

## B.—APPLIED CHEMISTRY

AUG. 28 and SEPT. 4, 1936.\*

## I.—GENERAL; PLANT; MACHINERY.

**Temperature in industrial furnaces.** H. C. HOTTEL, F. W. MEYER, and I. STEWART (Ind. Eng. Chem., 1936, 28, 708—710).—An instrument for measuring heat-flow rates in furnaces consists essentially of two thermocouples in the form of parallel plates. Theoretically the heat-flow rate across the plane of the instrument is the same as between two infinite black parallel planes at the two temp. measured by the thermocouples, assuming that the surface emissivities of the latter are uniform throughout the spectrum, but in practice an additive correction term  $\propto$  the temp. difference is necessary. C. R. H.

**Radiation reaction at any point in a furnace cavity.** W. J. WOHLBERG (Ind. Eng. Chem., 1936, 28, 698—703).—Mathematical. General expressions are derived for the solution of the thermal equilibrium at any point in a furnace cavity, conditions within the cavity conforming to certain fixed types. C. R. H.

**Heat transmission with high-boiling organic compounds.** E. F. HOLSER (Ind. Eng. Chem., 1936, 28, 691—698).—The advantages of liquid and vaporised Dowtherm A (I), a mixture of  $\text{Ph}_2\text{O}$  75 and  $\text{Ph}_2$  25%, over  $\text{H}_2\text{O}$  and steam as a heat-transfer agent are discussed, and installations which have been run successfully with (I) are briefly described. Heat-transfer coeffs. are derived theoretically, and it is shown that thermal conductivity and  $\eta$  are the two main factors which cause the difference between (I) and  $\text{H}_2\text{O}$  or steam. The heat-transfer coeff. of (I) is much  $<$  that of  $\text{H}_2\text{O}$  or steam, but in view of the higher temp. possible with (I) more heat per unit surface can be transferred. C. R. H.

**Heat transference in the chemical industry.** S. ERK (Chem. Eng. Cong. World Power Conf., 1936, H2, 26 pp.).—The methods of conducting research on heat transference are discussed. A. J. M.

**Heat transmission—some recent advances.** C. H. LANDER, M. FISHENDEN, and O. A. SAUNDERS (Chem. Eng. Cong. World Power Conf., 1936, H3, 29 pp.).—Radiation from non-luminous gases, convection for liquids in streamline flow through tubes, the relation between heat transfer and fluid friction, and the results of experiments on the effect of grooving metal plates on heat transfer are discussed. Experimental results of radiation from  $\text{CO}_2$  and  $\text{H}_2\text{O}$  vapour, and curves for natural convection from vertical surfaces in air and from horizontal cylinders in liquids, are given. D. K. M.

**Heat transmission.** T. B. DREW, H. C. HOTTEL, and W. H. McADAMS (Chem. Eng. Cong. World Power

Conf., 1936, H7, 33 pp.).—A review of the present state of knowledge of the subject. D. K. M.

**The hydrocal.** A. D. MOORE (Ind. Eng. Chem., 1936, 28, 704—708).—A description is given of a calculating machine the function of which is to imitate hydrodynamically transient heat problems. C. R. H.

**Endless-belt dryers.** H. HOENING (Chem. Fabr., 1936, 9, 157—160).—The material treated must be suitable in regard to cohesion, adhesion, consistence, and particle size. The drying medium may pass in the same direction as the band, or in the opposite direction. Considerations of adhesion of the material to the belt limit the capacity of a given drying vol. by making necessary large-diam. rollers for the zig-zag course of the belt. Overhead charges remain substantially const. whether the load is light or heavy, and, in general, the method is economic only for large-scale operation. A porous band of special construction, in which Al alloys may be used, gives advantages of less dust formation and abolition of guiding rollers, whilst the material falling through is usually  $> 1\%$  of the total. Granulation is promoted and drying time frequently reduced from 24—48 hr. to 1—4 hr. Temp. between  $80^\circ$  and  $300^\circ$  may be used, giving a final  $\text{H}_2\text{O}$  content of 0.1—0.05%. D. R. H.

**Drying by spraying or atomisation.** A. ANTONI (Chem. Eng. Cong. World Power Conf., 1936, C19, 26 pp.).—A review. The production of sprays by jets and centrifugal force is described and applications to spray-drying in industry are discussed. R. S. B.

**Air-drying of solids.** T. K. SHERWOOD (Chem. Eng. Cong. World Power Conf., 1936, C15, 18 pp.).—Air-drying is necessarily uneconomical because it involves the vaporisation of the liquid, and heat recovery is rarely feasible. Drying of a solid involves an initial const.-rate period and a later period of decreasing rate. Effects of air temp., humidity, and velocity are discussed quantitatively. Radiation and conduction are usually much more effective in the laboratory than on the large scale. Procedure for determining the zone of evaporation is described. The movement of  $\text{H}_2\text{O}$  in solids is probably always due to capillarity. Integrated diffusion equations based on Fick's law (which states that the rate of moisture diffusion  $\propto$  the moisture gradient) are unreliable, and the assumption has never been proved. The falling-rate period is best studied by curves showing rate of drying against  $\text{H}_2\text{O}$  content, which show breaks where the mechanism changes. Approx. equations are given for determining the time of drying, and dryer design is discussed. The heat loss in exhaust air decreases with rising air temp. C. I.

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



**Control of fine grinding and its theory.** J. D. MARY (Chem. Eng. Cong. World Power Conf., 1936, D5, 5 pp.).—Rittinger's law, which states that the energy necessary for grinding  $\propto$  the surface of the new particles created, though open to theoretical objection, seems to be accurate for particles  $< 2$  mm. The author states that  $(S_r - S_t)/V = C$ , where  $S_r$  is the sum of the real surfaces produced by grinding and  $S_t$  the sum of the theoretical surfaces. The efficiency of a mill may be calc. by the use of diagrams, assuming Rittinger's law. C. I.

**Estimation of very finely-divided solids.** H. W. GONELL (Chem. Eng. Cong. World Power Conf., 1936, D3, 33 pp.).—The characteristics of finely-divided solids (grain composition, mean grain size, poured wt., sediment vol., wetting properties, etc.) are described and their estimation is indicated. A. J. M.

**Rotary filters.** ANON. (Fuel Econ., 1936, 11, 353–356).—The various types of modern rotary filters used for separating liquids and solids from slurries are described and compared; they include the stream-lined-cell, the disc, the deep-submergence, and the top-feed types. H. C. M.

**Filter-presses.** E. A. ALLIOTT (Chem. Eng. Cong. World Power Conf., 1936, C9, 34 pp.).—A general survey of types of filter-press, including those using edge filtration and vac. filters, with examples of performance in industrial practice. C. I.

**McCabe-Thiele diagram in extraction problems.** M. E. OTHMER (Chem. Met. Eng., 1936, 43, 325–328).—A battery of extraction units is analogous to a fractionating column, each unit corresponding to one plate, provided flow is countercurrent and temp. const. The McCabe-Thiele graphical method of determining the no. of plates necessary for a given distillation problem is also applicable to solvent extraction, the solubility relationships of the three liquids being known. As an example a problem on the extraction of AcOH from aq. solution by  $\text{CHCl}_3$  is worked out. C. I.

**Distillation.** G. G. BROWN (Chem. Eng. Cong. World Power Conf., 1936, C14, 43 pp.).—There is a wide scope for further determinations of thermal and equilibrium data for those cases in which Raoult's law does not apply. Methods for determining the no. of equilibrium plates are discussed, including those applicable to multi-component systems. Plate efficiency, defined as the ratio of no. of equilibrium plates to the no. required in practice, may much exceed 100% if there are several contacts on one plate. It increases with vapour velocity and also depends on design of bubble caps etc. Design is discussed and a centrifugal fractionator having a plane spiral conduit described. The effect of centrifugal force is to magnify greatly the difference in density between liquid and vapour and to render sharp separation possible in compact apparatus. A plant used for the continuous distillation of whisky is also described. C. I.

**Graphical calculation of plate columns.** E. ÖMAN (Chem. Eng. Cong. World Power Conf., 1936, C12, 13 pp.).—Trouton's rule, that the molal heat of vaporisation divided by the abs. boiling temp. is const (approx.

21), is not accurate. Thus  $\lambda/T$  for  $\text{H}_2\text{O}$  is 26, and for EtOH 14. Plate columns calc. in this way are very uncertain. The author describes his graphical method of calculating rectifying columns, in which by computing the liquid composition in 3 pairs of adjacent plates for a given heat content curves are obtained for varying amounts of heat throughout the column. C. I.

**Recent advances in rectification technology.** E. KIRSCHBAUM (Chem. Eng. Cong. World Power Conf., 1936, C2, 31 pp.).—The best efficiency in fractionation is obtained when the liquid moves in the same direction on all the exchange plates. A theoretical derivation of the efficiency of a plate is given and the conclusions are tested experimentally. A. J. M.

**Condensation of vapours mixed with gases.** M. ROUILLY (Chem. Eng. Cong. World Power Conf., H9, 23 pp.).—A method for separating vapours from gas streams is described, and the factors controlling the condensation of solids and liquids are discussed. The use of incombustible solvents is recommended. R. S. B.

**Evaporation operating at low temperature with waste heat.** H. E. H. GÖTH (Chem. Eng. Cong. World Power Conf., 1936, H5, 15 pp.).—The liquid is first heated by indirect contact with waste gas (if flue gas is used it should first be saturated with  $\text{H}_2\text{O}$  vapour), then evaporated by direct contact with unsaturated gas, e.g., air, and recycled. The application of this process in the evaporation of sulphite liquor is indicated. D. K. M.

**Design of evaporators.** N. GALPERIN (Chem. Eng. Cong. World Power Conf., 1936, C16, 18 pp.).—The economical limit to the use of steam for evaporation is 8–10 atm., at which pressure it can be previously used in turbines. For liquids of b.p.  $> 200^\circ$  the most suitable heat carrier is superheated  $\text{H}_2\text{O}$ , and, in view of the high cost of high-pressure apparatus, forced circulation to reduce heating surface is necessary. Use of a heat pump in connexion with a single-effect evaporator working under pressure is discussed, and the calculation of the "coeff. of injection" (where the secondary vapour is partly recovered by compression in an injector) explained. Multiple-unit evaporation with parallel flow of liquid and vapour (the only scheme in practical use) is irrational where  $\eta$  increases with concn. Where salts separate, the units should be fed in parallel. Heat calculations for each scheme are given and the importance of correct temp. difference between units is stressed. C. I.

**Fractional-distillation columns.** M. R. FENSKE, C. O. TONGBERG, D. QUIGGLE, and D. S. CRYDER (Ind. Eng. Chem., 1936, 28, 644–645).—Two fractional-distillation columns with approx. 100 theoretical plates, by means of which petroleum constituents having b.p.  $2.8^\circ$  apart can be almost quantitatively separated, are described. C. R. H.

**Determination of moisture content by distillation with liquids immiscible with water.** F. G. H. TATE and L. A. WARREN (Analyst, 1936, 61, 367–382).—The Bidwell and Stirling apparatus is improved (B., 1925, 268). Paraffins are substituted for aromatic hydrocarbons, commercial  $\text{C}_7\text{H}_{16}$  being the best for general purposes, and 2 ml. of  $\text{H}_2\text{O}$  can be distilled with



an accuracy of 99.5%. Evidence for the formation of  $\text{CuSO}_4 \cdot \text{H}_2\text{O}$  and the mono-, di-, and tri-hydrates of  $\text{MgSO}_4$  during dehydration under boiling org. liquids is given and also comparisons of the method with the oven-drying method applied to  $\text{H}_2\text{O}$  determination in yeast, artificial silk, cacao products, dried milk, and lactose hydrate. E. H. S.

**Standardisation of chemical apparatus.** H. H. FRANCK (Chem. Eng. Cong. World Power Conf., 1936, M4, 12 pp.).—The present position in Germany regarding the standardisation of laboratory apparatus is described, and the possibility of standardisation of industrial equipment discussed. C. I.

**Apparatus for determination of the apparent volume and of the volume of voids.** J. P. BUWALDA (J. Inst. Petroleum Tech., 1936, 22, 177—179).—Apparent total vol. of a sample of stones is obtained by measuring the displacement of Hg in a special vessel connected to a suitably graduated tube. Using the same apparatus, the vol. of voids is obtained by measuring the total vol. of air which can be collected from the sample by manipulating the Hg reservoir so as to subject the sample to a reduced pressure. The voids are expressed as a % of the apparent total vol. C. C.

**Combustion efficiency.**—See II. Ni alloys for low- and high-temp. service.—See X. Crop drying.—See XVI.

#### PATENTS.

**High-temperature furnace insulated-wall construction.** A. S. NICHOLS, Assr. to ILLINOIS CLAY PRODUCTS Co. (U.S.P. 2,021,742, 19.11.35. Appl., 18.6.34).—The wall is constructed by building an outer wall of compressible insulating bricks in contact with the firebrick wall and having a metallic retaining structure on its outer side. D. M. M.

**Furnaces.** J. S. ATKINSON, and STEIN & ATKINSON, LTD. (B.P. 448,354, 7.2.35).—In a furnace for annealing or other heat-treatment, a fan is provided to circulate the gases, in the muffle if the furnace is of that type. B. M. V.

**Apparatus for mixing and warming not readily inflammable liquids, pastes, or the like.** G. CAULIER and E. A. ITTERLEIN (B.P. 448,553, 4.3.36).—A cylindrical chamber is provided with upper and lower inlet and outlet openings, and within it is rotated a spiral spring providing friction heat and conveying the material. B. M. V.

**Ore-crushing apparatus.** E. B. MYERS (B.P. 448,662, 7.8.35. U.S., 31.7.35).—An impact crushing device comprises a tube of uniform bore for a length of 14—18 diam. to which is introduced at the upper end a hollow converging cone of high-pressure air, the apex angle being  $< 10^\circ$  ( $6^\circ$ ) and the ore to be pulverised being introduced centrally. The mixture emerges at the lower end of the tube to strike an anvil plate, after which the air expands and is utilised for classification. B. M. V.

**Apparatus for scouring and cleaning granular material.** S. HOWES Co., INC. (B.P. 448,566, 28.1.35. U.S., 14.12.34).—Grain is agitated and caused to travel through a horizontal cylindrical chamber (C) by means

of beaters, air being admitted through the pervious lower part and withdrawn through suction devices situated at the feed end, near the middle, and at the outlet end of the upper part of C. B. M. V.

**Treatment of solids with gaseous media.** N. C. CHRISTENSEN (B.P. 448,433, 26.11.34).—In, e.g., the prep. of sponge Fe or effecting interaction of CO and CaO to produce  $\text{H}_2$ , also for physical changes only, the finely-divided solid material (S) and the gas (G) are impelled mechanically into a reaction zone so as to make and maintain a uniform suspension of S in G, circulating so that all portions obtain substantially the same treatment, but treatment in stages with intermediate separators is claimed. Heat may be applied to any zone. The apparatus may comprise a horizontally elongated chamber with semi-circular bottom, rotating closely to which is a paddle wheel with uninterrupted radial blades, the feed being continuous to one end and the products withdrawn from the other. B. M. V.

**Apparatus for separation of liquids of different specific gravity.** COUTTS & Co., and F. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 448,638, 15.12.34).—In a settler the inlet is placed remotely from and at a lower level than the overflows, the latter being separated by a baffle extending nearly to the bottom. The entering liquid is caused to flow in horizontal zigzags by means of partitions. B. M. V.

**Concentration of liquid materials.** D. D. PEEBLES and P. D. MANNING (B.P. 448,539, 18.5.35).—Apparatus operating by flash evaporation, the liquid flowing downward to a separate chamber with a dry sump, is described. The sump pump is of the centrifugal type having a drooping head/quantity characteristic so that it will be self-regulating. Multiple effects at increasing vac. are contemplated. B. M. V.

**Fractional distillation and like operations.** A. J. V. UNDERWOOD (B.P. 448,556, 10.11.34).—In a multistage rectifier or the like the liquid and gas are passed in contact at each stage in such a manner that substantially all the liquid is entrained, the mixture passing to a separating zone, whence the gas and liquid pass to the next contact stage in opposite directions. B. M. V.

**Reduction of foam formation.** A/S. DANSK GAERINGS-INDUSTRIE (B.P. 448,632, 11.12.34. Denm., 12.12.33).—A foam-restraining agent contains a considerable proportion of at least one higher fatty acid; e.g., a soap sludge from the refining of fats is treated with acid. B. M. V.

**Filters [for air etc.].** D. A. TULLIS and E. LONGDEN (B.P. 448,569, 14.2. and 12.6.35).—Filters comprising zigzag cloth are claimed. In the same housing therewith may be means for bringing the air in contact with oil or  $\text{H}_2\text{O}$  prior to filtration. B. M. V.

**Manufacture of filtering masses for removing aerosols and like fine suspended matter from the atmosphere.** SOC. ITAL. PIRELLI (B.P. 448,664, 11.9.35. Ital., 14.9.34. Addn. to B.P. 395,918; B., 1933, 817).—The fine inert powder is produced *in situ* either by mechanically pulverising a portion of the fibres or by interaction of two substances, e.g., by dipping the



fibrous mass in a solution in which reaction is effected on heating.

B. M. V.

**Apparatus for raising liquids, treating air and other gases, and particularly air-conditioning.** M. BERLOWITZ (B.P. 448,538, 16.5.35. Ger., 17.5.34).—A centrifugally rotated, hollow, inverted cone draws liquid from an axial tube (*T*) and delivers it to an annular space surrounding the cone, circulation being maintained through ports in the lower part of *T*.

B. M. V.

**Controlling the opening and closing of passages between gas-filled spaces.** A. A. THORNTON. From KERAMISCHE INDUSTRIE-BEDARFS A.-G. (B.P. 448,435, 5.12.34).—Through a wall are formed substantially horizontal, not very deep passages for gas, *i.e.*, a large port would be divided by horizontal diaphragms, and vertically in the centre of the wall, intersecting the passages, is a conduit for sand, inclined outwards at the bottom to a suitable door. Dampers or other form of approx. stoppers on which the sand will pile may be provided so that the passages may be closed individually.

B. M. V.

**Heatproof product.**—See IX.

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Examination of coal structure by means of X-rays.** B. G. ŠIMEK and J. PULKRABEK (Mitt. Kohlenforsch. Inst. Prag, 1935, 2, 218—235).—The structure of typical Czechoslovakian coals, as revealed by X-ray analysis, is discussed.

R. B. C.

**Float-and-sink tests for friable coals and the finest sizes.** A. GÖTTE (Glückauf, 1936, 72, 378—382).—Two methods of conducting the float-and-sink test with the min. of coal degradation are described. (1) The sample is placed in a liquid of *d* 1.3, and the float is removed, dried, weighed, and incinerated. The *d* of the liquid is then raised in stages to 1.35, 1.4, 1.5, 1.6, and 1.8, the above procedure being repeated at each stage. (2) A series of liquids of increasing *d* is employed for a corresponding no. of samples. Results obtained by the two methods are compared.

R. B. C.

**Heavy-hydrogen content of coals.** B. G. ŠIMEK and A. STADLER (Mitt. Kohlenforsch. Inst. Prag, 1935, 2, 317—318).—Samples of anthracite and brown coal were dried and burned in air, and the H<sub>2</sub>O condensed from the flue gases was examined for D<sub>2</sub>O. Since the % D<sub>2</sub>O present was about the same as that in tap-H<sub>2</sub>O it was concluded that D is not present in coal.

R. B. C.

**Theory of coal washing.** V. SPÉE (Chem. Eng. Cong. World Power Conf., 1936, C1, 29 pp.).—A theory is developed based on the assumption that the behaviour of a particle of coal or shale in a bed of coal in a coal-washing apparatus is similar to that of a sphere in a narrow tube. Results of tests with spheres of different *d* in rising currents of air or H<sub>2</sub>O in inclined tubes are recorded. The results of tests made in a laboratory jig support the theory.

A. B. M.

**Action of solvents on coal.** R. S. ASBURY (Ind. Eng. Chem., 1936, 28, 687—690).—Soxhlet-extraction

studies of coal have been made with NH<sub>2</sub>Ph, tetralin, and PhOH at different temp. Polar liquids appear to have the greater solvent action. Chemical separations and microscopical examination of the extracts were made, besides elementary analyses of all products and mol.-wt. determinations. It is concluded that coal may be regarded as essentially a polymericide of relatively small units.

D. M. M.

**Swelling of gas and coking coals.** H. CASSAN (Chaleur et Ind., 1935, 16, 495—508; J. Usines à Gaz, 1936, 60, 145—157).—A description is given of the "C.G.C.F." (Comp. Gén. de Construction de Fours) apparatus for determining the swelling of coal and the method of conducting tests with it. The changes in vol. of a cylindrical specimen of coal are automatically plotted against time when heat is applied at a steady rate. The sample, ground and moulded under pressure, is placed in a vertical, cylindrical quartz tube within an electric furnace so adjusted that the temp. can be raised at a rate of 1°, 2°, 5°, or 10°/min. A thermocouple is inserted through the lower end of the tube. The movement of a grooved quartz piston resting on the specimen is transmitted by means of a system of levers to the pen of a recording drum. Curves, relating % increase in vol. with temp., obtained with a variety of coals are discussed. For any given coking coal an increase in rate of heating usually led to an increase in its degree of swelling. The swelling of a mixture of two or three coals could not be predicted from a knowledge of the swelling properties of the components. The fusion of coals was studied in the same apparatus. Commencement of fusion was indicated by a reduction in vol. followed by an increase and a second subsequent decrease. Fusion and swelling occurred at the same temp., the second reduction in vol. in the fusion experiments corresponding with max. swelling. An appendix describes the Woodall-Duckham method for determining swelling power.

R. B. C.

**Relation of extract to residue in a bituminous coal.** B. S. BIGGS (J. Amer. Chem. Soc., 1936, 58, 1020—1024).—The humic acids prepared from the Et<sub>2</sub>O-sol. (*A*) and -insol. (*B*) fractions of the C<sub>6</sub>H<sub>6</sub> extract (*B*, 1936, 481) and from the residue (*R*) after such extraction, by oxidation with *N*-HNO<sub>3</sub> (method: Juettner *et al.*, *B*, 1936, 225), are all similar; minor differences are noted. Mild catalytic reduction of *R* at 350° gives  $\psi$ -bitumens indistinguishable from those extractable from the original coal, whilst repeated hydrogenation of *R* affords oils of high b.p. resembling those similarly obtained (*loc. cit.*) from *A* and *B*. The coal appears to consist of aggregates of fundamental units (with an average mol. wt. of about 300) held together by some relatively weak type of linking. Differences in *A*, *B*, and *R* are ascribed to the varying degree of association.

H. B.

**Colloidal solutions of coal.** J. M. PERTIERRA (Anal. Fis. Quím., 1935, 33, 500—510).—Mixtures of 25% and 50% solutions of PhOH in tetrahydronaphthalene (*I*) with a powdered coking coal has an apparent *d* which increases for 28—30 days while the liquid penetrates the capillaries, followed by a decrease in *d* due to swelling of the coal gel. The residue of



Asturias coal, after extraction with  $C_6H_6$ , oxidised with  $KMnO_4$  gives 40.7% of benzenecarboxylic acids (II). The solution of the coal in  $PhOH$ -(I) heated for 2 hr. at 385–390° in  $H_2$  under pressure, flocculated by  $Et_2O$  or  $AcOH$ , and oxidised ( $KMnO_4$ ) gives 45.8% of (II), compared with 86.7% found by Bone *et al.* (B., 1930, 846) for Durham coal heated without employing  $H_2$ .

F. R. G.

**Dependence of gas liberation on the petrographic constitution and degree of coalification of Ruhr coals.** E. HOFFMANN (Glückauf, 1936, 71, 997–1005).—Experiments show that gas liberation from Ruhr coals depends on their petrographic constitution and degree of coalification.  $CH_4$  liberation from boreholes begins, in general, in the gas-flame coal group, the dull coal in this group and others up to the medium-fat coal group yielding considerably more  $CH_4$  than the bright coal. In the range of coals from the medium-fat coals to the lean coals, in which the total amount of gas decreases, bright coal produces more  $CH_4$  than does dull coal. Cellular fusain gives little or no gas. It is concluded that not all the gas is present in the free state in the coal pores.

R. B. C.

**Underground gasification of coals.** P. A. CHEKIN, A. I. SEMENOV, and J. S. GALINKER (Chem. Eng. Cong. World Power Conf., 1936, E12, 16 pp.).—Gasification of crushed coal in “chambers” underground was difficult of control. Gasification of the virgin coal by the “stream” method, using a blast gas containing 27–35% of  $O_2$ , has proved successful and the Gorlovka mine has been operated on this system since Aug., 1935, yielding a gas of composition  $CO_2$  18,  $CO$  15,  $H_2$  49,  $CH_4$  4, and  $N_2$  14%. By periodically interrupting the blow and drawing off the gas it was possible to obtain a gas of high  $H_2$  content. The regenerative method, *i.e.*, use of alternate blasts of air (preferably enriched) and steam, has also been used successfully. It is proposed to utilise the gases obtained for steam-raising, chemical synthesis, obtaining sponge Fe, for combustion in gas turbines, etc.

A. B. M.

**Laboratory studies of the inflammability of coal dust. Effect of fineness of coal and inert dusts on the inflammability.** A. L. GODBERT and H. P. GREENWALD (U.S. Bur. Mines, 1935, Bull. 389, 29 pp.; cf. B., 1934, 913).—A laboratory method has been devised which allows tests of the inflammability (I) of coal dusts to be correlated with large-scale tests of explosibility (E) in the experimental mine. I and E are defined as the total incombustible material needed to prevent inflammation of coal dust in a laboratory apparatus or propagation of flame through the dust under specified conditions in experimental mine tests. The effect of fineness of coal and inert dusts on I is studied, graphs being constructed and mathematical formulæ deduced. British and American coals were compared and different curves obtained when % incombustible matter in the limiting mixture is plotted against volatile matter. Sp. surface and fineness figure of coal and inert dusts are related to its I, and formulæ are developed for calculating I, these being verified by experiment. Application of the formulæ to large-scale tests is considered as far as data are available,

and also the use of the laboratory method for samples of dusts from commercial mines.

D. M. M.

**Correlation between coal analysis and semi-scale and industrial carbonisation.** S. QVARFÖRT (Chem. Eng. Cong. World Power Conf., 1936, E11, 27 pp.; cf. B., 1926, 1001).—On the basis of carbonisations carried out at 1190–1220° in an experimental retort of 110–155 kg. capacity, curves have been constructed showing the relation between (a) the volatile matter content of the coal and the gas, tar, and coke yields, the calorific val. of the gas, and the benzol yield, (b) the S content of the coal and the S in the coke and  $H_2S$  in the gas, (c) the O content of the coal and the liquor yield, and  $CO_2$ ,  $CO$ , and  $O_2$  in the gas, and (d) the H content of the coal and the  $H_2$ ,  $CH_4$ , and heavy hydrocarbons in the gas. The factors necessary to convert the semi-scale results into industrial practice have also been determined by comparative experiments.

A. B. M.

**Plant experiments with the Bureau of Mines—American Gas Association carbonisation retort.** A. C. FIELDNER and J. D. DAVIS (Chem. Eng. Cong. World Power Conf., 1936, E13, 40 pp.).—The B.M.—A.G.A. test consists in carbonising the coal in an electrically-heated, cylindrical Fe retort of 75–90 or 180–200 lb. capacity, provision being made for the collection and examination of the products (cf. B., 1931, 6). Carbonisation is effected at 500–1100°. The results obtained with a high-volatile (Pittsburgh) coal (I), a low-volatile (Pocahontas) coal (II), and blends of these, are recorded. The yields of coke and gas, by wt., from the blends agreed with those calc. from the simple-mixture law; the yields of tar, however, were < the calc. vals. Addition of (II) to (I) up to 40% improved the physical quality of the coke.

A. B. M.

**Products obtained by carbonisation of Scottish cannel in continuous vertical retorts.** J. JAMIESON and J. G. KING (Inst. Gas Eng., Comm. 135, 1936, 70 pp.).—Tests have been carried out in a setting of four Woodall-Duckham retorts with a throughput of 8–9 tons per retort per day. The cannel coal used gave, on analysis,  $H_2O$  2.3–5.1, volatile matter 39.3–49.1, fixed C 44.4–50.0, ash 3.9–5.9%. Owing to its weak caking power sized material had to be used to produce lump fuel. The yield of graded coke was about 7.2 cwt./ton; it was strong, readily combustible, and suitable for closed stoves or the open domestic grate. The yield of gas was high, *e.g.*, 120 therms per ton when using 30% of steam and producing a gas of 480 B.Th.U./cu. ft. By stripping the gas a yield of 46 gals. of crude spirit per ton was obtained; the refined spirit had an  $C_8H_{18}$  no. of 70. The tar yield was 40–50 gals./ton. The tar was amenable to hydrogenation by the vapour-phase process, 100 gals. giving either 105 gals. of motor spirit and 57 lb. of wax, or 36 gals. of spirit, 67 gals. of Diesel oil, and 57 lb. of wax, according to the operating conditions. If the tar could be sold for hydrogenation purposes the estimated cost of production of the gas could be as low as 0.5d. per therm.

A. B. M.

**Carbonisation of coal-oil mixtures.** D. BROWNLEE (Ind. Eng. Chem., 1936, 28, 629–635).—A no. of processes for the carbonisation of coal-oil mixtures at



different temp. and pressure are reviewed and data concerning the working conditions quoted, but in no case are reliable working results available. D. M. M.

**Low-temperature carbonisation of coal.** F. MÜLLER (Chem. Eng. Cong. World Power Conf., 1936, E7, 20 pp.).—Careful selection of the coal is emphasised. The requirements of a satisfactory process are discussed and various processes examined from this viewpoint. The outlets for tar and semi-coke are discussed. J. W.

**Low-temperature carbonisation.** ANON. (Ind. Chem., 1936, 12, 227—234, 283—291).—An illustrated description is given of the Cannock process at the Tipton works of the National Coke & Oil Co., Ltd., in which a 50% mixture of coal and coal oil is carbonised in revolving, externally heated, horizontal retorts yielding, after fractionation, motor spirit, Diesel and coal oil, gas, pitch, and coke. Briquettes are made from the last two. Oil fractions are suitable for cracking by the Dubbs process. D. K. M.

**Recent development of the low-temperature carbonisation industry in Japan.** Y. BAN (Chem. Eng. Cong. World Power Conf., 1936, E10, 11 pp.).—Development has been impeded because semi-coke could not compete with charcoal as a household fuel. It is now hoped to use it to produce a gas useful for chemical syntheses. J. W.

**Distillation tests [on coal].** B. G. ŠIMEK, F. COUFALÍK, and Z. BERÁNEK (Mitt. Kohlenforsch. Inst. Prag, 1935, 2, 3—17).—An assay apparatus similar in principle to that of Fischer, but embodying various improvements, is described. R. B. C.

**Dry distillation of wood and its thermal balance sheet.** K. KIETAIBL (Chem. Eng. Cong. World Power Conf., E3, 1936, 7 pp.).—By comparison of the observed thermal balance with that calc. on the basis of Klason's equation it is concluded that the exothermic heat of carbonisation is evolved, not during the primary decomp. of the wood, but in the subsequent tar-cracking reactions. The carbonisation of wood in externally- and internally-heated retorts, its gasification in generators with recovery of by-products, and its combustion are briefly discussed from the viewpoint of heat requirements and heat distribution. A. B. M.

**Determination of the specific heats of by-products from coke ovens and gasworks.** W. SCHAIRER (Glückauf, 1936, 72, 454—456).—To facilitate calculation of thermal balances, the sp. heats of crude tar and its fractions, benzol wash-oil before and after debenzolisation, crude and refined gas liquor, motor benzol, solvent naphtha, etc. have been determined. R. B. C.

**Simplified methods of combustion calculations.** H. KAY (J. Inst. Fuel, 1936, 9, 312—322).—The construction and use of Rosin and Fehling's heat content-temp. (*It*) and related diagrams are explained and illustrated by application to typical problems. A. B. M.

**Problems of the coke-oven industry.** G. E. FOXWELL (Fuel Econ., 1936, 11, 298—300, 313, 336—337).—A more general chemical utilisation of coal as a raw material is advocated as a method of increasing the demand for coal. H. C. M.

**Methods for the works supervision of the reactivity of coke.** G. SPECKHARDT (Glückauf, 1936, 72, 225—231).—The Hoesch-Köln Neuessen A.-G., Dortmund, method for determining the reactivity (*R*) of coke with min. coke consumption is described. Experiments were conducted with coke in a shaft furnace lined with refractory and provided at its base with a tipping, divided grate permitting easy emptying. Air was supplied through a pipe in the ash pit.  $H_2O$ -cooled tubes inserted at intervals of 15 cm. one above the other in the shaft served for measuring temp. and taking gas samples. The results are presented by means of 3-dimensional diagrams showing temp. and % CO at each measuring point as functions of time. The distance of the point in the shaft at which  $O_2$  was entirely consumed and CO first appeared was a measure of *R*, which depends on the nature of the coke surface, the surface area per unit wt. of coke exposed, the gas velocity, and the temp. The "practical" *R*, taken as a measure of the suitability of coke for practical use, is the quantity of C converted into CO per unit vol. of coke under sp. conditions of temp., air supply, and time. Data are given showing the influence of coke size on the "practical" *R*. The quantity of C converted per unit surface area of coke depends on temp. only up to 1000°. Having once determined the "practical" *R* of a standard coke that of any other may be calc. mathematically provided the heaped wt., average lump size, and apparent *d* are known. By insertion of suitable vals. in Wolf's formula for breeze formation the changes in *R* occurring in the blast furnace can be determined. In this way the practical suitability of coke can be checked continuously because no special *R* tests are required. R. B. C.

**Reactivity of metallurgical coke.** L. RODRÍGUEZ PIRE (Anal. Fís. Quím., 1935, 33, 474—491).—Coke from Asturias coal reduces  $CO_2$  more rapidly and has a higher energy of activation than coke from coal originating in S. Wales, N.-E. England, or the Ruhr. Vegetable charcoal is more reactive than coke. The amount of macroporosity is determined for each sample by impregnation with paraffin wax. F. R. G.

**Technique of hydrogenation of coal and its products.** J. G. KING (J. Inst. Fuel, 1936, 9, 323—333).—The effects of varying the experimental conditions on the results of the hydrogenation-cracking of coal, low-temp. tar, etc. are discussed. An increase of pressure, at const. temp. and const. reaction time, results at first in an increase in the % conversion into motor spirit; above a certain pressure, however, there is little further effect. Increased pressure also lengthens the life of the catalyst. A rise of temp. accelerates both the hydrogenation and the cracking reactions in the vapour-phase hydrogenation of low-temp. tar and also increases the rate of deterioration of the catalyst ( $MoS_2$ ); the operating conditions must therefore be so chosen as to give the best compromise. The optimum temp. is, in general, higher the higher is the pressure. The rate of hydrogenation is in all cases accelerated by the addition of a suitable catalyst. The yield of motor spirit from low-temp. tar increases with increase of the  $H_2$ :tar ratio up to a mol. ratio of 30:1 (taking the



mol. wt. of tar as 250); an increase above this ratio has little effect. Increased time of contact increases the conversion, but, of course, diminishes the throughput of a given plant, so that here again a compromise has to be effected to obtain max. efficiency. The technical application of these considerations to commercial practice is discussed, and illustrated by reference to the operation of an intermediate-scale plant at the Fuel Research Station. A. B. M.

**Comparison of hydrogenation processes.** H. WINTER and G. FREE (Glückauf, 1936, 72, 256—259).—Pressure-hydrogenation (420°; 200 atm.) of electrically conducting wood charcoal or conducting artist's charcoal in presence of a Ni or  $\text{MoO}_3$ -S catalyst yielded a reaction gas containing 10—15% of  $\text{CH}_4$  or  $\text{C}_2\text{H}_6$ , but no liquid products. When  $\text{C}_{10}\text{H}_8$  was added to the charcoal, liquid products, attributed to partial conversion of  $\text{C}_{10}\text{H}_8$  into  $\text{C}_{10}\text{H}_{12}$ , were obtained. The continuous and intermittent hydrogenation of a primary bituminous tar was studied. In the first case tar was pumped through a Hiag horizontal-tube furnace filled with a Mo catalyst (450°; 200 atm.), the gas being circulated with continuous addition of  $\text{H}_2$ . Intermittent hydrogenation was carried out in an autoclave without a catalyst (428°; 220 atm.). Comparison of the reaction gases, which in the continuous process had a much lower hydrocarbon content, indicated that hydrogenation in the autoclave was accompanied by marked cracking of tar. R. B. C.

**Utilisation of the nitrogen and sulphur in bituminous coal.** F. MUHLERT (Chem. Fabr., 1936, 9, 273—281).—Recent developments in  $\text{NH}_3$  and S recovery in gasworks etc. are outlined. A. B. M.

**Gas analysis.** E. DITTRICH (Brennstoff-Chem., 1936, 17, 245—251).—A gas-analysis apparatus of suitable design for most laboratory purposes is described. Precautions to be observed in the determination of paraffins, olefines,  $\text{H}_2$ , and CO are discussed. A. B. M.

**Determination of hydrogen cyanide in coal gas.** E. BOYE (Chem.-Ztg., 1936, 60, 508—509).—2—10 litres of the gas are passed through two wash-bottles containing 10% aq. NaOH at 0°. The solution is then made up to a definite vol., to 20 c.c. of which are added 5 c.c. of saturated aq. picric acid. The mixture is heated at 60° for 15 min. and the colour developed is compared with a series of standards of known KCN content. The method depends on the formation of a salt of isopurpuric acid (cf. A., 1929, 686). A. B. M.

**Wet purification of coke-oven gas.** H. A. J. PIETERS (Chem. Eng. Cong. World Power Conf., 1936, C10, 12 pp.).—The principles of wet purification combining S recovery are discussed, and results obtained in a laboratory investigation of the various washing media that may be used are given. A suspension of active C in dil.  $\text{NH}_3$  completely removed  $\text{H}_2\text{S}$  and oxidised it to S, which accumulated in the pores of the C. The activity of the C was regenerated by washing with aq.  $(\text{NH}_4)_2\text{S}$  and subsequently steaming. The presence of traces of Fe is proved essential for the successful operation of the Thylox process. The use of suspensions in dil.  $\text{NH}_3$  of  $\text{Fe}_2\text{O}_3$  and of Prussian-blue stabilised with

$(\text{NH}_4)_2\text{SO}_4$  is also described. The utilisation of complex Fe cyanides as O carrier was successfully effected on a semi-technical scale. Methods of purifying the crude S recovered are discussed. H. C. M.

**Determination of nitric oxide in coke-oven gas.** J. A. SHAW (Ind. Eng. Chem. [Anal.], 1936, 8, 162—167).—Modified apparatus and technique, using the  $m\text{-C}_6\text{H}_4(\text{NH}_2)_2$  colorimetric method, are described. E. S. H.

**Ageing of oil used in benzol recovery.** G. C. RICO AVELLO (Anal. Fis. Quím., 1935, 33, 713—720).—The increase in  $\eta$  with use of heavy oil employed for washing coke-oven gas is accompanied by reduction in capacity to absorb, and increase in losses of, benzol (I). The amount of (I) recovered is, however, const., so that (I) must be formed from the oil. The  $\eta$  is reduced by addition of  $\text{C}_{10}\text{H}_8$ , but is independent of the presence of S. The increase in  $\eta$  is regarded as due to formation of compounds of high mol. wt. with simultaneous liberation of (I). F. R. G.

**Wash-oil problems.** W. DEMANN and W. BRÖSSE (Tech. Mitt. Krupp, 1936, 4, 9—16).—The causes of thickening of wash oil used for scrubbing  $\text{C}_6\text{H}_6$  from coke-oven gas, and the part played therein by  $\text{H}_2\text{S}$ , have been studied. Thickening appears to be due to a chain of reactions brought about by absorption of  $\text{H}_2\text{S}$  and  $\text{O}_2$  by the wash oil.  $\text{H}_2\text{S}$  is absorbed by the oil at room temp. inside the scrubber (S) with formation of an additive compound; only 14% of the total S absorbed can be determined as  $\text{H}_2\text{S}$  in the oil leaving S. Under certain conditions, not yet investigated, the reaction is reversible.  $\text{O}_2$  dissolved in the oil simultaneously reacts with the  $\text{H}_2\text{S}$ -oil compound, probably inside the heat exchanger, to give free S. At temp.  $> 120^\circ$  mol. condensation, i.e., thickening, takes place as a result of the reaction of S with tar-oil constituents, org. S compounds being formed with liberation of  $\text{H}_2\text{S}$ . R. B. C.

**Bituminous shale in France.** V. CHARRIN (Mat. grasses, 1934, 26, 10,056—10,057, 10,084—10,086; Chem. Zentr., 1935, ii, 463).—The material, and semi-technical-scale coking tests thereon, are described. H. N. R.

**Relations between tar and oil yields on low- and high-temperature carbonisation of bituminous coal.** H. WINTER (Glückauf, 1936, 72, 450—454).—The amount of tar obtained by the low- or high-temp. carbonisation of coal depends on the O content, i.e., the age of the coal, a young coal yielding most tar. The max. yield of primary tar and light oil is obtained by mild heating at 500°. The presence of a free space above the coal promotes thermal decomp. of distillation gases, which becomes more pronounced with temp. rise. In general, an increase in benzol yield is accompanied by a decrease in tar yield. R. B. C.

**Production of dense (cavity-free) asphalt and bitumen mixtures.** G. ROTHFUCHS (Bitumen, 1935, 5, 57—61; Chem. Zentr., 1935, ii, 161).—The influence of variations in the nature of the "metal" chips employed is discussed. H. N. R.

**Determination of the proportion of bitumen and tar in mixtures of the two.** A. B. C. LICENCE



(Chem. & Ind., 1936, 487—488).—Qual. (a) and quant. colour methods (b) are described. In (a) a small quantity of material to be tested is placed on a filter-paper and two drops of pure  $C_6H_6$  are added. The colours produced (affected by evaporation) are compared with those given by known mixtures. In (b), after dissolution in  $C_6H_6$  and drying (2 hr. at 110—115°; 4 hr. at 140°), 0.5 g. of material is melted to a thin film in a metal dish (diam. 1—1½ in., depth ¼—½ in.) and refluxed 3 times in a 150-ml. wide-necked flask with 30 ml. of light petroleum (b.p. 60—80°; free from aromatic hydrocarbons). The extracts and washings are made up to 200 ml., shaken, and, after settling, the colour of the supernatant liquid is compared with that of standards.

J. W.

**Physical properties of coal tars. Influence of tar- and solvent-insoluble constituents.** E. W. VOLKMAN, E. O. RHODES, and L. T. WORK (Ind. Eng. Chem., 1936, 28, 721—734).—Comparative tests were carried out on a no. of tars, including continuous-vertical, horizontal-retort, and coke-oven tars, in an attempt to correlate the properties tested to suitability of the tar for any special purpose. The properties considered were: the amount and character of the suspended material (*S*), solvent-insol. material,  $\eta$  index,  $\gamma$ , adhesion to aggregates, and *d*. New methods had to be devised for some of these. Results showed that the *d* is of primary importance, but since *S* has a significant influence on *d*,  $\gamma$  and adhesive properties which are not affected by *S* appear to be more closely related to the *d* of tars from which *S* has been removed.

D. M. M.

**Rheological properties of asphaltic bitumens.** J. P. PFEIFFER and P. M. VAN DOORMAAL (J. Inst. Petroleum Tech., 1936, 22, 414—440).—Asphaltic bitumens are classified into three groups according to the temp.-susceptibility (*S*), which is represented by an index figure (—5 to 10) obtained from a nomogram relating penetration with ring-and-ball softening point. *S* decreases as the index rises. It is concluded also that the differences in index between bitumens of different types are probably attributable to the differences in the extent to which they deviate from purely viscous flow, i.e., the index indicates the degree of peptisation of the asphaltenes. The asphaltic bitumens with a high index are considered as mixed isogels, and display typical gel properties. The lower is the index of the product, the less is the coherence between the asphaltenes forming the skeleton structure. Truly viscous bitumens, e.g., of the coal-tar pitch type, do not exhibit gel properties.

C. C.

**Change of penetration with temperature of various asphalts.** I. BENCOWITZ and E. S. BOE (Ind. Eng. Chem. [Anal.], 1936, 8, 157—162).—With 13 kinds of asphalt the variation of penetration *p* with temp. *t* can be expressed by  $p = A + B + C^t$ , where *A*, *B*, and *C* are consts.

E. S. H.

**Significance of the thermal conductivity of bitumen.** E. GRAEFE (Bitumen, 1935, 5, 54—57; Chem. Zentr., 1935, ii, 161).—Owing to its low thermal conductivity bitumen is best mixed with quartz powder when used for making electrical insulators. This low

conductivity is favourable for road-making since it hinders ice formation.

H. N. R.

**Modified accelerated weathering test for asphalts and other materials.** O. G. STRIETER and H. R. SNOKE (J. Res. Nat. Bur. Stand., 1936, 16, 481—485; cf. B., 1930, 1137).—The accelerated weathering cycle for asphalts described previously is modified to an exposure to arc light, dipping in  $H_2O$ , and examination of the  $H_2O$  for sol. org. compounds. The latter, obtained only after this exposure to light and  $O_2$ , contain  $CO_2H$  and  $CO$  groups. Cotton, rubber, and wool, treated similarly, give similar acid products, which, in the case of cotton and rubber, also reduce Fehling's solution. Possible applications of the method, especially with respect to the function and effectiveness of antioxidants, are discussed.

J. W. S.

**Modern cracking process.** G. EGLOFF and E. F. NELSON (Chem. Eng. Cong. World Power Conf., 1936, C13, 48 pp.).—The results of various commercial cracking operations on stocks of different origin, the reforming of gasoline, polymerisation of cracked gases, etc. are discussed. The design of cracking plant is affected by the physical properties of petroleum fractions, e.g., sp. heat, latent heat, vapour vol., crit. pressure and temp., and rates of decomp. From general correlations between these and other physical properties and rates of reaction it is possible to predict roughly the size of equipment required in the reaction zone, the conditions under which the plant should operate, and the yields of the various products. The properties of the materials used in cracking plants are described and the economic significance of the cracking process is discussed.

C. C.

**Automatically-controlled method for the micro-analytical separation of low-boiling hydrocarbons by desorption.** A. EUCKEN and H. KNICK (Brennstoff-Chem., 1936, 17, 241—244).—The gas is adsorbed on active C contained in one arm of a U-tube cooled to —103° (liquid  $C_2H_4$ ). A clockwork device slowly raises the U-tube into an electrically-heated furnace at 250°. The gases evolved are continuously withdrawn from the other arm of the U-tube by means of a Hg-vapour pump and delivered to a collecting vessel. The pressures (*p* and *P*) in the U-tube and the collecting vessel, respectively, are recorded as functions of the time. The gases are desorbed successively, the end of the desorption of each constituent being indicated by a min. val. of *p*; the proportions of the constituents are determined from the corresponding vals. of *P*. The method has been applied successfully to the separation of mixtures of  $CH_4$ ,  $C_2H_4$ ,  $C_2H_6$ , and  $C_3H_8$ .

A. B. M.

**Isolation of acenaphthylene and pyrene from products of pyrolysis of natural gas.** A. W. CAMPBELL, N. H. CROMWELL, and J. J. HAGER (J. Amer. Chem. Soc., 1936, 58, 1051—1052).—Acenaphthylene (I) is isolated by sublimation of the waxy material (*A*) formed during the manufacture of C black by the thermatomic process (cf. Moore, B., 1932, 327). Distillation of *A* gives fractions, b.p. 149—200°/20 mm. and 200—260°/20 mm., from which a *polymeride*, m.p. 345—350° (corr.), of (I) and pyrene, respectively, are isolable.

H. B.



**Desulphurisation of hydrocarbons with carbon monoxide.** B. V. MALISHEV (J. Inst. Petroleum Tech., 1936, 22, 341—346).—The S content of a solution of thiophen (I) in PhMe was reduced from 0.85% to 0.05% by treatment for 4 hr. with CO with an initial pressure of 1000 lb. in a closed autoclave at 300°, using  $\text{MoS}_3$  as catalyst.  $\text{MoS}_3$  was more effective than Ni, NiS, Cu, Te, Pd, or CoS. Under the same conditions in a pressure distillate, b.p. 175—200°, containing tetramethylthiophen, S was reduced from 0.95% to 0.27%. Completely dry  $\text{MoS}_3$  was less effective, probably because traces of  $\text{H}_2\text{O}$  (or  $\text{H}_2\text{S}$ ) activate the CO. Vapour-phase treatment of (I) in PhMe with CO at 300°/1 atm., using  $\text{MoS}_3$ , reduced S from 0.60 to 0.32%. C. C.

**Gasoline and alcohol-gasoline blends.** L. T. BROWN and L. M. CHRISTENSEN (Ind. Eng. Chem., 1936, 28, 650—652).—Comparative studies have been carried out on the influence of air/fuel ratio, engine speed, and throttle opening on the relative power output, sp. fuel consumption, and CO production of two fuels, one a 65—66  $\text{C}_8\text{H}_{18}$  gasoline, and the other a blend of 10vol.-% anhyd. EtOH denatured with 1% of aviation gasoline. Results showed that the same carburettor setting was optimum for both, and that the blend was preferable at low speed and part throttle. D. M. M.

**Use of heavy fuel oil.** H. KÄHR (Petroleum, 1936, 32, No. 26, 1—4).—The modifications in operation required for burning heavy fuel oil in place of fuel oil of the gas-oil type are described. C. C.

**Motor fuels. Effect of sulphur compounds on lead response.** S. F. BIRCH and R. STANSFIELD (Ind. Eng. Chem., 1936, 28, 668—672).—A synthetic cracked gasoline was prepared and tested for response to additions of  $\text{PbEt}_4$  (I) both alone and after addition of 0.1% of S in various forms. Results are shown in both tabular and graphic forms and confirm that low response to (I) may be due to S compounds. D. M. M.

**Separation of benzene, benzol, etc. from effluents by means of active carbon.** H. WINKELMANN (Apparatebau, 1935, 47, 69—70; Chem. Zentr., 1935, ii, 414).—Treatment of 80 cu. m. of residual  $\text{H}_2\text{O}$  (1.2 kg. of benzene etc. per cu. m.) with 280 kg. of active C yielded 100 kg. of product, 95% of which had b.p. < 100°. H. J. E.

**Modern tests on fuels for high-speed Diesel engines.** A. HAGEMANN and T. HAMMERICH (Öel u. Kohle, 1936, 12, 499—500).—The "filtration index" at any desired temp. is obtained by comparing the time of flow of the oil through a 0.1-mm. mesh gauze in a special apparatus with the time of flow through the same apparatus without the gauze. The corrosion of Cu and Zn is examined by immersing strips of these metals in the oil at 50°. The tendency to form coke is shown by determining the hard asphalt and insol. residue formed on heating the oil at 150° for 2 hr. in a stainless-steel bomb with air at 20 atm. The conditions for determining knock-rating (cetene no.) on the army Diesel test-engine are briefly outlined. C. C.

**High-speed motion pictures of engine flames.** G. M. RASSWEILER and L. WITHROW (Ind. Eng. Chem.,

1936, 28, 672—677).—By means of a special engine fitted with a quartz window in the top of the cylinder block and a specially designed camera (described), moving pictures at the rate of 5000 per sec. or 30 for a single explosion were taken of the flame propagation in the engine cylinder. At the same time a pressure-time curve of the explosion was recorded. A sample set of pictures is included. D. M. M.

**Combustion of motor fuels.** W. A. OSTWALD (Öel u. Kohle, 1936, 12, 135—138).—A discussion. D. R. H.

**Fractionation of heavy oils by means of solutions of gases.** S. PILAT (Chem. Eng. Cong. World Power Conf., 1936, C11, 5 pp.).—Lubricating oil stocks are fractionated (without distillation) by dissolving in light hydrocarbons, e.g.,  $\text{C}_3\text{H}_8$ , and forcing natural gas into the solution. By progressively increasing the gas pressure, a series of oil fractions, gradually becoming lighter, are separated. C. C.

**Use of liquid propane in dewaxing, deasphalting, and refining heavy oils.** R. E. WILSON, P. C. KEITH, JUN., and R. E. HAYLETT (Chem. Eng. Cong. World Power Conf., 1936, F8, 38 pp.).—The theoretical and practical aspects of the use of liquid  $\text{C}_3\text{H}_8$  for removing asphalt, wax, and undesirable constituents, in the production of lubricating oils, are discussed, together with the commercial application of the process in several plants. C. C.

**Recent developments which have increased the flexibility of the phenol process for treatment of lubricating oils.** R. K. STRATFORD (Chem. Eng. Cong. World Power Conf., 1936, F1, 22 pp.).—Phenols can be removed from phenolic  $\text{H}_2\text{O}$  by scrubbing the vapours of the latter with hot oil going to the phenol plant. Emulsion difficulties are overcome by washing the NaOH-neutralised oil with  $\text{H}_2\text{O}$  before treating with phenol. Special precautions to overcome corrosion troubles are described. The normal 7-stage counter-current treater can be advantageously replaced by centrifuges or simple countercurrent towers. Best results are obtained by dewaxing before phenol treatment. Two treated distillates may be simultaneously taken off the same treater. An increased yield of high  $\eta$ -index oil can be obtained by adding  $\text{H}_2\text{O}$  to the extract and raising the temp. of treatment. Mixtures of cresol and PhOH can be used satisfactorily for treating oils of high  $\eta$  index in place of PhOH without altering the yield or  $\eta$  index of the treated oil. C. C.

**Chemical-engineering design of solvent-extraction units for refining lubricating oil.** T. G. HUNTER and A. W. NASH (Chem. Eng. Cong. World Power Conf., 1936, C18, 27pp.).—Triangular equilibrium diagrams are employed as a basis of computation in hydrocarbon-solvent systems in conjunction with graphical methods. The efficiency of various contacting equipment is discussed. C. C.

**Distillation curves of lubricating oils.** C. WALTHER (Öel u. Kohle, 1936, 12, 553—555).—It is considered that a pressure of 40 mm. Hg (as specified by the U.S. Bureau of Mines) is too high for distilling lubricating oil fractions. A laboratory apparatus is described which enables the



distillation curve to be obtained under a pressure of 10 mm. B.p. at one pressure are converted into b.p. at other pressures by means of the Beale-Docksey diagram (B., 1936, 51). C. C.

**Viscosities of lubricating oils at low temperatures.** III, IV. Y. TANAKA, R. KOBAYASHI, T. TSUKUDA, and T. ÔNO (J. Soc. Chem. Ind., Japan, 1936, 39, 172—179 B; cf. B., 1936, 627).—The  $\eta$  of numerous lubricating oils at temp. down to  $-35^\circ$  agree fairly well with the empirical formula  $\epsilon = e^c(T-b)^n$ , where  $c$ ,  $b$ , and  $n$  are consts. and  $\epsilon$  is the ratio between the  $\eta$  at  $T$  and at  $303^\circ$  abs. C. R. H.

**Relation between the properties of lubricating oil and its chemical structure.** H. I. WATERMAN and J. J. LEENDERTSE (Chem. Eng. Cong. World Power Conf., 1936, F5, 11 pp.).—The composition of a lubricating oil, e.g., the proportion of aromatic and naphthene rings and paraffinic side-chains, can be approx. deduced from determinations of mol. wt.,  $n$ ,  $d$ , and  $\text{NH}_2\text{Ph}$  point, making use of the mol. refraction. Correlation of the chemical nature of lubricating oils and their behaviour in practice may give useful results. C. C.

**Laboratory method for determination of the vaporisability of lubricating oils for internal-combustion engines.** K. NOACK (Angew. Chem., 1936, 49, 385—388).—65 g. of oil are electrically heated for 1 hr. at  $250^\circ$  under a pressure of 20 mm.  $\text{H}_2\text{O}$  in a weighed metal crucible and the loss in wt. is determined. Duplication to  $\pm 0.5\%$  is claimed. J. W.

**Rotary filters. Fractional-distillation columns.**—See I.  $\text{H}_2$  from water-gas.—See VII. Ni alloys [for petroleum plant].—See X. Paraffin for candle-making.—See XII. Varnish etc. diluents. Bituminous plastics.—See XIII. Clarifying coal wash  $\text{H}_2\text{O}$ .—See XVII.

See also A., July, 801, Ignition of  $\text{CH}_4$ -,  $\text{C}_2\text{H}_6$ -, and  $\text{C}_3\text{H}_8$ -air mixtures. 819, High-temp. pyrolysis of gaseous olefines.

#### PATENTS.

**Preventing oxidation and other losses in coals and the like, and more especially in bituminous coals.** F. S. WOLDICH (B.P. 448,299, 31.5.35. Fr., 31.5.34).—All operations liable to cause the loss of volatile constituents from the coal are carried out in a current of inert gas, e.g., waste combustion gases, from which the volatile substances are recovered by oil scrubbing or adsorption on active C. The coal is also treated, e.g., by spraying, with tar acids which form a protective coating on the particles and thereby prevent oxidation. A. B. M.

**Cleaning of coal.** J. H. DICKERSON (U.S.P. 2,022,588, 26.11.35. Appl., 1.9.33).—Modifications of a pneumatic coal separator designed to have an improved feed arrangement, and a free passageway for refuse along the deck below the feeder and to give the coal better prep. for cleaning, are claimed. D. M. M.

**Coke ovens and the like.** KOPPERS CO. of DELAWARE, ASSEES. of J. BECKER (B.P. 448,282, 4.2.35. U.S., 19.1.35).—The flues ( $F$ ) in the heating walls of a coking retort oven are connected together in groups by horizontal passages ( $P$ ) over the tops of the flues. Cross-

over ducts opening into the  $P$  connect corresponding groups of flues in adjacent heating walls. Means are provided for controlling the inflow of combustible media through the air and gas inlet ports of each flue, independently of the other flues of the group. The cross-over ducts are throughout of greater cross-section than the aggregate of the inlet ports of the individual flues of each group. Pressure differences between the flues and the coking chambers are thereby reduced. A. B. M.

**Coking retort oven.** J. VAN ACKEREN, ASSR. to KOPPERS CO. of DELAWARE (U.S.P. 2,020,919, 12.11.35. Appl., 10.6.32).—A coke-oven battery is provided with expansion units designed to prevent leakage or counterflow between combustible media and waste gases. D. M. M.

**Destructive distillation of carbonaceous material.** L. C. KARRICK (U.S.P. 2,011,054, 13.8.35. Appl., 23.6.28).—Coal is carbonised in internally-heated, vertical, cylindrical retorts ( $R$ ), coned at the top and bottom. The coal is freed from dust and charged into  $R$  with the largest particles at the bottom and the smallest at the top. The charge is preheated by passing a heated gas up through it, is then carbonised by passing a gaseous heating medium (steam and/or gas) at a higher temp. downwardly through it, and is finally cooled by means of a downward current of cold inert gas. The gas so heated is used to preheat the fresh charge in another  $R$ . The volatile products evolved in the carbonising period are recovered in suitable condensing and scrubbing plant. A. B. M.

**Distillation and carbonisation of mixtures of oil with coal or similar carbonaceous material.** H. P. STEPHENSON (B.P. 448,028—9, 29.8.34).—(A) A mixture of finely-ground coal and oil, preheated to  $100$ — $325^\circ$ , is coked in an externally-heated stationary retort ( $R$ ) at  $450$ — $650^\circ$ . The gases and vapours evolved from the preheater and  $R$  are passed to a fractionating column ( $C$ ), the condensate from which is returned to the mixing apparatus. The vapours leaving  $C$  are condensed, first in a  $\text{H}_2\text{O}$ -cooled condenser and then in a refrigerator at about  $-40^\circ$ . The uncondensed vapours and gases are passed through scrubbers to an exhaustor which maintains a negative pressure of  $\leq 6$  in.  $\text{H}_2\text{O}$  throughout the system. If desired, the vapours leaving  $R$  may be passed through a catalysing tube before entering  $C$ . (B) The unsaturated compounds in the residual gases and vapours are recovered by treating them with halogens and/or  $\text{H}_2\text{SO}_4$ . A. B. M.

**Production of low-boiling hydrocarbons from products of destructive hydrogenation of coals.** H. E. POTTS. From INTERNAT. HYDROGENATION PATENTS CO., LTD. (B.P. 448,334, 4.12.34).—The liquid products of b.p.  $200$ — $400^\circ$  are treated at elevated temp., e.g.,  $50^\circ$ , with liquefied hydrocarbons, e.g.,  $\text{C}_3\text{H}_8$  or  $\text{C}_4\text{H}_{10}$ . After removal of the dark oil which separates, the refined oil is freed from the solvent and submitted to further destructive hydrogenation under pressure in presence of a catalyst, e.g., Mo or W sulphide. A. B. M.

**Gas-producing apparatus.** R. FALCONER and E. COLLIGNON (U.S.P. 2,021,055, 12.11.35. Appl., 1.12.33. Mex., 10.5.33).—A gas producer for use with solid and liquid fuels is designed to be mounted in an



automotive vehicle and to produce high- and low-grade gas separately, which may then be blended to obtain a suitable mixture. D. M. M.

**Apparatus for production of gaseous mixtures.** R. W. THOMAS, ASSR. to PHILLIPS PETROLEUM CO. (U.S.P. 2,021,271, 19.11.35. Appl., 18.2.30).—A fuel gas, *e.g.*,  $C_4H_{10}$ , is stored in liquid condition and distributed by vaporising and mixing with a base gas to produce fuel gas of desired calorific val. D. M. M.

**Electrically detecting the presence of gas or firedamp in mines and other places.** OLDHAM & SON, LTD., and H. HOLT, JUN. (B.P. 448,646, 8.2.35).—A filament (*F*) is in contact with the atm., and its luminosity is measured by a photoelectric device (*P*) connected to a microammeter, the distance between *F* and *P* being adjustable to set the zero. [Stat. ref.] B. M. V.

**Treatment of asphalt.** C. D. LOWRY, JUN., ASSR. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,997,261, 9.4.35. Appl., 26.5.34).—Oxidation and deterioration of petroleum asphalt is prevented by addition of 0.1–5% of wood-tar pitch. L. C. M.

**Distillation of tars and tarry oils containing tar acids.** H. G. C. FAIRWEATHER. From BARRETT CO. (B.P. 448,109, 27.11.34).—The tar or tar oil, heated to  $> 125^\circ$ , is brought in intimate contact with oil vapours from the tar, which are then freed from tar acids by scrubbing them with hot aq. NaOH, and, after condensation of the excess vapour, are recirculated. The greater part of the tar acids are thereby recovered from the starting material with the production of a relatively small amount of neutral oil distillate. A. B. M.

**Production of [aqueous bituminous] emulsions.** U. B. BRAY and L. B. BECKWITH, ASSRS. to UNION OIL CO. OF CALIFORNIA (U.S.P. 2,022,229, 26.11.35. Appl., 30.3.34).—Melted bitumens are mixed with an aq. solution containing an emulsifier, and the emulsion is cooled to  $< 48^\circ$  and mixed with a small amount of a stabiliser consisting of a protein or carbohydrate. D. M. M.

**Rubber-containing bituminous compositions.** J. LEWIS (B.P. 447,416, 16.11.34).—Comminuted raw or waste rubber is mixed with powdered "Lake asphalt"; a plasticising agent, *e.g.*, rosin or synthetic gum, may be added. The material may be calendered, pressed, moulded, etc., and used for road surfaces, damp courses, etc. D. K. M.

**Plugging of strata in [oil] wells.** H. T. KENNEDY and H. C. LAWTON, ASSRS. to GULF RES. & DEVELOPMENT CORP. (U.S.P. 2,019,908, 5.11.35. Appl., 8.4.35).—A well is sealed from adjacent strata by injecting into the strata an oil solution of a liquid Si or Ti halide and keeping it there until hydrolysed with the production of an insol. deposit. D. M. M.

**Recovery of oil and spirit from shale, coal, and the like.** H. E. GOTTING and J. M. BROWNE (B.P. 448,279, 21.1.35. Austral., 20.1.34. Cf. B.P. 369,305; B., 1932, 536).—The crude shale etc. is distilled in a suitable retort (*R*) under a pressure, generated by the volatile products evolved, of  $< 25$  lb./sq. in. The *R* is

provided with an air-cooled reflux condenser which returns the heavier volatile products to *R* for further cracking. The lighter products pass through a condenser to a receiver, the non-condensable gases passing thence through a pressure-release valve to a scrubber and gasholder. The liquid product has a distillation end-point (Engler, A.S.T.M.) of  $> 232^\circ$ . A. B. M.

**Treating [cracking] of hydrocarbon oils.** W. M. STRATFORD, ASSR. to TEXAS CO. (U.S.P. 2,020,086, 5.11.35. Appl., 15.11.30).—A surge chamber is provided to even out the fluctuations in pressure caused by intermittent introduction of cracked products from the pressure-cracking vessel to the stripping still, thus affording a more even distillation from the latter. D. M. M.

**Treatment of hydrocarbons.** V. IPATIEFF, ASSR. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 2,020,649, 12.11.35. Appl., 3.7.33).—Normally gaseous olefinic hydrocarbons are polymerised by treatment at elevated temp. with such materials as  $H_3PO_4$ ,  $ZnCl_2$ ,  $Al(OH)_3$ ,  $ZnO$ , and the like, with or without an adsorbent earth. D. M. M.

**Polymerisation of olefines.** F. W. SULLIVAN, JUN., ASSR. to STANDARD OIL CO. (U.S.P. 2,022,221, 26.11.35. Appl., 25.11.31).—Hydrocarbon oils are converted into gasoline-like products by cracking in presence of recycled, unsaturated, normally gaseous hydrocarbons which have been freed from tarry products in a separating zone and from  $CH_4$  and  $H_2$  by scrubbing with oil. D. M. M.

**Treatment [refining] of petroleum hydrocarbons.** T. T. GRAY, ASSR. to GRAY PROCESSES CORP. (U.S.P. 2,020,115, 5.11.35. Appl., 23.2.26. Renewed 17.6.31).—Cracked petroleum hydrocarbons are refined by passing them countercurrent to a stream of solid adsorbent in a tower provided with the necessary baffle plates etc. D. M. M.

**Compound catalyst [for petroleum reactions].** D. R. STEVENS and W. A. GRUSE, ASSRS. to GULF REFINING CO. (U.S.P. 1,999,345, 30.4.35. Appl., 3.11.31).—An equimol. mixture of  $AlCl_3$  and cresylic acid is employed in the removal of S and unsaturated compounds from and in the depolymerisation of petroleum. L. C. M.

**Solvent refining of hydrocarbon oil.** L. A. CLARKE, ASSR. to TEXAS CO. (U.S.P. 2,020,290, 12.11.35. Appl., 3.11.33).—Undesired non-paraffinic compounds are removed from hydrocarbon oils by extraction with relatively low-boiling solvent comprising an aliphatic acyl (Ac) derivative of furan. D. M. M.

**Treatment of hydrocarbon oils.** (A) J. C. MORRELL and G. EGLOFF, (B) G. EGLOFF and J. C. MORRELL, ASSRS. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 2,021,739–40, 19.11.35. Appl., 17.7.31).—Hydrocarbon vapours are refined by treatment with an aq. solution containing (A) free HOCl in presence of and excess of solid Zn halide, (B) with an aq. solution containing free oxygenated halogen acid (HOCl,  $HClO_3$ ,  $HBrO_3$ , or  $HIO_3$ ) in amount sufficient to desulphurise the vapours). D. M. M.

**Treatment of hydrocarbon oils.** W. A. SCHULZE and L. V. CHANEY, ASSRS. to PHILLIPS PETROLEUM CO. (U.S.P. 2,020,661, 12.11.35. Appl., 20.6.33).—S is removed from petroleum oils by treatment with an



aq. solution of an alkali or alkaline-earth polysulphide, or mixture of polysulphides, at room temp.

D. M. M.

**Treatment of hydrocarbon oil.** G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,009,108, 23.7.35. Appl., 8.2.33).—The gases and vapours of the gasoline fraction leaving a fractionator from a cracking operation are passed, together with liquid aromatic hydrocarbons, into a vessel containing a catalyst, *e.g.*, a silicious carrier impregnated with  $\text{AlCl}_3$ , in which olefines and aromatics combine to form aralkyl derivatives, *e.g.*,  $\text{PhPr}^3$ , which are rich in anti-knock properties, thereby increasing the stability of the gasoline obtained on condensation.

D. K. M.

**Treatment of [cracked] mineral oil distillates.** A. J. VAN PESKI, Assr. to SHELL DEVELOPMENT Co. (U.S.P. 2,019,772, 5.11.35. Appl., 7.10.32. Holl., 8.10.31).—The distillate is first treated for removal of undesirable compounds by various processes, including lightly polymerising it, the undesired polymerides, catalyst, and diluent, if any, are removed, and the residue is further polymerised, with or without diluent.

D. M. M.

**Sweetening of hydrocarbon oil.** C. F. TEICHMANN, Assr. to TEXAS Co. (U.S.P. 2,011,954, 20.8.35. Appl., 27.1.32).—The oil is treated with a suspension of  $\text{PbS}$  in alkaline solution containing inorg. peroxide, *e.g.*,  $\text{Na}_2\text{O}_2$ , then separated and treated with  $\text{S}$ .

D. K. M.

**Purification of acid-treated light hydrocarbon oil.** F. M. ARCHIBALD and P. JANSSEN, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,022,268, 26.11.35. Appl., 28.8.31).—Acid-treated, light hydrocarbon oils are freed from sulphuric esters by heating at  $80\text{--}150^\circ/30\text{--}70$  lb. per sq. in., and releasing into a second chamber at  $100\text{--}150^\circ/5\text{--}25$  lb. per sq. in., with or without addition of aq.  $\text{NaOH}$  to the latter or of previously separated impurities which act as catalysts.

D. M. M.

**Hydrogenation process of oil refining.** N. J. LOCKHART, Assr. to LATHROP INVESTMENT CORP. (U.S.P. 2,011,109, 13.8.35. Appl., 2.7.32).—Hydrocarbon oil is heated to  $260^\circ$  under pressure and passed through a nozzle into an expansion chamber. The vapours in a coil (*C*) and steam in another coil (*D*) are heated to  $605^\circ$  in the same furnace. The steam is discharged into a vessel (*V*) below the surface of a molten metal, *e.g.*,  $\text{Pb}$ , and  $\text{H}_2$  with steam mixes the vapours, after which they are condensed, yielding gasoline. The molten metal is carried to *V* through jackets on *C* and *D*.

D. K. M.

**Production of olefines from [saturated] gaseous hydrocarbons.** J. G. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 447,470, 15.10.34).—The saturated hydrocarbons, *e.g.*,  $\text{C}_3\text{H}_8$ , are heated at  $750\text{--}1000^\circ$  under vac. with a gas containing (or supplying, *e.g.*,  $\text{NO}_2$ ) free  $\text{O}_2$  so that the  $\text{O}_2$  content is  $10\text{--}45$  vol.-% with reference to the initial hydrocarbons; combination of some hydrocarbons and/or  $\text{H}_2$  supplies heat for the endothermic reaction.

D. K. M.

**Production of oxidised hydrocarbons.** J. HYMAN, Assr. to VELSICOL CORP. (U.S.P. 2,011,053, 13.8.35. Appl., 18.11.33).—Light hydrocarbon oil (90% boiling below  $110^\circ$ ) from vapour-phase cracking is oxidised by

air at  $< 80^\circ$  in presence of a metal soap, *e.g.*, of  $\text{Mn}$ . The oleoresin produced is separated by distillation, preferably under vac. and at  $< 100^\circ$ .

D. K. M.

**Prevention of gum formation in cracked gasoline.** D. W. HOGE, Assr. to C. P. RITTER (U.S.P. 2,011,556, 13.8.35. Appl., 17.10.33).—During fractionation the gasoline is brought in contact successively with  $\text{Cu}$ ,  $\text{Al}$ , and  $\text{Zn}$ . These may be in the form of  $30\text{--}50\%$  alloys with  $\text{Mn}$  and each may form a tray in the column.

D. K. M.

**Production of non-knocking motor fuels.** J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 448,690, 8.10.34).—A mixture of alcohols, mainly  $\text{Bu}^n\text{OH}$  and higher alcohols, is obtained by heating  $\text{CO}$  and  $\text{H}_2$  at  $> 50$  atm. in presence of a catalyst, *e.g.*,  $\text{ZnO}$ ,  $\text{Cr}_2\text{O}_3$ .  $\text{MeOH}$  is separated and the residual alcohols are dehydrated at  $300^\circ$  by catalysts, *e.g.*,  $\text{Al}_2\text{O}_3$ . *iso*Olefines are thus obtained which are partly polymerised to di- and tri-merides by  $\text{H}_2\text{SO}_4$ . The product is mixed with monomeric higher *iso*-alcohols (in some cases after hydrogenation of the latter) to give a motor fuel of high antiknock val.

C. C.

**Motor fuel.** E. F. PEVERE, Assr. to TEXAS Co. (U.S.P. 2,021,088, 12.11.35. Appl., 29.9.32).—The antiknock val. of motor fuel is improved by adding small quantities ( $0.5\text{--}1\%$ ) of  $\text{C}_2\text{H}_4(\text{NH}_2)_2$ .

D. M. M.

**Fuels for use in internal-combustion engines and for other purposes.** R. G. TERAKOPOFF (B.P. 448,446, 6.12.34).—A mixture of paraldehyde ( $20\text{--}50$  pts. by vol.) and a polycyclic hydrocarbon ( $50\text{--}80$ ), *e.g.*, tetrahydronaphthalene, with or without a thin lubricating oil as upper-cylinder lubricant, is added to liquid fuels for internal-combustion engines in order to assist in initiating or promoting combustion of the fuel. An aromatic amine, *e.g.*,  $\text{NH}_2\text{Ph}$ ,  $\text{NHPhMe}$ , or preferably aminocymene, may also be present. Normally  $0.5\%$  of the composition is added to gasoline and  $1\%$  to Diesel fuels.

C. C.

**Refining of motor fuels.** CARBO-NORIT-UNION VERWALTUNGS G.M.B.H. (B.P. 447,533, 30.11.35. Ger., 1.12.34 and 12.1.35).—The gum-forming constituents are reduced and colour is improved by treating crude motor spirit from cracking processes with alcoholic  $\text{FeCl}_3$  during or before (at  $100^\circ$ ) distillation, or at temp. above b.p. under pressure.

D. K. M.

**Motor fuels containing inhibitors.** H. G. M. FISCHER and C. E. GUSTAFSON, Assrs. to GASOLINE ANTIOXIDANT Co. (U.S.P. 2,019,899, 5.11.35. Appl., 10.6.33).—Gum formation in motor fuel is inhibited by addition of small proportions of mixed antioxidants comprising  $\alpha$ -substituted, aromatic condensed-ring hydrocarbons in which adjacent nuclei have two C atoms in common; such compounds may carry an  $\text{NH}_2$ - or a  $\text{OH}$ -substituent.

D. M. M.

**Stabilisation of motor fuels.** W. S. CALCOTT and I. E. LEE, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,999,830, 30.4.35. Appl., 20.5.33).—The gum formation during storage is prevented by the addition of  $> 0.1\%$  of a dihydroxyanisole.

L. C. M.

**Treatment of motor fuel.** J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,009,118, 23.7.35.



Appl., 27.2.33).—In the prevention of deterioration of cracked gasoline during storage by means of an inhibitor (I), those light fractions which normally evaporate under atm. storage conditions and having a great affinity for  $O_2$  are removed by fractionation before addition of (I).  
D. K. M.

**Raising the calorific value of liquid fuel.** A. CLASSEN (U.S.P. 2,021,175, 19.11.35. Appl., 21.2.33. Ger., 30.7.32).—The calorific val. of liquid fuels containing furfuraldehyde is increased by dispersing in them  $< 50\%$  of pure amorphous C, obtained by dry distillation of lignin.  
D. M. M.

**Oil emulsion [for polishes etc.].** F. D. SNELL and C. S. KIMBALL (U.S.P. 2,021,027, 12.11.35. Appl., 2.4.30).—An emulsifying agent is made by mixing a carbohydrate, a  $H_2O$ -sol. natural gum, a  $H_2O$ -swelling natural gum, and a  $H_2O$ -swelling vegetable colloid. The constituents are ground and mixed dry, and may be dissolved to form a stock solution when required. Abrasives may be added to such emulsions to form polishing compositions.  
D. M. M.

**Preparation of wax emulsions.** J. R. MACRILL, ASSR. to CALIFORNIA FRUIT GROWERS EXCHANGE (U.S.P. 2,019,758, 5.11.35. Appl., 26.8.32. Renewed 6.4.35).—A solid wax stock, consisting chiefly of paraffin and carnauba wax with a small proportion of vegetable oil, oleic or stearic acid, and commercial  $N(C_2H_4 \cdot OH)_3$ , is mixed, the mixture dissolved in a suitable solvent, and a conc. emulsion (10 wt.-%) made by mixing with aq.  $Na_2CO_3$ . For use this is further diluted as required.  
D. M. M.

**[Penetrating] lubricating preparations.** H. F. GREEN (B.P. 448,507, 5.12.34 and 25.3.35).—Lubricating oil is mixed with a OH-derivative of cholanolic acid, e.g., Na tauroglycocholate, and a solvent compatible with both, comprising an ester of a OH-acid and an alcohol  $> C_4$ , e.g., amyl lactate.  
B. M. V.

**Production of low cold-test oil.** A. BERNE-ALLEN, JUN., ASSR. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,008,674, 23.7.35. Appl., 16.2.32).—In the separation of wax from hydrocarbon oil by addition of a diluent, chilling, and centrifuging the pptd. wax, the centrifuging is facilitated by addition of a small quantity (2%) of a wax derivative, e.g., the product obtained by treating chlorinated wax with aromatic hydrocarbons, e.g.,  $C_{10}H_8$ , in presence of  $AlCl_3$ , or Al stearate etc.  
D. K. M.

**Stabilised mineral oil.** B. H. SHOEMAKER, ASSR. to STANDARD OIL Co. (U.S.P. 2,012,918, 27.8.35. Appl., 3.11.32).—0.001–0.1 (or even up to 1.0)% of an oil-sol. metal (alkali or alkaline earth) amide of the type  $MNRR'$ , where M is a metal, and R and R' are H, alkyl, aryl, and/or aralkyl radicals, e.g.,  $NaNH_2$ ,  $NaNEtPr$ , is added to a lubricating oil to inhibit formation of colour, gum, and sludge. It may be added as such, or formed *in situ* from the colloidal metal and the amine or NH.  
E. J. B.

**tert.-Olefines.**—See III.  $SO_2$  from sludge acid.—See VII. Lubricating grease.—See XII. Sulphured pine oil. Paint vehicle.—See XIII. Rubber solvent.—See XIV. Herbicide.—See XVI.

### III.—ORGANIC INTERMEDIATES.

**Catalytic vapour-phase nitration of benzene.** R. H. MCKEE and R. H. WILHELM (Ind. Eng. Chem., 1936, 28, 662–667).—Passage of  $C_6H_6$  and  $NO_2$  vapours over  $SiO_2$  gel at 225–380° affords  $PhNO_2$ ,  $NO$ , and small quantities of by-products probably nitrophenols (I); the proportion of (I) is increased by the presence of air. The space-time yield increases with increasing space velocity, and the optimum temp. for the reaction is 310°, the average conversion (based on  $C_6H_6$  taken) being 32%. The catalyst can be used repeatedly.  $TiO_2$  is inefficient, and with bauxite  $NH_3$  and  $Ph_2$  result. Preliminary experiments with  $PhMe$  indicate that temp. control is important.  
P. G. C.

**Stabilisation of diazo compounds in solution.** G. J. MARRIOTT (J. Soc. Dyers & Col., 1936, 52, 172–175).—Decomp. rates (*D*) of aq. solutions of 5- and 4-chloro-*o*-toluidine (I), *p*-nitroaniline (II), 3-nitro-*p*-toluidine, and *m*- $C_6H_4Me \cdot NH_2$  buffered with K H phthalate and  $KH_2PO_4$  at  $p_H$  5–9 and stabilised with 1–5 mol.-equivs. of anisole-*p*-sulphonic acid (III) and 1:5- $C_{10}H_6(SO_3H)_2$  (IV) were determined at 0–20°. The stabilising influence of (III) and (IV) is confirmed; (IV) is especially effective with diazotised nitroamines, and the presence of 5 mol.-equivs. halves the *D*. The stability of a diazo solution increases with decrease of  $p_H$ . The stabilising influence of (IV) is  $>$  that of (III), and (III) increases the *D* of diazotised (II), probably by coupling with it. Assuming the decomp. of diazotised amines to be a unimol. reaction,  $k = t^{-1} \log a/(a-x)$  (cf. B., 1903, 89), then *k* decreases with increase of *t*, with and without the presence of (III) or (IV); in the case of (I), however, at an initial  $p_H$  of 6.0 the *k* vals. increase with increase of *t*.  
A. J. H.

**Extraction [of AcOH].**—See I. Desulphurising hydrocarbons with CO.—See II. Dry-cleaning solvents.—See VI. Determining guanidine in rubber.—See XIV.

See also A., July, 802, Velocity of diazotisation. 806, Catalytic esterification of alcohols. 807, Condensation of  $C_2H_2$  and AcOH. 808, Electroreduction of sorbic acid. 819, Prep. of  $\beta$ -methyl- $\Delta^a$ -butene, dialkylacetylenes, and  $\alpha$ -chloro- $\gamma$ -bromopropane. 821, Catalytic prep. of esters of glycol and AcOH. 822, Electrolysis of mixtures of *n*-butyrates with nitrates. 825,  $Ac_2$ . 828, Electrolytic oxidation of proline and  $\gamma$ -aminobutyric acid. 829, Determining  $CO(NH_2)_2$  by distillation. Prep. of carbamides. 830, Electrolysis of Mg Me halides in  $Et_2O$  solutions. 836, Prep. of amino- and halogeno-phenanthrenes. 837, De-ethylation of  $NPhEt_2$ . Catalytic synthesis of  $NHPh_2$ . Prep. of  $NH(CH_2 \cdot C_{10}H_7 \cdot \alpha)_2$ . 839, Synthesis of vanillin from cresols. 840, Prep. of substituted benzene-*o*-dithiols. 869, Synthesis of methoxybenzthiazoles. 873, Determination of camphor. 879, Prep. of cytochrome-*c*. 897, Kojic acid from xylose.

#### PATENTS.

**Preparation of substantially pure tert.-olefines.** R. M. DEANESLY and W. ENGS, ASSRS. to SHELL DEVELOPMENT Co. (U.S.P. 2,012,785, 27.8.35. Appl., 18.3.35).—



*tert.* Olefines are produced by heating at  $< 85^\circ$  ( $70-85^\circ$ )/1 atm. solutions of *tert.* aliphatic alcohols (I) in acid ( $> 50\%$   $\text{H}_2\text{SO}_4$ ), e.g., those obtained by the selective absorption of a *tert.* olefine (II) from a narrow fraction containing essentially the latter and isomerides, obtained from cracking gases, natural gas, etc., in acid ( $> 70\%$   $\text{H}_2\text{SO}_4$ , or  $\text{H}_3\text{PO}_4$ ,  $\text{PhSO}_3\text{H}$ , etc.). The sulphate, oxide, etc. of a bivalent metal (Zn, Mg, Pb) (0.02–0.5 mol. per mol. of acid) catalyses the reaction and does not interfere with the preliminary absorption. The  $\text{H}_2\text{O}$  formed is distilled off with the (II), and the (I) is kept at a concn.  $< 1$  mol. per mol. of acid. E. J. B.

**Manufacture of ethyl chloride.** COUTTS & Co., and F. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 448,269, 5.12.34).— $\text{C}_2\text{H}_4$  and  $\text{HCl}$  are allowed to react in the gaseous phase, preferably at  $180-200^\circ$ , or at lower temp. under pressure, in presence of a  $\text{ZnCl}_2$  catalyst activated with Li, Mg, Ca, Cu, Sn, Cl', or Br'. S. C.

**Catalytic oxidation of ketols.** N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of M. DE SIMO and S. H. McALLISTER (B.P. 448,313, 10.9.35. U.S., 22.9.34).—Polyketones and/or keto-aldehydes are obtained by oxidising primary and/or *sec.* ketols with substantially stoichiometric amounts of  $\text{O}_2$  at  $200-500^\circ$  in presence of a solid catalyst containing Cu,  $\text{CuO}$ , brass, Ag, Ag–Zn, Ag–As, Ag–Au, Pt, Pd, Co,  $\text{CoO}$ , Ni,  $\text{NiO}$ , V,  $(\text{VO})_2(\text{SO}_4)_3$ ,  $\text{AgVO}_3$ , Al, Cd, Cr,  $\text{Cr}_2\text{O}_3$ , Sn, SnO, W,  $\text{MnO}$ , Zn,  $\text{ZnO}$ ,  $\text{ZnS}$ , Ti, or Fe. Elements in the 3rd horizontal period of the periodic table (e.g., Cu) are specifically claimed. S. C.

**Purification of aliphatic acids.** CARBIDE & CARBON CHEMICALS CORP., Assees. of G. H. REID (B.P. 448,145, 17.5.35. U.S., 13.6.34).—Monobasic acids produced by the oxidation of aldehydes are freed from diacyl compounds by treatment with  $\text{O}_2$  or air at  $80-150^\circ$  ( $115-120^\circ$ ) in presence of 0.05–0.1% of  $\text{V}_2\text{O}_5$  or  $\text{NH}_4\text{VO}_3$ .  $\text{AcOH}$ ,  $\text{EtCO}_2\text{H}$ ,  $\text{Pr}^n\text{CO}_2\text{H}$ ,  $\text{C}_5\text{H}_{11}\text{CO}_2\text{H}$ , and  $\text{CHMeEt}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$  are specifically mentioned as examples. S. C.

**[Preparation of] alkylene esters of polybasic acids.** W. H. CAROTHERS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,012,267, 27.8.35. Appl., 1.8.29).—A dibasic acid  $(\text{CH}_2)_n(\text{CO}_2\text{H})_2$  and a glycol  $(\text{CH}_2)_m(\text{OH})_2$  (I),  $m$  and  $n$  being  $> 2$ , are heated together at approx.  $250^\circ$  until no further  $\text{H}_2\text{O}$  distils off, the excess of (I) is removed by heating (at  $170-240^\circ$ ) in vac., and the residual microcryst. polymeric ester produced is purified by dissolution in  $\text{CHCl}_3$  and reprecip. with  $\text{Et}_2\text{O}$ . Incomplete reaction yields products of lower m.p. 7 examples are given. Other methods of preparing simple esters may be used. E. J. B.

**Production of butylamines.** H. R. ARNOLD, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,012,333, 27.8.35. Appl., 1.6.33).—The alcohol, e.g.,  $\text{Bu}^n\text{OH}$ , and  $\text{NH}_3$  are passed together at  $250-500^\circ$  ( $300-400^\circ$ ) and with prescribed space velocity over Al silicates, either natural (clay) or synthetic (zeolites), to yield mixtures of mono- and poly-alkylamines. E. J. B.

**Production of monoalkylolamines.** N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of C. T. KAUTER (B.P. 448,373, 26.9.35. U.S., 1.10.34).—Monoalkylolamines ( $> \text{C}_5$ ) are obtained by treating an

alkylene oxide ( $> \text{C}_5$ ) with excess of  $\text{NH}_3$  ( $20-50$  mols.) in  $\text{H}_2\text{O}$  ( $10-200$  mols.). The reaction may be carried out at any temp. or pressure and is independent of the mode of mixing of the reagents. 83.2% yields of  $\text{NH}_2\cdot\text{C}_2\text{H}_4\cdot\text{OH}$  are obtained by mixing 88 g. of  $(\text{CH}_2)_2\text{O}$  with 6 kg. of 18.3%  $\text{NH}_3$  solution at  $20^\circ$  and heating the mixture at  $94^\circ$  for 1 hr. Batch and continuous processes for isobutanolamine are described. S. C.

**Manufacture of quaternary ammonium compounds.** COUTTS & Co., and F. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 448,251, 10.12.34).— $\text{N}(\text{R}\cdot\text{OH})_4$  compounds, as distinct from hydroxyalkyl ethers, are obtained by treating a *tert.*-alkylolamine with an alkylene oxide at  $p_{\text{H}} 8-9.6$  ( $< 8.5$  at the beginning of the reaction), by buffering the solution with a suitable acid ( $\text{HCl}$ ,  $\text{NaH}_2\text{PO}_4$ ,  $\text{HCO}_2\text{H}$ ,  $\text{AcOH}$ , lactic or stearic acid). The quaternary alkylolammonium salts are sol. in 35%  $\text{NaOH}$ . The examples include *tetra*-( $\beta$ -hydroxyethyl)ammonium hydroxide, chloride,  $\text{Na}_2$  phosphate, acetate, stearate, *tri*-( $\beta$ -hydroxyethyl)butyl- and diethyl-di-( $\beta$ -hydroxyethyl)-ammonium hydroxide. S. C.

**Effecting continuous hydrogenation and other catalytic reactions.** I. SETO and M. SATO (B.P. 447,159, 8.4.35).—Agitation during hydrogenation of, e.g., soya-bean oil or  $\text{PhNO}_2$  is improved by application of a high-tension a.c. After the reaction high-tension d.c. is applied, whereby the catalyst, e.g., Ni, adheres to one of the electrodes, and the product is removed from the chamber. On charging further raw material and reapplication of the a.c. the catalyst is liberated. Apparatus is claimed. A. W. B.

**Manufacture of condensation products [arylaminohydroxybenzenes].** I. G. FARBENIND. A.-G. (B.P. 448,242, 3.12.34. Ger., 2.12.33. Addn. to B.P. 415,945; B., 1934, 945).—*s*-Arylamino-dihydroxybenzenes and bisarylamino-phenols are obtained by boiling an aq. suspension of  $s\text{-C}_6\text{H}_3(\text{NH}_2)_3\cdot 3\text{HCl}$  and a primary arylamine; e.g.,  $\text{NH}_2\text{Ph}$  gives 3:5-dianilinophenol (yield 72%), and  $p\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}_2$  gives 3:5-bis-(4'-nitroanilino)-1-, m.p.  $275^\circ$  and 1-(4'-nitroanilino)-3:5-dihydroxybenzene, m.p.  $205^\circ$ , sol. in  $\text{Na}_2\text{CO}_3$ . S. C.

**Manufacture of anthraquinone derivatives.** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 443,958–9, [A, B] 28.8.34. Cf. B.P. 349,115; B., 1931, 834).—1- or 2-Naphthyl-, pyrenyl-, or perylenyl-amino-anthraquinones substituted (A) by halogen in the *o*-position to NH in the anthraquinone nucleus or the *peri*-position of the arylamino-substituent, or *vice versa*, and (B) by halogen in the *o*-position in either nucleus, the other position being free from substituent in both cases, are treated with agents capable of eliminating  $\text{HCl}$  ( $\text{K}_2\text{CO}_3$  in  $\text{PhNO}_2$  or alkalis + phenols or alcohols). In (A) complex quinolines, and in (B) carbazoles, are formed. E.g., (A) 2-bromo-1- $\alpha$ -naphthylaminoanthraquinone is heated at the b.p. with  $\text{K}_2\text{CO}_3$  in  $\text{PhNO}_2$  to give 8:9-phthaloyl-4:5-trimethineacridine, a green-blue vat dye. Other starting materials are: 8'-chloro-1- $\alpha$ -naphthylamino-2-bromo-1-2'-methyl- $\alpha$ -naphthylamino-, 2:6-dibromo-1:5-bis-2'-methyl- $\alpha$ -naphthylamino-, 3-bromo-1-benzamido-4-2'-methyl- $\alpha$ -naphthylamino-anthraquinone, and the compound from 1:5- $\text{C}_{10}\text{H}_6(\text{NH}_2)_2$



(2 mols.) and 1:2-dibromoanthraquinone (1 mol.). (B) 2-Bromo-1-anilinoanthraquinone with boiling  $K_2CO_3$ - $PhNO_2$  (+ a Cu salt) gives 1:2-phthaloylcarbazole. Other examples describe the prep. of: 1:2-phthaloyl-6-methyl-, -5:6-benzo-, and -6-phenyl-carbazole; 4-bromo-1:2-phthaloyl-6-methyl-, 6-bromo-1:2-phthaloyl-, and 2:3-phthaloyl-6-methyl-carbazole; 1:2:5:6-bis-5'-phenyl-1':2'-indoloanthraquinone, and 1:2:1':2'-bisphthaloyl-6:6'-dicarbazolyl; the last two are brown vat dyes.

H. A. P.

**Olefines from gaseous hydrocarbons.** Non-knocking motor fuels.—See II. **Acid inhibitor.**—See X.

#### IV.—DYESTUFFS.

**Testing dyes.** S. PESTALOZZI (Zellstoff u. Papier, 1936, 16, 278—280).—Methods of testing dyes and pigments for their tinctorial power and their resistance to light and chemical reagents are briefly reviewed.

D. A. C.

**Logwood dyes for wool.**—See VI.

See also A., July, 830, **Dyes from furfuraldehyde**. 849, **Dyes from acetylenedicarboxylic acid**. 861, **Dyes from acenaphthenequinone**. 866, **Quinoxaline colours**. 869, **Dyes from methoxybenzthiazoles**. **Cyanine dyes**.

#### PATENTS.

**Manufacture of triphenylmethane dyes.** I. G. FARBENIND. A.-G. (B.P. 447,067, 9.11.34. Ger., 11.11.33).—Dyes containing one or more aryl residues carrying one or more alkylsulphonic acid groups directly combined to the nucleus are prepared by the usual syntheses. Examples of intermediates are *o*-sulphomethyl-*N*-phenyl-taurine, 1:2-xylyl- $\omega\omega$ -disulphonic acid,  $\beta$ -phenylethylsulphonic acid and *o*-monobenzylaminobenzyl- $\omega$ -sulphonic acid.

A. W. B.

**Manufacture of acid triphenylmethane dyes.** I. G. FARBENIND. A.-G. (B.P. 439,815, 15.6.34. Ger., 15.6.33. Addn. to B.P. 417,014; B., 1934, 1096).—A 4:4'-dihalogeno- or -dialkoxy-benzophenone is condensed with a *sec.*- or *tert.*-arylamine, the halogen or alkoxy groups are then replaced by condensation with a primary 4-alkoxy- or 4-aryloxy-arylamine, and the product is sulphonated. Examples are: 4:4'-dichlorobenzophenone (I) with ethylbutyl-*m*-toluidine, condensed with *p*- $NH_2 \cdot C_6H_4 \cdot OEt$ , sulphonated (blue); (I) with di-*n*-butyl-*m*-xylylidine, condensed with *p*- $NH_2 \cdot C_6H_4 \cdot OPh$ , sulphonated (very greenish-blue).

C. H.

**Manufacture of [direct] azo dyes.** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 439,372, 17.7.34).—A 2-(3'-halogeno- or 3'-alkoxy-4'-aminophenyl)benzthiazole is diazotised and coupled with suitable coupling components for direct dyes. Examples are: 2-(4'-amino-3'-methoxyphenyl)-6-methylbenzthiazolesulphonic acid  $\rightarrow$  phenyl-J-acid (reddish-violet on cotton, bluish-violet when coppered), or benzoyl-J-acid (bluish-red), or carbonyl-J-acid (bluish-red).

C. H.

**Manufacture of [acid] azo dyes.** W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 448,505, 3.12.34).—3-Aryl-5-pyrazolones, which may carry alkyl in position 1, are coupled with diazotised arylamines,  $\leq 1 SO_3H$  or

$CO_2H$  being present in the components. Examples are:  $o-NH_2 \cdot C_6H_4 \cdot SO_3H \rightarrow$  3-*p*-carboxyphenyl-5-pyrazolone (greenish-yellow); 1:2:4-aminonaphtholsulphonic acid  $\rightarrow$  3-phenyl-5-pyrazolone (red); 4-nitro-*o*-aminophenol-sulphonic acid  $\rightarrow$  3-*p*-anisyl-5-pyrazolone (brownish-red). C. H.

**Preparation of azo dyes capable of forming metal compounds.** COMP. NAT. MAT. COL. ET MANUF. DE PROD. CHIM. DU NORD RÉUNIES ÉTABL. KUHLMANN (B.P. 439,451, 23.1.35. Fr., 2.2.34).—A diazotised *o*-amino-phenol or -naphthol or anthranilic acid is coupled with the product from 1:8-naphthasultone-4-sulphonyl chloride and  $NH_3$  or an aliphatic or aromatic amine. Examples are: 1:2:4-aminonaphtholsulphonic acid  $\rightarrow$  1:8-aminonaphthol-5-sulphon- $\alpha$ -naphthylamide (bordeaux on wool, blue when after-chromed) or -anilide (bordeaux; + Cr, violet); 4-chloro-*o*-aminophenol  $\rightarrow$  amide (red; + Cr, violet-red); 4-sulphoanthranilic acid  $\rightarrow$  anilide (+ Cr, bordeaux). C. H.

**Manufacture of [chromable] azo dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 439,680, 2.6.34).—Coupling components are coupled with 3-(aminoarylsulphonamido)salicylic acids which may carry Me,  $NO_2$ , or  $SO_3H$  in position 5. Examples are: 3-*m*-aminobenzenesulphonamido-5-sulphosalicylic acid  $\rightarrow$  3-methyl-5-pyrazolone (chrome-yellow), 2:4-dihydroxyquinoline (chrome-yellow), or resorcinol (yellowish-brown on leather). C. H.

**Manufacture of [chromable] azo dyes.** CHEM. WORKS FORMERLY SANDOZ (B.P. 448,592, 27.7.35. Ger., 28.7.34).—Azo dyes carrying  $R \cdot SO_2 \cdot NH$  *ortho* to the  $N_2$  are capable of forming complex metal compounds. Arylamines,  $o-NH_2 \cdot Ar \cdot N(COR') \cdot SO_2R$ , where Ar = aryl,  $COR'$  = acyl, and R = an aromatic, heterocyclic, or aliphatic group, are diazotised and coupled with a coupling component or azo dye capable of coupling, and the acyl group is removed. Examples are: 3-amino-di-*p*-toluenesulphonyl-*p*-toluidine (I)  $\rightarrow$  1-*p*-sulphophenyl-3-methyl-5-pyrazolone, hydrolysed to remove one *p*-toluenesulphonyl group (yellow on wool; + Cr, brownish-red); (I)  $\rightarrow$  1:3:6-naphtholdisulphonic acid, hydrolysed (orange; + Cr, violet);  $p-NH_2 \cdot C_6H_4 \cdot SO_3H \rightarrow$  resorcinol  $\leftarrow$  5-chloro-2-aminodi-*p*-toluenesulphonyl-aniline, hydrolysed (orange-brown; + Cr, brown); 3-amino-*N*-*p*-toluenesulphonylacetyl-*p*-toluidide  $\rightarrow$  N.W.-acid, hydrolysed (orange-red; + Cr, violet). C. H.

**Manufacture of [chromed *o*-hydroxy]azo dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 439,811, 14.6.34).—Diazotised 4-chloro-5-nitro-*o*-aminophenol is coupled with 1:3:8- or 1:4:8-naphtholdisulphonic acid and chromed to give a dark greenish-blue or navy-blue dye. C. H.

**Manufacture of blue [azo] dyes on the fibre [ice colours].** SOC. CHEM. IND. IN BASLE (B.P. 439,256, 17.7.34. Switz., 27.7.33).—A 4-phenoxyacetamido-2:5-diethoxyaniline is diazotised and coupled on the fibre with 2:3-hydroxynaphthoic anilide or *o*-substituted anilide, e.g., *o*-aniside, *o*-toluidide, 2':5'-dimethoxyanilide, or *p*-xylylide. C. H.

**Manufacture of water-insoluble azo dyes [pigments and ice colours] and intermediate products**



therefor. I. G. FARBENIND. A.-G. (B.P. 448,459, 7.12.34. Ger., 8.12.33).—2-Hydroxy-5 : 6 : 7 : 8-tetrahydro-3-naphthoic arylamides are coupled in substance or on the fibre with diazo compounds free from  $\text{SO}_3\text{H}$  and  $\text{CO}_2\text{H}$  groups. Examples are:  $\alpha$ -naphthylamide, m.p.  $192^\circ$ ,  $\leftarrow$  5-nitro-*o*-anisidine (I) (brown-black pigment); dianisidine, m.p.  $292^\circ$ ,  $\leftarrow$  *m*-nitroaniline (brown on cotton); 3-carbazylamide  $\leftarrow$  (I) (reddish-black pigment). C. H.

**Manufacture of [vat] dyes of anthraquinone series.** E. I. DU PONT DE NEMOURS & Co. (B.P. 439,296, 4.6.34. U.S., 3.6.33).—1 : 4 : 5 : 8-Tetra- $\alpha$ -anthraquinonylamino-anthraquinone is heated at  $175$ – $200^\circ$  with  $\text{AlCl}_3$  and  $\text{NaCl}$ , preferably in presence of  $\text{Na}_2\text{CO}_3$ , and then oxidised, e.g., with  $\text{Na}_2\text{Cr}_2\text{O}_7$  and  $\text{H}_2\text{SO}_4$ . A yellowish-olive vat dye results. C. H.

**Manufacture of vat dyes [of the anthraquinone series].** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 439,570, 1.6.34).—1-Anthraquinonylarylo-oxazoles or -thiazoles carrying 1 or 2  $\text{COCl}$  groups in the arylo-nucleus are condensed with  $\alpha$ -aminoanthraquinones, or the corresponding amides with  $\alpha$ -halogenoanthraquinones. Examples are: 1- $\beta$ -anthraquinonylbenzthiazole-5-carboxyl chloride [from 2-aldehydoanthraquinone and 4-amino-3-thiolbenzoic acid] with 1-aminoanthraquinone (II) (yellow) or 1-amino-5-benzamidoanthraquinone (III) (yellow); 1-(1'-amino-2'-anthraquinonyl)benzthiazole-5-carboxyl chloride with (II) (red) or (III) (reddish-brown), or 1 : 4-diaminoanthraquinone (reddish-violet); 1- $\beta$ -anthraquinonylbenzthiazole-3 : 5-dicarboxyl chloride with (II) (yellow); 2'- $\beta$ -anthraquinonyl- $\beta$ -naphtho-oxazole-3-carboxyl chloride [from (I) and 1-amino-2-hydroxy-3-naphthoic acid] with (II) (yellow). C. H.

**Manufacture of dyes of the anthraquinone series [for acetate silk].** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 439,885, 8.6.34).—Compounds  $\text{AQ}\cdot\text{NH}\cdot\text{Ar}\cdot\text{C}_2\text{H}_4\cdot\text{OH}$  (AQ = anthraquinonyl, Ar = arylene of  $\text{C}_6\text{H}_6$  or  $\text{C}_{10}\text{H}_8$  series) are synthesised from suitable halogeno- (etc.) or amino-anthraquinones and amino- or halogeno-arylethyl alcohols. Examples are:  $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{C}_2\text{H}_4\cdot\text{OH}$  with 1-chloro- (rose-red on acetate silk), 1 : 5-dichloro- (bluish-red), 4-chloro-1-amino- (violet-blue), 4-bromo-2-sulpho-1-amino- (blue), or 2 : 3-dichloro-1 : 4-diamino- (blue) -anthraquinones; 2 : 4-( $\text{NH}_2$ ) $_2\cdot\text{C}_6\text{H}_4\cdot\text{C}_2\text{H}_4\cdot\text{OH}$  with leucoquinizarin (green). C. H.

**[Manufacture of] anthraquinone vat dyes.** R. J. SOBATZKI and O. M. BISHOP, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,012,930, 27.8.35. Appl., 9.5.34).—2-*p*-Aminophenylantraquinone is condensed with aroyl chlorides, e.g., 1 : 9-thiazoloanthrone-2-carboxyl chloride (greenish-yellow),  $\text{BzCl}$  (yellow), 1-nitroanthraquinone-6-carboxyl chloride (reduced and benzoylated, yellow). C. H.

**Manufacture of indigoid dyes.** Soc. CHEM. IND. in BASLE (B.P. 448,654, 11.4.35. Switz., 21.4.34).—The  $\alpha$ -chloride or -anil of a 4 : 7-dialkylisatin, which preferably carries a 5-halogen, is condensed with a naphthol or halogenated naphthol, and, if desired, the product is halogenated. Examples are: 4 : 7-dimethylisatin  $\alpha$ -chloride with 4-chloro- $\alpha$ -naphthol (blue); 5-bromo-4 : 7-

dimethylisatin  $\alpha$ -chloride with  $\alpha\text{-C}_{10}\text{H}_7\cdot\text{OH}$ , brominated or chlorinated (blue).

[A] **Production of dyes of the cyazine type.** [B] **Sensitisation of photographic emulsions.** J. D. KENDALL (B.P. [A] 447,038 and [B] 447,109, 3.8.34).—By causing the usual intermediates for cyanine dyes to interact with a heterocyclic N compound, containing an  $\text{NH}_2$  in the  $\alpha$  or  $\gamma$  position, compounds resembling cyanines, but with 1 or 2 N atoms in the chain, are obtained. The linking between the nuclei may be (1) by  $\cdot\text{N}\cdot$  (name "*cyazine*" proposed for the product), (2) by  $\cdot\text{N}\cdot\text{CH}\cdot\text{N}\cdot$  ("*cyadiazine*"), or (3) by  $\cdot\text{CH}\cdot\text{CH}\cdot\text{N}\cdot$  ("*carbo-cyazine*"). E.g., a compound of type (1) is prepared from 1-aminobenzthiazole, 2-methylthiolquinoline, and Me *p*-toluenesulphonate (I), followed by  $\text{C}_6\text{H}_5\text{N}$  and aq. KI; there are 12 other examples of substances of this type, prepared from an  $\text{NH}_2$ -compound and a compound with a reactive  $\cdot\text{SMe}$  group or I atom. From 1-aminobenzthiazole and diphenylformamidine is prepared 1 : 1'-*dibenzthiazolylformamidine*, m.p.  $250^\circ$  (and there are instances of 5 similar substances produced from other  $\text{NH}_2$ -compounds); with (I) followed by  $\text{C}_6\text{H}_5\text{N}$  and aq. KI it gives a dye of type (2). The majority of the compounds are sensitisers for chloride emulsions, but one is described as sensitising a bromide emulsion. F. M. H.

## V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

**Mechanism of sulphur lability in alkali degradation of wool-protein.** J. A. CROWDER and M. HARRIS (J. Res. Nat. Bur. Stand., 1936, 16, 475–480; cf. B., 1935, 896).—Investigations of the action of dil. aq. NaOH on wool indicate that the primary process in the cleavage of the disulphide linking is hydrolysis with formation of a SH compound and a sulphenic acid. The latter is very unstable and in NaOH solution loses  $\text{H}_2\text{S}$ , yielding an aldehyde. The existence of labile S in a protein is not an indication that the bulk of the S is present in  $>$  one form. J. W. S.

**Determination of the lint on cottonseed and the cellulose in hull fibre.** R. S. MCKINNEY and G. S. JAMIESON (Oil & Soap, 1936, 13, 139–140).—Duplicate determinations of lint on seed by the following method agree within 0.2% and are comparable with plant yields. 50 g. of seed are "fumed" by heating in a covered porous earthenware pot, in the walls of which 3 c.c. of conc. HCl have previously been absorbed, at  $130^\circ$  for 1 hr. The cooled fumed seed is weighed and spread on a 10-mesh sieve, so that the lint may be rubbed off with a large rubber bung and/or a towel. The loss in wt. of the dried fumed seed gives the wt. of "dried lint," and the wt. of lint on the original seed is calc. by allowing for the average  $\text{H}_2\text{O}$  content of fresh lint (approx. 7–8%) and "dried lint" (approx. 2%), which are determined occasionally during the season. [Collaborative tests reported by the A.O.C.S. Seed Analysis Committee (*ibid.*, 144–145) suggest that a lower fuming temp. might be adopted.] On boiling (1 g.) with 8% NaOH solution (100 c.c.) for  $3\frac{1}{2}$  hr., washing, and drying, bald cottonseed hulls (free from lint) and pure lint (cellulose) lost 68% (including 9.3 of  $\text{H}_2\text{O}$  and volatiles) and 12.0% (including 5.4% of  $\text{H}_2\text{O}$  etc.) of their wt., respectively; hence the proportions of hulls and cellulose in "hull



fibre" can be calc. from a determination of the  $H_2O$  content and the loss of wt. on treating the sample with NaOH. E. L.

**Hydrophilic hemp.** D. MAROTTA and A. CALÒ (Annali Chim. Appl., 1936, 26, 152—156).—The properties of hydrophilic hemp are described. It is equal to hydrophilic cotton [wool] and may completely substitute it. L. A. O'N.

**Dangers to drying felt on paper machines and methods for decreasing them.** R. WERNER (Angew. Chem., 1936, 49, 382—385).— $H_2SO_4$  attack on wool felt may arise (a) from the manufacturing process, (b) by air- $H_2O$  vapour oxidation of protein-S in the wool. (a) may be prevented by addition of  $NH_3$ , which however, only increases the trouble from (b), and this cannot be avoided by the use of antioxidants. Cotton, which has no protein-S, gives better results and has also better tensile properties than wool. J. W.

**Weathering quality of roofing felts made from various fibres.** O. G. STREETER (J. Res. Nat. Bur. Stand., 1936, 16, 511—523).—Roofing rags, old jute and manila bagging, old newspapers, sulphite pulp, and finely-ground wood sawdust have been tested as fibrous materials for asphalt roofing felts. No significant difference in the resistance of the products to weathering has been detected which could be attributed to the kind of fibre or combination of fibres employed. J. W. S.

**Chemical composition of German spruce, pine, and beech.** C. G. SCHWALBE and W. ENDER (Cellulosechem., 1936, 17, 36—40, 54—56).—Complete analytical data are recorded for various parts of young, middle-aged, and old trees. No definite differences are found between the North and South sides. Middle-aged and old trees give more regular vals. than the young. In general, the ash, cellulose (spruce), and furfuraldehyde (spruce and pine) contents fall with increasing age of the wood, whilst the cellulose content of pine and beech increases. The furfuraldehyde content of beech increases with the height from which the sample is taken, but increases with the age of the tree. A. G.

**Decortication of beech wood for chemical-technical purposes.** B. MARSCHALLECK (Cellulosechem., 1936, 17, 53—54).—A suitable method is described. A. G.

**Properties and mode of application of beech cellulose.** E. WEDEKIND (Cellulosechem., 1936, 17, 45—49).—Cellulose can be prepared from beech wood by treatment at  $< 100^\circ$  with dioxan containing a little HCl, but this process is too expensive for practical application. Oxidation with dil.  $HNO_3$  is also effective, but somewhat expensive. An unpublished process, which avoids the use of  $HNO_3$  or other acid, yields a product containing about 90% of  $\alpha$ -cellulose. This forms an absorbent paper of good tensile strength, but low resistance to folding; it is thus suitable for blotting paper, but would require admixture for printing and writing papers. When nitrated, normal di- and tri-nitrates are obtained, but the stability of the latter is low. The cellulose is readily sol. in cuprammonium, but would require further purification before use in the manufacture of cuprammonium rayon. A. G.

**Characteristics of the lignin of red beech. I.** K. STORCH (Cellulosechem., 1936, 17, 49—52).—Dioxan- and  $H_2SO_4$ -lignins from red beech (*Fagus sylvatica*) are practically identical in composition, that of the latter being C 62.3, H 5.5, OMe 19.3% corresponding with the formula  $C_{16}H_{14}O_5(OMe)_2$ . Methylation and acetylation indicate the presence of 2 OH groups. The lignin combines with 1 mol. of PhOH, and may be better represented by  $C_9H_{10}O_3 + C_9H_{10}O_4$ , only the former combining with PhOH. A. G.

**Nitration of cellulose with nitric acid vapour.** A. BOUCHONNET (Compt. rend., 1936, 202, 1437—1440; cf. A., 1933, 939, 1038).—Cellulose with  $HNO_3$  vapour at  $38-65^\circ/40-150$  mm. (cf. B., 1934, 1053) gives nitrocelluloses (10.9—13.75% N) which are more suitable for industrial purposes than those obtained by the use of  $HNO_3$ . The rate, but not the extent, of nitration depends on the pressure. J. L. D.

**Nitration of cellulose in presence of phosphoric acid.** T. TOMONARI (Cellulosechem., 1936, 17, 29—34).—According to the conditions, Knecht's compound, cellulose dinitrate II and trinitrate III are formed, but not dinitrate I or trinitrate I, which appear to be the result of a sp. action of  $H_2SO_4$ . In most respects mixtures containing  $H_3PO_4$  behave similarly to those containing  $H_2SO_4$ . When the proportion of  $H_3PO_4$ , and hence the  $\eta$ , are high, nitration is more rapid than diffusion and the micelles are attacked from the surface inwards; with diminishing proportion of  $H_3PO_4$  the attack of the micelles becomes increasingly homogeneous. Although a N content of  $> 14\%$  can be attained, it is probable that this is due not to complete esterification to trinitrate, but to partial hydrolysis of the cellulose. A. G.

**Additional intermediate product in the nitration of cellulose.** T. TOMONARI (Cellulosechem., 1936, 17, 34—36).—If ramie is nitrated with mixtures containing equal wts. of  $H_3PO_4$  and  $HNO_3$  the course of the reaction depends on the  $H_2O$  content. When this is  $< 8.7\%$  the N content and COME<sub>2</sub>-solubility of the product are high, and there is little swelling or contraction; the intermediate product is then cellulose dinitrate II. Between 8.7 and 14% of  $H_2O$  the N content and solubility are less, but there is a max. of swelling and contraction (80%); it is concluded that a different intermediate compound is formed, and the N content suggests a mononitrate. With more  $H_2O$  Knecht's compound is formed with low N content, solubility, and shrinkage, but considerable swelling. A. G.

**Viscose. LXV. Production of strong fine filaments from viscose from fresh alkali-cellulose.** G. KITA, S. MONDEN, T. IKEDA, and Y. KIKUTI (J. Soc. Chem. Ind., Japan, 1936, 39, 166—170 B).—When prepared from alkali-cellulose aged for 24 hr. a viscose of suitable  $\eta$  for spinning contains 5—5.5% of cellulose and 7—9% of NaOH; when the alkali-cellulose is less fully aged, the cellulose content of the viscose must be lower. The  $\eta$  can be lowered by increasing the [NaOH] and by adding  $Na_2SO_3$ , but reducing the cellulose concn. is the most effective method. Fine filaments of good strength can be obtained from viscose containing 5—5.5% of cellulose, using a 60%  $H_2SO_4$  bath. Ripening for  $< 4$  days, a high concn. (9%) of NaOH, and a



low concn. (40%) of  $\text{H}_2\text{SO}_4$  are unfavourable, but addition of Igepon T to the viscose results in strong filaments.

A. G.

**Viscose staple fibre.** ESSELMANN (Chem.-Ztg., 1936, 60, 533—536).—The German product ("Vistra") differs from earlier staple fibres, which were simply rayon thread cut into lengths, and is made in different counts to replace cotton or to weave with wool. It is prepared from sulphite cellulose, but attempts to use German beech wood for the manufacture of the latter have so far failed. Its mechanical properties are much better than those of the Italian "casein-wool." They are compared quantitatively with those of cotton and wool. Admixture of "Vistra" with wool as in "Wollstra" involves difficulties in dyeing.

C. I.

**Physical properties of rayon yarn.** G. S. RANSHAW (Silk & Rayon, 1936, 10, 550—552).—Data relating to  $d$ , denier, and cross-sections are summarised.

A. J. H.

**Capacity and efficiency of beaters and refiners [for paper pulp].** J. B. GOUGH (Pulp & Paper Mag. Canada, 1936, 37, 383—385).—The refining capacity of both conical and disc-type refiners is examined mathematically.

H. A. H.

**Pitch troubles in the manufacture and use of sulphite pulp.** O. KRESS and L. A. MOSS (Paper Trade J., 1936, 102, TAPPI Sect., 306—317).—The chemical properties of gum rosin ( $R$ ) and pitch ( $P$ ) from spruce sulphite pulp have been investigated comparatively by determining their acid, I, ester, and sap. vals., as well as those of their fractions sol. and insol. in light petroleum, both before and after oxidation and heating. The I and sap. vals. of  $R$  were  $>$  those of  $P$ . The sap. val. of insol.  $P$  was  $>$  either, and this fraction contained a large % of esters. Prolonged heating in air at  $105^\circ$  caused a marked decrease to a min. of 50 in all the I vals., whereas heating in absence of air gave min. I vals. of 100. Although both heat-treatments produced an equal hardening effect, reduction in solubility was greater in presence of air. Ageing in air at room temp. also caused a reduction in solubility. Large-scale methods of reducing the pitch-forming tendency of sulphite pulp as estimated by the stickiness of the EtOH extract were investigated. A slight reduction was obtained by raising the digester ( $D$ ) temp. to  $155^\circ$  during the last  $\frac{1}{2}$  hr. of the cooking period, but the decrease in pulp yield and quality made this impracticable. Treatment of the raw wood with  $\text{CH}_2\text{O}$  under pressure and at high temp., and addition of  $\text{CH}_2\text{O}$  to  $D$ , blow-pit, or beater, were without effect, and the removal of lignin in  $D$  was seriously interfered with. An EtOH solution of natural spruce resin added to  $\text{H}_2\text{O}$  or to pulp stock is stable while at rest, but forms a deposit when agitated or aerated. Such deposition may be used to ascertain pitch-forming tendency of pulp. The rate of pitch deposition is more rapid with a pulp which has been pre-extracted with dil. HCl and washed with  $\text{H}_2\text{O}$  to remove inorg. impurities. Mere acidity has little effect in allaying pitch formation, but acidic emulsifying agents like waste sulphite liquor are effective, especially when employed in pulp washing. The use of  $\text{Al}_2(\text{SO}_4)_3$  ppts. the pitch on the fibre.  $\text{Na}_2\text{S}_2\text{O}_3$  causes a slight hardening. China clay is without effect, but bentonite

gives a considerable improvement. Most of the resinous material in sulphite pulp occurs in the fine fibre fraction.

H. A. H.

**Pitch problems [in paper mills].** S. R. H. EDGE (Paper-Maker, 1936, 91, 62—64 ts, 69—70 ts).—The val. of the laboratory method of ascertaining the probability of pitch deposition from sulphite pulp in paper mills (B., 1935, 447) is confirmed. It is believed that the so-called "fatty acid" component of sulphite resin is primarily responsible, but the chemical properties are stated not to be those of true fatty acids. There is no evidence of a particular  $p_{\text{H}}$  val. at which pitch pptn. primarily occurs. The chemical differences between the  $\text{Et}_2\text{O}$  and EtOH extracts of sulphite pulp (bleached and unbleached) and of pitch are indicated.

H. A. H.

**Chemical nature of [sulphite-pulp] pitch.** R. D. HAWORTH (Paper-Maker, 1936, 91, 70—71 ts; cf. preceding abstract).—The various fractions obtained from sulphite pitch and from the resinous material in medullary-ray fibres by extraction methods are compared with those obtained by Hibbert and Phillips (B., 1931, 403) from Jack pine. As with Jack pine, sitosterol and resene are present in the unsaponifiable fraction, and traces of linolenic and linoleic acids in the "fatty acid" fraction, which, however, is mainly composed of an unidentified acid containing  $< \text{C}_{20}$ . The "resin acid" fraction has not been identified, but, unlike the corresponding fraction from Jack pine, it does not contain abietic acid or  $d$ -pimaric acid.

H. A. H.

**Cleansing of pulp stock.** N. WUNDERLICH (Papier-Fabr., 1936, 34, Fest- u. Auslandsheft, 234—239).—The mechanism of sand traps, screens, and "Erkensator"-type separators is discussed. It is suggested that by passing half-stuff, prior to bleaching, through an "Erkensator," an appreciable saving in bleach would be obtained.

D. A. C.

**Velocity of the flow of stock from the high-pressure projection slice of an imitation parchment machine.** F. HAURY (Papier-Fabr., 1936, 34, Fest- u. Auslandsheft, 240—245).—The flow of stock from the slice was obtained indirectly by measuring the quantity of  $\text{H}_2\text{O}$  withdrawn and evaporated on the machine, and the paper production. Compared with machines making printings, this machine shows a high ratio of velocity of stock flow from the slice to wire speed, and the ratio increases with increasing basis wt. Owing to disturbing variables (freeness, consistency, etc.) a definite ratio between measured and calc. velocity was not obtainable.

D. A. C.

**Developments in paper drying.** F. L. SHONKWILLER (Pulp & Paper Mag. Canada, 1936, 37, 386—390).—Some recently developed methods of controlling steam flow to, and  $\text{H}_2\text{O}$  removal from, the drying cylinders are briefly discussed.

H. A. H.

**Rate of drying writing papers.** F. W. ADAMS (Paper Trade J., 1936, 102, TAPPI Sect., 319—320; cf. B., 1934, 188).—Data regarding dryer performance in the production of writing papers have been compiled from questionnaires. Production and evaporation rates increase with rise in steam temp., but are much  $<$  those obtained with most types of paper and board.

H. A. H.



**Durability of paper.** M. KOMETANI (J. Cellulose Inst. Tokyo, 1936, 12, 35—37).—Book papers, on exposure to sunlight, suffer loss of tensile strength and folding-endurance more in the machine- than in the cross-direction. Bursting strength is not appreciably affected. Sizing degree is much reduced, whilst the expected increase in Cu no. and acidity and decrease in  $\alpha$ -cellulose content occur. H. A. H.

**Determining H<sub>2</sub>O content.**—See I. Accelerated weathering tests [for cotton etc.].—See II. Sulphite waste liquor.—See XXIII.

See also A., July, 807, Acetylation of cellulose fibres. 857, Lignin in wood.

#### PATENTS.

**Manufacture of transparent cellulose formate products.** R. KOEPP & Co. CHEM. FABR. A.-G. (B.P. 448,218, 22.10.35. Ger., 22.10.34).—The primary reaction product obtained by formylation of cellulose is shaped, partly dried while evaporating a portion of the HCO<sub>2</sub>H (I) by means of hot gases (air), and finally treated with pptg. agents (H<sub>2</sub>O, aq. solutions, org. liquids or solutions). The (I) is recovered by condensation, or absorption by org. bases or solvents.

F. R. E.

**Production of mixed organic esters of cellulose.** C. J. STAUD and C. L. FLETCHER, ASSRS. to EASTMAN KODAK Co. (U.S.P. 2,010,829, 13.8.35. Appl., 5.9.31).—A cellulose ester containing free and esterifiable OH groups is acylated ( $>C_6$ ) in presence of CH<sub>2</sub>Cl<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>Cl<sub>2</sub>, C<sub>3</sub>H<sub>6</sub>Cl<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>Cl.OAc, or 1 : 4-dioxan as solvent.

F. R. E.

**Treatment of cellulosic solutions.** R. W. MAXWELL, ASSR. to DU PONT RAYON Co. (U.S.P. 2,011,227, 13.8.35. Appl., 3.4.34).—A small quantity of NaCN is added to viscose to control or inhibit the ripening just prior to its introduction into the spinning room.

F. R. E.

**Manufacture of partly acetylated cellulose threads.** COURTAULDS, LTD., and R. L. WORMELL (B.P. 448,063, 22.3.35).—Cotton or regenerated cellulose is partly acetylated with Ac<sub>2</sub>O in presence of AcOH and a catalyst consisting of ZnCl<sub>2</sub> and an alkali acetate. The products are resistant to substantive dyes.

F. R. E.

**[Manufacture of cellulose] composition [moulding powder].** M. R. XIMENEZ, ASSR. to JOHNS-MANVILLE CORP. (U.S.P. 2,009,600, 30.7.35. Appl., 14.4.33).—Cellulose acetate (I) (100 pts.) is pptd. from solution by addition of a suspension of finely-divided diatomaceous earth (II) (40—120 pts.) in H<sub>2</sub>O, and the intimate (I)-(II) mixture is separated from the solvent and H<sub>2</sub>O.

F. R. E.

**Manufacture of cellulose nitrate sheeting including imbibition.** E. K. CARVER and C. L. A. WYND, ASSRS. to EASTMAN KODAK Co. (U.S.P. 2,011,354, 13.8.35. Appl., 26.5.33).—A dope of nitrocellulose dissolved in a liquid in which COMe<sub>2</sub> predominates in its effect on the micellar structure of the sheeting is cast and, after evaporation of sufficient solvent, the sheet is stripped and treated with a solution in which MeOH predominates.

F. R. E.

**Manufacture of cellulose derivatives and filaments, films, plastic masses, sizes, and the like therefrom.** H. DREYFUS (B.P. 447,832, 26.11.34).—A cellulose ether or ester containing an unsaturated aliphatic radical (allylcellulose, cellulose crotonate) (I) is treated with a halogenating agent and/or NH<sub>3</sub> at super-atm. temp. and/or pressure under substantially anhyd. conditions, e.g., using dry NH<sub>3</sub> gas or its solution in an anhyd. org. solvent, to avoid hydrolysis of (I). The N derivative may subsequently be alkylated, arylated, or acylated. The products have an affinity for acid wool dyes and for some direct cotton dyes and may be employed as textile, film, and plastic materials. Those which are sol. in or readily dispersible with H<sub>2</sub>O are suitable as textile sizes. F. R. E.

**Antistatic thin sheeting.** A. D. SLACK and A. A. YOUNG, ASSRS. to EASTMAN KODAK Co. (U.S.P. 2,011,348, 13.8.35. Appl., 26.5.33).—A transparent sheet of org. cellulose ester (I) is coated on one or both sides with a permanently clear layer of solid fatty acid, applied as a  $\frac{1}{4}$ — $\frac{7}{8}$ % solution in a liquid which does not dissolve (I) (PhMe, naphtha, ligroin). F. R. E.

**Retting of flax straw.** LINEN IND. RES. ASSOC., and G. O. SEARLE (B.P. 449,108, 26.3.35).—Double retting by H<sub>2</sub>O is carried out in tanks without removing the straw for drying between the rets, the flax undergoing the second ret being treated with H<sub>2</sub>O containing bacteria from other flax undergoing a first ret. D. A. C.

**Decortication [of pine needles].** A. T. RATLIFF, ASSR. to PINE-FELT CORP. (U.S.P. 2,011,077, 13.8.35. Appl., 27.10.34).—Pine needles are cooked in a bath of aq. NaOH, crushed between corrugated rolls, and agitated in H<sub>2</sub>O, when the cortex is dissolved. The fibrous material is then recovered. D. A. C.

**Fibre refining and refiners.** D. M. SUTHERLAND, JUN. (B.P. 448,980, 30.10.35).—The refiner consists of two opposing co-axial rotors having plain working surfaces with radial-flow grooves. One rotor may be stationary, or may rotate more slowly than the other in the same or opposite direction. The pulp is fed at the centre and thrown centrifugally to the refining surfaces, which may be metallic or of natural or artificial stone. Rapid and uniform action is claimed. D. A. C.

**Manufacture of [paper] pulp.** W. BRUEACHER (U.S.P. 2,008,635, 16.7.35. Appl., 5.5.32).—Wood chips are continuously digested by passing through a vertical torpedo-shaped digester (D). The feed is through two worm screws, with a space between them into which the chips are compressed to act as a gas seal. The pulp is discharged through a pipe in the bottom of D, aided by a rotating perforated steam-ejecting scraper (S). Hot cooking liquor is introduced at the widest part of D substantially below the middle; the steam from S and hot gases rise through the chips to the top of D and are discharged into cooling-coils. The pulp is discharged into a vac. chamber where it is disintegrated by sudden expansion, the released gases being condensed in coils by means of cold fresh liquor. D. A. C.

**Production of fibrous material.** G. L. SCHWARTZ, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,011,914, 20.8.35. Appl., 29.6.28).—Wood pulp or any



papermaking fibre is mixed in the beater with fibres which are easily swollen by addition of a solvent (*S*) (e.g., nitrated cellulose). *S* is added either to the beater furnish or in vapour form to the dried paper sheet in quantities sufficient to swell but not dissolve these fibres. Excess of *S* is then removed and the paper calendered.

D. A. C.

**Bleaching of cellulose materials [wood pulp].** J. CAMPBELL and L. O. ROLLESTON, Assrs. to INTERNAT. PAPER CO. (U.S.P. 1,996,363, 2.4.35. Appl., 27.9.30).—Kraft pulp produced by the  $\text{Na}_2\text{SO}_4$  process is bleached by  $\text{Cl}_2$  at 70 lb./sq. in.; excess of  $\text{Cl}_2$  is removed by evacuating, and washing with  $\text{H}_2\text{O}$ , aq.  $\text{SO}_2$ , and  $\text{H}_2\text{O}$ .

L. C. M.

**Manufacture of paper.** C. H. DEXTER & SONS, INC. (B.P. 449,118, 21.7.34).—Vegetable fibres, e.g., *Musa textilis*, are digested in conc. aq.  $\text{NaOH}$  at  $\leq 100$  lb./sq. in. The fibres are separated without mechanical pressure or appreciable hydration and suspended in  $\text{H}_2\text{O}$  at a concn.  $\geq 0.025\%$ . The stock then flows on a Fourdrinier machine having its coarse (50-mesh) wire inclined upwards for a short distance from the headbox. A uniform, porous, long-fibred, absorbent paper is obtained.

D. A. C.

**Manufacture of [waterproof] paper.** H. H. NELSON and G. BECKER (U.S.P. 2,011,156, 13.8.35. Appl., 14.4.33. Fr., 19.4.32).—Paper is impregnated with cellulose thiosulphocarbonate solution (I), which is then regenerated by addition of a weakly acid solution ( $\text{H}_2\text{SO}_3$  or bisulphites). The paper is then washed and dried. An alkaline sulphide is added to the wash- $\text{H}_2\text{O}$  to remove traces of *S*. (I) is preferably prepared at  $< 0^\circ$ .

D. A. C.

**Composite [transparent waterproof] sheeting.** H. A. LEVEY (U.S.P. 2,012,344, 27.8.35. Appl., 18.1.30).—Flexible starch sheets are made by macerating with heat in presence of a plasticiser (glycerol, glycol, etc.) either starch alone or mixtures of starch and its esters or ethers, and casting on a lightly greased or waxed surface. The sheet is dried and rendered waterproof by coating with a solution of cellulose nitrate (or other esters) containing a plasticiser and a small quantity of wax.

D. A. C.

**Manufacture of (A) insulating or "fish" paper, (B) paper.** J. L. McCLELLAN, Assr. to HOLLINGSWORTH & VOSE Co. (U.S.P. 2,008,141—2, 16.7.35. Appl., [A] 24.3.31, [B] 16.5.32).—(A) Continuous webs of absorbent paper made from sisal or Manila hemp are passed simultaneously through a  $\text{ZnCl}_2$  bath (*d* 1.93), then pressed together by means of hot rolls to form a laminated sheet, and washed by festooning in a series of water-baths. Some of the inner plies of the pressed sheet may consist of cotton pulp as bonding material. A paper of high strength and electrical resistance is claimed. (B) Kraft, cotton, or Manila and sisal hemp are digested in a rotary drum boiler at  $82^\circ$  with 12—15% aq.  $\text{NaOH}$  for 4 or 5 hr.; the temp. is then slowly lowered, the  $\text{NaOH}$  drained, and the pulp beaten and at the same time washed by means of a drum washer, then mechanically refined, and made into paper. A porous and absorbent sheet is produced, the kraft and cotton fibres being curled.

D. A. C.

**Manufacture of decorated and saturated sheet.** R. G. JACKSON and J. T. BALDWIN (U.S.P. 2,011,150, 13.8.35. Appl., 19.6.35).—A design is printed (dye solution) on paper which is absorbent so that the design will penetrate substantially through the whole thickness of the paper. The paper is then saturated with a melted resin (natural or synthetic) containing a plasticiser ( $\text{Bu}_2$  or diamyl phthalate,  $\text{Bu}_2$  tartrate,  $\text{Ph}_3$  or tolyl phosphate). Modifiers, e.g., rubber, waxes, polymerised oils, etc., and inorg. colloidal substances may also be added. The paper is finally calendered and may be embossed to be used as a floor covering.

D. A. C.

**Preparation of filling or coating materials for paper or the like.** L. MELLERSH-JACKSON. From R. T. VANDERBILT Co., INC. (B.P. 448,138 and 448,458, 7.12.34).—(A) Finely-divided clay (50—90),  $\text{TiO}_2$  (6—30), alum (2—15),  $\text{CaO}$  (1—10), and  $\text{Na}_3\text{PO}_4$  ( $\geq 2\%$ ) are mixed together in the dry state. The clay should pass 200-mesh. When used as filler, the mixture is stirred to a thick paste with 40—60% of  $\text{H}_2\text{O}$ ; for coating purposes, starch or casein etc. is added. (B) Finely-divided  $\text{CaCO}_3$  (pptd.) (I),  $\text{Ca}(\text{OH})_2$  (II), and alum (III) are mixed dry, the quantity of (III) being regulated so that the mixture is not acidic. It contains 75—90% of (I), and the ratio of (II) to (III) varies from 1:1 to 5:1. The mixture can be shipped and stored in the dry state.

D. A. C.

**Wrapping material.** W. L. HYDEN, Assr. to DU PONT CELLOPHANE Co., INC. (U.S.P. 2,011,246, 13.8.35. Appl., 7.7.32).—Thin sheets of regenerated cellulose are coated, to prevent mutual adhesion when stacked, by passing in the undried state through a bath containing a mixture in  $\text{H}_2\text{O}$  of either blood-albumin, or a  $\text{H}_2\text{O}$  emulsion of casein, or gelatin, and glycerin and  $\text{CH}_2\text{O}$ . The sheets are then dried to render the coating insol.

D. A. C.

**Manufacture of a product simulating leather.** SOC. DES PROC. ECLA (B.P. 448,212, 9.9.35. Fr., 18.10.34).—A vulcanised article or agglomerate made with coagulated latex, or a vulcanised rubbered fabric, is treated with a solution of  $\text{S}_2\text{Cl}_2$  (I) in a cyclic or aliphatic hydrocarbon for about 20 sec., and then with  $\text{H}_2\text{O}$ , before (I) is evaporated or fixed on the rubber by decomp.

F. R. E.

**Dielectric materials.**—See XI.  $\text{H}_2\text{O}$ -sol. resinate. **Vinyl resin films.**—See XIII. **Rubber filaments.**—See XIV. **Surgical pads etc.**—See XX. **Film base.**—See XXI.

## VI.—BLEACHING; DYEING; PRINTING; FINISHING.

**Hydrogen peroxide in bleaching [textiles].** H. WILKINSON (J. Soc. Dyers & Col., 1936, 52, 168—169).—Data on the stability of aq.  $\text{H}_2\text{O}_2$  during storage up to 6 years are given. In bleaching wool by the steeping process a  $\text{H}_2\text{O}_2$  bath of  $p_H$  7.2—7.4 (phenol-red indicator) is recommended; excessive gassing with loss of  $\text{O}_2$  occurs in bleaching at  $p_H$  8.0.  $\text{H}_2\text{O}_2$  of  $p_H$  9—10 (phenolphthalein) is preferred for bleaching blankets and flannel by the ageing process. A  $\text{Na}_4\text{P}_2\text{O}_7$ — $\text{Na}_2\text{C}_2\text{O}_4$  mixture known as stabiliser C (Laporte) has combined stabilising and neutralising properties and a buffering action which makes ineffective the adverse



effect in bleaching of acid products derived from oxidation of impurities in the wool (cf. A., 1932, 353, 486; B., 1932, 336). A. J. H.

**Logwood dyes for wool.** J. HORROD (Text. Rec., July, 1936, 54, 40, 43).—A one-bath dyeing process is described. The dye liquor is prepared (180 lb. of wool) with  $\text{FeSO}_4$  cryst. (1 lb.),  $\text{CuSO}_4$  cryst. (2.5), hematone-red paste or hæmatin cryst. (50), and sufficient  $\text{H}_2\text{C}_2\text{O}_4$  (I) (about 1.8) to dissolve the pptd. black Fe-Cu-logwood lake to yield a clear yellowish-brown solution; (I) may be replaced by K H tartrate and the resulting black shade is then bluer. Dyeing is effected at  $100^\circ$  and the resulting dyeings are faster to light, rubbing, and washing, and are better penetrated, than with the usual 2-bath process. Naphthol Blue Black 4 B, Naphthylamine Black 4 B, or Sulphocyanine Black may be added to the dye liquor to secure deeper dyeings. A. J. H.

**Fastness of wool dyeings to wet treatments. II.** F. L. GOODALL (J. Soc. Dyers & Col., 1936, 52, 211—218).—Rapid removal of dyestuff from acid-dyed wool by phosphate solutions commences at  $p_H$  8—8.2 and is due to alkaline swelling of the fibre. During the process  $p_H$  increases. The presence of aggregating or dispersing agents in the solution plays an important part in the removal of dyes which are colloiddally dispersed, but has little or no effect on molecularly-dispersed systems. A reduction of the amount of inorg. salts present reduces the removal of dispersed dyestuffs, but increases the removal of aggregated dyestuffs in accordance with theories previously outlined (cf. B., 1933, 424; 1936, 97). S. C.

**Dyeing and finishing Bemberg rayon.** E. HIGGS (J. Soc. Dyers & Col., 1936, 52, 209—210).—Bemberg rayon has a high degree of affinity and rapid levelling properties due to the extreme fineness of the filaments. It is usually dyed at  $40^\circ$  and levelled by heating to the boil. Max. affinity is obtained when the dye is in equilibrium with the fabric and the solution and dyestuffs are classified into groups 1, 2, and 3 having max. affinities at  $20^\circ$ ,  $60^\circ$ , and  $80^\circ$ , respectively, 4 having increased affinity as the temp. rises to the boil, and 5 in which affinity is independent of temp. Dyestuffs in groups 2 and 5 are of most general applicability. S. C.

**Reduction and dispersion of azoic dyes etc. in presence of Lissolamine-A (I.C.I.).** F. M. ROWE and G. OWEN (J. Soc. Dyers & Col., 1936, 52, 205—208; cf. B., 1936, 311).—The stripping action of alkaline  $\text{Na}_2\text{S}_2\text{O}_4$  and Lissolamine-A (I) is due to the normal reductive fission of the  $\cdot\text{N}\cdot\text{N}\cdot$  group. (I) promotes the reaction on account of its powerful dispersing action on the dyestuff. Silk and wool may also be dyed from neutral or acid baths of very sparingly sol. basic dyes (spirit-soluble indulines etc.) dispersed in dil. NaOH and (I). S. C.

**Common sense is still the best dyeing assistant.** C. M. WHITTAKER (J. Soc. Dyers & Col., 1936, 52, 165—168).—A lecture dealing with factors influencing the production of level-dyeing. A. J. H.

**Chlorinated solvents in dry-cleaning.** D. H. KILLEFFER (Ind. Eng. Chem., 1936, 28, 640—643).—The methods of dry-cleaning, solvent recovery, and

regeneration etc. are described and the fire hazards of earlier methods using volatile inflammable solvents referred to. The replacement of these materials by non-inflammable chlorinated solvents in modern practice has eliminated the fire danger, but necessitated radical re-design of plant to minimise possible toxic effects on operators and to effect more complete recovery of these more expensive solvents. F. C. B. M.

**Unshrinkable finish [for wool].** ANON. (Text. Merc., 1936, 95, 11).—The reaction of wool with aq. solutions of I (Haller and Holl; B., 1936, 734) is discussed in relation to the chlorination of wool.

A. J. H.  
**Stains on (A) rayon, (B) cotton, and (C) wool.** (A) T. H. JONES. (B) A. J. HALL. (C) E. R. TROTMAN (J. Soc. Dyers & Col., 1936, 52, 169—171).—(A) Oil stains become more difficult to remove after oxidation during storage and they are especially objectionable on viscose rayon in viscose-acetate rayon mixtures since they absorb acetate-rayon dyes. Metal stains cause tendering in bleaching with  $\text{H}_2\text{O}_2$ . (B) Methods are described for identifying and dealing with various stains due to modification of the fibre substance or the presence of impurities, and for ascertaining whether holes in fabric are caused by mechanical or chemical damage. (C) Various types of stain are described, including those produced in the unshrinkable ( $\text{Cl}_2$ ) process and by overbleaching with  $\text{H}_2\text{O}_2$ . A. J. H.

**Stabilising diazo compounds in solution.**—See III. Oxidative dyeing.—See XV.

#### PATENTS.

**Dyeing [with vat dyes].** R. G. CLARKSON and F. W. JOHNSON, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,021,932, 26.11.35. Appl., 18.11.33).—A cellulose ether forming a stable colloidal solution in dil. caustic at dyeing temp. is used as retardant in vat dyeing. D. M. M.

**Coloration of acetate artificial silk.** IMPERIAL CHEM. INDUSTRIES, LTD., P. G. CARTER, R. H. SENNETT, and C. SHAW (B.P. 447,134, 12.11.34).—The use of *Bz*-1-methoxybenzanthrone, alone or mixed with other Duranol dyes, in dyeing or printing is claimed.

A. W. B.  
**Printing with vat dyes.** W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 446,488, 22.8.34. Addn. to B.P. 420,095; B., 1935, 95).—Betaine and its derivatives, including *N*-substituted products having partly a nuclear constitution and also those containing OH groups, are used instead of pyridine-betaine as in the prior patent. A. J. H.

**[Assistants for wet] treatment of textiles.** W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 446,416, 22.8.34).—Betaines containing  $\leq 1$  aliphatic radical of  $\leq \text{C}_8$  are used as wetting and levelling agents in dyeing, scouring, milling, etc. processes. A. J. H.

**Washing, detergent, and softening agents [for textiles].** CHEM. WERKE FORM. H. & E. ALBERT (B.P. 447,467, 11.9.34. Ger., 31.1.34).—Alkali polyphosphates suitable for use in textile treatment are produced by calcining neutral mixtures of alkali orthophosphates, or



constituents adapted to produce such mixtures, at 300—500°. A. J. H.

**Treatment of textile fibres and fabrics made therefrom.** O. F. MULLER (U.S.P. 2,011,726, 20.8.35. Appl., 29.6.34).—Degummed or artificial silk is dipped at room temp. in a 2–5% solution of the reaction product of rubber and chlorostannic acid, and the solvent removed by drying. D. A. C.

**Treatment [weighting] of [silk and rayon] fibres.** B. E. ROETHELI (U.S.P. 2,010,324, 6.8.35. Appl., 2.7.32).—Weighting is effected up to 200% by one or more treatments comprising steeping the textile material for 30 min. in an aq. solution ( $p_H \leq 8.0$ ) of a basic Pb salt (preferably the acetate), then hydro-extracting, rinsing in cold  $H_2O$ , and finally fixing and making the absorbed Pb salt non-irritating to human skin by treatment with an aq. solution of a mild alkali (e.g.,  $Na_2CO_3$ ,  $Na_2HPO_4$ , Na silicate). The lustre of the silk varies simultaneously with the basicity of the Pb salt liquor. A. J. H.

**Conditioning [lubricating] artificial textile and other materials.** BRIT. CELANESE, LTD. (B.P. 447,885, 2.12.35. U.S., 26.12.34).—Materials composed of org. derivatives of cellulose (I) are treated with egg oil (a) by incorporation during their formation, (b) by subsequent application as a solution or emulsion, together with a relatively non-volatile solvent or latent solvent for (I) (formal of  $OH \cdot C_2H_4 \cdot OMe$ ), a hygroscopic substance [ $C_2H_4(OH)_2$ ], or oleic acid. F. R. E.

**Fabrics resistant to shrinking.** RADUNER & Co. A.-G. (B.P. 445,891, 19.10.34. Switz., 25.11.33).—Cotton or other fabric is impregnated with a 20% aq. solution of a partly formed synthetic resin [e.g., urea +  $CS(NH_2)_2 + CH_2O$ ] or a natural resin, then stentered and thereby stretched as required, heated at 120–140°, washed in  $H_2O$ , and again stentered. The ordinary washing-shrinkage of cotton-voile fabric is thereby reduced from 7–9% to 0.09–1.8%. A. J. H.

**Fireproofing of cellulosic materials.** M. LEATHERMAN, Ded. to U.S.A. (U.S.P. 2,012,686, 27.8.35. Appl., 2.5.34).—Textile fabric is optionally treated with a wetting agent. It is then proofed against flaming by soaking in 20% aq.  $Na_2SnO_3$ , dried, and soaked in 20% aq.  $FeSO_4$ , when a coloured ppt. is produced in the fabric. If a metal salt of the same group giving a colourless ppt. is used, a pigment should be introduced into the fabric. The remaining Fe is then pptd. with  $NH_3$  gas, and the fabric washed and dried. It is then impregnated to resist glowing, with a chlorinated mixture of paraffin wax and low- $\eta$ , partly unsaturated petroleum oils containing chlorinated  $Ph_2$  as plasticiser. D. A. C.

**Cellulosic sizes. Bleaching wood pulp.**—See V. **Washing agents.**—See XII. **Materials containing rubber.** Elastic fabric.—See XIV.

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

**Phosphate deposits of the Transvaal: analysis and determination of the  $P_2O_5$  content.** W. ANDERSON (J. Chem. Met. Soc. S. Afr., 1936, 36, 287–295).—

The Palabora deposit consists of massive granular green and pink apatite in a granite, syenite, and pyroxenite rock and covered with limestone containing magnetite. The ore is mined by quarrying and ground to 90% through 200-mesh for use as a fertiliser; the finer ore is separated from accompanying minerals by flotation with oleic acid and  $Na_2SiO_3$  in a  $Na_2CO_3$  circuit. The  $(UO_2)(OAc)_2$  volumetric method and the  $(NH_4)_2MoO_4$  and  $MgNH_4PO_4$ -citrate methods for determining  $P_2O_5$  are described. A. R. P.

**Electrolytic oxidation of sodium arsenite.** O. W. BROWN, J. E. HATFIELD, and J. M. CHURCH (Trans. Electrochem. Soc., 1936, 70, Preprint 2, 31–33).—The efficiency of electrolytic oxidation of  $NaAsO_2$  is greater with Acheson graphite than with Pt anodes. With an 8% solution of  $As_2O_3$  in an alkali bicarbonate electrolyte a current efficiency of 100% is obtainable. C. R. H.

**Production of arsenic compounds and sulphur from copper sulpharsenate ores.** J. SZÉKI and A. ROMWALTER (Mitt. berg-hüttenw. Abt. kgl. ung. Palatin-Joseph-Univ., 1934, 6, 47–51; Chem. Zentr., 1935, ii, 415).—Dry distillation, which yields a sublimate of  $As_2S_3$  and S, is better than roasting in the treatment of the ore prior to flotation. The  $As_2S_3$  is dissolved in aq.  $NH_3$ , and the residual finely-divided S can be used directly for treating plants. In the treatment with aq.  $NH_3$ , formation of  $NH_4$  polysulphide diminishes if access of air is restricted. The aq.  $NH_3$  extract is treated with CaO.  $Ca_3AsO_3SAsS_4$ , on roasting, forms  $Ca_3(AsO_4)_2$ . H. J. E.

**Determination of talc in talc minerals.** O. KALLAUNER and I. ALEJNIKOV (Sprechsaal Keram., 1935, 68, 113–114; Chem. Zentr., 1935, ii, 420–421).—The powdered mineral, heated at 750°, is treated on the water-bath with HCl and dil. aq. NaOH. The talc is practically unattacked. H. J. E.

**Production of hydrogen by catalytic water-gas reaction.** F. G. LAUPICHLER (Chem. Met. Eng., 1936, 43, 122–126).—Curves are given of the variation, with temp., of the reaction const., the % conversion, and the % CO in the reaction products for CO, water-gas (I), producer gas (II), and mixtures of (I) and (II) using different steam/CO ratios, for the reaction  $CO + H_2O = H_2 + CO_2$ . The operation of a typical plant is described and costs are quoted. D. K. M.

**Utilising N and S from coal.**—See II. **Phosphate fertilisers.**  $NCl_3$  as fungicide.—See XVI.

See also A., July, 794, **Prep. of Au and  $Fe(OH)_3$  sols.** S organosol.  $FePO_4$  hydrosols. 795,  $Al_2O_3$  gel. 807, **Electrolysis of  $Mn^{II}$  salts.** 809, **Properties of  $Na_6P_6O_{18}$ .** **Prep. of  $Cu_2HgI_4$ , luminescent  $Zn_2SiO_4$ , and cryst.  $Al(OH)_3$ .** 810, **Prep. of  $PbCO_3$ ,  $PbCl_2$  and of alkali nitrates thereby.** **Prep. of  $Cr_2S_3$ .** 811, **Determination of HBr in HCl, and of F in  $Ca_2$  phosphate.** 813, **Analysis of silicate rocks.**

## PATENTS.

**Absorption and distillation of ammonia.** D. PYZEL, Assr. to SHELL DEVELOPMENT CO. (U.S.P. 1,999,546, 30.4.35. Appl., 7.6.32).—A stream of dil. aq.  $NH_3$  is introduced into the top of an absorber (A) and



meets a countercurrent stream of  $\text{NH}_3$  gas, whereby saturated aq.  $\text{NH}_3$  is formed, which is withdrawn from the bottom of *A*. Part of this is conducted away, and the remainder mixed with dil. aq.  $\text{NH}_3$ , cooled, and returned to the top of *A*. L. C. M.

**Production of nitrates from metal halides.** L. ROSENSTEIN, Assr. to SHELL DEVELOPMENT CO. (U.S.P. 2,007,478, 9.7.35. Appl., 2.2.31).— $\text{N}_2\text{O}_4$  is passed over fused KCl or the eutectic KCl- $\text{KNO}_3$  mixture to produce  $\text{KNO}_3$  and NOCl. A. R. P.

**Manufacture of hydrous [magnesium-sodium] silicate gel.** E. W. REMBERT, Assr. to JOHNS-MANVILLE CORP. (U.S.P. 1,999,210, 30.4.35. Appl., 10.4.31. Renewed 26.7.34).—Adsorptive products for decolorising oils etc. are prepared by mixing an aq. suspension of  $\text{MgO}$ ,  $\text{MgCO}_3$ , or  $\text{Mg}(\text{OH})_2$  (1 g.-mol.), with aq. Na silicate ( $\text{Na}_2\text{O} : \text{SiO}_2 = 3.34$ ) (0.3—1 g.-mol.). L. C. M.

**Manufacture of neutral calcium hypochlorite which can be satisfactorily filtered.** H. KLOPSTOCK and A. WURBS (U.S.P. 2,007,429, 9.7.35. Appl., 31.7.33. Ger., 4.8.32).—A 1 : >6 (10—14) suspension of  $\text{Ca}(\text{OH})_2$  in aq.  $\text{CaCl}_2$  (> 300 g. per litre) is treated with  $\text{Cl}_2$  to produce a readily filterable, relatively coarse-grained  $\text{Ca}(\text{OCl})_2$  containing 80—90% of available Cl. A. R. P.

**Manufacture of zinc sulphate and iron oxide.** C. R. C. C. WESPY, Assr. to C. PADBERG (U.S.P. 2,007,233, 9.7.35. Appl., 9.9.31. Ger., 12.9.30).—Roasted ZnS ore is mixed with  $\text{FeSO}_4$  (spent pickling solution) and heated at 650—750° to produce a mixture of  $\text{ZnSO}_4$  and  $\text{Fe}_2\text{O}_3$ . The former is leached out with  $\text{H}_2\text{O}$  and the residual  $\text{Fe}_2\text{O}_3$  etc. used as a red pigment. A. R. P.

**Preparation of zinc chloride melts for granulation.** F. L. FROST, JUN., Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,999,873, 30.4.35. Appl., 9.6.32).—Aq.  $\text{ZnCl}_2$  is evaporated until anhyd., the melt cooled to 250°, and agitated at 230—250° in a granulation tube. L. C. M.

**Reclaiming of pickling solution.** I. HECHENBLEIKNER, Assr. to CHEM. CONSTRUCTION CORP. (U.S.P. 2,006,693, 2.7.35. Appl., 3.5.32).—The solution is spray-dried and the resulting  $\text{FeSO}_4$  roasted with 12% of coal to give a gas containing 6% of  $\text{SO}_2$  for use in the chamber process of making  $\text{H}_2\text{SO}_4$ , and a residue of  $\text{Fe}_2\text{O}_3$  which is sintered on Dwight-Lloyd grates to reduce the S to > 0.1% and produce a granular product for the Fe blast furnace. A. R. P.

**Extraction of values from ores [carnotite].** H. L. GIBBS (U.S.P. 1,999,807, 30.4.35. Appl., 25.6.34).—Ra, U, and V are extracted by leaching the finely-ground ore (1 ton) with  $\text{H}_2\text{O}$  (3 tons) containing NaOH 75,  $\text{Na}_2\text{CO}_3$  300, and 30% aq.  $\text{H}_2\text{O}_2$  60 lb., or an equiv. wt. of  $\text{Na}_2\text{O}_2$  or  $\text{NaBO}_3$ . L. C. M.

**Treatment of nelsonite ore.** B. D. SAKLATWALLA and H. E. DUNN, Assrs. to SOUTHERN MINERAL PRODUCTS CORP. (U.S.P. 1,999,825, 30.4.35. Appl., 29.11.32).—Ilmenite (I) and apatite (II) are recovered by crushing the ore, grinding with 30 wt.-% of  $\text{H}_2\text{O}$  in a rod mill, desliming, and classification. The sand is dried and screened, and (I) is separated from (II) magnetically. L. C. M.

**Production of oxygen of high purity.** G. J. BOSKOFF, Assr. to LINDE AIR PRODUCTS CO. (U.S.P. 1,985,763, 25.12.34. Appl., 18.5.33).— $\text{O}_2$  free from hydrocarbons and inert gases is produced by the fractionation of liquid air in 3 stages, the first at high and the others at low pressure. L. C. M.

(A) [Method of], (B) apparatus for, removal of sulphur dioxide from flue gases. H. F. JOHNSTONE, Assr. to UNIV. ILLINOIS (U.S.P. 2,021,936—7, 26.11.35. Appl., 8.12.30, [B] 19.12.31).—(A) Flue gases containing free  $\text{O}_2$  are substantially freed from  $\text{SO}_2$  by scrubbing with a solution containing  $\text{Fe}^{+++}$  and  $\text{Mn}^{++}$  in solution. (B) A form of washer is claimed. D. M. M.

**Production and purification of sulphur dioxide [from sludge acid].** W. M. HIBBS (U.S.P. 1,996,764, 9.4.35. Appl., 4.4.33).—Sludge acid (*d* 1.16—1.50) (I) is treated with C at 235—260°; fresh (I) and C are added continuously, maintaining [C] :  $[\text{H}_2\text{SO}_4]$  < 2 : 1, and  $\text{SO}_2$  is withdrawn. L. C. M.

**Production of chlorine dioxide.** G. L. CUNNINGHAM, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 2,008,388, 16.7.35. Appl., 2.2.34).— $\text{Mg}(\text{OH})_2$  suspension is treated with  $\text{Cl}_2$  to form aq.  $\text{MgCl}_2$  and  $\text{Mg}(\text{ClO}_3)_2$  (I) and the latter is extracted from the solution with  $\text{COMe}_2$ . The residual  $\text{MgCl}_2$  solution is evaporated to dryness and the solid heated in air to regenerate  $\text{MgO}$  and form a mixture of steam,  $\text{Cl}_2$ , and HCl which is allowed to react on the (I) to produce  $\text{ClO}_2$  and  $\text{MgCl}_2$ . The gas mixture is then passed through a suspension of the recovered  $\text{MgO}$  in  $\text{H}_2\text{O}$  to remove the  $\text{Cl}_2$  and leave pure  $\text{ClO}_2$ . A. R. P.

Treating solids with gases [in  $\text{H}_2$  prep.].—See I. Filler etc. for paper.—See V. Washing etc. agents.—See VII. Lithopone.—See XIII.

## VIII.—GLASS; CERAMICS.

**Routine determination of boron in glass.** F. W. GLAZE and A. N. FINN (J. Res. Nat. Bur. Stand., 1936, 16, 421—429).—The sample is fused with  $\text{Na}_2\text{CO}_3$  and then the slightly acidified solution shaken with  $\text{Et}_2\text{O}$  and EtOH, the  $\text{H}_3\text{BO}_3$  passing into the  $\text{Et}_2\text{O}$  layer being titrated. The partition coeff. is 0.403 at  $25^\circ \pm 2^\circ$ . Accurate results are obtained with  $\text{B}_2\text{O}_3$  contents of 0.7—16%.  $\text{CaO}$ ,  $\text{MgO}$ ,  $\text{Al}_2\text{O}_3$ , NaOH,  $\text{Fe}_2\text{O}_3$ ,  $\text{As}_2\text{O}_3$ , and  $\text{As}_2\text{O}_5$  in amounts normally present in glass do not interfere. BaO, F, and large amounts of  $\text{Fe}_2\text{O}_3$  interfere slightly, whilst ZnO interferes seriously. J. W. S.

**Firing of tin glazes.** E. WETTIG (Keram. Rundsch., 1935, 43, 96—99; Chem. Zentr., 1935, ii, 418).—Firing at Segar cone 010a—0.07a gave good results in a coal-heated muffle, whereas in an electric muffle the product was matt and discoloured. H. J. E.

**Westerwald clays.** K. ZIMMERMANN (Sprechsaal Keram., 1935, 68, 145—146, 161—164; Chem. Zentr., 1935, ii, 419).—Composition data for 15 samples are given. Tests on the ceramic properties are described. H. J. E.

**Microbiology of ageing clays.** D. P. GLICK (J. Amer. Ceram. Soc., 1936, 19, 169—175).—A large no.



and varieties of bacteria were found on 6 samples of clay. The bacteria were typical  $H_2O$  and soil organisms. By sterilising the surface of a lump of native ball clay with I vapour it was possible to show that the bacteria existed only on the surface and were derived from outside sources. J. A. S.

**Kinetics of some reactions of interest to ceramists. Disintegration of blast-furnace linings due to carbon deposition.** C. C. FURNAS (J. Amer. Ceram. Soc., 1936, 19, 177—186).—The subject is reviewed in detail, and further experimental evidence shows that the deposition of C at Fe spots is greatly diminished if the brick is fired in a reducing atm. J. A. S.

**Fluxing effect of feldspar in whiteware bodies.** E. SCHRAMM and F. P. HALL (J. Amer. Ceram. Soc., 1936, 19, 159—168).—Vitrification, porosity, and high-temp.  $\mu$  curves (slumping of loaded test cylinder) were determined for vitreous (with and without  $CaO$ ) and semi-vitreous bodies made up with feldspars ranging from high  $K_2O$  to high  $Na_2O$  content. Long-duration tests corresponding with the slumping tests were made by firing, in a commercial kiln, an inverted, flat-bottomed dish loaded in the centre. High- $Na_2O$  feldspar produces earlier vitrification than  $K_2O$  feldspar unless the body contains  $CaO$ , when the reverse is true. This is due to the increasing of the fusibility of the feldspar by the  $CaO$ . Feldspars at the high- $K_2O$  end of the series are interchangeable in practice because the development of leucite crystals in the melt is almost independent of the  $Na_2O$  content. The fluxing properties of intermediate natural feldspars can be matched by blendings based on chemical analysis. The fluxing action of a feldspar is a function not only of its own fusibility, but also of its interaction with the other components of the body. *E.g.*, a lower-fusibility feldspar may give a greater vitrification, clay and  $SiO_2$  may be more sol. in the glass phase of a porcelain than in the feldspar alone, and the glass phase in a porcelain is approx.  $2\frac{1}{2}$  times the quantity of feldspar used. J. A. S.

**Influence of firing time on properties of some whiteware bodies.** A. S. WATTS (J. Amer. Ceram. Soc., 1936, 19, 175—176).—Contrary to the generally accepted principle, several bodies when fired in commercial kilns were shown to give a lower  $H_2O$  adsorption and greater shrinkage if fired at a faster rate. J. A. S.

**Kabus softness tester [for ceramic materials].** H. HECHT (Keram. Rundsch., 1935, 43, 73—74; Chem. Zentr., 1935, ii, 420).—An instrument is described with which the plastic state and  $H_2O$  content are deduced from the depth of penetration of a piston. H. J. E.

**Electrical ultra-micrometer for measuring the thermal expansion of ceramic materials.** A. HEINZ and H. KOTTAS (Sprechsaal Keram., 1935, 68, 49—51, 65—67; Chem. Zentr., 1935, ii, 420).—The change in length of a test-piece is transferred by a lever to one electrode of a differential condenser. The change in capacity of the latter is measured. H. J. E.

**Accelerated method for determining wear caused by abrasion.** F. D. SNELL and K. W. HAESELER (Ind. Eng. Chem. [Anal.], 1936, 8, 191—194).—Apparatus and technique suitable for testing the wear-resistance of

flooring are described. Tests on the abrasive efficiency of tooth pastes have also been carried out. E. S. H.

See also A., July, 806, **Effect of F' on thermal synthesis of Ca silicates.**

#### PATENTS.

**Manufacture of multicellular glass.** SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (B.P. 447,805 and Addn. B.P. 447,821, 28.5.35. Fr., [A] 28.5.34).—(A) Crushed glass mixed with materials which develop gas at a high temp. ( $SiC$ ,  $Na_2SO_4$ , kieselguhr, etc.) is placed in a mould which is then heated to the softening temp. of the glass and cooled when the desired degree of cellular structure is attained. The gas-producing materials may function by reaction among themselves or with the glass. A mixture of glass 90,  $SiO_2$  3,  $Na_2SO_4$  6, and C 1%, if heated to  $850^\circ$ , produces a glass of  $d$  0.45. (B) The mixture claimed in (A) is placed in a (graphite) mould preheated to  $800$ — $900^\circ$ . J. A. S.

**Glass-tube connexion, more particularly for laboratory and chemical technical apparatus.** VEREIN. LAUSITZER GLASWERKE A.-G. (B.P. 448,658, 5.6.35. Ger., 30.4.35).—Conical surfaces turned or milled to mate by hard metal tools are utilised. B. M. V.

**Frosting the inner surface of glass bulbs for electric lamps.** T. NARUSE (U.S.P. 1,997,375, 9.4.35. Appl., 21.3.33).—An evenly-frosted surface is obtained with a mixture of aq. HF (40%) 38,  $NH_4F$  38,  $H_2SO_4$  5, and  $H_2O$  15 pts., with 20 wt.-% of powdered paraffin wax. L. C. M.

**Glass to metal seals.** BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 448,727 and 448,746, [A] 13.3.35, [B] 16.9.35. U.S., [A] 17.3.34, [B] 15.9.34).—(A) In the case of a glass bulb (B) for an electric-discharge device the seal comprises a metal tube, glass tube, and metal tube sealed together end-to-end, the conductor (C) being sealed to one joint of the 3-piece tube and B to the other. (B) A mass of glass completely fills the space between C and a metal envelope (or an extension tube attached thereto) and the path over the surface of the insulation is  $>$  the shortest distance between C and B. (A, B) The metal and glass have the same thermal expansion from  $0^\circ$  to the softening point of the glass. B. M. V.

**Agglomeration of fossil silica.** (MRS.) R. ANDRA (B.P. 448,755, 9.11.35. Luxemb., 14.11.34).—Kieselguhr is mixed into a paste with 4—5% of a Mg salt ( $MgCl_2$ ), moulded, and baked at  $800$ — $1200^\circ$ . J. A. S.

**Acid-resistant vitreous enamel composition.** J. G. G. FROST, ASST. to VITREOUS ENAMELING CO. (U.S.P. 2,010,776, 6.8.35. Appl., 23.12.31).—A fusible enamel, suitable for application to sheet steel, is prepared by fritting  $B_2O_3$  2—10,  $Na_2O$  15—30, and  $SiO_2$  55—75%. The  $SiO_2$  may be replaced by a mixture of  $SiO_2 + TiO_2 + Sb_2O_3$ , the amount of  $SiO_2$  being 50—65%.  $Al_2O_3$  and fluorides may be introduced in amounts of 3—5% and 0.3—3.0%, respectively. *E.g.*, a suitable frit consists of  $Na_2O$  15—30,  $B_2O_3$  2—10,  $SiO_2$  50—75,  $TiO_2$  1—10,  $Sb_2O_3$  1—5,  $Al_2O_3$  0.5—5,  $CaF_2$  1—5%. J. A. S.



**Production of spalling-resistant magnesia bricks or masses.** SILIKA- U. SCHAMOTTE-FABR. MARTIN & PAGENSTECHER A.-G. (B.P. 447,525, 24.8.35. Ger., 18.9.34).—A mixture of coarse sintered MgO ( $> 2$  mm.) containing  $< 2\%$  of  $\text{Fe}_2\text{O}_3$  and fine sintered MgO containing  $> 4\%$  of  $\text{Fe}_2\text{O}_3$  is shaped and fired at  $> 1450^\circ$ .  
J. A. S.

**Heat-insulating bricks or blocks for use in furnaces, kilns, and the like.** H. V. ALLEN (B.P. 448,663, 9.9.35).—A porous back is moulded with a dovetail and burned; a refractory face is moulded on and the whole burned.  
B. M. V.

**Manufacture of (A) porous bodies, (B) abrasive articles.** CARBORUNDUM CO. (B.P. 448,453—4, 7.12.34. U.S., 8.12.33).—(A) A slip is formed including granular material, binding agents, a stabilising agent (S), and (preferably added last) a gas-forming agent ( $\text{H}_2\text{O}_2$ ). S is, e.g.,  $\text{NHPhAc}$ , and prevents any substantial evolution of gas until the slip has been puddled into the mould, and is also a deflocculating agent. Buffer solutions ( $\text{Na}_4\text{P}_2\text{O}_7$ ,  $\text{Na}_2\text{SnO}_3$ , or an acid) are also desirable. (B) Abrasive grains, coke, and vitreous and temporary bonds are mixed and pressed and the coke is burned out, the average size of the coke being  $<$  that of the grains.  
B. M. V.

**Oil emulsion [for polishes].**—See II. **Refractory mortars.**—See IX. **Enamelled rustless steel.**—See X.

## IX.—BUILDING MATERIALS.

**Effects of partial prehydration and different curing temperatures on some of the properties of cement and concrete.** F. B. HORNIBROOK, G. L. KALOUSEK, and C. H. JUMPER (J. Res. Nat. Bur. Stand., 1936, 16, 487—509).—The heats of hydration ( $H$ ) and compressive strengths ( $C$ ) of concrete specimens made of untreated and steam-prehydrated cements have been determined for ages of 7, 28, and 90 days, and 1 year.  $H$  and  $C$  are both reduced by prehydration, 5% prehydration causing more reduction than 3%. At later ages the  $H$  vals. obtained at continuous  $65\text{--}5^\circ$  curing were  $<$  those at continuous  $29^\circ$  curing, but the  $C$  vals. were little affected. Excepting for cements of high  $\text{Ca}_3$  aluminate content, prehydration increases resistance to the action of aq.  $\text{Na}_2\text{SO}_4$ .  
J. W. S.

**Deterioration of concrete owing to chemical attack.** F. M. LEA (Cement, 1936, 9, 130—138).—The conditions of attack on different types of cement are discussed. Sulphates react with the hydrated Ca aluminates in set Portland cement to form Ca sulphoaluminate. In the reaction of sulphates other than  $\text{CaSO}_4$ , the free  $\text{Ca}(\text{OH})_2$  of the cement first reacts to form  $\text{CaSO}_4$ . The resistance of Portland cement concrete increases with the density and watertightness and with the preliminary ageing of the concrete before exposure. Aluminous cement is immune to sulphate attack, and puzzuolanic and Portland blast-furnace cements are more resistant than is Portland cement. Pure  $\text{H}_2\text{O}$  has a solvent action on set Portland cement, which is normally limited to the surface; acid waters are more aggressive. Aluminous cement has a high resistance to these. Ground which has been filled or

contaminated with trade wastes may contain material harmful to concrete. Examples are given. Internal attack on concrete sewer pipes and protective measures are described in detail.  
T. W. P.

**Roman puzzuolanic mortar.** Q. SESTINI (Annali Chim. Appl., 1936, 26, 167—173).—Examination of old puzzuolanic mortar from Civitavecchia shows that it was made from two types of puzzuolana, viz., one red (R) (Roman type) and the other yellow (Y) (Flegrea type). The old mortar containing R has 21.30% of CaO (6.70% insol. in HCl), and that containing Y 12.10% of CaO (1.50% insol. in HCl). Mortar prepared from R is more compact and resistant than that from Y. It is shown that only mortars still containing notable quantities of CaO possess solidity and resistance.  
L. A. O'N.

**Influence of time and temperature of hardening on strength of lime-sand stone.** H. IPPACH (Tonind.-Ztg., 1935, 59, 88—92; Chem. Zentr., 1935, ii, 420).—A mixture of  $\text{SiO}_2$  (50 pts.),  $\text{Ca}(\text{OH})_2$  (50), and  $\text{H}_2\text{O}$  (70) was used. For each temp. a max. strength was reached for an optimum time of hardening. The primary process is the formation of colloidal Ca silicate. A subsequent crystallisation process reduces the strength of the product. These reactions are accelerated to different degrees by rise of temp.  
H. J. E.

**Chemistry of Australian timbers.** V. Lignin determination. III. W. E. COHEN (Counc. Sci. Ind. Res., Australia, 1936; Forest Prod. Tech. Paper 20, 30 pp.; cf. B., 1935, 357).—"Apparent lignin," determined by means of 72%  $\text{H}_2\text{SO}_4$  and from the lignin-OMe val., when applied to woods extracted by solvents, includes lignin-like substances produced during extraction pretreatment. It is suggested that solvents react with certain uronic and non-uronic furfuraldehyde-yielding constituents, producing compounds which form lignin-like substances with 72%  $\text{H}_2\text{SO}_4$ . Treatment with aq. NaOH removes the uronic, and has little effect on the non-uronic, constituents, but hot 3%  $\text{H}_2\text{SO}_4$  hydrolyses both. A pretreatment technique recommended therefore includes extraction with  $\text{EtOH-C}_6\text{H}_6$  (1:2) and then with EtOH, maceration with cold  $\text{H}_2\text{O}$ , digestion with hot  $\text{H}_2\text{O}$ , treatment with aq. NaOH, and hydrolysis with hot dil.  $\text{H}_2\text{SO}_4$ .  
E. A. R.

**Preservative treatment of pit timber.** P. F. DAY (Trans. Inst. Min. Eng., 1935, 90, 160—164).—Pit timber has been impregnated with hot  $3\frac{1}{2}$  and 8% aq. NaCl, 2 and 5% aq.  $\text{ZnCl}_2$ , 2 and 4% aq. NaF, 2 and 5% aq. Wolman salts, and creosote and exposed in a coal mine. The preservative effect of the substances increased in the above order. Estimates of cost of treatment are given.  
D. K. M.

**Use of mineral oils in wood impregnation.** F. MOLL (Oel u. Kohle, 1936, 12, 577—579).—Non-aq. materials used in the impregnation of wood are reviewed. The rôle of preservatives and the nature of the responsible constituent are considered to be unsolved problems. Impregnation with tar oils, or with tar oil-petroleum oil mixtures, is the invariable practice.  
E. A. R.

**Influence of calcium in the decay of wood.** (A) R. A. B. SMITH. (B) J. G. BOSWELL (Chem. and Ind., 1936, 402).—Replies to McLachlan (B., 1936, 546)



(A) Modern cements in the dry state may contain less free CaO than older cements, but when set into mortar or concrete there is just as much free CaO. Consequently if CaO has any inhibitory effect it is still available in mortar and concrete made with modern cements.

(B) CaO applied in such a manner that considerable CaCO<sub>3</sub> may be formed acts as an accelerator, and not as an inhibitor, of the growth of *Merulius lachrymans* on timber.

D. K. M.

**Influence of calcium on decay of wood.** T. McLACHLAN (Chem. & Ind., 1936, 422; cf. Smith and Boswell, preceding abstract).—The influence of CaCO<sub>3</sub> on metabolism of moulds etc. is associated with the biological theory of decay of building materials.

E. A. R.

**[Influence of calcium on decay of wood.]** A. V. HUSSEY (Chem. & Ind., 1936, 423; cf. preceding abstract).—If free CaO accelerates decay, it is suggested that aluminous cements should remedy such action.

E. A. R.

**Bitumen [for insulation]. Asphalt-bitumen mixtures.**—See II. Weathering of roofing felts.—See V. Wear caused by abrasion.—See VIII. Bituminous plastics.—See XIII.

See also A., July, 809, [Attack of cement by] Na<sub>6</sub>P<sub>6</sub>O<sub>18</sub>.

## PATENTS.

**Manufacture of cement.** SOUTHERN STATES PORTLAND CEMENT CO. (B.P. 447,722, 2.10.35. U.S., 1.11.34).—Portland cement clinker is made in proportions to contain 30–75% of 3CaO.SiO<sub>2</sub> (I) and no free CaO. A second mixture is made up and calcined at 700–1200° to contain free active SiO<sub>2</sub>, CaO, Al<sub>2</sub>O<sub>3</sub>, 2SiO<sub>2</sub>, and CaO.SiO<sub>2</sub>. The two clinkers are mixed in such proportions that the active SiO<sub>2</sub> is in sufficient quantity to react with the Ca(OH)<sub>2</sub> produced on hydration of the (I). It is claimed that by variation of the mixes, cements of high sulphate-resistance, low heat of hydration, or high early strength may be obtained.

T. W. P.

**Manufacture of a sound- and heat-proof product.** SOC. ANON. FRANÇ. "ETERNIT" (B.P. 448,477, 15.3.35. Belg., 15.3.34).—85–98% of Portland or like cement is mixed with 15–2% of asbestos fibre, and gas is mechanically incorporated to make the product cellular; 0.1–1.0% of a frothing agent, e.g., a carbonate, may be added to assist.

B. M. V.

**Refractory building materials, more particularly mortars.** V. M. GOLDSCHMIDT (B.P. 447,452, 30.5.35. U.S., 24.11.34).—A cement suitable for use with basic and acid bricks consists substantially of olivine together with a suitable bond such as alkali silicate or borate, glue, etc.

J. A. S.

**Rubber-bitumen compositions.**—See II. Metal-wood joints.—See X. Sizing stone.—See XIII.

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

**Constructional and operation data of open-hearth [steel] furnaces with mixed-gas heating.** F. WESEMANN (Stahl u. Eisen, 1936, 56, 677–684).—

Data relating to the construction of burners and the size of conduits and flues are given in the form of tables and figures.

W. P. R.

**Technique of charging the open-hearth furnace.** G. STRIEGAN (Stahl u. Eisen, 1936, 56, 728–732).—The period of melting and refining in an open-hearth steel furnace depends on the composition and character of the charge.

W. P. R.

**Methods of estimating cupola mixtures.** E. C. ROLLASON (Metallurgia, 1936, 14, 49–52).—Various methods, algebraic and graphical, for estimating the amounts of 2 or 3 different pig irons to obtain a charge of required composition are given.

W. P. R.

**Blast-furnace slag.** L. R. PIRE and J. GARRIDO (Anal. Fis. Quím., 1935, 33, 709–712).—Addition of dolomite to the furnace leads to formation, in the slag, of crystals having the composition (SiO<sub>2</sub>)<sub>6</sub>(CaO)<sub>7</sub>(MgO)<sub>3</sub>(Al<sub>2</sub>O<sub>3</sub>). An examination of the X-ray reflexions indicates a resemblance to mellite.

F. R. G.

**Technical data on open-hearth steel-making practice.** ANON. (Stahl u. Eisen, 1936, 56, 622–624).—A list of terms used in open-hearth practice and drawn up by the Steelworks Committee of the Vereins deutscher Eisenhüttenleute is presented and each term is given an agreed meaning.

W. P. R.

**Determination of silica in iron ores.** C. C. HAWES (Min. & Met., 1936, 17, 335–336).—The ore is digested with HCl and a little HNO<sub>3</sub> if pyrite is present and the solution evaporated to dryness with a little HClO<sub>4</sub>. The residue is moistened with HCl and digested with H<sub>2</sub>O and the insol. matter collected, washed, and ashed in a nichrome crucible. The ash is mixed with 4 g. of an intimate 10:7 mixture of Na<sub>2</sub>CO<sub>3</sub> and ZnO and the mixture kept at 1000° for 15 min. The resulting frit is dissolved in a 10:10:5 mixture of H<sub>2</sub>O, HCl, and HClO<sub>4</sub> and the solution evaporated until HClO<sub>4</sub> fumes are evolved. After cooling, diluting, and filtering, the SiO<sub>2</sub> is ignited, weighed, and tested with HF as usual.

A. R. P.

**[Distribution of] phosphorus in chilled cast-iron rolls.** H. RUDOLPH (Mitt. Forsch.-Anst. Konz. Gutehoffnungshütte, 1935, 3, 208–222; Chem. Zentr., 1935, i, 3591).—The P occurs in the outer, severely-chilled layers as a very fine-grained, pseudobinary eutectic of Fe<sub>2</sub>P and ternary solid solution, in the next zone as the ternary Fe<sub>2</sub>P–Fe<sub>3</sub>C–ternary solid solution eutectic, and in the core as isolated islands of the ledeburite eutectic.

A. R. P.

**Soil-corrosion studies, 1934. Rates of loss of weight and pitting of ferrous specimens.** K. H. LOGAN (J. Res. Nat. Bur. Stand., 1936, 16, 431–466).—The conclusions of previous reports (B., 1929, 942; 1931, 887, 1100; 1934, 364) are confirmed. Average max. penetrations for wrought Fe, Bessemer and open-hearth steels differ by only a few %. Open-hearth Fe and steel containing 0.2% Cu pit slightly more deeply than other wrought specimens. In some soils cast Fe corrodes more rapidly than steel. Addition of Cr to steel reduces loss of wt. by pitting and no. of pits, but, especially in soil containing Cl<sup>-</sup>, does not prevent



serious pitting. Addition of Ni, with or without Cr, tends to reduce the depth of pits. J. W. S.

**Rapid determination of phosphorus in stainless steels. Use of perchloric acid.** C. D. SUSANO and J. H. BARNETT, JUN. (Ind. Eng. Chem. [Anal.], 1936, 8, 183—184).—The sample is dissolved in 60%  $\text{HClO}_4$  and then subjected to ordinary analytical procedures. E. S. H.

**Determination of selenium in steel.** W. C. COLEMAN and C. R. McCROSKY (Ind. Eng. Chem. [Anal.], 1936, 8, 196—197).—Modifications of Norris and Fay's procedure (A., 1897, ii, 70) are described. E. S. H.

**Hydrogen in steel.** H. PLOUM (Chem. Fabr., 1936, 9, 173—177).—A comprehensive review of the effect of H on the properties of steel. W. P. R.

**Susceptibility of high-tensile [low-alloy] steels to weld fissures.** F. BOLLENRATH and H. CORNELIUS (Stahl u. Eisen, 1936, 56, 565—571).—Weld fissures originate chiefly at high temp., but the possibility of their occurrence at  $< 250^\circ$  is suggested. Welding stresses set up by differential expansions and unsuitable construction are the chief cause of failure, but in addition the influence of the type of steel welded, the composition of the filler rod, and the purity of the gas is discussed. The effect of S and P in causing fissures depends on the C content of the steel; the higher is the latter, the lower is the permissible limit for combined S and P. W. P. R.

**Strength of metals under combined alternating stresses.** H. J. GOUGH and H. V. POLLARD (Proc. Inst. Mech. Eng., 1935, 131, 3—103).—By means of a specially designed combined stress-fatigue testing machine (described) a study of the behaviour of three materials, (a) 0.1% C steel, (b) 3.5% Ni steel, and (c) a Si cast Fe, under the influence of combined alternating-plane flexural and torsional stresses has been made. The behaviour of (a) is in almost exact agreement with the von Mises-Hencky const. shear-energy theory, but (b) behaves in accordance with the const. total energy theory, and (c) in accordance with the max. principal stress theory. The results obtained can be expressed thus:  $f^2/f_1^2 + q^2/q_1^2 = 1$ , where  $f$  and  $q$  are the applied bending and torsional stresses at fatigue limit, and  $f_1$  and  $q_1$  are fatigue limits under simple bending and pure shear, respectively. W. P. R.

**Impact torsion tests. V. Impact and static torsion diagrams of 0.6, 0.8, 1.0, and 1.3% carbon steels at low and high temperatures.** M. ITIHARA (Tech. Rep. Tôhoku, 1936, 12, 63—104; cf. B., 1935, 856).—Impact and static torsion stress-strain diagrams are given for normalised steels, and it is shown how they are influenced by temp., sp. sliding speed, and the structure of the metal. By the aid of Sunatani's law of failure the mechanism of blue- and cold-shortness in steels is explained. W. P. R.

**Similarity between stress-strain diagrams obtained from impact tensile and torsional tests.** M. ITIHARA (Tech. Rep. Tôhoku, 1936, 12, 105—118).—A study of the diagrams obtained in tensile- and torsion-impact tests on mild steel and brass indicates that a similarity obtains to within 5—7%. W. P. R.

**Determination of the elastic limit in indentation tests as an adjunct to hardness measurements.** G. TAMMANN and W. MÜLLER (Z. Metallk., 1936, 28, 49—54).—From the height of the ridge formed when a cone is indented into a metal and from the diam. ( $a_0$ ) of the circle produced by wearing away the ridge on emery paper it is possible to calculate the stresses along the outer rim of the ridge, which are = the elastic limit ( $E$ ) of the metal. If  $Q$  is the load producing the impression, then  $E = Q/\pi a_0^2$ . For Al, Cu, and electrolytic Fe  $E$  increases rapidly with the degree of rolling up to 10% reduction, and thereafter more slowly, the vals. for the annealed metals being 5, 6, and 14, for the metal after 10% reduction 8.5, 25, and 35, and after 40% reduction 10, 30, and 41 kg. per sq. mm., respectively. A. R. P.

**Means for detecting iron in alloy equipment.** F. H. HOYT (Chem. Met. Eng., 1936, 43, 150).—The presence of Fe parts, e.g., nuts, rivets, etc., in corrosion-resisting materials, e.g., Ni, stainless steel, can be detected by covering the metal with a paste of plaster of Paris 0.25—0.5 in. thick. When dry a yellow stain appears on the plaster covering the Fe. D. K. M.

**Replacement of tin, especially by antimony, in red brass Rg 5 and Rg 9.** W. KEESE (Z. Metallk., 1936, 28, 58—63).—The homogeneous  $\alpha$ -solid-solution range in the Zn-Sb-Cu system is bounded by a straight line joining the 38% Zn point on the Cu-Zn side of the ternary diagram with the 8% Sb point on the Cu-Sb side. All alloys with up to 2.5% Zn and  $\geq 5\%$  Sb can be cold-worked, but are inferior in mechanical properties to the corresponding Sn alloys. A. R. P.

**Making strong brass and making brass strong. Practical considerations in producing brass castings and forgings. Conclusion.** M. G. CORSON (Metal Ind., N.Y., 1935, 33, 280—282; cf. B., 1936, 412). L. S. T.

**What is phosphor bronze?** M. G. CORSON (Metal Ind., N.Y., 1935, 33, 428—429).—A discussion. L. S. T.

**Nickel alloys for low- and high-temperature service.** B. B. MORTON (Chem. Met. Eng., 1936, 43, 136—138).—The use of Ni alloys as materials for plant used in different operations in petroleum refineries is discussed. D. K. M.

**Testing of soft solders.** H. HANEMANN (Z. Metallk., 1936, 28, 68—69).—The shear strength of soldered joints is determined by pulling in the tensile machine a soldered joint with an overlap of 5 mm., torsion tests are made on butt-soldered rods prepared with a standard soldering pressure, and the hot strength of joints is determined by hanging a 1-kg. wt. on the lower of two soldered strips and observing the temp. at which the joint fails. A mechanical soldering machine is described for making joints at definite temp. in controlled times with standard amounts of solder. Resistance to corrosion is determined in distilled, tap, and artificial sea- $\text{H}_2\text{O}$ , 10% aq. tartaric acid, and in 10% aq. citric acid. A. R. P.

**Test for porosity in the coating of tinplate.** J. C. ANDREWS and R. T. D'ANVERS (Analyst, 1936, 61, 402).—A sheet of Cellophane paper (No. 300) is soaked



for 15 min. in 750 c.c. of a 7% solution of  $K_3Fe(CN)_6$  containing 10 drops of  $H_2SO_4$ , and after draining it is laid and pressed on the cleaned surface of the tinplate and protected by a paper damped with the solution. After 45–60 min. the sheet is removed, washed, and dried, and the imperfections in the Sn coating will be indicated by the presence of blue stains. E. H. S.

**Re-treatment of cyanide tailings from the Golden Horseshoe Mine.** T. B. STEVENS (Bull. Inst. Min. Met., 1936, No. 379, 12 pp.).—The dump contains 1.65 dwt. of Au per ton and 95% of the material is —200 mesh; it is sluiced with a hydraulic nozzle, using aq. 0.015% NaCN containing slime in suspension, to obtain a pulp of  $d$  1.5 suitable for treatment in the agitators without thickening. Most of the Au dissolves during sluicing, the agitators being sufficient only to hold a supply for the filters during stoppages in the sluicing plant. The consumption of NaCN is 0.54 lb. per ton of tailings, and this is made up by adding the NaCN to the Au solution after filtration to yield a suitable solution for pptn. with Zn. Only 0.003% of CaO as protective alkalinity is used, equiv. to a consumption of 1.2 lb. per ton, and the Zn consumption is 0.036 lb. per ton. The bullion obtained contains Au 62 and Ag 33% and the cost of treatment is 2s. 1d. per ton. A. R. P.

**Palladium and palladium leaf.** A. B. THOMAS (Metal Ind., N.Y., 1935, 33, 354).—Uses are described. L. S. T.

**Tungsten carbide tools.** G. PERDRIZET (Bull. Soc. Ind. Mullhouse, 1936, 102, 204–218).—The manufacture, cost of operation, and the general characteristics of  $W_3C$  cutting tools (of Widia, Carboram, Ardoloy, Titanit) are described. W. P. R.

**Advantages of chemically-prepared metal powders as raw materials.** P. WIESSNER (Chem.-Ztg., 1936, 60, 536).—Metal powders prepared by reduction of oxides or by electrolysis are very pure and consequently suitable (1) for making uniform alloys, as Cu–W; (2) for plating, as Fe with Ni; (3) for mixing with non-metals, e.g., graphite, to form self-lubricating bronze, which can be impregnated with oil. C. I.

**Metal coating with the pistol.** J. FASSBINDER and P. SOULARY (Gas J., 1936, 215, 112–113).—Sprayed Zn, Cd, Al, Studal, and Inalium coatings on steel were tested for corrosion-resistance by cycles of treatment involving spraying with liquids, partial immersion, and intermediate drying. All afforded good protection. C. E. H.

**High-purity ingot metal.** W. E. McCULLOUGH (Metal Ind., N.Y., 1935, 33, 274–275).—The application of the spectrograph to the analysis of non-ferrous alloys is described. L. S. T.

**Purification of magnesium and calcium by distillation.** J. HERENGUEL and G. CHAUDRON. (Aciers spéc. Mét., 1934, 9, 415–417; Chem. Zentr., 1935, ii, 428).—An apparatus is described yielding Mg and Ca of 99.99 and 99.5% purity, respectively. H. J. E.

**Furnace for melting aluminium and its alloys.** U. SCHWEDLER (Z. Metallk., 1936, 28, 69–71).—An induction type of furnace operated on 3-phase current and provided with internal Fe cores to circulate the

charge is described. In melting hydronalium the total metal loss is  $> 1.2\%$ , of which  $< 0.1\%$  is Mg.

A. R. P.

**Preparation, working, and uses of aluminium bronzes.** E. LAY (Z. Metallk., 1936, 28, 64–67).—The mechanical properties of 4, 8, and 10% Al–Cu alloys after various degrees of cold-work and of Ni–Al bronzes after different heat-treatments are shown graphically. Methods of casting these alloys are briefly described and some of their more important industrial uses indicated.

A. R. P.

**“Alumag” self-protecting aluminium alloys.** E. DROUILLY (Aciers spéc. Mét., 1934, 9, 404–407; Chem. Zentr., 1935, ii, 428).—A review. H. J. E.

**Bimetallic corrosion promoted by copper-aluminium contacts.** P. MABB (Metallurgia, 1936, 14, 29–31).—Whilst pure Al is itself fairly resistant to corrosion, in contact with Cu it is quickly attacked. Numerous examples of corrosion tests are cited, and it is shown that even the protective action of an anodic coating breaks down in the region of Cu contacts.

W. P. R.

**Application of microchemical analysis to the study of corrosion of light aluminium alloys.** H. FOURNIER (Compt. rend., 1936, 202, 1792–1794).—The colorimetric determination of Al by means of the lake formed with hæmatoxylin in buffered medium (B., 1933, 494) is applicable to [Al] of 0.1–2 mg. per litre and is not appreciably affected by equal amounts of Mg or traces of other metals. The greatest error is caused by Fe. The method has been applied to the determination of the dissolution of duralumin and of an Al–Mg alloy (8% Mg, 0.5% Mn) in continuously renewed 10% NaCl. The latter alloy has a pronounced auto-protective behaviour, its dissolution being rapid initially, but becoming very slow after the first 20 min.

J. W. S.

**Rhokana electrolytic copper refinery.** A. E. WHEELER and H. Y. EAGLE (Bull. Inst. Min. Met., 1936, No. 379, 19 pp.).—The Cu is refined in reverberatory furnaces until it contains Fe  $< 0.01$ , S  $> 0.015$ , and O 0.33%, and then cast into anodes of 625 lb. The electrolytic tanks are arranged in 30 nests of 13 and are lined with 6% Sb–Pb alloy; the electrolyte enters each tank at the top and leaves at the bottom of the opposite side and each tank contains 32 anodes and 33 cathodes. The c.d. is 14 amp. per sq. ft. of cathode and the electrolyte circulates at 4 gals. per min. through each tank, being maintained at about 55° by steam coils. The slimes are removed continuously from the bottom of the cells, filtered, dried, and smelted to a crude blister Cu; they contain Cu 62, Se 4.5%, Au 5, and Ag 600 oz. per ton. The electrolyte contains Cu 3.265 and  $H_2SO_4$  17.14% together with small quantities of Bi, Fe, Ni, and Co. The wire bars obtained by melting the cathodes contain Cu 99.95, Sb 0.001, O 0.035% with traces of Pb, Bi, and S. Photographs and diagrams of the plant are included. A. R. P.

**Direct production of electrolytic copper plates.** ANON. (Metal Ind., N.Y., 1935, 33, 395–396).—Factors essential for successful production are discussed.

L. S. T.



**Electric annealing of brass and copper.** T. B. BECHTEL (Metal Ind., 1936, 34, 12—14). L. S. T.

**Influence of additions to nickel[-plating] baths on the harmful effect of iron.** E. RAUB (Mitt. Forsch.-Inst. Edelmet. Schwäb. Gmünd, 1935, 9, 1—8; Chem. Zentr., 1935, ii, 429).—The effect of substances (lactic, citric, and tartaric acids, pyrocatechol, BzOH, lactose, and fluorides) which form complexes, and so prevent accumulation of Fe ions in the Ni bath, was studied. At  $p_H > 4$  such substances hinder flaking of the ppt., even with high [Fe]. Under normal conditions ( $p_H$  5—6) they were less effective. Citric acid gave the best result, and then tartaric acid; lactic acid, lactose, and other addenda were harmful. H. J. E.

**Determining the thickness of zinc coatings.** W. R. MEYER (Metal Ind., N.Y., 1936, 34, 173—175).—The Hull-Strausser drop test, the Sb chloride-HCl stripping test, microscopical measurement, and analytical determinations give trustworthy and correlated results with electrodeposited Zn coatings. The Preece test is unreliable for coatings  $< 0.001$  in. thick. For sherardised coatings, dissolution in HCl and determination of the Zn analytically is the only trustworthy method. This is also the best method for hot-galvanised coatings. L. S. T.

**Electrodeposition of tin.** A. L. SHIELDS (Metal Ind., N.Y., 1935, 33, 355—357, 393—394).—Experiences in production with semi-automatic equipment are described. L. S. T.

**Plating rhenium and rhenium-nickel alloys.** C. B. F. YOUNG (Metal Ind., N.Y., 1936, 34, 176—177).—Details for the electrodeposition of Re and of Ni-Re on brass are given. L. S. T.

**Use of Korolac as a protective coating on electroplating racks.** H. E. FRITZ (Metal Ind., N.Y., 1936, 34, 26—27). L. S. T.

**Welding.** E. JIMENO, A. MODOLELL, and F. R. MORRAL (Anal. Fis. Quim., 1935, 33, 696—708).—A review of physical and chemical methods for the control of arc welding. F. R. G.

**Flotation.**—See XI.

See also A., July, 783, Cd-plate. 785, Electrolytically separated metals. 789, Al-Li alloys. 790, Systems Na-Pb and Co-Mo. 799, Zn baths. 808, Electrochemical isolation of alkali metals. 813, Determining Sn in alloys with Sb and Pb. 814, Determining V in steel. 840, Prep. of reagent for Sn.

#### PATENTS.

**[Heat]-treatment of metal [cast iron].** C. F. LAUENSTEIN, ASSR. to LINK-BELT CO. (U.S.P. 1,987,481, 8.1.35. Appl., 17.2.30).—White cast Fe is rendered malleable by heating for 4 hr. at 900°, then for 4 hr. at 1010°, and finally for 1 hr. at 760°, cooling at 5.5° per hr. to 650°, and allowing uncontrolled cooling to atm. temp. L. C. M.

**Production of heat-treated cast iron.** M. G. JEWETT and S. C. HARRIS, ASSRS. to CHAIN BELT CO. (U.S.P. 2,008,452, 16.7.35. Appl., 23.9.31).—To develop a homogeneous, spherulitic, cementite-pearlite structure

free from sorbite, malleabilised cast Fe is heated at 800—890° until the free C is all dissolved, quenched to produce a martensitic structure, and reheated at 720° to produce the desired structure. A. R. P.

**Hardening grey and mottled cast iron.** H. I. SHAW and N. S. HOERLE (U.S.P. 1,999,790, 30.4.35. Appl., 18.8.30).—In the manufacture of valve tappets and cam shafts, a uniform martensitic-troostitic structure is obtained by casting the metal (containing V 0.15—0.25%) at 1400—1500° in sand moulds with chill plates, removing the castings at 380°, heating quickly to 860—950° (920°), and the quenching in H<sub>2</sub>O. or oil at 37—39°. L. C. M.

**Welding of cast iron and welding rod therefor.** T. R. HAGLUND and S. J. A. I. HARLITZ (ASSR.) (U.S.P. 2,008,447, 16.7.35. Appl., 15.11.34. Swed., 21.9.33).—The welding rod consists of an alloy of Fe with Ti 1—4, Si 1—4, C  $> 0.5$ , and Al 0.15—0.35%, which is made by the aluminothermic process and coated with slag-forming ingredients. A. R. P.

**Production of [ferrous] metal with phosphide case.** R. B. MCCAULEY (U.S.P. 2,007,977—8, 16.7.35. Appl., [A] 29.2.32, [B] 19.6.33).—(A) The articles are treated with PH<sub>3</sub> or P vapour at  $> 100^\circ$  under pressure. (B) Wire or sheet is passed through a metal (e.g., Zn, Sn, or Cu) both containing P, with or without Pb. A. R. P.

**[Alloy for] furnace roll and the like.** N. B. ORNITZ (U.S.P. 1,997,469, 9.4.35. Appl., 5.4.33).—Fe alloys for high-temp. annealing-furnace rolls containing Cr 28—32, Ni 6—8, Si 1—2, Mn 0.5—1, C  $> 0.3$ , S  $> 0.05$ , and P  $> 0.04\%$  are claimed.

**Welding of alloy steels.** P. A. E. ARMSTRONG (U.S.P. 1,997,538, 9.4.35. Appl., 27.11.34).—Steel articles faced with Cr steel are coated at weld points with electrolytic Fe, with or without an initial coating of Cu, Co, Ag, or Ni. L. C. M.

**Ornamental panel and the like of rustless steel and vitreous enamel.** H. H. HARRIS (U.S.P. 2,001,725, 21.5.35. Appl., 21.10.31).—Steel (containing Cr 18 and Ni 8%) plaques etc. having a relief design in polished metal and the remaining surface coated with enamel fired at 670—1190° are claimed. L. C. M.

**Copper-iron alloy.** C. S. SMITH and E. W. PALMER, ASSRS. to AMER. BRASS CO. (U.S.P. 1,999,850, 30.4.35. Appl., 20.12.34).—Ductile Fe alloys of high electrical conductivity, containing Cu 30—70 (55) and Mg 0.02—1 (0.2%), are annealed at 600—850° for  $\frac{1}{4}$ —4 hr. and cooled to 450° during 2 hr. prior to the final cold-drawing. L. C. M.

**Production of [iron] alloys containing yttrium metals of the rare earths.** J. B. GRENAGLE, ASSR. to W. W. VARNEY and UNIVERSAL ALLOYS INC. (U.S.P., 2,008,302, 16.7.35. Appl., 18.9.29).—Oxalates of the Y group are introduced into a bath of molten Fe under a slag. A. R. P.

**Examination of high-grade alloyed steels.** E. SCHAUFFELE (U.S.P. 2,007,285, 9.7.35. Appl., 25.4.34. Ger., 8.12.32).—The steel is placed in warm 20% H<sub>2</sub>SO<sub>4</sub> for 10 min., rinsed, and coated with a warm solution of gelatin containing K<sub>3</sub>Fe(CN)<sub>6</sub>. The development of blue



spots in the gelatin film indicates the presence of areas subject to corrosion. A. R. P.

**Prevention of corrosion.** H. E. BUC, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,002,523, 28.5.35. Appl., 23.7.32).—0.02–1% of an alkylated phenol (*e.g.*, PhOBu) is added to the cooling-H<sub>2</sub>O in the radiators of internal-combustion engines. L. C. M.

**Acid inhibitor [for pickling solutions].** F. B. DOWNING and R. G. CLARKSON, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,006,710, 2.7.35. Appl., 23.2.32).—Claim is made for the reaction product of an aliphatic aldehyde, *e.g.*, MeCHO, CS<sub>2</sub>, and a polyamine having at least one primary NH<sub>2</sub>-group and at least one *tert.* NH<sub>2</sub>-group, *e.g.*, *p*-NH<sub>2</sub>-C<sub>6</sub>H<sub>4</sub>-NMe<sub>2</sub>. A. R. P.

(A) **Surface hardening of metal articles [tools].**  
(B) **Welding rod.** (A) W. A. WISSLER, (B) G. W. WOODS, Assrs. to HAYNES STELLITE CO. (U.S.P. 2,002,198 and 2,002,462, 21.5.35. Appl., [A] 19.11.31, [B] 6.8.28).—(A) Well-drilling tools etc. are coated with metal from a weld rod consisting of a 1 : 1 mixture of steel containing Cr 32, W 14, and C 2.5% and abrasive particles ( $\frac{1}{16}$ – $\frac{3}{16}$  in.) consisting of W 85, Co 11, and C 5%. (B) A weld rod of Fe containing WC particles, the Fe and WC being alloyed together along the outer surfaces of the particles, is claimed. L. C. M.

**Case-hardening composition.**—A. F. HOLDEN (U.S.P. 2,002,180, 21.5.35. Appl., 15.12.32).—A bath for use at 630–930° consists of NaCN 9, BaCl<sub>2</sub> 6, BaCO<sub>3</sub> 8, and CaF<sub>2</sub> 2 pts. by wt. L. C. M.

**[Ore] sintering.** W. S. REID, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 2,006,368, 2.7.35. Appl., 12.10.32).—The ore is fed in a thin layer on to a travelling belt which passes below an ignition box, and air is drawn through the charge throughout the sintering zone (Z). The sintered material is quenched in H<sub>2</sub>O and the resulting mixture of steam and dust is passed back through Z so that most of the dust is collected again by the charge and the hot gases passing to the Cottrell plant have a relatively low dust content. A. R. P.

**Precipitating copper from solutions.** H. A. TOBELMANN (U.S.P. 2,008,373, 16.7.35. Appl., 30.7.32).—The fine portion of cement Cu is screened away from the coarse portion and redissolved in aq. Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, and the solution, after filtration, is returned to the pptn. vat. A. R. P.

**[Copper] alloy.** R. A. WILKINS, Assr. to REVERE COPPER & BRASS, INC. (U.S.P. 2,002,460, 21.5.35. Appl., 2.3.35).—Ductile copper alloys suitable for hot- or cold-working and containing Si 2.25–3.5 (2.75–3.5) and Sn 0.25–2 (0.25–0.5)% are claimed. L. C. M.

**Copper alloy.** F. J. MAAS (U.S.P. 2,007,430, 9.7.35. Appl., 30.11.34).—A non-stainable Cu alloy contains Ni 1–5 (2.76), Co 0.25–2 (0.48), Si 0.25–2 (0.47), Al 1–5 (2.53), Mo 0.25–3 (0.37), Fe 0.1–1 (0.17), and Ca 0.05–0.5 (0.06)%. A. R. P.

**Roasting of [zinc] sulphide ore.** H. FREEMAN, Assr. to NICHOLS ENG. & RES. CORP. OF CANADA, LTD. (U.S.P. 2,002,496, 28.5.35. Appl., 25.3.32).—The finely-ground (< 250-mesh) ore is oxidised with preheated air in a combustion chamber, and the hot gases are scrubbed

with spent electrolyte or leaching liquor; suspended ZnO is removed and SO<sub>2</sub> recovered from the hot fluid at the head of the scrubber. L. C. M.

**Elimination of contaminating metals and metalloids from [zinc sulphide] ores.** A. L. J. QUENEAU (U.S.P. 1,999,209, 30.4.35. Appl., 20.1.28).—As, Sb, Pb, Cd, and S are removed as volatile chlorides by subjecting a mixture of roasted ore with C 2–3, H<sub>2</sub>O 12–16%, and sufficient NaCl, CaCl<sub>2</sub>, or MgCl<sub>2</sub>, to an oxidising blast at 1000–1500°. L. C. M.

**Manufacture of zinc dust.** J. F. W. SCHULZE, Assr. to GRASSELLI CHEM. CO. (U.S.P. 2,007,027, 2.7.35. Appl., 31.5.34).—Two interconnected retorts are used for the distillation of the Zn, a valve between the two allowing each one to be recharged as required without admitting air into the condensing system and so increasing the ZnO content of the dust. A. R. P.

**Differential froth flotation [for antimonial pyritic ores].** F. A. BRINKER (U.S.P. 2,007,176, 9.7.35. Appl., 15.4.33).—Au ores containing FeS<sub>2</sub> and Sb<sub>2</sub>S<sub>3</sub> are ground with CuSO<sub>4</sub> and NaOH, and then floated with K amylxanthate and cresol to recover FeS<sub>2</sub> and Au; re-treatment of the tailings with the same flotation reagents after addition of PbCl<sub>2</sub> results in recovery of the Sb<sub>2</sub>S<sub>3</sub>. A. R. P.

**Treatment of antimonial lead.** H. H. MONSON, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 2,007,545, 9.7.35. Appl., 27.5.33).—Antimonial Pb containing Sn and other impurities is oxidised in a drossing furnace until the impurities are removed, then cooled slowly to 313° to allow the hypereutectic Sb to separate in a coarsely cryst. form. The mush is agitated with powdered resin or petroleum coke to convert the separated Sb into a dry dross containing 70–80% Sb, which is easily removed from the residual eutectic, the latter being usable for making type metal. A. R. P.

**Production of ferrochromium.** V. ANGELINI (U.S.P. 2,008,055, 16.7.35. Appl., 20.4.32. Belg., 28.4.31).—A mixture of chromite (48% Cr<sub>2</sub>O<sub>3</sub>) 65%, CaSi<sub>2</sub> 23, Al 4, CaF<sub>2</sub> 4, Fe–Si 2, and CaO 2% is heated in an electric furnace to reaction temp. The resulting exothermic reaction produces Cr–Fe which needs no further refining. A. R. P.

**Cyanide treatment of [gold] ores.** J. P. RUTH, JUN. (U.S.P. 2,006,875, 2.7.35. Appl., 6.2.33).—Before returning regenerated cyanide liquor to the leaching vats the dissolved gas is removed by vac. treatment and the liquor aerated until saturated with air. A. R. P.

**[Precious-metal] alloys [resembling white gold].** E. A. CAPILLON and F. E. CARTER, Assrs. to BAKER & Co., INC. (U.S.P. 1,999,864–6, 30.4.35. Appl., [A] 25.4.34, [B, C] 10.7.34).—The alloys contain in each case Pd + Pt 35–70 (45)% of which 5–10 (5)% of Pt; the remainder of the alloy is (A) Ag, (B) Ni, (C) Ag and a metal of the Ni group. L. C. M.

**Adhesively joining [sheet] metal and wood.** W. L. JONES, Assr. to RODDIS LUMBER & VENEER CO. (U.S.P. 2,006,770, 2.7.35. Appl., 4.2.33).—The metal surface is coated with a film of rubber latex containing Na silicate and, after drying, glue is applied, the wood



placed on top of the glue, and the whole united by heat and pressure.

A. R. P.

**Magnesium-base alloy.** R. T. WOOD, Assr. to MAGNESIUM DEVELOPMENT CORP. (U.S.P. 2,006,565, 2.7.35. Appl., 18.5.34).—The alloy consists of Mg with Sn 1—15 (6), Mn 0.1—3.0 (1), and Si 0.1—1 (0.5)%.  
A. R. P.

**Refining of aluminium.** J. J. RIPNER (U.S.P. 2,008,188, 16.7.35. Appl., 18.8.33).—The metal is melted under a  $\text{ZnCl}_2$  or cryolite flux, skimmed, heated at 1035—1065° to dissolve all nuclei-forming constituents, cooled to casting temp., and cast.  
A. R. P.

**Aluminium-base alloy.** W. E. MANSFIELD (U.S.P. 1,997,494, 9.4.35. Appl., 12.12.34).—Al alloys for the production of fine-grain castings containing Fe 2—10 with Sb 0.05—15 (2—7) and Mg < 0.5, or Cu 2—14 and/or Ni 2—10 and Mg < 0.5, or Mg < 0.1 and Zn < 2%, are claimed.  
L. C. M.

**Duplex metal articles [coated aluminium alloy].** R. H. BROWN, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,997,165—6, 9.4.35. Appl., 20.10.33).—Articles of Al or Al alloys are coated with Al alloys of higher electrode potential, containing (A)  $\leq 1$  of the following: Ag, Pt, Ga, or In 0.02—2, Cd 0.05—5, Zn 0.2—10, Ca or Sr 0.1—1, Ba 0.1—2, Bi 0.02—1, or Sn 0.02—0.5%; or (B) Zn 0.2—3 and Mg 0.5—6%.  
L. C. M.

**Manufacture of chromium-plated articles [steel cutlery].** W. H. KEEN (U.S.P. 2,008,282, 16.7.35. Appl., 31.3.32).—Steel containing C 0.3—0.4, Cr 5—9, and Mg 0.2—0.4% is formed into knife blades which are hardened and tempered, and then Cr-plated.  
A. R. P.

**Treating solids with gases [in prep. of sponge Fe].**—See I. Pickling solution.—See VII. Glass-metal seals. Vitreous enamel.—See VIII. Sparking-plug electrode.—See XI.

## XI.—ELECTROTECHNICS.

**Measurement of discharges in dielectrics.** A. N. ARMAN and A. T. STARR (J. Inst. Elec. Eng., 1936, 79, 67—81).—Various methods of discharge detection, and some details of the apparatus finally adopted for this purpose, are described, together with some practical uses of the apparatus.  
J. S. G. T.

**Fluorescent screens for cathode-ray tubes for television and other purposes.** L. LEVY and D. W. WEST (J. Inst. Elec. Eng., 79, 11—19).—The fluorescent and phosphorescent characteristics of willemite,  $\text{CaWO}_4$ , Zn phosphate, and various preps. of ZnS (I) and Zn—Cd sulphide (II) are discussed, and the method for eliminating the undesirable phosphorescence of (I) and (II) preps. is described. Current-candle power curves of the fluorescent radiations emitted by the different substances are given. (I) and (II) are the most suitable substances hitherto developed for fluorescent screens for cathode-ray tubes. A mixture of the two giving a brilliant white fluorescence of high intensity has been prepared. Phosphorescence, when not required, can be entirely eliminated, and mixtures giving prolonged phosphorescence can be prepared.  
J. S. G. T.

**Electrostatics of flotation.** B. KAMIENSKI and L. BENIS (Rocz. Chem., 1936, 16, 81—91).—The positive

potential assumed by inert electrodes in aq. solutions is  $\propto [\text{H}^+]$ ; as a result, adhesion of air bubbles, which have a similarly positively-charged outer layer, is prevented. Flotation is made possible by adding a reducing agent, e.g., K xanthate, which reduces the positive potential of the mineral, together with a foam promoter, such as pine oil, which exerts the same effect on the air bubbles.  
R. T.

**Cause of bubble attachment in flotation.** O. C. SHEPARD (Min. & Met., 1936, 17, 339).—The angle of contact of an air bubble on Hg increases from 46° to 90° with increase in cathodic potential from 0 to 1.6 volt; at the same time the degree of attachment is increased. Similar effects are observed with an amalgamated Ag plate. Since  $\gamma$  varies with the potential, it is concluded that a variation in  $\gamma$  of a mineral particle in a solution causes a corresponding variation in the attachment of the air bubble to the mineral.  
A. R. P.

**Bitumen [for road-making].**—See II. Oxidation of  $\text{NaAsO}_2$ .—See VII. Measuring thermal expansion of ceramic materials.—See VIII. Melting Al. Cu refining. Electrolytic Cu plates. Annealing brass and Cu. Ni-plating baths. Determining thickness of Zn coatings. Sn-plating. Plating Re and Re—Ni alloys. Korolac coating for plating racks. Welding.—See X. Measuring baking val. of flour.—See XIX.

See also A., July, 780, Cd-plate. 785, Electrolytically separated metals. 790, Na—Pb alloys. 799, Zn baths. 807, Electrolysis of  $\text{Mn}^{II}$  salts. 808, Electrochemical isolation of alkali metals. Electroreduction of sorbic acid. 822, Electrolysis of mixtures of *n*-butyrates with nitrates. 828, Electrolytic oxidation of proline and  $\gamma$ -aminobutyric acid. 830, Electrolysis of Mg Me halides in  $\text{Et}_2\text{O}$  solutions. 902, Titration of insulin.

## PATENTS.

**Primary battery [dry cell].** F. KILLIAN (U.S.P. 1,997,367, 9.4.35. Appl., 29.5.33).—The life of dry cells is increased by a layer of powdered Zn on the bottom of the cylindrical Zn anode cup.  
L. C. M.

**Electrolytic apparatus.** P. E. EDELMAN, Assr. to R. T. MACK (U.S.P. 1,999,408, 30.4.35. Appl., 2.4.29).—In electrolytic condensers and rectifiers for use at  $\geq 140^\circ$ , a film-forming electrode of Al, Ta, Be, or Al—Be alloy is employed in conjunction with an electrolyte containing K or  $\text{NH}_4$  tartrate 1 pt., gum arabic 24, and glycerin 104 pts.  
L. C. M.

**Electrolytic condenser.** H. E. RHODES, Assr. to AEROVOX CORP. (U.S.P. 1,997,562, 9.4.35. Appl., 18.10.34).—Al electrodes having a surface increased by controlled etching and a paper dielectric 0.001—0.005 in. thick impregnated with electrolyte are employed.  
L. C. M.

**Dry-plate rectifier.** W. C. VAN GEEL and H. EMMENS Assrs. to RADIO CORP. OF AMERICA (U.S.P. 1,999,551, 30.4.35. Appl., 7.10.31. Holl., 8.10.30).—A cathode of Th, Zr, or Ti, and an anode consisting of a mixture of  $\text{CuS}$ ,  $\text{Cu}_2\text{S}$ , or  $\text{Cu}_2\text{I}_2$  with  $\text{BaO}_2$ ,  $\text{KClO}_3$ , or  $\text{KMnO}_4$ , compressed against a conductor of Mg or Al gauze are employed.  
L. C. M.



**[Gas-filled] electric-discharge devices.** GEN. ELECTRIC CO., LTD. FROM PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 448,585, 21.5.35).—The pressure of the rare-gas filling is adjusted so that the watt consumption of the device when first switched on from cold is  $\leq 15\%$  that when the device is in full operation. J. S. G. T.

**Mercury-vapour electric-discharge tubes.** N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 448,685, 6.3.36. Ger., 20.3.35).—A discharge tube containing Hg vapour at  $> 10$  atm. pressure during operation of the tube, and in which electron emission is increased by the use of SrO, is claimed. J. S. G. T.

**Oxide-coated cathode [for thermionic valve].** W. W. EITEL and J. M. CULLOUGH, ASSRS. to HEINTZ & KAUFMAN, LTD. (U.S.P. 1,999,806, 30.4.35. Appl., 25.2.33).—Ni ribbon is coated with an adherent layer of electron-emissive material, and formed into the filament shape by cold-working. L. C. M.

**Production of photoelectric tubes.** S. WEIN, ASSR. to RADIO CORP. OF AMERICA (U.S.P. 2,006,850, 2.7.35. Appl., 7.7.30).—The internal surface of the tube is coated with Mg by flashing, then with Na or K by admitting the vapour to the evacuated tube, and finally  $H_2$  at low pressure is admitted and the alkali-metal film heated to convert the metal into hydride. A. R. P.

**Photoconductive device and its manufacture.** V. E. BURG, ASSR. to TELEFUNKEN GES. F. DRAHTL. TELEGRAPHIE M.B.H. (U.S.P. 1,997,479, 9.4.35. Appl., 5.11.31. Ger., 5.11.30).—A sensitive material containing Se with  $\geq 0.5\%$  of Ag, Ni, or Mg is prepared by evaporation of a mixture of Se with a solution of the metal compound in  $H_2O$  or org. solvent, and liberation of the metal by heating above the m.p. of Se. L. C. M.

**[Getter for] rectifier tubes.** P. L. SPENCER, ASSR. to RAYTHEON MANUFG. CO. (U.S.P. 2,006,488, 2.7.35. Appl., 8.7.27. Renewed 9.5.30).—A mixture of crushed fused CsCl and KCl with Ca chips is claimed. A. R. P.

**Electrical [insulated] cable.** C. R. BOGGS, ASSR. to SIMPLEX WIRE & CABLE CO. (U.S.P. 1,997,355, 9.4.35. Appl., 15.7.29. Can., 1.2.26).—Insulation of natural or vulcanised rubber, rendered non-absorbent of  $H_2O$  by treatment with  $C_6H_6$  or  $CHCl_3$ , is employed. L. C. M.

**Insulation of electrical materials.** BRIT. CELANESE, LTD. (B.P. 448,307, 15.7.35. U.S., 26.7.34).—The electrical materials are covered with filaments or similar materials composed of an org. deriv. of cellulose with  $\leq 20\%$  of an ester of  $H_3PO_4$  [ $(C_6H_4Me)_3PO_4$ ]. F. R. E.

**Impregnated dielectric materials.** DUSSEK BROS. & CO., LTD., and A. W. THOMPSON (B.P. 448,790, 13.12.34).—Paper or other fibrous material is impregnated with a mixture of a hydrocarbon of very high  $\eta$ . e.g., 1500–3000 sec. Redwood at  $93^\circ$ , prepared by polymerising petroleum fractions in presence of  $AlCl_3$ , and a mineral oil of  $\eta$  50–200 sec. Redwood at  $93^\circ$ . J. S. G. T.

**Spark[ing]-plug electrode.** D. W. RANDOLPH, ASSR. to GEN. MOTORS CORP. (U.S.P. 2,001,888, 21.5.35.

Appl., 6.5.32).—Ni or Ni-Co alloy containing Cr 0.5–10, Ba 0.01–0.8 (0.01–0.2), Mn 0–2%, and a trace of Mg is employed. L. C. M.

**Etching of electrodes.** PLESSEY CO., LTD. (B.P. 448,616, 4.7.35. U.S., 7.7.34).—Electrodes formed of an alloy of a film-forming metal (*A*), e.g., Al, and one or more other metals (*B*), e.g., Mg, Ca, Li, Be, are etched with  $HNO_3$ ,  $H_2SO_4$ , chromic acid, or an acid salt, e.g.,  $Al_2(SO_4)_3$ , which dissolves *B* but not *A*. J. S. G. T.

**Firedamp detector.**—See II. **Effecting hydrogenation.**—See III. **Insulating paper.**—See V. **Glass-metal seals.** **Electric-lamp bulbs.**—See VIII. **Cu-Fe alloy.** **Cr-plated articles.**—See X. **Flavourings from butter fat.**—See XII. **Vulcanisable compound.**—See XIV.

## XII.—FATS; OILS; WAXES.

**Report of the Analytical Methods Committee. The Reichert-Polenske-Kirschner process [for butter fat].** (Analyst, 1936, 61, 404–408).—The standard Polenske apparatus is used, and the procedure, including the particle size of the pumice, the amount and temp. of the  $H_2O$  added to the saponified fat, and the determination of the Reichert (sol. fatty acid) and Kirschner vals., is specified. E. H. S.

**Oxidation of fats in storage.** G. R. GREENBANK (Oil & Soap, 1936, 13, 140–144).—Experiments designed to study separately the effect of such factors as light,  $H_2O$ , heat, and air on the oxidation of butter fat are described. In presence of air, oxidation is accelerated by light (which causes the formation of  $CO_2$  and more  $H_2O$ ),  $H_2O$ , and heat in decreasing order. Vac. may retard, but does not prevent, oxidation. E. L.

**Action of micro-organisms on fat. I. Hydrolysis of beef fat by some bacteria and yeasts tolerating low temperatures.** J. R. VICKERY (J. Counc. Sci. Ind. Res. Australia, 1936, 9, 107–112).—All strains of asporogenous yeasts and *Pseudomonas*, but only one strain of *Achromobacter*, hydrolysed beef fat in culture media. The amount of free acid produced in fat cannot be generally adopted as an index of spoilage during cold-storage. A. G. P.

**Milled toilet soaps.** C. R. KEMP and E. G. THOMSEN (Soap, 1936, 12, No. 6, 26–31, 37, 73).—Plant and manipulation for the milling, plodding, and stamping of toilet soaps, and the avoidance of defects are discussed in detail. E. L.

**Acid blistering of soap bases in the drying process.** ANON. (Seifensieder-Ztg., 1935, 62, 341–342; Chem. Zentr., 1935, ii, 456).—Addition of  $Na_2S_2O_3$  to the soap base before drying is recommended. Water-glass also serves to stabilise soap curds and flakes. H. N. R.

**Refractometric determination of fatty acids in soaps and washing powders.** W. LEITHE and H. J. HEINZ (Angew. Chem., 1936, 49, 412–414).—The washing powder or finely-divided soap is heated to boiling with 10%  $H_2SO_4$ , and the fatty acids are extracted with 1- $C_{10}H_7Br$  (I). The amount of fatty acids is calc. from the decrease in  $n$  of the (I) extract. J. S. A.



**Comparison of extracted and refined with natural and refined, pressed olive oil.** D. MANGRANE (Anal. Fis. Quím., 1935, 33, 767—779).—Earlier methods (cf. Halphén, A., 1905, ii, 125) proposed for the determination of S in olive oil which has been extracted with  $\text{CS}_2$  are not suitable for refined samples of oil containing small amounts of S. The following method is proposed for the detection of S: 50 c.c. of oil with 50 c.c. of 25% aq. NaOH are boiled with Ag foil during 20 min., giving a stain of AgS, sol. in KCN, insol. in aq.  $\text{NH}_3$  and  $\text{Na}_2\text{S}_2\text{O}_3$ . Comparison of the stains obtained with standards given by  $\text{Na}_2\text{S}$  permits determination of S in the oil. The sensitiveness is 0.5 pt. in 10,000. Pure  $\text{CS}_2$  gives no reaction with olive oil, but commercial  $\text{CS}_2$  contains dissolved  $\text{H}_2\text{S}$  and acid hydrosulphides which react with the oil. Oil extracted with petrol,  $\text{Et}_2\text{O}$ , or  $\text{CHCl}_3\text{-CCl}_4$  gives a weak S reaction; pressed oil contains < 1 pt. of S in 10,000 and this decreases as the season advances. It is suggested that the S is present in the oil in the form of additions to the double linkings.  $d$ ,  $n_D^{20}$ ,  $\eta$ ,  $\gamma$ , acidity, and the Ac, sap., and I vals. are recorded for Spanish oils, both pressed and extracted. The resin content of the extracted is > that of the pressed oil. F. R. G.

**Tung oil in Kenya.** C. MAHER (Bull. Imp. Inst., 1936, 34, 180—188).—From the results of trials made to date, *Aleurites Fordii* appears to be unsuited to Kenya Colony, but the general standard of culture has been low, and further trials under better conditions are in hand. The results of isolated plantings of *A. montana* are more promising, and further trials of this, of *A. moluccana* (as a stock for grafting and as a shade tree), and of *A. cordata* are advocated. E. L.

**Chaulmoogra oils.** ANON. (Bull. Imp. Inst., 1936, 34, 145—154).—Seed kernels of *Hydnocarpus Wightiana*, Blume, from Nigeria contained 61.5% of oil and 4.3% of  $\text{H}_2\text{O}$ . The cold-expressed oil had  $d_4^{25}$  0.9548 [ $\alpha_D^{25}$  +55.4° (in  $\text{CHCl}_3$ ), m.p. 24.2°, acid val. 1.2, sap. val. 202.2, I val. (Wijs, 30 min.) 98.2, and conformed to the B.P. specification except that it was not wholly sol. in hot 90% EtOH. Hydnocarpic and chaulmoogric acids, and a small amount of a liquid, optically-active acid (? gorlic), were identified, but no other acid (e.g., palmitic) could be isolated. Seeds from Ceylon and Malaya yielded similar oils ([ $\alpha_D^{25}$  59.8°, 58°; sap. vals. 201.1, 205.1, respectively). The composition of seeds of *H. anthelmintica*, Pierre, from Malaya, containing 59.2% of oil (on moist kernel), corresponded with previously recorded figures (cf. B., 1932, 391). E. L.

**Determination of clouding substances in vegetable oils.** E. MIRER (Z. Unters. Lebensm., 1936, 71, 345—357).—None of the customary methods—the Russian and American standard methods and the centrifugal method—gives trustworthy results. In the method described, 12.5 c.c. each of oil and  $\text{COMe}_2$  are shaken with 3 c.c. of acidified saturated aq.  $\text{CaCl}_2$  in a centrifuge cup so constructed that the oil- $\text{H}_2\text{O}$  interface lies within a graduated constriction. After centrifuging for 15 min. at 1500—1600 r.p.m., the vol. of the ppt. is read off on the scale. E. C. S.

**Nickel-chromic oxide catalysts for hydrogenation of an oil.** J. C. W. FRAZER and C. B. JACKSON

(J. Amer. Chem. Soc., 1936, 58, 950—952).—The prep. of  $\text{Ni}_2\text{Cr}_2\text{O}_5$  catalysts is described. Such catalysts are active in the hydrogenation of cottonseed oil. Addition of small amounts of S, Se, or Te compounds increases the catalytic activity, although larger additions poison the catalysts. E. S. H.

**Application of chromatographic adsorption technique to study of the unsaponifiable residue of fish oils.** J. C. DRUMMOND, A. SANTOS RUÍZ, and T. THORBJARNARSON (Anal. Fis. Quím., 1935, 33, 680—691).—Greenland and Japanese whale-liver oils, liver oil from *Chimæra monstrosa*, and Iceland herring oil were examined after separation of the bulk of the cholesterol and batyl alcohol by adsorption from petrol (b.p. 40—60°) through  $\text{Al}_2\text{O}_3$  and determination, for the original oil and the fractions, of  $n_D^{40}$ , sap. and I vals. (Cf. B., 1935, 733.) F. R. G.

**Whale oil and whale tribes.** J. LUND (Oil & Soap, 1936, 13, 148—150).—A study of the variation in the I vals. of various whale oils with the condition (fatness) of the animals and their geographical distribution supports the theory of the migration of whales and affords evidence of a differentiation into distinct tribes or herds within a given species. The I val. of the oil increases (with the yield) during the fattening period, the change being more marked with the flesh and internal fats than with the blubber, tongue, or bone oils. E. L.

**Constants and properties of processed fish oils.** L. J. REIZENSTEIN (Amer. Paint J., 1936, 20, No. 37, 7—9, 46—50).—The properties and advantages of various commercial fish oils specially refined for use in paints are discussed. D. R. D.

**Use of duty-free fats and oils.** F. DIETRICH (Chem.-Ztg., 1936, 60, 536—537).—An explanation of German tariff regulations. C. I.

**Water-emulsion waxes: Preparation of rubless wax finishes, and a study of emulsifiers, water-resistance, specifications, and testing of finished products.** II. G. S. GLICKMAN (Soap, 1936, 12, No. 6, 119, 121, 123).—The manufacture of various types of wax emulsions is described, and some practical tests of the products are briefly reviewed. E. L.

**Bleaching of Japan wax.** IV. I. SAKUMA and I. MOMOSE (J. Soc. Chem. Ind., Japan, 1936, 39, 171 B; cf. B., 1936, 158).—Exposure of Japan wax to sunlight results in a lowering of the I val. from 16.54 to 9.60 (8.35) (38 days); the exposed, but not the unexposed, wax affects a photographic plate, the effect being nearly  $\propto$  the peroxide content of the wax. P. G. C.

**Paraffin and its applications.** III. Candle manufacture. M. FRIEDWALD (Rev. pétrolif., 1935, 147—149; Chem. Zentr., 1935, ii, 161).—A description of the candle-making industry is given. H. N. R.

**Apparatus for determination of the unsaponifiable matter in fats, oils, waxes, and fatty compositions of all kinds.** WELWART (Seifensieder-Ztg., 1935, 62, 342—343; Chem. Zentr., 1935, ii, 456).—A continuous-extraction apparatus is described. H. N. R.

**Emulsion vehicles.**—See XIII. Determining oleomargarine in ice cream.—See XIX.



See also A., July, 822, Soap solutions. "Akaritom"—kernel fat. 878, Fatty acids of chrysalis oil. 904, Vitamin-A of shark-liver oil. 911, Oil from *Abies balsamea*. Fatty acids of wheat embryo.

## PATENTS.

**Flavouring matters obtained from butter fat, and their application.** IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 448,800; 14.12.34. Holl., 16.12.33).—Dry butter fat is subjected to short-path ("mol.") distillation under high vac. at 180–250°, to yield a distillate (*e.g.*, 10–30% of the fat) which contains the flavouring and vitamin constituents of the original butter and is used as a flavouring matter in bakery-fat compositions etc. The residue is suitable for use in margarine, shortening, etc.

E. L.

**Manufacture of soaps and soap masses.** INZERSDORFER CHEM. IND. G.M.B.H. (B.P. 448,930, 13.12.34. Austr., 14.12.33).—Fats, oils, wool fat, etc. are saponified with alkali (NaOH of *d* 1.32) in amount < that required for complete saponification in presence of (0.2% of) insol. metal oxides or soaps in a homogenising or emulsifying apparatus, working at temp. preferably > 37° until near the end of the reaction. < 15% of low-b.p. solvents may be added at temp. < the b.p., or high-b.p. solvents incorporated under pressure at > the b.p.

E. L.

**Improvement of potassium soaps.** CHEM. FABR. J. A. BENCKISER G.M.B.H., and F. DRAISBACH (B.P. 448,608, 13.12.35. Ger., 31.10.35).—A fused mixture of alkali metaphosphates ( $\text{NaPO}_3 + \text{KPO}_3$ ) in the mol. ratio of 2 : 3 is added to the soap.

E. H. S.

**Manufacture of washing agents.** E. FRANZ (B.P. 448,350, 17.12.34. Ger., 18.12.33).— $\text{H}_2\text{O}$ -sol. salts ( $\text{SO}_3''$ ,  $\text{SO}_4''$ ,  $\text{PO}_4'''$ ,  $\text{BO}_3'''$ ) of long-chain aliphatic compounds (>  $\text{C}_{11}$ ), *e.g.*, Na octadecylsulphonate, are purified and made suitable for use in shampoos etc. by separate extraction with a hydrocarbon solvent to remove insol. matter, and EtOH to dissolve out the product from inorg. salts. Addition of bleaching agents (peroxides, per-salts) and compounds capable of evolving  $\text{CO}_2$  with acids, is also claimed.

S. C.

**[Lubricating] grease.** A. W. BURWELL, Assr. to ALOX CORP. (U.S.P. 2,012,252, 20.8.35. Appl., 7.10.31).—Fatty acids obtained by the liquid-phase oxidation of petroleum hydrocarbons (*cf.* U.S.P. 1,828,356; B., 1932, 737) are used in the manufacture of soap-mineral oil greases.

E. L.

**Foam-reducing agent.**—See I. **Effecting hydrogenation.**—See III. **Cured tung oil acid.**—See XIII. **Train-oil meal.**—See XIX.

## XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

**Oil-free emulsion vehicles.** H. WAGNER (Farben-Ztg., 1936, 41, 667–669).—The development and properties of oil-free  $\text{H}_2\text{O}$ -paint vehicles based on aq. emulsions of waxes (beeswax, shellac wax, carnauba, etc., and—using emulsifying agents, *e.g.*, Nekal—ozokerite, paraffin wax) are described, and the structure of their films is illustrated by photomicrographs. The desirable properties of combination emulsions of waxes

and synthetic film-forming ingredients (vinyl and acrylic resins) are indicated.

S. S. W.

**Naphthenate driers.** C. A. KNAUSS (Paint, Oil, and Chem. Rev., 1936, 98, No. 12, 32–34).—Commercial naphthenic acid varies considerably in composition, and the choice of suitable material for making naphthenate driers is important. These driers are more efficient than resinates and linoleates, except under conditions of very low humidity (< 25%), when resinates are sometimes more efficient. The cloudiness occasionally observed with varnishes containing naphthenate driers is due to coagulation of colloidal components by the driers, and not to insolubility of the driers themselves; it may be avoided by using a more acid medium or reducing the concn. of driers.

D. R. D.

**Properties of pigment powders.** G. A. CAMPBELL (J. Oil Col. Chem. Assoc., 1936, 19, 177–189).—A general dissertation is given on surface properties, conditions and reactions taking place at interfaces, measurements of  $\gamma$  and their relation to paint-manufacturing problems, *e.g.*, displacement processes for oil pastes, stabilising of paint suspensions, complete wetting of pigments during grinding. The significance of oil-absorption determinations is stressed, and the results of such tests on Helio-red, Hansa-yellow, and Lithol-red of various coarseness, are quoted, it being shown that the Gardner-Coleman test is more discriminating than the standard "rub-out" method.

S. S. W.

**Varnish and lacquer diluents from California petroleum.** A. LAZAR (Ind. Eng. Chem., 1936, 28, 658–661).—Naturally-occurring aromatic components of petroleum (extractable with liquid  $\text{SO}_2$ ) or aromatic hydrocarbons (formed synthetically from petrol fractions during pyrolysis) are ideal for the incorporation of artificial and natural resins in cellulose lacquers.

F. C. B. M.

**Plasticising lac films.** I. L. C. VERMAN and R. BHATTACHARYA (London Shellac Res. Bur., 1936, Tech. Paper 9, 29 pp.).—Data (graphed and tabulated) for the tensile strength, extensibility, breaking load, scratch-hardness (*S*), flexibility, abrasion-resistance, and  $\text{H}_2\text{O}$ -absorption (*A*) of uniformly aged lac films containing 5% and 10% of each of 10 plasticisers show that none of the latter improves all the foregoing properties. The relative merits of the plasticisers are therefore set out for various conditions of use; the overall decreasing order of efficiency was: "sextol" phthalate (5% or 10%),  $(\text{C}_6\text{H}_4\text{Me})_3\text{PO}_4$  (5% or 10%),  $o\text{-C}_6\text{H}_4(\text{CO}_2\text{Bu})_2$  (5%), heavy pine oil (5%), lac wax (4.5%, *i.e.*, the naturally occurring quantity). This order is not simply related to the solubility (tabulated) of lac in these substances. Castor oil produced satisfactory  $\text{H}_2\text{O}$ -resistance but deficient mechanical properties. "Blushing" was promoted by the added agents, but the % of  $\text{H}_2\text{O}$  retained in detached films was reduced and was  $= K^m$  (*K* and *n* are consts., *t* = immersion period); all the curves exhibited a transition point with alteration in the *n* val., an increase indicating a deleterious change in the film. *S* was (*a*) reduced by the plasticiser, (*b*) increased by stoving, (*c*) a max. with lac wax, which received detailed investigation, (*d*) greater with Cu as



support for the film than with Sn. *A* was also influenced by the supporting material. S. M.

**Cellulose acetate as a cigarette-burn-proof [and alcohol-resistant] finish for furniture tops.** G. PHILLIPS (Ind. Finish., 1936, 12, No. 8, 5—7).—The cellulose acetate may be applied as a lacquer or as sheeting. D. R. D.

**Organic finishing media. IV.** ANON. (Paint Tech., 1936, 1, 229—232).—A review, covering glyptal, urea- $\text{CH}_2\text{O}$ , vinyl, and styrene resin finishes. D. R. D.

**Evaporation behaviour of mixed lacquer solvents.** G. W. BENNETT and W. A. WRIGHT (Ind. Eng. Chem., 1936, 28, 646—648).—Contrary to the views of Lewis *et al.* (B., 1935, 160), the authors present experimental evidence to show that evaporation of const.-boiling mixtures follows the course of non-ebullition distillation, Const.-evaporation mixtures of a new type, resulting when binary mixtures are evaporated over adsorbents, are shown to exist. F. C. B. M.

**Improvement of rosin.** H. KEMNER (Farbe u. Lack, 1936, 303—304).—Rosin (I) which has been hardened by heating with  $\text{CaO}$  or  $\text{ZnO}$  gives films which are not highly  $\text{H}_2\text{O}$ -resistant, and caution is necessary in choosing a pigment. Esterification with glycerol avoids these disadvantages and the products are further improved by heating with about 10% of maleic acid. Direct fusion of (I) with copal resin (II) until oil-solubility is attained involves partial decomp. and the resultant films are poor, but if (II) has been previously hot-kneaded, the (I)–(II) product is readily sol. in oil at  $280^\circ$  and, after esterification with a polyhydric alcohol, has little colour and an acid val. usually  $< 10$ . The presence of (II) can be recognised by the reduced tolerance of  $\text{C}_6\text{H}_6$  solutions for  $\text{EtOH}$ . S. M.

**Polymerised acrylic acid derivatives.** L. KLEIN and W. T. PEARCE (Ind. Eng. Chem., 1936, 28, 635—639).—A comprehensive survey is given of the polymerisation of such compounds, of such properties of acryloid films as their flexibility, extensibility, tensile strength, thermoplasticity, durability,  $\text{H}_2\text{O}$ -, chemical-, and light-resistance, flammability, etc., and of methods of application of the resins, and of their uses. F. C. B. M.

**Paracoumarone-paraindene resins.** ANON. (Paint, Oil, and Chem. Rev., 1936, 98, 38—39, 46).—The properties and uses of various commercial resins of this type are reviewed. D. R. D.

**New synthetic resins in the manufacture of gramophone records.** E. P. IRANY (Canad. Chem. Met., 1936, 20, 193—195).—A survey.

**Bituminous plastics. Determination of flow properties.** R. N. TRAXLER (Ind. Eng. Chem. [Anal.], 1936, 8, 185—188).—Tests on bituminous plastics in the parallel-plate plastometer show that even highly-filled plastics do not possess a true yield val. Elastic moduli of some plastics have been determined. The flow properties of paving mixtures, roofing asphalts, and flooring materials are discussed. E. S. H.

**Testing dyes.**—See IV. **Korolac coating for plating racks.**—See X. **Processed fish oils.**—See XII. **Synthetic resins and health.**—See XXIII.

See also A., July, 840, **PhCHO-resorcinol resins. 868,  $\text{CO}(\text{NH}_2)_2$ - $\text{CH}_2\text{O}$  condensation products.**

#### PATENTS.

**Sulphurisation of pine oil.** M. C. EDWARDS and J. V. CONGDON, Assrs. to SOCONY-VACUUM OIL Co., INC. (U.S.P. 2,012,446, 27.8.35. Appl., 21.7.34).—A mixture of pine oil (I) and S (approx. 2 : 1) is maintained at  $150^\circ$  in presence of agitating steam, the (I) fraction distilling over being condensed, separated, and returned to the still, giving "cutting oils" of desirable high content of stable S. S. S. W.

**Producing a mineral oil-substitute paint vehicle.** G. FIORE (U.S.P. 2,020,936, 12.11.35. Appl., 10.7.34).—A mineral oil is converted into an oxidisable oil by heating at  $> 100^\circ$ , adding 20% of vegetable oil, passing  $\text{O}_3$  for 1 hr. at  $100^\circ$ , and adding  $\frac{1}{2}$ — $\frac{1}{3}$  of the combined wt. of a 1 : 2 mixture of  $\text{HNO}_3$  and  $\text{EtOH}$ . D. M. M.

**Lithopone manufacture.** E. J. FLYNN, G. F. A. STUTZ, and C. B. SCHERTZINGER, Assrs. to NEW JERSEY ZINC Co. (U.S.P. 2,007,527, 9.7.35. Appl., 31.8.32).—Aq. BaS and aq.  $\text{ZnSO}_4$  are fed at const. rate in the correct proportions through a small pptn. vessel containing a rapidly rotating agitator to obtain a lithopone ppt. of uniform fine grain size having a high hiding power after calcination. A. R. P.

**Non-caking pigments.** C. COOLIDGE and H. S. HOLT, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,009,435—7, 30.7.35. Appl., [A] 16.3.32 [B, C] 24.5.32).—The sedimentation of pigments (particularly of  $\text{TiO}_2$  and lithopone types) in paints, lacquers, etc. to a hard cake difficult to reincorporate into the vehicle is eliminated by pretreating the finely-divided dry pigment with 0.25—2.0% of a protective agent. Suitable substances are (A) rubber, rubber latex, balata, gutta-percha, (B) waxes (carnauba, montan), stearin pitch, (C) acid sulphonation products of petroleum, tallow, drying oils. S. S. W.

**Liquid coating composition.** H. A. DE PHILLIPS (U.S.P. 2,011,042, 13.8.35. Appl., 6.6.32).—Flexible coating compositions comprise 10—40 pts. of a keto-acid resinous condensation product [benzophenone-dicarboxylic acid and a polyhydric alcohol (glycerol)], 90—60 pts. of chlorinated  $\text{Ph}_2$ , and a common volatile solvent (xylol-petroleum spirit), together, if desired, with non-volatile oils (linseed), fatty acid (palmitic), natural resin (rosin, dammar). S. S. W.

**[Non-frosting coating composition containing] cured tung oil acid.** H. L. PLUMMER and L. F. STONE, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,011,908, 20.8.35. Appl., 18.2.32).—Synthetic glycerides or polyhydric alcohol-polybasic acid resins prepared from "cured tung oil acids," which are obtained by heating tung oil fatty acids at  $305$ — $280^\circ$  for 20—65 min., do not cause "frosting" of coating compositions containing them together with a reasonable (normal) proportion of driers. E. L.

**Production of a composition [pigmented viscose solution].** E. KLINE and H. W. BARLOW, Assrs. to DU PONT RAYON Co. (U.S.P. 2,012,232, 20.8.35. Appl., 30.3.34).— $\text{TiO}_2$  is dispersed in cellulosic (viscose)



solutions with the aid of  $\approx 10$  (0.2—0.7)% of  $\text{Na}_4\text{P}_2\text{O}_7$  (calc. on wt. of  $\text{TiO}_2$ ) and, if desired, white mineral oil as dispersing agents. S. S. W.

**Bronzing liquid.** C. BOGIN and V. KELLY, Assrs. to COMMERCIAL SOLVENTS CORP. (U.S.P. 2,012,922, 27.8.35. Appl., 18.1.30).—The use of 0.05—1.0% of lactic acid, or its esters or salts, as anti-gelling agents in nitrocellulose bronze lacquers is claimed. S. S. W.

**Sizing material [for stone].** M. W. HENDRICH, Assr. to R. W. SEMERAD and H. RADZINSKY (U.S.P. 2,008,304, 16.7.35. Appl., 29.8.33).—A mixture of petroleum distillate 100 gals.,  $\text{COMe}_2$  2 gals., Al stearate 30 lb.,  $\text{AcOH}$  1 lb., and  $\text{HNO}_3$  6 lb. is claimed for coating stone prior to painting. A. R. P.

**Water-soluble resinate production.** E. H. FRENCH (U.S.P. 2,012,125, 20.8.35. Appl., 26.11.32).—An aq. emulsion of crude rosin, *e.g.*, from wood-pulp black liquor,  $\text{H}_2\text{O}$ -insol. rosin solvent (I) (kerosene), and sufficient alkali ( $\text{NaOH}$ ) nearly to neutralise the rosin, is introduced (sprayed) into excess of (I) maintained at 190—200°, the vapours, mainly  $\text{H}_2\text{O}$ , so produced being continuously removed and the neutral resinate, pptd. in granular form, being recovered by filtration, washing, and centrifuging. S. S. W.

**Manufacture of [vinyl resin] films and the like.** H. F. ROBERTSON, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 2,010,963, 13.8.35. Appl., 22.11.33).—A solution of vinyl resin (halide and ester) in  $\text{COMe}_2$  is passed in a shaped stream through a pptg. non-solvent bath ( $\text{H}_2\text{O}$ ), and the partly-formed film is heated at 50—110° while supported on surfaces lubricated with a mixture of mono- and poly-hydric alcohols, to remove solvent and non-solvent. S. S. W.

**Coated, transparent [waterproof] sheets of caseinates.** R. L. JENKINS, Assr. to SWAN RES., INC. (U.S.P. 2,010,517, 6.8.35. Appl., 7.4.33).—A sheet of casein plastic material is covered with a coating of nitrocellulose, chlorinated  $\text{Ph}_2$  resin (I), and plasticiser ( $\text{Bu}_2$  phthalate), and then with a resin-wax coating [(I), ester gum, hard paraffin wax, and mineral oil]. F. R. E.

**Oxidised hydrocarbons. Rubber-bitumen.**—See II. **Azo pigments.**—See IV. **Cellulosic plastic masses. Moulding powder.**—See V. **Fe oxide.**—See VII. **Insulation.**—See XI. **Surgical pads etc.**—See XX.

#### XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Rubber-particle count in *Hevea* latex.** E. E. LANGELAND (Ind. Eng. Chem. [Anal.], 1936, 8, 174—175; cf. B., 1906, 940).—An average of the results of 7 counts with 3 samples of latex indicates  $640 \times 10^9$  microscopically visible globules per g. of latex of 35% dry rubber content. Assuming sphericity and  $d$  0.914 for the globules, the average size of these is 1.04  $\mu$ . D. F. T.

**Proportioning of sulphur in rubber mixings.** ANON. (Gummi-Ztg., 1936, 50, 599—600, 623—624, 649—650).—A review, including the advantages of the use of org. accelerators and the gradual tendency to reduction in the % of combined S in technical rubber products. D. F. T.

**Incorporation of fillers in rubber mixings.** W. ESCH (Kautschuk, 1936, 12, 106—111).—A review is given of various dispersing agents used for facilitating and improving the distribution of high % of dry compounding ingredients in rubber. Many of these agents are of ester or fatty acid type. They not only shorten the mixing operation and reduce the concurrent heat generation, but also lead to improved mechanical properties in the product. Illustrative mixtures are described. D. F. T.

**Incorporation of fillers in rubber mixings.** J. BEHRE (Kautschuk, 1936, 12, 145—146; cf. preceding abstract).—Esch fails to stress the important distinction between dispersing agents and rubber plasticisers (cf. Burbridge, B., 1926, 598). D. F. T.

**Bitumen as "mineral rubber" in the rubber industry.** W. BECKER (Kautschuk, 1936, 12, 131—135).—Of the various commercial products, "blown" bitumen is the form generally used in the rubber industry. Typical analyses and results are quoted. It exerts a desirable softening action during milling and is favourable to good ageing. It has a beneficial effect on the elasticity of the vulcanised products, whereas an equal proportion of paraffin wax is shown to be detrimental. D. F. T.

**Use of benzol in rubber compounds.** ANON. (India-Rubber J., 1936, 92, 58—59).—A general account. D. F. T.

**Determination of sulphur in rubber compounds.**  
I. **Precipitation of barium sulphate in presence of picric acid.** II. **Sources of error in the determination of free sulphur in rubber compounds containing rapid accelerators and sulphur-bearing accelerators.** C. H. LINDSLY (Ind. Eng. Chem. [Anal.], 1936, 8, 176—178, 179—180).—I. Addition of 1—5 c.c. of saturated aq. picric acid to the acidified  $\text{SO}_4^{4-}$  solution before introduction of the  $\text{BaCl}_2$  and boiling for 5—10 min. produces a  $\text{BaSO}_4$  ppt. which can easily be collected in a filter.

II. Possible sources of error in the determination of free S in "accelerated" rubber mixtures are (a) elemental S present as impurity in the accelerator, (b) S in the accelerator mol., (c) S in the  $\text{COMe}_2$ -sol. products of vulcanisation, (d) S in the  $\text{COMe}_2$ -insol. combination other than with rubber, (e) further vulcanisation of the rubber during the  $\text{COMe}_2$  extraction. Of these, (a) is generally smallest. Consideration of mixtures containing mercaptobenzthiazole shows that the error from (b), (c), and (d) will be distinctly variable with differences in degree of vulcanisation, and evidence is adduced showing that (e) is probably the most serious. The standard methods for the determination of free S are not in strict accord with the A.S.T.M. definition of the free S as "that which is removed during  $\text{COMe}_2$  extraction." D. F. T.

**Determination of guanidines in rubber stocks and consumption of guanidines during vulcanisation.** B. J. HUMPHREY (Ind. Eng. Chem. [Anal.], 1936, 8, 153—157).—Guanidine (I) accelerators, *e.g.*, di-*o*-tolylguanidine (II), incorporated in rubber by milling cannot be recovered completely by extraction with  $\text{COMe}_2$  either before or after vulcanisation. Extraction



with  $C_6H_6$  and dil. aq. HCl or with wet  $COMe_2$  gives more effective removal. It is probable that compound formation occurs between the diarylguanidine and the rubber or its protein and that this compound is the actual accelerator of vulcanisation. This is in accord with the fact that with (II), which accelerates more powerfully than the  $Ph_2$  derivative (III), the  $COMe_2$  extraction is more incomplete. For the determination of the (I) compound 20 g. of the finely-divided rubber in 400 c.c. of  $C_6H_6$  are thrice extracted under reflux with 50 c.c. of approx. 0.1*N*-HCl. The combined extract is cooled, filtered, conc. by evaporation to 100 c.c., treated with 100 c.c. of saturated aq. picric acid, and filtered after 12 hr., when the wt. of the picrate dried at 100–110° [plus 8 mg. for (III) or 5 mg. for (I)] permits the quantity of the (I) base to be calc. D. F. T.

**Age-resisters in vulcanised rubber. Hydroxy-substituted *N*-phenylmorpholines.** A. W. CAMPBELL and M. C. REED (Ind. Eng. Chem., 1936, **28**, 656–657).—Six of such compounds are examined as to anti-oxidant effect. An OH in the 4 position of the Ph group is most effective in raising the antioxidant action, 4-hydroxy-*N*-phenylmorpholine (I) being about as effective as  $\beta$ - $C_{10}H_7$ -NHPh. A 2-Me group, e.g., the 2-Me derivative of (I), causes least staining, whilst the 3-Me derivative of (I) has increased solubility in rubber. D. F. T.

**Isoprene and rubber. XLIV. Viscosity measurements with solutions of squalene and hydro-squalene.** H. STAUDINGER and H. P. MOJEN (Kautschuk, 1936, **12**, 121–123; cf. B., 1934, 1023; 1935, 113).—The sp.  $\eta$  of squalene (I) ( $C_{30}H_{56}$ ) in  $C_6H_6$  or  $CCl_4$  is the same as that of hydrosqualene ( $C_{30}H_{62}$ ). The vals. enable a more accurate determination of the const. necessary for the calculation and comparison of the degree of polymerisation of various samples of rubber. The results are in reasonable agreement with the earlier ones, thereby confirming the similarity in structure and shape of the (depolymerised) rubber and (I) mols. and the theory that in dil. solutions of depolymerised rubber the same relation exists between sp.  $\eta$  and mol. length as in dil. solutions of simple substances of lower mol. wt. D. F. T.

**Colloid-chemical foundations of the modern rubber industry.** F. KIRCHHOF (Gummi-Ztg., 1936, **50**, 669–672).—A review is given covering rubber latex and methods for its concn. and compounding, the processing of dry rubber, the use of plasticisers, reinforcing and dispersing agents, etc. D. F. T.

**Accelerated weathering tests [for rubber etc.].**—See II.

#### PATENTS.

**Preparation of reversible rubber compositions from rubber latex and their reversal.** L. MELLERSH-JACKSON. From HEVEATEX CORP. (B.P. 449,056, 18.12.34).—Latex to which a  $H_2O$ -sol. stabiliser (caseinate, albuminate) has been added is flocculated with a chemical (a salt of a heavy metal, e.g., Zn) so that the insolubilised stabiliser envelopes the rubber globules. The flocculated latex is partly dewatered to a loosely coherent, semi-solid mass ( $\leq 20\%$   $H_2O$ ). This is

reconverted into "latex" by addition of  $H_2O$  and a solvent (aq.  $NH_3$ ) for the stabiliser. D. F. T.

**Manufacture of materials of or provided with compositions of or containing rubber.** INTERNAT. LATEX PROCESSES, LTD., E. W. MADGE, and F. J. PAYNE (B.P. 448,688, 12.9.34. Addn. to B.P. 416,077; B., 1934, 1023).—Continuous lengths of (flexible) material (faced sheeting, a plurality of parallel cords, lengths of carded wool or cotton, paper, fabrics), treated with aq. dispersions of rubber under non-coagulating conditions, are introduced into one or more nips formed between moving surfaces (e.g., rollers treated with coagulant) so that coagulation is effected, the rubber-impregnated or -coated material being then withdrawn continuously. D. F. T.

**Manufacture of elastic fabric.** INTERNAT. LATEX PROCESSES, LTD. (B.P. 448,669, 13.11.35. U.S., 18.12.34).—Rubber is deposited from a rubber-containing fluid on to a "condensed" fabric (i.e., one which has been reduced in length in one or more directions without distortion or stretching in any direction) so as to maintain the fabric normally in the condensed condition. The "condensing" may be effected by first causing the fabric to adhere to a stretched surface and allowing the latter to retract before the rubbering operation; the supporting surface can be subsequently removed. Apparatus is described. D. F. T.

**Rubber moulding powders.** F. N. PICKETT (B.P. 448,497, 6.11.34).—The press-moulding of hard or soft vulcanised rubber dust is rendered possible by treating (in presence of added vulcanising agents) until plastic with a rubber distillate, b.p. 70–200°, this solvent being subsequently removed by evaporation. D. F. T.

**Production of solvents from rubber.** F. N. PICKETT (B.P. 447,538, 20.9.34).— $AlCl_3$  (I) ( $\approx 10\%$ ) is added to rubber or rubber distillates (which may have been previously "refluxed" for 20–30 hr.) and the mixture is distilled, preferably at a specified rate, until (I) is about to volatilise. The distillate is a solvent of improved colour and odour. The residue, freed from (I), is a lubricating oil. D. F. T.

**Vulcanisation of rubber.** UNITED STATES RUBBER CO., ASSEES. OF C. COLEMAN (B.P. 447,458, 12.7.35. U.S., 14.7.34).—A nitrosated arylaminomethyl arylene-thiazyl sulphide, of the probable structure  $NO \cdot NR' \cdot CH_2 \cdot SR''$  ( $R'$  = aryl and  $R''$  = arylene-thiazyl), e.g., *N*-nitroso-phenyl- or *N*-nitroso-*p*-tolyl-aminomethyl benzthiazyl sulphide, is incorporated (as anti-scorch agent) in a vulcanisable rubber mixture which may contain an ultra-accelerator such as Zn dimethyldithiocarbamate. D. F. T.

**Vulcanisable compound.** A. N. GRAY and A. R. KEMP, ASSTS. to BELL TELEPHONE LABS., INC. (U.S.P. 2,008,861, 23.7.35. Appl., 29.10.32. Can., 21.7.31).—A mixture for electrical insulation is produced capable of being extruded, without vulcanisation, on a conductor at 400 ft./min. at approx. 70° and of being substantially completely vulcanised in 15 sec. at the temp. of steam at 170–175 lb., without being so soft as to cause decentralisation during vulcanisation. The mixture contains rubber (22), plasticiser (e.g., reclaimed rubber, 20, and



mineral rubber, 5), softener (*e.g.*, pine-tar oil, 3), whiting (44.7), ZnO (2.5), antioxidant (1.5), S (1), and ultra-accelerator (tetramethylthiuram mono- or di-sulphide, 0.3%). D. F. T.

**Phosphatide condensation products.** J. TALALAY, and MAGNA RUBBER CO., LTD. (B.P. 447,256; 10.9.34).—Phosphatides, *e.g.*, lecithin, are heated, *e.g.*, at 60–75°, with higher fatty acids or their salts or mixtures thereof, excluding salts of Mn, Cu, Co, and Ni. The products are for use in vulcanisation of rubber. (Cf. B.P. 445,534; B., 1936, 657.) A. W. B.

**Continuous vulcanisation of rubber goods.** L. J. CLAYTON (B.P. 448,971, 17.8.35).—Rubber goods in continuous strip form are passed near a radiant electric heater or heaters in a zone of predetermined pressure, the heating and/or pressure being independently controlled. Apparatus is claimed. D. F. T.

**Age-resisting vulcanised rubber.** R. L. SIBLEY, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 2,011,952, 20.8.35. Appl. 15.9.30).—The incorporated antioxidant comprises a reaction product of a di- (or tetra-)hydroxy-diphenylalkylidene compound (heat-treated at approx. 220°) and an equiv. proportion of a primary arylamine. The condensation products of  $\text{CH}_2(\text{C}_6\text{H}_4\text{OH})_2$  with 2 mols. of  $\alpha$ - or  $\beta$ - $\text{C}_{10}\text{H}_7\text{NH}_2$  or  $\text{NH}_2\text{Ph}$  or of 2:4- $\text{CH}_2[\text{C}_6\text{H}_3(\text{OH})_2]_2$  with 4 mols. of  $\beta$ - $\text{C}_{10}\text{H}_7\text{NH}_2$  or *o*- $\text{C}_6\text{H}_4\text{MeNH}_2$  or of 2:3- $\text{CH}_2[\text{C}_6\text{H}_3(\text{OH})_2]_2$  with 4 mols. of  $\alpha$ - $\text{C}_{10}\text{H}_7\text{NH}_2$  are claimed specifically. D. F. T.

**Rubber-bitumen compositions.**—See II. **Artificial leather.**—See V. **Insulated cable.**—See XI.

## XV.—LEATHER; GLUE.

**Effect of delayed curing of raw hide on the curing process and the finished leather.** F. STATHER and H. HERFELD (Collegium, 1936, 215–229).—A delay of 24 hr. had little effect, but there was marked hydrolytic decomp. of collagen after 72 hr. delay in curing. The solvent action of the NaCl on the hide and bacterial action during the curing were much increased thereby. Chemical analysis of the finished leathers revealed no difference except in a slightly diminished yield, but all the physical properties were adversely affected by the longer period of delay. D. W.

**Alkalinity of protein substrates [in the evaluation of bating materials].** K. H. GÖLLER (Collegium, 1936, 193–200; cf. B., 1933, 277, 437).—Greater action by tryptic enzymes is obtained on protein substrates which have been pretreated with alkalis or have been swollen than on untreated substrates. In the equation  $x = K\sqrt{F}$ , where  $x$  is the amount of protein decomposed,  $F$  the concn. of the enzyme, and  $K$  a const.,  $K$  should be standardised just like the other variables.  $K$  is a measure of the resistance of the substrate to hydrolysis, as well as of the efficacy of the bating enzymes, and has been determined for different substrates and bating materials. D. W.

**Chromic acid cleansing of [Berkefeld] filter candles [in tannin analysis].** D. MCCANDLISH (J. Soc. Leather Trades Chem., 1936, 20, 295–297).—Colour measurements of tan liquors are increased by

$\text{H}_2\text{CrO}_4$  cleansing of filter candles, whereas cleansing with hot  $\text{H}_2\text{O}$  is a breach of the official regulations. D. W.

**Determination of quebracho in blended [tannin] extracts.** F. POTHIER (J. Soc. Leather Trades Chem., 1936, 20, 278–290).—A modified Stiasny  $\text{CH}_2\text{O}-\text{HCl}$  method is advocated. The temp. of filtration should be < 95–100°. The ppt. should be washed, in turn, with boiling  $\text{H}_2\text{O}$ , aq.  $\text{Na}_2\text{CO}_3$  (2%), 0.01N-HCl, and hot  $\text{H}_2\text{O}$ , the washed ppt. dried at > 60°, and the ratio tannin/wt. of ppt. determined. This ratio is practically unaffected (for quebracho) by  $\text{NaHSO}_4$ ,  $\text{Na}_2\text{SO}_3$ ,  $\text{H}_2\text{C}_2\text{O}_4$ , and  $\text{Al}_2(\text{SO}_4)_3$ , but is reduced to 0.80 by  $\text{MgSO}_4$ . A no. of mixtures have been analysed to confirm the efficacy of the method. D. W.

**Chemistry of myrobalans. II. Nitrogenous and phosphorus-containing constituents of myrobalans and other tanning materials. III. Separation and deposition of chebulinic and ellagic acids from myrobalans tan liquors.** H. PHILLIPS (J. Soc. Leather Trades Chem., 1936, 20, 259–264, 265–278; cf. B., 1936, 754).—II. N and P have been determined in a no. of vegetable tanning materials. Substances containing N and P are extracted from the tan liquors by  $\text{EtOAc}$ , and it is considered that they are some type of lipin.

III. The insol. matter in myrobalans tan liquors consists of chebulinic and ellagic acids. The ellagic acid is derived from ellagitannins, which are decomposed by enzymes derived from the myrobalans nut and partly by mould enzymes. This decomp. is connected with a N constituent of the tan liquor. D. W.

**Judging the method of tannage of [vegetable-tanned] sole leather from chemical analysis.** V. KUBELKA (Collegium, 1936, 200–215).—The vals. for slow-pit-tanned and quick-tanned leathers are, respectively: leather substance (collagen tannate) at 13%  $\text{H}_2\text{O}$  content (%) > 72, < 72; rendement < 250, > 250;  $\text{H}_2\text{O}$ -sol. matter (as % of leather substance) < 15, > 20; ratio of combined tannin to  $\text{H}_2\text{O}$ -sol. matter > 2.5, < 2.5, Filmer grade 1–2, > 5. The quality of the leather depends on structural features. Chemical analysis is useful only in determining the mode of tannage and the possibility of deterioration of the leather. D. W.

**Oxidative dyeing [of leather].** E. K. ZILBERKVEIT and V. P. DROBINSKAJA (J. Appl. Chem. Russ., 1936, 9, 862–878).—The no. of mg. of benzidine bound per g. of untanned leather from an alkaline bath containing  $\text{H}_2\text{O}_2$  is given by  $KM^{-n}$ , where  $M$  is the wt. of the leather, and  $K$  and  $n$  are consts. The amount of dye adsorbed by leather treated with  $\text{K}_2\text{Cr}_2\text{O}_7$  or Fe salts is greater, and does not correspond with the above formula, owing probably to formation of lakes and to the catalytic action of Fe salts. The relative vol. of dye solution should be small in the case of leather treated with Cr, but not Fe, salts. R. T.

**Apparatus for determination and further study of fat, water-soluble matter, and acidity in leather and other porous materials.** A. COLIN-RUSS (J. Soc. Leather Trades Chem., 1936, 20, 290–295; cf. B.,



1933, 642).—Apparatus is described for removing a piece of leather from the liquor in which it has been immersed. D. W.

**Inhibitors of gelatin and age of animal.** STEIGMANN (Phot. Ind., 1935, 33, 276; Chem. Zentr., 1935, ii, 173).—Gelatin contains  $H_2O$ -sol., partly degraded inhibitors, and more effective insol. inhibitors, the latter varying with the age of the animal from which it was made. The determination of both kinds of inhibitors is discussed. J. S. A.

**Tannery waste-waters.**—See XXIII.

See also A., July, 911, **Tea tannins.**

#### PATENTS.

**Tanning of hides and skins.** M. BERGMANN, ASST. to STUDIENGES. DER DEUTSCHER LEDERIND. G.M.B.H. (U.S.P. 1,999,316, 30.4.35. Appl., 7.5.32. Ger., 20.5.31).—Hides etc. are prepared for tanning, treated with a non-tanning aromatic sulphonic acid (I), and subsequently treated with Cr salts of (I) or with a mixture of (I) and an inorg. Cr-tanning salt. D. W.

**Chromable azo dyes.**—See IV. **Artificial leather.**—See V. **Metal-wood adhesive.**—See X.

### XVI.—AGRICULTURE.

**Technically important properties of soils and rocks.** (A) Soil types, their classification, recognition, and important properties. R. GRENGG.

(B) Methods of examining rocks. A. SCHMÖLZER (Petroleum, 1936, 32, No. 25, 1—7, 7—11).—Formation, structure, and certain physical properties are considered. A. G. P.

**Podsols and brown forest soils.** III. K. LUNDBLAD (Soil Sci., 1936, 41, 383—394; cf. B., 1936, 610).—Dye adsorption by aluminosilicates is comparable with cation adsorption by soil colloids. The application of dye-adsorption methods to the examination of soil colloids and of soil-forming processes is indicated. A. G. P.

**Thermal decomposition of ammonium clays.** O. BOTINI (Atti R. Accad. Lincei, 1936, [vi], 23, 142—149; cf. B., 1933, 725).—The decomp. of various samples of clay soils saturated with  $NH_4^+$  has been studied up to  $500^\circ$ . There is a gradual loss of  $NH_3$  with rising temp. The temp. at which no further  $NH_3$  is evolved may be taken as a measure of the strength of binding of the adsorbed  $NH_4^+$ . O. J. W.

**Establishment of moisture equilibrium in soil.** F. SHREVE and W. V. TURNAGE (Soil Sci., 1936, 41, 351—355).—Movement of  $H_2O$  in soils of low  $H_2O$  content is very limited. Rainfall and surface evaporation are the principal factors affecting changes in  $H_2O$  content. Slow capillary movement is an unimportant factor in the establishment of a  $H_2O$  equilibrium in soil. A. G. P.

**Soil-sampling tubes for shallow depths.** F. HEYWARD (Soil Sci., 1936, 41, 357—360).—Three types of samplers for different purposes are described. A. G. P.

**Determination of lime status and lime requirement of soils based on reaction with calcium carbonates.** A. N. PURI and A. S. VANSHYLLA (Soil Sci., 1936, 41, 361—365).—Exchangeable Ca in soil is

determined before and after shaking with a suspension of  $CaCO_3$ , using the  $K_2C_2O_4$  method. Within certain limits the amount of soil taken, the concn. of solution used, and the period of shaking do not affect the results obtained. A. G. P.

**Exchangeable hydrogen in soils.** C. S. PIPER (J. Coun. Sci. Ind. Res. Australia, 1936, 9, 113—124).—Soil is shaken overnight with a Ca *m*-nitrophenoxide buffer solution. The filtered liquid is subsequently titrated with acid (bromocresol-green indicator). A correction is applied for the change in apparent basicity of the buffer due to dilution with soil- $H_2O$  (cf. Schofield, B., 1933, 561). Results obtained are of the same order as those of Bradfield's residual-carbonate method. A. G. P.

**Comparison between Schofield's *p*-nitrophenol buffer method and Prescott and Stephens' method for determining the lime requirement of soils.** C. S. PIPER and C. G. STEVENS (J. Coun. Sci. Ind. Res. Australia, 1936, 9, 125—127; cf. B., 1933, 561; 1935, 165).—Results of the two methods agree closely. Schofield's method gives slightly the higher vals. for soils of low CaO requirement, and *vice versa*. A. G. P.

**Volumetric determination of lime and magnesia in soil.** N. GAUDENZI (Ann. R. Staz. sperim. Agrar., 1932—4, 3, 181—192; Chem. Zentr., 1935, ii, 425—426).—Soil is extracted with HCl (boiling for 1 hr.) and after oxidation of Fe with  $KClO_3$  the extract is evaporated to a syrup with  $HNO_3$ . After redissolution in HCl, Fe, Al, Mn, and  $PO_4^{'''}$  are removed by aq.  $NH_3$ . In the filtrate Ca is determined by pptn. as  $CaC_2O_4$  from acid solution, and titration with  $KMnO_4$ . From the residual liquid Mg is pptd. as  $MgNH_4AsO_4$ , which is determined iodometrically. A. G. P.

**Relation of crystal structure to base exchange and its bearing on base exchange in soils.** W. P. KELLEY and H. JENNY (Soil Sci., 1936, 41, 367—382).—The position of exchangeable cations in the lattice structure is considered. Increased base-exchange capacity of minerals following fine grinding results from rupture of the lattice and the exposure of many OH ions. The extension of the theory to soil clays is discussed. A. G. P.

**Phosphate fertiliser mixtures.** W. H. MACINTYRE, L. J. HARDIN, and F. D. OLDHAM (Ind. Eng. Chem., 1936, 28, 711—717).—The reaction between wetted superphosphates and dolomite or limestone has been followed by measuring either the  $CO_2$  evolved or the decrease in  $H_2O$ -sol.  $P_2O_5$  content. On a laboratory scale the reaction is rapid, 90% transition to diphosphate occurring within 3 days. Large-scale experiments with mixtures up to 9 tons were carried out with a view of determining the effects of various methods of mixing and storage. C. R. H.

**Phosphate fertilisers by calcination process.** D. S. REYNOLDS, H. L. MARSHALL, K. D. JACOB, and L. F. RADER, JUN. (Ind. Eng. Chem., 1936, 28, 678—682).—The influence of grain size on the reaction between  $H_2O$  vapour and single- and multi-grain layers of various phosphate rocks has been studied. For single-grain layers the rate of reaction, as measured by F volatilisation and citrate-solubility of the P, increases with decrease in grain size. C. R. H.



**Effect of temperature on extraction of available phosphoric acid in soils.** E. B. KIDSON (J. Agric. Res., 1936, 17, 685—690).—The 1% citric acid-sol.  $\text{PO}_4^{'''}$  in soils increased with the temp. of extraction to extents which varied with soils of different types. A standard temp. of  $21.1^\circ$  is adopted for analytical purposes.

A. G. P.

**Nitrogenous manurial trials with cereals, in relation to agronomic, physiological, and technical properties.** A. FABBRI (Ann. R. Staz. sperim. Agrar., 1932—34, 3, 491—550; Chem. Zentr., 1935, ii, 451).—High yields of improved quality are obtained by maintaining a suitable level of fertility in soils, rather than by heavy N manuring.

A. G. P.

**Influence of manuring with nitrogen and phosphate at various stages of development of cereals on the milling quality of the grain and the baking quality of the flour.** A. FABBRI (Ann. R. Staz. sperim. Agrar., 1932—34, 3, 469—490; Chem. Zentr., 1935, ii, 451).—Manuring with N increases the yield of flour and lowers that of bran. Manuring with P increases the N content. The effects are additive when P and N are applied simultaneously.

A. G. P.

**Presence of soft grains in hard wheat (Damiano-Chiesa) and its dependence on manuring.** A. FABBRI (Ann. R. Staz. sperim. Agrar., 1932—34, 3, 457—467; Chem. Zentr., 1935, ii, 450—451).—Suitable manuring increases the N content, gluten, and baking val. of the grain. Vitreous grain improves the baking quality of flour.

A. G. P.

**Grasses.** A. McTAGGART, W. HARTLEY, T. B. PALTRIDGE, and H. K. C. MAIR (Counc. Sci. Ind. Res. Australia, Pamph., 1936, No. 63, 32 pp.).—Growth characteristics, feeding val., and analyses of *Agropyron intermedium*, *A. cristatum*, *Brachypodium phaeocoides*, *Ehrharta erecta*, and *Festuca Mairei* are recorded.

A. G. P.

**Crop drying by artificial heat.** J. ROGERS (Fuel Econ., 1936, 11, 323—326).—Grass if cut when young, and then dried, has a much greater food val. than mature hay. It is essential that the temp. of drying should be  $> 160^\circ$  otherwise much of the food val. is destroyed.  $2\frac{1}{2}$ —4 tons of  $\text{H}_2\text{O}$  have to be evaporated per ton of dried grass produced. The drying is usually effected by means of a current of hot air and furnace gases, blown or sucked through the grass by means of fans. Two types of commercial dryers, continuous and intermittent, are described; the thermal efficiency of each is approx. 70%.

H. C. M.

**Growth inhibition in potatoes caused by gas, emanating from apples.** O. H. ELMER (J. Agric. Res., 1936, 52, 609—626).—A volatile substance produced by the mesocarp and endocarp of sound, ripe apples causes abnormal radial growth, cessation of apical growth, and epinasty in potato shoots. Respiration, catalase and oxidase activity are increased and the N/carbohydrate balance of the shoots is disturbed. Stored tubers remain well preserved, and sprouting is almost entirely stopped by exposure to a sufficiency of the emanation. The inhibitory gas exhibits chemical and physiological properties indistinguishable from those of  $\text{C}_2\text{H}_4$ .

A. G. P.

**Nutrition of blueberry (*Vaccinium corymbosum*, L.) in sand cultures.** C. A. DOEHLERT and J. W. SHIVE (Soil Sci., 1936, 41, 341—350).—Best growth was obtained with high-N, low-P media.  $\text{NO}_3^-$  was preferable to  $\text{NH}_3$ . Absence of Mn and B quickly induces deficiency symptoms.

A. G. P.

**Decomposition of pineapple trash [in soil] under field conditions.** R. K. TAM and O. C. MAGISTAD (Soil Sci., 1936, 41, 315—327).—The resistance of constituents of the trash to decomp. increased in the order  $\text{H}_2\text{O}$ -sol.,  $\text{Et}_2\text{O}$ -sol.,  $\text{EtOH}$ -sol., hemicellulose, cellulose, lignin. The C:N ratio in the soil increased during a part of the decomp. period, but tended, later, to return to its original val. Changes in available N were of the reverse order. Available K increased throughout the experimental period (35 weeks). Easily-sol. P decreased during the early stages but subsequently regained the initial level.

A. G. P.

**Response of *Rhizobia* to natural humic acid.** F. E. ALLISON and S. R. HOOVER (Soil Sci., 1936, 41, 333—340).—Humic acid (I) obtained by alkali extraction of soil stimulates the development and  $\text{O}_2$  consumption of artificial cultures of *R. trifolii* and *R. meliloti*. In absence of (I) very little growth occurs. Synthetic (I) had no stimulating action. Growth response to natural (I) depends on the presence of co-enzyme R (II). *Azotobacter chroococcum* and *A. vinelandii* do not respond to (II). In the separation of (I) from soil, repeated dissolution in alkali and pptn. with acid markedly lowers its (II) content.

A. G. P.

**Potato blight. Control by spraying.** R. K. MACDOWALL (Scot. J. Agric., 1935, 18, 243—249).—Infected haulm is killed by spraying with  $\text{H}_2\text{SO}_4$  (15 vol.-% of B.O.V.). Tubers near the soil surface are not affected.

A. G. P.

**Fertiliser placement for cannery peas.** C. B. SAYRE and G. A. CUMINGS (New York State Agric. Exp. Sta. Bull., 1936, No. 659, 30 pp.).—Fertiliser placed in contact with seed in some cases lowered the yield to < that of unmanured controls. Best results were obtained by side placement, notably  $2\frac{1}{2}$  in. away from and 1 in. below the seed. Superphosphate was less injurious than a complete fertiliser when placed in contact with seed. The residual effect of heavy applications of fertiliser to the preceding crop does not affect the uniform maturation of peas.

A. G. P.

**Zinc and other mineral constituents in relation to rosette disease of pecan trees.** A. H. FINCH (J. Agric. Res., 1936, 52, 363—376).—Pecan rosette is associated with an insufficiency of Zn for the normal metabolism of the tissues. Environment may exert a secondary influence on Zn deficiency. There is no evidence of the presence of Zn in a non-utilisable form in affected tissues. The ash content of diseased tissue is > that of healthy tissue in twigs of similar kind and position on the tree. Zn is translocated through the xylem, moving rapidly in an acropetal direction, and probably very slowly in lateral and downward directions.

A. G. P.

**Zinc content of soils in relation to pecan rosette.** A. O. ALBEN and H. M. BOGGS (Soil Sci., 1936, 41, 329—332).—The disease appears in basic soils although the total Zn content is considerable, but not on acid



soils which contain only moderate amounts of Zn. The relative availability of Zn to pecan trees is an important consideration in the control of rosette. A. G. P.

**Role of fungi in the diet of the common damp-wood termite *Zootermopsis angusticollis*.** E. C. HENDEE (Hilgardia, 1935, 9, No. 10, 499—525).—Presence of fungi or conditions permitting the growth of fungi in wood favoured the growth of the termites. The fungi provide protein and, probably, vitamins. A. G. P.

**Availability of the copper of Bordeaux mixture residues and its absorption by the conidia of *Sclerotinia fructicola*.** M. C. GOLDSWORTHY and E. L. GREEN (J. Agric. Res., 1936, 52, 517—533).—The sol. Cu content of ppts. from residues of Bordeaux mixture is  $\approx 4$  p.p.m. Sol. Cu is absorbed by conidia, causing death or inhibition according to the amount of Cu available. Dormant cells and those delayed in activity do not absorb Cu. Conidia, the growth of which has been inhibited by Cu, become active when placed on a suitable culture medium. Actively growing conidia placed on Cu residues absorb Cu, as also do germ-tube cells, with lethal effects. Freshly sprayed Bordeaux residues contain available Cu which is lost by washing with rain but not by ageing. Conidial cells do not secrete a substance which can dissolve Cu from inert material. A. G. P.

**Control of *Rhizoctonia* damping-off of citrus seedlings.** S. WEINDLING and H. S. FAWCETT (Hilgardia, 1936, 10, No. 1, 1—16).—Damping-off was controlled by acidifying the soil close to plants by means of acid peat moss or preferably  $\text{Al}_2(\text{SO}_4)_3$  (I). The treatment was not effective in sterilised soil in absence of *Trichoderma* spp. In unsterilised soil the action of (I) is not entirely due to the production of soil conditions unfavourable to the development of *Rhizoctonia*, but depends, in part, on the modification of the soil microflora, permitting better development of *Trichoderma*. A. G. P.

***Cercospora* leaf-spot (Frog-eye) of tobacco in Queensland.** A. V. HILL (Counc. Sci. Ind. Res. Australia, Bull., 1936, No. 98, 46 pp.).—Conditions influencing infection are examined. Control measures include sterilisation of seed (0.1% aq.  $\text{AgNO}_3$  for 15 min.) and seed-bed spraying with Cu preps. A. G. P.

**Downy mildew (blue mould) of tobacco; its control by benzol and toluol vapours in covered seed-beds. II.** H. R. ANGELL, J. M. ALLAN, and A. V. HILL (J. Counc. Sci. Ind. Res. Australia, 1936, 9, 97—106; cf. B., 1935, 1061).—The presence of  $\text{C}_6\text{H}_6$  vapour in seed-beds prevents the appearance of mould in seedlings under all conditions. Under less severe conditions PhMe is nearly as effective. Light petroleum fractions check the spread of the disease, but do not always prevent its appearance. A. G. P.

**Effectiveness of various arsenicals in destroying larvæ of the Japanese beetle in Sassafras sandy loam.** W. E. FLEMING and F. E. BAKER (J. Agric. Res., 1936, 52, 493—503).—The observed efficiency of various arsenates is largely influenced by the period during which they have been in contact with soil. Other factors were more important in the case of  $\text{As}_2\text{O}_3$ . Arsenates of Pb (acid) Zn, and Fe produced the most consistent results; those of Al, Mn, di- and tri-Ca, and also  $\text{As}_2\text{O}_3$  varied so much in effect as to render them of doubtful

val. as soil insecticides. Basic Pb arsenate was valueless for this purpose. When freshly applied, Fe arsenate was more, and the other compounds were less, effective than acid Pb arsenate. No relation was apparent between insecticidal efficiency and  $\text{H}_2\text{O}$ -sol. As contents. The total  $\text{As}_2\text{O}_5$  content was influential, but was of secondary importance. Loss of efficiency with time (examined over 5 years) is attributable to leaching and to slow conversion into inactive forms. A. G. P.

**Effect of different colloidal soil materials on toxicity of calcium arsenate to millet.** P. L. GILE (J. Agric. Res., 1936, 52, 477—491).—The effect of soil colloid in reducing the toxicity of Ca arsenate to millet is examined in sand-soil mixtures. The detoxicating action  $\propto$  the amount of colloid present (up to 3%) and the composition of the colloid. It is unaffected by P fertilisation, the reaction of the colloid, or by the presence of  $\text{CaCO}_3$ . Relations are indicated between the action of the colloid and the % and reactivity of the Fe present. A. G. P.

**Sulphuric acid for weed control.** W. E. BALL and O. C. FRENCH (Calif. Agric. Exp. Sta. Bull., 1935, No. 596, 29 pp.).—Field trials are recorded. Spraying minimised the lodging of barley. Use of spreading agents did not increase appreciably the efficiency of the acid and caused additional injury to waxy-leaved plants, which were unaffected by acid alone. A spraying machine having an injector mixing device is described. A. G. P.

**Nitrogen trichloride and other gases as fungicides.** L. J. KLOTZ (Hilgardia, 1936, 10, No. 2, 27—52).—Repeated treatment with  $\text{NCl}_3$  (5—15 mg. per cu. ft.) prevents decay in navel oranges due to *Penicillium* spp. Similar  $\text{Cl}_2$  concns. injure the fruit and are less effective against decay, although being more toxic to fungi in cultures. Methylchloroamine can probably be substituted for  $\text{NCl}_3$ . Disinfection of boxes and packing houses can be effected with  $\text{SO}_2$ .  $\text{O}_3$  has little toxic action. A. G. P.

**New water-soluble nicotine insecticide. Nicotine humate.** L. N. MARKWOOD (Ind. Eng. Chem., 1936, 28, 648—649).—The black liquid formed in the prep. of nicotine (I) peat (cf. B., 1936, 756) is evaporated at 60°, the yield from 20 g. of peat varying from 0.8 to 5.4 g. depending on the source of the peat. Alternatively, humic acid (II) prepared from peat is treated in aq. suspension with an aq. solution of (I). (I) humate forms a slightly acid colloidal solution in  $\text{H}_2\text{O}$ , from which HCl ppts. (II); alkali liberates (I). P. G. C.

**Transvaal phosphate deposits.**—See VII. **Soil corrosion.**—See X. **Tung oil.**—See XII. **Pyrethrins.**—See XX. **Derris and cubé.**—See XXIII.

See also A., July, 909, **Effect of X-irradiation on auxins and plant growth.** **Determining total S in plants, and of forms of Ca and  $\text{H}_2\text{C}_2\text{O}_4$  in sugar-beet leaves.**

#### PATENTS.

**Fertilising soil.** C. B. DE BRUYN, ASST. to SHELL DEVELOPMENT Co. (U.S.P. 2,020,824, 12.11.35. Appl., 26.11.34).— $\text{NH}_3$  gas is introduced into irrigation  $\text{H}_2\text{O}$  in suitable concn., and the  $\text{H}_2\text{O}$  used for irrigation in the normal way. D. M. M.



**Treatment of seeds, bulbs, and tubers.** G. E. HEYL (B.P. 448,849, 31.8.34).—Seeds etc. are coated with a solution of rubber latex containing fertiliser material, fungicides, and/or N-fixing bacteria. A. G. P.

**Herbicide.** I. E. MELHUS (U.S.P. 2,007,433, 9.7.35. Appl., 17.1.31).—Claim is made for a mixture of kerosene (89), furfuraldehyde (10), and heavy petroleum (1%) for killing weeds on fallow land. A. R. P.

## XVII.—SUGARS; STARCHES; GUMS.

**Applications of colloidal chemistry [in clarifying sugar juices and coal wash-water].** A. GILLET (Rev. univ. Mines, 1935, [viii], 11, 118—123; Chem. Zentr., 1935, ii, 409).—On treating sugar juices containing  $\text{Ca}(\text{OH})_2$  with  $\text{SO}_2$  the colloidal acidic materials set free undergo mutual pptn. with colloidal bases. The colloidal matter (proteins or clay) is removed from coal wash- $\text{H}_2\text{O}$  by adding an alkaline starch solution. H. J. E.

**Turbidity in sugar products. IV. Preparation of raw sugar solutions for determinations of colour and turbidity.** F. W. ZERBAN and L. SÄTTLER (Ind. Eng. Chem. [Anal.], 1936, 8, 168—174; cf. B., 1935, 648).—For the simultaneous determination of transmittancy and turbidity of raw sugar solutions both the concn. of solids and the cell thickness must be standardised. Mixtures of dark and white syrups should be filtered after mixing, and optical readings made 2 hr. after mixing. No filtering agent could be found which removed turbidity without removing pigment.  $\text{SiO}_2$  gel is most effective in removing total dispersed matter. E. C. S.

**Errors in routine analysis of sucrose and apparent purity coefficient with sugar beet taken from field experiments.** F. R. IMMER and E. L. LECLERG (J. Agric. Res., 1936, 52, 505—515).—Laboratory errors in % sucrose ( $S$ ) or purity coeff. ( $P$ ) were not significantly different for 10-, 20-, and 30-beet samples. The laboratory error was a proportionately greater part of the plot error for  $P$  than for  $S$ . Variance for the plot was lowered more by increasing the no. of samples analysed than by increasing the no. of analyses per sample. A highly significant positive correlation was observed between  $P$  and %  $S$ . A. G. P.

**Richness of [paste formation by] starch.** M. SAMEC (Z. Spiritusind., 1936, 59, 215—216, 223—224).—Some relation may be traced between the richness of paste formation ( $\eta$ ) by starches of different plants and their amylopectin content (electrodialysis), though there are cases of varying  $\eta$  with similar amylopectin content. In general, increasing  $\text{P}_2\text{O}_5$  content of starch samples runs parallel with increasing  $\eta$ , and small starch granules (having relatively high  $\text{P}_2\text{O}_5$  content) yield greater  $\eta$  than large granules. Phosphorylation of starch gives improved paste-forming properties. However, there are limits to the dependence of  $\eta$  on  $\text{P}_2\text{O}_5$  content; thus, wheat starch gives poorer pastes than potato starch, though the  $\text{P}_2\text{O}_5$  contents are similar. The differences may be explained by different modes of combination. The mol. aggregation and tendency to hydration also influence  $\eta$ , whilst  $\eta$  diminishes with decreasing mol. wt. Some starches (with high initial  $\eta$ ) show a rapid decrease in  $\eta$  on heating, whilst others (with lower initial  $\eta$ ) are

more resistant to heat; the difference may be due to the presence of potential acid groups in the first case. Pretreatment of starch with warm  $\text{H}_2\text{O}$  for increasing periods leads to a progressively higher gelatinisation temp. and a progressively lower  $\eta$ , but pastes from pretreated starches are less sensitive to heat. The presence of electrolytes causes diminution in  $\eta$ , and the importance of this fact in the examination of starch pastes is stressed. I. A. P.

**Determining  $\text{H}_2\text{O}$  content.**—See I.

See also A., July, 873, **Determination of reducing sugars.** 909, **Determining forms of Ca and  $\text{H}_2\text{C}_2\text{O}_4$  in sugar-beet leaves.** 910, **Gum from lemon trees.**

PATENT.

**Composite sheeting.**—See V.

## XVIII.—FERMENTATION INDUSTRIES.

**Determination of the volatile acidity of wine with the new Jozzi acidacetimeter.** G. AMADIO and L. PARONETTO (Annali Chim. Appl., 1936, 26, 173—178).—The acidacetimeter (described) consists of an apparatus for distillation of the volatile acids with superheated steam. Results compare satisfactorily with those by the official methods. L. A. O'N.

**Determination of tartaric acid in musts and wines by the racemate method.** E. PEYNAUD (Ann. Falsif., 1936, 29, 260—273).—A single pptn. leads to erroneous results. Kling's double-pptn. method (B., 1924, 696) gives better results with wines poor in tartaric acid if increased time is allowed for the first ppt. to form, and if aq.  $\text{NH}_3$  is substituted for  $\text{NaOAc}$  in the second pptn. E. C. S.

**Employment of Selivanov's reaction in bromatological analysis.** K. TÄUFEL and C. SAMPIETRO (Annali Chim. Appl., 1936, 26, 139—143; cf. A., 1933, 597).—The modification of Selivanov's reaction is extended to wine, beer, milk, and powdered milk. The volatility of hydroxymethylfurfuraldehyde under opportune conditions is reconfirmed. L. A. O'N.

**Exact detection of hydroxymethylfurfuraldehyde in sweet wines.** W. HUNTENBURG (Z. Unters. Lebensm., 1936, 71, 332—337).—Hydroxymethylfurfuraldehyde is hydrolysed to lævulinic acid and  $\text{HCO}_2\text{H}$ , and the former identified by conversion into 1-phenyl-3-methyl-6-keto-1 : 4 : 5 : 6-tetrahydropyridazine. E. C. S.

**Composition of the first and last runnings of [fermented] plum water. II.** A. FREY and E. MALENKE (Z. Unters. Lebensm., 1936, 71, 338—345; cf. B., 1935, 920).—To determine the extent of annual fluctuations the work described previously (*loc. cit.*) was repeated. The preliminary rise in the aldehyde content of the several fractions of the first runnings was less marked, and that of the ester content completely absent. 76% of the volatile acids remain in the last runnings and residues, and the latter contain 43% of the difficultly volatile higher aldehydes. E. C. S.

**Determining  $\text{H}_2\text{O}$  content.**—See I. **Extracts by fermentation.**—See XX.

See also A., July, 895, **Prep. of phosphatase from bone.** 897, **Kojic acid from xylose.** 898, **Lactobacillus hilgardia from Californian wine.**



## PATENT.

**Production of yeast and fermentation of solutions.** H. SCHOLLER and R. EICKEMEYER (B.P. 448,689, 12.9.34).—Yeast is circulated by means of finely-divided air in a vessel which is provided with inclined surfaces on which the yeast will collect and slide off again, it being withdrawn continuously or at frequent intervals, preferably just after it has slid down; the nutrient solution (e.g., wood sugar) is continuously added to a point near the air spray and decanted at the top. Forms of baffles giving long sinuous circulation are described. Flocculation may be assisted by  $[H^+]$  buffer salts or flocc lactic acid or other bacteria. The content of yeast may be even  $>$  that of the nutrient matter present.

B. M. V.

## XIX.—FOODS.

**Physical properties of wheat-flour doughs.** L. J. BOHN and C. H. BAILEY (Canad. Chem. Met., 1936, 20, 196—197).—Measurements on 36 different flours were carried out with a modification of the Schofield-Blair apparatus, using a stress balance. High correlation was found of stress readings with ability of the dough to withstand prolonged mixing and with loaf vol. Temp. and  $H_2O$  absorption greatly affect the stress. Stress readings are increased by keeping and by adding salt or milk powder, and decreased by fermentation, large additions of papainase, malt, and shortenings. E. A. F.

**Behaviour of wheat flour on hydrolysis and formation of sugar.** A. VERCILLO (Annali Chim. Appl., 1936, 26, 179—184; cf. B., 1935, 1113).—Examination of a no. of breadmaking flours shows that the sucrose (I) content and diastatic power, and hence the reducing sugar formed on hydrolysis, increase with the amount of ash. Little (I) is formed by hydrolysis.

L. A. O'N.

**Selenium content of wheat from various parts of the world.** W. O. ROBINSON (Ind. Eng. Chem., 1936, 28, 736—738).—Samples of market wheat contained 0.1—1.9 p.p.m. of Se, most of which was found in the gluten fraction. These amounts are probably not harmful to the human subject. Wheat grown on richly seleniferous soil contained 30 p.p.m. of Se. E. C. S.

**Flour.** DENIGÈS, DUBAQUIÉ, LABAT, and DANGOUMAU (Bull. Soc. chim., 1936, [v], 3, 1173—1175).—The % of ash, gluten (moist and dry), fatty matter, moisture, and the acidity in 40 samples of French baking flour is recorded.

H. W.

**Baking value of flours. Measurement of the "body" of doughs by the "dynamometer."** A. DANGOUMAU (Bull. Soc. chim., 1936, [v], 3, 989—993).—An electrical device is described.

H. W.

**Physico-chemical study of bread-making.** E. FLEURENT (Chim. et Ind., 1936, 35, 507—519, and Compt. rend., 1936, 202, 1341—1343).—The conditions determining the quality of bread are discussed, with particular reference to the effect of the plasticity of the gluten (II). The effect of variations in the % of gliadin (I) and glutenin on the extensibility of (II) was determined by placing lumps of (II) on the sole of a small cylindrical-spherical (Dathis) oven at 150—155°. The results were confirmed by addition of pulverulent (I) to (II) containing a low % of (I), the (II) samples having

the same form after baking as those containing the total amount of (I) in the natural state. Kneading (I) with org. acids, such as those produced in panary fermentation, and with mineral acids led to a dispersion of the (I), which in all cases finally resulted in the destruction of the (II), but whereas this took place at approx.  $p_H$  3 in the case of org., it occurred only at approx.  $p_H$  1 in the case of mineral acids.  $H_3PO_4$  behaved similarly to the org. acids. The effect of acids is related to their activity coeffs.

E. A. F.

**Nature and properties of odoriferous substances in bread grains, flour, and bread.** H. DEUTSCH-RENNER (Mühlenlab., 1936, 6, 87—90).—Each grain has its characteristic odour, the source of which is not known, though some work has been done on rancid or otherwise damaged grain. Apart from its association with the small proportion of fat present, the odour resides chiefly in the bran, and is made evident by grinding or by contact with  $H_2O$ , as in bread-making. Aromatic breads contain  $CHAcMeOH$ , the conversion of which into  $Ac_2$  is thought to be responsible for the aroma.

E. A. F.

**Chemical determination of bread aroma.** T. MASLING (Mühlenlab., 1936, 6, 90—94).—The aroma depends on conditions of baking and on fermentation. Previous conclusions are confirmed, that aroma is due to the presence of  $CHAcMeOH$  (I), formed by yeast from sugar, and its isolation from bread and determination as Ni dimethylglyoxime are described. The relation of the (I) val. (mg. per 150 g. of dough or bread) to various factors is investigated. (I) formation is favoured by a high sugar: yeast ratio, diastase preps., low fermentation temp. and short time, sponge-dough method, oxidising agents, and suitable yeast. The (I) val. can be used to determine yeast quality.

E. A. F.

**Accessory factors in rice polishings. Extraction of antineuritic substance.** C. A. COOK and R. H. CARROLL (Ind. Eng. Chem., 1936, 28, 741—742).—The vitamin- $B_1$  was extracted from the adsorption product with aq. NaOH, LiOH, EtOH- $C_5H_5N$ , or  $COMe_2$ , followed by extraction of the free vitamin base from alkaline solution with oleic or hexoic acid. The org. acid layers were washed with  $H_2O$ , the vitamin extracted with dil. aq. HCl, and the solution evaporated to dryness at a low temp. The product contained  $>$  300 units of  $-B_1$  per g.

E. C. S.

**Effect of fat extractants on solubility of sesame-seed protein in salt and alkali.** W. H. ADOLPH and I. LIN (Ind. Eng. Chem., 1936, 28, 734—735).—Treatment of the dried, ground, oil-extracted seeds with petroleum, b.p. 85°, or heating for 3 hr. at 110°, caused no loss of solubility of the protein in aq. NaCl, NaOH, or  $Na_2CO_3$ , but treatment with MeOH caused marked loss of solubility.

E. C. S.

**Utilisation of marine fish. Dietetic value of alcohol-extracted fish flour.** S. TOKUYAMA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 29, 129—166).—Continued extraction of air-dried fish with EtOH gives odourless, palatable flour of high nutritive val. Rats fed on this flour supplemented with bread and yeast show excellent growth rates and reproduction.

E. D. Y.



**Calculation of added water from the f.p. of watered milks.** G. D. ELSDON and J. R. STUBBS (Analyst, 1936, 61, 382—386).—A revised formula is suggested. Added  $H_2O = (100 - \text{total solids})(T - T')/T$  wt.-%, where  $T$  is the f.p. depression (Hortvet) of the original milk (or an average figure) and  $T'$  that of the mixture. Accurate results with  $> 25\%$  of added  $H_2O$  are obtained and slightly lower results with  $> 25\%$ . E. H. S.

**Effect of different sources of radiant energy on flavour and antirachitic potency of milk.** K. G. WECKEL, H. C. JACKSON, R. HAMAN, and H. STEENBOCK (Ind. Eng. Chem., 1936, 28, 653—656).—Milk irradiated to excess by means of the C or  $SiO_2$ -Hg vapour arc develops an undesirable flavour. The regions of the spectrum active in this respect have  $\lambda < 2600$  Å. and 3100—3800 Å., whilst the region active in inducing antirachitic activity has  $\lambda$  2300—3130 Å. When milk is irradiated for the latter purpose it is, therefore, advisable to screen out radiation of  $\lambda < 2000$  Å. and  $> 3100$  Å. E. C. S.

**Chemical analysis of milk.** A. C. C. DA SILVA and J. R. DIONÍSIO (Rev. Chim. pura appl., 1936, [iii], 11, 78—89).—The chemical and bacteriological examination of milk, as practised in Oporto, is described, with specimen analyses. F. R. G.

**Metallic contamination of dairy products. I. Determination and distribution of copper in New Zealand milk.** R. J. McILROY (New Zealand J. Sci. Tech., 1936, 17, 710—712).—Cu is determined by the carbamate method after separation of the protein by 20%  $CCl_3 \cdot CO_2H$ . Cu is present almost entirely in combination with proteins, both sol. and insol. A. G. P.

**Determination of oleomargarine in ice cream.** T. H. WHITEHEAD and J. B. DUNSON (Ind. Eng. Chem. [Anal.], 1936, 8, 203—204).—Fat is extracted by a modification of the Röse-Gottlieb procedure, and its Reichert-Meissl val. determined with a slight modification of the usual technique. E. C. S.

**Maturation of cheeses. II. Polypeptides containing phosphorus.** E. PARISI and G. DE VITO (Atti R. Accad. Lincei, 1936, [vi], 23, 149—152; cf. A., 1934, 1384).—The presence in the juice of ripe cheeses of certain polypeptides containing P is shown. These substances are sol. in  $H_2O$  and, under the action of proteolytic enzymes, split off fragments of relatively low mol. wt., which contain practically all the P of the original polypeptide. O. J. W.

**Sterols of the unsaponifiable matter of cheese.** A. DANGOUMAU (Bull. Soc. chim., 1936, [v], 3, 988—989). The presence of ergosterol is confirmed. H. W.

**Determination of casein by formol titration after precipitation with acid.** F. H. McDOWALL and A. K. R. McDOWELL (Analyst, 1936, 61, 387—390).—Casein (I) is pptd. from the milk (20 ml.) diluted with  $H_2O$  (100 ml.) at  $42^\circ$  with AcOH and NaOAc according to Moir's procedure. It is separated and washed, dissolved in NaOH (11 ml. of 0.1N), neutralised with 0.2N-acid, treated with formalin (4 ml.), and titrated with NaOH. The formol titre  $\times 1.05$  gives the wt.-% of (I). Reasonably accurate results are obtained, but the separation of the (I) requires considerable attention and limits the use of the method for routine work. E. H. S.

**Microdetermination of ammonia-nitrogen in eggs.** S. L. BANDEMER and P. J. SCHAIBLE (Ind. Eng. Chem. [Anal.], 1936, 8, 201—203).—Procedures are described for the determination of  $NH_3$  in egg-white, yolk, and mixed whole egg, using a modification of the Conway-Byrne cell (cf. A., 1933, 654). E. C. S.

**Tomatoes and tomato preserves.** A. KLING and DEMESSE (Ann. Falsif., 1936, 29, 273—279).—Methods of determining total solids by evaporation or by determination of the  $n$  of the juice are criticised. Methods of determining acidity and reducing substances are outlined. During maturation the last-named increase to a max., and it is suggested that the fruit are in an optimum condition at this max. The ratio of reducing substances to acidity is termed "coeff. of maturity." E. C. S.

**Buffer capacity of tomato juice.** M. OAKLEY and J. C. KRANTZ, JUN. (Ind. Eng. Chem. [Anal.], 1936, 8, 205—206).—The buffer capacity with respect to strong acid of 6 samples of tomato juice was uniform and not markedly affected by addition of  $H_2O$ . With respect to alkali the buffer capacity was more variable. It was possible to detect addition of  $H_2O$  by its effect on the buffer capacity of the serum with respect to alkali. E. C. S.

**Iodine-starch reaction [as an index of maturity in apples].** L. W. TILLER (New Zealand J. Sci. Tech., 1936, 17, 702—709; cf. B., 1935, 38).—Earlier work is extended to cover the whole period of maturation of Cox's Orange Pippin and Jonathan apple. Results are discussed in relation to pitting and storage quality. The test probably has little commercial val., at least in so far as Jonathans are concerned. A. G. P.

**Composition of Hungarian "liquid apple."** S. VON FINÁLY (Z. Unters. Lebensm., 1936, 71, 322—323). E. C. S.

**Accuracy of determinations of lead and arsenic on [sprayed] apples.** D. E. H. FREAR and W. S. HODGKISS (J. Agric. Res., 1936, 9, 639—644).—Data are given for the author's photoelectric method for Pb and the Gutzeit method for As. Sampling errors are examined. A. G. P.

**Dithizone as a reagent for dissolving and determining spray-residue lead [on fruit].** W. E. WHITE (Ind. Eng. Chem. [Anal.], 1936, 8, 231).—Pb is removed from the fruit surface by dithizone in  $CHCl_3$  in presence of aq. KCN,  $NH_3$ , and citric acid. The colour change is not affected by the org. matter present, but the repeated washings probably reduce the accuracy of determination to an undetermined extent. E. S. H.

**Ripeness of grapes.** E. HUGUES and E. BOUFFARD (Ann. Falsif., 1936, 29, 279—283).—When perfectly ripe, "Chasselas" grapes have a sugar:acidity ratio of 30. They are sufficiently ripe for marketing when this ratio is 25. E. C. S.

**Storage diseases of grape fruit.** C. BROOKS and L. P. MCCOLLOCH (J. Agric. Res., 1936, 52, 319—351).—Pitting of stored fruit was increased by inclusion of small quantities of soil, sand, or C in the wrappers or by impregnation of the wrappers with glycerin; it was decreased by control of pre-storage and storage temp., exposure to atm. containing 20—45% of  $CO_2$  prior to



low-temp. storage, or by use of oiled, paraffin-waxed, or Cellophane wrappers. Coating fruit with mineral oil-wax mixtures gave best control of pitting, but tended to increase scald and watery breakdown. A. G. P.

**Sources of vitamins.** XVIII. Concentrated sorrel juice as antiscorbutic agent. XIX. Effect of freezing on antiscorbutic activity of potatoes. T. L. ISUMRUDOVA (Z. Unters. Lebensm., 1936, 71, 324—326, 326—330). XX. Vitamin-A value of pine needles. S. N. MATZKO (*Ibid.*, 1936, 71, 330—332; cf. B., 1936, 346).—XVIII. The juice was conc. 18-fold. When 3 c.c. of HCl were added to 1 litre of juice, the concentrate contained approx. 3000 units of -C per kg. Without HCl the -C content fell to approx. 2000 units per kg.

XIX. A considerable loss of -C occurs during storage at 2.5—3.0°, but, provided the potatoes are rapidly thawed, no loss occurs as a result of storage at < -14°.

XX. Needles of *Picea excelsis* gathered in spring and summer contain 130 units of -A per g. E. C. S.

**Presence of manganese in tea.** P. BALAVOINE (Arch. Sci. phys. nat., 1936, [v], 18, Suppl., 42—44).—In various samples of tea the content of Mn varied with the N content. This result is in general agreement with previous observations. W. O. K.

**Fluorine content of some Chinese food materials.** E. REID (Chinese J. Physiol., 1936, 10, 259—272).—Chinese teas contain a high proportion of F compared with other native food products. Addition of such tea to a normal diet results, in rats, in white striations appearing on the incisors, characteristic of chronic F toxicosis. F. A. A.

**Comparative feeding trials with A.I.V. fodder and silage.** I. AIKINEN (Karjalalous, 1935, 11, 237—241; Chem. Zentr., 1935, ii, 146).—Tests of milk yields for two groups of cows are recorded. H. J. E.

**Vitamins in the cult of pigs. Vitamin-A and -D content of whole and skim milk, young rye grass, and sun-cured pasture hay, with reference to the vitamin requirements of pigs.** M. M. CUNNINGHAM (New Zealand J. Sci. Tech., 1936, 17, 673—678).—Vals. are recorded and discussed in relation to pig rations. Neither -A nor -D was detected in skim milk by biological methods. A. G. P.

**Influence on yolk colour by feeding with synthetic and vegetable dyestuffs; mimicry of egg shells.** O. ROEMMELE (Z. Fleisch- u. Milchhyg., 1935, 45, 225—227; Chem. Zentr., 1935, ii, 143—144).—Positive results are recorded, and also a lightening of shell colour during a snowfall. J. S. A.

**Determining H<sub>2</sub>O content.**—See I. Hydrolysis of beef fat.—See XII. Grasses. Crop drying.—See XVI. Bromatological analysis [of milk etc.].—See XVIII. Slaughterhouse waste waters. Bacteria from green vegetables.—See XXIII.

See also A., July, 825, Ac<sub>2</sub>. 880, Electrical resistance of milk. 903—8, Vitamins. 911, Tea tannins. 912, Proteins of Indian foods. Ionisable Fe in foods.

#### PATENTS.

**Coloration of flour.** E. J. BOSTROM and A. P. SUMMERS (U.S.P. 2,012, 708, 27.8.35. Appl., 27.5.33).

—Flour is fed under pressure through a tapering nozzle (N) into which is delivered a colouring solution (I) and then compressed air. The air aids the distribution of (I) through the flour, and effects some drying of the coloured flour as it is blown from N into a settling chamber, which is provided with an exhaust fan to remove further excess H<sub>2</sub>O. E. B. H.

**Production of a baking agent.** C. G. QUASCHNING and H. HUNDERTMARK, Assrs. to "DEBACK" DEUTS. BACKMITTEL G.M.B.H. (U.S.P. 2,009,274, 23.7.35. Appl., 25.5.33).—Rye bran is stirred to a thin paste with H<sub>2</sub>O, allowed to swell, dried on a roller dryer at 180° for 2—10 min., and ground to a powder, which is mixed with a rye meal dough for production of dark rye bread. E. B. H.

**Retarding staling of bread.** A. K. EPSTEIN and B. R. HARRIS (U.S.P. 2,009,440, 30.7.35. Appl., 4.12.33).—Arabinose (I) (0.5—1.0% on the flour wt.) is added to the dough. Gums, e.g., acacia, arabic, may be hydrolysed with acid to produce (I) and the neutralised solution employed directly in bread-making. The loaf remains fresh for 24—48 hr. longer than normal. E. B. H.

**Packing of edible or other substances or preparations liable to deterioration or injury from damp, heat, or climatic conditions.** T. E. STURGES and C. SOUTHWELL & Co., LTD. (B.P. 448,572, 21.2.35).—The material is charged into open jars and only the top exposed to radiant heat to form a dry skin thereon; another cover capable of forming a vac.-tight joint is placed thereon, preferably before cooling, any air trapped being sterile owing to the heat. B. M. V.

**Binding the water of food extracts, yeasts, juices, hygroscopic substances, and the like.** W. BECKER, O. ENGLERT, and F. BECKER (B.P. 448,067, 18.7.35).—An anhydride of lactose is prepared by heating the sugar to < 150°. This anhydride is mixed with a food extract (e.g., coffee), which thickens and finally sets to a pulverisable "cement." E. B. H.

**Stabilising material [jell-forming seaweed as food ingredient].** W. SELTZER, Assr. to KRAFT-PHENIX CHEESE CORP. (U.S.P. 2,011,594, 20.8.35. Appl., 14.11.32).—The use of Irish and Iceland moss as stabilisers (S) in emulsified products often introduces unpleasant flavours. This may be prevented by suitable pretreatment of the S with either EtOH or Pr<sup>2</sup>OH. E. B. H.

**Materials for preparation of non-alcoholic beverages.** H. J. GREEN, and H. J. GREEN & Co., LTD. (B.P. 449,051, 20.5.35).—The flavouring for beverage crystals is prepared in the form of a small pastille containing gelatin, glycerin, and sugar, wrapped in protective paper. E. B. H.

**Cooking utensil.** A. L. CLAPP (U.S.P. 1,985,764, 25.12.34. Appl., 21.2.29).—A mixture of asbestos fibre 40, wood fibre 60, and Ca(OH)<sub>2</sub> 10—15 pts. with H<sub>2</sub>O is rolled into sheets; utensils are moulded from the material, and stiffened by immersion in aq. Na silicate (d 1.16). L. C. M.

**Treatment of animal fodder.** D. R. TULLIS and P. OAKLEY (B.P. 448,176, 29.11.34).—Grass, grain offals, waste human-food products, etc. are dried to 3.0—



15.0%  $H_2O$  content and powdered. A mixture of these dried products suitable for a balanced ration is sprayed with a culture of *B. prodigiosus* Tullensi or *B. proto* SS 5 until the  $H_2O$  content is 30–50% and the bacterial inoculation 0.1–0.4%, and then incubated until the  $p_H$  has fallen from 7 to 4. The material is then dried by heating, to stop further bacterial action. E. B. H.

#### Treatment of fish, whale flesh, and the like.

J. M. and R. V. PEHRSON (B.P. 448,033, 29.10.34).—The material is partly dried, without previous cooking, by treatment with hot gases in a rotating drum, to a  $H_2O$  content of 20–30%. The fat content is then reduced (to give about 10% in the final meal) (a) by pressing the warm, partly dried material, or (b) by adding 40–60% of dried grasses, lucerne, etc. Finally, the  $H_2O$  content is reduced to about 8% by further drying. The temp. of the treated material should not exceed 70°. E. B. H.

#### Manufacturing meal and train oil from train-oil sediment.

G. JÖNSSON (B.P. 448,584, 15.5.35).— $H_2O$  is removed from fish-liver sludge by rapid evaporation, e.g., in vac., and the residue is pressed or centrifuged. E. H. S.

**Preservation of foodstuffs.** T. L. SWENSON (U.S.P. 2,009,033, 23.7.35. Appl., 17.8.32).—Dehydration, freezer burn, and loss of bloom on meat and poultry are prevented by dipping the chilled carcass in an odourless mineral oil saturated with  $CO_2$  and having a pour point 3–5° above the temp. of the cold store. Oil having  $\eta$  70° Saybolt at 38° gives a thin yet fully protective coating when coagulated. E. B. H.

**Flavourings from butter fat.**—See XII.

### XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Titrimetric determination of camphor (and hexetone) in medicinal mixtures.** R. WOLSTADT (Magyar. gyóg. Társ. Ert., 1935, 11, 257–265; Chem. Zentr., 1935, ii, 82).—A volumetric method involving titration against  $NH_2OH$  is described. H. N. R.

**Bile acids and their practical application in medicine.** H. KUNZE and H. VOLK (Münch. med. Woch., 1935, 82, 869–871; Chem. Zentr., 1935, ii, 400).—Three preps. consisting of cholic acid derivatives combined with garlic oil are described. H. N. R.

**Chemical examination of Chinese remedies for nightblindness.** P. G. MAR and B. E. READ (Chinese J. Physiol., 1936, 10, 273–284).—20 animal and 65 vegetable products used as Chinese native remedies give physico-chemical indications of the presence of vitamin-A or provitamin-A. *Atractylis ovata* shows 15–20 times the val. of cod-liver oil. F. A. A.

**Production of extracts by means of fermentation processes.** S. VON BARI (Pharm. Ztg., 1936, 81, 629–631).—Five fermentation processes and that of the Hung. Pharm. IV are compared. Extracts of belladonna, hyoscyamus, and cinchona may be made more cheaply and quickly by the fermentation method and they are lighter in colour. It is unsuitable for the prep. of strychnine extract and it increases the non-morphine alkaloid content of opium extract but does not influence the morphine content. E. H. S.

#### Capillary distribution of plant constituents.

III. A. KUHN and G. SCHÄFER (Pharm. Ztg., 1936, 81, 624–628; cf. B., 1935, 573).—The zoning and distribution of sugars, tannins, humins, alkaloids, saponins, cyanogenetic glucosides, hydroxymethylanthraquinones, and flavones over capillary strips, examined in ordinary and ultra-violet light, of tinctures of the following barks are described: angustura, angustura spura, cascara sagrada, cinchona, frangula, pomegranate, witchhazel, wild cherry, quebracho, and swamp sumach. E. H. S.

**Determination of morphine in opium preparations.** F. SZEGHÖ (Magyar. gyóg. Társ. Ert., 1935, 11, 222–230; Chem. Zentr., 1935, ii, 82).—A method involving isolation and titration is described.

H. N. R.

**Preparation of injectable apomorphine hydrochloride solutions.** D. PONTE (G. Farm. Chim. Sci. aff., 1935, 84, 53–57; Chem. Zentr., 1935, ii, 80).

R. N. C.

**Injection therapy. VIII. Decomposition of arecoline hydrobromide on heat sterilisation.** S. A. SCHOU (Dansk Tidsskr. Farm., 1936, 10, 175–180).—Heating for 1 hr. at 100° in glass vessels is without effect, whilst autoclaving for 20 min. at 120° results in 5% decomp. Addition of buffering agents does not afford protection, but that of 0.001N-HCl stabilises the solution; with 0.1N-HCl hydrolysis occurs.

F. O. H.

**Extracts of cinchona bark and bearberry leaves.** A. JERMSTAD and O. ØSTBY (Dansk Tidsskr. Farm., 1936, 10, 161–174).—Prep. of cinchona extract over a free flame is as efficient as that by the Norwegian Pharmacopœia or D.A.B. VI method; that of the Swiss Pharmacopœia or addition of citric acid yields an alkaloid-rich extract. Acidic (HCl) extracts have an increased (by 13–14%) alkaloid content. The Norwegian and Swiss pharmacopœial and boiling methods for Decoctum Folii Uvae Ursi yield similar extracts. The content of arbutin and quinol of extracts from coarsely powdered leaves is > that of extracts from cut leaves.

F. O. H.

**Presence of quinotoxine in cinchona bark.** C. MASINO (Boll. Chim. farm., 1936, 75, 297–299).—Samples of *C. succirubra* bark which have been exposed to sunlight for 3 years contain quinotoxine. E. W. W.

**Quinine iodobismuthate for hypodermic use.** G. VITA and L. BRACALONI (Boll. Chim. farm., 1936, 77, 325–328, 331–334).—The prep. of this drug is described in detail, and its composition and physical properties are considered. E. W. W.

**Constituents of pyrethrum flowers. V. Structure of pyrethrolone.** F. B. LAFORGE and H. L. HALLER (J. Amer. Chem. Soc., 1936, 58, 1061).—Pyrethrolone and tetrahydropyrethrolone are now considered to be 5-hydroxy-3-methyl-2-pentadienyl- and -2-amy- $\Delta^2$ -cyclopentenone, respectively. The former gives the 5-Cl-derivative, which is reduced to (probably) 3-methyl-2-amy- $\Delta^2$ -cyclopentenone, probably identical with dihydrojasnone (Staudinger and Ruzicka, A., 1924, i, 522; Treff and Werner, A., 1933, 1296). H. B.

**Loss of pyrethrins during analysis of mineral oil-pyrethrum extracts by the Seil method.** J. J. T.



GRAHAM (Ind. Eng. Chem. [Anal.], 1936, 8, 222).—25% loss of pyrethrins occurred during steam-distillation.

E. C. S.

**Composition of Turkish tobacco.** I. J. VLĂDESCU and N. DIMOFTE (Z. Unters. Lebensm., 1936, 71, 358—361).—The % of  $H_2O$ , of total, protein-, and nicotine-N, reducing sugar, sol. carbohydrate, and ash in the dry matter of 5 grades of tobacco from each of 5 districts, and of grade III tobacco from 13 districts, are given.

E. C. S.

**Examination of the esters of essential oils.** B. ANGLA (Ann. Chim. Analyt., 1936, [iii], 18, 145—148; cf. B., 1934, 555).—The volatile acids of the esters of lavender (oil and concrete), lavender abs. (AcOH and homologues), sage, bergamot, jasmin abs. (all mainly AcOH), and violet leaf abs. (no volatile acids; "octine- and heptene-carboxylic acids" were detected) have been examined by Duclaux method.

E. H. S.

**Tobacco. Nicotine humate.**—See XVI. **Antineuritic vitamin from rice polishings.**—See XIX.

See also A., July, 858, **Product with celery odour.** 863, **Prep. of kynurine.** 864 and 866, **Antimalarials. tert.-Alkylbarbituric acids. N-Substituted barbituric acids.** 869—871, **Alkaloids.** 891, **Hypnotic barbiturate.** 898, **Prep. of sp. polysaccharide from B. dysenteriae.** 901, **Prep. of gonadotropic hormone of pregnant mare's blood.** 902, **Purification of galactin. Prep. of cryst. insulin. Titration of insulin.** 903—8, **Vitamins.** 911, **Marjoram oil.** 912, **Saharan lily containing colchicine. Alkaloids of Lupinus albus seeds.**

#### PATENTS.

[A] **Applying coating to a medical preparation.** [B] **Coating for medical compound.** G. C. MILLER, Assr. to KELP-OL LABS., INC. (U.S.P. 2,011,586—7, 20.8.35. Appl., [A] 3.7.33, [B] 24.3.34).—(A) The enteric coating of oil or wax having m.p.  $\leq 60^\circ$  is powdered and applied to the medicament with the aid of an adhesive and then melted by heating. (B) Coatings consisting of mixtures of either a high-m.p. oil, wax, or fatty acid or nitrocellulose lacquer, and a hygroscopic, effervescent, or readily sol. substance are specified.

E. H. S.

**Production of surgical and sanitary pads, dressings, and bandages.** SANDERS CHEM. PRODUCTS, LTD. From E. SANDER (B.P. 448,742, 21.8.35).—The fibrous material is coated with polymerised vinyl alcohol or acrylic acid, or an ester thereof, containing a plasticiser.

E. H. S.

### XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Determination of resolving power of photographic emulsions.** A. NARATH (Kinotech., 1935, 17, 91—95, 107—110; Chem. Zentr., 1935, ii, 173—174).—A method is described for determining the resolving power, which is  $\propto$  the grain size of the emulsion.

J. S. A.

**Measurement of printing range.** F. FORMSTECHER (Phot. Ind., 1935, 33, 196—197; Chem. Zentr., 1935, ii, 174).—Tables are given for use with commercial emulsions.

J. S. A.

**Motion pictures of engine flames.**—See II.

See also A., July, 806, **Reduction of Ag salt.** 808, **Desensitisation.**

#### PATENTS.

**Film base for motion-picture and other photographic films.** VOIGTLÄNDER & SOHN A.G. (B.P. 448,256, 3.12.34. Ger., 1.12.33).—A film base composed of a difficultly inflammable org. cellulose derivative (acetate) (I) is coated on one or both sides with a layer of material (cellulose nitrate, natural or artificial resin) of greater surface hardness than (I), the layer being so thin that it does not prevent passage of vapours or liquids to or from (I). Where the layer consists of cellulose nitrate it may be applied to (I) or formed by superficial chemical treatment of (I).

F. R. E.

**Manufacture of anti-halation layers and filter layers.** I. G. FARBEIND. A.-G. (B.P. 446,583, 2.11.34. Ger., 18.11.33).—Dyes of the  $CHPh_3$  series, containing one or more sulphaalkyl groups, are suitable for dyeing photographic colloid layers; they are decolorised easily and completely in developers, and wash out completely.

J. L.

**Projection of lenticular films.** I. G. FARBEIND. A.-G. (B.P. 447,490, 19.11.34. Ger., 18.11.33).—When prisms or gratings are used in place of the usual multi-colour filter, a filter which absorbs light from the borders of the spectrum and from regions between the primary colours is placed between the source of light and the prisms. The filter is preferably composed of the glass described in B.P. 338,334 (B., 1931, 158).

J. L.

**Films for projection of coloured and black-and-white images alternately.** OPTICOLOR A.-G. (B.P. 447,644, 22.7.35. Ger., 27.7.34).—Both the images to be reproduced in colour and those to be reproduced in black-and-white are recorded on one lenticular film, the black-and-white record being whole and non-reticulated; the colour-record is adapted for use with a multi-zone filter which gives correct projection of the black-and-white images. Alternatively, the black-and-white images may be on smooth film, and the filter then has the central zone less transparent than the amount necessary to give white with a blank lenticular film; the colour-record is adapted for use with this filter.

J. L.

**Treatment of photographic surfaces [kinematograph films].** V. A. STEWART, Assr. to L. A. SOLOMON (U.S.P. 1,997,269, 9.4.35. Appl., 31.10.31).—A hardening and toughening bath for kinematograph positives contains tannic acid 1 oz. and glycerin 3 oz. in 8 quarts of a 3:2:1:1:1 mixture of  $CCl_4$ , turpentine, formalin, eucalyptus oil, and  $H_2O$ , and sufficient EtOH to give a homogeneous solution.

L. C. M.

**Photographic stripping films.** KODAK, LTD., Assees. of C. R. FORDYCE and M. SALO (B.P. 448,802, 15.12.34. U.S., 15.12.33).—A temporary support carries on it, in order, an adhesive stripping layer (e.g., sol. gelatin,  $H_2O$ -sol. dextrin), a  $H_2O$ -permeable but not  $H_2O$ -sol. layer (I), and the photographic emulsion. (I) is formed of a cellulose aliphatic ester of low acyl content, e.g., cellulose acetate of Ac val.  $< 36$  (33—36)%, or hydrolysed cellulose acetate-propionate with Ac  $< 30\%$  and COEt  $< 5\%$ .

J. L.



**Production of films in natural colour.** W. T. CRESPINEL, Assr. to HUGHES INDUSTRIES CO., LTD. (U.S.P. 2,009,689, 30.7.35. Appl., 19.8.30).—Positives are printed from the separate colour-records of two-layer negative stock on to films carrying two emulsion layers on the same side of the base. The top emulsion only is selectively bleached and mordanted with a solution of I, KI, and AcOH in  $H_2O$ , and the image is then dyed red with a mixture of safranine-Y and chrysoidine-Y. The image in the bottom emulsion is then toned blue-green with a weakly acid (AcOH)  $Fe^{III}$  alum toner. The colours may be reversed, the top image being dyed blue-green with, e.g., malachite-green, and the lower image toned red with U toner. J. L.

**Printing lenticular colour-record films.** I. G. FARBENIND. A.-G. (B.P. 447,489, 19.11.34. Ger., 18.11.33).—Halation is avoided in printing from lenticular films by contact by interposing a coloured layer ( $L$ ) between the two sensitive layers, which face each other;  $L$  may be a thin separate coloured sheet, or a layer between the support and emulsion of the original film, or may be applied over the emulsion of either the original or the printing material. The dyes used must be insol. in photographic baths; the layers must absorb  $\geq 20$ –30% of incident light. J. L.

**Sensitising emulsions.**—See IV. Cellulose nitration.—See V.

## XXII.—EXPLOSIVES; MATCHES.

See also A., July, 803, Thermal decomp. of azides.

### PATENTS.

**Explosive.** G. C. HALE (U.S.P. 2,011,578, 20.8.35. Appl., 15.3.34).—Ethylenedinitroamine,  $(CH_2-NH-NO_2)_2$ , has a high resistance to detonation by shock and a relatively low ignition temp. ( $180^\circ$ ). It is therefore suitable both as a shell-filling charge and an initiating explosive, and may be used as a substitute for nitroglycerin or nitrocellulose in propellant powders. Oxidising agents, e.g., chlorates or perchlorates, may be added. W. J. W.

**Igniter powder.** O. A. PICKETT, Assr. to HERCULES POWDER CO. (U.S.P. 2,008,366, 16.7.35. Appl., 12.11.31).—A thermally-fired igniter charge for a detonator comprises Zr 20, Hg fulminate 23.5,  $KClO_3$  37.6, nitrostarch 11.3, and powdered charcoal 7.5%. A. R. P.

## XXIII.—SANITATION; WATER PURIFICATION.

**Production and use of de-humidified air in mines.** A. G. WALKER and J. R. D. WALKER (Trans. Inst. Min. Eng., 1936, 91, 273–279).—Air is over-compressed, e.g., to 130 lb./sq. in., cooled, and expanded, doing useful work so that its final temp. is  $0^\circ$ , and then passed through a separator and scrubber to remove condensed  $H_2O$  at the surface. This air, still at working pressure, e.g., 80 lb./sq. in., is passed into the mine and expanded, doing work, and the cooled air of low humidity is exhausted into the mine, thereby improving working conditions. D. K. M.

**Health injurious effects of synthetic resins.** W. MEYER (Farbe u. Lack, 1936, 279–280, 295, 305–306.)

—Cases mainly of skin diseases produced by contact with phenol-aldehyde resins and vessels are reviewed.

S. M.

**Rôle of green vegetables in spreading pathogenic plant and animal bacteria.** S. MIHAÉLOFF (Ann. Hyg. publ. ind. soc., 1934, 224–255; Chem. Zentr., 1935, i, 3732).—The danger of infection in handling vegetables and methods of detecting bacterial infection are discussed. Washing in dil.  $Cl_2-H_2O$  is recommended as the best safeguard against infection. A. R. P.

**Derris and cubé: approximate chemical evaluation of their toxicity.** H. A. JONES and C. M. SMITH (Soap, 1936, 12, No. 6, 113–115, 117).—The approx. toxic val. ( $T$ ) to house-flies of samples can be obtained by chemical analysis from the expression  $T = \text{rotenone content } (R) + F(\text{total extractive content} - R)$ . For derris root,  $F$  (which indicates the toxicity of extractives other than rotenone) is 0.5, 0.5, or 0.4 when the total extractives are determined with  $CCl_4$ ,  $C_6H_6$ , or  $COMe_2$ , respectively, and 0.4 for cubé root for each of these solvents. E. L.

**Testing fly sprays: modified procedure in testing petroleum-base insecticides by the settling-mist method.** A. E. ZERMUEHLEN and T. C. ALLEN (Soap, 1936, 12, No. 6, 105–107).—An improved screen-wire testing cage is described. E. L.

**Water purification in fish ponds.** A. SCHILLINGER (Gesundheitsing., 1935, 58, 192–193; Chem. Zentr., 1935, ii, 96).—Control of dissolved  $O_2$  and maintenance of the  $pH$  at 7.2–8.0 are discussed. J. S. A.

**Anaërobic decomposition of sulphite waste liquor discharged into water bodies.** H. K. BENSON and A. M. PARTANSKY (Ind. Eng. Chem., 1936, 28, 738–740; cf. B., 1934, 1118; 1936, 365).—After removal of lignin, sulphite waste liquor may be treated by methods similar to those used in the disposal of sugar wastes. When sufficiently diluted it is oxidised biochemically in either fresh or sea-water to  $CO_2$  and  $H_2O$  within 5 months. The fear of pollution is exaggerated. E. C. S.

**Value of waste products in tannery and slaughter-house waste water.** R. VAN DER LEEDEN (Gesundheitsing., 1935, 58, 194; Chem. Zentr., 1935, ii, 414).—Recovery of S is never economical, and that of Cr salts is so only in special cases. The sludge from tanneries should be dehydrated and ignited owing to risk of anthrax. The vac. treatment of blood is convenient.

H. J. E.

**Wear [of teeth] caused by abrasion.**—See VIII.

See also A., July, 811, Determining  $H_2S$  in air, and of  $NO_3'$  in  $H_2O$ .

### PATENTS.

**Application of chlorinated hydrocarbons in the treatment of sewage, garbage, etc.** H. SEYDEL (U.S.P. 1,996,353, 2.4.35. Appl., 22.10.32).—Bacterial decomp. is prevented by addition of chlorinated hydrocarbons of low solubility in  $H_2O$ , e.g.,  $PhCl$ ,  $C_6H_4Cl_2$ ,  $BuCl$ . L. C. M.

**Air conditioning. Removing aerosols from the atm.**—See I.