. W.

Manufacture of synthetic resin. J. MCINTOSH, Assr. to CONTINENTAL-DIAMOND FIBRE Co. (U.S.P. 1,820,816, 25.8.31. Appl., 12.8.20).—A phenol, e.g., PhOH , is condensed with H_2O -sol. carbohydrate, e.g., glucose, in the presence of an acid catalyst, e.g., H_2SO_4 , and the initial condensation product so formed is heated with a hardening agent, e.g., hexamethylenetetramine, giving a hard infusible resin.

S. S. W.

Coating and moulding compositions containing oriental lac. X. WINTER (B.P. 388,115, 19.10.31).—Lac from *Rhus vernicifera*, *Melanorrhæa laccifera*, or the like is incorporated, before setting, with 15–100 wt.-% of pulverised calcareous cement.

S. M.

Manufacture of moulding mixtures and articles moulded therefrom. BAKELITE GES. M.B.H. (B.P. 369,571, 19.12.30. Ger., 21.12.29).—Mixtures of filler and potentially reactive synthetic resin, e.g., $\text{PhOH}-\text{CH}_2\text{O}$, "glyptal," in the *B*-state, are prepared by dissolving an *A*-resin or the components thereof in a *B*-resin solvent, e.g., cyclohexanol, and heating the solution to convert the resin into the *B*-state, the filler being introduced at any convenient stage before pressing.

S. S. W.

Compositions of matter. [Moulding powders containing cellulose acetate etc.] BRIT. CELANESE, LTD. (B.P. 388,421, 24.8.31. U.S., 22.8.30).—The acetate or other ester or ether of cellulose which is sol. in CO_2 and has $\eta < 5$ can be used as the basis in moulding powders for sound records etc.

S. M.

Manufacture of moulded articles from cellulose derivatives. CELLULOID CORP. (B.P. 388,387, 22.7.31. U.S., 24.7.30).—The mass left after removal of excess of solvent from the kneaded mixture of cellulose nitrate or acetate, plasticiser, stabiliser, and filler may be malaxated and is then either calendered between hot rolls or extruded through a shaped orifice. Sheets suitable for safety glass are thus made.

S. M.

Grinding etc. of thermoplastic materials consisting of or containing cellulose derivatives. CELLULOID CORP. (B.P. 388,384, 21.8.31. U.S., 21.8.30).—The mill is provided with a H₂O-jacket and the mixture of cellulose acetate, or other ester, and plasticiser is further cooled during the grinding by a current of air. S. M.

Production of [resinous] moulded articles [e.g., gramophone records]. HANSEATISCHE MÜHLENWERKE A.-G., and POLYPHONWERKE A.-G. (B.P. 388,297, 23.7.32. Ger., 17.8.31).—Crackling noises are eliminated by incorporating a phosphatide, e.g., lecithin, from which any oils naturally present are removed with COMe₂, with the mixture of natural or synthetic resins, fillers, etc. prior to moulding. S. M.

Plastic [vinyl] compositions. CARBIDE & CARBON CHEMICALS CORP., Assees. of F. GROFF (B.P. 388,309, 4.8.32. U.S., 10.8.31).—Polymerisation of a mixture of a vinyl halide, e.g., chloride, with < 43 wt.-% of a vinyl compound containing O, e.g., acetate, in the presence of Bz₂O₂ and a stabiliser, e.g., Ca stearate or TiO₂, gives a uniform, mouldable resin suitable for making sound records, floor and wall surfaces, etc. Incorporation of large proportions of plasticisers yields lacquer resins and wrapping and insulating material. S. M.

Production of moulded articles. A. NOWACK A.-G., and R. HESSEN (B.P. 387,207, 26.5.32. Ger., 1.9.31).—Hardenable artificial resin masses are heated nearly to, or just above, their hardening temp., and when they have become plastic but not appreciably hardened are very rapidly introduced under pressure, preferably through narrow channels, into the moulds.

Linoleum and methods of manufacture. R. HAMBURGER (B.P. 387,107, 28.7.32).—A more or less finely-grained linoleum having an open surface is treated with a colouring matter suspended in a volatile, non-film-forming liquid (e.g., amyl acetate), and the latter is removed by evaporation.

Apparatus for producing coatings from lacquers, stand oils, lacquer paints, stand oil paints, and rust-protective paints [by spraying]. A. PAHL (B.P. 386,101, 9.12.31).

Products from cellulose derivatives.—See V. Ice colours. Coated fabrics.—See VI. Lacquered wires.—See X.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Chlorinated rubber. E. KARSTEN (Kautschuk, 1933, 9, 41–42).—Chlorinated rubber (I) may be produced by the action of Cl₂ on dissolved rubber or on crêpe rubber in the presence of CCl₄ vapour; it is easily sol. in C₆H₆ and various other solvents, and tenaciously retains CCl₄. The commercial product is of variable composition and may contain plasticisers which increase its elasticity. Varnishes made with (I) are very resistant to conc. acids and alkalis in the cold, but are rapidly attacked at 80° although at this temp. they offer considerable resistance to dil. acids. No definite statement is yet possible as to whether (I) will prove an effective alternative to acid-resisting paints and to ebonite for the protection of metals. D. F. T.

Factors affecting rate of vulcanisation of chloroprene plastic polymerides. E. R. BRIDGWATER and E. H. KRISMANN (Ind. Eng. Chem., 1932, 25, 280–283).—“Duprene Type F,” consisting of polymerised chloroprene 94.5, mineral oil 5, and β-C₁₀H₇·NHPH 0.5%, can be vulcanised at 141° with the addition of 10% of MgO, ZnO, or sublimed PbO, but the physical properties of the product are not satisfactory. The presence of rosin, rosin oil, or pine tar improves the results, but S causes a tendency to premature vulcanisation. The joint use of ZnO, MgO, and rosin (or its above equivs.), however, leads to much better results than can be obtained with any of these in pairs or singly, and the further introduction of S, even as little as 0.5%, greatly accelerates vulcanisation and substantially improves the physical properties of the product. Coumarone resin and brown factice also are desirable compounding ingredients. D. F. T.

Properties of rubber threads used in textiles. W. DAVIS (J. Text. Inst., 1933, 24, τ 44–53).—Results of physical tests (breaking load, extensibility, etc.) are discussed. B. P. R.

Testing of insulating materials containing rubber. A. VON NAGY (Gummi-Ztg., 1933, 47, 627–628, 655–656).—Various mechanical tests are described.

Balata resin.—See XIII.

PATENTS.

Methods of thickening [rubber] latex. NAUGATUCK CHEM. CO., Assees. of A. W. HOLMBERG and P. E. RICE (B.P. 388,692, 22.9.32. U.S., 8.10.31).—The latex is mixed with a colloidal sulphide, e.g., ZnS, and a fixed alkali; the ZnS may be formed *in situ* from ZnO and Na polysulphide. The viscosity of the product may be reduced by adding an acid, e.g., H₃BO₃, and may be restored by NaOH. D. F. T.

Production of rubber masses. E. NOTTEBOHM, and HEROLD A.-G., Assees. of H. ROTH (B.P. 388,031, 14.7.31. Ger., 15.7.30).—A light, porous or microporous, elastic material is produced by casting an emulsion of rubber latex and a H₂O-combining form of calcined gypsum in the presence of more H₂O than is necessary for hydration of the calcined gypsum; the shaped mass is then dried by evaporation and may be vulcanised. The proportion of calcined gypsum should preferably exceed that of the rubber in the latex, and the latex should contain protective colloids to prevent premature coagulation. D. F. T.

Production of porous rubber. R. H. KOPPEL (B.P. 388,605, 10.5.32. Ger., 15.7.31).—Urea, e.g., 15–20%, is incorporated in the raw rubber mixture; vulcanisation is effected at about 122°. D. F. T.

Manufacture of rubber filaments. REVERE RUBBER CO., Assees. of W. A. GIBBONS, E. HAZELL, and A. W. KEEN (B.P. 388,216, 29.2.32. U.S., 11.3.31).—Details are given of procedure permitting control of size and quality of rubber thread produced by extruding de-aerated latex through a no. of orifices under an automatically adjusted hydrostatic head ensuring const. pressure, into an acid coagulant bath; the resulting threads are spray-washed and then hardened by passage

through a bath of aq. NH_3 , whence they pass to a drying belt and are subsequently vulcanised. D. F. T.

Preparation of pulveriform rubber. M. J. STAM (B.P. 388,341, 18.10.32).—By spraying latex containing dextrin (e.g., 6–12% by wt. of the latex) into an atm. of drying air or gas, a rubber powder is obtained in which the rubber particles are surrounded by a film of dextrin. D. F. T.

Vulcanisation of rubber. RUBBER SERVICE LABS. Co., Assees. of R. L. SIBLEY (B.P. 388,432, 26.8.31. U.S., 30.8.30).—Vulcanisation is accelerated by the reaction product of an aromatic acyl halide (e.g., phthalyl chloroide) and a mercaptoarylenethiazole (e.g., mercaptobenzthiazole) together with a basic org. nitrogenous accelerator. D. F. T.

Artificial wood.—See IX.

XV.—LEATHER; GLUE.

Wattle barks and tannin extraction. F. A. COOMBS (J. Soc. Leather Trades' Chem., 1933, 17, 90–107).—Mixed commercial bark from feathery-leaved wattle trees, usually described as from *Acacia decurrens*, includes bark from *A. mollissima*, *A. decurrens*, *A. arundelliana*, *A. filicifolia*, *A. irrorata*, and *A. dealbata*, the average % tannin contents of which are 44.0, 42.0, 36.6, 29.0, 28.0, 26.2, and for mixed commercial barks, 35.2, respectively. Commercial bark from broad-leaved wattle trees, sold as Adelaide bark, is derived from *A. pycnantha* and contains 36.9% of tannin. Wattle barks are best leached by commencing with cold H_2O and finishing off with liquors at 100°. Wattle-bark tannin is not destroyed by boiling the tan liquors. Difficultly sol. tannins have not been found in wattle bark, but starch-tannin compounds are present. Adelaide bark contains more red tannins than the barks of the feathery-leaved varieties, and the red colour is increased by exposing the tan liquors to high temp. (e.g., 40–45°). The structure of the bark and commercial leaching are discussed. D. W.

Nature of the combination of wattle-bark tannin with collagen. R. O. PAGE (J. Amer. Leather Chem. Assoc., 1933, 28, 93–113; cf. B., 1933, 160).—It is suggested that the H in a phenol group in wattle-bark tannin, in the combined H_2O -sol. matter (I) in a leather, is attached by means of a secondary valency to the O in a peptide group in the collagen, whereas the fixed tannin is attached to the N in the peptide group. The facts that 1, 2, or 4 equivs. of tannin can combine as H_2O -sol. matter with the collagen—the same amounts as for fixed tannin—and that (I) is unaffected by the deamination of the collagen are thereby explained. The increase in (I) by neutral salts, acids, and alkalis is also explained since the possible combination of the neutral salts by means of secondary valency with the O of the $\cdot\text{CO}\cdot$ group will break the linking between adjacent polypeptide chains, and on the removal of the salts the O will be free to combine with tannin. The amount of H_2O -sol. matter is determined by the no. of free $\cdot\text{CO}\cdot$ groups in the collagen, which partly depends on the degree of swelling. It is probable that the collagen is not combined with the fixed tannin through the phenol groups in the tannin. D. W.

Antimony electrode. IV. Measurement of p_{H} with the glass and antimony electrodes in tannin solutions. W. B. PLEASS (Arch. Phys. biol. Chim.-Phys., 1932, 9, 267–272; Chem. Zentr., 1932, ii, 2489).—The glass electrode is preferred. For CaO liquors the glass, H_2 , and Sb electrodes are equally applicable. In presence of sulphites or sulphides only the glass electrode gives good results. The Sb electrode is generally unsuitable for use in the leather industry. A. A. E.

Numerical expression of the wear-resistance of sole leather. J. G. PARKER (J. Soc. Leather Trades' Chem., 1933, 17, 111–122).—The wear-resistance ($W.R.$) of a no. of different sole leathers of various tannages has been determined by the Thuau machine (cf. B., 1931, 129) and the results are expressed as a % of the $W.R.$ of a standard "red Cu." The accuracy of the results has been confirmed by practical wearing tests. $W.R.$ was reduced by bleaching, scouring, hammering, high-pressure rolling, or by drum tannage. The $W.R.$ of sole leather made from salted hides was < that of leather made from fresh market hides. The $W.R.$ of the leather increased to a max. about the middle of its thickness. Sole leathers which had a good $W.R.$ val. were shown to possess a lower H_2O -absorption coeff. than leathers of low $W.R.$ D. W.

Folding endurance tester for light leathers. I. D. CLARKE and R. W. FREY (J. Amer. Leather Chem. Assoc., 1933, 28, 77–92).—A modified Massachusetts Institute of Technology paper-folding endurance tester is described. Pieces of different kinds of leather, including goatskin, sheepskin, and cowhide, carrying a load, have been subjected to repeated folding (flesh- and grain-side alternately) and the no. of foldings required to break the leather was determined; this no. is termed the "folding endurance" (F). F is increased by reducing the angle of fold, but by a greater proportion than the reduction. The width of test-strips of leather should be > 0.5 cm. The equation $\sqrt{F} = (aW/L) + b$ has been derived, where a and b are consts., W is the width of the piece of leather, and L the load it carries. No relationship was found between F , tensile strength, and tear-resistance. D. W.

Heat conductivity of leather—its determination and importance. D. WOODROFFE, O. BAILEY, and A. S. R. RUNDLE (J. Soc. Leather Trades' Chem., 1933, 17, 107–111).—An apparatus is described for the determination of the heat conductivity (k) of leather. The variations in k of different parts of an East Indian-tanned kip have been studied. The k val. was a max. in the butt portion and gradually diminished to a min. on the outside edges of the kip. D. W.

PATENTS.

Improvement of animal hides and leather. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 388,091, 2.9.31).—Tanning substances and/or fatty compounds or H_2O -sol. org. substances of high mol. wt., which contain acid groups in the free state or in the form of ester or salt groups, are rendered insol. in the hides or leather by treatment with aq. solutions of H_2O -sol., complex hexacarbamidochromic salts, with or without substances which do not form ppts. with such salts or are capable of redissolving the ppts. D. W.

Reviving agents for leather.—See III. Fatty substances.—See XII.

XVI.—AGRICULTURE.

Soil permeability. J. KOZENY (Z. Pflanz. Düng., 1933, 28A, 54—66).—Zunker's empirical formula, expressing the permeability of soil to fluids in terms of pore space and internal surface area, is modified. The importance of soil structure as a factor in permeability is emphasised. A. G. P.

Preparation of standard solutions for the colorimetric determination of the humification number in moor soils. W. HOFFMANN (Z. Pflanz. Düng., 1933, 28A, 102—106).—Samples of humic acid (Merck) used for standard solutions in Odén's method vary somewhat in H₂O content and solubility in NaOH. Humic acid is determined in such solutions by pptn. with dil. HCl, filtering, washing, and drying the residue at 105°. The solution is then adjusted to contain the requisite proportion of sol. humic acid (0.03384%). A. G. P.

Acidity determinations in forest soils. II. G. DEINES and R. KLEINSCHMIT (Z. Pflanz. Düng., 1933, 28A, 67—82).—Views expressed in an earlier communication (B., 1932, 906) are modified. Conventional methods for determining p_H , using a definite ratio of fresh soil to H₂O, cannot give strictly comparable results owing to the varying H₂O contents of the samples. Soils do not become more acid on drying, apparent changes being the result of altered H₂O contents. Measurements of the p_H of soil suspensions are comparable only when the ratio of dry wt. of soil to H₂O is maintained const. Appropriate methods of ensuring this condition are described. Curves expressing the relationship between p_H and H₂O content are characteristic for individual soils. A. G. P.

Simplification of the determination of lime requirement in soils. F. WITTE (Z. Pflanz. Düng., 1933, 28A, 83—102).—The degree of saturation of soil with bases may be determined by utilising Kappen's method for the s val., and the heat of wetting (Janert, B., 1931, 454) as a basis of calculation for the max. adsorptive capacity. Results so obtained with a no. of soils agree closely with those by the Hissink method. A. G. P.

Relation between the reaction and mechanical composition of soils. H. NIKLAS and A. FREY (Landw. Jahrb., 1932, 76, 819—843).—A close relationship exists between the slope of the linear portion of the "rest"-acidity curves of soils (cf. Maiwald, B., 1929, 221) and their sand constituents. A. G. P.

Electrical conductivity of the expressed fluid from soils. K. PFELSTICKER (Z. Pflanz. Düng., 1933, 28A, 36—53).—Suitable technique is described. In normal soils containing Ca as the dominant base, changes in the Ca content of the expressed soil solution accompanying nitrification are indicated with considerable accuracy by changes in conductivity. The method is also suitable for examining the leaching process in soils and the effects of added fertiliser. In the latter case there is a considerable increase in conductivity immediately after the application, followed by a decline, at

first rapid, then more slow, until approx. the original val. for the untreated soil is regained. A. G. P.

Comparison of the soil-plaque method with the Neubauer and Hoffer maize-stalk methods for determining mineral soil deficiencies. L. C. STEWART, W. G. SACKETT, D. W. ROBERTSON, and A. KEZER (Col. Agric. Exp. Sta. Bull., 1932, No. 390, 59 pp.).—The soil-plaque and Neubauer methods were equally reliable. The Hoffer method showed definite deficiencies and generous supplies of K and N, but was less dependable for intermediate vals. A. G. P.

Determination of the fertiliser requirements of soils. E. BOTTINI (L'Ind. Chimica, 1933, 8, 155—158).—Available methods are critically reviewed. H. F. G.

Value and use of various nitrogenous fertilisers. ENGELS (Kunstdünger u. Leim, 1932, 29, 266—271; Chem. Zentr., 1932, ii, 2513).—NH₄ salts are not inferior to nitrates. A. A. E.

Solubility of soil phosphates. E. RAUTERBERG (Z. Pflanz. Düng., 1933, 28A, 106—114).—Citric acid, by forming complex phosphatic compounds, dissolves considerable amounts of soil phosphates even in the presence of cations forming insol. phosphates. The solubility of phosphates in neutral and alkaline soils is increased by the removal of Ca⁺⁺. The amount of PO₄^{'''} extracted from soil by Ca(HCO₃)₂ solution (the Dirks method for PO₄^{'''} availability) is not appreciably influenced by the proportion of soil used. A. G. P.

Agricultural use of basic slag. C. LA ROTONDA (Landw. Jahrb., 1932, 76, 587—625).—The favourable action of slag on crops is largely attributable to its easily assimilable silicate constituents. Higher crop yields obtained are closely related to the increased SiO₂ intake of the plants. A corresponding increase in PO₄^{'''} intake was not observed. The effect of slag as a source of SiO₂ persists through several seasons. The secondary influence of slag on grain production is associated with its Mg and Mn contents. A. G. P.

Action of preparations of coal on plant growth. R. GAGARIN (Gas- u. Wasserfach, 1933, 76, 137—138).—Pot experiments are described illustrating the manurial action of a no. of inorg. and org. materials prepared from lignite. A. G. P.

Close grazing system of pasturage. F. T. SHUTT and S. N. HAMILTON (Trans. Roy. Soc. Canada, 1932, [iii], 26, III, 93—101).—High protein content of the young grass is the outstanding feature of the Hohenheim system, whilst incursion of Dutch white clover, which reaches a peak in the second or third year and then declines, increases this. The yield of dry matter decreases with the frequency of cutting. The system is the best so far devised for producing the max. amount of digestible protein per unit area. H. G. R.

Influence of period of cutting on yield of highmoor meadows and nutrient content of highmoor hay. F. BRÜNE (Landw. Jahrb., 1932, 76, 767—782).—On highmoor meadows containing a high proportion of clover, delayed cutting results in a steady decline in the digestibility of the hay, especially of the protein constituents. This reduction is most marked immediately after the flowering period of the grasses. The

crude fibre of the hay begins to increase rapidly immediately prior to this period. Analytical data and feeding trials with hay cut at various periods are recorded.

A. G. P.

Efficiency of Schleswig-Holstein permanent pastures as related to the soil, the sward, and climatic factors. W. DIX (Landw. Jahrb., 1932, 76, 525—574).—Relationships between the chemical and physical properties of the soil, the botanical composition of the herbage, and the nutrient val. of the pasturage are examined.

A. G. P.

Periodic variations in the protein value of pasturage. T. REMY, A. DHEIN, and G. WULKOTTE (Landw. Jahrb., 1932, 76, 575—586).—The protein content (both digestible and non-digestible) decreases rapidly at first and then more slowly as the grazing period advances. The effect becomes the more marked as the commencement of grazing is made later in the season. A. G. P.

Influence of climate on the properties of German cereals. OPITZ (Landw. Jahrb., 1932, 76, 697—731).—Variations in growth period, H_2O and protein contents, and wt. per 1000 grains in wheat, oats, and barley grown in different climatic regions are recorded. A. G. P.

Effect of the quantity and form of potash applications on the quantity and quality of potato varieties rich in starch, on the chemical composition, food and seed values of the tubers. F. BERKNER and W. SCHLIMM (Landw. Jahrb., 1932, 76, 783—808).—Kainit (I) used in conjunction with N fertilisers produced a luxuriant growth of leaves and stems and prolonged the growth period of the plants. Applied at sowing, (I) tended to delay the sprouting of the plants and to lower the yields in proportion to the amount supplied. When used at the flowering period, the injurious action of Cl' was less marked. A similar but less extensive injurious action was shown by 40% K salts. The manurial action of K_2SO_4 was independent of the period of application, within the above limits. Late applications of K in all forms increased the proportion of large tubers in the crop. The lowest proportion of small tubers was obtained with K_2SO_4 . The highest % of starch was obtained from tubers grown on unmanured soils. The reduction in starch content and in total starch yield was in the order (I) > 40% K salts > K_2SO_4 . This effect was greater with early than with late applications and was minimised by generous N manuring. Variations in starch and dry-wt. contents in the tubers were parallel. With increasing proportions of N applied the % of starch decreased and that of N increased. The intake of K increased with the amount supplied, was greatest with fertilisers containing Cl', and was reduced by heavy dressings of N. K_2SO_4 tended to reduce scab and also produced potatoes of better flavour than did mixtures containing Cl'. A. G. P.

Water formation in potato silage. G. RUSCHMANN (Landw. Jahrb., 1932, 76, 679—691).—The amount of H_2O draining from steamed potato silage made in pits is not markedly influenced by the H_2O content of the original material. Drier samples of silage had better keeping qualities and superior chemical composition. Drainage, however, removed appreciable amounts of nutrients. Excessive drainage is best avoided by

thorough steaming to obtaining max. gelatinisation of starch and consequent max. H_2O -binding capacity of the product. A. G. P.

Determination of acids in, and evaluation of, silage. W. STOLLENWERK (Landw. Jahrb., 1932, 76, 809—818).—The method for determining volatile acids in silage described previously (B., 1932, 1129) is modified for use in the presence of appreciable quantities of lactates. A system of grading silage based on chemical data is described. A. G. P.

Importance of potash manuring in vegetable culture. A. GEHRING (Ernahr. Pflanze, 1933, 29, 21—23).—Data are recorded showing the action of K fertilisers on a no. of vegetable crops. Marked responses were obtained with carrots, kohlrabi, and celery. A. G. P.

Interpretation of [sugar cane] fertiliser tests with potash. H. COSTENOBLE (Sugar News, 1932, 13, 147—148).—Potash fertiliser trials with sugar cane in the Philippines indicate that where the Ca:Mg ratio in the soil is about 2:1, no response may be expected from the application of potash. An increased yield is to be expected only when there is an excess of CaO over this ratio; indeed, potash may decrease the yield when the Ca in the soil is < 2:1. J. P. O.

Chemical reagents for preservation of cut flowers and plants. W. LIEBISCH (Angew. Chem., 1933, 46, 149—151).—An exhaustive review of the reagents recommended for the purpose leads to the conclusion that none of them fulfils completely the necessary conditions. H. W.

"Instant" Bordeaux [mixture]. F. J. SCHNEIDERHAN (West Va. Agric. Exp. Sta. Circ., 1932, No. 60, 8 pp.).—The direct prep. in the spray tank of a Bordeaux mixture from finely-powdered $CuSO_4$ and $Ca(OH)_2$ is described. High-grade CaO of low MgO content is essential. The prep. is no more caustic than the standard mixture and in some cases gave better results against apple blotch. A. G. P.

Methods affecting the efficiency of chlorate weed killers. H. W. HULBERT, R. S. BRISTOL, and L. V. BENJAMIN (Idaho Agric. Exp. Sta. Bull., 1931, No. 189, 12 pp.).—Rates of effective application of $NaClO_3$ solutions depend on moisture content and type of soil and on climatic conditions. No advantage is gained by the use of > 1 lb. per gal. $NaClO_3$ used alone is more effective wt. for wt. than are mixtures of $NaClO_3$ with deliquescent salts. Variations in the pH of the spray solutions did not affect their weed-killing properties in any definite direction. A. G. P.

Dusting for control of apple sawfly. H. W. MILES (J. Min. Agric., 1933, 39, 1125—1128).—A 30% $C_{10}H_8$ prep. applied at the blossoming period was an effective repellent and very considerably reduced the proportion of fruit attacked. Setting of fruit was not affected. A. G. P.

Effect of soil on syrup from cane.—See XVII.

PATENTS.

Manufacture of a fertilising agent by the wet oxidation of coal and the like. M. F. CARROLL, and

A. BOAKE, ROBERTS & Co., LTD. (B.P. 388,134, 18.11.31. Addn. to B.P. 361,890; B., 1932, 125).— NaNO_3 and H_2SO_4 (e.g., spent nitrating acid) or NaHSO_4 are used instead of HNO_3 in the prior process. L. A. C.

Waste products [insecticides].—See II.

XVII.—SUGARS; STARCHES; GUMS.

Quantity of syrup from cane grown on different soils. C. A. FORT and C. F. WALTON, JUN. (Sugar Bull., 1932, 11, No. 5).—The quality of juices expressed from different cane varieties grown on different types of soil in Louisiana, after purification by the sulphitation process and evaporation in vac., depends to some extent on the type of soil on which the cane was grown, though also on cultural conditions. Well-drained black soils may give cane with juice equal to that obtained from sandy soils. J. P. O.

Practical experience with pre-defecation [of sugar juice]. K. MIEHE and W. WITT (Centr. Zuckerind., 1932, 40, 916—918).—In the pre-defecation 0.25% of CaO was used on juice which was heated to 85°, giving at this temp. a pale blue colour to thymolphthalein paper ($\equiv p_H$ 10.8—11.0), after which it was treated with 0.6—0.7% of CaO (on the beets) and carbonated as usual. Working thus, there was a direct saving of 50% in the CaO consumption, the press-cake was easily filtered and sweetened-off, and the sugar loss was below normal. Besides this, the capacity of the filter-station was increased, the coal bill reduced 10%, and the consumption of filter-cloth decreased. J. P. O.

Defecation of sugar-cane juice by bauxite. F. HARDY (Internat. Sugar J., 1933, 35, 64—68).—Data from laboratory and factory experiments indicate that ignited bauxite is an efficient agent for the defecation and decolorisation of cane juice. It yields purer and paler syrups than either kieselguhr or CaO, introduces no additional solutes into the juice, and avoids the complications consequent on the use of CaO. On the other hand, greater quantities are required, < 4% being insufficient to secure an adequate defecation. The spent material may easily be revived by heating to 350—600°. It would be applied in the granular state and in special filters. J. P. O.

Determination of the true dry substance of molasses. C. SYLMANS (Archief Suikerind. Ned.-Indië, 1932, 40, II, 993—1007).—Each % of ash was found, in a large no. of determinations, to increase the Brix above the % true dry substance by 0.72, 0.86, and 0.74 in molasses from defecation, sulphitation, and carbonation factories, respectively. This method of determination gave results which agreed reasonably well with the truth and were closer than the refractometric vals. J. P. O.

Determination of the electrical conductivity as a means of ascertaining the supersaturation of massecuites. P. HONIG and W. F. ALEWIJN (Archief Suikerind. Ned.-Indië, 1932, Deel III, Meded. No. 16, 1182—1220).—Electrodes of Ag, Cu, or brass, 1 sq. cm. in area, were used, and measurements made by a milliammeter with a.c., supplied by a transformer at 24—32

volts. As the concn. of the liquor undergoing boiling in the pan increased, the conductivity decreased, though this was affected by the vac. (i.e., the temp.), the conductivity all the time following the supersaturation val. It was possible by conductivity observations so to control boiling that the massecuite could be held free of false grain in a pan of good circulation. Inexperienced pan-men are enabled to duplicate the boiling of more experienced operators and to obtain a more uniform grain. J. P. O.

Composition of bagasse fractions obtained by sifting. H. L. GROGAN (J.S.C.I., 1933, 52, 63—64 r).—Bagasse was sifted to give particles of sizes from $\frac{1}{2}$ —1 up to 4—5 mm. and each fraction was examined. Only small differences in the chemical composition of the several fractions were shown, but a positive correlation between the HCl distillate, the hygroscopic coeff., and the moisture content was demonstrated. Further, the probability of an inverse correlation between the lignin and cellulose contents was indicated. Sifting is shown to be a very unsatisfactory method of separating the pith of the bagasse from its fibrous portion. The fraction which passed through the $\frac{1}{2}$ -mm. sieve was alone composed only of pith tissues. J. P. O.

Results obtained with Lafeuille crystalliser pans [for low-grade sugar]. W. PATERSON (Sugar News, 1932, 13, 573—578).—Extended factory trials carried out in the Philippines showed a decided advantage over the old U-crystallisers in the treatment of low-grade massecuites, the most important being: complete control of temp. and of *d* before discharge; better purging at a high Brix, this meaning an increase in the centrifugal capacity; and a striking decrease in the time, seeing that a final product can be obtained within 15—18 hr., as compared with 5—6 days in the ordinary air-cooled crystallisers. J. P. O.

Deposits on the steam side of sugar-juice evaporator tubes. J. F. SPOELSTRA (Archief Suikerind. Ned.-Indië, 1932, Deel III, Meded. No. 12, 983—987).—Oily matter found on the steam side of the tubes, in the first body, consists largely of lubricating oil entrained with the steam, and wax in the case of the others. Cu is the largest constituent, due to corrosion by acid juice vapour. SiO_2 and CaO are generally also present. J. P. O.

Vacuum-pan control and automatic sugar boiling. W. E. SMITH (Rept. of Raw Sugar Tech. Commee., Hawaii, 1932; Internat. Sugar J., 1933, 35, 112—114).—The operation of boiling was controlled by means of an apparatus measuring the b.-p. elevation of the massecuite. By following its indications obtained during a well-conducted strike, it was possible to reduce pan boiling to a few easily operated directions, thus eliminating the rule-of-thumb methods at present in use. Crystal growth took place without false-grain formation, which resulted in a notable saving in time, and the complete elimination of the extra steam required for boiling-off the H_2O used for washing out the fine grain. By the use of suitable auxiliaries, the control was carried a step further by being made to actuate a motor-drive valve on the feed-line of the pan, so as to maintain the *d* to correspond with any selected b.-p. elevation. It was thus possible to boil the pan by the automatic

control of the feed valve. Charts showed that the *d* could be held closer to the optimum point than the best of operators could do in the conventional method of boiling. J. P. O.

Purging low-grade sugar, using the Oliver "crystal" filter. H. F. BOMONTI (Internat. Sugar J., 1933, 35, 84—85).—Experiments made with an Oliver rotary-drum vac. filter on the re-purging of low-grade massecuites showed this to be feasible, in practice, though the average of 15 tests gave a capacity of 105 lb. per sq. ft. of screen area, as compared with 153 lb., the figure required for economic capacity. Moreover, the power requirement was 32.5—35 kw. per hr. for the production of 1 ton of re-purged sugar. J. P. O.

Spontaneous ignition of stored sugar. A. SCHÖNE (Deuts. Zuckerind., 1932, 57, 896, 916).—The primary condition for the spontaneous ignition of stored sugar is created by the spontaneous reaction between amides and reducing sugars, or may be caused by anaërobic fermentation, or may be the result of both phenomena. Both are supposed to result in the formation of pyrophoric masses, which may absorb atm. O₂ with such avidity as to raise the temp. to ignition point. Inflammable gases thus produced may then ignite. J. P. O.

Determination of ash in raw sugars. J. PUCHERNA (Z. Zuckerind. Czechoslov., 1933, 57, 175—176).—From the results of a large no. of ash determinations, gravimetrically (I) and conductometrically (II), the val. for the probable mean deviation for the two methods is calc., viz., ± 0.0129 (for method I) and ± 0.0130 (method II). Hence it follows that the methods are interchangeable. J. P. O.

Evaluation of [beet] raw sugars according to their rendement. V. KOŘÁN (Z. Zuckerind. Czechoslov., 1933, 57, 198—200, 206—208).—A formula incorporating all the factors which bear on the evaluation of a raw beet sugar for refining purposes is proposed. J. P. O.

Sugar-cane fertilisation.—See XVI.

XVIII.—FERMENTATION INDUSTRIES.

Clarification of wine. L. VON VÁSONY (Mezőg.-Kutat., 1932, 5, 293—302; Chem. Zentr., 1932, ii, 3316).—An electrolyte-sensitive compound of gelatin and tannin, not pptd. in presence of protective colloids (pectin), is probably formed. If much gelatin is present the protective action is overcome and separation commences. In presence of too much gelatin the excess acts as a protective colloid. In presence of protective colloids casein, dissolved with a little KHCO₃ or citric acid, gave good results. A. A. E.

β -Butylene glycol and acetylmethylcarbinol in wines and vinegars. E. GARINO-CANINA (Annali Chim. Appl., 1933, 23, 14—20).—12 wines showed 0.2—0.66 g. of β -butylene glycol per litre, the amount being proportional to the EtOH present. The glycol is absent from beer, but occurs in malt wort fermented at 25° with *S. ellipsoideus*. Acetylmethylcarbinol is found (1) in grape must fermented in presence of MeCHO, and (2) in vinegar, and indicates this to be a fermentation product. T. H. P.

PATENTS.

Manufacture of flavoured spirituous liquors. D. HAYASHI and Y. NISHIKAWA (B.P. 388,281, 30.6.32).—A fatty substance obtained by dry distillation of liquorice residues is added as flavouring to a mash of koji, steamed rice, and molasses or glucose. The flavour of the final spirituous liquor is varied by oxidising the fatty substance with HNO₃, or by boiling with acid or alkali before addition to the mash. R. H. H.

Sterilising beer.—See I.

XIX.—FOODS.

Biuret reaction of maize. B. CZYZEWSKI (Z. ges. Getreide-Mühlenw., 1932, 19, 142—144; Chem. Zentr., 1932, ii, 2556).—The biuret reaction for the detection of maize in admixture with wheat fails with certain kinds of maize. The inhibiting factor is probably present in the fat or pigment. The colour is masked particularly by xanthophyll. When the reaction fails it should be repeated at greater dilution, or after a larger addition of NaOH and CuSO₄, or after treatment with COMe₂ or CHCl₃. A. A. E.

Detection of soya flour as an adulterant of food products. D. COSTA (Annali Chim. Appl., 1933, 23, 3—14).—10% of soya flour in biscuits, food pastes, chocolate, or ground, roasted coffee raises appreciably the protein and lowers the fat content. Microscopical examination shows aleuronic agglomerates, entire palissade-tissue cells, parenchyma cells containing starch granules among the aleurone mass, fragments of skin, etc. T. H. P.

Rapid determination of ash in organic substances. Application to grain and coal. R. GUILLET and C. SCHELL (Bull. Soc. chim., 1933, [iv], 53, 47—60).—The low ash content of coal and grain is determined by combustion in O₂ in a special electric furnace (described) at 700—1000°, the residue being weighed on a micro-balance. R. S. C.

Effect of diastatic malt on loaf volumes of commercial flours. R. H. HARRIS (Canad. J. Res., 1932, 7, 571—577).—Addition of up to 4% of diastatic malt to 10 commercial flours increased the vol. of the loaf obtained. Addition of a further 2% resulted in a further increase only with 2 flours of high protein content. Addition of 0.002% of KBrO₃ increased the loaf vol. except with 2 flours of low diastatic power. Sucrose was not as effective as malt in equiv. concn. No significant relation exists between protein content of the flour and loaf vol. R. S. C.

Influence of locality on the baking value of wheat. M. CHOPIN (Compt. rend., 1933, 196, 500—502).—The baking val. of wheat, expressed as the sp. work (*W*) of stretching 1 g. of dough to the breaking point (cf. B., 1927, 396), is characteristic of the soil in which the wheat is grown. For any two soils, the ratio $W_1 : W_2$ is const. for several varieties of wheat. A no. of these const. are recorded. A. C.

Milk of a typical herd of shorthorn cows. I. J. GOLDING, J. MACKINTOSH, and E. C. V. MATTICK (J. Dairy Res., 1932, 4, 48—73).—The fat % was lower

in the morning than in the evening and for both morning and evening was lower in spring (< 3% for morning and 4.2% for evening milkings). It rose with fall in yield as lactation progressed. Solids-not-fat were fairly high and very regular, falling below 8.5% only in one period when the feeding was altered owing to an outbreak of "husk." Titratable acidity was fairly uniform, tending to be lower when the cows were at pasture. Formol titration vals. were also fairly steady with a tendency to be higher in the winter months. The rennet test showed a marked slowing down in winter. Total N showed a higher level in the last two years than in the first year, and a general tendency to be higher in spring. Casein-N closely paralleled total N. Uniformity of composition was the most marked feature of the ash composition. The feeding of cabbage and kale seemed to result in a slight increase in Ca in the winter months.

NUTR. ABS.

Cotton seed for dairy cows. R. H. LUSH and A. J. GELPI (Louisiana Agric. Exp. Sta. Bull., 1932, No. 227, 11 pp.).—Cows fed on rations containing cottonseed meal produced more milk and greater live-wt. increases than those receiving a similar ration with whole seed. Butter from cows receiving cotton seed was exceptionally hard, brittle, and mealy and had a tallow-like flavour. The churning period of the cream was also prolonged.

A. G. P.

Effect of delayed milking on composition of cow's milk. W. E. PETERSEN and T. V. RIGOR (Proc. Soc. Exp. Biol. Med., 1932, 30, 257—259).—Lactose and fat, and hence total solids, showed a decrease; total protein rose; ash increased for 36 hr. and then showed no further change; Ca and P decreased. pH increased from 6.7 to 7.3.

NUTR. ABS.

Variation in iodine value of milk fat from individual cows. E. BROUWER (Bied. Zentr., 1932, B4, 593—621).—Examination of the I vals. for the butter fat of 37 individual cows indicates (a) a rather large standard deviation (± 3 units) for distribution of individual I vals. about their mean; (b) a negative regression of I val. on butter fat production; partial regression coeff. -0.0134 ± 0.0031 ; (c) a negative regression of I val. on % fat in milk; partial coeff. -3.82 ± 1.18 ; (d) a probable positive regression of I val. on live wt.; $+0.0082 \pm 0.0081$. Each additional 100 g. of butter fat corresponded to an average decrease of 1.3 units and each additional 0.1% of milk fat to a decrease of 0.38 unit in the I val. Assuming a factor in the grass which raises the I val., the I val. will vary with the quotient food/butter fat = z' . From the Lars Frederiksen standard for milch cows is deduced a decrease in z' with rise in butter fat production and milk fat %, and with fall in live wt.

NUTR. ABS.

Distribution of nitrogen in milk with reference to the solids-not-fat content. W. L. DAVIES (J. Dairy Res., 1932, 4, 142—146).—On 62 samples of morning milk, with 6.5—9.0% of solids-not-fat (I), the following N fractions were determined: total, protein, casein, and casein + globulin. The ratio casein : albumin : globulin was approx. 14 : 2.5 : 1 for samples high in (I), but as the (I) decreased, the casein dropped relatively to globulin, the albumin showing a slight parallel decrease.

The samples low in (I) were apparently abnormal secretions, since they showed relatively increased albumin, globulin, and Cl contents. They were further characterised by low total N and high and variable non-protein-N.

NUTR. ABS.

Milk pasteurisation as a technical problem. W. G. SAVAGE (J. Hyg., 1933, 33, 42—54).—Different types of pasteurising plant, their possible defects, and the difficulties in securing efficient use are discussed. The standard requirements of the "holder" system in England are compared with those in America, where the prescribed holding temp. is lower and better setting of cream is obtained.

NUTR. ABS.

Effect of temperatures used in pasteurising milk on the bacteria contained therein. T. A. STARKEY (J. Roy. Sanit. Inst., 1933, 53, 390—393).—"Pinpoint" colonies are likely to be shown when testing samples of pasteurised milk, unless the milk has been held at 146° F. for 30 min. A lowering of this temp. by 2° F. may greatly affect the result and positive tests for *B. coli* in 0.01 c.c. may be given.

NUTR. ABS.

Fat-globule size in milk. M. H. CAMPBELL (Vermont Agric. Exp. Sta. Bull., 1932, No. 341, 67 pp.).—Dilution of milk with glycerol-H₂O mixture (1:1) does not affect the size of fat globules or the rising of the fat, but prevents the Brownian movement of the globules. Methods of measuring the globules in such diluted milk are described. Effects of environmental factors, changes of feeding, and period of lactation on the size of globules are examined.

A. G. P.

Precipitation of milk proteins by means of trichloroacetic acid. G. P. SANDERS (J. Assoc. Off. Agric. Chem., 1933, 16, 140—146).—CCl₃·CO₂H used in the proportion of 4 pts. of 10% acid to 1 pt. of milk is almost as effective as tungstic acid for pptg. N compounds in milk. It has the advantages that only one reagent is added to the milk, that the casein particles are coarser (facilitating filtration), and a larger quantity of filtrate is secured from a given quantity of mixture. The possibility of using this method for determining non-protein-N compounds in milk is discussed.

J. W. S.

Factors affecting solubility of milk powders.
I. Effect of heat on solubility of milk proteins. N. C. WRIGHT (J. Dairy Res., 1932, 4, 122—141).—The insolubility induced by liquid or moist heating is apparently due to denaturation of the milk proteins, and particularly of the casein. The two most important factors influencing this protein-insolubility are the inter-relationship of temp. and time of heating and the concn. of the milk solids. At temp. approx. 100° and at concns. of milk solids between 60 and 90%, insolubility may be induced by heating for periods varying from a few sec. down to a fraction of a sec., and hence the difficulty of producing a highly sol. atm. roller-dried milk powder is apparent. The increased insolubility which results from dry heating is almost entirely associated with a change in the properties of the casein, the change being physical rather than chemical, possibly some type of dehydration.

NUTR. ABS.

Manufacture of cheese from soft- and hard-curd milks. R. L. HILL and A. C. MERRILL (Utah Agric. Exp. Sta. Bull., 1932, No. 236, 12 pp.).—Hard-curd milk

produces the greater yield of cheese, of higher fat content, and better texture, flavour, and keeping quality.

A. G. P.

Statistical treatment for establishing the accuracy of methods of interpreting analytical results with special reference to certain egg products. F. A. VORHES, JUN. (J. Assoc. Off. Agric. Chem., 1933, 16, 113—127).—A mathematical method is developed for determining the proportions of two different materials present in a mixture, by determining the concns. of two components which are common to them. The method is applied particularly to egg products.

J. W. S.

Determination of water-soluble extract of coffee and coffee substitutes. P. BELAVOINE (Mitt. Lebensm. Hyg., 1932, 23, 203—209; Chem. Zentr., 1932, ii, 3318).—A 10-g. sample of the undried and unground material is used, and 20 c.c. of the extract (or 10 c.c. for > 50% extract) are evaporated. Then the extract $E = 0.5p(200 + e/10 + 6p)$, where p is the wt. of extract and e is % H_2O .

A. A. E.

Analysis and composition of concentrated grape juice. L. BENVENIGNI and E. CAPT (Mitt. Lebensm. Hyg., 1932, 23, 267—283; Chem. Zentr., 1932, ii, 3317—3318).—In untreated juice, in spite of separation of tartar, the free acid is proportional to d and extract content. Sugared must has a small sugar-free extract. Sucrose determination distinguishes between sugared and deacidified musts, but even at $< 50^\circ$ much sucrose may be inverted.

A. A. E.

Grape-juice spoilage due to faulty pasteurisation. F. W. FABIAN (Fruit Products J., 1933, 12, 173—175, 188).—A hot- H_2O rinse is not sufficient to destroy all micro-organisms present in the machinery of a grape-juice bottling plant. The system should be flushed with hot H_2O before and after the bottling of the juice. Pasteurisation at 82° for 37 min. after bottling and capping prevents spoilage in the bottles during storage.

E. B. H.

Saving steam by temperature control [in food canning]. ANON. (Canning Ind., 1933, 3, 41—42).—The importance of maintaining a processing plant at $\geq 100^\circ$ at all points is stressed, and figures are given showing the waste due to the latent heat of steam if this temp. is exceeded.

E. B. H.

Factors influencing the vitamin content of foods. R. A. DUTCHER (Penn. Agric. Exp. Sta. Bull., 1932, No. 275, 24 pp.).—The effect of natural growth conditions and of various processes of pretreatment on vitamin contents are discussed.

A. G. P.

Examination for benzoic acid in food products. U. HORDH (Anal. Assoc. Quím. Argentina, 1932, 20, 176—180; cf. B., 1931, 609).—As little as 0.03% of BzOH may be detected by direct extraction of tomato ketchup by dil. alkali, extraction of the acidified solution by Et_2O , and application of the Jonescu reaction in slightly acid solution. The salicylic acid may be extracted from the reaction mixture. BzOH is separated from saccharin by extraction with CCl_4 .

R. K. C.

Advantages of germinating grain as fodder for farm animals, especially the horse. L. RAYBAUD (Compt. rend., 1933, 196, 641—642).—Use of germinating

instead of dried oats as horse fodder effects a 43% saving in the ration needed, owing to its greater digestibility, the partial conversion of starch into sugar, and greater activity of vitamins and enzymes. Similar advantages accrue with other animals.

J. W. B.

Digestibility experiments on pigs with lucerne hay meals differently ground. I. SCHMIDT and E. LAGNEAU (Z. Schweinezucht, 1932, 39, 820—821).—Lucerne meal was apparently better digested along with barley meal than with dari. In both cases higher average digestibility of the org. matter was shown by 3-mm. grist than by 1-mm. or 6-mm. grist. The lucerne meal contained on the average 16.5% of crude protein, of which, however, only 40—50% was digested.

NUTR. ABS.

Feeding value of artificially dried young grass. J. A. NEWLANDER (Vermont Agric. Exp. Sta. Bull., 1933, No. 350, 15 pp.).—The feeding to cows of dried young grass as the sole concentrate in a hay-silage ration reduced milk and fat yields, probably because of the excessive bulk of the ration. With smaller proportions of dried young grass (10 lb.) and the inclusion of grain, satisfactory results were obtained. The replacement of the hay in a ration by an amount of dried young grass to yield an equal proportion of total digestible nutrients produced increased milk and fat yields.

A. G. P.

Digestibility of artificially-dried grass. J. A. NEWLANDER and C. H. JONES (Vermont Agric. Exp. Sta. Bull., 1932, No. 348, 20 pp.).—The artificial drying of young grass did not affect its total digestible nutrient content. Comparative digestion trials are recorded in which dried grass, green grass, and grain are interchanged in an ordinary mixed ration.

A. G. P.

Feeding trials with potato silage made in various silos. W. STAHL and F. HARING (Landw. Jahrb., 1932, 76, 693—696).—Silage made in concrete silos with permeable floors proved very satisfactory. Nutrient losses in the drainage thus involved are of less importance than the deterioration in quality caused by the use of impermeable flooring.

A. G. P.

Fatty matter [in casein].—See XII. **Pasturage. Highmoor hay. Food val. of potatoes. Silage.**—See XVI.

PATENTS.

Making dough from wheat and other cereals. A. PAYS (B.P. 387,144, 2.3.32. Fr., 10.4.31).—The grains are soaked in H_2O at 45 — 50° so long as they continue to increase in wt. (7 hr. for wheat), then allowed to swell without H_2O , and crushed so that the endosperm is separated and dough formed directly.

Preparation of cereal foods. YEASTIES PRODUCTS, INC., Assees. of R. C. SPOHN and C. E. LUKE (B.P. 388,282, 1.7.32. U.S., 29.10.31).—Toasted cereal foods are sprayed with a suspension of yeast before the final roasting, which is carried out at a temp. $\geq 49^\circ$ to prevent decomp. of the vitamins. Apparatus is claimed.

E. B. H.

Aqueous lecithin compositions. H. KUNZER (B.P. 388,332, 21.8.31).—The addition of 66% sucrose solution to an equal wt. of lecithin produces a stable, homogeneous emulsion with very good keeping properties

and good flavour, which can be readily mixed with bakery doughs etc. E. B. H.

Elimination of bitter substances from the fibre of pectin-containing plant materials in general and particularly from the peel of acid fruit. G. BOSURGI and K. FIEDLER (B.P. 388,284, 4.7.32. It., 2.7.31).—The material is heated at approx. 80° for 1 hr. in H₂O containing an Al salt, thus hardening the vegetable fibres and preventing loss of pectin, but allowing dissolution of bitter and colouring matters. These are removed by washing with cold H₂O. E. B. H.

Impregnation of caffeine-free coffee beans with caffeine-free coffee extract. C. FRIESE (B.P. 388,699, 12.10.32. Ger., 12.10.31).—Practically the whole of the extractives removed in the decaffeination process are restored to the raw beans by impregnation at a high temp. (e.g., 3–4 hr. at 85–90°) with a caffeine-free extract of the coffee in such a way that concn. of the extract occurs. E. B. H.

[Apparatus for] manufacture of margarine. H. BORGEN and G. W. WADSWORTH (B.P. 388,636, 18.6.32).

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Standardisation of ergot—a modification of Smith's quantitative colorimetric assay. A. N. STEVENS (J. Amer. Pharm. Assoc., 1933, 22, 99–106). From a crit. examination of Smith's colorimetric method (B., 1931, 135), a modification (A) has been devised which gives results in closer agreement with the cock's-comb and the Broom and Clark physiological methods. Method A differs chiefly in the methods of Et₂O extraction, of EtOH evacuation, and of addition of the H₂SO₄ solution; it is not affected by the presence of HCl, tartaric acid, NaH₂PO₄, Na₂S₂O₄, or Na₂S₂O₃. E. H. S.

Cascara. J. H. HOCH (Amer. J. Pharm., 1933, 105, 64–69).—Pretreatment of cascara with hot C₆H₆ reduces the activity of the extract prepared from it. A fluid extract prepared with boiling 1% AcOH is less active than one prepared with boiling H₂O. Anthraquinones present in or liberated by hydrolysis are not responsible for the cathartic action, and their appearance in the urine is not related to the activity of the prep. They appear in the urine within 15–30 min. after oral administration. Oxidation and/or hydrolysis reduces the activity of the extract, and pptn. with Pb subacetate does not isolate the active constituents. E. H. S.

Technique of tincture manufacture. J. A. MARSHALL (Pharm. Zentr., 1933, 74, 145–148).—Examination of tinctures prepared by maceration for 3, 4, 5, 6, and 7 days of 8 representative drugs indicated that extraction was complete after 4–5 and in some cases 3 days, and also that pressing of the residue was unnecessary. The EtOH can be recovered directly from the marc by distillation. E. H. S.

Buffer capacity of tincture of digitalis. J. C. KRANTZ, JUN. (J. Amer. Pharm. Assoc., 1933, 22, 106–109).—The tincture prepared with abs. EtOH has practically no buffer val. Re-extraction of the marc from the above prep. with 80% EtOH gives a tincture having a buffer capacity equiv. to a normal 80% tincture. E. H. S.

Microchemical determination of nicotine. R. HOFMANN (Bul. Tutunului, 1932, 21, 357–373).—2 g. of tobacco are steam-distilled in a special apparatus and the nicotine in the distillate is pptd. with silicomolybdic acid. The ppt. is collected in a small porcelain filter-tube, dissolved in Na₂SO₃ solution containing glycine, and the Mo determined colorimetrically in the resultant solution. The sensitivity of the method is 2 mg. of nicotine and the accuracy 1.5%. S. C.

Analysis of fats etc.—See XX. BzOH.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

PATENTS.

Sensitising photographic bleaching-out layers. I. G. FARBENIND. A.-G. (B.P. 388,670, 4.8.32. Ger., 4.8.31).—The sensitiser, e.g., allylthiocarbamide, is applied in solution (which may also contain gelatin) to the otherwise finished layers, by spraying or coating from rollers, by diffusion from a suitable carrier, or by exposing the layers to the vapour of the sensitiser. J. L.

[Composite] colour filters for use in colour photography or cinematography. KELLER-DORIAN COLORFILM CORP. (B.P. 385,680, 29.9.31. U.S., 15.12.30).

Multi-colour light filters for use with lenticular films. I. G. FARBENIND. A.-G. (B.P. 387,159, 11.3.32. Ger., 11.3.31).

XXII.—EXPLOSIVES; MATCHES.

Pentrite [pentaerythritol tetranitrate] and T₄ [trimethylenetrinitroamine]. A. IZZO (L'Ind. Chimica, 1933, 8, 171–177).—The prep. and chemical and physical properties of the two explosives are described, and their relative merits as regards cost, stability, etc. are compared. (Cf. A., 1933, 150.) H. F. G.

Laws of combustion of colloidal [explosive] powders. H. MURAOUR and G. AUNIS (Compt. rend., 1933, 196, 404–406).—Experiments with a powder free from solvent and containing 9% of centralite, in tubes 2.56 mm. thick, show that the velocity of combustion of such powders is proportional to the pressure, and not to the density of the gases in the bomb (cf. B., 1933, 173). C. A. S.

Laws of combustion of nitrocellulose colloidal powders. H. MURAOUR and G. AUNIS (Compt. rend., 1933, 196, 544–546).—The proportionality of velocity of combustion to pressure and not to density of loading, Δ, proved for nitroglycerin powders (cf. preceding abstract), is shown to be true also of nitrocellulose powders, the material used being powder B without stabiliser (cf. B., 1933, 125). C. A. S.

Apparatus for determining detonation temperature of explosives, especially smokeless powders and cellulose nitrates, and the stability of cellulose acetates and rayons. E. BERL and G. RUEFF (Cellulosechem., 1933, 14, 43–44).—For cellulose nitrates of great shattering power the usual oil-bath is replaced by an electrically heated Cu block with holes for test-tubes and a thermometer, and this apparatus is suitable

also for determining the stability of rayons at high temp. A. G.

Combustion problem of internal ballistics. I. A. D. CROW and W. E. GRIMSHAW (Phil. Mag., 1933, [vii], 15, 529—553). Theoretical. H. J. E.

PATENTS.

Manufacture of [granular] explosives. A. C. SCOTT (B.P. 388,027, 14.8.31).—Finely-divided KClO_4 and KNO_3 are mixed and heated to 49—54°, about 10% of H_2O at 60—71° being then added to dissolve the KNO_3 . The moist, hot mixture is granulated by sieving and dried in a steam-heated oven. The resultant porous granules may subsequently be impregnated with a liquid fuel, e.g., kerosene or a NO_2 -compound. W. J. W.

Production of [low-density] explosives. LIGNOZA SPÓLKA AKCYJNA (B.P. 388,508, 27.11.31. Poland, 22.12.30).—Absorbent carbonaceous materials, e.g., wood meal, are incorporated with O carriers, such as NH_4NO_3 and KNO_3 , some H_2O being added to give sufficient salt solution to be totally absorbed by the carbonaceous material. The whole is mixed at 90°, other materials being added after subsequent cooling, and the product is sieved and cartridgeed without previous drying. W. J. W.

XXIII.—SANITATION; WATER PURIFICATION.

Rapid semi-micro-determination of carbon dioxide in air. L. W. WINKLER (Z. anal. Chem., 1933, 92, 23—31).—A dry, long-necked flask, 0.25 litre, is filled with the air containing CO_2 and closed. Approx. 10 c.c. of 96% EtOH are put in a 50-c.c. flask with 2 drops of 1% phenolphthalein solution (in EtOH) and a few drops (5—6) of 0.02N- Na_2CO_3 are added until a permanent pale rose colour is obtained. This solution is quickly poured into the flask of air, which is again closed and left for 1—2 min. without shaking to allow the EtOH to reach its equilibrium vapour tension. The flask is opened momentarily, closed, and shaken. The solution is then titrated with 0.02N- Na_2CO_3 . In EtOH Na_2CO_3 absorbs CO_2 to form NaHCO_3 very much more quickly than in H_2O . M. S. B.

Removal of positive ions [from water] by electro-osmose apparatus. E. BARTOW and M. A. FRY (Ind. Eng. Chem., 1933, 25, 336—338; cf. B., 1932, 130).—With rates of flow of 20, 25, and 30 litres per hr. the ions Na^+ , Ca^{++} , and Mg^{++} are satisfactorily removed from solutions containing 200 p.p.m. of the positive ion or of mixtures in the form of chlorides. The rate of removal is in the decreasing order stated. C. I.

Rapid examination of waters, using a photoelectric cell. P. RUMPF (Bull. Soc. chim., 1933, [iv], 53, 84—95).—A photoelectric comparator is described for the rapid daily determination of NH_3 , NO_2' , NO_3' , Cl' , and SO_4'' in drinking water. Its more extended application is discussed. M. S. B.

Application of 2:2'-dipyridyl to the determination of ferrous and total iron in natural waters. H. MÜLLER (Mikrochem., 1933, 12, 307—314).— Fe^{++} is determined by addition of 8 c.c. of H_2O to 2 c.c. of 1% 2:2'-dipyridyl in 0.1N-HCl, the colour being compared

with a series of standards. Total Fe is determined in the same sample by addition of 0.6 g. of Na_2SO_3 and 2 drops of HCl. The standards keep well, and 0.1×10^{-6} g. Fe in 8 c.c. of H_2O may be determined. J. S. A.

Detection and determination of manganese in drinking water. L. W. WINKLER (Pharm. Zentr., 1933, 74, 148—150).—The H_2O is evaporated with KClO_3 and HCl, the residue treated with HNO_3 , and Mn determined colorimetrically after addition of AgNO_3 and $\text{K}_2\text{S}_2\text{O}_8$. The method is unaffected by the presence of colour, Fe, or turbidity in the H_2O . E. H. S.

Nephelometric determination of sulphate in drinking water. H. MOHLER (Z. anal. Chem., 1933, 92, 15—18).—The method is a rapid one and is based on the pptn. of BaSO_4 in the presence of gum arabic. The concn. of sulphate must not exceed 30 mg. per litre. M. S. B.

Oil-field water analysis. I. Estimation of the sulphate radical by benzidine and errors inherent in the method. II. Volumetric estimation of calcium in the presence of magnesium. D. G. JONES and C. E. WOOD (J. Inst. Petroleum Tech., 1932, 18, 817—832).—I. Errors in the determination of SO_4'' are introduced by the occlusion of benzidine hydrochloride in benzidine sulphate (I) and by the solubility of the latter, but the method is practicable for concns. of $\text{SO}_4'' > 0.04\%$ and with the aid of a graph for concns. of $\text{SO}_4'' > 0.008\%$; when the $[\text{SO}_4'']$ is $> 0.2\%$ the H_2O must first be diluted. The effect of Ca^{++} is slight and the method may be used without correction for $[\text{SO}_4''] > 0.06\%$ in the presence of the max. concn. of Ca^{++} possible in such H_2O . Mg^{++} exerts a marked solvent action on (I) and should be removed from solution before determination of SO_4'' .

II. In the separation of Ca and Mg from solutions containing 0.1 g. Ca per 200 c.c. the pptd. CaC_2O_4 should be dissolved and repptd. when the ratio Mg/Ca is > 1.0 . When the ratio Mg/Ca is about 10 pptn. in acid solution (Treadwell and Hall, "Analytical Chemistry") gives slightly the better results, but for lower ratios pptn. in alkaline solution is indicated. D. K. M.

Present status of municipal water softening. C. P. HOOVER (J. Amer. Water Works Assoc., 1933, 25, 181—191).—A discussion.

Extraction of Ra [and health safeguards]. Te-Pb [pipes for H_2O]. Dissolution of Mg by sea- H_2O .—See X.

PATENTS.

Fumigating material. W. W. TRIGGS. From AMER. CYANAMID Co. (B.P. 388,408, 14.5.31).—The material comprises liquid HCN absorbed in blocks moulded from, e.g., a 3:1 mixture (by wt.) of gypsum and bagasse flour. [Stat. ref.] L. A. C.

[Apparatus for] sterilising the atmosphere of rooms or enclosed spaces. W. & F. WALKER, LTD., and J. T. FREESTONE (B.P. 386,185, 16.4.32).

Rotary furnaces for combustion of town refuse etc. A. CHRISTENSEN (B.P. 386,209, 27.5.32).

Waste products [disinfectants].—See II. Base-exchange substances.—See VII.