

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAR. 1 and 8, 1935.*

I.—GENERAL; PLANT; MACHINERY.

Prevention of accidents in the chemical industry. C. RHEINFELS (Chem. Fabr., 1934, 7, 474—477).—An analysis is made of the causes of accidents during 1933, according to the classes of equipment with which they occurred. D. R. D.

Equipment and work of the chemical-engineering laboratories of the Technische Hochschule, Karlsruhe. E. KIRSCHBAUM (Chem. Fabr., 1934, 7, 465—471).—An illustrated description. D. R. D.

Measurement of the thermal expansion of solid bodies. O. COSMANN (Chem. Fabr., 1934, 7, 445—448).—A development of the Goerz apparatus (Z. techn. Physik, 1926, 7, 505) is described which has been applied to measurements on magnesite and on kaolins of different compositions. J. W. S.

New-type Premier [colloid] mill. F. J. E. CHINA (Ind. Chem., 1935, 11, 15—17).—A general description with illustrations. D. K. M.

Disperse systems from the technical viewpoint. H. W. GONELL (Kolloid-Z., 1935, 70, 31—38).—A review. E. S. H.

Absolute and ordinary specific gravity and a new apparatus for their rapid determination. H. ENGELKE (Mühlenlab., 1934, 4, 157—162).—A differentiation is made between ordinary (s) (measured with the air spaces) and the abs. (s') (without these spaces) sp. gr. The ratio s/s' serves as an expression of the vitreousness or flouriness. A formula is deduced by which s' can be determined, and an apparatus is described for the rapid determination of s . E. A. F.

Use of the Redwood No. I viscosimeter for determination of viscosity in absolute units. E. A. GOODE and T. V. HEATH (J. Inst. Petroleum Tech., 1934, 20, 1054—1056).—For the conversion of times of flow (T) in the Redwood instrument to abs. units the equation $V/D = 0.00248T - 182/T^{2.15}$ is derived. It is stated that turbulent flow occurs when T is < 50 sec. C. C.

Pressure drop through dry packed towers. I—III. S. UCHIDA and S. FUJITA (J. Soc. Chem. Ind., Japan, 1934, 37, 724—728 B, 728—731 B, 731—733 B).—I. The pressure drop is expressed as a function of four dimensionless groups of terms, and an experimental apparatus is described.

II. Experimental data determining the indices of the groups of terms for Pb-shot packing are given.

III. Similar data are given for Raschig rings of Al, for which the % free space is much $>$ for shot. A. G.

Pressure drop through dry packed towers. IV. Broken solid packing. S. FUJITA and S. UCHIDA

(J. Soc. Chem. Ind., Japan, 1934, 37, 791—794 B).—Equations are given. For const. size and free space of the packing, decrease in the diam. of the tower tends to increase the pressure gradient. F. L. U.

Production of high vacua. J. E. MILLS (J. Proc. Austral. Chem. Inst., 1934, 1, 175—190).—The Topler and Sprengel jet pumps, rotary pumps of the scraping-vane type (immersed in oil; for pressures $> 10^{-3}$ mm. Hg), Gaede's mol. pump (with a backing pump; to reduce pressures from 10^{-2} mm. Hg to 10^{-6} mm.), the Hg-vapour pump, and Langmuir's pump are described and their limitations indicated. The only limit to the vac. is the rate of emission of gas from the walls of the vessel being evacuated. Methods of removing such gases in the case of electric lamps etc. are outlined. C. I.

Microanalytical methods and their applications in industrial control. J. MATTHEWS (Ind. Chem., 1935, 11, 8—11).—The advantages to be gained by the use of such methods are indicated. A summary is given of some of the chief industries, and how they may be served by microchemistry. D. K. M.

High-pressure hydrogenation plant.—See II. **Vac.-pan design.**—See XVII.

PATENTS.

Heat-exchange apparatus. N. B. LEO (U.S.P. 1,960,849, 29.5.34. Appl., 7.2.33).—Comparatively cold liquid is drawn thermosiphonically from the bottom of a tank (T) (or is supplied from an external source), passed downwards through a coil in an inclined flue countercurrent to products of combustion (C), and then passed through a double-conical device the closed base of which is heated in the centre by the flame producing C , the vapour bubbles forming a lift to deliver the liquid to the top of T . B. M. V.

Drying of granular or like material. V. T. BARTRAM, ASSR. to METALLICS & NON-METALLICS, LTD. (U.S.P. 1,960,616, 29.5.34. Appl., 21.3.33).—Comminuted material is projected repeatedly upward into and substantially countercurrent to a stream of air, it being caught in transverse, V-shaped troughs or hoppers and projected by high-pressure jets or paddles situated at the angles of each V. B. M. V.

Crusher. H. H. RUMPEL, ASSR. to SMITH ENG. WORKS (U.S.P. 1,960,980, 29.5.34. Appl., 21.7.30).—A gyratory cone crusher is described, the claims relating to prevention of access of dust to and escape of oil from the working parts, and to mechanism for adjusting the mantle. B. M. V.

Means for crushing [and mixing] viscous and other substances. E. G. LOOMIS (U.S.P. 1,960,708,

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

29.5.34. Appl., 8.12.28).—The material is fed by a worm to a no. of rings of ball- and roller-bearings, *e.g.*, to a bearing of the cycle type followed by one containing taper rollers. B. M. V.

Hammer mill. E. G. MYERS, Assr. to MYERS-SHERMAN Co. (U.S.P. 1,960,346, 29.5.34. Appl., 11.11.31).—A hammer mill is connected to its fan by a conduit having a trap door (*D*) at the lowest point. To convert the mill from a pulveriser to a grain-cracker, the speed is reduced and *D* opened, the cracked grain discharging therethrough. B. M. V.

Hammer mill. C. E. EVERETT, Assr. to MASSEY-HARRIS Co. (U.S.P. 1,960,626, 29.5.34. Appl., 9.5.32).—The material enters through an aperture in the upper casing, and then passes through a screen below the hammer path into a trough-like lower casing through which a stream of air is passed from end to end to withdraw the crushed material. B. M. V.

Thickener. L. H. LOGUE and A. C. DAMAN, Assrs. to DENVER EQUIPMENT Co. (U.S.P. 1,960,707, 29.5.34. Appl., 20.4.31).—The bottom of the tank is substantially horizontal except at the central sump, which latter is steeply conical; separate sets of rakes are provided for each zone, and when the larger rakes are lifted the sump scrapers may be left in action. B. M. V.

Countercurrent washing [of naphtha etc.]. P. J. HARRINGTON, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,943,822, 16.1.34. Appl., 20.10.30).—Naphtha (I), *e.g.*, is passed downwards against an uprising stream of H₂O in a tower divided into a no. of superimposed compartments by perforated vertical plates so that alternate compartments are filled with H₂O and (I) which bubble alternately through one another. A. R. P.

Viscosimeter. A. G. THOMAS (U.S.P. 1,960,465, 29.5.34. Appl., 2.7.32).—Used oil (*e.g.*) is withdrawn (for testing) from the crankcase of an engine by means of a collapsible bulb and then allowed to pass through a small aperture and fall upon a moving band in separate drops the distance apart of which is a measure of η . B. M. V.

II.—FUEL; GAS; TAR; MINERAL OILS.

Influence of flotation on ash composition and ash m.p. of Ruhr coal slurries. A. VAN AHLEN (Brennstoff-Chem., 1934, 15, 461—465).—The content, composition, and m.p. of the ash of sieved fractions of a slurry before and after flotation have been compared, and an attempt has been made to correlate the results with the relative proportions of the banded constituents in the fractions. By processes involving selective flotation it is possible to raise the ash m.p. of the product as well as to bring about other desired improvements. A. B. M.

Manufactured solid fuel for heating. L. J. FOWLER (Gas J., 1935, 209, 95—96; cf. B., 1934, 1042).—A review of work on the combustion of coke, with special reference to domestic boilers. T. H. B.

Temperature correction in determinations of calorific value. W. SCHULTES and R. NÜBEL (Brennstoff-Chem., 1934, 15, 466—469).—Mathematical. The

Regnault-Pflaundler formula for the cooling correction is modified and simplified. A. B. M.

Radiation from surface combustion. K. TAWADA (J. Soc. Chem. Ind., Japan, 1934, 37, 781—782 B).—In the surface combustion of town gas at a fireclay surface, radiation (*R*) is slightly increased if the surface is coated with CoO or UO₃. No parallelism is found between catalytic activity and total *R*, or between % increase in *R* and combustion temp. F. L. U.

High-pressure plant for experimental hydrogenation processes. A. T. BARBER and A. H. TAYLOR (Engineering, 1934, 138, 576—578, 635—636).—Plant used for the hydrogenation of coal and tar at the Fuel Research Station, Greenwich, is described. This comprises 2-litre autoclaves for preliminary work, a Bergius coal-hydrogenation plant with a capacity of 1 ton of coal per 24 hr., a small-scale continuous plant for coal, designed and constructed at the Station, two small continuous tar-hydrogenation plants, two internally (electrically-)heated converters with a throughput of 6—10 gals. of tar per 24 hr., and a larger converter (*C*), now being erected, with a nominal throughput, when operating at 200 atm. pressure, of 300 gals. of tar per day. *C* is constructed of Ni-Cr-Mo steel and is designed to work at pressures up to 400 atm. if desired. Details of design are given, and engineering problems that have arisen in the operation of the plant are discussed. A. B. M.

Laboratory apparatus for hydrogenating heavy tars. E. DITTRICH and H. VOLLBRECHT (Chem. Fabr., 1934, 7, 472).—In order to overcome difficulties due to the high η the whole of the system outside the catalyst tubes, including the circulating pump, valves, etc., is enclosed in an oven. D. R. D.

Isolation of a natural inhibitor from Rumanian cracked distillate and its application to selective acid refining. F. SAGER (J. Inst. Petroleum Tech., 1934, 20, 1044—1050).—A study of the effect of contact time (5—300 sec.) on the refining of Rumanian Dubbs pressure distillate, using 2% of 96% H₂SO₄, showed that a longer mixing time was necessary to give a satisfactory gum test by the Voorhees and Bisinger method (I) (J. Soc. Aut. Eng., 1932, 30, 198) with 5 hrs.' heating than by the Cu-dish test (II). Although the gum in the gasoline fraction by method (II) decreased with increase in reaction time and progressively after soda-washing and doctor treatment, the potential gum by method (I) was higher in the last two cases than on the direct distillate. 0.16% of an inhibitor (III) consisting mainly of *p*-cresol was isolated by a soda-wash (IV) before acid treatment and successive applications of (IV) therefore reduced gum stability. In (II) the accelerating effect of H₂S and mercaptans outweighed the effect of (III), but the latter dominated (I). To obtain the max. effect from (III) it should be isolated and added to the sweetened gasoline. C. C.

Action of the silent electric discharge on hydrocarbon gases and oils. A. W. NASH, J. L. HOWARD, and F. C. HALL (J. Inst. Petroleum Tech., 1934, 20, 1027—1043).—A lit. review dealing with the action of such discharge (I) on the various classes of hydrocarbons

and on fatty acids and oils, including the production of lubricating oils by the Electrion and Voltol processes. The application of (I) to cracking is summarised.

C. C.

Changes occurring in oils for superheated cylinders. M. LOEWENSTEIN (Bull. Soc. d'Encour., 1934, 133, 569—572).—The volatile products and residual oil (I) obtained when cylinder oils (II) are heated at controlled temp. in a current of air have been examined. Cracking occurs with the formation of H_2O at 300° , but less H_2O is liberated at 400° , below which temp. oils could not be satisfactorily differentiated. The amounts of H_2O and distillate obtained increase with the rate of air supply; the volatile acids, however, increase with temp. The hard-asphalt content of (I) (which increases rapidly with the time of heating) is the most satisfactory test for grading oils. Although (II) give rise to volatile acids and oxy-acids they do not themselves become strongly acid.

C. C.

Improved form of sulphur determination apparatus [for mineral oils]. F. ESLING (J. Inst. Petroleum Tech., 1934, 20, 1051—1053).—The author's earlier apparatus (cf. B., 1921, 500 A) is modified. The combustion products from gasoline or kerosene are absorbed in a tower (*T*) the upper part of which consists of a cylindrical vessel containing glass beads, and this fits by a ground joint into a lower vessel (*V*) provided with a stop-cock and side opening carrying the glass lamp hood under which the fuel is burned in a lamp. The lower part of *T* consists of a glass tube, below the joint, reaching almost to the bottom of *V*. $N/16-Na_2CO_3$ is used as absorbent, the excess being titrated with H_2SO_4 . The apparatus can be washed out without dismantling.

C. C.

Synthesis of liquid fuels (kogasin) and lubricating oils from carbon monoxide and hydrogen at atmospheric pressure. F. FISCHER (Brennstoff-Chem., 1935, 16, 1—11).—A lecture describing the development and present position of the process. A comprehensive bibliography is appended.

A. B. M.

Gasoline from waste cottonseed oil. K. C. CHANG and H. Y. CHANG (J. Chinese Chem. Soc., 1934, 2, 211—215).—Crude cottonseed oil when heated with $Ca(OH)_2$ (14%) under pressure during 11 hr. gives a soap which, when distilled, affords an oil, a gaseous product (12%); mainly saturated hydrocarbons, and some CO , H_2 , and CO_2 , a liquid (I) and a solid residue. (I) contains a light oil (17%), b.p. $< 150^\circ$, which resembles gasoline (II), and fractions, b.p. $150-300^\circ$ and $300-365^\circ$, which correspond to kerosene and lubricating oils, respectively, and can be cracked to give a total yield of (II) of about 50%.

J. L. D.

Recent developments in the refining of motor benzol and similar fuels. The Instill process. ANON. (Gas World, 1935, 102, 15—17, 41—43; cf. B., 1931, 429).—The advantages of the Instill process are enumerated. With the percolator method, part of the thiophen may be removed.

T. H. B.

Discontinuous fractionating column for separation of benzene, toluene, and xylene from the gasoline fraction of Shukkoko crude. II. Number

of fractionating plates required for separation of the fraction containing only one aromatic hydrocarbon from the aromatic gasoline. M. MIZUTA (J. Soc. Chem. Ind., Japan, 1934, 37, 769—771 B; cf. B., 1934, 1044).—25 plates are required to separate 70% and 130 to separate $> 80\%$ of C_6H_6 . For the separation of PhMe or xylene 25 suffice.

F. L. U.

Occurrence of knocking in fuels. M. BRUTZKUS (Compt. rend., 1934, 199, 1186—1189).—The greater is the increase in the no. of mols. during combustion the greater is the effect of knock. Examples are discussed.

H. J. E.

Non-carcinogenicity of certain synthetic lubricating oils and the action of some commercial spindle oils, solvent-fractionated spindle oil distillates, and tar oils, tested under similar conditions. D. L. WOODHOUSE (J. Inst. Petroleum Tech., 1934, 20, 1057—1063).—A series of synthetic oils prepared from C_2H_4 with $AlCl_3$ under various conditions (cf. B., 1931, 328) showed no carcinogenic properties (I) in a no. of experiments on mice. With a spindle oil distillate from a paraffin-base oil refined with liquid SO_2 , the raffinate showed no (I), but the carcinogenic substances were conc. in the extracts. A horizontal-retort coal tar and a light petroleum extract of pitch from the latter showed marked (I). Correlation of mouse tests and human tendencies to develop cancer is only possible where results are definitely negative or strongly positive.

C. C.

Viscosity of lubricants. L. FAERMANN (Bol. Informac. Petroleras, 1934, 11, No. 120, 33—43).—The use of the Saybolt and Engler viscosimeters and the significance of η in the grading of lubricating oils are described.

E. L.

Determining abs. viscosity.—See I. Roughness of road surfaces.—See IX. Petroleum oil insecticides. Petroleum products as sprays.—See XVI. Test for liquid paraffin.—See XX. Microscopy of H_2O [from petroleum deposits].—See XXIII.

PATENTS.

Heating of coal. J. S. MORGAN (B.P. 419,444, 8.4.33).—Incandescent coke, produced by feeding a mechanical grate (*G*) with coal and running it at an increased rate, is mixed with coal in a suitable chamber (*C*) in such proportion that the coal is carbonised by the sensible heat of the coke. The volatile products of carbonisation are recovered by known means. The coke may be conveyed from *G* to *C* by means of a pneumatic elevator utilising preheated air, steam, or stripped coal-distillation gases. The gases produced by the action of the air or steam on the hot coke may be mixed with the distillation gases or fed to *G* and there consumed. Part or all of the coke formed may be returned to *G*.

A. B. M.

Carbonisation of solid fuel. M. M. BRANDEGEE, ASSR. to COMBUSTION UTILITIES CORP. (U.S.P. 1,953,040, 27.3.34. Appl., 28.3.31).—Fuel is carbonised in a retort (*R*) of annular cross-section which is suspended within the upper part of a gas generator (*G*) or within a chamber connected to a *G*. The hot gases from *G* pass along the walls of *R*, where they may be burned with

secondary air, and pass thence to a stack, the arrangement being such that the gases passing up within the inner surface of *R* are caused to return to the lower end of *R*, through, or on the outer side of, a cylindrical refractory member suspended within the inner central space, and thence into the stream of gases passing along the outer wall of *R*. The coke produced may be discharged on to the fuel bed of *G*, or into the bottom of the chamber, whence it can be withdrawn as desired.

A. B. M.

Coal-distillation ovens and the like. F. TOTZEK (B.P. 420,124, 14.2.34).—The walls which form the coking chambers of a coke-oven battery are built up of a single layer of bricks and contain horizontal or vertical passages formed by groove-like recesses extending parallel to the wall surface in the middle of the sides of the bricks, these passages serving to convey away gases which leak through the wall from either side. The passages may lead into the gas-collecting space of the chamber.

A. B. M.

Cracking and coking of mixtures of hydrocarbon oils and solid bituminous materials. A. L. MOND. From UNIVERSAL OIL PRODUCTS CO. (B.P. 420,115, 18.8.33).—A mixture of solid or semi-solid bituminous material, *e.g.*, coal, pitch, with a hydrocarbon oil is heated, preferably under pressure in a heating coil, and passed into a chamber (*C*) wherein it is distilled and coked. The mixture is sprayed into *C* or introduced therein in such a manner as to flow in thin films down the walls. The coking is assisted by simultaneously introducing a heating medium, *e.g.*, an oil obtained by fractionation of the volatile products or the gas produced in the process, preheated to a suitable temp.

A. B. M.

Production of carbon black. W. W. TRIGGS. From ELECTROBLACKS, INC. (B.P. 419,884, 18.5.33).—Hydrocarbon or similar oil is decomposed by means of one or more electric arcs located beneath the surface of the oil, fresh oil being introduced, and the suspension of C black formed being withdrawn, at such a rate as to maintain a concn. of suspended C of 5–15% in the oil surrounding the arc.

A. B. M.

Conversion [hydrogenation] of oxygen-containing carbon substances. E. STEFFEN (U.S.P. 1,950,460, 13.3.34. Appl., 13.6.30. Ger., 31.5.29).—Coal, tar, etc. is destructively hydrogenated by treatment with a gas containing approx. 20% of CO and 80% of H₂, at about 460°/≪ 160 atm. Most of the O in the initial material is thereby converted into CO₂, and the formation of H₂O, and consequently the consumption of H₂, is considerably reduced.

A. B. M.

Extraction of asphalt [from bituminous rock]. A. B. ALVEY, G. H. ALVEY, and E. A. YOUNG, Assrs. to UVALDE ROCK ASPHALT CO. (U.S.P. 1,952,647, 27.3.34. Appl., 10.1.31).—Apparatus for solvent extraction is described.

A. B. M.

Distillation of tar or pitch to coke and apparatus therefor. S. P. MILLER, Assr. to BARRETT CO. (U.S.P. 1,952,020, 20.3.34. Appl., 9.8.29).—Tar or pitch is fed continuously to a still (*A*) wherein it is coked. *A* is heated externally and at the same time hot coal-distillation gases are passed through it. Provision is made for agitating the contents of *A* and for continuously dis-

charging the coke formed. The gases and vapours leaving *A* are cleaned by subjecting them to a tar spray, the tar being simultaneously distilled. Part or all of the pitch so produced may be fed to *A*.

A. B. M.

Treatment of asphalt. R. A. CURRAN, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,951,790, 20.3.34. Appl., 31.5.30).—Fine streams of molten asphalt are allowed to fall through a jacketed tower, heated by passing furnace gases through the jacket. The streams break up into drops which then pass through a gaseous cooling medium, *e.g.*, air, and, after solidifying fall into a receiver.

A. B. M.

Manufacture of granular asphalt [etc.]. H. P., PEARSON and L. J. BURROWS, Assrs. to STANCO, INC. (U.S.P. 1,951,769, 20.3.34. Appl., 12.4.29).—Molten asphalt (*I*) is applied in a relatively thin layer to a reticulated surface, which is cooled, and the solid flake-like particles so formed are removed by lateral pressure. A cylindrical surface may be used, (*I*) being applied thereto by means of another cylinder rotating in a bath of the molten material, and the solid particles being removed by rotating blades. The process may be applied to soap, glue, etc.

A. B. M.

Regeneration or purification of wash oil used in the recovery of crude benzol and similar hydrocarbons from coal gas. CLAYTON SON & CO., LTD., and W. SOWDEN (B.P. 419,545, 23.6.33).—A proportion of the hot debenzolised oil is continuously withdrawn from circulation at a point near the outlet of the separating still, and, after distillation (with steam) to remove the pitch, is returned to service.

A. B. M.

[Steel] apparatus for cracking hydrocarbon oils. E. S. DIXON, Assr. to TEXAS CO. (U.S.P. 1,950,786, 13.3.34. Appl., 4.12.30).—Tubes or containers resistant to the action of corrosive materials, *e.g.*, S, and of high temp., *e.g.*, for cracking hydrocarbon oils, are composed of Fe containing Cr 4.0–6.0, C 0.05–0.25, Mn 0.3–0.6, and Si 0.1–2.0%.

C. C.

Deacidification of gasoline. S. J. DICKEY (U.S.P. 1,949,786, 6.3.34. Appl., 14.2.31).—Unstable, oil-sol., acid compounds (*S*) formed by the H₂SO₄ treatment of gasoline distillates are removed by heating the distillate to a temp. at which *S* are decomposed (*i.e.*, 270–300°), withdrawn from the heated surface, and immediately treated in substantially liquid phase with solid NaOH. Liquefied NaOH and extract are withdrawn and the distillate is subsequently fractionated.

C. L. G.

Refining of gasoline. A. P. BJERREGAARD, Assr. to GASOLINE ANTIOXIDANT CO. (U.S.P. 1,949,896, 6.3.34. Appl., 12.9.29).—Gum formation and instability to light of cracked gasoline are inhibited by the addition of small quantities of certain aldehydes, mercaptans, complex hydrocarbons [anthracene (*I*) and phenanthrene], phenols, and alcohols. (*I*) is the most efficient, the quantity required being considerably reduced by subsequent earth filtration. The inhibitor is added before the gasoline is sweetened.

C. L. G.

Production of non-knocking benzines. I. G. FARBENIND, A.-G. (B.P. 418,926, 7.7.33. Ger., 26.7.32).—Low-quality benzines containing S and O compounds are hydrogenated at 250–430°/10–300 atm. with

catalysts immune from S-poisoning. The liquid products are then separated and subjected to heat-treatment at 450–600° with catalysts, *e.g.*, bauxite, thus producing benzines of good anti-knock val. C. C.

Improvement of motor fuels having a tendency to form pitchy residues. INTERNAT. HYDROGENATION PATENTS Co., LTD., Asses. of I. G. FARBENIND. A.-G. (B.P. 418,941, 11.12.33. Ger., 9.3.33).—Motor benzol etc. is blended with 5–30 (20) wt.-% of a hydrocarbon product, b.p. 30–220°, *e.g.*, benzol which has been refined by hydrogenation in the vapour phase under such conditions that no appreciable cracking occurs, *e.g.*, at 180–500°/10–250 atm. in presence of oxides, hydroxides, or sulphides of metals of group VI. C. C.

Motor fuels. STANDARD OIL DEVELOPMENT Co., Asses. of R. G. SLOANE and J. I. WASSON (B.P. 419,690, 1.12.33. U.S., 23.2.33).—Gum formation in the engine can be decreased and the nature of the deposit changed by adding to the fuel 0.1–2% of a gum flux (I) (a liquid hydrocarbon material of low v.p. and preferably of naphthenic type). The deposit formed is of a loose, semi-fluid nature. (I) should have kauri-BuOH val. > 15, η (Saybolt) 70–450 sec. at 37.8°, d 0.887–0.95, η index < 30. The process is particularly applicable to gasoline of high potential gum content and is equally effective when antiknock agents or gum inhibitors are present, and to blended fuels, *e.g.*, those containing EtOH. C. C.

Reducing discoloration of motor fuels. W. A. SCHULZE and F. E. FREY, Assrs. to PHILLIPS PETROLEUM Co. (U.S.P. 1,950,697, 13.3.34. Appl., 24.6.30).—The discoloration of hydrocarbon liquid motor fuels (I), due to exposure to light, is removed or prevented by simultaneously subjecting (I), *e.g.*, in the storage tank, to actinic light and treating it with H₂O or an aq. solution of MeOH or glycol as a separate liquid phase, such that < 0.01% of H₂O relative to the fuel is present. Alternatively, 0.05–0.5% of a simple aliphatic monohydric alcohol may be added to (I). C. C.

(A) Production of decolorised refined petroleum product and decolorising agent therefor. (B–D) Distillate petroleum product and treatment of same. (A–D) J. B. RATHER and (A–c) O. M. REIFF and L. C. BEARD, JUN., (D) L. C. BEARD, JUN., and O. M. REIFF, Assrs. to SOCONY-VACUUM CORP. (U.S.P. 1,951,205–8, 13.3.34. Appl., [A] 3.2.27, [B] 29.10.28, [c] 23.4.29, [D] 19.6.30).—Refined petroleum products, *e.g.*, kerosene or gasoline, are decolorised and made colour-stable by addition of a minute quantity of a dihydroxybenzene, *e.g.*, *o*-, *m*-, or *p*-C₆H₄(OH)₂ (1 pt. in 50,000–150,000). Trihydroxybenzenes, *e.g.*, pyrogallol (> 0.01%), and other org. compounds including α - and β -C₁₀H₇·OH, thiocarbanilide (which is not affected by H₂O), and reducing agents such as aromatic amines, alkali alkoxides, or inorg. reducing agents, *e.g.*, SnCl₂, are also effective. Gum formation is also retarded. The negative catalyst may be added to the still during distillation, placed in the condenser, or added to the distillate. The polyhydroxybenzenes are preferably added as a solution in a suitable solvent, *e.g.*, a 10% solution in an aliphatic or aromatic alcohol. When added to the distillate, mixing may be effected by a

centrifugal mixer or, alternatively, the product may be decolorised by percolation through the granular solid catalyst. C. C.

Treating oil [for separation of asphalt]. U. B. BRAY, Assr. to UNION OIL Co. OF CALIFORNIA (U.S.P. 1,949,989, 6.3.34. Appl., 29.7.32).—Lubricating oil (I) is obtained from asphaltic stock by extraction with liquefied light petroleum hydrocarbons (H). The pptd. asphalt is withdrawn, washed with H, and the extracted oil and solvent are used for extraction of fresh asphaltic stock. H is evaporated from (I) by expansion through heating coils. C. L. G.

Chassis lubricating oil and method of testing same. J. BIJUR, Assr. to AUTO RESEARCH CORP. (U.S.P. 1,944,164, 23.1.34. Appl., 14.12.28).—Claim is made for a vac.-distilled bright oil with an asphaltic base and containing 6–15% of blown rapeseed oil, the mixture having η about 3000 Saybolt units at 36°. A. R. P.

Treatment of hydrocarbons. F. I. L. LAWRENCE, Assr. to ATLANTIC REFINING Co. (U.S.P. 1,963,092, 19.6.34. Appl., 25.5.33). A. FISHER and G. EGLOFF, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,963,265, 19.6.34. Appl., 18.12.31). E. ELLSBERG, Assr. to TIDE WATER OIL Co. (U.S.P. 1,963,488, 19.6.34. Appl., 27.12.30).

Treatment of hydrocarbon oils. W. M. STRATFORD, Assr. to TEXAS Co. (U.S.P. 1,962,752, 12.6.34. Appl., 23.7.29. Can., 20.5.29). A. F. SPIEHLER and C. R. WAGNER, Assrs. to GYRO PROCESS Co. (U.S.P. 1,963,178, 19.6.34. Appl., 17.12.30).

Countercurrent washing of naphtha. Viscosimeter.—See I. Sulphonates etc. from petroleum. **Deoxygenation of phenols.**—See III. **Waterproof containers.**—See V. **Dry-cleaning composition.**—See VI. **Road construction.**—See IX. **Chloroprene plastic [for gasoline hose].**—See XIII.

III.—ORGANIC INTERMEDIATES.

Determination of formaldehyde and formic acid in admixture in presence of iodic acid. J. LANGE (Ann. Chim. Analyt., 1934, [ii], 16, 300–303, 385–393; cf. A., 1933, 596).—The total reducing power of the solution (due to CH₂O and HCO₂H) is determined by treatment with excess of standard KMnO₄ in presence of Na₂CO₃. The unchanged KMnO₄ is pptd. as hydrated Mn oxides by addition of MnSO₄. The ppt. is washed, dissolved in acid aq. KI, and titrated with Na₂S₂O₃. The CH₂O is determined by a modification of Bougault and Gros' method (A., 1922, ii, 667) in which the Hg pptd. is filtered off, washed, dissolved in standard I solution, and determined by back-titration with Na₂S₂O₃. The HCO₂H is calc. by difference. D. R. D.

Analysis of hexamethylenetetramine. S. MINATOYA and I. NAGAI (J. Soc. Rubber Ind. Japan, 1934, 7, 337–346).—A 1-g. sample is refluxed for 15 min. with 200 c.c. of H₂O and 50 c.c. of 10% HCl and diluted to 1 litre. To 25 c.c. of this solution are added 26 c.c. of a filtered solution of HgCl₂ (5%), KI (15%), and gum arabic (2.5%), and 13 c.c. of a filtered solution containing HgCl₂ (10%), KI (30%), gum arabic (5%), and KOH

(15%). The mixture is stirred for 6 min., and 12.5 c.c. of 40% AcOH and 25 c.c. of 0.1N-I are added, excess I being titrated with 0.05N-Na₂S₂O₃. CH. ABS. (e)

Determination of *o*-nitroaniline in presence of large quantities of *p*-nitroaniline. A. P. TERENTIEV, V. A. KLIMOVA, and V. P. PUZIREVA (Anilinokras. Prom., 1934, 4, 554—557).—10 g. of the mixture in 750 c.c. of H₂O are distilled for 40 min., 200 c.c. of H₂O being added during the distillation. The 450 c.c. of distillate are diluted to 500 c.c., and the *o*-NH₂·C₆H₄·NO₂ content of 200 c.c. of solution is determined by titration with 0.1N-NaNO₂; the mean error is > 0.7%. R. T.

Methods of preparation of phenyl-β-naphthylamine. O. M. TSCHERNTZOV and N. S. DROZDOV (J. Appl. Chem. Russ., 1934, 7, 785—789).—β-C₁₀H₇NHPH (I) is obtained in 88% yield by heating a 1:1 mol. mixture of β-C₁₀H₇·OH and NH₂Ph·HCl at 230° for 4 hr.; crude (I) is a suitable antioxidant for rubber. R. T.

Determining citric acid in milk etc.—See XIX.
Stability of H₂O₂-EtOH mixtures.—See XX.

PATENTS.

Uncatalysed oxidation of acetylene. S. LENHER and G. B. KISTIAKOWSKY, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,955,885, 24.4.34. Appl., 3.12.30).—CH₂O, HCO₂H, and (·CHO)₂ are formed by slow passage of C₂H₂ and O₂ through a tube at 200° up to the explosion temp. (275—316°). H. A. P.

Manufacture of hydrocarbons of high mol. wt. from isobutylene. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 421,118, 8.5.33).—Liquid hydrocarbons of high η are obtained by treating *iso*-C₄H₈ with volatile halides of groups II, V, VI, and VIII (BeCl₄, ZnCl₂, BCl₃, PF₅, AsF₃, UF₆, FeCl₃, TiCl₄, OsF₈, SnCl₄) or AlCl₃ at -10° to 50°. H. A. P.

Manufacture of alcohols [from olefines]. A. J. VAN PESKI and W. C. B. SMITHUYSEN, Assrs. to SHELL DEVELOPMENT Co. (U.S.P. 1,954,506, 10.4.34. Appl., 9.12.32. Holl., 8.7.32).—The polymerides are extracted from a hydrolysed solution of olefine in aq. H₂SO₄ by the substance [*e.g.*, (C₆H₆), PhMe, xylene, CCl₄, C₂H₄Cl₂, C₂HCl₃, cyclohexane, Prβ₂OAc] used subsequently as entraining liquid in dehydration of the alcohol by azeotropic distillation. H. A. P.

(A) **Recovery [manufacture] of alcohols containing more than four carbon atoms.** (B) **Production of alcohols.** (A, B) W. ENGS and (A) R. MORAVEC, (B) R. Z. MORAVEC, Assrs. to SHELL DEVELOPMENT Co. (U.S.P. 1,955,416—7, 17.4.34. Appl., [A] 9.6.31, [B] 7.2.33).—(A) An olefine containing > C₄ (amylenes giving *sec*-C₅H₁₁·OH only on hydration) is dissolved in H₂SO₄ and the solution diluted to < 35% (20—30%) H₂SO₄ content and heated at < the b.p. of the alcohol (I); the layer of (I) formed is separated, further hydrolysed if necessary, and distilled. (B) A solution of an alkyl H ester (sulphate) (BuHSO₄) in 40—50% aq. H₂SO₄ is hydrolysed at < 45°, any polymeride layer is separated, and the residual solution neutralised (NH₃); then (I) is separated and worked up as in (A). H. A. P.

Catalytic dehydrogenation of alcohols. A. J. VAN PESKI and H. F. J. LORANG, Assrs. to N. V. DE BATAAFSCHE PETROLEUM MAATS. (U.S.P. 1,956,088, 24.4.34. Appl., 8.6.31. Holl., 14.6.30).—The alcohol (PrβOH) is passed at 250—400° over a dehydrogenating catalyst (Cu) supported on a H₂O-sol. alkaline carrier (Na₂CO₃, K₂CO₃, Na₂SiO₃). No olefines are formed. H. A. P.

Production of sulphuric esters [from olefines]. R. M. DEANESLY, Assr. to SHELL DEVELOPMENT Co. (U.S.P. 1,955,873, 24.4.34. Appl., 4.11.29).—Apparatus is claimed in which an olefine-containing mixture and H₂SO₄ are intimately mixed in a packed column (I), and the hydrocarbons (II) vaporised by the heat of reaction are condensed and reintroduced at higher points in (I) so that liquid (II) are always present in the reaction zone. Accurate temp. control and the use of lower temp. are claimed. H. A. P.

Production of sulphonic acids and sulphonates [from petroleum]. R. T. OSBORN and R. CRAIG, Assrs. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,955,859, 24.4.34. Appl., 17.2.28).—Dried petroleum is extracted with liquid SO₂, and the SO₂-free extract added slowly to 90% H₂SO₄-3% oleum at 55—65°; the resulting emulsion is diluted to 50—60% H₂SO₄ content and the layer of H₂O-sol. sulphonic acids separated. H. A. P.

Manufacture of methylamines. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 421,486, 10.7.33).—A mixture of NH₃, NH₂Me, NHMe₂, NMe₃, H₂O, and MeOH is first fractionally distilled to separate the bases (I) from H₂O and MeOH, and (I) are then repeatedly fractionally distilled to separate the individual amines. H. A. P.

Production of aqueous, positively charged emulsions. CHEM. FABR. PFERSEE G.M.B.H. (B.P. 421,519, 23.7.34. Ger., 28.9.33).—The suspensoid (*e.g.*, paraffin wax), an aq. solution of an org. protective colloid (glue), and an aq. solution of a charge-reversing electrolyte (*e.g.*, HCO₂H) are run simultaneously in the required proportions into the emulsifier. H. A. P.

Preparation of [tert.]butylcymene. H. BARBIER (U.S.P. 1,951,123, 13.3.34. Appl., 29.5.30. Ger., 12.4.30. Cf. A., 1932, 729).—To *p*-cymene (10 pts.) is added conc. H₂SO₄ (60 pts.) followed by Bu^tOH (5 pts.) at > 0°; the product is poured into ice-H₂O, the oily layer washed, and the fraction, b.p. 220—230°, of *tert*-butyl-*p*-cymene (9 pts.) collected. H. A. P.

Production of derivatives of diphenylmethane. E. L. MATTISON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,954,484, 10.4.34. Appl., 27.8.32).—An alkylaniline etc. is condensed with aq. CH₂O in presence of an NH₄ or a substituted NH₄ salt. *E.g.*, NPhEt₂ (300 pts.) is heated to the b.p. with 37% CH₂O (150 pts.), 28% NH₃ (8 pts.), (NH₄)₂SO₄ (10 pts.), and EtOH (15 pts.) in H₂O (300 pts.). The yield of 4:4'-CH₂(C₆H₄·NEt₂)₂, m.p. 40.4°, is quant. H. A. P.

Chlorination of aromatic hydrocarbons. E. C. BRITTON, G. H. COLEMAN, and B. C. HADLER, Assrs. to DOW CHEM. Co. (U.S.P. 1,954,438, 10.4.34. Appl., 10.10.32).—Apparatus is claimed in which a C₃—C₅

paraffin (*iso*-C₄H₁₀) is mixed with Cl₂ (0.1—1 equiv.) and passed through a brightly lighted zone at $\geq 250^\circ$ ($\geq 165^\circ$), the walls of the reaction vessels being $\geq 200^\circ$, so that reaction is complete in ≥ 10 sec.; the products are then rapidly cooled to $< 100^\circ$. Formation of olefines and chloro-olefines is thus inhibited. H. A. P.

Deoxygenation of oxygen-containing organic compounds [phenols]. M. STUART and A. G. L. TRY (B.P. 420,977, 7.6.33).—Phenols (from coal tar) are converted into hydrocarbons by admixture with hydrogenating gases (H₂, coal gas) and subjection in the vapour phase to a silent electric discharge of 50,000—200,000 (100,000) volts/10,000—70,000 (35,000) cycles. (Cf. B.P. 400,234; B., 1934, 8.) H. A. P.

Production of (A) aminodiphenyls, (B) benzidine and other arylamines. C. F. BOOTH, Assr. to SWANN RES., INC. (U.S.P. 1,954,468—9, 10.4.34. Appl., [A] 27.9.29, [B] 28.4.30).—(A) (2- or 4-)C₆H₄Ph·NO₂ is dissolved in C₆H₆ and heated with a dried reaction product of Fe with $<$ its equiv. of conc. HCl. H₂O is then added gradually at the rate at which it is consumed in the reaction. A yield of 90% of theory of C₆H₄Ph·NH₂, uncontaminated with Cl-compounds, is obtained. (B) The ammonolysis of 4:4'-(C₆H₄Cl)₂ (I) and other halogenodiphenyls, using CuCl as catalyst, is carried out in presence of an alkali or alkaline-earth hydroxide to inhibit corrosion of the steel autoclave. *E.g.*, (I) (20 pts.) is heated with 33% aq. NH₃ (45 pts.), CuCl (2 pts.), and Ca(OH)₂ (6.8 pts.) at 225—230° for 8 hr. to give 99—99.5% of theory of benzidine. H. A. P.

Preparation of anhydrous alkali phenoxides. L. E. MILLS, Assr. to DOW CHEM. CO. (U.S.P. 1,955,080, 17.4.34. Appl., 18.5.32).—The phenol is dissolved in a hydrocarbon (I) (PhMe) or chlorinated (I) of b.p. 75—180°, mixed with the alkali hydroxide dissolved in an aliphatic alcohol or ether of lower b.p. (II) (MeOH), and the H₂O formed distilled off with (II). H. A. P.

Manufacture of condensation products of the aromatic series. J. Y. JOHNSON. From I. G. FARBEN-IND. A.-G. (B.P. 420,969, 6.3.33).—An aromatic NO₂- (*p*-position free) or halogenonitro-compound is condensed with a nitrile containing an α -CH₂ group, using an alkaline catalyst. *E.g.*, *p*-C₆H₄Cl·NO₂ and CH₂Ph·CN (I) are ground with dry KOH and C₅H₅N in a ball mill at -5° , and give 4-nitrodiphenylacetone nitrile (II); the same product is obtained using 50% aq. KOH as medium at 60—70°. Condensation of PhNO₂ with (I) in C₅H₅N (dry KOH) at 20—25° gives (II) and the corresponding 4-NH·OH compound. Other examples include the condensation of (I) with *m*-C₆H₄(NO₂)·CO₂H, 2:5:1-C₆H₃Cl(NO₂)·CO₂H, 3'-nitro- (III), 4'-chloro-3'-nitro-, and 3'-nitro-4'-methyl-2-benzoylbenzoic acid, *o*-C₆H₄Cl·NO₂ (to give 3-chloro-4-nitrodiphenylacetone nitrile), *m*-NH₂·C₆H₄·NO₂ (orange Celanese dye), *m*-C₆H₄Me·NO₂, 8-nitroquinoline, 1-nitroanthraquinone, *o*-C₆H₄(OMe)·NO₂, *m*-C₆H₄(NO₂)·CHO, 1-C₁₀H₇·NO₂, and 1:4-C₁₀H₆Cl·NO₂; and of (III) with MeCN and CH₂(CN)₂. H. A. P.

Manufacture of (A) aminoarylthioglycolic acids, (B) 1-thioglycol-2-amino-5-alkoxybenzene derivatives [2-amino-5-alkoxythioglycolic acids]. H. A. LUBS and J. E. COLE, Assrs. to E. I. DU PONT DE

NEMOURS & Co. (U.S.P. 1,954,706—7, 10.4.34. Appl., [A] 30.8.30, [B] 10.8.32).—(A) A 1-thiolarylthiazole is hydrolysed by alkali (*e.g.*, 36% aq. NaOH or 50% NaOH-EtOH at 180—190° under pressure) to the corresponding *o*-aminothiophenol, which is then condensed with CH₂Cl·CO₂H (I) in alkaline aq. solution (at 50°). Examples of starting materials are 1-thiolbenzthiazole and its 3-Me and 5-OEt derivatives. (B) CS₂ is condensed with a *p*-aminoalkoxybenzene (*p*-NH₂·C₆H₄·OMe, *p*-NH₂·C₆H₄·OEt) (at 200°), the resulting alkoxythiolbenzthiazole fused with aq. NaOH at 165—210° (approx. 80% NaOH at 180—200°), and the product condensed with (I). H. A. P.

[Manufacture of esters of] leuco-compounds of vat dyes. J. G. KERN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,954,702, 10.4.34. Appl., 19.8.27).—A H sulphate (I) or phosphate (II) of the leuco-compound is converted into a salt with a hydroxy-alkylamine (III) (di- or tri-ethanolamine), or the base (III) is added to the printing paste, containing an alkali salt of (I) or (II). H. A. P.

PbEt₄.—See X.

IV.—DYESTUFFS.

Preparation of light yellow to dark blue sulphur dyes. Y. H. LI and C. H. YUAN (J. Chinese Chem. Soc., 1934, 2, 198—204).—OH·C₆H₄·SO₃H with NH₂Ph at 190—230° during 14 hr. affords a substance which with *p*-nitrotoluene-*o*-sulphonic acid and molten Na₂S₉H₂O containing S at 120° during 2—3 hr. gives a product which dyes unmordanted cotton. Different shades are obtained by varying the proportions of the ingredients. The dyes are fast to light, H₂O, alkali, and acid, but not to Cl₂. Mordanting increases the depth of colour. J. L. D.

Coloured smokes from dyes.—See XXII.

PATENTS.

Production of isoviolanthrone. F. KNOWLES, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,954,482, 10.4.34. Appl., 31.8.32).—*Bz*-1-Chloro- or -bromo-benzanthrone or *Bz*-1:1'-benzanthronyl sulphide, selenide, or telluride is fused with alkali (KOH-NaOH-EtOH at 130—145°), and the aq. solution of the leuco-dye produced filtered (with exclusion of O₂) before oxidation. H. A. P.

Condensation products. Esters of leuco-vat dyes.—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Hydration of fibres. IV. Fluctuation of fibre length with changes in atmospheric humidity. H. SOBUE (J. Soc. Chem. Ind., Japan, 1934, 37, 777—780 B; cf. B., 1934, 879).—Increase in atm. humidity generally results in both inter- and intra-micellar swelling; the latter is small for natural cellulose, but large for viscose rayon (*R*) and for animal fibres treated with alkali. The time lag is small for *R*. A. G.

Crêpes. IV. Value of ϕ . V. Forms of weft crêpes. Y. KONISHI (J. Soc. Chem. Ind., Japan, 1934, 37, 751—753 B, 753—754 B; cf. B., 1935, 16).—Mathematical. A. G.

Bagasse. V. **General properties of bagasse lignin.** Y. HACHIHAMA and H. SAEGUSA (J. Soc. Chem. Ind., Japan, 1934, 37, 771—772 B).—Lignin extracted from bagasse with 25 mol.-% EtOH at 180° and p_H 13 for 2 hr. has m.p. 130—140°, C 66.7, H 6.4, ash 0.1, and OMe 16%; pentosans and EtO are absent. Lignin extracted with dioxan and HCl at 80—90° is similar but contains 10% of combined pentosans. A. G.

Viscose. LIII. **Mechanism of the outflow of viscose from the nozzle during spinning.** G. KITA, S. JIMBO, K. TANAKA, and S. RIKO LIV, LV, **Comparison of the influence of cellulose pretreatment and ageing of alkali-cellulose on the viscosity of the viscose and its change during ripening.** G. KITA, M. SHOJINO, and I. SAKURADA (J. Soc. Chem. Ind., Japan, 1934, 37, 764—765 B, 765—768 B).—LIII. The drafting of the viscose results in a considerable negative pressure at the nozzles (N) and increases the rate of flow. The draft and the friction on the walls of N partly orients the cellulose particles in the direction of flow, and the holes are so bored as to avoid disturbing this orientation.

LIV, LV. Alkali-cellulose from variously pretreated ramie (boiled with aq. NaOH and bleached) was aged for periods up to 8 days, converted into viscose, and η measured at various stages of ripening. Increasing pretreatment and ageing diminish the min. η , the time required to reach this min., and the rate of subsequent increase. The effects of pretreatment and of ageing are not identical, and these processes are essentially different. A. G.

Relation between the capacity of the heat exchanger and boiler plant of a sulphite-pulp mill. J. KUUSINEN and I. KJELLMAN (Papier-Fabr., 1935, 33, 13—16).—The correct relation between the capacities of heat exchanger for spent liquor and boiler plant (B) resulting in max. saving of costs of B by removal of peak steam loads at the commencement of the cook are calc. and discussed. D. A. C.

Optical studies of chemical wood pulps. [Influence of beating, loading materials, cooking, and calendering.] H. RESS (Papier-Fabr., 1934, 32, 491—500).—The effect of calendering on the gloss (G) and brightness (B) of different papers is investigated photometrically. At the commencement of calendering the rate of increase in G is very rapid but gradually falls off, G finally reaching a max. which remains practically unaltered on further calendering. The rate at which max. G is reached is a characteristic of the calender used, and depends on the no. of bowls, their size and composition, and speed and pressure during calendering, etc. G observed in the machine direction gives slightly higher results than in the cross direction. Owing to decrease in scattering B decreases with rise in G . Fillers, however, may be used to increase B , and also to off-set the loss of opacity on calendering. D. A. C.

Standard methods for determining the alcohol extract [of pulp] and the resolution of resin extracts into unsaponifiable matter, fatty and resin acids. MEMO. NO. 6. FASERSTOFF-ANALYSENKOMM. DES VEREINS DER ZELLSTOFF- U. PAPIER-CHEMIKER U. -INGENIEURE (Papier-Fabr., 1934, 32, 481—482).—Methods are described. $CaCl_2$ is added to the resin extract (E) (obtained

with either EtOH or CH_2Cl_2) after saponification, and the unsaponifiable matter separated from the Ca salts of the fatty (F) and resin acids (R) by extraction with CH_2Cl_2 . F are determined by methylating E , extracting in the cold with Et_2O in presence of NaCl, and titrating with EtOH-KOH. R are obtained by difference ($R = E - U - F$). D. A. C.

Antiseptic value of zinc and other pigments toward paper stocks. O. A. SMITH (Paper Trade J., 1934, 99; T.A.P.P.I. Sect., 231—232).—Zn pigments of the lithopone type, whilst not always producing complete sterilisation of paper stock, are more effective in this respect than other pigments, including those containing Ti. This is not due to the presence of $BaSO_4$, since commercial ZnS is most effective of all in the control of slime, and TiO_2 - $BaSO_4$ mixtures are least so. H. A. H.

Soda-smelting furnaces.—See VII. **Iodised wraps for fruit.**—See XIX.

PATENTS.

Production of cellulose from lignocellulosic materials. H. DREYFUS (B.P. 421,379, 12.6.33 and 17.1.34).—Lignocellulosic materials (L) are treated at elevated temp. (150—250°) and pressure with org. solvent compositions, e.g., aq. alcohols, in such a way that the lignin (I)-containing solutions (S) formed remain in contact with L for short periods compared with the time needed for complete extraction of (I); after separation, S are cooled to ppt. (I) and the solvent recovered is re-heated and re-used for (I) extraction. F. R. E.

Refining of cellulose. G. A. RICHTER, ASSR. TO BROWN Co. (U.S.P. 1,953,191, 3.4.34. Appl., 29.10.32).—Cellulose (wood pulp or cotton), in the form of a flowable aq. suspension, is chlorinated at 40—80° by gradual addition of Cl_2 , and is afterwards treated with alkali refining liquor and bleached. F. R. E.

Treatment [stabilisation and reduction of viscosity] of cellulose esters. R. K. ESKREW, ASSR. TO DU PONT VISCOLOID Co. (U.S.P. 1,953,398, 3.4.34. Appl., 5.12.30. Renewed 23.1.34).—The undissolved ester (particularly cellulose nitrate with < 12.5% N) is heated at < 60° (80—95°) in H_2O containing H_2O_2 and sufficient NaOH to render the solution distinctly alkaline. F. R. E.

Manufacture of cellulose ethers. E. I. DU PONT DE NEMOURS & Co. (B.P. 420,448, 2.6.33. U.S., 2.6.32).—A slurry of NaOH in an inert liquid (C_6H_6) is mixed, without grinding, with the alkali-cellulose, and the whole (containing 4.5—36 mols. of H_2O and 2—10 mols. of NaOH per $C_6H_{10}O_5$ unit) subsequently etherified in known manner. F. R. E.

Treatment [regeneration] of acid setting baths used in [viscose] artificial silk manufacture. G. A. RICHTER and J. G. GOSSELINK, ASSRS. TO BROWN Co. (U.S.P. 1,953,868, 3.4.34. Appl., 3.2.31).—The contaminated solution is treated with an oxidising agent (Cl_2 , $KClO_4$, Na_2O_2 , etc.) and heated to decolorise it and form a colourless ppt., which is removed by filtration or prolonged heating. The solution is brought to its original composition by crystallising out the excess of Na_2SO_4 and adding H_2SO_4 . F. R. E.

Fibrous web for impregnation purposes. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,956,045, 24.4.34. Appl., 11.12.31).—The dried, porous, and bulky web of paper (*W*), produced with as little pressure as possible both at the wet and dry ends of the paper machine, is composed chiefly of unbeaten and unbleached sulphite or soda pulp (α -cellulose content 93–96%), mixed with long-fibred pulps (*e.g.*, manila, sisal) and/or non-cellulosic fibres (*e.g.*, wool, asbestos). *W* may be impregnated with asphalt at 150–177°, of which it is claimed to be capable of absorbing 300 wt.-%.

D. A. C.

Production of artificial film from seaweed and the like. T. GOHDA (B.P. 421,505, 22.1.34).—Matured brown alga is treated with aq. Na_2CO_3 until its original shape is destroyed and, after filtration, the viscous solution is acidified to yield a gelatinous substance which is removed, dispersed in $\text{Na}_2\text{CO}_3\text{-NH}_3$, again filtered, and treated with dil. HCl and HNO_3 to separate and bleach the product, which is washed and dried. This raw material is then dissolved in aq. Na_2CO_3 containing a condensate of a product obtained by passing mixed vapours of EtOH and Et_2O , produced by dry-distillation of $\text{Ca}(\text{OAc})_2$, over a heated catalyst (Ni-CaS) and the viscous solution is diluted with H_2O , filtered, and passed through the film-forming apparatus to a coagulating bath composed of furfuraldehyde and NaOH.

F. R. E.

Artificial fabric containing resins. W. E. LAWSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,953,083, 3.4.34. Appl., 12.6.30. Renewed 19.1.33).—Cellulose (wood) pulp is treated with aq. NaOH (8–35%), washed, beaten in H_2O without cutting, and formed into a web of crinkled fibres, which is impregnated with a solution, *e.g.*, in BuOAc, of a vinyl ester polymeride with or without softeners (castor oil, Bu_2 phthalate, etc.) and afterwards dried.

F. R. E.

Artificial leather. M. O. SCHUR, Assr. to BROWN Co. (U.S.P. 1,955,892, 24.4.34. Appl., 11.1.32).—Paper comprised of 50–75% of substantially unbeaten wood pulp (93–96% α -cellulose content) and 25–50% of wool shoddy is impregnated with a 9% aq. dispersion of rubber latex. The final sheet contains 20–25% of added solids.

D. A. C.

Manufacture of waterproof and oilproof material [for wrappers or containers]. E. I. DU PONT DE NEMOURS & Co. (B.P. 421,649, 28.6.33. U.S., 28.6.32).—Containers for oily or aq. substances, *e.g.*, lubricating oil, paint, milk, etc., can be made from paper, jute, etc. coated with a molten, substantially saturated fatty acid derivative having m.p. $> 50^\circ$, *e.g.*, hydrogenated castor oil, blown hydrogenated tung oil. Softeners, *e.g.*, soap, linseed oil, may be incorporated.

S. M.

[Pigmentation of] wrapping paper for photographic goods. S. E. SHEPPARD and H. J. DIETZ, Assrs. to EASTMAN KODAK Co. (U.S.P. 1,954,333, 10.4.34. Appl., 13.5.30).—The paper is loaded with a size and a light-excluding pigment (I) (artificial graphite) and marked with an ink, using the same size and a contrasting pigment (II) (MnO_2), (I) and (II) having the same catalytic effect on the production of H_2O_2 by autoxidation of the paper.

H. A. P.

Treatment of papers and fabrics for use in photographic printing. J. HALDEN & Co., LTD., and J. HOLDEN (B.P. 418,976, 4.3.33).—The materials are treated, after sensitising, with a waterproofing substance (paraffin wax, chlorinated rubber, cellulose esters, in suitable solvents, or fluid molten wax), whereby they can be preserved in a dry condition and subsequently printed and developed without becoming soaked with H_2O .

F. R. E.

Coating [paper] surfaces [for moisture-proofing]. E. R. CAMPBELL, and IMPERMEABLE PRODUCTS, LTD. (B.P. 421,499, 24.11.33).—Paper, cardboard, etc. are coated on one or both surfaces with a solution of unvulcanised rubber and, after partly drying in a heating chamber, a coating of cellulose ester or ether is applied, the solvents of the latter being chosen to give “key” to the rubber coating. Fillers, colouring matter, metal powders, etc. may be incorporated with either coating.

S. S. W.

[Fourdrinier machine for] production of paper. S. MILNE and K. SONDER (B.P. 421,547, 17.6.33. Ger., 17.6.32).

Nitrogenous fertiliser.—See XVI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

PATENTS.

Dry-cleaning composition. S. BORN (U.S.P. 1,944,859, 23.1.34. Appl., 24.9.31).—A mixture of $\text{C}_2\text{H}_2\text{Cl}_4$ 1, $(\text{C}_2\text{H}_4\text{Cl})_2\text{O}$ 3–5, CCl_4 4–6, and Stoddard solvent (a mixture of benzene, naphtha, and petrol) 90% is claimed.

A. R. P.

Coloration of textile materials. [Dyeing of cellulose acetate with ice colours.] BRIT. CELANESE, LTD., E. W. KIRK, and G. H. ELLIS (B.P. 421,122, 9.6.33).—Impregnation of fabrics of cellulose esters or ethers with the coupling component (a 2:3-hydroxynaphthoic or acetoacetic arylamide) is carried out in alkaline aq. solution in presence of a (reducing) sugar (glucose) which restrains the action of the alkali on the fabric.

H. A. P.

Resisting of alkaline dyeing liquors. BLEACHERS' ASSOC., LTD., C. S. PARKER, C. L. WALL, and F. FARRINGTON (B.P. 421,466, 21.3.33).—The fabric is printed with a paste containing ingredients that in alkaline solution give a membrane (I) permeable only to electrolytes and not to the dyes used in the paste or in the grounding bath. The materials used to form (I) are H_2O -sol. methylcellulose and locust-bean gum with inorg. salts, *e.g.*, MnCl_2 . The dyes used are ice colours [(I) is permeable to the diazonium salt used for developing], vat, or S dyes.

H. A. P.

Development of fabrics printed with vat dyes. I. G. FARBENIND. A.-G. (B.P. 421,279, 12.6.33. Ger., 11.6.32).—Apparatus is claimed in which the printed goods are rapidly heated to the optimum temp. ($< 100^\circ$) for reduction of the dye by a source of radiant heat in an atm. of controlled humidity, and removed from the source of heat as soon as reduction is complete.

H. A. P.

Production of coloured patterns on woven fabric [during weaving]. J. H. VAVASSEUR & Co., LTD. From ASPINWALL & Co., LTD. (B.P. 420,625,

31.10.33 and 30.1.34).—The sheet of warp is printed with a coloured pattern and the constituent threads are then rearranged (device described) so that the pattern is modified while passing from the warp beam or creel to the healds of the loom. A. J. H.

Finishing of [cotton] textile fabrics. F. H. FLIGHT (B.P. 420,592, 21.6.34).—Grey or bleached fabric is impregnated with aq. Na_2SO_4 , dried, passed through a cuprammonium solution containing dissolved cotton, acidified (HCl), and finally shrunk on a "pin" stentering machine. A. J. H.

Carbonisation of fabrics. H. KRANTZ (B.P. 420,648, 26.4.34. Ger., 11.5.33).—Fabric (*F*) is led continuously through series of drying (*D*) and then carbonising (*C*) chambers; *C* are maintained hotter than *D*. Separate supplies of fresh air are circulated counter-flow to the course of the *F* in *D* and with the *F* in *C* so that no deposition of volatile impurities leaving the *F* in carbonisation can condense on the *F* in drying. A. J. H.

Treatment [sizing] of textile fibres. H. H. and O. SCHEFTER (B.P. 418,875, 2.12.33).—The threads are soaked in a colloid, e.g., vegetable mucilage containing no resinifying and/or oxidising constituents, which forms a protective coating (*P*) over which the actual sizing material, consisting of linseed oil varnish, turpentine, a resin, and a solvent, e.g., benzine- C_6H_6 , with addition of a highly sulphonated oil, is applied. After weaving etc., desizing is carried out by swelling *P* at $\gt 80^\circ$ with a soap solution ($\gt 5\%$) containing expansion solvents but no free alkali. F. R. E.

Water-repellent size for fibre products. E. C. LATHROP and F. A. IRVINE, Assrs. to CELOTEX Co. (U.S.P. 1,943,975, 16.1.34. Appl., 6.11.30).—The fibre is mixed with 1% of rosin and the aq. suspension is coagulated by addition of $\gt 10\%$ (on the wt. of dry fibre) of FeCl_3 , $\text{Fe}_2(\text{SO}_4)_3$, or FeClSO_4 . A. R. P.

Preparation for removing rust, ink, and fruit stains from linen and other washable materials. R. MORAWETZ (B.P. 420,426, 20.7.34).—A mixture of powdered citric acid, NaCl, and KHC_2O_4 , with or without addition of soap, is claimed. F. R. E.

Parasiticides and mothproofing. P. L. SALZBERG and F. M. MEIGS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,955,891, 24.4.34. Appl., 6.12.30).—The use of solutions or emulsions of org. F compounds is claimed. Examples are: 1-, b.p. 216° , and 2- $\text{C}_{10}\text{H}_7\text{F}$, m.p. 59° , 2-, m.p. 73.5° , and 4- $\text{C}_6\text{H}_4\text{PhF}$, m.p. 74.2° , 4:4'-($\text{C}_6\text{H}_4\text{F}$) $_2$, m.p. 94° , *p*- $\text{C}_6\text{H}_4\text{F}\cdot\text{NHAc}$, m.p. 150° , *o*-, m.p. 120° , and *p*- $\text{C}_6\text{H}_4\text{F}\cdot\text{CO}_2\text{H}$, m.p. 182° , *p*- $\text{C}_6\text{H}_4\text{F}\cdot\text{OEt}$, b.p. 197° , 4:3:1- $\text{OMe}\cdot\text{C}_6\text{H}_3\text{F}\cdot\text{CO}_2\text{H}$, m.p. 204° , CPhF_3 , b.p. 103.5° , $\text{CH}_2\text{F}\cdot\text{CO}_2\text{H}$, b.p. 165° , and $\text{CHBrF}\cdot\text{CH}_2\text{Br}$, b.p. 122.5° . H. A. P.

Leuco-compounds of vat dyes.—See III. **Wrinkle-finished articles. Coloured mouldings.**—See XIII. **Colouring rubber.**—See XIV.

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

Soda-smelting furnaces. W. SCHMID (Papier-Fabr., 1934, 32, 485—487).—Some recent developments in construction are described. D. A. C.

Spontaneous decomposition of ammonium chlorate. T. POTJEWIJD (Pharm. Weekblad, 1935, 72, 68—69).—A weedkiller consisting of NaClO_3 and an NH_4 salt decomposed spontaneously with explosive violence when stored in an Fe bin. S. C.

Chemistry of sulphur. M. P. APPLEBEY (Chem. & Ind., 1934, 1097—1101).—Owing to the cost of transport of H_2SO_4 it frequently happens that much metallurgical S as SO_2 is wasted and at the same time S is imported for manufacture of H_2SO_4 near where this is required. Reduction of SO_2 to S by coke, which would avoid this loss, is now being carried out on a pilot-plant scale at Billingham. As absorbent for SO_2 from the dil. gas a solution containing AlCl_3 is used. This will absorb 6 wt.-% from a 6.5% SO_2 gas with 98% efficiency at room temp. On heating to 100° , the SO_2 is evolved through hydrolysis of the AlCl_3 lowering the p_{H} . The reaction $\text{SO}_2 + \text{C} = \text{CO}_2 + \text{S}$ proceeds rapidly and completely at 1100° and no external heat is required when the reaction has started. Some CO, COS, and H_2S are formed, but these are destroyed by a catalyst. The process offers a means of manufacturing S from CaSO_4 , or from pyrites without loss of the Fe content, as in the Orkla process. C. I.

Thermal conductivity apparatus for continuous determination of the helium content of natural gas. A. S. SMITH (Bur. Mines, Rept. Invest., No. 3250, 1934, 11 pp.).—The gas is burned to increase the relative vol. of He, H_2O and CO_2 are removed, and the residual mixture of N_2 , O_2 , and He is passed into a thermal-conductivity cell for comparison with a reference cell. CH. ABS. (e)

Thermal expansion of solids [magnesite].—See I. **Na silicate.**—See VIII. **Fertilisers. Fungicides.**—See XVI. **Test for K alum. Assay of Pb subacetate solution.**—See XX. **Atm. S pollution.**—See XXIII.

PATENTS.

Manufacture of boric acid [from kernite]. E. FRANKE, Assr. to CHEM. FABR. GRUNAU, LANDSHOFF & MEYER A.-G. (U.S.P. 1,944,598, 23.1.34. Appl., 30.9.30. Ger., 22.10.29).—Kernite is dissolved in H_2SO_4 containing NaBO_2 and the solution cooled to deposit H_3BO_3 ; the mother-liquor is boiled down until a double Na-Mg sulphate separates, the crystals are removed, and the solution is cooled to recover more H_3BO_3 . A. R. P.

Purification of caustic soda solution. H. BENDER, Assr. to PENNSYLVANIA SALT MANUFG. Co. (U.S.P. 1,944,630, 23.1.34. Appl., 26.9.29).—Aq. NaOH resulting from the electrolysis of brine is evaporated until it contains about 40% NaOH, the separated NaCl is removed, and Na_2SO_4 is added in equimol. amount to the NaCl content (about 1%) of the mother-liquor, whereby acicular needles of NaOH, NaCl, Na_2SO_4 separate, leaving a solution containing $\gt 0.1\%$ of NaCl. A. R. P.

Synthesis of ammonia. COMP. DE PROD. CHIM. ET ELECTROMÉTALL. ALAIS, FROGES ET CAMARGUE, and J. BASSET (B.P. 421,158, 11.6.34. Fr., 27.6.33).—Very impure mixtures of N_2 and H_2 , e.g., crude industrial gases, are caused to react, with or without the use of catalysts, at $450\text{--}1200^\circ / \gt 1500$ (2000) kg./sq. cm.

W. J. W.

Production of finely-divided hydrated calcium sulphate. F. VON BICHOWSKY (U.S.P. 1,943,497, 16.1.34. Appl., 19.3.32).—Acicular $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is heated with H_2SO_4 (d 1.25) at 100° for > 24 hr. to disintegrate it without dehydration. A. R. P.

Manufacture of granular calcium phosphate. W. H. KNOX, JUN., Assr. to VICTOR CHEM. WORKS (U.S.P. 1,943,919, 16.1.34. Appl., 19.9.31).—Claim is made for a mechanically resistant CaHPO_4 containing $< 0.5\%$ of FePO_4 , $< 0.2\%$ of MgO , and 1–2% of Na_2O , made by adding 1–1.5% of Na_2CO_3 to H_3PO_4 , neutralising with CaO , and spray-drying. A. R. P.

Purification of [natural] phosphates [and manufacture of phosphoric acid]. G. E. WALKER, A. E. MARSHALL, and H. E. DUNN, Assrs. to SOUTHERN MINERAL PRODUCTS CORP. (U.S.P. 1,944,048, 16.1.34. Appl., 8.8.32).—Rock phosphate (I) containing Fe and Al is leached at 80° with 5–15% H_3PO_4 (II) from a later stage to dissolve the Al and Fe, and the residue is mixed with 20–30% H_3PO_4 (III) and conc. H_2SO_4 to decompose the (I) and yield a 30–33% H_3PO_4 solution containing H_2SiF_6 and ppt. the Ca as $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (IV). The (IV) is first washed with a small amount of H_2O to give (III), and then with more H_2O to give (II). Part of the Al-Fe phosphate solution is treated with NaOH to ppt. $\text{Al}(\text{OH})_3$ and $\text{Fe}(\text{OH})_3$ and the resulting aq. Na_3PO_4 is added to (III) to ppt. Na_2SiF_6 in the decomp. process. A. R. P.

Production of copper sulphate in solution from metallic or scrap copper and dilute sulphuric acid. D. W. and B. H. MARSH (U.S.P. 1,944,444, 23.1.34. Appl., 1.7.31).—Scrap Cu is treated with dil. H_2SO_4 at 90 – 100° in a closed container into which air is passed at 25–30 lb./sq. in. A. R. P.

Production of zinc oxide. R. W. FRENCH, Assr. to SUPERIOR ZINC CORP. (U.S.P. 1,944,158, 23.1.34. Appl., 23.12.30).—Zn residues containing CO_3 , and Na or K salts obtained from org. reductions etc. are boiled with H_2O and agitated with air to remove sol. alkali salts and oxidise any metallic Zn. The insol. residue after washing is roasted, leached to remove ZnSO_4 , ground wet, and dried. A. R. P.

Manufacture of basic zinc carbonate. M. J. ENGBERG (U.S.P. 1,944,415, 23.1.34. Appl., 16.11.29).—AcOH is treated with an excess of ZnO to produce a suspension of $\text{Zn}(\text{OAc})_2$, $\text{Zn}(\text{OH})_2$, ZnO, which is treated with CO_2 to convert it into ZnCO_3 , $\text{Zn}(\text{OH})_2$, ZnO with the liberation of AcOH for re-use. The product forms a useful white pigment with a high covering power. A. R. P.

Production of chemical compounds [zinc sulphide and barium hydroxide]. T. G. STEVENS (U.S.P. 1,944,281, 23.1.34. Appl., 25.2.32).—Aq. BaS at $< 60^\circ$ is mixed with a slurry of ZnO at $< 60^\circ$ to give a ppt. (I) of ZnS containing some adsorbed $\text{Ba}(\text{OH})_2$ and a solution (II) of $\text{Ba}(\text{OH})_2$ containing a little ZnO; (I) is digested with dil. HCl to give BaCl_2 solution and pure ZnS, and (II) is treated with $(\text{NH}_4)_2\text{S}$ to ppt. ZnS and yield pure $\text{Ba}(\text{OH})_2$. A. R. P.

Shaping and cooling hot liquid [saline] detergent. A. W. SCHEIDT, Assr. to ELECTRIC SMELTING &

ALUMINUM Co. (U.S.P. 1,944,848, 23.1.34. Appl., 7.3.30).—A fused aluminosilicate of the composition $(\text{R}_2\text{O})_{x-1}\text{Al}_2\text{O}_3(\text{SiO}_2)_x$, where R is K or Na and $x > 7$, is cast from the furnace directly through rolls to produce a thin sheet of a readily sol. detergent. A. R. P.

Preroasting of hydrogen-production catalysts. W. V. HANKS and G. H. FREYERMUTH, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,943,821, 16.1.34. Appl., 5.5.31).—A mixture of a hydroxide or carbonate of Ni, Co, or Fe with $\text{Cr}(\text{OH})_3$, MgO , or $\text{Al}(\text{OH})_3$ is heated to expel H_2O and then maintained at 870 – 1035° for 12–72 hr. in a current of steam or reducing gas free from catalyst poisons. A. R. P.

Preparation of [vanadium zeolite] catalysts [for oxidation of sulphur dioxide]. J. L. KOETZ, Assr. to SELDEN Co. (U.S.P. 1,941,557, 2.1.34. Appl., 5.3.30).—Zeolite pellets containing V (I) are prepared in known manner and calcined to expel H_2O of hydration by passing them downwards through a wide tube containing an internal tube system (II) in which SO_2 and air are passed over precalcined (I), the heat of reaction thus being utilised in the calcining process. The hot pellets are cooled by air, which is thus preheated before passing to (II). A. R. P.

Manufacture of aluminium fluoride. J. WILKINSON & SON, LTD., and C. J. SAURIN (B.P. 421,139, 7.11.33).— $\text{Al}_2(\text{SiF}_6)_3$ (I) is heated at 600° , the SiF_4 expelled being caused to combine with HF to produce H_2SiF_6 for further formation of (I) by reaction with Al_2O_3 . The AlF_3 itself may be heated at 100 – 600° . W. J. W.

Controlling oxidation of halide solutions to liberate free halogen [bromine from brine]. J. J. GREBE and R. H. BOUNDY, Assrs. to DOW CHEM. Co. (U.S.P. 1,944,738, 23.1.34. Appl., 31.7.30).—The addition of Cl_2 to brine to liberate Br is controlled potentiometrically by a system of relays, so that the potential between an electrode immersed in the brine is about 1.215 volts referred to the standard H_2 scale. A. R. P.

Recovery of iodine [from brine]. C. W. GIRVIN, Assr. to GEN. SALT Co. (U.S.P. 1,944,423, 23.1.34. Appl., 5.3.27).—The brine is treated with NaNO_2 and H_2SO_4 to liberate the I; this is adsorbed in charcoal and recovered therefrom by treatment with SO_2 . A. R. P.

H_2 - N_2 mixture from hydrocarbon gases.—See II. Gels.—See IX. Electrolysing H_2O .—See XI.

VIII.—GLASS; CERAMICS.

Chilled plate glass. V. Bending strength, Young's modulus, and stress-strain relation of the glass. T. ARAKI, S. TAKAHASHI, and S. MORI (J. Soc. Chem. Ind., Japan, 1934, 37, 737 B; cf. B., 1934, 1058).—The bending strength (B) and Young's modulus (E) of the chilled and the untreated glass are, respectively: $B = 2000$ – 2200 and 400 – 500 kg./sq. cm., $E = 6.53 \times 10^{11}$ and 6.98×10^{11} . These vals. of B were unchanged after 120 days at 120° . E follows Hooke's law to the breaking point and shows no elastic "after effect." $\Delta B \propto \sqrt{\Delta E}$, approx. J. A. S.

Salt glaze. II. Action of mixed vapour of water and sodium chloride on alumina, ferric oxide,

felspar, kaolin, and synthetic body; treatment of waste gases. III. Manufacture of sodium silicate. IV. Microscopical observation of commercial salt-glazed wares. V. Slip glaze. S. KONDO and S. SUZUKI (J. Soc. Chem. Ind., Japan, 1934, 37, 702—703 B, 703 B, 737—738 B, 738 B; cf. B., 1934, 717).—II. The degree of interaction with NaCl + H₂O vapour in N₂ at 900—1200° for 1—3 hr. increases in the order Fe₂O₃, Al₂O₃, SiO₂. Felspar reacted (3 hr. at 1200°) less readily than kaolin and the products contained less SiO₂ than did salt glaze. Synthetic bodies "glassified" at 1100° and contained more Na₂O than did salt glaze.

III. The optimum reaction at 900—1150° (in presence of steam) occurred with the mixture 2.5 NaCl : 1 SiO₂. The volatilisation of the NaCl increased rapidly with the temp.

IV. Salt glaze is yellow-dark brown or colourless glass containing fibrous crystals, black cubes, and reddish-brown hexagonal plates. The boundary between the body and glaze is not as smooth as in other wares.

V. Satisfactory glazes were made by using salt slip (S) (10—20% of NaCl). Firing in a reducing atm. produced a celadon tint. Addition of PbO to S gave the appearance of an earthenware glaze. J. A. S.

Permeability of refractory materials to gases. IV. Influence of the firing process on the permeability to air of fireclay materials. F. H. CLEWS and A. T. GREEN (Trans. Ceram. Soc., 1934, 33, 479—494; cf. B., 1934, 276).—Measurements (I) of the porosity and permeability to air (*P*) at room temp. were made on 3 types of fireclay in the "green" state, and at various stages during the (laboratory) firing to 1400°; *P* was found to increase continuously on firing to 1200°, and it is concluded that the no. of pores decreased, but their average size increased, on firing over this range. The low vals. of *P* found after drying at 120°, and also after burning at about 650°, emphasise the strains which may be set up by too rapid heating during the "H₂O-smoking" period, and explain the extended time necessary for complete C elimination from some clays at 650°. In (I) and in other tests on firebricks reheated at 1400°, vitrification was found to cause an increase in *P* in 5 cases, and a decrease in 5 others; it is suggested that vitrification *per se* decreases the *P*, the increased vals. being attributed to the development of fine cracks. A. L. R.

Thermal expansion of solids [kaolin].—See I. Effect of H₂O on tiles and bricks. Weathering of bricks.—See IX.

PATENTS.

Porous heat-insulating body. [Building block.] A. P. THURSTON. From BABCOCK & WILCOX Co. (B.P. 419,484, 20.11.33).—A slip of refractory clay materials and org. matter (I) (e.g., wood flour) is aerated, shaped, and fired at a high temp. (e.g., 1650—1690°). The aeration is such that the voids formed are comparable (in no., size, and distribution) with those due to (I). The initial firing is carried out in a reducing atm. in order to carbonise (I) prior to its combustion. The slip is shaped by filter-moulding or by a centrifugal process. The shapes are placed in the kiln so that only the upper

surface is exposed to the highest temp., thereby forming a vitrified skin on an otherwise porous article. Suitable apparatus is described. J. A. S.

Material, and bodies formed therefrom, for the polishing, smoothing, and grinding of very hard objects, particularly hard alloys. SIEMENS & HALSKE A.-G. (B.P. 419,744, 18.5.33. Ger., 30.5.32).—Highly abrasive particles are made by sintering pure BeO at > 1700°; they are bonded at high temp. (1700—2000°) with such materials as Al₂O₃ etc., or by a process of recrystallisation. J. A. S.

Glass-resistant refractory and batch composition for its manufacture. P. G. WILLETTS, Assr. to HARTFORD-EMPIRE Co. (U.S.P. 1,944,856, 23.1.34. Appl., 16.4.32).—A mixture for making refractory bricks for glass tanks consists of about 65% of grog granules [made by firing a 92.5 : 7.5 mixture of kaolin (*K*) and felspar (*F*) at 1565°] and 35% of a similar unfired mixture of *K* and *F*. The product, after briquetting and firing, consists of mullite crystals in a glassy matrix and contains (approx.) SiO₂ 53.5, Al₂O₃ 44, and Fe₂O₃, K₂O, Na₂O > 1.5% (in all). A. R. P.

Flexible glass substitute. Abrasive wheels. Polymerised org. compounds.—See XIII.

IX.—BUILDING MATERIALS.

Problems of porous bodies and their behaviour as building materials. B. H. WILSDON (J.S.C.I., 1934, 53, 397—402 T).—The behaviour of porous building materials is discussed in terms of capillary theory. The simple application of the Kelvin equation is inadequate to explain the properties of H₂O in a finely porous material. The mechanical effects produced by H₂O in porous bodies are discussed. The available work due to moisture absorption measured experimentally may be small compared with that estimated from the unrestrained moisture expansion and the modulus of elasticity. It is suggested that the liability to mechanical damage through frost action or the crystallisation of salts is determined largely by the effects of micropores in causing delayed transformation.

Changes in the size of tiles and bricks on treatment with water. G. R. RIGBY (Trans. Ceram. Soc., 1934, 33, 527—532).—Changes in length after boiling and subsequent cooling in H₂O and after autoclaving for 4 hr. (steam pressure = 25 lb./sq. in.) were measured. Vitreous floor tiles showed low, the glaze from a white tile very low, and a white unglazed tile the largest, expansion. Diatomite bricks showed a large expansion, but with SiO₂ bricks and firebricks contractions were found. Explanations are offered. A. L. R.

Correlation of laboratory tests with the weathering properties of bricks. I. Scope of the investigation and description of ground-exposure test. B. BUTTERWORTH (Trans. Ceram. Soc., 1934, 33, 495—526).—An exposure test (I) designed to show the resistance (II) of building bricks to weathering consists in burying a no. of bricks, some entirely below the surface, the others half in the ground, and noting the changes resulting from exposure. Methods of obtaining representative brick samples from kilns for the (I) and for

laboratory tests, and the results of one winter's exposure on several types of bricks, are described. Good (II) in general was found with a North of England hand-made facing brick, common pressed (Staffordshire) fireclay bricks, one set of fletton-type bricks made from Oxford clay (moderately good), red wire-cuts and hand-made sand Stocks from Leicestershire clay, hand- and machine-made London Stocks, wire-cut engineering bricks (Weald clay), and North of England red pressed bricks; North of England rusticated wire-cut facing bricks, common Gault wire-cuts, and other fletton-type bricks were of poor resistance, and a batch of red pressed bricks made from shale and soft plastic clay showed extreme variations in properties, which could be correlated with their position in the kiln. (I) is considered to distinguish bricks of high and low (II), but not to provide a direct measure of this property.

A. L. R.

Laboratory measurement of index of roughness of road surfaces. A. LÉAUTÉ (Compt. rend., 1934, 199, 1215—1216).—The Léauté-Dupont apparatus consists of a loaded chassis with a rubber-covered base, the whole being drawn across the surface. Vals. are recorded for glass and for various road surfaces (wet and dry).

H. J. E.

Composition of Philippine woods. VII. F. M. YENKO, L. BAENS, and A. P. WEST (Philippine J. Sci., 1934, 55, 1—9; cf. B., 1934, 836).—Analyses of 24 samples are recorded.

PATENTS.

Manufacture of cement. M. VOGEL-JØRGENSEN (B.P. 420,756, 7.6.33).—Clinker ground to normal fineness is separated into at least 2 portions; the finer fraction (*e.g.*, consisting essentially of grains of $< 30 \mu$), to which gypsum may be added, yields a cement (I) which hardens rapidly, and the coarser fraction may be further ground, or mixed with fine (I), to give a normal-setting (I).

A. L. R.

Inorganic gel composition [for paints and for waterproofing cement]. R. CROSS, Assr. to SILICA PRODUCTS Co. (U.S.P. 1,943,584, 16.1.34. Appl., 28.3.29).—Claim is made for a mixture of raw bentonite with 0.5—10% of calcined dolomite or magnesite. A. R. P.

Manufacture of a synthetic inorganic gel [for cement]. C. S. HOWE, Assr. to LOS ANGELES TESTING LAB. (U.S.P. 1,943,532, 16.1.34. Appl., 27.7.29).—In the manufacture of cement a proportion of alkali carbonate is added to the charge to produce an alkali silicate during the clinking process. After grinding, the clinker is mixed with a proportion of KHSO_4 or NaHSO_4 which liberates colloidal SiO_2 and forms $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ when the cement is mixed with H_2O .

A. R. P.

Cement admixture. A. BEGHELLI (U.S.P. 1,944,820, 23.1.34. Appl., 19.4.32).—A 60:10:25:5 mixture of sol. SiO_2 , Al_2O_3 , Fe_2O_3 , and TiO_2 is added to unkeaded Portland cement to prevent the ageing of moulded cement articles after their impregnation with molten S.

A. R. P.

Road construction. F. L. CARSON, Assr. to PACIFIC LUMBER Co. (U.S.P. 1,960,865, 29.5.34. Appl., 16.12.30).—A subgrade composed of crushed rock and redwood-

bark fibres is sprayed with alum solution and then an irreversible emulsion of asphalt, of high m.p. and emulsifiable at 100° , is applied while thinly liquid at 150° .

B. M. V.

Coloured roofing granule. H. R. GRUNDLACH, Assr. to CENTRAL COMMERCIAL Co. (U.S.P. 1,943,525, 16.1.34. Appl., 19.8.31).—Granules of fired clay, rock, or the like (1 ton) are mixed with a slurry of ZnO or MgO (10), china clay or ground glass (10), $\text{Al}(\text{OH})_3$ ($2\frac{1}{2}$ —3), a colour pigment (12), and 19—20% H_3PO_4 (115—120 lb.) and the mixture is dried to affix the colour to the granules.

A. R. P.

Building block.—See VIII.

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

Relationship between the blowing time and output in Bessemer converters. R. FRERICH and T. LÜTGEN (Stahl u. Eisen, 1934, 54, 1329—1332).—A statistical examination of the total products from 4300 Bessemer heats indicates the extreme importance, from the economy and quality viewpoints, of the blowing time in Bessemer practice.

W. P. R.

Decarburisation of cast iron with hydrogen. W. BAUKLOH, W. VON KRONENFELS, and H. GUTHMANN (Stahl u. Eisen, 1934, 54, 1334—1336).—The rate of decarburisation of both white and grey cast Fe increases with the H_2 flow and with temp. up to 950° . At $> 950^\circ$ the rate decreases owing to decomp. of CH_4 with reabsorption of C by Fe. White cast Fe is decarburised to a smaller extent than grey, which is in contradiction to the generally accepted view of the ultimate stability of the Fe-graphite system.

W. P. R.

Properties of grey cast iron as affected by casting conditions. C. M. SAEGER, JUN., and E. J. ASH (J. Res. Nat. Bur. Stand., 1934, 13, 573—577).—The effect on the transverse breaking load (S_T), deflexion (θ), modulus of rupture, modulus of elasticity, hardness, d , and microstructure of sand-cast, grey cast Fe of superheating at 1400 — 1700° in a high-frequency induction furnace has been determined. The degree of superheat has no effect on the d -temp. relation in the liquid state, but the strength (S) of a bar of given diam. (D) depends on the max. heating temp. (T). For some types of cast Fe T for max. S varies with the D of the bar, but for other types it is const. for all vals. of D . The castability is not appreciably affected by T , but is solely a function of the liquidus temp. (L), being higher the lower is L . Removal of the "casting skin" reduces S_T considerably, but increases θ . Low-strength cast Fe contains relatively large straight graphite (G) flakes in a matrix of coarse pearlite (P), whereas high-strength cast Fe has a matrix of fine P or sorbite with fine G flakes disseminated throughout it.

A. R. P.

Veining of ferrite. L. NORTHCOTT (Metallurgist, 1934, 9, 163—165).—Recent theories of α -Fe veining (V) or sub-boundaries (S) are discussed. Although V appears to have some connexion with the $\gamma \rightarrow \alpha$ -phase change, the appearance of similar S in Ni and Cu in which allotropy does not occur may be taken as evidence that the effect is caused by the pptn. of particles,

probably oxides, in such a manner that they bear some definite relationship to the lattice of the parent metal. The boundary between two grains differently oriented is always a continuous line, but the *S* are always discontinuous and appear to be composed of small particles. W. P. R.

Manufacture of rimming steel. W. R. FLEMING (Trans. Amer. Soc. Met., 1935, 22, 532—524).—The composition of rimming steels falls within the limits: C 0.07—0.09%, Mn 0.30—0.40%. The thickness of the rim is almost entirely dependent on the chemical composition, and the O₂ content of the molten steel is largely responsible for degree of rimming. W. P. R.

Effect of cold-work on the physical properties of cold-headed [steel] bolts. C. L. HARVEY (Trans. Amer. Soc. Met., 1934, 22, 657—669).—Highly stressed bolts are usually made from 0.3% C steel or steel of fairly low alloy content. Heat-treatment at 480° is advantageous. W. P. R.

Effect of cold-work on the microstructure of low-carbon steel tubes. E. P. POLUSHKIN (Trans. Amer. Soc. Met., 1934, 22, 635—656).—By the ordinary bench-drawing method (*O*) a mild-steel tube can be reduced only 30—40%, i.e., < twice without annealing, by the Dudzele (*D*) process 2.5—6 times, and by the Rockrite (*R*) process 2.5—37.9 times. The distortion of the microstructure is evident from (*a*) elongation of the grains, (*b*) deformation of the lattice structure shown by appearance of slip-lines etc., (*c*) fragmentation. In process *R* the grains appear to be free from slip-lines, which must be regarded as potential cracks. The stresses used in process *R* are mainly compressive and not tensional as in processes *O* and *D*. These compressive stresses cause deformation lines in the structure, which are not centres of weakness as the slip-lines appear to be. W. P. R.

[Steel] tube corrosion. F. J. BULLEN (Metallurgist, 1934, 9, 183—186).—Three cases of corrosion (*C*) of tubes carrying cooling-H₂O are described in which steel tubes corroded after a short service in conditions which had previously not caused trouble. *C* in each instance was characterised by severe local pitting, and in all the corroded tubes the presence of small quantities of oil was detected. *C* occurred at places where the oil had come in contact with the metal, thus protecting it from dissolved O₂ in the H₂O. This area then became the anode of a local galvanic cell and *C* under the oil proceeded according to the well-known differential-aëration principle. W. P. R.

Oxy-acetylene welding of steel tubes. ANON. (Metallurgist, 1934, 9, 167—171).—Tests by G. CALBIANI on plain C-steel tubes and Cr—Mo-steel tubes indicate that elongation vals. of the welded tubes do not give reliable information of the resistance and ductility of the welds and the zones adjacent to the welds. W. P. R.

Chromium oxide inclusions in stainless steels and ferrochromium. M. BAEYERTZ (Trans. Amer. Soc. Met., 1934, 22, 625—634).—The oxide inclusions which are present in ferrochrome are duplex in character and by reflected light appear purplish-grey. By transmitted light one constituent is green and the other red. An acid

KMnO₄ reagent preferentially attacks the “red” constituent. The inclusions which occur in stainless steels are homogeneous when examined on a polished surface of the steel, but the etching reagent described only partly attacks the inclusions and it is probable that they are mixtures of the “red” and “green” varieties found in ferrochromium. The “green” has a higher Cr content than the “red.” W. P. R.

Banding in a chromium-molybdenum steel. E. R. JOHNSON and W. J. BUECHLING (Trans. Amer. Soc. Met., 1934, 22, 249—265).—Banding caused by segregation of P, O, and possibly other impurities in steel may have a detrimental effect on the transverse ductility, but tensile-impact tests on bars and tubes made from steel containing C 0.3, Mn 0.54, Cr 0.95, Mo 0.22, S < 0.02, and P < 0.02% show that directional effects are present even when banding has been removed by a high-temp. treatment prior to rolling. W. P. R.

High-temperature tensile, creep, and fatigue of cast and wrought high- and low-carbon 18 chromium-8 nickel steel. Progress Report of the A.S.M.E.—A.S.T.M. Research Committee on effect of temperature on the properties of metals. H. C. CROSS (Trans. Amer. Soc. Mech. Eng., 1934, 56, 533—553).—The high-C steel (*A*) contained 0.125% C and the low-C steel (*B*) 0.067% C. Hardness (*H*) and magnetic permeability (*M*) tests in the cast and wrought condition at room temp. of *A* and *B* indicate that there is only slight difference in *H* between the two materials. *M* for the cast steels was variable. Rolled *A* is superior in creep (*C*) properties to cast *A*, but there is little difference between rolled and cast *B*. Cast *A* is superior in *C* to cast *B*, and both *A* and *B* show improved *C* properties after H₂O-quenching from 1100°. The *C* tests were carried out at 420°, 540°, and 645°. Notched-bar impact tests on material which had been tested at elevated temp. for *C* show that neither rolled nor cast *B* had developed room-temp. impact brittleness after exposure to temp. within the carbide-pptn. range. Under similar conditions there is slight loss of ductility in *A*. It appears that susceptibility to intergranular corrosion does not necessarily imply embrittlement. The endurance limits (*E*) under reversed flexures at elevated temp. were well marked for both materials, but a larger no. of cycles of stress were required to determine *E* for the cast materials. Microscopical examination of the material which had been tested at the elevated temp. indicates that (*a*) time and C content are controlling factors in carbide pptn. and time is the more important, (*b*) there is no acceleration of carbide pptn. due to stress, (*c*) cold-working causes pptn. of fine carbide particles along the slip bands. W. P. R.

Comparison of single-step, long-time creep results with Hatfield's time-yield stress. A. E. WHITE and C. L. CLARK (Trans. Amer. Soc. Met., 1934, 22, 481—494).—A large no. of steels have been tested by the single-step method of loading in which a separate specimen is used for each load. From the time-elongation curves thus obtained the time-yield stress (cf. B., 1930, 1070) was computed and was taken as the stress which, during the 48-hr. period following the initial 24-hr. period, produces a deformation of 0.000048 in. per in. The results indicate that there is no definite

relationship between the two vals. so obtained, but the time-yield has possibilities as a relatively rapid method of ascertaining the creep characteristics of ferrous metals. W. P. R.

Fatigue in structural steel. B. P. HAIGH (Engineering, 1934, 138, 698—701).—The behaviour of a mild steel (I) and a Cr-Cu steel (II) under the combined influences of alternating and direct stress shows that the strength of (II) is 1.45 times that of (I). W. P. R.

Reactions in the galvanising of iron. III. Determination of the dependence on temperature of the solubility of nickel, chrome, and manganese steels in zinc. H. GRUBITSCH (Monatsh., 1934, 65, 122—128; cf. B., 1932, 800).—The solubilities at different temp. of a no. of different steels in Zn have been determined. All except one, a Mn steel, showed max. and min. vals. The results are in agreement with the metallographic observations which were also made. M. S. B.

Corrosion. J. F. LEVY (Bol. Soc. Quim. Peru, 1934, 1, No. 2, 32—49).—Corrosion of buried pipes etc. is discussed with reference to a detailed microscopical and analytical study of two sections of railway rails and adjacent soil (*S*), which shows how the intensity of corrosion depends on the amount of sol. salts in *S*. E. L.

Effect of light on corrosion of steel in aqueous solutions. H. ENDO and H. SEKIGUCHI (Kinz. no Kenk., 1933, 10, 166—178).—The loss in wt. of specimens in aq. HNO₃, AcOH, or FeCl₃ was greater on exposure to diffused light than in the dark. The effect of light is discussed. CH. ABS. (e)

Three-product flotation at Britannia. Separation of copper-zinc-iron from low-grade ore. H. A. PEARSE (Trans. Canad. Inst. Min. Met., 1934, 341—350).—The ore contained chalcopyrite, pyrite, sphalerite, Au, and Ag. A bulk concentrate was produced by flotation, reground, refloat to give a Cu concentrate, a Cu-Zn middling (retreated), a Zn concentrate, and a pyrite product. Recovery of Cu was approx. 81%, that of Au 60% in the Cu concentrate, and that of Zn 65%. CH. ABS. (e)

Grain refinement of various alloys by peritectic reactions. J. ASATO (Kinz. no Kenk., 1933, 10, 488—503; cf. B., 1934, 150).—In Cu-rich alloys the crystal grains become very fine when Fe or Co is added up to their peritectic points. A similar phenomenon occurs for Sn-Cu, Si-Cu, Zn-Cu, Zn-Ag, Cd-Ag, Sb-Sn, and Al-Ni, all of which have peritectic reactions. CH. ABS. (e)

Cementation of zinc into some metals by means of zinc dust. I. T. KASÉ (Kinz. no Kenk., 1933, 10, 555—572).—Cementation of Fe, Cu, brass, Ni, etc. by Zn dust at 250—800° has been studied. Diffusion of Zn into the metals starts at 150° and increases with the temp. The cemented surface resists corrosion by air or H₂O better than the base material. CH. ABS. (e)

Phase changes during ageing of zinc alloy die castings. I. Eutectoidal decomposition of β -aluminium-zinc phase and its relation to dimensional changes in die castings. M. L. FULLER and R. L. WILCOX (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Tech. Publ. 572, 1934, 17 pp.).—In the Al-Zn system the

β -phase decomposes in < 1 week of ageing in die castings. This occurs in spite of Cu and/or Mg present. Single-phase β -alloys containing Mg require > 6 weeks for the complete decomp. at room temp. Data are recorded. Other phase changes must also contribute to this shrinkage in die castings. CH. ABS. (e)

Vanadium problem in the Urals. M. N. SOBOLEEV (Redk. Met., 1934, 3, No. 2, 5—11).—The ores are titanomagnetites (< 0.5% V). Pig Fe (0.5—1.0% V) is produced from the non-magnetic concentrate of this ore. This pig Fe when blown in a Bessemer converter yields up 90% of its V to the slag (V 3—5, Si 60%). The crushed slag is roasted for 3 hr. with 10% of NaCl at 750—800°, after which 90% of the V can be dissolved in H₂O as Na vanadate. The solution is free from Fe, Cr, and Mn. The overall recovery is 65—70%. CH. ABS. (e)

Magnesium metal from Washington magnesite and dolomite deposits. C. F. FLOE (State Coll. of Wash., Met. Res. Bur., Bull. B, 1934, 21 pp.).—Processes for producing Mg are reviewed. A method was developed for producing pure MgO or MgCl₂ by leaching impure magnesite (I) with H₂SO₄ or HCl. Calcination of (I) prior to leaching increases the rate of extraction. High-grade dolomite may be treated similarly. CH. ABS. (e)

Effect of melting conditions on the running quality of aluminium cast in sand moulds. A. I. KRYNITSKY and C. M. SAEGER, JUN. (J. Res. Nat. Bur. Stand., 1934, 13, 579—588).—Tests on 99.8 (I) and 99.2% Al (II), and on 8:92 Cu-Al alloy (III) have shown that the length (*L*) of the spiral in the castability test increases linearly with the casting temp., but is decreased by about 10% by raising the max. heating temp. from 750° to 850°. *L* for (I) is much > *L* for (II) or (III), which are about = one another. Treatment with ZnCl₂ slightly reduces *L* for (I) and slightly increases it for (II) and (III); treatment with O₂ reduces *L* for (I), but has no effect in the other cases, and weathering of (II) is also without effect on *L*. Castings of (I) show much more extensive piping and more intercryst. shrinkage cavities than do those of (II) or (III). A. R. P.

Production of ternary aluminium-copper hardeners. E. R. THEWS (Metallurgist, 1934, 9, 162—163).—When producing Al alloys containing one or more elements in addition to Cu, more homogeneous material is obtained if the extra elements are incorporated in the hardener alloy. Two common ternary hardeners are: (1) Al-Cu-Mn and (2) Al-Cu-Fe. The composition of (1) is usually Al 70, Cu 20, and Mn 10%, and it is usually made by first adding clean Cu sheet to molten Al at 800—855°. Mn is added as small lumps. Better results are obtained by adding Mn to Cu heated to 1150° and protected by a borax flux. The resulting alloy approximates to the eutectic composition and melts at 880°. Molten Al is then added and the alloy covered with a cryolite flux. A similar procedure is recommended for (2), by which method contamination by oxides is eliminated if solid Cu and Fe are added to molten Al. W. P. R.

Present status of age-hardening. R. H. HARRINGTON (Trans. Amer. Soc. Met., 1934, 22, 505—524).—

Age-hardening (*H*) phenomena may be caused by (a) simple pptn.-hardening, (b) lattice strain, (c) allotropy. Examples of each type are discussed. Certain alloys, e.g., duralumin, show a hardness peak due to (a) and a second peak due to (b). The addition of a third metal to a binary alloy often results in an *H* alloy, and in this respect Co appears to have remarkable properties. Ni-Be, Cu-Be, Fe-W, and Fe-Be alloys all show increased *H* by the addition of varying amounts of Co. Addition of Co to the Cu-Be alloys increases the electrical conductivity as well as the hardness; Co also raises the temp. at which *H* occurs, and may prove useful in the development of alloys with good creep-resisting properties at high temp. W. P. R.

Influence of chemically and mechanically formed notches on fatigue of metals. D. J. McADAM, JUN., and R. W. CLYNE (J. Res. Nat. Bur. Stand., 1934, 13, 527—572).—The results of recent work on the corrosion-fatigue of numerous types of steel and on Cu, Ni, and Al alloys are summarised in tables and graphs and critically discussed. Comparison of the curves obtained for the fatigue of metal specimens with a mechanically formed notch (I) with those obtained on specimens which have previously been submitted to stressless corrosion (II) shows that pits produced by (I) and (II) are similar in effect. Consideration of the relationship between notch-sensitivity (III) and the elastic hysteresis (IV), ductility, and work-hardening capacity (V) of a metal indicates that the scattering of the individual results in a composite graph is due chiefly to differences in the tensile strength and that (III) depends largely on (V) as well as, to a certain extent, on (IV). A. R. P.

Impact testing [of metals]. H. HALLAM and R. V. SOUTHWELL (Engineering, 1934, 138, 689—690, 703—704).—A new type of impact-testing machine, in which loss of energy of the striker to earth is avoided and the impulsive load subjects the specimen to a bending moment unaccompanied by shear, is described and illustrated. Energy to fracture \propto area of fracture. W. P. R.

Independence of grain size and dendrite fineness [of alloys]. I. IITAKA (Bull. Inst. Phys. Chem. Res., Japan, 1934, 13, 1395—1400).—Examination of gunmetal, bronze, Al bronze (5% Al), brass (20% Zn), constantan, and Al-Mg alloy (5% Mg), solidified under varying conditions, leads to the conclusion that grain size (mean grain diam.) and dendrite fineness (mean distance between the branches of dendrites) are independent variables and have no functional relationship. J. W. S.

Electrolytic refining of copper, using complex salts of cuprous chloride. XII. Behaviour of gold. N. KAMEYAMA and R. TANABE. XIII. Enlarged-scale study, with electrolyte circulated by the pressure of an inert gas. N. KAMEYAMA, S. IKUO, and S. MAKISHIMA (J. Soc. Chem. Ind., Japan, 1934, 37, 721—722 B, 722—723 B; cf. B., 1933, 750).—XII. The potential of Au is 0.8 volt $>$ that of Cu and the Au is, therefore, not dissolved from an anode. If AuCl₃ is added to the solution it is immediately reduced by Cu to Au. Cathodes are always free from Au.

XIII. Cathodic deposits of satisfactory properties

and purity were obtained by electrolysis at 50° and 2 amp./sq. dm. from anodes containing 0.05% each of Fe, Ni, Pb, As, Sb, and Bi, with a bath (20 litres) containing 4*N*-NaCl, *N*-HCl, *N*-CuCl, and 0.05% of gelatin. A. G.

Electrodeposition of metals. H. MOORE (Metallurgist, 1934, 9, 191—192).—A review of the research work in electrodeposition carried out under the auspices of the Department of Scientific and Industrial Research. W. P. R.

Rapid determination of nickel and chlorides in nickel-plating solutions. W. R. MEYER (Metal Ind. [N.Y.], 1934, 32, 306—307).—To 10 c.c. of the filtered solution are added 50 c.c. of a solution containing 40 g. of KI, 35 c.c. of conc. aq. NH₃, and 50 g. of Na₄P₂O₇ per litre. The mixture is titrated with approx. 6% KCN solution containing 0.34% AgNO₃ until no turbidity remains. The KCN solution is standardised with Ni solutions of known concn. treated in the same way. Cl is determined by adding 50 c.c. of 0.2% Na₂CrO₄.10H₂O to 10 c.c. of the solution and titrating with 0.1*N*-AgNO₃ to a buff colour. CH. ABS. (e)

Accelerated tests of nickel- and chromium-plating on steel. P. W. C. STRAUSSER, A. BRENNER, and W. BLUM (J. Res. Nat. Bur. Stand., 1934, 13, 519—526).—The results of salt-spray and intermittent-immersion (in aq. NaCl) tests (*A*) on Ni- and Cr-plates have been compared with the results obtained in atm. exposure tests (*E*). The results show that *A* are useful for determining the relative quality, especially the porosity, of plated coatings and give approx. similar results, as regards protective val., to those obtained in *E* if the no. and size of the rust spots at the end of a specified period, e.g., 100 hr., are recorded instead of the time for the first appearance of rust. *A* do not, however, give the same types of corrosion as *E*, and are not suitable for detecting small differences in protective val. The ferroxyl test is a rapid and reliable method for determining relative porosity. A. R. P.

Testing of metal coatings. A. GLAZUNOV (Chem. Listy, 1934, 28, 302—305, 313—315).—Methods elaborated by the author (Iron Age, 1934, July 5, 12) are described. R. T.

Protecting duralumin.—See XIII.

PATENTS.

Ferrous alloys. [Malleableised cast iron.] V. O. HORNERBERG, Assr. to NITROMAL CORP. (U.S.P. 1,944,178—9, 23.1.34. Appl., 10.5.29).—Claim is made for *N*-case-hardened articles of malleable cast Fe containing 0.15—5% Al and, in addition, (A) 0.1—8% of \leq 1 of the following: B, Cr, Mo, Ni, Ti, W, V, Zr, preferably Cr 1.5 and Mo 0.4%. A. R. P.

Continuous furnace for [heat-treatment of steel]. S. CHARLESWORTH, Assr. to SURFACE COMBUSTION CORP. (U.S.P. 1,944,729, 23.1.34. Appl., 17.9.30).—The furnace contains a sloping hearth (I) terminating at its lower end, below the exit flue of the waste gases, in a soaking chamber in which the heat absorbed by the material in its passage along (I) is given time to equalise itself throughout the article. A. R. P.

Production of galvanised malleable iron. V. S. DURBIN (U.S.P. 1,944,227, 23.1.34. Appl., 11.9.31).—The castings after annealing to convert them into malleable Fe are dipped into molten Zn at 480°, cooled, and annealed at 650°. A. R. P.

Surface treatment of metal [steel]. H. H. HOLLOWAY, Assr. to APOLLO STEEL Co. (U.S.P. 1,943,764, 16.1.34. Appl., 24.10.31).—The finished sheet is heated until it acquires a blue temper colour, then passed hot through a pair of polished rolls the surfaces of which are kept constantly wet so as to increase the thickness of the oxide film and compress it into the surface of the sheet. A. R. P.

[Bright] annealing of [stainless] steel. F. C. KELLEY, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,944,743, 23.1.34. Appl., 26.6.30).—Stainless-steel wire is passed continuously through an electric furnace at 1100°, each end of the furnace being provided with a small chamber packed with a 1:1 Al₂O₃-ferrosilicon mixture, and a current of pure dry H₂ is passed in the same direction as the wire. A. R. P.

Manufacture of hardened steel alloy. F. B. FOLEY (U.S.P. 1,943,595, 16.1.34. Appl., 26.9.31).—Steel containing > 30% Al + Ni is heated at > the Acl point to produce an α -solid solution, quenched, and reheated at $\leq 165^\circ < Acl$ to ppt. an Al-Ni compound in a highly dispersed form. *E.g.*, steel with Ni 2.83, Al 3.47, Cr 11.30, Si 0.88, Mn 0.63, and C 0.66% when quenched from 1150° has H_B 201 and is non-magnetic; after reheating at 760° it becomes magnetic and $H_B = 352$, and on again heating at 590° for 1 hr. $H_B = 467$. A. R. P.

[Collector for] concentrating ores and minerals by flotation. W. A. DOUGLASS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,943,758, 16.1.34. Appl., 25.2.25).—The collector is prepared by reacting on an alkali xanthate with Cl₂ or an alkyl or acyl halide to produce a xanthyl disulphide or derivative thereof. A. R. P.

Hardening of copper. C. E. MOYER (U.S.P. 1,943,738, 16.1.34. Appl., 22.3.33).—Molten Cu (16) is treated with a mixture of CuSO₄ (2) and NaCl (2 oz.) under a borax cover. A. R. P.

Centrifugal casting [of copper-lead alloy bushings]. R. D. PIKE, Assr. to KALIF CORP. (U.S.P. 1,944,461, 23.1.34. Appl., 19.1.32).—Alloys of Cu with > 25 (27.5)% Pb are cast at 1204—1250° into a centrifugal mould heated at 150—300° and rotated at such a speed that r.p.m. $\times R = (4-10) \times 10^6$, where R is the radius of the mould. A. R. P.

[Lead] alloy for use in the manufacture of lead tetraethyl. W. S. CALCOTT, A. E. PARMELEE, and H. F. MESCHTER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,944,167, 23.1.35. Appl., 22.10.29).—The alloy is made by agitating a molten 9:1 mixture of Pb and Na with 0.01% of FeCl₃ or AlCl₃ out of contact with air. The product readily reacts with EtCl under pressure to give a high yield of PbEt₄. A. R. P.

Production of metallic magnesium. F. HANSGIRG, Assr. to AMER. MAGNESIUM METALS CORP. (U.S.P. 1,943,601, 16.1.34. Appl., 27.2.31. Austr., 4.8.30).—

A mixture of MgO and C is heated in an electric furnace in a current of H₂ and the issuing gases are cooled suddenly to deposit Mg powder, which is separated from the CO + H₂ in a settling chamber and passed to a retort in which it is distilled under a low pressure of H₂ to yield compact Mg of high purity. A. R. P.

[Aluminium] alloy. L. W. KEMPF and I. R. DAWSON, Assrs. to ALUMINUM Co. OF AMERICA (U.S.P. 1,944,183, 23.1.34. Appl., 2.6.32).—A mixture of finely-powdered Al (10—80) and Si (90—20%) is compressed into ingots which are heated at > 300° and < the m.p. of the eutectic to homogenise and sinter them. A. R. P.

Oil-cracking apparatus.—See II. CuSO₄ from scrap Cu.—See VII. Grinding hard alloys.—See VIII.

XI.—ELECTROTECHNICS.

Dry rectifiers. I. PEYCHÈS (Compt. rend., 1934, 199, 1198—1199).—Measurements are recorded for rectifiers of the type Pb|CuS|Mg. The CuS|Mg interface is the main source of rectification. H. J. E.

Mechanism of the pure electric breakdown of solid and liquid insulators. U. SHINOHARA (Mem. Fac. Eng. Hokkaido, 1934, 3, 157—207).—The properties of the negative and positive streamers in solid and liquid insulators, and the mechanism of their propagation, are investigated. A. J. M.

High vacua.—See I. Action of silent discharges on oils etc.—See II. Determining He in natural gas.—See VII. Cu refining. Electrodeposition. Ni-plating solutions. Tests for Ni- and Cr-plate. Testing metal coatings.—See X. Sugar-boiling control.—See XVII.

PATENTS.

Electrolytic [pressure] decomposing devices [for electrolysing water]. W. J. TENNANT. From DRUCKZERSETZER GES.M.B.H. (B.P. 421,310, 9.4.34).—Groups of units, comprising perforated electrode sheets pressing against the separating diaphragm (D), with interposed frames, are arranged in parallel so that each electrolyte chamber is limited on its major surfaces by gas-generating electrodes (E) of the same polarity, and on its narrow sides by frame walls. The end chamber of an electrode group have only one E bearing directly against a D . J. S. G. T.

Electric incandescence lamp. T. MILLNER, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,944,825, 23.1.34. Appl., 21.12.29. Hung., 18.12.28).—Claim is made for a lamp containing a gaseous fluoride of an element of at. wt. > 11, *e.g.*, PF₃. A. R. P.

Photoelectric tube. T. H. NAKKEN, Assr. to NAKKEN PATENTS CORP. (U.S.P. 1,943,984, 16.1.34. Appl., 27.5.30).—The apparatus comprises a vac. tube containing an anode and a Mo cathode coated with several layers of photoelectric elements, each succeeding layer differing from the one below by one group position and series no. in the periodic system, *e.g.*, Ba and Cs. A. R. P.

[Liquid] composition for dielectric use. F. M. CLARK, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,944,730,

23.1.34. Appl., 28.5.32).—Claim is made for the use of $C_6H_3Cl_3$ with a small proportion of pentachlorodiphenyl as transformer oil; it has d 1.43—1.48, m.p. $< 5^\circ$, and a dielectric const. of 5 at room temp. and yields only a non-inflammable gas on thermal or electrical decomp.

A. R. P.

Fluorescent screens for cathode-ray tubes. A. C. COSSOR, LTD., Assees. of (BARON) M. VON ARDENNE (B.P. 421,507, 22.2.34. Ger., 22.2.33).

C black.—See II. **Deoxygenation of phenols.**—See III. **Controlling oxidation of halogens.**—See VII. **Hardened steel alloy.**—See X. **Increasing the vitamins in liquid foods.**—See XIX.

XII.—FATS; OILS; WAXES.

Fluorescence test for olive oils. T. T. COCKING and S. K. CREWS (Quart. J. Pharm., 1934, 7, 531—534).—Pure olive oil loses its fluorescence in ultra-violet light on treatment with charcoal, adulterants remaining fluorescent.

C. G. A.

Analytical classification of fish-liver oils. IV, V. N. EVERS and W. SMITH (Quart. J. Pharm., 1934, 7, 476—482; cf. B., 1934, 26).—*cyclo*Hexane (I) is a better solvent than $CHCl_3$ for the spectrographic examination of fish-liver oils for vitamin-A (II). For oils of low (II) content the determination should be made on the unsaponifiable fraction (III), whereby effects due to substances other than (II) are eliminated. (III) may be extracted with (I). Further analytical results on such oils are reported.

C. G. A.

Gasoline from cottonseed oil. Action of silent electric discharges on [lubricating] oils etc.—See II. **Lipins in sewage sludge.**—See XXIII.

PATENTS.

Manufacture of fatty esters [glycerides]. PROCTER & GAMBLE Co. (B.P. 421,284, 13.6.33. U.S., 22.8.32).—A triglyceride (natural oil) is heated with a polyhydric alcohol (glycerol) and 1—5% of an alkali alkoxide or soap at $\geq 175^\circ$, any H_2O formed being removed by a vac. or inert gas.

H. A. P.

Manufacture of superfatted soaps, shaving creams, and like masses. HENKEL & Co. G.M.B.H. (B.P. 421,490, 25.7.33. Ger., 16.9.32. Addn. to B.P. 411,295; B., 1934, 684).—Additions are made to soaps etc. of compounds of the type $R \cdot X \cdot R' (OH)_n$, where R and R' are alkyl residues of $< C_8$ and $< C_6$, respectively, n being < 1 , and X is S, S_2 , NH, SO, SO_2 , $\cdot NH \cdot NH \cdot$, or an alkyl residue having $< C_6$ connected to R and R' by O, S, or N groupings. Examples are: dodecyl- β - γ -dihydroxypropylamine, α - β -tetradecyl- and -dodecyl-oxyethyl glyceryl ether, heptadecylbis- β - γ -dihydroxypropylamine, and dodecyl- β - γ -dihydroxypropylsulphone.

H. A. P.

Washing composition [detergent]. P. S. DENNING, Assr. to F. E. SCHUNDLER & Co., INC., and WYODAK CHEM. Co. (U.S.P. 1,943,519, 16.1.34. Appl., 25.5.31).—A finely-ground mixture of bentonite (50—70%) and Na_2CO_3 (50—30%) is mixed with sufficient of a dil. soap solution to dissolve the Na_2CO_3 .

A. R. P.

Granular soap. Lubricating oil.—See II.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Protection of duralumin in aeroplane construction. E. K. O. SCHMIDT (Farbe u. Lack, 1934, 591—594).—33 paint systems of varied composition were sprayed or brushed on duralumin sheets and exposed (a) to a town atm. (6 months), (b) in the North Sea (3 months), and to the accelerated action of intermittent (c) brine spray (3 months) and (d) brine immersion (2 months). Tabulated results are given of the elongation, flexibility, adhesion, appearance, and general usefulness of each type of weathered film as well as the no. of g. of paint per sq. m. used. Good protection is obtained with < 200 g./sq. m. The choice of a particular paint must depend on the conditions.

S. M.

Methods of testing and control in the paint and varnish industry. L. CLÉMENT, C. RIVIÈRE, and A. HONNELAITRE (Ann. Chim. Analyt., 1934, [ii], 16, 289—299, 337—345, 433—445, 485—500, 533—543).—The methods of testing paints, lacquers, and varnishes, both in the liquid state and as dried films, are reviewed and illustrated by a report of the examination of a series of cellulose acetate aeroplane dopes.

D. R. D.

Artificial resins. IX. Physico-chemical investigation of the course of the urea-formaldehyde condensation. 3. Urea-formaldehyde resins. G. WALTER and H. LUTWAK (Kolloid-Beih., 1934, 40, 158—210; cf. B., 1934, 1020).—The changes in [H], electrical conductivity, η , d , n , dispersion, and composition at different stages of the condensation process have been investigated. The acid used as condensation agent is bound, either chemically or by adsorption, in the early stages, but is liberated completely in the later stages. The fractions of condensation product pptd. spontaneously or by H_2O are poorer in $CH_2 \cdot OH$ groups than the sol. fractions. Neutral salts, especially KCl, have a stabilising influence.

E. S. H.

Resin acids in wood pulp. Pigments in paper.—See V.

PATENTS.

Manufacture of compositions comprising cellulose derivatives or resins. L. P. KYRIDES (B.P. 421,420, 20.6.33. U.S., 20.6. and 27.12.32).—(a) Esters of a di- or aromatic mono-carboxylic acid with a OH-fatty acid ($< C_5$), e.g., $OH \cdot CH_2 \cdot CO_2H$, and (b) glycollates of an aromatic dicarboxylic acid, e.g., the Et glycollate of Et H phthalate, are used as plasticisers.

S. M.

Plastication of cellulose esters or ethers. BRIT. CELANESE, LTD. (B.P. 421,332, 13.4.33. U.S., 13.4.32. Cf. B.P. 421,115; B., 1935, 162).—A cellulose ester or ether (1 pt.) is agitated with a plasticiser in 4—25 pts. of an aq. medium in presence of a H_2O -sol. swelling agent for the cellulose derivative (b.p. $\geq 170^\circ$), e.g., $COMe_2$, cyclohexanol, cyclohexanone, preferably at raised temp., e.g., 35—100°. After absorption of the plasticiser and removal of liquid and volatile matter, the product is suitable for use as moulding powder.

S. S. W.

Composition of oils and highly polymerised compounds. A. EIBNER, W. O. HERRMANN, W. HAEHNEL, and M. MILLER, Assrs. to CONSORT. F. ELEKTROCHEM. IND., G.M.B.H. (U.S.P. 1,956,551, 1.5.34. Appl.,

2.6.31. Ger., 21.6.30).—A solution of nitrocellulose or other cellulose ester is added to the product obtained by incomplete polymerisation of a solution of a polymerised drying oil in a vinyl ester. Polymerised vinyl compounds or fatty oils may also be added. 10 examples are given. S. M.

Preparation of a coated article. [Flexible glass substitute.] C. DREYFUS (U.S.P. 1,950,662, 13.3.34. Appl., 23.3.28).—Wire screen, netting, or other foraminous material is treated with a coating composition containing an at least partly polymerised vinyl compound in quantity insufficient to close the meshes thereof, and a cellulose acetate coating composition is then applied so as to close the meshes. Improved weather-resistance is claimed for the flexible glass substitute so made. S. S. W.

Wrinkle finish for flexible articles. F. B. ROOT, Assr. to CHADELOID CHEM. Co. (U.S.P. 1,950,417, 13.3.34. Appl., 17.4.29).—Stoving finishes comprising mixtures of "wrinkling" drying oils, particularly preoxidised tung oil, "non-wrinkling" semi- or non-drying oils, e.g., soya-bean oil, non-volatile org. liquid plasticisers, e.g., Bu phthalate, and resins, driers, solvents, etc. are applied to leather, paper, cloth, or other flexible substrates, an intermediate flexible sealer coat of long oil or highly plasticised nitrocellulose types being used if required. S. S. W.

Manufacture of oil varnishes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 419,611, 19.5.33).—Drying oils are heated at $\geq 350^\circ$ (240–260°) with thermoplastic, resinous, brittle conversion products obtained from rubber by known methods [these products being less unsaturated than rubber, of approx. composition $(C_5H_8)_x$, softening between 50° and 130° (Kraemer-Sarnow), and readily sol. in org. solvents], and driers, e.g., Pb-Co naphthenate, and solvents, e.g., a benzene fraction, b.p. 130 – 160° , are added, pigmentation following if desired. Alternatively, stand oils may be incorporated with a solution of the converted rubber. S. S. W.

[Chlorinated rubber] coating materials. A. SCHMIDT and M. DESENISS, Assrs. to DEUTS. TORNESITGES. M.B.H. (U.S.P. 1,950,820, 13.3.34. Appl., 14.4.31. Ger., 26.6.30).—Highly-resistant protective coatings comprise a mixture of a solution of chlorinated rubber in a volatile solvent, e.g., C_6H_6 , and a filler, e.g., carborundum, quartz meal, of grain size 40–100 μ . S. S. W.

[Chlorinated rubber] coating composition. W. KOCH, Assr. to HERCULES POWDER Co. (U.S.P. 1,950,894, 13.3.34. Appl., 29.7.32).—Corrosion-resistant compositions containing chlorinated rubber, chlorinated Ph_2 , solvents, e.g., PhMe, xylol, and, if desired, resins and drying oils are claimed. S. S. W.

Manufacture of artificial [rubber-like] masses. I. G. FARBENIND. A.-G. (B.P. 421,146, 28.2.34. Ger., 2.3.33).— α -Chlorobutadiene (I) is polymerised, alone, or with other polymerisable substances, in bulk, or in aq. emulsion, in absence of large amounts of O_2 . The products may be vulcanised. E.g., (I) is heated in a vac. at 30° for 19.5 hr. (46% polymerises) or with 1% BzO_2H and a little air at 25° for 10 days, or with Na at 30° , or an emulsion of (I) (20 pts.) and $COMe \cdot CMe \cdot CH_2$

(6 pts.) in H_2O (28 pts.; 1 pt. of NH_4 oleate) containing H_2O_2 (1 pt.) is heated at 30° for 1 day and pptd. with AcOH. H. A. P.

[Chloroprene] plastic compositions. NEW YORK BELTING & PACKING Co., Asses. of L. J. DE HOLCZER (B.P. 421,435, 4.4.34. U.S., 18.10.33).—A product which is resistant to oil and gasoline is obtained by mixing a chloroprene (cf. B., 1932, 156) plastic polymeride with a compound prepared according to the process of B.P. 407,948 (B., 1933, 512). Fillers, factice, etc. may be incorporated. S. M.

Manufacture of phenol[formaldehyde] resin. H. L. BENDER, Assr. to BAKELITE CORP. (U.S.P. 1,955,731, 24.4.34. Appl., 11.11.26).— $PhOH$ (1 pt.) is heated with $(CH_2 \cdot NPh)_n$ (≤ 2 pts.) and a basic catalyst, preferably $(CH_2)_6N_4$, until homogeneous, and the NH_2Ph removed by heating at $\geq 210^\circ$ (under vac.). A thermo-hardening resin is obtained. H. A. P.

Resin-bonded [abrasive] wheel. F. A. UPPER, Assr. to BAKELITE CORP. (U.S.P. 1,950,641, 13.3.34. Appl., 17.12.30).—Abrasive granules, e.g., SiC , cryst. Al_2O_3 or garnet, are bonded by a mixture of thermally irreversible resins of the $PhOH-CH_2O$ type and reversible resins, e.g., shellac, coumarone resin, the proportions being adjusted according to the hardness and toughness required in the finished abrasive article. The binder is added to the granules in presence of a suitable solvent or plasticiser as wetting agent, e.g., furfuraldehyde, and the shaped article is baked. S. S. W.

Polymerisation of organic compounds. TRIPLEX SAFETY GLASS Co., LTD., L. V. D. SCORAH, and J. WILSON (B.P. 421,397, 12.4.33. Cf. B.P. 419,357; B., 1935, 93).—Tough, elastic, transparent masses are obtained by polymerisation of a mixture of $\leq 40\%$ (50–75%) of $CH_2 \cdot CMe \cdot CN$ (I) with another polymerisable substance (II) (excluding maleic anhydride) and a plasticiser. E.g., a mixture of (I) (80 pts.), $CH_2 \cdot CMe \cdot CO_2Me$ (40 pts.), $o-C_6H_4(CO_2 \cdot C_2H_4 \cdot OMe)_2$ (12 pts.), and $BzOH$ (1 pt.) is heated at 60° for 10 days. Other examples of (II) are $CHPh \cdot CH_2$, coumarin, and $CH_2 \cdot CH \cdot CHO$. H. A. P.

Manufacture of coloured moulding compositions. H. CLAYTON and H. JONES (B.P. 419,445, 8.4.33).—Finely-divided fillers, e.g., wood meal, asbestine, are coloured by an aq. medium containing vat dyes, S dyes, insol. lake pigments, etc. together with a wetting agent, and then impregnated with suitable undyed synthetic resins. S. S. W.

Minimising colour content in kauri gum resin. N. L. WRIGHT. From E. MARSDEN (B.P. 419,667, 10.5.33).—Crude kauri is treated with a solvent, e.g., $C_6H_6-EtOAc$, and colouring matter is removed from the extract by agitating with mild alkali, e.g., 1% aq. NH_3 , and allowing to separate, when the light-coloured supernatant liquor is run off, scrubbed with H_2O to remove NH_3 , and the solvent removed therefrom. S. S. W.

Waterproof containers. Coated paper.—See V. **Basic Zn carbonate.**—See VII. **Gel for paints.**—See IX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Structure of rubber and mechanism of elastic stretching. E. MACK, JUN. (J. Amer. Chem. Soc., 1934, 56, 2757—2770).—Theoretical. A mechanism, which explains elongation and retraction, to account for the elasticity of rubber (I) is given. The following properties of (I) are discussed in an attempt to develop a unified theory: the shape of the mol.; X-ray diffraction patterns; the work of stretching; the shape of the stress-strain curve; heat effects (including the Joule effect). Hydrogenated (I) (Staudinger and Leupold, A., 1934, 412) should possess considerable elasticity. Factors controlling *cis*- and *trans*-addition in the polymerisation of butadiene and the properties of various synthetic (I) are also discussed. H. B.

Ether-insoluble or gel rubber hydrocarbon: its solution, crystallisation, and properties. W. H. SMITH and C. P. SAYTOR (J. Res. Nat. Bur. Stand., 1934, 13, 453—464).—The insol. gel portion (I) of the hydrocarbon (II) of *Hevea* latex remains as a gelatinous mass after the purified latex is extracted with Et_2O in the entire absence of O_2 and forms about 25% of the total (II); when traces of O_2 are present or when a small amount of $\text{CCl}_3\cdot\text{CO}_2\text{H}$ (III) is added to the Et_2O (I) dissolves and can be obtained in crystals by cooling to -50° to -70° after removing (III). Cryst. (I) has $\epsilon = 1.535$ and $\omega = 1.583$ at -5° , which vals. are close to those of the Et_2O -sol. hydrocarbon (V) (cf. B., 1933, 641). The C:H ratio and the fact that the m.p. of (I) varies from -5° to 14° according to its history suggests that (I) is a solid solution of closely related substances of empirical composition C_5H_8 . (I) differs from (V) in being elastic instead of plastic, and in being more resistant to deformation when just melted. On vulcanising (V) with S_2Cl_2 below the m.p. the shape of the crystals remains unchanged, but the birefringence disappears and the resistance to deformation is increased. A. R. P.

Vulcanisation and stress-strain behaviour of sol, gel, and total rubber hydrocarbon. W. H. SMITH and W. L. HOLT (J. Res. Nat. Bur. Stand., 1934, 13, 465—468).—Stress-strain curves (I) have been obtained for sol. (A), insol. (B), and total rubber (C) hydrocarbon (cf. preceding abstract) after vulcanisation with (a) tetramethylthiuram disulphide, (b) triphenylguanidine, and (c) H_2S and SO_2 at room temp. (Peachey process). Under the same sets of conditions the S absorption of all 3 rubbers is the same and the (I) are similar, but the products from A are less extensible than those from B, whilst those from C occupy an intermediate position. A. R. P.

Effect of surface-active materials and electrolytes on crystallisation of sulphur from rubber solutions. B. DOGADKIN and J. MARGOLINA (Kautschuk, 1935, 11, 7—11).—After a theoretical consideration of the phenomena it is shown that the addition of fatty acids and their salts, naphthenic acids and their SO_3H derivatives, etc. to rubber solutions containing S leads to reduction in the size of the S particles formed on evaporation; Ca oleate and fish oil showed a max. effect at a concn. of 1% (rubber 100). The dispersive action of the surface-active agent decreases with increase in age of the rubber

solution. Non-polar rubber softeners, e.g., vaseline oil, have no such action, but some electrolytes, e.g., NaCl, have a similar effect. At 70° the effect on the particle size of the S is not observed. D. F. T.

Rational compounding of ebonite stocks. B. L. DAVIES (India-Rubber J., 1935, 89, 51—54).—A general review covering the use of fillers and their influence on shrinkage and on the hardness of the product, and the effect of softeners and vulcanisation accelerators. D. F. T.

PATENTS.

Compounding of rubber. W. S. CALCOTT and W. A. DOUGLASS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,950,478, 13.3.34. Appl., 22.8.29).—Resistance to deterioration is increased by incorporating a compound of the type $\text{NH}_2\cdot\text{R}'\cdot\text{NH}\cdot\text{R}''\cdot\text{Y}$ ($\text{R}' = \text{aryl}$, $\text{R}'' = \text{C}_6\text{H}_4$, $\text{Y} = \text{H}$ or OH) in which N is directly connected to a C atom in the ring of R' or R'' ; e.g., 8-aminonaphthylphenylamine, *p*-aminodiphenylamine, or *p*-amino-*p'*-hydroxydiphenylamine. D. F. T.

Manufacture of rubber films. INTERNAT. LATEX PROCESSES, LTD. (B.P. 421,305, 24.2.34. U.S., 10.6.33).—The removal of rubber films from a former (F) is facilitated by subjecting the surface of F, prior to dipping, to the action of ≤ 1 oxidising (I) or halogenating agent (II) (NaOCl , $\text{K}_2\text{Cr}_2\text{O}_7$, Br , H_2O_2 , etc.), which may be applied in solution or in suspension in an org. solvent, with or without a wetting or bonding agent; this leads to the necessary modification of the rubber surface adjacent to F. Alternatively, the (I) or (II) may be applied in, or subsequent to, a preliminary dipped film of rubber solution and successive coatings of an aq. dispersion of rubber may be applied subsequently. D. F. T.

Manufacture of articles and goods of or containing rubber [from latex]. INTERNAT. LATEX PROCESSES, LTD. (B.P. 421,385, 20.6.34. U.S., 4.10.33).—A backing surface or former is coated with an aq. dispersion of rubber etc. and the coating, after coagulation from an inner stratum outwardly, is treated with a swelling agent, e.g., C_6H_6 , for the development of a wrinkled or corrugated effect on its surface. The coagulation may be effected by diffusion of a chemical coagulant, by electrophoresis, or by using an internally heated former. D. F. T.

Treatment [for colouring] of rubber. E. L. BOWER (B.P. 421,367, 10.11.33 and 10.7.34).—Crêpe or sheet rubber (I) is treated with a solution of a cellulose prep. (II), e.g., cellulose acetate, and a dye, in a solvent which also is capable of dissolving (I). The dye is absorbed by diffusion and a protective coating of (II) is left on the surface of the (I). The applied solution may contain also gums, resins, and/or plasticisers. D. F. T.

Colouring of rubber. E. I. DU PONT DE NEMOURS & Co. (B.P. 421,055, 8.6.33. U.S., 9.6.32).—Yellow monoazo dyes are used, prepared by coupling a diazotised orthanilic acid (I) with a 1-aryl-3-alkylpyrazolone; the aromatic nuclei may be substituted by halogen, alkyl, or alkoxy, the no. of such substituents being

γ 3 in all and γ 2 in (I). Examples are: 3 : 1 : 6 : 4 or 4 : 1 : 6 : 3-NH₂-C₆H₂MeCl-SO₃H, or *o*-NH₂-C₆H₄-SO₃H → phenylmethylpyrazolone. H. A. P.

Manufacture of aqueous dispersions of rubber. H. L. LEVIN, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,950,451—3, 13.3.34. Appl., [A] 4.2.31, [B] 10.3.31, [C] 18.4.31).—(A) Plasticised rubber is dispersed in a continuous phase consisting of a relatively stiff aq. paste of a H₂O-sol. org. colloid such as rosin soap (or [B] gum, *e.g.*, locust-bean gum, or [C] a carbohydrate colloid, *e.g.*, starch or dextrin) and a non-colloidal mineral powder such as whiting. D. F. T.

Forming cement-receptive backing for rubber soles. A. L. MURRAY (U.S.P. 1,950,258, 6.3.34. Appl., 25.4.32).—A coating of rubber (I) solution is applied to the vulcanised material before the after-effects of vulcanisation (the formation of a glazed insol. surface) are complete, so that the surface (I) and the raw (I) of the evaporated solution become inseparably united. D. F. T.

Inhibition of deterioration of rubber. W. S. CALCOTT and W. A. DOUGLASS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,954,377, 10.4.34. Appl., 27.9.29).—The use as anti-agers of diamini-diaryl-methanes and their (OH- and alkoxy-)substitution products is claimed. Preferred compounds are: 4 : 4' : 2 : 2'-CMe₂[C₆H₃(NH₂)·OMe]₂, 4 : 4' : 3 : 3'-CH₂[C₆H₃(NH₂)·OH]₂, and bisethylaminodihydroxy-ditolylmethane. H. A. P.

Production of chlorinated rubber. CHEM. FABR. BUCKAU (B.P. 421,313, 18.4.34. Ger., 26.5.33).—The addition of a small proportion of hypochlorite (*e.g.*, a solution of NaOCl, γ 1% of active Cl on the solution) greatly reduces the η of the freshly prepared solution of rubber, *e.g.*, in CCl₄, and facilitates chlorination. D. F. T.

Oil varnishes. Coating materials. Rubber-like masses. Chloroprene plastic.—See XIII.

XV.—LEATHER; GLUE.

Discoloration and staining of leather by iron impurities in vegetable tanning liquors. M. P. BALFE and H. PHILLIPS (J. Soc. Leather Trades Chem., 1934, 18, 592—600).—Fe stains on vegetable-tanned leather are the result of absorption by the leather of a highly-coloured, colloidal, basic Fe^{III} tannate, which is formed in the tan liquor (*T*) at $p_H > 2.7$. Fe impurities in *T* can be filtered off after they have been pptd. by boiling or by the addition of phosphates at p_H 5.2. Leather which has not discoloured in Fe-contaminated *T* because of low p_H val. are liable to become stained on exposure to air if *T* contains SO₂ either free or in the form of sulphited extracts. D. W.

Quality of vegetable-tanned sole leather. III. R. H. MARRIOTT and E. W. MERRY (J. Soc. Leather Trades Chem., 1934, 18, 600—618; cf. B., 1934, 727).—Previous results have been confirmed by tests on 38 fresh leathers (*L*). No connexion was found between the quality (*Q*) of *L* as determined by a microscopical assessment and from the ash, fat, and H₂O contents, respectively. The degree of tannage increased as *Q*

improved. The H₂O-sol. matter was const. in *L* of better *Q*, and higher only when *Q* was lowest. The ratio tans : non-tans was fairly const. in *L* of different *Q*, as assessed microscopically. The results given by the abrasion test were in agreement with *Q*. The following criteria are suggested: abrasion figure (Thuau) \leq 23, total H₂O absorption 20—25, free H₂O 28—34, air permeability \leq 1.00, H₂O absorbed per 100 g. of collagen in air of 75% R.H. γ 47 g., degree of tannage 50—90, H₂O-sol. matter 45—75 g. per 100 g. of collagen; the microscopical structure should indicate high-angle weave with some splitting of fibres into fibrils, but no separation of the latter from the fibres. These desirable features are yielded by English and Continental, but not by American, wet-salted hides. Dry and dry-salted hides yield moderately good, low-priced leather. D. W.

PATENTS.

Granular glue.—See II. Artificial leather.—See V. Wrinkle-finished articles.—See XIII. Nitrogenous fertiliser.—See XVI.

XVI.—AGRICULTURE.

Weathering of basalt in the Westerwald. P. PFEFFER and J. H. HELLMERS (Z. Pflanz. Düng., 1934, A, 36, 296—320).—Chemical and mineralogical examinations of 3 basalt profiles are described and the soil-forming processes are discussed. Ground basalt is unlikely to have any manurial val. A. G. P.

Morphology and genesis of the solonetz soils of western North Dakota. C. E. KELLOGG (Soil Sci., 1934, 38, 483—501).—Analysis, profile data, and typical vegetation of solonchak, solonetz, and soloth are recorded. Changes involved in their formation are discussed and the importance of the influence of plant growth is emphasised. A. G. P.

Organisation of soil investigations in Württemberg. A. C. WOLF (Z. Pflanz. Düng., 1934, A, 36, 290—295).—Systems of soil mapping and their utilisation in practice are described. A. G. P.

Variations of reaction in soils. K. NEHRING (Z. Pflanz. Düng., 1934, A, 36, 257—270).—Seasonal changes in forest soils are recorded and discussed in their relation to soil mapping. A. G. P.

Degradation and regradation of grey forest soils. P. E. SHAVRIGIN (Trans. Dokuchaiev Soil Inst., 1934, 10, No. 3, 47—80).—Several stages of podsolisation of these soils can be distinguished. Degraded soils under steppe vegetation or by cultivation accumulate org. matter and increase their exchange capacity and exchangeable-base content. A. M.

Determination of the total surface area of soils, clays, and similar substances. VII. Water absorption in clay saturated with non-dissociating cations. H. KURON (Z. Pflanz. Düng., 1934, A, 36, 282—287; cf. B., 1934, 515).—Replacement of the customary bases of clay by methylene-blue reduces the H₂O-absorbing capacity of the complex. The point of inflexion of the H₂O-absorption isotherm corresponds with a H₂O surface layer 1—2 mols. thick. A. G. P.

Determination of physical properties of soils using non-aqueous liquids. A. M. PANKOV (Trans. Dokuchaiev Soil Inst., 1934, 10, No. 6, 5—20).—The capillary rise of purified vaseline oil and the oil capacity should be recognised as consts. A. M.

Soil-moisture system. G. B. BODMAN and N. E. EDLEFSEN (Soil Sci., 1934, 38, 425—444).—A discussion of the physical forces concerned in soil- H_2O relationships. A. G. P.

Analysis of water extracts of soils. N. I. SOKOLOV (Trans. Dokuchaiev Soil Inst., 1934, 10, No. 5, 3—36).—Exchange reactions may take place during the prep. of the aq. extract, thus giving erroneous results for the amount of cations present. The content of anions gives truer conception of salt content. The determination of the alkalinity is of little val. and depends on the salts present. A. M.

Partial introduction of hydrogen and iron into the [soil] adsorption complex. A. T. KIRSANOV (Trans. Dokuchaiev Soil Inst., 1934, 10, No. 4, 5—26).—Partial replacement of Ca by H and subsequent introduction of $FeCl_3$ results in the death of plants. Neither H nor Fe acts negatively on plant growth. A. M.

Equilibrium between the absorbing complex and the soil solution. R. CHAMINADE (Ann. Agron., 1934, 4, 781—792).—The proportionality between adsorbed and dissolved cations (I) in soils depends on the nature and total quantity of (I) in the soil solution. Following the addition of salts to soil a portion of the adsorbed (I) enters into other forms of combination in which base exchange is less easy. In the case of K there is also some transition into a non-exchangeable condition. A. G. P.

Buffer action of soils. S. MAUTNER (Z. Pflanz. Düng., 1934, A, 36, 353—362).—The buffering power of soils is determined as the max. proportion of AcOH which can be absorbed without change of reaction. Within this limit acidification resulting from manuring etc. does not injure plant growth, and may produce increased crops as a result of improved solubility of soil nutrients. A. G. P.

Buffer properties of soils of the Valdai Highlands. A. I. MARCHENKO (Trans. Dokuchaiev Soil Inst., 1934, 10, No. 1, 107—123).—The relationship between the buffer index (I) and the degree of podsolisation is not marked, but is definite between (I) and humus content and degree of saturation (II). A great difference between vals. for (II) was found between slightly ($V = 50\%$) and strongly ($V = 16—25\%$) podsolised soils. A. M.

Soil organic matter. M. M. KONONOVA (Trans. Dokuchaiev Soil Inst., 1934, 10, No. 4, 39—48).—A comparative study of Waksman's method. A. M.

Application of steam to sterilisation of soils. A. H. SENNER (U.S. Dept. Agric. Tech. Bull., 1934, No. 443, 19 pp.).—Practical methods of sterilisation are examined. A. G. P.

Is von Kruedener's method for mechanical analysis of forest soils suitable for agricultural soils? A. VON NOSTITZ (Z. Pflanz. Düng., 1934, A, 36, 335—342).—By suitable modification, including the

use of Li_2CO_3 as dispersing agent, the method may be used for rapid determinations with reasonably satisfactory results. A. G. P.

Colorimetric determination of phosphoric acid in aqueous citric acid soil extracts. J. FOÛT (Chem. Listy, 1934, 28, 283—286).—Arrhenius' and Némec's colorimetric methods are applicable to the determination of sol. phosphates in soil; the mean error is approx. 10%. R. T.

Cunninghamella plaque method of measuring available phosphorus in soil. A. MEHLICH, E. B. FRED, and E. TRUOG (Soil Sci., 1934, 38, 445—461).—The soil sample is moistened with a P-free nutrient, made into a plaque, and the smoothed surface inoculated centrally with spores of *Cunninghamella* sp. The diam. of the colony after 2 days' incubation is a measure of the available PO_4''' content of the soil. Results compare satisfactorily with field trials with fertilisers. The method is applicable to highly calcareous soils. A. G. P.

Methods for determining fertiliser requirements [of soils]. H. KELLER (Z. Pflanz. Düng., 1934, A, 36, 320—335).—A review of current methods. A. G. P.

Solubility and distribution of phosphoric acid in soils. E. RAUTERBERG (Z. Pflanz. Düng., 1934, A, 36, 270—282).—The proportion of sol. PO_4''' in soils is satisfactorily determined by extraction with 0.1N- $Mg(HCO_3)_2$. In ascertaining fertiliser requirements (I) of soils the ability of the soil to maintain a supply of sol. PO_4''' must be considered. After fertiliser treatment PO_4''' may be distributed in "pockets" and laboratory determination of (I) may show correspondingly irregular vals. A. G. P.

Intake and utilisation by plants of phosphoric acid from various depth levels in soil. W. U. BEHRENS (Z. Pflanz. Düng., 1934, A, 36, 343—348).—Plants examined obtained PO_4''' from all depths to 1 m. The bearing of this on determinations of fertiliser requirement is discussed. A. G. P.

Effect of degree of base saturation of soil on capacity to fix phosphorus in a difficultly available form. A. F. HECK (Soil Sci., 1934, 38, 463—470).—Soils having low degrees of saturation with bases show high capacity for fixing P in a difficultly available form. Min. fixation (F) is associated with 80—90% saturation. [100% saturation \equiv that produced by leaching with $Ca(OAc)_2$]. The p_H of soils corresponding to min. F is lower for those having org. than for those having inorg. colloids. A. G. P.

Padi manurial experiments, 1933—1934. W. N. C. BELGRAVE (Malay. Agric. J., 1934, 22, 583—597).—Fertiliser trials are recorded. Satisfactory use of finely-ground phosphatic rock is indicated. A. G. P.

Analysis of phosphatic fertilisers. H. TERLET and A. BRIAU (Ann. Falsif., 1934, 22, 541—547).—The method of determination of P_2O_5 by pptn. with magnesia mixture in presence of NH_3 and citrate gives correct results only when conditions are such that errors balance. With the newer fertilisers rich in P_2O_5 these conditions are not achieved. The official method of pptn. with $(NH_4)_2MoO_4$ is recommended. E. C. S.

Solubility of phosphorus in soils from some Illinois experiment fields. H. J. SNIDER (Soil Sci., 1934, 38, 471—476).—Comparative data for PO_4^{3-} solubility (I) ($0.002N\text{-H}_2\text{SO}_4$) and fixation (II) [from $\text{Ca}(\text{H}_2\text{PO}_4)_2$] are examined for a no. of soils. Types having low (I) and high (II) gave the greatest response to rock phosphates in field trials. Liming increased (I).

A. G. P.

Comparative effects of Chilean nitrate and ammonium sulphate [as fertiliser for sugar cane]. T. SAITO (Rept. Sugar Expt. Stat., Tainan, Formosa, Mar., 1934, No. 1).—Two series of experiments were carried out to compare the effect of these two fertilisers, one with and the other without previous green-manuring. In both the $(\text{NH}_4)_2\text{SO}_4$ (I) was found superior in cane yields to the Chilean nitrate in the ratio of 100 : 90—94, but in sugar contents there was little difference. In recoverable sugar (I) was again superior, the ratio being 100 : 90 with green-manuring and 100 : 96 without.

J. P. O.

18-3-6 mixture as fertiliser for [sugar] cane. B. G. CAPO (Gilmore's Puerto Rico Sugar Manual, 1934—5, 63—72).—Analyses of 13 multiple fertiliser trials made with sugar cane according to the "triangle" system in Puerto Rico and elsewhere have been made, 21 different formulæ being tested in each. In a large majority of all cases the highest yields obtained corresponded closely to the point in the triangle represented by the formula 18-3-6; this result is regarded as corroborating theory on the point. Fertiliser practice in Puerto Rico is tending toward the ideal predicted from theory. Thus, a favourite practice is to use a 12-5-9 fertiliser followed by an application of about 400 lb. of $(\text{NH}_4)_2\text{SO}_4$ per acre, which, except for a slight excess of K_2O , is practically equiv. to an 18-3-6 mixture.

J. P. O.

Fertiliser studies with sugar beet in the Arkansas Valley area, Colo., 1921—28. L. A. HURST and A. W. SKUDERNA (U.S. Dept. Agric. Circ., 1934, No. 319, 20 pp.).—Part of the N manure for beet is preferably in the org. form. Artificial fertilisers (notably P) gave best results in highly org. soils.

A. G. P.

Improvement of the sugar beet. J. VONDRÁK (Internat. Sugar J., 1935, 37, 28—29).—A consistent decrease in % N as a result of systematic beet breeding has been observed with a corresponding raising in the purity of the thick-juice, which in 1898—1900 averaged 92.9—93.1 with 0.487% N, whereas in the period 1920—30, with considerable improvement in the genotypic characters of varieties, the figure was approx. 94.8 with 0.337% N. Further selection to reduce the % N should result in a still higher thick-juice purity.

J. P. O.

Growth of high-yielding forage beet. VINCENT, HERVIAUX, and SARAZIN (Ann. Agron., 1934, 4, 793—809).—Manurial requirements are examined.

A. G. P.

Utilisation of organic compounds by plants. A. I. VIRTANEN and S. VON HAUSEN (Suomen Kem., 1934, 7, B, 97).—Various N-free org. substances may be absorbed directly from nutrient media by growing plants. This may explain variations in composition of individual plant species grown on different soils and the poor palat-

ability of forage on "sick" soils which frequently have high org. matter contents.

A. G. P.

Yarovisation of winter varieties [of wheat] and frost-resistance. I. M. VASILIEV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 154—161).—Loss of frost resistance following yarovisation is shown by decreased carbohydrate content (notably of hemicellulose and monosaccharides) and increased H_2O content in treated seed.

A. G. P.

Yield variations in cropping trials in cylinders. W. U. BEHRENS (Z. Pflanz. Düng., 1934, A, 36, 348—353).—With customary care in filling cylinders, yield variations result from factors other than lack of soil uniformity between individual cylinders.

A. G. P.

Determination of the degree of decomposition which unknown decayed vegetable organic materials have already undergone in nature. G. J. BOUYOUKOS (Soil Sci., 1934, 38, 477—482).—The "volatilisation index" (loss on heating in a bomb at 310° for 24 hr. ÷ loss on ignition) of vegetable matter increases with the extent of decay.

A. G. P.

Preparation of green plant material for extraction of juices. L. D. DONEEN (Plant Physiol., 1934, 9, 839—843).—Moist green material wrapped in damp cloths is autoclaved for 5 min. (15 lb.), cooled, and the juice extracted by pressure.

A. G. P.

Utilisation of petroleum products as horticultural spray materials. H. MARTIN (J. Inst. Petroleum Tech., 1934, 20, 1070—1089).—A lecture and discussion.

A. G. P.

Penetration and accumulation of petroleum spray oils in leaves, twigs, and fruit of citrus. P. H. ROHRBAUGH (Plant Physiol., 1934, 9, 699—730).—Methods are described for the observation of oil penetration in sections of tissue and for the determination of the amount of oil absorbed. Spray oils seldom penetrate > 6 cells below the epidermis and remain between but do not enter living cells. Accumulations may remain for long periods without causing injury. In leaves oil enters principally along mid-ribs and margins. Heavy application of oil may cause penetration to the pith of twigs several cm. in diam. No translocation of oil occurs within tissues. After 1—3 weeks $\frac{1}{3}$ of heavier (I) and $\frac{2}{3}$ of lighter oils (II) disappear from sprayed leaves. After 6 months $\frac{1}{3}$ of (I) remains, but no (II).

A. G. P.

Freezing phenomena in creosap emulsions of petroleum oils [insecticides]. P. A. YOUNG (Plant Physiol., 1934, 9, 795—805).—The formation and orientation of ice crystals in emulsions (I) are examined. Freezing and thawing liberated 60—90% of the oil from 1—2% (I), approx. 10% from 4% (I), and none from 8% (I). Much of the oil mass separating during freezing was re-emulsified as the ice melted. Freezing of (I) on apple buds did not increase oil injury.

A. G. P.

Fungicidal action and the periodic system of the elements. S. E. A. MCCALLAN and F. WILCOXON (Contr. Boyce Thompson Inst., 1934, 6, 479—500).—Toxicity (I) within a group of metals increases with at. wt. The more positive elements exhibit similar (I) irrespective of the form of combination. The (I) of the more negative elements depends to a large extent on the nature of their

compounds. The possible use of Ag, Os, Ce, Cd, Pb, Tl, Cr, and As as fungicides is considered. A. G. P.

Toxicity [to plants] of air containing sulphur dioxide gas. P. W. ZIMMERMANN and W. CROCKER (Contr. Boyce Thompson Inst., 1934, 6, 455—470).—Young growing leaves were more resistant to SO₂ injury (I) than older leaves. (I) increased with [SO₂] and with the period of fumigation. Resistance was greater in wilted plants and in those fumigated at night. The susceptibility of a no. of species is considered in relation to (I) in the vicinity of Cu smelting works. A. G. P.

B. typhosus in sewage sludge.—See XXIII.

PATENTS.

Manufacture of a nitrogenous fertiliser. W. H. WAGGAMAN, Assr. to OBERPHOS Co. (U.S.P. 1,944,046, 16.1.34. Appl., 8.9.28).—Waste animal tissue (feathers, hair, leather, or wool) is treated with N oxides, e.g., from a Gay-Lussac tower, until 2% N is absorbed. The product is heated at 90—110° for 1—2 hr. under pressure to yield a brittle product rich in org. N and practically free from NO₃'.

A. R. P.

Insecticidal, fungicidal, and bactericidal compositions. A. W. BURWELL, Assr. to ALOX CHEM. CORP. (U.S.P. 1,955,052, 17.4.34. Appl., 8.5.33).—The use of aq. solutions or dispersions of alkali (Na, NH₄) salts of CHO-free OH-acids having C₄₋₁₅ from air-oxidation of paraffins is claimed. H. A. P.

XVII.—SUGARS; STARCHES; GUMS.

Chemical composition and productive value of sugar beets. C. SMOLENSKI and J. ZALESKI (Publins. Inst. Belge Amel. Bett., 1934, 2, 111—127).—When the val. of the roots to the factory is calc. according to Smolenski's formula, the "high-tonnage" *P*-beets are worth 20% less in actual cash than the "high-sugar" or *C*-beets. The former type has a lower purity, and especially a larger amount of harmful ash (more K₂O and Na₂O, and less Ca and Mg salts), and is therefore more expensive to work. J. P. O.

Loss of sugar during storage of beet. F. MASSA (Ind. Sacch. Ital., 1934, 27, 439—446).—Freshly dug and topped beets lose sugar by respiration rapidly for the first 6—8 days, after which the rate lessens. To keep the loss at its lowest the duration of storage should be as short as possible, the silos ventilated with air at a low temp. and the action of the micro-organisms, especially moulds, depressed by the use of suitable disinfectants such as milk-of-CaO. J. P. O.

New continuous diffusion process [for sugar-beet cossettes]. Bergé system. ANON. (Internat. Sugar J., 1934, 36, 473—476).—Trials made with the Raffinerie Tirlémontoise process (cf. B.P. 358,837 and 365,007; B., 1932, 76, 319) show that if the diffusion juice is withdrawn at the rate of 100—102 litres per 100 kg. of slices the corresponding loss of sugar is 0.02—0.24 kg. with the purity 0.5° > with the ordinary process, besides which the temp. needed is lower (about 68°) and the time shorter (about 80 min.). Prior to their admission to the drum (*D*), the cossettes are scalded with juice at 85—90°, and half the H₂O used is supplied at 85°. Temp. are maintained

in *D* without any further regulation. Operating details are given. J. P. O.

Coagulation of beet juices. Acid range. III. Acid addition and progressive coagulation. J. VAŠÁTKO (Z. Zuckerind. Czechoslov., 1934, 59, 149—152, 153—157; cf. B., 1935, 75).—In elucidation of the mechanism of beet-juice predefecation, coagulation by varying additions of acid was examined, it being observed that by gradual progressive coagulation the greatest amount of tannin-N is pptd., 60° being the most favourable temp. and 15—20 min. the optimum time. The bearing of the results obtained on the Dědek-Vašátko process of predefecation is discussed. J. P. O.

Dědek-Vašátko process at Tirlémont. F. BAERTS and P. DELVAUX (Sucr. Belge, 1934, 53, 324—332, 341—349).—As practised at Tirlémont, pre-liming in this process is done at 30° during 15 min., the total amount of CaO used being 1.15% (on roots) before the first carbonatation and 0.20% before the second. There was a saving of 21% of limestone and 26% of coke, while 3 out of 11 filter-presses were put out of use, and 3 men less were required at the lime kilns. J. P. O.

Clarification [of sugar juice] and the rôle of the colloids. G. A. GUANZON (Philippine Agric., 1934, 23, 353—354).—Using the usual CaO defecation process, the colloid elimination in one Philippine central ranged from 10 to 32 (average 15.6)%. Heating before and after liming gave the same result in respect of non-sugar removal. Superheating the raw juice at 120° showed no higher SiO₂ removal than the usual procedure, and caused an increase in the reducing sugars and a darker clarified juice. An advantageous modification in defecation is to mix the last mill juice with the mud from the settling tanks, lime the mixture to *p_H* 10, re-settle, and then use the resulting re-settled juice for tempering the mixed juice. Another useful modification is the Ventura system of compound clarification, as tried out at San Fernando. J. P. O.

Large-scale preservation of beet diffusion juice. M. Z. KHELEMSKI, I. I. SHOIKHEM, and I. E. GLUKHOVSKI (Nauk. Zapiski, 1933, 10, 1—13).—Some 6580 hectolitres of beet diffusion juice containing 2% of CaO covered with a layer of mineral oil 10 mm. thick were stored in a reservoir. After about 4 months there was no appreciable loss of sucrose or deterioration in purity. This is considered a more economical and more practical method of extending the usual length of the beet campaign than that involving the dehydration of the cossettes. J. P. O.

"IIa carbonatation" [of sugar juice]. F. W. MEYER (Deut. Zuckerind., 1934, 59, 609—612).—Juice from the first presses is carbonatated to an alkalinity > 0.05% CaO, filtered, treated with a small amount of CaO, and subjected to the final "IIa carbonatation." The effect of this additional carbonatation is mainly seen in the marked improvement in the colour of the juice. Neither the final alkalinity nor the CaO content of the clarified juice is affected. J. P. O.

Making white sugar. J. R. CARRERAS (Gilmore's Puerto Rico Sugar Manual, 1934—5, 38—39).—In a double-carbonatation process in use at Central Reforma,

Cuba, the various steps are: liming with the equiv. of 80 lb. of limestone per short ton of cane, heating to 85°, adding 50–60% of the first molasses from the centrifugals, heating the mixture for 10–15 min. to destroy the glucose, intermittently carbonating to p_H 8.4, reheating to 85°, allowing the mud to settle, filtering, treating with a mixture of CO_2 and SO_2 to obtain p_H 7.0–7.2, filtering, evaporating, sulphiting, and finally boiling to 4 massecuites. J. P. O.

Regeneration of the carbonation scums in cane-sugar factories. ANON. (Internat. Sugar J., 1935, 37, 32).—A calculation is given showing that in the case of carbonation cane-sugar factories obliged (as in parts of India) to draw their supplies of limestone from a considerable distance, it would be economical to dry the carbonation sludge from the filter-presses. For so doing the waste flue gases of the factory would be used, after which the dry, powdered material would be returned in a rotary kiln, thus giving CaO and CO_2 for re-use in the factory carbonation. It is believed to be possible thus to repeat the drying and kilning processes several times before the impurities accumulate to a prohibitive extent, and in this way to reduce the amount of new limestone required to perhaps 25% of that formerly bought. J. P. O.

“Undetermined losses” [in beet-sugar manufacture]. M. GARINO (Ind. Sacch. Ital., 1934, 27, 491–497).— O_2 is absorbed by beet juice during factory operations, e.g., during carbonation, as was proved by carbonating limed juice with CO_2 in presence and absence of air, the difference in purity observed averaging 0.34% with a max. of 0.56%. Org. non-sugars are more readily oxidised, in general, than in sucrose. J. P. O.

Alterations in colour between thick-juice and molasses. R. MEHRLE (Deut. Zuckerind., 1934, 59, 659–660, 673–675, 691–692, 707–708).—The principal factor in increasing the colour is the amount of non-sugars maintained in circulation by the return of low-grades, much more colour being formed in the last than in the first weeks of the campaign. A light-coloured thin-juice may give a dark-coloured sugar, and *vice versa*, for the same content of non-sugar, depending on the system of boiling in use. J. P. O.

Rapid informative method of determining amides and amino-acids (harmful nitrogen) of beet [factory products]. V. STANĚK and P. PAVLAS (Z. Zuckerind. Czechoslov., 1934, 59, 129–142).—Details are given of a colorimetric method depending on the blue coloration produced with Cu salts (as nitrate) in presence of an excess of a buffering reagent ($NaOAc$). The “blue no.” (mg. of N per 100 g. of beets) thus obtained applied to beet-factory control was shown to give results in accordance with the theory of “harmful N.” J. P. O.

Vacuum-pan design and operation [for sugar boiling]. W. E. SMITH (Internat. Sugar J., 1935, 37, 20–22).—An outline is given of experience gained in pan design in Hawaii during the past 10 years. This has culminated in the construction of the Hutchinson pan, of which a drawing and specification are given. In this design it was possible to complete the boiling

with steam at 5 lb. pressure, the final concn. after the feed was closed being completed in much less time than with the older type of pan used. Circulation was most vigorous, and could be maintained even when the d of the massecuite reached a high degree. J. P. O.

Automatic vacuum-pan control [in sugar boiling]. J. M. BROWN (Facts About Sugar, 1934, 29, 317).—The system described (with illustrations) operates on the principle of b.-p. elevation, by means of which by adjusting vac. and temp. it is possible to boil at the optimum supersaturation for the formation of the max. growth of crystal, while preventing the occurrence of “false grain.” Advantages realised by the system are: a saving in pan time, steam, and condenser H_2O , and an increase in sugar yield with greater uniformity of crystal size. J. P. O.

Forced circulation in vacuum pans [for sugar boiling]. R. O. WATSON (Facts About Sugar, 1934, 29, 353–354).—A mechanical device for promoting the circulation of the contents of a calandria vac. pan during boiling is described; it consists of a no. of screw pump elements mounted on a vertical shaft, driven by a multi-speed, const.-h.p., squirrel-cage motor (cf. B.P. 410,052; B., 1934, 658). An ammeter records the speed of the circulator shaft. J. P. O.

Deposits in and around [sugar-factory] boilers. W. REICHER (Internat. Sugar J., 1934, 36, 483).—Analyses of deposits formed on the heating surfaces of such boilers, in the steam pipes, and elsewhere are given. Thus, a deposit forming in the fire-tubes and on the interior surface of the plate above the H_2O -level consisted mainly of $CaSO_4$. One forming mostly in the H_2O -tubes of a multi-tubular boiler contained mineral oils 40.3, SiO_2 12.2, CaO 14.0%; and another taken from the panholes of a high-pressure boiler, was a mixture of Ca and Mg salts with $NaCl$, together with $AcOH$ and lactic acid, the $AcOH$ pointing to the presence of sugar in the feed supply. J. P. O.

Conductivity control of vacuum-pan [sugar] boiling. (A) D. G. CONKLIN. (B) W. E. SMITH. (C) E. SAILLARD (Internat. Sugar J., 1934, 36, 478–479, 479–480, 480).—(A) The best results are obtained by boiling at a very slight supersaturation during the first half of the boiling period, with a progressive concn. thereafter; the danger of the formation of false grain in the later period can be easily controlled with a conductivity instrument. This device also offers an excellent means of comparing the “waiting method” with the so-called “shock-seeding” system, showing that the latter halves the time and produces a more uniform grain.

(B) Modification of the procedure for applying the “Micromax” system of controlling pan boiling (B., 1933, 361) has produced improved results, and its practicability is now being recognised.

(C) In a French factory, each of the pans was equipped with a “Tarpometre” conductivity-control instrument, one of which was worked with a recording instrument. Satisfactory results were obtained throughout, and a more uniform quality of sugar was produced than ordinarily. It was not possible to indicate the optimum supersaturation for each massecuite, the system of control being quite empirical. By means of this instrument

the method of boiling followed by the best operator in the factory can be recorded in such a way that it can be applied by the others. J. P. O.

Polarisation of raw cane sugars, using wet and dry clarification. F. W. ZERBAN (Facts about Sugar, 1934, 29, 277—278).—The results obtained fully confirm those found by others, that the vol. error in the polarisation of raw sugars after clarification with Pb subacetate (I) solution is considerable and must be corr.; the error in the Ventzke scale must be corr. at the same time. So long as clarification with (I) solution is adhered to, the Herzfeld-Schönrock scale should be retained with the normal wt. of 26·000 g., because the two errors very nearly counterbalance each other for the average raw cane sugar being produced at the present time. J. P. O.

Polarimetric determination of sucrose, invert sugar, and starch syrup in pure sugar syrups, fruit syrups, and marmalades, and determination of starch syrup in these products. J. BULÍŘ (Chem. Listy, 1934, 28, 287—290).—Knowing the dry content, optical rotation before and after hydrolysis, ash, and org. acid contents, the content of the above constituents can be calc. from a no. of formulæ given. R. T.

Storage of mill [sugar] cane. J. I. LAURITZEN and R. T. BALCH (U.S. Dept. Agric. Tech. Bull., 1934, No. 449, 29 pp.).—Inversion of sucrose during storage is markedly reduced by sprinkling the heaps. No appreciable change in titratable acidity, p_H , or non-sugar constituents occurs in treated or untreated heaps. Deterioration is more rapid in less mature cane. Inversion increases with the drying-out of the heaps. A. G. P.

Potato starch as raw material for synthetic products. II. H. STEIN (Z. Spiritusind., 1934, 57, 339).—The properties of the starch esters obtained according to various patent specifications are considered in relation to their industrial application. T. H. P.

Sugar beet and cane.—See XVI.

XVIII.—FERMENTATION INDUSTRIES.

Influence of copper on yeast. M. VAN LAER (Ann. Zymol., 1934, [ii,] 1, 287; Woch. Brau., 1934, 51, 388—392).—There is a fall in the Cu content of unhopped wort containing $CuSO_4$ during fermentation, due to absorption by the yeast and to chemical pptn. Cu increases the incubation period (I) of yeast, and exerts its poisonous action (P) chiefly at the beginning of fermentation; it has little effect on the fermenting power of yeast. Old yeast is more susceptible to Cu than fresh yeast, but (I) becomes normal after preliminary growth in Cu solution. Small seeding gives an increased (I), but thereafter has little influence. Small amounts of Cu (≈ 10 mg./litre) shorten (I) as compared with controls; greater amounts have a marked P, and the yeast becomes small with many dead cells. Sensitivity to Cu varies with different yeast races, and decreases as the strength of the wort increases or its acidity decreases. In mineral nutrient solution, stimulation of multiplication is found in the early stages of growth with small amounts (≈ 2.5 mg./litre) of Cu, whilst the P of larger amounts is minimised

by addition of peptone. Different Cu salts have similar P. Acclimatised yeast used for fermentation in Cu vessels gave similar yeast development and fermentation to controls in glass, but the cells at the close contained 0·95% Cu on their dry wt. Cu is more active at low temp. (6°) than at, e.g., $18-25^\circ$. I. A. P.

The mashing process. H. LÜERS, G. KRAUSS, O. HARTMANN, and H. VOGT (Woch. Brau., 1934, 51, 361—365).—Mashes were carried out by 2-mash (I), 3-mash (II), infusion (III), and short-period high-temp. (IV) processes, the same malt being used throughout each series of experiments. Wort ran bright most quickly from (II). The highest extract was obtained from (II), the least from (IV), but the difference was smallest with well-modified malt. Cast wort from (III) had the lowest η . Processes with the lowest initial mash temp. (T) and longest mashing time gave the highest titratable acidity; the total N of the wort was dependent on T, but this had little effect on inorg. PO_4 . (III) gave the greatest turbidity on the coolers, whilst (II) yielded the lowest final % fermentation. Beer from (III) possessed the greatest stability, but modification of the malt was important in this connexion. Malts prepared by high (H), normal, and low heat-treatment were compared by (I) and (IV). H gave the lowest extract, total N, NH_2-N , inorg. PO_4 , and % fermentation, due to lessened enzyme activity. Mashes yielding apparently different worts from the same malt need not necessarily give beers of different characters, but well-modified malts are more susceptible to changes than poor malts. The rapid initial change in η of gelatin due to malt enzymes could not be explained by the rate of production of NH_2-N , in agreement with the lack of correlation between the effect of after-peptonisation of wort and the NH_2-N produced thereby. I. A. P.

Curtailling the time of fermentation. W. KILP (Z. Spiritusind., 1935, 58, 7).—The time of fermentation of potato mash can safely be reduced from 3 days to 2 if a higher proportion of malt than usual is used in the mash, together with a higher pitching rate and temp. ($23.75-25^\circ$). Such acceleration is useful to permit increased utilisation of potatoes of low starch content. I. A. P.

Separation of coarse and fine sediments [of beer wort]. F. KUTTER and H. SIEGFRIED (Woch. Brau., 1934, 51, 401—406).—A larger addition of hop extract to wort increased the total sediment (T) and also the proportion of sediment appearing in the hot wort [coarse sediment (C)]. Dilution of worts favoured the separation of T, but had little effect on the ratio C/sediment obtained later on cooling [fine sediment (F)]. Delayed addition of hop extract increased C and diminished F, whilst more intensive heating increased T. The protein contents of the sediments varied considerably with different treatments. Whole hops or hop meal gave the greatest production of C, whilst resins alone had rather less pptg. action than MeOH extract, but aq. extracts were least effective, despite the presence of tannin. Boiling under pressure gave increased T and F. The val. of C was much affected by the method of mashing used, but this had little effect on F. Addition of EtOH to cooling wort to 3·5% did not markedly affect the deposition of F. Agitation of hot

wort increased the ratio C/T , but T was almost unchanged. Passage of air or CO_2 through the wort affected T only by causing more thorough mixing, but air produced an increase of colour. The sediment had d 1.23 approx.

I. A. P.

Separation of sediment due to the boiling and cooling of wort. F. KUTTER (Woch. Brau., 1935, 52, 1—5).—The conditions for the separation of coarse (hot) (I) and fine (cool) (II) sediment are discussed, and the unfavourable effects of (II) on beer quality and yeast activity indicated. Laboratory experiments showed no advantage for pressure cooking in separation of (I) and (II).

I. A. P.

Oxidation-reduction potential during the manufacture of beer. B. D. HARTONG (Woch. Brau., 1934, 51, 409—411).—“Decolorisation no.” (N) is defined as $30/T$, where T is the time (min.) required for the decolorisation of dichlorophenol-indophenol by the solution (S) under test, in presence of alkali. If T is much > 30 , $N = 0$. A simple relationship exists between N and the reduction potential of S . Unboiled wort has a low N , and a moderate reducing action (R); after hop treatment N and R increase, but diminish again on cooling. In the early stages of fermentation N is very great, but then falls as fermentation proceeds. Yeast has reducing properties, but does not form reducing substances from glucose. Protein-tannin compounds during boiling develop free SH groups, and appear in wort and beer as reversible oxidation-reduction catalysts. Other systems of similar function may also be present. The relationship between the oxidation-reduction systems and the biological stability of beer is discussed.

I. A. P.

Sarcinæ, the most feared infection organisms of beer. S. LAUFER and S. SIEGEL (Amer. Brewer, Nov., 1934; Woch. Brau., 1935, 52, 5—6).—The occurrence of sarcinæ and their dangerous effects on beer are discussed and difficulties of identification emphasised. The consideration of organisms as sarcinæ if they consist of < 2 cocci errs on the side of safety.

I. A. P.

Disinfecting agents [in breweries and maltings]. M. STERKX (Woch. Brau., 1935, 52, 13—16).—The characters of good chemical disinfectants and their applications in brewery and malting rooms and apparatus are discussed, and an account is given of the influence on micro-organism growth of light rays of differing λ , and of pure metals.

I. A. P.

Flavin of white wines. L. GENEVOIS (Bull. Soc. chim., 1934, [v], 1, 1504—1505).—The fluorescence of wine is due partly to flavin and partly to lumiflavin (I). It disappears at p_{H} 8 and becomes blue at p_{H} 1. Extraction with C_2HCl_3 removes (I), part of which is removed by shaking the C_2HCl_3 solution with 0.1N-NaOH.

R. S. C.

Treatment of “casse ferrique” [iron turbidity] in white wines. R. MARTIN and M. CASTAING (Ann. Falsif., 1934, 27, 528—541).—Methods of determining the susceptibility of a wine to “casse ferrique” (C) are discussed. In the slow-oxidation method (I) the rate (R) of appearance of $C \propto \% \text{ Fe}$. Results of determination of R at 10° and 25° with various amounts of added Fe

are given. By the O_2 -diffusion method (II) much time is saved. Results of comparative tests by (I) and (II) are given. C is prevented by treatment with citric acid and gum arabic except in the most serious cases, which must be treated by rapid oxidation followed by clarification.

E. C. S.

Determination of volatile acidity of wines. P. JAULMES (Ann. Falsif., 1934, 27, 547—550).—The author's methods (B., 1932, 619) are discussed with reference to recent publications (B., 1934, 647, 981, etc.).

E. C. S.

Detection of sorbitol in wines. D. RAFFAELI (L'Ind. Chimica, 1934, 9, 1631—1634).—Precautions to be taken when testing for sorbitol by Werder's method (B., 1929, 619) are outlined.

D. R. D.

“Amine base” content of crude spirit. F. REINDEL and K. UNTERWEGER (Z. Spiritusind., 1934, 57, 338).—Crude EtOH, from an air-yeast distillery, having a putrid odour contained amine bases $\equiv 4.6$ mg. of NH_2Me per litre (cf. B., 1934, 857).

T. H. P.

Laboratory preparation of absolute ethyl alcohol. T. H. LIGGETT and K. DYKSTRA (Proc. Iowa Acad. Sci., 1932, 39, 160).—The rate of dehydration of 95% EtOH (I) by means of CaO (II) at 15° , 45° , and 78° is recorded. An improved method of dehydration of (I) with (II) is described, together with a special still-head for use in the subsequent distillation.

CH. ABS. (7)

PATENT.

Alcoholic fermentation of sugar-containing liquids. USINES DE MELLE, and F. BOINOT (B.P. 420,878, 27.6.34. Addn. to B.P. 393,082; B., 1933, 649).—The optimum sp. cellular saturation (S) of yeast in a fermenting liquid, viz., 10 kg. of yeast (75% H_2O)/1000 litres of fermentable liquor (L), is maintained by either partial or complete removal of nitrogenous nutritive materials from L by, e.g., CaO treatment, the ppt. being filtered off, or by adding to L one or more substances (e.g., furfuraldehyde, ulmic acid, ZnSO_4 , FeCl_3) capable of arresting vegetative development without affecting EtOH production. Preliminary de-aeration of L may be effected by injection of an inert gas (CO_2 , N_2 , H_2). The yeast is allowed to develop to the optimum S in a first-fermentation (I) limited as above, and is then transferred to a second vol. of treated $L =$ that used in (I).

I. A. P.

XIX.—FOODS.

Determination of rancidity in flour, semolina, macaroni, etc. A correction. J. BERLIE (Ann. Falsif., 1934, 27, 552—553).—The method (B., 1934, 905) is amended by (a) substituting aq. EtOH for AcOH as solvent for KI, since AcOH reacts with both KI and the products of rancidity, and (b) stipulating the use of pure H_2SO_4 -free Et_2O in the extractant. Results with various foodstuffs are recorded.

E. C. S.

Göttingen method of testing wheat quality and the baking test. H. ENGELKE (Mühlenlab., 1934, 4, 175—184; cf. B., 1934, 1080).—The gassing power (G) of meal is considerably reduced by the addition of 2% (calc. on the meal substance) of NaCl (I), whereas the G of yeast is unchanged by such an addition, which shows that (I) reduces the diastatic activity of meal. (I)

considerably increases the tenacity of the dough, probably owing to its effect on the proteolytic activity. The increase in tenacity depends both on the protein content and on the toughness of the gluten. The results from the baking test run parallel to the gas-retention val. (V), and the loaf vol. can be calc. directly from V by the formula given. E. A. F.

Relations between granulation and baking quality, particularly fermenting [gassing] power, of wheat flours. W. KRANZ (Mühlenlab., 1934, 4 169—176).—The diastatic activity, and hence the total gassing power (G), of the dough, increases with the fineness of the flour particles (P). Too extensive grinding of P , however, particularly in the case of soft wheat (S), injures the swelling of the dough and so reduces the loaf vol. The G of strong wheats (e.g., Manitoba) alone, or when mixed with S flours, is increased by removing the larger-sized P . E. A. F.

Gliadin-glutenin ratio in [wheat] gluten of various qualities. N. P. KOSMIN and A. I. POPZOVA (Mühlenlab., 1934, 4, 153—158).—Fleurent's theory that the quality of different flours (F) depends on the gliadin-glutenin ratio (R) of their glutes is untenable; R varies, but approaches 50:50 (the ratio given by Osborne) in each of the F investigated. E. A. F.

Micro-determination of potassium in milk and milk products. M. MIETHKE and H. FINZENHAGEN (Milch. Forsch., 1934, 16, 426—434).—The K is pptd. in a centrifuge tube from a clarified serum ($\text{CCl}_3 \cdot \text{CO}_2\text{H}$ or wet destruction with H_2SO_4 and HNO_3) as cobaltinitrite. The ppt. is dissolved in dil. H_2SO_4 , then NH_4CNS and COMe_2 are added. The extinction coeff. of the resulting blue-coloured solution is determined in a Pulfrich step photometer and hence the K content is calc. from tables supplied. E. B. H.

Determination of citric acid in milk and cheese by the pentabromoacetone method. O. REICHARD (Z. anal. Chem., 1934, 99, 161—169).—The milk is coagulated by addition of H_2SO_4 and 10% aq. phosphotungstic acid (I), and filtered. Citric acid (II) in an aliquot portion of the filtrate is pptd. as pentabromoacetone (III) (cf. B., 1934, 952); co-pptn. of CaSO_4 occurs. (III) is dissolved away with $\text{Et}_2\text{O} + \text{EtOH}$ and determined by difference. The presence of lactose in considerable excess does not interfere. The concn. of (II) in milk is found to decrease with time to zero as the acidity rises. (II) in cheese may be detected and determined by rubbing up with H_2O to a milky consistency, and then coagulating with (I). (III) is then pptd. from the filtrate by treatment with $\text{KBr} + \text{KMnO}_4$ at $\geq 5^\circ$ as before. J. S. A.

Improving the consistency of butter in winter. H. HERZ (Milch. Zentr., 1934, 63, 349—350).—Brittleness of winter butter is attributed to the changed feed (beet, oil-cake) of the cattle, but the consistency (C) can be favourably influenced by controlled conditions of kneading, washing, etc. A brief indication of the method of determining C is given. E. B. H.

Iodised wraps for prevention of rotting of fruit. R. G. TOMKINS (J. Pomology, 1934, 12, 311—320).—

Storage rots of grapes, tomatoes, oranges, apples, plums, and peaches are reduced, and in some cases eliminated, by use of wrapping paper soaked in an EtOH solution of I and KI and subsequently dried. A. G. P.

Determination of sucrose in jams and chocolate. A. FOSCHINI (L'Ind. Chimica, 1934, 9, 1636—1639).—The methods in current use are described and criticised, the following modified procedures being preferred. 25 g. of jam are ground in a mortar with pptd. CaCO_3 and a little hot H_2O . The resultant paste is washed into a beaker with H_2O and heated on a boiling H_2O -bath till homogeneous. It is then cooled and 15 c.c. of basic Pb acetate solution are added. After keeping for a short time, the solution is mixed with 30 c.c. of saturated aq. Na_2SO_4 and filtered through a double filter-paper, the ppt. being thoroughly washed with hot H_2O . The filtrate is made up to 200 c.c. and the sucrose determined polarimetrically (cf. B., 1934, 647). In the case of chocolate, a 25-g. sample is pulverised, made into a paste with EtOH, H_2O is added, and the analysis continued in the same way as with jam. The error is $< 0.2\%$. D. R. D.

Decomposition of certain foodstuffs in presence of various electrolytes. H. BADER (Ann. Falsif., 1934, 27, 518—528).—The effect of CaCO_3 (I) and MgCO_3 (II) on the preservative action of NaCl pickle was investigated. Suspensions of rice, beef extracted by boiling with H_2O , fresh pork, and fresh- and salt- H_2O fish in H_2O , in aq. NaCl of concn. varying from zero to saturation, and in the same solutions containing solid (I) and (II), were covered with petroleum and incubated at 39° for 15 days. The extent of putrefaction (P) was ascertained by determination in the aq. medium of titratable acidity or alkalinity, and total, NH_2 -, and NH_3 -N. (I) and (II), in that order, diminished the inhibitory effect of NaCl on P . The effect of the nature and composition of the foodstuff on the products of P is discussed. E. C. S.

Determination of water in potato flakes. B. LAMPE (Z. Spiritusind., 1934, 57, 332—333).—Using the Pritzker-Jungkunz apparatus, determination by distillation with C_2Cl_4 gives rapid results with satisfactory accuracy. I. A. P.

Determining sp. gr.—See I. Forage beet.—See XVI. **Determining sugars in marmalades etc.**—See XVII.

PATENTS.

Keeping liquid dairy products in a fresh condition. T. HOFUS (B.P. 420,985, 16.6.33. Ger., 16.6.32).—Cream and milk subjected to an atm. of O_2 (or air + O_2) (about 10 atm. pressure) and maintained simultaneously at $< 12^\circ$ can be stored thus for long periods. The whipping properties of cream are enhanced by this process. E. B. H.

Increasing the vitamin content of liquid foods. J. H. BRAGG (U.S.P. 1,954,065, 10.4.34. Appl., 13.4.32).—The liquid, such as milk, is passed through a chamber (C) which is fitted with vertical baffles and is relatively long and wide compared with its depth. The bottom of C is permeable to ultra-violet rays. A quartz lamp is placed below C and both irradiates and heats the liquid.

The top of *C* is cooled and the convection currents thereby set up ensure action on every particle of liquid.

E. B. H.

Treatment of food materials. SARDIK, INC., Assecs. of W. W. COWGILL (B.P. 421,429, 13.2.34. U.S., 13.2.33. Addn. to B.P. 409,727; B., 1934, 649).—An apparatus is described whereby the edible portion of citrus fruit may be dried as a powder, with but little loss of vitamins and flavour. The juice is squeezed on a rotary burr and transferred under an inert gas (to prevent oxidation) to a vac. chamber, where dissolved gases are removed. Inert gas is then again applied, in a further chamber, and the pulp and juice are forced through a series of fine screens with knives revolving over their surfaces; the pulp is thus finely divided and is finally sprayed on to the surface of a revolving drum (at 79°). Treatment for 15 sec. is sufficient to dry the pulp to a powder.

E. B. H.

Production of caffeine-free coffee. E. SCHEELE (U.S.P. 1,957,358, 1.5.34. Appl., 6.7.32. Ger., 7.7.31).—Green berries are extracted with a mixture of H₂O and a caffeine (I) solvent, emulsified beforehand, or *in situ* by motion of the container. The berries absorb the H₂O and the solvent extracts the (I) in a single process.

E. B. H.

(A) Condimentation and coloration of foodstuffs.

(B) Production of a protein food-colour. H. E. ALLEN, Assr. to A. G. McCALEB (U.S.P. 1,956,784—5, 1.5.34. Appl., [A] 24.2.32, [B] 23.6.32).—(A) Nitroso-hæmoglobin (I), prepared from thoroughly fresh animal blood, is used for colouring meat products (a) alone as a liquid, (b) as a spray-dried powder, or (c) in conjunction with spice-oil-sugar mixtures, e.g., blood powder 25, essential oils, oleo-resins, etc. 3—10, coarse granulated sugar 65—72%. (B) Fresh blood, preferably ox, is agitated mechanically and the fibrinogen, which rises to the surface, is removed. Centrifugal separation of the defibrinated blood yields red hæmoglobin and amber serum. The former is agitated for 3—5 min. with 1% of a curing mixture containing (approx.) NaNO₂ 30, NaNO₃ 10, NaCl 560 lb. The resulting solution of (I) is dehydrated by spray- or vac.-drying.

E. B. H.

Waterproof containers.—See V.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Stability of mixtures of hydrogen peroxide and ethyl alcohol. W. A. WOODWARD and J. PICKLES (Quart. J. Pharm., 1934, 7, 418—421).—MeCHO and AcOH are produced in mixtures of EtOH and H₂O₂ (10-vol.) on keeping.

C. G. A.

Assay of strong solution of lead subacetate. S. WETHERELL (Quart. J. Pharm., 1934, 7, 459—475).—The low results of the B.P. method (I) for total Pb (1.6%) are due to occlusion of PbC₂O₄, and of the U.S.P.X. method (0.5%) due to oxidisable impurities in the liberated AcOH. The low results given by method (I) for alkalinity are caused by the vol. of the PbSO₄ ppt.

C. G. A.

Sulphuric acid test for liquid paraffin. C. H. HAMPSHIRE and G. R. PAGE (Quart. J. Pharm., 1934, 7,

354—360).—Details of procedure are given for carrying out the test using a Lovibond colorimeter.

C. G. A.

Pharmacopœial tests. I. Quinine ethyl carbonate, atropine sulphate, potash alum, aloin, solution of cresol with soap. G. R. PAGE (Quart. J. Pharm., 1934, 7, 361—371).—Quinine Et carbonate (recryst.) has m.p. 91.5—92.5°. Amendments of the B.P. tests for the above substances are recommended.

C. G. A.

Alkaloid content of cinchona bark and decoctions. A. JACOBSEN and S. A. SCHOU (Dansk Tidsskr. Farm., 1935, 9, 1—10).—Coarse portions of the powdered bark contain less alkaloids (I) (Keller-Fromme method of determination) than do the fine portions, the variation being gradual, from 5.4 to 10.3%. The whole bark should, therefore, be finely powdered before analysis. The (I) content of simple or acid decoctions does not vary with the state of division of the bark.

R. S. C.

Determination of theophylline in soluble theophylline compounds. F. REIMERS (Dansk Tidsskr. Farm., 1935, 9, 11—25).—Theophylline is determined by extraction of the neutral solution or solid (freed from AcOH or acetates) with CHCl₃-Pr^oOH (3:1) and evaporation of the extract. Other methods are tedious or inaccurate.

R. S. C.

Exhaustive distillation of tobacco does not cause the liberation of more nicotine. A. WENUSCH (Pharm. Zentr., 1935, 76, 17—20).—Pyriki's conclusion (B., 1934, 77) is questioned. The positive reaction for alkaloids obtained after prolonged steam-distillation of tobacco is probably due to the presence of practically insol. alkaloids which are liberated from the cells only very slowly by aq. alkali.

E. H. S.

Test for olive oils. Fish-liver oils.—See XII.

PATENTS.

Manufacture of aliphatic diaminocarboxylic acid derivatives. [Pharmaceuticals.] J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 421,407, 20.5.33).—An ω -amino- α -substituted (aryl)-amino-carboxylic acid is heated with an alkyl carbamate in absence of H₂O. E.g., α -benzoylornithine [from the Bz₂ derivative and aq. Ba(OH)₂] is heated with NH₂-CO₂Et and ZnCl₂ at 150°. The product is hydrolysed by 30% H₂SO₄ to δ -*carbamido-ornithine*. Also, α -benzoyl-lysine with NHAc-CO₂Et gives a product hydrolysed as before to ϵ -*carbamidolysine*.

H. A. P.

[Manufacture of] propylmethylcarbinyllallyl-[5-allyl-5- β -amyl-]barbituric acid and its salts. H. A. SHONLE, Assr. to E. LILLY & Co. (U.S.P. 1,954,429, 10.4.34. Appl., 22.1.34. Can., 2.8.30).— β -Bromopentane (I) is condensed with CHNa(CO₂Et)₂ in EtOH and the resulting Et₂ β -*amylmalonate*, b.p. 103—105°/4 mm., condensed with urea (NaOEt in EtOH) to give 5- β -*amylbarbituric acid*, m.p. 167—168° (corr.), which is heated with CH₂:CH-CH₂Br and KOH in EtOH; the product (Na and NH₄ salts) has m.p. 98—100°. Alternatively, (I) is condensed with CH₂:CH-CH₂:CN(CO₂Et)₂, and the product condensed with urea.

H. A. P.

Manufacture of sterilising agents. WALLACE & TIERNAN PRODUCTS, INC., Assees. of F. C. SCHMELKES (B.P. 421,006, 1.9.33. U.S., 8.9.32).—Hydrazo- or azo-dicarbonamidine (I), $[\text{NH}_2\text{C}(\text{NH})\text{N}]_2$ is treated with HOCl or a salt of it (at $> 5^\circ$). The product is a Cl_2 -derivative of (I), decomp. 150° , and is a powerful bactericide in aq. solution (0.0025—0.02%) in presence of org. matter. H. A. P.

[Manufacture of] mercurated isatin derivatives. W. G. CHRISTIANSEN and S. E. HARRIS, Assr. to E. R. SQUIBB & SONS (U.S.P. 1,954,619, 10.4.34. Appl., 25.5.32).—Hg derivatives of 3-hydroxyphenyl- and 3:3-bishydroxyphenyl-isatins are claimed. Examples of starting materials are: 3':3''-dibromo- $[(\text{HgOAc})_2$ and $(\text{HgOH})_2$ derivatives], 3':3''-dinitro- $[(\text{HgOAc})_2$ derivative], (?) 3':5':3'':5''-tetrabromo- $(\text{HgOAc}$ derivative), 5':5''-dibromo-3':3''-diphenyl- $[(\text{HgOAc})_2$ and HgOAc derivatives], and 5':5''-dinitro-3':3''-diphenyl- $[(\text{HgOAc})_2$ derivative]-4':4''-dihydroxy-3:3-diphenylisatin; 5':5''-dibromo- $(\text{HgOAc}$ derivative) and 5':5''-dinitro-6':6''-dihydroxy-3:3-di-*m*-tolylisatin $[(\text{HgOAc})_2$ derivative]; 5':5''-dibromo- $[(\text{HgOAc})_2$ derivative] and the 2':2''-ether of 5:5'-dinitro-2':4':2'':4''-tetrahydroxy-3:3-diphenylisatin $(\text{HgOAc}$ derivative). H. A. P.

[Preparation of] ephedrine ethylmercurithiosalicylate. E. H. STUART, Assr. to E. LILLY & CO. (U.S.P. 1,954,432, 10.4.34. Appl., 4.11.33).—The base and acid are combined in EtOH. The l-, m.p. $140\text{--}142^\circ$, and dl-ephedrine ethylmercurithiosalicylates, m.p. $150\text{--}152^\circ$, are described; they are slightly sol. both in H_2O and oils. H. A. P.

Manufacture of solutions of therapeutically valuable compounds. I. G. FARBENIND, A.-G. (B.P. 421,175, 15.5.33. Ger., 14.5.32).—Sparingly sol. salts of aminoacid-ines or -inium compounds (I) with org. arsenic acids are dissolved in aq. solutions of readily sol. salts of (I). *E.g.*, < 1 equiv. of Na *p*-glycolylamino-phenylarsinate is added to an aq. solution of 3:6-diamino-10-methylacridinium chloride. H. A. P.

[Preparation of] antimony derivative of sulpharsphenamine. W. G. CHRISTIANSEN and A. E. JURIST, Assrs. to E. R. SQUIBB & SONS (U.S.P. 1,954,615, 10.4.34. Appl., 11.5.31).— Na_2 3:3'-diamino-4:4'-dihydroxyarsenobenzene-*N:N'*-bis- ω -methylsulphinate is treated with Na antimonyl tartrate in H_2O and the product pptd. with EtOH. The product contains Sb 10—12 and As 13—15%. H. A. P.

Manufacture of female sexual hormone. F. HOFFMANN-LA ROCHE & CO. A.-G. (B.P. 420,632, 12.1.34. Ger., 24.2.33).—The urine from stallions is acidified and heated and then, after cooling, extracted with org. solvents. The extract is purified in the usual manner. [Stat. ref.] E. H. S.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

PATENTS.

Photographic emulsions containing fog inhibitors. S. E. SHEPPARD and W. VANSELOW, Assrs. to

EASTMAN KODAK CO. (U.S.P. 1,954,334, 10.4.34. Appl., 4.1.33).—The use as fog inhibitors of 5-thiopyrazolones having $\leq 1\text{H}$ in position 1 or 4 (0.001—1% of 1-phenyl-3-methyl- or 1-phenyl-2:3-dimethyl-5-thiopyrazolone) is claimed. H. A. P.

Antihalation coatings for photographic supports. F. F. RENWICK and R. B. KING (B.P. 421,721, 31.5.33).—An antihalation layer, which may be coated on the back of the emulsion support or between it and the emulsion, consists of a gelatin layer containing a dyed Ag salt which is relatively insensitive to light, *e.g.*, AgCl. The Ag salt dissolves out during the processing of the emulsion. J. L.

Recording materials for colour films. B. GASPAR (B.P. 421,534, 23.3.33. Ger., 24.3.32).—In a multipack film the top (blue-sensitive) layer is colourless, though it may contain a colourless dye-forming substance; in the underneath layer(s) are incorporated dyes acting both as filters and as agents for forming the final coloured images. J. L.

Multicolour screens for use in colour photography. C. L. FINLAY (B.P. 421,771, 22.10.34).—For the prep. of multicolour screens on flexible (celluloid) supports, a dyed collodion layer is coated on to a polished, stainless-steel, flexible foil. A multicolour screen is then formed in known manner by ruling on lines in a greasy resist, removing the dye from the uncovered portions, and re-dyeing them in another colour. The screen is protected by coating with a layer of rubber in xylol, and a layer of collodion on top. The whole layer is transferred to a temporary paper support, whilst both are passed under acidulated H_2O . The colour pellicle is then transferred to the final celluloid support and pressed together by rollers. The adhesion is aided by a partial solvent for the two components, *e.g.*, AcOH or COMe_2 , in H_2O . J. L.

Colour photography. T. T. BAKER, and DUFAY-COLOR, LTD. (B.P. 420,824, 6.6.33).—The film base is dyed with a suitable colour and then a pattern (lines etc.) is applied in greasy ink (I) from a roller (R) on which the pattern has been prepared in mercurial ink-repelling areas. R is made by plating with Ag and then with Cr, and a dichromated gelatin layer coated on top; the screen pattern is photographed on and developed, and the Cr etched away under the unhardened portions; the Ag exposed is amalgamated with Hg, forming ink-repelling surfaces. After inking, the dye is dissolved away from the unprotected areas, and these are dyed with another colour. The (I) is then removed. A third and, if required, a fourth colour may be applied by running R at right angles across the film. Other suitable non-regular patterns may be applied. When the screen is completed, the photographic emulsion is coated on top. J. L.

Production of photographic dyestuff images. B. GASPAR (B.P. 421,727, 23.6.33. Ger., 23.6.32).—The dye or leuco-compound is incorporated in a gelatin layer by itself, this layer being in juxtaposition to the light-sensitive Ag halide layer; after development, chemical reactions are produced which destroy or form the dyes in the other layer corresponding to the image or

non-image portions, as required. Various combinations of layers for multicolour work are described.

J. L.

[Optical projection printing system for] colour photography and cinematography. J. LAGRAVE and V. HUDELEY (B.P. 421,582, 20.6.33. Luxemb., 16.6.33).

Wrapping paper. Papers and fabrics for printing.—See V.

XXII.—EXPLOSIVES; MATCHES.

Sensitiveness and brisance of commercial dynamites. P. NAOUM (Chem.-Ztg., 1934, 58, 959—962).—Existing types of dynamites, such as Dynamite I, initiated by means of a normal detonator, will reach a detonation velocity of 6500 m./sec. even after 1 year's storage. The problem of insensitiveness does not therefore arise for the home market. For overseas markets or hot climates the use of a supplementary explosive of higher sensitiveness may be necessary to ensure max. brisance. Max. detonation velocity can be attained as readily by $C_6H_2(NO_2)_3 \cdot OH$ as by pentritine or $C_6H_2Me(NO_2)_3$, when these are used to increase brisance.

W. J. W.

Coloured smokes from synthetic dyes. Y. H. LI and C. SHIH (J. Chinese Chem. Soc., 1934, 2, 205—210).

—Many dyes (I) (listed) containing NH_2 - or substituted NH_2 -groups, but not SO_3H , are volatile, and give coloured smokes when ignited with $KClO_3$ -sucrose.

J. L. D.

Cellulose nitrate.—See V.

PATENTS.

Production of an explosive. L. E. D'A. CALLERY (B.P. 421,138, 16.10.33).—A solution of $(CH_2)_6N_4$ produced by treating CH_2O with anhyd. NH_3 gas at $\gt 10^\circ$ is oxidised with HNO_3 ($d < 1.52$) at $\gt 5^\circ$, and the product separated and dried. [Stat. ref.]

W. J. W.

Manufacture of explosive compositions of the character of gelatine dynamites. E. I. DU PONT DE NEMOURS & Co. (B.P. 421,598, 24.6.33. U.S., 24.6.32).—A gelatinised liquid explosive is incorporated with a vegetable pith (bagasse or cornstalk pith) of 6-mesh particle size and d 0.1—0.3 together with oxidising and other carbonaceous material. The product will retain a low d and satisfactory propagating power for long periods of time.

W. J. W.

(A) Blasting cartridges, borehole charges, and cooling plugs. (B) Blasting explosive charges and borehole charges. A. G. WHITE, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 420,913 and 420,915, [A] 8.6.33, [B] 9.6.33).—(A) Plugs (P) used in boreholes consist of, or contain, a high % of cooling salts and have a central core of a non-rigid safety explosive of low brisance into which the detonator is inserted. P and the blasting cartridge may be enclosed in a common container. (B) A core of safety explosive (E) having a detonation velocity $\gt 2300$ m./sec. is surrounded with a sheath of solid cooling material $\gt 40\%$ of the core. The grist of the

ingredients of E should preferably be such that as little as possible passes 80-mesh.

W. J. W.

XXIII.—SANITATION; WATER PURIFICATION.

Measurement of atmospheric sulphur pollution by means of lead peroxide. B. H. WILSDON and F. J. MCCONNELL (J.S.C.I., 1934, 53, 385—388 r).—A method of employing the reaction between a dry paste prepared from PbO_2 and SO_2 for the measurement of the S pollution of the atm. is described. The rate of sulphation $\propto [SO_2]$ up to high % of sulphation. When the paste is applied to cylinders the rate of absorption for small velocities $\propto 1/(\text{air velocity})^{\frac{1}{2}}$. The variation in rates of absorption is \gt that attributable to wind and temp., and is probably dependent on errors in the volumetric method and to differences in the exposure at the points of observation. It is concluded that the PbO_2 method, in addition to affording a reliable means of estimating the relative "activity" of atm. SO_2 , may provide a simple method of estimating prevalent $[SO_2]$ if exposures are made under conditions which enable corrections to be applied for the effects of wind velocity and temp.

Industrial gasmasks. J. D. PRATT (Chem. & Ind., 1934, 1092—1097).—Respirator container fillings for use against the principal toxic gases are catalogued. Filter masks should not be used where there is any danger of O_2 deficiency; a hose mask must be employed. No present-day dust mask is really satisfactory.

C. I.

Maintaining the concentration of oxygen [in sealed rooms] in the protection of crowds against chemical attacks. A. SOLDI (L'Ind. Chimica, 1934, 9, 1624—1630).—The following methods for maintaining in a breathable condition the air in a hermetically closed room in which a crowd is gathered for protection from poison-gas attacks are described: (1) absorption of CO_2 by circulating the air through vessels containing beads of $NaOH$ - KOH mixture (I), the $[O_2]$ being maintained by means of cylinders of the gas; (2) absorption of CO_2 by means of Na_2O_2 containing a heavy-metal oxide as catalyst, O_2 being liberated in the reaction; (3) absorption of CO_2 by means of (I) and production of O_2 in the room by burning rods (so-called "solid O_2 candles") composed of $KClO_3$, Fe powder, asbestos, catalysts (oxides of Co, Ni, Cu, etc.), and alkaline materials (CaO , Na_2CO_3) to absorb traces of Cl_2 and Cl oxides. Portable apparatus for individual use, working on the same principles, is also discussed.

D. R. D.

Nature and amount of the colloids present in sewage. V. Electrical and surface properties of sewage colloids. E. V. MILLS (J.S.C.I., 1934, 53, 402—410 r; cf. B., 1933, 94).—Sewage dispersates carry an electronegative charge which is diminished by increasing $[H]$. The dispersate of a fresh sewage liquor extensively associates with any extended surface presented to it by pptn. of the cations of salts of Ca or of Al, by the addition of alkali, or by the addition of inorg. sols or suspensions of bentonite.

Influence of temperature and season on biological purification of sewage. K. VIEHL [with B. MEISSNER]

(Zentr. Bakt. Par., 1934, 91, II, 14—39).—The rate of oxidation of org. matter in sewage is unaffected by temp. at 15—30°, is slightly retarded at 8°, and markedly reduced at > 35°. The H₂O content of activated sludge is highest when formed at moderate temp., when protozoa and metazoa showed max. nos. Only bacteria survived > 44°. A. G. P.

Operation experiments at Indianapolis activated sludge plant. C. K. CALVERT and D. E. BLOODGOOD (Sewage Works J., 1934, 6, 1068—1072).—This plant, treating 43 × 10⁶ gals. per day, has been operated without returning any sludge. Plain aëration removes a greater wt. of solids and reduces the biochemical O₂ demand > when using the activated-sludge process, the effluents in both cases being turbid and unsatisfactory. No reasonable increase in the amount of submerged contact surface will produce increased purification commensurate with the cost of installation, and aëration of sewage prior to activated-sludge treatment is uneconomical. The sludge produced by plain aëration contains more grease, but offers no difficulty on digestion. C. J.

Relation between drainability of [sewage] sludge and degree of digestion. W. RUDOLFS and H. HEUKLEKIAN (Sewage Works J., 1934, 6, 1073—1081).—Laboratory experiments indicate that the drainability (*D*) of a digested sludge is affected by its original nature, certain trade wastes greatly decreasing it. In most cases *D* increases as digestion proceeds until and shortly after the peak of gas formation has been reached, but prolonged storage causes a decrease. Chemicals, e.g., alum, help *D* when sludge is poorly digested or has been stored too long, but are ineffective when the sludge is gasifying freely. C. J.

Bulking of activated [sewage] sludge. II. **Causative organisms.** J. SMIT (Sewage Works J., 1934, 6, 1041—1053; cf. B., 1933, 254).—A pure culture of thread-like organisms has been obtained from diseased sludge by replating on agar. It is similar in many ways to *Sphaerotilus natans*, but is thinner and does not attach itself to solid material. Its shape and size vary with nutrition; its N requirements are slight, and although max. growth occurs in presence of many carbohydrates in a solution containing 1% of peptone and 1% of CaCO₃, arabinose and glycerol are unsuitable. Attempts to cause bulking by adding the organism to healthy sludge have failed and the conditions necessary to promote an abundant growth of the thread under apparently normal conditions have not been determined. C. J.

Lipins of sewage sludge. O. J. KNECHTGES, W. H. PETERSON, and F. M. STRONG (Sewage Works J., 1934, 6, 1082—1093).—Four solvents were compared with respect to the quantity of fatty matter extracted from various types of sludge. CHCl₃ extracted the largest and light petroleum the smallest amounts, the difference being chiefly due to the dissolution of Ca soaps. The effect of the presence of one lipin on the solubility of another was observed; Ca stearate, which is < 2% sol. in CHCl₃, was extracted to the extent of 40% when mixed with Ca oleate. An examination was made of

the composition of the lipins and the nature of the free fatty acids. C. J.

Longevity of *B. typhosus* (*Eberthella typhi*) in sewage sludge. C. C. RUCHHOFF (Sewage Works J., 1934, 6, 1054—1067).—*B. typhosus* has been isolated from activated sludge at Chicago, the ratios to the *coli-aërogenes* group being 1:7700. At 10—15° the organism can survive in stored sludge for > 80 days and hence care should be used in the application of wet sludge as a fertiliser. In artificially infected aërating mixtures, 86% of the organisms were destroyed after 5½ hrs. aëration and a further 8.2% were carried down by the sludge on settling. C. J.

Effect of chlorine dosage on percentage reduction of *B. coli* [in sewage]. W. RUDOLFS, J. ZIEMBA, and H. W. GEHN (Sewage Works J., 1934, 6, 1094—1102).—The rates of *B. coli* reduction were determined in fresh and stale sewages chlorinated to the extent of 20, 40, and 50% of the initial Cl₂ demand. The % reduction depends on the amount of Cl₂ added and not on the % of the Cl₂ demand satisfied; thus with const. contact time it is greater in strong sewages, containing more Cl₂-absorbing substances, than in dil. sewages, the effect being most marked under 50% of Cl₂ satisfaction. In any given sewage the greater is the % of the demand satisfied the greater is the kill. The Cl₂-consumption rate and the *B. coli* kill are instantaneous in both fresh and stale sewages, but the total germicidal power of the Cl₂ is not all expended immediately, as in some cases substances are formed which remain slowly active for > 1 hr. C. J.

Rapid determination of traces of active chlorine in water. L. LEROUX (Compt. rend., 1934, 199, 1225—1227).—Cl is determined colorimetrically by adding a crystal of KBr to a 50-c.c. sample. The liberated Br gives a violet colour on adding 1 c.c. of AcOH and 1 c.c. of aq. fuchsin (I) [10 c.c. of 0.1% aq. (I) in 100 c.c. of H₂SO₄ (1:20)]. The determination is applicable to concns. of 0.005—0.7 mg./litre. Org. matter does not interfere. H. J. E.

Residue from a drop of water observed under the polarising microscope. M. CASANOVA (Bol. Informac. Petroleras, 1934, 11, No. 121, 49—75; cf. *ibid.*, 1932, No. 99).—The type and composition of H₂O from petroleum deposits may be determined approx. by examination, under the polarising microscope, of the residue left by the evaporation of one drop of the liquid (preferably adjusted to *d* 1.01—1.03). Numerous illustrative photomicrographs are given and crystallographic data for 48 naturally occurring salts, which can be formed by the evaporation of various types of waters, are tabulated. E. L.

Disinfectants for breweries etc.—See XVIII.

PATENTS.

Sterilisation of water. J. C. BAKER and F. C. SCHMELKES, Assys. to WALLACE & TIERNAN PRODUCTS, INC. (U.S.P. 1,943,650, 16.1.34. Appl., 20.5.31).—The H₂O is treated with a 0.02—0.3 (0.07)% solution of NHCl₂. A. R. P.

Bactericides.—See XVI.