

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

NOV. 22 and 29, 1935.\*



### I.—GENERAL; PLANT; MACHINERY.

#### Measurement and regulation of temperature.

F. RITTER (Oesterr. Chem.-Ztg., 1935, 38, 154—157).—A lecture.

**Errors in the measurement of temperatures with thermocouples.** H. EULER and K. GUTHMANN (Arch. Eisenhüttenw., 1935—6, 9, 73—90).—A review of the properties, sphere of usefulness, and the causes and avoidance of errors in the use of all commercial types of thermocouples is followed by a summary of published information on the properties and range of usefulness of metallic and ceramic protection tubes.

A. R. P.

**Drying of solid materials.** IX—XI. S. KAMEI (J. Soc. Chem. Ind., Japan, 1935, 38, 407—410 B, 410—411 B, 411—416 B; cf. B., 1935, 227).—The explanation of the well-known characteristic shape of the rate-of-drying curve is discussed in detail, with special reference to clay and clay-non-plastic mixtures.

J. A. S.

**Rotating ball mill.** A. F. FURNSTAL (Ind. Eng. Chem. [Anal.], 1935, 7, 342—343).—The mill consists of two horizontal, rotating shafts on which is placed a cylindrical container of glass or steel, holding the material to be pulverised, and rotated by the revolving shafts.

E. S. H.

**Fractional distillation and condensation.** M. FRENC (Refiner and Nat. Gas. Mfr., 1934, 13, 390).—Methods of calculation based on Raoult's and Dalton's laws and the equilibrium rule are criticised. A method of computing the composition of the liquid and vapour phases, based on the relation between solubility and temp., is described.

CH. ABS. (e)

**Volumetric determination of evaporation rates.** L. A. WETLAUFER and J. B. GREGOR (Ind. Eng. Chem. [Anal.], 1935, 7, 290—293).—Dry air at const. temp. and rate of flow is passed over the liquid surface, and the vol. of liquid is measured at successive time intervals. Application to protective coatings is indicated.

E. S. H.

**De-dusting coal.**—See II. **Boiler safety plugs.** **Welding.**—See X. **Printing-ink mills.**—See XIII. **Regenerative evaporation.** **Sugar crystallisation.**—See XVII.

See also A., Oct., 1219, Applications of pervaporation.

### PATENTS.

**Rotary kiln plant.** J. S. FASTING (B.P. 434,669, 6.3.34).—An independently rotated drying or pre-heating device surrounding the upper end of a rotary cylindrical kiln is described.

B. M. V.

**Rotary kilns and coolers.** M. VOGEL-JØRGENSEN (B.P. 432,892, 3.2.34).—The links of heat-transmitting and agitating chains are circular.

B. M. V.

**Kiln trucks.** B. J. MOORE and C. CLIFFORD (B.P. 433,497, 14.7.34).—A truck having refractory means to support the goods in several stories is provided with rods, sleeves, or the like of heat-resisting metal embedded in the refractory uprights and other places needing extra strength, the rods being embedded in the clay before firing and completely covered.

B. M. V.

**Ovens or furnaces for tempering or heat-treating articles.** BRAYSHAW FURNACES & TOOLS, LTD., S. N. BRAYSHAW, and F. C. NEWMAN (B.P. 434,593, 2.3.34).—In one form the furnace comprises 3 co-axial, vertical cylindrical walls: (1) of metal forming a work container, (2) of metal, (3) the outer wall lined with bricks or the like. The space between (1) and (2) forms a return path for air or inert gas which is circulated by a fan below the end of (1) and above the end of (2). The space between (2) and (3) is for combustion and is isolated from the rest. For the treatment of wheel tyres or other stacked articles a refractory displacer may depend from the roof. A rectangular form is also described. [Stat. ref.]

B. M. V.

**Furnace regenerator.** F. R. MCGEE (U.S.P. 1,986,737, 1.1.35. Appl., 26.11.32).—A form of regenerator brick is described.

B. M. V.

**Apparatus for conducting reactions at elevated pressures.** A. V. GROSSE, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,986,196, 1.1.35. Appl., 4.5.33).—An outer vessel adapted to resist pressure and heat, but not corrosion, encloses a reaction vessel (V) of non-corrosive but weak or thin material, and a capillary tube connects the interior of (V) with the space between the vessels.

B. M. V.

**Production of chemical reactions.** W. W. ODELL (U.S.P. 1,984,380, 18.12.34. Appl., 17.12.29).—The reaction gases are passed upwards through a catalyst at such a rate that the latter is maintained in ebullient motion.

B. M. V.

**Heat-treatment of diatomaceous earth [for use as filter-aid].** M. STOCKTON, Assr. to DICALITE Co. (U.S.P. 1,985,526, 25.12.34. Appl., 11.8.33).—After air-drying, prior to grinding, the material is roasted in lump form to dehydrate without much shrinkage.

B. M. V.

**Volatilisation of materials.** I. H. DERBY, Assr. to P. C. REILLY (U.S.P. 1,984,731, 18.12.34. Appl., 25.9.30).—Liquid (e.g., coal pitch) is distilled to coke while distributed centrifugally in a rotating retort but

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

separated from the wall thereof by a layer of heavier liquid, *e.g.*, Sn or Sb metal or a metal chloride.

B. M. V.

**Treatment of non-gaseous materials.** D. D. PEEBLES (U.S.P. 1,984,381, 18.12.34. Appl., 29.3.32).—Non-gaseous medium is kept suspended in a whirling gaseous medium in a circular vessel by continuously withdrawing part of the contents from a point at intermediate radius and returning it tangentially at the periphery. Raw material is fed by an axial "atomiser," suspension is removed to a separate separator, and the gas returned to the atomiser.

B. M. V.

**Crusher.** D. COLE (U.S.P. 1,986,104, 1.1.35. Appl., 1.7.32).—In a Symons gyratory-cone type of fine crusher either cone is flared to give a wide entry which is, nevertheless, narrow relatively to the diam. of the crushing zone because both cones are truncated; pockets occupying  $\gt$  5% of the total area are formed in the crushing faces to permit entry of large pieces, the pockets being situated preferably in unequal nos. in the head and bowl.

B. M. V.

**Gyratory crusher.** J. E. KENNEDY, Assr. to N. KENNEDY (U.S.P. 1,985,098, 18.12.34. Appl., 12.11.28. Renewed 1.7.33).—The concave is reversible and provides a wide entry with successively decreasing angles between it and the mantle.

B. M. V.

**Grinding mill.** A. M. READ (U.S.P. 1,986,530, 1.1.35. Appl., 10.9.32).—The ball or rod mill is lined with rolled plates, the sections being held in place by bolted wedges which also form lifting bars for the material.

B. M. V.

**Dual-fed mill.** D. COLE (U.S.P. 1,986,103, 1.1.35. Appl., 18.4.32).—A rod mill is fed through hollow trunnions at each end and discharged peripherally at mid-length, the rods being long enough always to bridge across the discharge openings.

B. M. V.

**Ball or tube mill.** J. SHEEHAN (U.S.P. 1,985,801, 25.12.34. Appl., 7.12.33. Austral., 19.9.32).—An elongated mill is divided into compartments, each of which is provided with  $\lt$  2 oppositely-inclined groups of lifting vanes or blocks for the balls.

B. M. V.

**Fine dry grinding.** F. G. BREYER, Assr. to SINGMASTER & BREYER, INC. (U.S.P. 1,985,076, 18.12.34. Appl., 16.8.30).—The material is kept cool and 0.125–1.0% of oleic acid is added. The increase of efficiency in the finer stages is believed to be due to prevention of formation of adhesive films of H<sub>2</sub>O.

B. M. V.

(A) Introduction of comminuted material into a fluid stream. (B) Blending and air-separation of diatomaceous earth powders. M. STOCKTON, Assr. to DICALITE CO. (U.S.P. 1,986,300—1, 1.1.35. Appl., [A] 26.11.32, [B] 29.7.33).—Diatomaceous earth is drawn into a fan and there comminuted without destruction of structure. Previously comminuted earth is fed into the stream at the delivery side of the fan and the combined stream separated with the return of the coarser part and removal of the finer.

B. M. V.

**Concentrator.** R. F. O'MARA, Assr. to RAYMOND BROS. IMPACT PULVERIZER CO. (U.S.P. 1,985,947, 1.1.35. Appl., 7.8.31).—A cyclone separator suitable for placing

in the positively-blown vent pipe of a pulverising and pneumatic classifying circuit is described, the claims relating to two conical baffles in the dust outlet.

B. M. V.

**Sealing composition for containers, such as metal cans.** CROSSE & BLACKWELL, LTD., W. CLAYTON, and R. I. JOHNSON (B.P. 434,222, 27.4.34).—The use of an aq. dispersion of a bituminous substance is claimed. *E.g.*, bitumen, asphalt, or pitch in alkaline H<sub>2</sub>O with optional addition of colophony, oils, fats, waxes, real or substitute rubber may be used.

B. M. V.

**Filters, strainers, and the like.** F. O. L. CHORLTON (B.P. 434,576, 27.10.34).—In a filter comprising a wire spirally wound on a fluted drum, the wire is of rhomboid or other section which will cause the spaces on the preflit side to be narrower than those elsewhere, and the drum is formed with teeth inside engaging with a hand-operated gear wheel at the lowest radius; on rotation, the outside of the wire is scraped and the teeth of the gear force filtrate back through the wire, the mud being collected in a small chamber at that lowest point.

B. M. V.

**Filter.** J. GANS, Assr. to COLUMBIA APPLIANCE CORP. (U.S.P. 1,986,570, 1.1.35. Appl., 4.8.32).—Filter bags (method of making described) are kept apart and supported by vertical sheets of meshwork resting on a horizontal sheet.

B. M. V.

**Filters.** E. ZAHM (B.P. 434,581, 28.11.34).—Roller supporting means for the plates and follower of a filter-press are described. The support for the filter medium is of meshwork, and complete fluid-tightness when closed is effected by a ridge around the plate bedding against a rubber ring inserted in the next plate or frame.

B. M. V.

**Liquid clarifier and thickener.** H. HARDINGE, Assr. to HARDINGE CO., INC. (U.S.P. 1,986,573, 1.1.35. Appl., 5.2.31).—A to-and-fro carriage over a sedimentation tank carries scrapers which automatically cover different halves of the bottom in each direction, and suction pipes for the removal of sludge are provided in front of each scraper.

B. M. V.

**Steam-column still.** J. W. GRAY, Assr. to L. DE FLOREZ (U.S.P. 1,986,431, 1.1.35. Appl., 6.3.33).—The bubble trays in a tower are designed to minimise stratification of immiscible liquids. The caps of the risers extend downwards only into the upper layer, but baffles around the downflows extend to the upper level of the lower layer, thus forcing all freshly-arriving liquid to descend as a mixture.

B. M. V.

**Vacuum distillation.** E. W. FAWCETT, J. L. MCCOWEN, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 434,726, 7.3.34).—"Mol." distillation is effected in several countercurrent stages all in one casing subjected to high vac., transfers of fluids being effected by electromagnetic pumps.

B. M. V.

**Distillation apparatus.** W. SIECK, JUN., Assr. to W. GARRIGUE & CO., INC. (U.S.P. 1,986,165, 1.1.35. Appl., 14.7.32).—A system suitable for glycerin is described, the cooling fluid from a condenser between the still and a tower being delivered to the still.

B. M. V.

**Fractional condensation of vapours derived from the distillation of liquids.** THERMAL INDUSTRIAL & CHEM. (T.I.C.) RES. CO., LTD., W. J. CHADDER, and W. H. MILLENER (B.P. 434,541, 22.3.34).—The dephlegmator at the top of the column is of trapped form, no liquid being allowed to run direct down the column, but both remaining vapour and condensed liquid are delivered together to a gravity separator for, e.g., oil and H<sub>2</sub>O, and part of the oil is delivered to the column for reflux. B. M. V.

**Countercurrent condenser.** H. E. BYER (U.S.P. 1,981,989, 27.11.34. Appl., 15.11.32).—Arrangements of overflow weirs and baffles are described. B. M. V.

**Crystallisers applicable for sugar crystallisation.** W. J. BLANCHARD (B.P. 434,740, 9.3.34).—A crystallising drum is provided with a cooler-agitator comprising a smaller rotating drum provided with hollow spokes and filled with H<sub>2</sub>O to axis level. The heat-exchange surfaces of the spokes may be kept clean on the outside by means of loose rings, and on the inside by loose abrasive bodies. B. M. V.

**Froth for sealing volatile liquids.** G. M. FISHER (U.S.P. 1,985,491, 25.12.34. Appl., 25.1.30).—The liquid part comprises an emulsion of H<sub>2</sub>O containing a sol. substance (soap) to increase its surface tension and a non-volatile oil (kerosene), the H<sub>2</sub>O being the continuous phase. B. M. V.

**Hydraulic pressure-transmitting fluid.** R. R. FULTON, Assr. to PURITAN SOAP Co. (U.S.P. 1,986,260, 1.1.35. Appl., 9.2.33).—The liquid comprises a mixture of "Carbitol" (OH-[CH<sub>2</sub>]<sub>2</sub>-OMe) and N(C<sub>2</sub>H<sub>4</sub>-OH)<sub>3</sub> salts of org. acids (e.g., the acids of coconut oil) or Et<sub>3</sub> citrate, or triacetin, or Me (or Et) lœvulate. B. M. V.

**Gas washer.** J. L. MAUTHE and E. G. PRICE (U.S.P. 1,986,736, 1.1.34. Appl., 9.4.34).—A tower contains, in order downwards: a spraying device, hurdles or like baffles, and an annular baffle having inclined sprays directed through its wall. The flow of gas is upwards. B. M. V.

**Manufacture of filtering masses for removing aerosols and like minute suspended matter from the atmosphere.** SOC. ITAL. PIRELLI (B.P. 434,700 and 435,168, [A] 8.4.35, [B] 13.5.35. It., [A] 28.4.34, [B] 19.5.34. [A] Addn. to B.P. 433,190. [B] Cf. B.P. 433,186; B., 1935, 930).—(A) Methods of felting the masses are described. (B) The auxiliary substance is dispersed into the mass after felting. B. M. V.

**Liquid and gas separator.** J. P. WALKER and E. R. WILLIAMS, Assrs. to NAT. TANK Co. (U.S.P. 1,986,168, 1.1.35. Appl., 20.4.31).—A gravity separator for gas and oil (e.g.) is described. B. M. V.

**Wet purification of gases.** W. LEARMONTH, G. NONHEBEL, J. L. PEARSON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 434,590, 5.2. and 21.6.34).—In a scrubbing tower below the laths, as described in B.P. 424,414 (B., 1935, 388), are placed a no. of much deeper vertical plates with bulbous tops, fewer in no. than the laths, so as to receive a greater vol. of liquid per unit of surface, staggered so that the bulbs prevent direct

vertical flow of gas, and (assuming entry of gas from the side) stepped in length so as to distribute the gas evenly. B. M. V.

**Apparatus for effecting gas reactions.** B. S. LACY and H. A. BOND, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,986,348, 1.1.35. Appl., 13.6.31).—An annular space formed between two short metal tubes, or a spiral passage in an annular mass of metal, is used as the reaction space, the metal forming the short-circuited, single-turn secondary of a transformer. The primary coil is wound next the core and may be a H<sub>2</sub>O-bearing pipe. B. M. V.

**[Floors of slag-tap boiler] furnaces.** BABCOCK & WILCOX, LTD., Asses. of R. SHELLENBERGER (B.P. 434,518, 1.2.35. U.S., 2.2.34).

**[Vertical] mercury boilers.** BRIT. THOMSON-HOUSTON Co., LTD. (B.P. 434,386, 26.9.34. U.S., 27.9.33).

**[Discharge nozzles for] centrifugal drums.** GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. (B.P. 434,693, 19.3.35. Ger., 21.3.34).

**Conducting reactions in alkaline media.**—See III. **Separating materials.**—See X.

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Pneumatic de-dusting of coal.** S. R. BERRISFORD and R. H. ALLEN (Trans. Inst. Min. Eng., 1935, 89, 298—334).—A review of early patents is given. Ideal de-dusting conditions are listed and modern de-dusters classified, typical examples being described. De-dusting efficiency is considered and the importance in this connexion of graphical representation is stressed. The chief factors affecting de-dusting efficiency are: grading of coal dealt with, ash, moisture. The main val. of de-dusting lies in improved cleaning-plant efficiency and reduction of moisture in washed coal. Other possible advantages are discussed. J. W.

**Microchemical analysis of solid fuels.** W. R. KIRNER (Ind. Eng. Chem. [Anal.], 1935, 7, 294—299).—A review of published work. E. S. H.

**Calculation of heating values of Chinese coals from proximate analysis.** K. C. CHANG and M. S. HSIEH (J. Chem. Eng. [China], 1934, 1, 127—135).—The heating val. in g.-cal./g. =  $81C + (A + B \log R)M$ , where  $C$  is the % of fixed C,  $M$  the % of volatile matter,  $R$  the ratio of fixed C to volatile matter, and  $A$  and  $B$  are consts. varying with  $R$ . CH. ABS. (e)

**Fusibility of coal and coke ash.** S. TWEEDY (Gas World, 1935, 103, Coking Sect., 99—104).—An attempt is made to justify the val. of the British Standards Institution Spec. No. 453, 1932, for works purposes. Either a gas or an electric furnace gives satisfactory results for ash fusibility. The prep. of the sample is particularly important. The relation of ash fusibility to coal-cleaning problems is discussed. J. W.

**Control of forms of iron in the determination of fusion temperatures of coal ash.** W. T. REID (Ind. Eng. Chem. [Anal.], 1935, 7, 335—338).—The production of definite ratios of Fe<sup>III</sup> by (a) reducing an oxidised slag in the gas furnace, (b) mixing different proportions of the same slag, one part having a low and the other a

high  $\text{Fe}^{\text{III}}$  ratio, (c) partly oxidising a reduced slag by heating it in air and transferring to the  $\text{N}_2$  furnace, and (d) adding C to the oxidised ash or partly reduced slag is described.

E. S. H.

**Complete gasification of coal. VII. Effect of heating rate of coal on reactivity of the coke towards steam. VIII, IX. Effect of heating rate of coal on combustibility of the coke.** T. NAMIKAWA (J. Soc. Chem. Ind., Japan, 38, 405—406 B, 406 B, 406—407 B; cf. B., 1933, 737).—VII. Four kinds of coke made by carbonising Shimbara coal at different rates showed that between  $900^\circ$  and  $1100^\circ$  the reactivity was greater the greater was the rate of carbonisation, and also increased considerably with the temp. of reaction.

VIII, IX. Coke from Shimbara coal carbonised at  $700$ — $1200^\circ$  with four different heating rates was subjected to the action of a stream of (a) 10%  $\text{O}_2$  and 90%  $\text{N}_2$ , and (b) air, at various temp. and the reaction temp. for max.  $\text{CO}_2$  content was determined. Results show that, for high temp. in a producer, slowly-carbonised coke is preferable.

D. M. M.

**Coal carbonisation—the plastic stage.** J. H. LUM and H. A. CURTIS (Ind. Eng. Chem. [Anal.], 1935, 7, 327—333).—The effect of different variables on the results obtained in the Foxwell procedure for determining the gas pressure-temp. curve has been investigated. A method for determining the "extrusivity" of coal is described, and the variation of extrusivity with temp. has been determined. Extrusivity decreases as the temp. of initial softening and of max. pressure rise.

E. S. H.

**Quality and quantity of gas obtained from coking stills.** S. M. GABRIELIANTZ and S. A. ISAEV (Groz. Neft., 1934, 4, No. 5, 32—35).—The gas yield in coking cracked residuums was approx. 10% of the charge (approx. 50%  $\text{CH}_4$ , unsaturated compounds and  $\text{H}_2 < 16$ , 29.5%, respectively). The gasoline contained approx. 20% of butanes. Much  $\text{H}_2\text{S}$  and heavy hydrocarbons were also present.

CH. ABS. (e)

(A) Bituminous shale deposits of the Petrograd district. N. F. POGREBOV. (B) Kukersite shales in Estonia. V. R. SCHRETTER. (C) Bituminous shale as fuel in industry in connexion with its composition. E. V. RAKOVSKI. (D) Composition of kerogen present in shale, and the influence of various factors on the oil yields from the kerogen. K. J. LUTS. (E) Pyrolysis of kerogen of shale at various temperatures. P. N. KOGERMAN. (F) History of the technological conversion of bituminous shale. F. FRANK. (G) Distillation of shale in the Ostashkov refinery. (H) Preparation of ichthyol from Volga shale. S. MARKUS. (I) Technology of shale. V. R. SCHRETTER. (J) Distillation of shale and chemical treatment of shale tars. V. V. TSHELINCEV. (K) Application of shale ash in the manufacture of building material. M. N. SAVTSCHUK (Bitum. Shale Tech. Util., 1932, 13—21, 21—28, 121—149, 243—255, 256—266, 267—273, 274—280, 281—298, 299—339, 391—436, 437—448).—(c) Comprehensive analytical data are given and discussed.

(E) At  $150^\circ$  dehydration and separation of occluded gases occurred. Decomp. of kerogen began at  $170$ — $180^\circ$ . At  $320$ — $340^\circ$  there was active decomp., depolymerisation

of the kerogen being complete at  $380$ — $390^\circ$ . The cracking reaction is endothermic below  $415$ — $420^\circ$ . Above  $470^\circ$  exothermic reactions prevail. The max. yield of liquid distillation products was obtained at  $470$ — $550^\circ$ . Above  $750^\circ$  gas formation increased, and aromatisation of the tar began.

(K) Tests are described showing that shale ash might replace Portland cement. It is also a good insulating material.

CH. ABS. (e)

**Increasing the throughput of asphalt stills.** E. MUIHSHIN (Nefi, 1933, 4, No. 19, 16—18).—Difficulties encountered in cooling asphalt during blowing are met by using kerosene or gas oil together with air. Heat-transfer calculations are given.

CH. ABS. (e)

**Determination of paraffin in asphalts.** V. PARINI (Nefi, 1933, 4, No. 5, 18).—The method depends on the low solubility of paraffin in  $\text{C}_5\text{H}_5\text{N}$  at  $0^\circ$ . 2.5—3 g. of asphalt are shaken with 50—70 c.c. of gasoline (b.p.  $30$ — $40^\circ$ ), set aside for  $\frac{1}{2}$  hr., filtered and washed. The gasoline is removed and the residue dissolved in lukewarm  $\text{C}_5\text{H}_5\text{N}$  (15 g. per g. of asphalt). The solution is cooled to  $0^\circ$  for  $\frac{1}{2}$  hr., and the paraffin filtered and washed at  $0^\circ$  with  $\text{C}_5\text{H}_5\text{N}$ . It is purified by dissolution in hot  $\text{C}_6\text{H}_6$ , agitation with a mixture of activated C and clay, and filtration. The paraffin is dried at  $110$ — $115^\circ$  and weighed. Results are  $>$  those by the Marcusson method.

CH. ABS. (e)

**Action of zinc chloride and sulphuric acid on coal tar.** F. K. CHÉOU and F. YUNG (Contr. Inst. Chem. Nat. Acad. Peiping, 1934, 1, 153—168).—Coal tar is made suitable for road-paving by warming with a little  $\text{H}_2\text{SO}_4$  and adding dry human hair. This method is more economical than  $\text{ZnCl}_2$  treatment.

CH. ABS. (e)

**Use of coal-tar products for insulating and luting in construction work.** E. WEISSFLOG (Oel u. Kohle, 1935, 11, 682—683).—A survey is given of the application of coal tar, insulating pitch, tar varnish, and tar blended with soft pitch and Trinidad asphalt.

C. C.

**Special coal tar for road-paving.** F. K. CHÉOU and H. L. CHANG (Bull. Nat. Acad. Peiping, 1934, 5, No. 1, 23—30).—The actions of  $\text{CaO}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{MnO}_2$ ,  $\text{Fe}_2\text{O}_3$ , Touze (a Chinese mineral), and  $\text{ZnCl}_2$  on Chinese coal tar were studied. Warming and agitating with  $\text{ZnCl}_2$  gave a material suitable for road-paving.

CH. ABS. (e)

**Evaluation of bitumens used in road-building on the basis of their absolute viscosity.** J. CSÁGOLY (Magyar Mérn. Épit. Köz., 1935, 69, 21—34).—Data for Mexican and Hungarian bitumens are recorded.

CH. ABS. (e)

**Preparation of pyrocatechol and pyrogallol from wood tars.** V. D. UGRUMOV (Lesokhim. Prom., 1933, 2, No. 3, 19—21).—An oil similar to pyrogallol in its photographic developing properties was obtained after a vac. redistillation from beech and birch tars treated with HCl in an autoclave. An oil containing up to 27% of pyrocatechol and having good photographic properties was prepared from a creosote of  $d$  1.08 and b.p.  $210$ — $220^\circ$ .

CH. ABS. (e)

**Separating guaiacol from wood creosote by calcium oxide.** V. P. SUMAROKOV (Lesokhim. Prom.,

1933, 2, No. 3, 36—39).—The solubility of Ca guaiacoxide in  $H_2O$  is  $<$  that of the Ba salt. The creosote from birch tar is lower in guaiacol than that from beech tar.

CH. ABS. (e)

(A) Changes in the gasoline extract from stump tar. I. V. FILIPOVITSCH. (B) Influence of organic solvents on extraction of rosin from stump tar. I. V. FILIPOVITSCH, N. V. TUCHOVITZKI, and M. M. SOROKIN (Lesokhim. Prom., 1932, 1, No. 5—6, 12—18, 19—24).—(A) Sawdust was extracted for 18 hr. at  $18^\circ$  with cold gasoline ( $d$  0.741). In the gradual evaporation of the solvent the  $d$  of the rosin solution increased by 0.00076 per rise of  $1^\circ$  between  $20^\circ$  and  $130^\circ$ .

(B) Various solvents were examined. Petroleum solvents were best, and aromatic compounds next best. Extraction with turpentine was slower but more uniform.

CH. ABS. (e)

Recognition of tars and bitumen from their viscosity-temperature characteristics. L. UBBELOHDE, C. ULLRICH, and C. WALTHER (Oel u. Kohle, 1935, 11, 684—690; cf. B., 1934, 744).—Using the viscosimeter described by Weiss (A., 1934, 986) it is shown that  $\eta$  vals. for tars and bitumen obey the same laws as for mineral lubricating oils, giving straight lines on the Walther  $\eta$ -temp. chart. For bitumens of the same origin the lines are parallel. The Ubbelohde dropping point ( $T_1$ ) for anthracene oil tar and bitumen corresponds to  $\eta = 250,000$  centistokes, whilst for tars containing middle oil  $T_1$  corresponds to  $\eta = 180,000$  centistokes,  $T_1$  being represented on the chart by two lines parallel to the  $X$  axis. If the Krämer-Sarnow softening points ( $T_2$ ) are plotted on the  $\eta$ -temp. chart, a straight line is obtained, rising with increasing  $\eta$ . The points of intersection of this line and the  $\eta$ -temp. curves correspond to  $T_2$  ( $T_2 = 0^\circ$  corresponds to  $10^7$  centistokes,  $T_2 = 110^\circ$  to  $5 \times 10^7$  centistokes). The  $\eta$ -temp. curve of a bituminous material can be obtained from measurements of  $\eta$  at one temp.,  $T_1$ , and/or  $T_2$ . A sufficiently accurate val. of  $\eta$  may be determined by means of the Road Tar Consistometer at about  $15^\circ$  above  $T_1$ , the time in sec. being multiplied by 340 to convert into centistokes.

C. C.

Commercial process for treating solidified pitch. B. F. SERGEEV and G. D. ATAMANTSCHUKOV (Lesokhim. Prom., 1934, 3, No. 3, 19—23).—The pitch was placed in a gauze basket and immersed in a container two thirds full of  $H_2O$ . On heating with steam, an emulsion was formed which, after drying, was used in making sealing wax.

CH. ABS. (e)

Oil shales in China. K. PING (Bull. Geol. Survey China, 1934, No. 24, 15—31).—Distillation tests on eight samples are described.

CH. ABS. (e)

Baikal ozokerite. V. E. TOKMANOV and V. D. RODZAEVSKAJA (O.N.T.I. Gorno-Geol.-Neft. Izdat., 1934, 262—269).—Analytical data and properties are recorded.

CH. ABS. (e)

Baikal crude oil. Fergana crude oils from the Shorsu deposit. S. N. PAVLOVA and P. S. HOFMAN. Fergana crude oil from the Kim (Santo) deposit. S. N. PAVLOVA. Chimion crude oil (eastern parcel, Sand "M," well no. 47). A. S. VELIKOVSKI and P. S. HOFMAN. Turkmenian crude oils. Neftedag

crude oil (lower part of the Apsheron horizon). Neftedag crude oil from well no. 13 (upper "red" sand layer). Chelekenui crude oils. Okha (Sakhalin) crude oil. A. S. VELIKOVSKI and S. N. PAVLOVA. Nuta (Sakhalin) crude oil. S. N. PAVLOVA and P. S. HOFMAN. Crude oils from non-Caucasian deposits. A. S. VELIKOVSKI and S. N. PAVLOVA. Ukhta crude oils. S. N. PAVLOVA and P. S. HOFMAN. Shubar-Kuduk crude oil (Emba). Tamduikul crude oil. Sagiz crude oil. A. S. VELIKOVSKI and S. N. PAVLOVA. Sulphur compounds in Shorsu crude oil. M. A. KAZARNOVSKAJA and A. S. SOSNINA. Resinous Emba crude oil (Dzhaman-Agach deposit). Light gasoline-paraffinic crude oil of the Emba district (Novobogatinski field). A. I. VORONOV (O.N.T.I. Gorno-Geol.-Neft. Izdat., 1934, 256—259, 173—201, 209—224, 225—239, 131—132, 132—147, 147—151, 151—159, 270—294, 301—309, 4—45, 46—61, 82—94, 94—105, 105—108, 202—209, 73—82, 118—128). CH. ABS. (e)

Fergana crude oil. V. E. TOKMANOV (Neft., 1932, 3, No. 6, 16—18).—The oil has a high content of combined and elementary S, which occurs mainly in the  $170$ — $200^\circ$  fraction. This fraction causes explosions on distillation and has a high toxicity and corrosive action on condensers.

CH. ABS. (e)

Breaking of [crude oil] emulsions. B. ERLICH (Neft., 1933, 4, No. 8, 22—23).—Emulsified crude oil was heated in tube stills at  $125^\circ/3$  atm., passed to mud separators, mixed with good crude oil, and distilled. The emulsions were also broken by treatment with alkali sludge from kerosene. Ceresin emulsions were easily decomposed by heating with steam in presence of 5% of NaCl. This effected a 95% saving of time.

CH. ABS. (e)

Utilisation of kerosene alkali sludge in de-emulsification of crude oil. B. ERLICH (Neft., 1933, 4, No. 17, 22—23).—Grozni lubricating-type crude oil is pretreated (before distillation, pipe still) with aq. NaOH ( $d$  1.02), with admixture of 10% of kerosene alkali sludge. The process is continuous.

CH. ABS. (e)

Analysis of commercial oil emulsions and suspensions. F. M. BIFFEN and F. D. SNELL (Ind. Eng. Chem. [Anal.], 1935, 7, 316—319).—Procedures which consist of combinations of known methods are outlined for (a) oil emulsions free from suspended solids, (b) oil emulsions containing suspended solids, (c) oil solutions and suspensions, and (d)  $H_2O$ -base wax emulsions.

E. S. H.

Preliminary caustic treatment of crude oil. B. ERLICH (Neft., 1932, 3, No. 5, 23).—Grozni mixed-base topped crude oil was treated with 0.5% of NaOH ( $d$  1.42). The distillates and final oils were superior to those refined in the usual way. Better results were obtained by treating the crude oil before distillation.

CH. ABS. (e)

Composition of sulphur compounds in the distillates of Grozni asphalt-base and Baku crude oils. S. M. GABRIELIANTZ and O. A. ARTEMEVA (Groz. Neft., 1934, 4, No. 8, 41—45).— $H_2S$  is determined with aq.  $CdCl_2$  (10% + 1 c.c. of conc. HCl per 100 c.c. of solution). Free S is removed by agitating the  $H_2S$ -free material with Hg. Mercaptans are determined with

EtOH-plumbite solutions, or with basic Pb acetate suspended in  $C_6H_6$ . Disulphide S and sulphide S are determined, respectively, by reduction to mercaptan with glacial AcOH and Zn, and by powdered  $HgNO_3$ .

CH. ABS. (e)

(A) Laboratory evaluation of oil stock. I. Classification of crude oils and methods of distillation.

(B) Typical analyses and evaluation curves. W. L. NELSON (Refiner and Nat. Gas Mfr., 1935, 14, 10, 67).

CH. ABS. (e)

**Bibliography of Soviet patents on petroleum.** A. A. BOEHLINGK (Foreign Petroleum Tech., 1934, 2, 1—20, 153—162, 267—276, 501—514). CH. ABS. (e)

**Fractionation of petroleum residues and of heavy petroleum by compressed natural gas.** S. VON PILAT (Oel u. Kohle, 1935, 11, 655—658).—The pptg. action of light hydrocarbons for asphaltic matter etc. in petroleum residues is greatly increased by addition of sol. gases, e.g., natural gas (approx. 97%  $CH_4$ ), under pressure. By increasing the pressure by stages up to 130 atm., using  $C_3H_8$ — $CH_4$ , petroleum residues can be separated at room temp. into a series of fractions of decreasing  $d$  and  $\eta$ . The selective action of  $CH_4$  solutions is increased by addition of separating materials such as cresol. The constituents of higher mol. wt. are conc. in the fractions obtained at lower pressures (30—50 atm.). C. C.

**Varnish drying oil from acid [petroleum] sludge.** L. K. ADALIJAN (Neft., 1933, 4, No. 20, 9—10).—The sludge is diluted with  $H_2O$  and agitated with air, the upper layer being separated. It is agitated several times with  $H_2O$ , and neutralised with NaOH ( $d$  1.06—1.07). The product dries in 3—4 hr. to a thin elastic skin.

CH. ABS. (e)

**Isolation of ethylcyclohexane from a Mid-Continent petroleum.** F. W. ROSE, JUN., and J. D. WHITE (J. Res. Nat. Bur. Stand., 1935, 15, 151—161).—Ethylcyclohexane (I) has been isolated from the fraction of b.p. 131—133° by means of fractional distillation, crystallisation from liquid  $C_3H_8$  and  $CH_4$ , removal of aromatic compounds by  $SiO_2$  gel, and distillation with glacial AcOH. The b.p., f.p.,  $n_D^{25}$ ,  $d$ , mol. wt., crit. solution temp. in  $NH_3Ph$ , and infra-red absorption spectrum of (I) are close to the vals. for the synthetic material, the difference in f.p. (1.6°), indicating a purity of 95 mol.-%. From  $n_D^{25}$  it is inferred that the initial sample of petroleum contains  $\geq 0.1\%$  of (I). R. S. B.

**Colour depth and colour type of petroleum products.** R. KOETSCHAU (Oel u. Kohle, 1935, 11, 719—724).—The work of Lederer (B., 1935, 614) is critically discussed and a survey given of the sources of error in photometric measurements. C. C.

**Reagent "kontakt." I. Sulphonation of liquid petrolatum.** V. PARCHOMENKO (Neft., 1932, 3, No. 3—4, 30—32).—18—20% of oleum (23—25%  $SO_3$ ) should be used in 4 operations at 75—80° for 2.5 hr. It is best not to use air for agitation. Operating conditions are described.

CH. ABS. (e)

**Vapour-phase Soviet [oil]-cracking unit.** B. KUSCHELEVSKI (Neft., 1932., 3, No. 9—10, 15—16).—

Details of operating conditions and products are given.

CH. ABS. (e)

**Refinery-scale reforming experiments with the Vickers cracking unit installed in Grozni.** L. A. ALEXANDROV and P. A. SENTZOV (Neft. Khoz., 1934, 26, No. 10, 32—34; Foreign Petrol. Tech., 1935, 3, 73—82).—The unit gave 64.7 and 70.3% of gasoline of final b.p. 185° and 200°, respectively. The cracking temp. was 500°/53 atm. Analytical data for the refined gasolines are given.

CH. ABS. (e)

**"Phenylc" cracking system [for oils].** A. I. KUBELINEK (Neft., 1933, 4, No. 5, 22—23).—A  $Ph_2$ — $Ph_2O$  mixture is used in heating the oil undergoing cracking.

CH. ABS. (e)

**Composition of gases derived from various types of cracking.** M. B. MARKOVITSCH (Materials on Cracking, 1933, No. 1, 38—50).—Data are recorded.

CH. ABS. (e)

**Physical and chemical foundations of cracking in presence of hydrogen.** M. S. NEMTZOV (Destr. Hydrog. Fuels, 1934, 1, 48—118).—A discussion.

CH. ABS. (e)

**Destructive hydrogenation of crude anthracene with production of light aromatic oils. II.** V. N. CHADSHINOV (J. Appl. Chem. Russ., 1935, 8, 889—902; cf. B., 1935, 708).—In presence of  $MoS_3$  32% of the anthracene is converted at 480—500° into  $C_6H_6$  homologues of b.p.  $\geq 180^\circ$ ; the yield can be raised to 55% by repeated hydrogenation of the residue. At  $< 400^\circ$  the bulk of the product boils at 230—300°, and consists largely of naphthenes and hydroaromatic compounds.  $C_6H_6$ , PhMe, PhEt,  $C_{10}H_8$ , tetra- and deca-hydronaphthalenes, alkylnaphthalenes and their hydrides,  $Ph_2$ , cyclohexane, methylcyclo-pentane and -hexane, dicyclohexyl, and perhydrides of  $C_{10}H_8$  and of phenanthrene have been identified among the products of hydrogenation. The activity of the catalyst falls significantly after 32 hr. of action.

R. T.

**Heat-treatment under pressure of vapour-phase cracked gasoline.** E. V. BART, V. N. ERICH, and I. G. GERVART (Materials on Cracking, 1933, No. 1, 138—168).—On heat-treating a wide range of fractions, 15—30% of polymerides was produced, the yield of polymeride increasing with the b.p. of the cut. After long treatment simple polymerides yielded higher polymerides.  $CaCl_2$  promotes isomerisation of the unsaturated compounds of the gasoline. CH. ABS. (e)

**Redistillation of cracked gasoline.** VUIBOROV (Neft., 1932, 3, No. 9—10, 17—18).—Operating conditions for units in Grozni and Tuapse are described. Losses in redistillation were 7—9%. CH. ABS. (e)

**Cracked and hydrogenated gasolines.** B. K. TARASOV and V. P. GOVAKOV (Groz. Neft., 1934, 4, No. 6—7, 33—36).— $H_2SO_4$  treatment lowers the  $C_8H_{18}$  no., whilst  $ZnCl_2$  tends to raise it. This no. is higher for vapour-phase gasoline than for liquid-phase cracked products. The properties of various gasolines are tabulated.

CH. ABS. (e)

**Determination of chemical composition of straight-run gasolines.** P. S. MASLOV and E. I. KOZUIREVA (Groz. Neft., 1934, 4, No. 5, 26—28).—

0.5—0.7% of 98%  $H_2SO_4$  completely removes aromatic hydrocarbons from straight-run gasolines when treated for 2 hr. in a mechanical agitator. Excess of  $H_2SO_4$  removes other hydrocarbons as well. CH. ABS. (e)

**Determination of corrosive properties of cracked gasoline.** L. A. ALEXANDROV (Groz. Neft., 1934, 4, No. 5, 52—53).—The Cu-strip corrosion test is carried out under reflux for 15 min. at 150°, using an oil-bath for heating. These conditions are equiv. to 3 hr. at 100°, loss of light fractions being insignificant. CH. ABS. (e)

**Elimination of corrosive substances from cracked gasoline.** L. SELISKI (Groz. Neft., 1934, 4, No. 8, 45—49).—Corrosion of the distillation plant was prevented by introducing aq. NaOH into the pipe-line used for the pressure distillate, the NaOH being recycled until spent. Use of aq.  $Ca(OH)_2$  on a refinery scale leads to emulsion formation.  $NH_3$  was unsatisfactory. CH. ABS. (e)

**Treating cracked gasolines to prevent corrosion.** P. A. SENTZOV and L. F. TSCHADAIEVA (Groz. Neft., 1934, 4, No. 6—7, 37—40).—Treatment with  $H_2SO_4$  yields non-corrosive gasolines. Pretreatment of the oil with NaOH makes it non-corrosive. CH. ABS. (e)

**Utilisation of acid sludge obtained in refining cracked gasoline with sulphuric acid.** D. SCHTROM (Neft., 1933, 4, No. 15, 13).—A steam-heated shell still is charged with acid sludge, and gradually neutralised with alkali sludge (2—3% of free NaOH). The upper layer contains a black material which, when mixed with asbestos fibre, forms a high-grade insulating material for hot pipe-lines. CH. ABS. (e)

**Composition of the amylene fraction of vapour-phase cracked gasoline.** V. G. MOOR and S. V. KATZMAN (Materials on Cracking, 1933, No. 1, 111—120).—The fraction of b.p. 30—45° separated from gasoline cracked at 570° was studied. It contained 17% of *tert.*-amylenes, 42% of  $CHMe \cdot CHEt$  and  $n-C_5H_{10}$ , and 22—23% of diolefines (cyclopentadiene 6—8, isoprene 10—12%). Piperylene (3—7%) may have been present. CH. ABS. (e)

**Preparation of amyl alcohols from the amylene fraction of vapour-phase-cracked gasoline.** S. A. NAZAROV (Materials on Cracking, 1933, No. 1, 102—111).—The fractions of b.p. 30—55° were treated with  $H_2SO_4$  in glass containers. Optimum results were obtained using a pretreatment with 75% acid at  $-10^\circ$  to  $0^\circ$  and a second treatment with 80% acid at 20°. CH. ABS. (e)

**Preparation of amyl chlorides from the amylene fraction of vapour-phase cracked gasoline.** V. G. MOOR and S. V. KATZMAN (Materials on Cracking, 1933, No. 1, 121—138).—The fractions of b.p. 20—30° and 30—42° were used. In treating the heavier fraction with 37% HCl, reaction with amylenes containing a *tert.*-C atom or diolefines was practically complete, *sec.*-amylenes being unattacked. The former yielded *tert.*- $C_5H_{11}Cl$  and the diolefines were mainly polymerised. The *sec.*-amylenes gave *sec.*- $C_5H_{11}Cl$  on treatment with HCl gas in presence of  $BiCl_3$  (optimum temp. 115—120°). The catalyst readily becomes poisoned. CH. ABS. (e)

**Content of five- and six-membered naphthenes in the Maikop "toluene" gasoline fraction.**

P. S. MASLOV and E. I. KOZUIREVA (Groz. Neft., 1934, 4, No. 8, 59—60).—The fraction contains aromatics 23, 6-membered naphthenes 33, 5-membered naphthenes 21, and saturated compounds 23%. The naphthenes were determined by treatment with  $H_2$  at 290—300° in presence of Pd. CH. ABS. (e)

**Oils from Grozni cylinder-oil distillate.** A. I. VORONOV (Groz. Neft., 1934, 4, No. 5, 28—32).—Tests on the oil after treatment with  $C_2H_4Cl_2$  and with  $PhNO_2$  are described. CH. ABS. (e)

**Iron carbonyl as an antiknock compound.** M. J. LEAHY (Refiner Nat. Gas Mfr., 1935, 14, 82).—A discussion. CH. ABS. (e)

**Influence of dissolved gum on engine performance.** B. K. TARASOV and V. P. GOVAKOV (Groz. Neft., 1934, 4, No. 2—3, 76—80).—Tests are described. CH. ABS. (e)

**Relation between ignition of brown-coal Diesel fuels and their physical properties.** R. HEINZE and M. MARDER (Oel u. Kohle, 1935, 11, 724—728).—An approx. linear relation exists between the parachor and cetene no. (or  $C_8H_{18}$  no.) of fuels of the same boiling index (cf. B., 1935, 660). A correction must be applied in the case of brown-coal Diesel fuels containing creosote, amounting to about 0.33 cetene no. higher for each 1% of creosote.  $n$  and  $d$  also show an approx. linear relation with cetene no. C. C.

**A priori estimate of value of commercial motor fuel.** M. BRUTZCUS (Compt. rend., 1935, 201, 423—425).—The mean expansion on combustion (increase in the no. of mols.) and the calorific val. of hydrocarbon fuels are calc. from the nett % composition, and used as a basis of comparison. J. S. A.

**Storage-stability of motor fuels.** C. CONRAD (Oel u. Kohle, 1935, 11, 728—734).—Potential gum formation has been examined by the bomb method of Hunn *et al.* (J. Soc. Autom. Eng., 1930, 26, 31), using a no. of fuels including blends of benzine with EtOH. The induction period, the fall in pressure, and the gum formed after 240 min. at 100° under 7 atm. of  $O_2$  have been determined and their relation to the gum formed after 6 months' storage has been studied. Duplicate storage tests (300 litres) over 26 months gave widely differing results. Comparison of results by the Cu-dish test and the above results by the bomb method with the gum formed on storage for 10 months for 30 fuels showed that no satisfactory indication of storage-stability is given by these tests. When using a 30-litre container specially designed to imitate practical storage conditions, some fuels showed an induction period during which little gum was formed, so that the relative order for a no. of fuels (as regards gum content) after, e.g., 3 months may be quite different from the order after 6 months' storage. C. C.

**Factors affecting the gum-stabilities of gasoline.** T. L. McNAMARA (Refiner Nat. Gas Mfr., 1934, 13, 381).—A comprehensive review. CH. ABS. (e)

**Gum inhibitors for gasoline and benzine.** R. C. BICKMORE (Chem. Ind. [N.Y.], 1935, 35, 407—411).—Substances which are themselves easily oxidised are the most effective inhibitors. The optimum concn. must be

worked out for each distillate. It varies from 0.01 to 0.05%. The fraction of b.p. 86–116° contains most of the gum-producing substances. CH. ABS. (e)

(A) **Determination of gum dissolved in kerosene.** B. K. TARASOV and V. V. RUDENKO. (B) **Determination of gums dissolved in cracked kerosene distillates.** L. A. ALEXANDROV (Groz. Neft., 1934, 4, No. 1, 65–66, 66–67).—(A) A 25-c.c. sample of the cracked kerosene is evaporated in a beaker (5 cm. diam., 7 cm. high) on a hotplate at 210° in a current of N<sub>2</sub> or CO<sub>2</sub> (20 litres per min.). The residue is dried for ½ hr. at 110° and weighed.

(B) A 25-c.c. sample is evaporated in a porcelain dish (4.5 cm. diam.) on a sand-bath at 250°. The amount of gum increases with the b.p. and with decrease in colour on the Stammer scale. Kerosene obtained in straight distillation is considerably lower in gum than that from cracked oil. CH. ABS. (e)

**Sludge formation during autoxidation of hydrocarbon oils.** Y. TANAKA, R. KOBAYASHI, and M. FURIHATA (J. Soc. Chem. Ind., Japan, 38, 417–420 B).—Caoutchouc and other substances have been observed to act as inhibitors of sludge formation of mineral lubricating oils, delaying the induction period, but to act as pro-oxidants under different conditions. The mechanism of the phenomena is examined and typical reaction formulæ are derived, showing the influence of reaction-velocity coeffs., concns., etc. D. M. M.

**Preheating of stored oil products by hot water admitted at the bottom of the tanks.** E. MUISHKIN (Neft., 1933, 4, No. 18, 16–17).—H<sub>2</sub>O on the bottom of the tank is heated by admitting H<sub>2</sub>O preheated with steam outside the tank. CH. ABS. (e)

**Oxidation of oil by bacteria.** V. O. TAUSON and S. L. SCHAPIRO (Microbiol. U.S.S.R., 1934, 3, 79–87).—Sterile Emba crude oil and samples of Baku lubricating oils were introduced into cultures of bacteria isolated from oil wells. In 7 months, 45% of the crude oil (equiv. to 250 g. per sq.m.) had been oxidised. Oxidation of the lubricating oils was slower. CH. ABS. (e)

**Humic substances. VIII. Humification during the weathering of oleic acid and mineral oils.** N. A. ORLOV and I. Z. IVANOV (J. Appl. Chem. Russ., 1935, 8, 903–908; cf. B., 1935, 791).—The humic acid-like product obtained by passing air through oleic acid at 110–115° for 6 months contains numerous OH and OMe groups, and yields a mixture of benzenecarboxylic acids on oxidation with KMnO<sub>4</sub>. A similar product is obtained from transformer oil under similar conditions. It is concluded that humic acids have a condensed aromatic ring-structure, and that structurally they are closely related, irrespective of their origin. R. T.

**Change of analytical data in the artificial ageing of mineral oils.** W. OBENAU (Angew. Chem., 1935, 48, 587–588).—Tests are described on changes in *d*,  $\eta$ , acid val., etc. of a series of transformer and lubricating oils during artificial ageing by the Ramsbottom test. The study of any one property alone may lead to wrong conclusions on ageing. H. J. E.

**Refining of lubricating oils.** Z. V. SKRUINNIKOV and B. M. ERlich (Neft., 1933, 4, No. 11, 22).—The

lubricating oil distillate is treated in an agitator at 80–90° with a mixture of 0.3% of rosin and 30% of aq. NaOH (*d* 1.007). The mixture settles in 24 hr. and emulsions are not formed. The rosin solution can be used 3 times with the addition of fresh NaOH. CH. ABS. (e)

**Refining of lubricating oil distillates.** E. SEMENIDO (Neft., 1932, 3, No. 3–4, 32–34).—Distillates yielded better oils, consumed less NaOH, and did not form stable emulsions after alkali treatment, when treated with clay at 80–90° after the H<sub>2</sub>SO<sub>4</sub> treatment. CH. ABS. (e)

**Refining of Grozni lubricating oil distillates.** Z. NEKRASOV (Neft., 1933, 4, No. 3–4, 18–19).—The distillates tend to form very stable emulsions when neutralised after acid treatment. This is avoided by addition of naphthenic acids, EtOH, rosin, or an alkaline extract of acid sludge from kerosene. The alkali treatment must be carried out at > 30–40°. CH. ABS. (e)

**Hydrogenation of lubricating oils and kerosene.** K. P. LAVROVSKI (Destr. Hydrog. Fuels, 1934, 1, 192–201).—A review. CH. ABS. (e)

**Graphited lubricating oils.** C. STEPHAN (Oel u. Kohle, 1935, 11, 665–668).—The effect of adding graphite (0.03–1%) to lubricating oil is discussed. Compounded oils with a high fatty acid content do not form a satisfactory base for added graphite. Slow-running machinery subjected to heavy load requires a higher proportion of graphite than do high-speed machines. C. C.

**Modern uses of lubricants.** K. KREKELER (Oel u. Kohle, 1935, 11, 734–736).—A review. C. C.

**Determination of the Conradson carbon number.** A. A. VOZNESENSKI (Neft., 1933, 4, No. 15, 18–19).—Russian standard methods as applied to lubricating oils are discussed. CH. ABS. (e)

**Determination of fluorescence of mineral oils.** F. EVERS (Oel u. Kohle, 1935, 11, 746–748).—Using the Zeiss photometer with a series of 5 filters (K III to K VII), luminescence vals. (*L*) for each wave-length ( $\lambda$ ) are calc. from the total intensity of the fluorescence. Plotting *L* against  $\lambda$  for mineral oils gives an approx. straight line. For refined oils *L* is greatest for violet light, but with crude or aged oils the reverse may be the case. The slope of the line represents the quotient of the difference of *L* and  $\lambda$  vals. This is a measure of colour "depth" (*F*). *L* (for K VII) – *L* (for K III) is always positive for unused oil, but often negative for aged or crude oils. The effect of ageing turbine or insulating oils is to lower *F*. For the latter oils the resistance decreases as *F* falls, and oils showing negative vals. of *F* are unsuitable for insulating purposes. C. C.

**Pyrolysis of hydrocarbons. Polymerisation of propylene and butylenes. Determining C<sub>10</sub>H<sub>8</sub>. Naphthenic acids.**—See III. **Steels for plant. Corrosion of gas condensers and of petroleum equipment. Steel-alloy tubes for petroleum manufacture.**—See X. **C<sub>2</sub>H<sub>2</sub>.**—See XI. **Thermal val. of bagasse.**—See XVII. **Toxic hydrocarbons in effluents.**—See XXIII.



## PATENTS.

**Production of smokeless fuel briquettes capable of easy ignition and of free burning.** L. N. REDDIE. From W. GROTH (B.P. 433,239, 3.7.34).—Lignite, peat, vegetable residues, petroleum coke, etc. are distilled at  $> 600^\circ$  and the crushed product, mixed with 20–30% of finely-pulverised coking coal, is briquetted and again distilled at  $> 600^\circ$  in an externally-heated, continuously-operated retort, the voids between the individual briquettes in the charge being filled with finely-divided inert material. A. B. M.

**Coking retort.** A. W. WARNER, Assr. to ISBELL PORTER Co. (U.S.P. 1,985,304, 25.12.34. Appl., 27.10.31).—A vertical, internally-heated retort is fed with an annular stream of coal and a central core of coke, the latter within an adjustable telescopic tube and having the object of breaking the film of molten coal which is believed to form at an intermediate zone in the shape of an upright cone. B. M. V.

**Distillation and treatment of coal and other carbonaceous materials.** H. S. REED and R. D. LAMIE (U.S.P. 1,980,828, 13.11.34. Appl., 15.1.32).—An externally-heated, inclined, rotary retort (*R*) is used. It is divided into four compartments by transverse screens. Longitudinal tumbling lugs are provided on the inner periphery of the walls of the first two compartments, which also contain loose impact tumbling bodies of cast Fe or similar heat-conducting material. A screw conveyor feeds the coal axially into the first compartment, and a similar conveyor discharges the coke into a separating chamber (*S*) wherein it is screened, the coarse material and the fines being separately discharged therefrom. The former is returned to be mixed with a fresh supply of the material being treated; the latter are passed to a generator wherein they are completely gasified. Part of the water-gas produced is used for heating *R*; the gas supply to the furnace is controlled automatically by a thermostatic device which maintains a const. temp. ( $480\text{--}680^\circ$ ) in *R*. The volatile products are withdrawn from *S* and pass thence to a condensing and scrubbing system. The rich gas formed is mixed with the remainder of the water-gas. A. B. M.

**Carbonisation of wood for obtaining a wood charcoal of high calorific value.** P. GUILLAUME (B.P. 433,256, 31.12.34).—The wood is carbonised in a heat-insulated chamber (*C*). A gas-collecting space (*S*) is provided between *C* and the flue (*F*). The flow of gas from *S* to *F* is controlled by means of a damper. Carbonisation is effected in such a manner that the gases and tar or creosote vapours evolved are maintained in contact with the material as long as possible, and that part of these gases and vapours is collected in *S* and again circulated through the charcoal during the last stages of carbonisation and during cooling. A. B. M.

**Manufacture of carbon black.** J. B. HEID, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,986,198, 1.1.35. Appl., 8.2.30).—Hydrocarbon oil is heated under pressure with partial vaporisation, and sprayed at reduced pressure but raised temp. into a chamber wherein it mixes with products of combustion and is completely volatilised, partial cracking taking place.

The whole is then subjected to incomplete combustion in known manner. B. M. V.

(A) Thermal treatment with hydrogenating gases of distillable carbonaceous materials to obtain hydrocarbons, and apparatus therefor. (B) Treatment with hydrogenating gases of distillable carbonaceous material. R. HOLROYD, C. COCKRAM, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 432,958 and 433,020, 5.1.34).—(A) In the destructive hydrogenation of carbonaceous materials in presence of halogen compounds (cf. B.P. 427,883; B., 1935, 661), corrosion of the apparatus is prevented by treating the reaction gases and vapours with an alkali or alkaline earth which forms a stable halide, e.g.,  $\text{Ca}(\text{OH})_2$ , suspended in a heavy oil, before their temp. falls below  $350^\circ$ , or at the reaction temp. if this is  $< 350^\circ$ . (B) The reaction products containing corrosive halogen compounds are cooled over the range  $350\text{--}200^\circ$  (the lower temp. corresponding to the complete conversion of the halogen compounds into  $\text{NH}_4$  halides) in a vessel resistant to attack, e.g., one constructed of high-Cr-Ni steels or lined with enamel, glass, etc. A. B. M.

**Prevention of gum formation in gas-distribution systems.** W. H. FULWEILER, Assr. to UNITED GAS IMPROVEMENT Co. (U.S.P. 1,986,333, 1.1.35. Appl., 17.12.28).—Mono- and poly-hydric phenols are vaporised into the gas and removed by condensation and absorption together with the gum-forming compounds at various points, intentional and unintentional. Alternatively, meter diaphragms may be treated with the liquid. B. M. V.

**Manufacture of sealing liquid [for waterless gasholders].** W. A. GRUSE, Assr. to GULF REFINING Co. (U.S.P. 1,985,860, 25.12.34. Appl., 29.7.32).—Specifications of suitable tars from the cracking of petroleum or naphtha are given. B. M. V.

**Treatment of tars.** THERMAL INDUSTRIAL & CHEM. (T.I.C.) RES. Co., LTD., and C. O. CONDRUP (B.P. 432,998, 10.5. and 14.7.34).—Crude tar, especially vertical-retort or low-temp. tar, is distilled to a hard pitch residue and the fraction of the distillate boiling above  $325^\circ$  is treated with a reagent, e.g., an acid or an alkali, which causes the fraction to separate into two layers containing gums and waxy oils, respectively. The gums are recovered by separating and neutralising the corresponding layer. A proportion of them may be returned to the pitch, together with selected condensates from the first distillation, to give a road tar or pitch. The gums may also be used in the compounding of rubber, the preparation of varnishes, etc. A. B. M.

**Improvement of tars.** LONZA ELEKTRIZITÄTSWERKE U. CHEM. FABR. A.-G. (B.P. 433,248, 19.10.34. Ger., 19.10.33, 19.12.33, and 10.7.34).—Tars are oxidised by air-blowing at elevated temp. ( $160\text{--}170^\circ$ ), in presence of thickening agents, e.g.,  $\text{MeCHO} + \text{NH}_3$ , under such conditions that the lighter oils are distilled off and the middle and heavy oils are retained in the reaction mass or are returned thereto after the oxidation treatment. A. B. M.

**Aqueous [bituminous] emulsions.** J. M. FAIN, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,980,192,

13.11.34. Appl., 3.2.30).—Bituminous emulsions in which powdered minerals, *e.g.*, bentonite, are used as emulsifying agents have incorporated therein 0.5—5% of a finely-divided oxide of an amphoteric element, *e.g.*,  $\text{Sb}_2\text{O}_3$ ,  $\text{Sb}_2\text{O}_5$ , or  $\text{TiO}_2$ , which accelerates coalescence of the bituminous particles in the  $\text{H}_2\text{O}$ -free film.

A. B. M.

**Removal of salt compounds from crude oil.** C. R. WAGNER, Assr. to PURE OIL Co. (U.S.P. 1,984,903, 18.12.34. Appl., 16.1.33).—Crude oil drawn from a well which has been treated with acid to increase the yield is mixed by injection with  $\geq 5\%$  of  $\text{H}_2\text{O}$  and stratified in a settling tank.

B. M. V.

**Dewaxing of [hydrocarbon] oils.** SHARPLES SPECIALTY Co., Asses. of L. D. JONES (B.P. 434,579, 16.11.34. U.S., 27.11.33).—Preliminary removal of wax is carried out by chilling the oil, *e.g.*, to between  $-18^\circ$  and  $-35^\circ$ , preferably after dilution, and centrifuging or filter-pressing. The partly dewaxed oil is heated to  $> -1^\circ$  (about  $10^\circ$ ) and again chilled to  $<$  the temp. in the first dewaxing operation, *e.g.*, to between  $-35^\circ$  and  $-51^\circ$ . Wax is removed by centrifugal processes.

C. C.

**Separation of hydrocarbon mixtures.** STANDARD OIL DEVELOPMENT Co. (B.P. 434,672 and 434,714, [A, B] 10.3.34. U.S., 10.6.33).—(A) Heavy hydrocarbon oils are separated into light and heavy fractions by diluting with a light hydrocarbon solvent ( $< \text{C}_6$ ) and maintaining the mixture within  $45^\circ$  of the crit. temp. of the solvent under a pressure not substantially  $>$  the equilibrium v.p. of the mixture at that temp. Two layers are formed, which are separated. Asphalt and wax may first be pptd., using the same solvent. (B) The heavy oil may flow in countercurrent to the solvent, the temp. of the latter being progressively raised in the direction of its flow. The light and heavy fractions may be repeatedly extracted with solvent of progressively rising or falling temp., respectively, the initial temp. of the solvent being  $42-70^\circ$  and the final temp.  $5-28^\circ <$  the crit. temp. Alternatively, the heavy oil may be treated in stages of rising or falling temp., the lighter fraction passing to the stage of next higher temp. and the heavy fraction to that of next lower temp. The temp. in the last and first stages, respectively, is within  $14^\circ$  ( $5^\circ$ ) of the crit. temp. of the solvent.

C. C.

**Manufacture of oxidation products from hydrocarbons.** STANDARD OIL DEVELOPMENT Co. (B.P. 434,311, 12.10.34. U.S., 10.11.33).—The oil content of petrolatum or slop waxes of poor crystal structure is reduced to  $< 25\%$  ( $< 20\%$ ) by extraction with low-boiling hydrocarbons, *e.g.*,  $\text{C}_2\text{H}_6$ ,  $\text{C}_3\text{H}_8$ ,  $\text{C}_4\text{H}_{10}$ , to which are added other non-solvents for wax such as alcohols, ketones, org. acids, esters, chlorinated hydrocarbons. The wax may then be distilled, with or without decomp., at  $315-482^\circ$ . In the former case, the distillate may be cracked or dehydrogenated. The product is oxidised in the liquid phase with air at  $120-170^\circ$  to give a product containing 20—70% of saponifiable matter.

C. C.

**Manufacture of liquid fuels.** (A, B) A. A. ROBERTS and (B) C. W. SMITH (B.P. 434,109 and 434,180, [A] 16.6.34, [B] 26.5.34).—Fuel oil or oil-coal mixtures are

emulsified, *e.g.*, in a colloid mill, with a small proportion (4%) of  $\text{H}_2\text{O}$ , using casein or carbohydrate colloid such as starch as emulsifier. A small proportion of sol. or (B) insol. B compound (borosilicate) and  $\text{NaCl}$  may be added to control combustion. The latter compound also facilitates ignition. Sol. B compounds are dissolved in the  $\text{H}_2\text{O}$  prior to emulsification, whilst insol. B compounds may be stabilised in the fuel by starch etc. When necessary,  $\text{C}_{10}\text{H}_8$  may be added to reduce the  $\eta$  of the fuel.

C. C.

**Lubricating oils.** J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 434,295, 8.6.34).—The colour and fluorescence of lubricating oils are improved and the setting point is lowered by the addition of 0.05—3% of sol. vac. residue, solid at room temp., obtained from de-asphaltised hydrocarbon products containing cyclic constituents, especially from destructive hydrogenation products of coals or coal tars. Asphalt is pptd. from the initial material by the usual reagents, and the residual oil is vac.-distilled.

C. C.

**Lubricating and insulating compositions.** STANDARD OIL DEVELOPMENT Co. (B.P. 434,626, 7.8.34. U.S., 23.9.33 and 14.7.34).—Compositions of high flash point ( $< 205^\circ$ ) and auto-ignition temp. ( $> 455^\circ$ ), of  $\eta$  (Saybolt,  $99^\circ$ ) 30—100 sec., and suitable for lubricating bearings of high-pressure steam turbines or for submer-sion-type circuit breakers consist of high-boiling aryl esters of an inorg. acid [*e.g.*,  $\text{Ph}_3\text{PO}_4$ ,  $(\text{C}_6\text{H}_4\text{Me})_3\text{BO}_3$ ], a sol. oxidation inhibitor (*e.g.*, an aromatic  $\text{NH}_2$ - or OH-compound, a thiophenolic compound, or an aromatic sulphide), and a sol. thickener (*e.g.*, glyceryl phthalate) or thinner (*e.g.*,  $\text{Ph}_2$ ). Soaps, oiliness agents (*e.g.*, Et oleate), and/or extreme-pressure lubricating agents may be added.

C. C.

**Lubricants with corrosion-inhibiting properties.** C. M. and S. O. H. CLEMENTSON (C. & S. CLEMENTSON) (B.P. 434,240, 9.8.34. Ger., 1.3.34).—Corrosion in engine cylinders is prevented by mixing with the lubricating oil a solution of alkali peroxide in an alcohol, *e.g.*,  $\text{Na}_2\text{O}_2$  in MeOH, together with a homogenising agent such as hydrogenated PhOH or cresol.

C. C.

**Apparatus for pyrolytic processing of hydrocarbons.** W. O. KEELING (U.S.P. 1,990,697, 12.2.35. Appl., 7.6.29).

**Pyrolytic treatment of hydrocarbons and carboniferous material.** W. O. KEELING (U.S.P. 1,991,750, 19.2.35. Appl., 14.1.32).

**Separation of heavy petroleum mixtures.** G. B. COUBROUGH, Assr. to LUMMUS Co. (U.S.P. 1,991,792, 19.2.35. Appl., 20.3.33).

**Production of hydrocarbons.** W. L. NELSON and G. H. FANCHER (U.S.P. 1,990,664, 12.2.35. Appl., 18.1.29).

**Treatment oils.** A. W. GLEASON and D. B. NUTT, Assrs. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,992,420, 26.2.35. Appl., 13.6.32).

**Decomposition of hydrocarbon oils.** R. E. WILSON, Assr. to STANDARD OIL Co. (U.S.P. 1,991,971, 19.2.35. Appl., 31.12.30).

**Coking of heavy oils.** W. P. ARNOLD, JUN., Assr. to SINCLAIR REFINING Co. (U.S.P. 1,988,644, 22.1.35. Appl., 28.2.29).

**Cracking of hydrocarbons.** (A) E. C. HERTHEL and T. DE C. TIFFT, (B) E. W. ISOM, Assrs. (A, B) to SINCLAIR REFINING Co. (U.S.P. 1,992,614 and 1,992,616, 26.2.35. Appl., [A] 1.11.29, [B] 12.4.29).

**Treatment [cracking] of hydrocarbon materials.** L. CLARK (U.S.P. 1,989,445, 29.1.35. Appl., 22.3.33).

**Treatment [cracking] of hydrocarbon oils.** J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,990,303, 5.2.35. Appl., 20.5.31).

**Hydrocarbon oil [conversion].** (A, D) J. B. HEID, (B) M. W. BARNES, (C) J. D. SEGUY, (E) J. G. ALTHER, Assrs. (A—E) to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,988,842, 22.1.35. Appl., 31.5.32. U.S.P. 1,989,731, 5.2.35. Appl., 27.5.32. U.S.P. 1,990,254, 5.2.35. Appl., 27.4.31. U.S.P. 1,990,868, 12.2.35. Appl., 8.4.27. U.S.P. 1,991,440, 19.2.35. Appl., 4.11.29).

**Treatment [conversion] of hydrocarbon oils.** G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,992,299, 26.2.35. Appl., 14.5.31).

(A) Method of, (B) apparatus for, applying heat to vessels used in hydrocarbon oil conversion. E. F. NELSON, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,990,877—8, 12.2.35. Appl., [A, B] 9.9.29. Renewed [A, B] 26.1.33).

**Distillation of hydrocarbon oils.** G. W. WATTS and W. B. MATHEWS, Assrs. to STANDARD OIL Co. (U.S.P. 1,989,389, 29.1.35. Appl., 9.2.31).

**Fractionation of mineral oil.** U. R. BRAY, Assr. to UNION OIL Co. OF CALIFORNIA (U.S.P. 1,988,713, 22.1.35. Appl., 23.2.32).

**Condenser for hydrocarbons.** L. T. CAMERON, Assr. to C. O. MARSHALL, JUN. (U.S.P. 1,992,352, 26.2.35. Appl., 11.9.33).

**Clarifying and improving the colour of hydrocarbon oils.** M. M. MOORE, R. R. THORBURN, and W. B. WILSON, Assrs. to CONTACT FILTRATION Co. (U.S.P. 1,989,330, 29.1.35. Appl., 21.2.27).

**Increasing the octane number of liquid hydrocarbon motor fuels.** A. D. SMITH, Assr. to JENKINS PETROLEUM PROCESS Co. (U.S.P. 1,992,512, 26.2.35. Appl., 20.10.32).

**Dewaxing of oils.** (A) C. E. SWIFT, (B) E. W. GARD, Assrs. (A, B) to UNION OIL Co. OF CALIFORNIA (U.S.P. 1,988,706, 22.1.35. Appl., 19.12.33. U.S.P. 1,989,355, 29.1.35. Appl., 21.8.33).

**Dewaxing of lubricating oils.** H. G. SMITH, Assr. to GULF REFINING Co. (U.S.P. 1,989,028, 22.1.35. Appl., 14.7.32).

**Production of lubricating oil.** U. R. BRAY and C. E. SWIFT, Assrs. to UNION OIL Co. OF CALIFORNIA (U.S.P. 1,988,711—2, 22.1.35. Appl., 4.8.31).

**Volatilising materials. Liquid and gas separator. Fractional condensation of vapours.**—See I. Road building.—See IX. Resin from petroleum.—See XIII. Purifying industrial wastes.—See XXIII.

### III.—ORGANIC INTERMEDIATES.

**Methane synthesis.** I. B. RAPOPORT and A. P. BLIUOV (Khim. Tverd. Topl., 1934, 5, 625—632).—In the synthesis of  $\text{CH}_4$  from CO and  $\text{H}_2$  a Ni catalyst is effective at  $250^\circ$ , whilst at  $270^\circ$  a 99% conversion of CO is achieved. With a Ni-Mn catalyst the reaction may be carried out at  $200$ – $204^\circ$ , much  $\text{CO}_2$  being formed at  $250$ – $280^\circ$ ; at these temp. a Ni-Mn-Al catalyst causes the simultaneous formation of  $\text{CO}_2$  and  $\text{CH}_4$ . A Mo catalyst promotes  $\text{CH}_4$  formation at  $350$ – $400^\circ$  and  $\text{CO}_2$  formation at higher temp. Addition of  $\text{Al}_2\text{O}_3$  is almost without effect. CH. ABS. (r)

**High-temperature pyrolysis of gaseous paraffin hydrocarbons.** H. TROPSCH and G. EGLOFF (Ind. Eng. Chem., 1935, 27, 1063—1067).—The products obtained by thermal decomp. of hydrocarbons are the result of a series of consecutive reactions and are determined by temp., pressure, and, especially, the contact time.  $\text{C}_2\text{H}_6$ ,  $\text{C}_3\text{H}_8$ , and *n*- $\text{C}_4\text{H}_{10}$  at  $1100^\circ/50$  mm. gave max. yields of  $\text{C}_2\text{H}_4$  of 66, 69, and 94 litres, respectively, per 100 litres of charge with contact times 0.0035, 0.008, and 0.0035 sec. The formation of  $\text{C}_2\text{H}_2$  increased and of  $\text{C}_2\text{H}_4$  decreased with increased contact time, max. yields being 10, 25, and 30 litres, respectively, for 0.1 sec. contact time. Max. yields of  $\text{C}_3\text{H}_6$  (8, 15, and 22 litres) were obtained after contact for 0.002 sec. Higher yields of  $\text{C}_3\text{H}_6$  and  $\text{C}_2\text{H}_2$  were formed from *iso*- $\text{C}_4\text{H}_{10}$  than from the *n*-paraffins. Rise of temp. to  $1400^\circ$  increased the yield of  $\text{C}_2\text{H}_2$  from  $\text{C}_2\text{H}_6$  and  $\text{C}_3\text{H}_8$  without appreciably affecting the yield of  $\text{C}_2\text{H}_4$  or  $\text{C}_3\text{H}_6$ , but contact times were only about one eighth of that at  $1100^\circ$ . Increase of C formation was directly  $\propto$  log contact time. C. C.

**Catalytic polymerisation of gaseous olefines by liquid phosphoric acid.** I. Propylene. V. N. IPATIEV, II. Butylenes. V. N. IPATIEV and B. B. CORSON (Ind. Eng. Chem. 1935, 27, 1067—1069, 1069—1071).—I. At  $135$ – $200^\circ/1$ – $15$  atm.  $\text{C}_3\text{H}_6$  polymerises in presence of liquid  $\text{H}_3\text{PO}_4$  to a liquid consisting almost entirely of mono-olefines, b.p.  $40$ – $230^\circ$ , and having probably an *iso*-structure. The reaction is more rapid if the acid has been previously used for polymerising  $\text{C}_4\text{H}_8$ . It is suggested that intermediate esters are formed (e.g.,  $\text{EtH}_2\text{PO}_4$  was isolated when  $\text{C}_2\text{H}_4$  was caused to react with  $\text{H}_3\text{PO}_4$  at  $200^\circ$ ), and these decompose at higher temp. to form polymerides, liberating  $\text{H}_3\text{PO}_4$ . Mixed polymerides are obtained from mixtures of olefines.

II. Mono-olefines are obtained by polymerising  $\text{C}_4\text{H}_8$  with  $\text{H}_3\text{PO}_4$ , the products becoming more complex as the temp. is raised. The reaction is most rapid with *iso*- $\text{C}_4\text{H}_8$  (I) and slowest with  $\Delta^a$ - $\text{C}_4\text{H}_8$ . The presence of (I) accelerates the polymerisation of *n*- $\text{C}_4\text{H}_8$ . The liquid polymerides from the individual butylenes were similar in physical and chemical properties. C. C.

**Preparation of ethylene glycol.** S. TAKAHASHI and G. MAKISHIMA (J. Soc. Chem. Ind., Japan, 1935, 38, 425 B).—Hydrolysis of an 8% aq. solution of  $\text{CH}_2\text{Cl}\cdot\text{CH}_2\cdot\text{OH}$  by  $\text{Na}_2\text{CO}_3$  at  $60$ – $80^\circ$  for 10 hr. gives a 90% yield of  $\text{C}_2\text{H}_4(\text{OH})_2$  (I). The yield of (I) on hydrolysis of  $\text{C}_2\text{H}_4\text{Cl}_2$  with dil.  $\text{Na}_2\text{CO}_3$  in an autoclave is lower. E. A. H. R.

**Utilisation of waste from the manufacture of acetic acid.** N. A. TELESKHIN and J. N. PROKOPENKO (Lesokhim. Prom., 1934, 3, No. 5—6, 49—51).—The residue after preparing AcOH from  $\text{Ca}(\text{OAc})_2$  contained  $\text{CaSO}_4$  50—60,  $\text{H}_2\text{O}$  15—40,  $\text{H}_2\text{SO}_4$  0.2—1.2, AcOH traces—1.5,  $\text{Ca}(\text{OAc})_2$  traces—1.5, tar 4—10, and (Fe, Al) oxides 0.5—0.7%. This residue, on being heated to  $180^\circ$ , either alone or when mixed with sand, yields a cement with good setting properties. Addition of CaO lowers its strength. CH. ABS. (e)

**Purification of acetic acid in the Asha plant.** I. GOLDMAN (Lesokhim. Prom., 1934, 3, No. 4, 6—11).—The addition of 50% of the  $\text{KMnO}_4$  required for oxidation of admixtures caused pptn. of impurities, due to partial oxidation and a catalytic action. Redistillation of the resulting AcOH gave a pure product. CH. ABS. (e)

**Replacement of ether by Nasakin solvent in the extraction of acetic acid.** J. M. TSCHERNIACHOVSKI, P. F. ELISEEV, and S. P. NASAKIN (Lesokhim. Prom., 1933, 2, No. 5, 1—7).—The solvent is a mixture of light wood oils (b.p.  $50$ — $80^\circ$ ). The distribution coeff. of AcOH between it and the aq. layer is  $>$  that for  $\text{Et}_2\text{O}$ . Other advantages are discussed. CH. ABS. (e)

**Increasing the yield of formaldehyde in the Krasno-Bakovski plant of the "trust" Atzetometil.** S. P. NASAKIN, M. F. SANENKOVA, and S. N. VSCHIVTZEY (Lesokhim. Prom., 1934, 3, No. 9—10, 35—41; No. 11, 22—27).—A crit. discussion of this plant is given, with recommendations for improvements. CH. ABS. (r)

**Conductometric determination of water in acetone.** E. SOMMER (Chem. Obzor, 1934, 10, 188—189).—Conductometric data for electrolytes dissolved in  $\text{H}_2\text{O}$ - $\text{COMe}_2$  mixtures, suitable for use in determining the  $\text{H}_2\text{O}$  content, are recorded. Data given for urea nitrate are suitable for approx. determinations of  $\text{H}_2\text{O}$  up to  $100\%$ . CH. ABS. (e)

**Preparation of higher ketones (homologues of acetone).** I. F. TSCHISTOV and A. M. TERECHOV (Lesokhim. Prom., 1934, 3, No. 11, 15—21).—A commercial plant for the separation of  $\text{COMeEt}$  and  $\text{COMePr}$  from  $\text{COMe}_2$  high fractions is described. CH. ABS. (r)

**Recovery of vapours of volatile solvents by solid sorbents.** I, II. E. V. ALEXEEVSKI (J. Appl. Chem. Russ., 1935, 8, 779—801, 802—822).—I [with B. A. VASKOVSKI]. Data are recorded for the static adsorption of  $\text{CCl}_4$  by charcoal, and for its desorption by steam.

II [with Z. I. AZARCH]. Kinetic and other data are recorded for sorption of  $\text{CS}_2$  by charcoal, and for its desorption by EtOH or  $\text{H}_2\text{O}$  vapours. Active C is preferable to  $\text{SiO}_2$ ,  $\text{Fe}_2\text{O}_3$ , or  $\text{Al}_2\text{O}_3$  gels, and desorption by steam is shown to be commercially realisable. R. T.

**Solvent recovery in the plastics and allied industries.** ANON. (Synth. Appl. Fin., 1935, 5, 244—245, 268—270, 290—292; 6, 9—11, 31—33, 63—65, 90—91, 111—113, 128, 146—147, 157, 173—176).—A comprehensive survey and discussion.

**Chlorination of benzene. I. Continuous chlorination in the liquid phase.** N. N. VOROSHOV, G. V. ZILBERMAN, and V. M. GRIGORIEV (J. Appl. Chem. Russ., 1935, 8, 872—883).—The lowest relative yield of

polychloro-derivatives is obtained by chlorination at  $35^\circ$  in a series of columns packed with glass and Fe rings, at certain optimum rates of flow of the substrates characteristic of a given apparatus. R. T.

**Preparation of triphenyl and tritoly phosphates.** J. S. SALKIND and E. G. DMITRIEVA (Plast. Massi, 1934, No. 4, 28—30).—The best method utilises the reaction between PhOH or cresol and  $\text{POCl}_3$ , with MgO as catalyst. CH. ABS. (r)

**Determination of naphthalene.** H. A. J. PIETERS and K. PENNERS (Chem. Weekblad, 1935, 32, 566—568).—Naphthalene picrate is insol. in unsaturated aq. solutions of picric acid (I). The v.p. of  $\text{C}_{10}\text{H}_8$  depends chiefly on temp.; it is therefore necessary to cool the solution to about  $4^\circ$ . (I) is non-volatile under the conditions of experiment, either in steam or in a stream of air. The min.  $[\text{C}_6\text{H}_6]$  in gas to give a separation of the picrate is  $150$ — $160$  g./cu. m., which is far  $>$  is ever found in practice. S. C.

**Conjugated hydrogenation of cresols and naphthalene. Hydrogenating a mixture of naphthalene and cresols.** N. A. KLIUKVIN, V. F. POLOZOV, and I. I. LOBUS (Khim. Tverd. Topl., 1934, 5, 357—372).—The optimum conditions for the use of  $\text{NH}_4$  molybdate and phosphomolybdate catalysts are discussed; a process for the recovery of the catalyst is described. CH. ABS. (r)

**Solvent power of tetralin, decalin, hexalin, and methylhexalin.** S. UENO (J. Soc. Chem. Ind., Japan, 1935, 38, 402—405 B).—The solubilities of 47 substances, including many gums and resins, in the above solvents are tabulated. E. A. H. R.

**Electrolytic substitution of naphthols. I. Electrolytic preparation of nitroso- $\beta$ -naphthol from  $\beta$ -naphthol, and of  $\beta$ -nitroso- $\alpha$ -naphthol from  $\alpha$ -naphthol.** K. EMI (Repts. Imp. Ind. Res. Inst., Osaka, 1934, 15, No. 1, 1—27).—A 53.8% yield of nitroso- $\beta$ -naphthol was obtained at  $20^\circ$ , with a cell voltage of 12, an anode solution consisting of  $\beta$ - $\text{C}_{10}\text{H}_7\text{OH}$  suspended in aq.  $\text{NaNO}_2$ , and a C anode (c.d. 7 amp./sq. dm.). The cathode was Cu in 0.5N-NaOH. A 54.9% yield of  $\beta$ -nitroso- $\alpha$ -naphthol was obtained using the same conditions with a c.d. of 3 amp./sq. dm. CH. ABS. (e)

**Naphthenic acids.** Y. MAYOR (Chim. et Ind., 1935, 34, 526—529).—Methods for preparing the acids, their salts and esters, and various derivatives, and their practical applications are reviewed. G. H. C.

**Widening the scope of raw products suitable for the preparation of camphor.** L. V. FILIPOVITSCH and V. I. KAPUSTINA (Lesokhim. Prom., 1933, 2, No. 4, 11—13).—Camphor may be prepared from fire-distilled as well as from steam-distilled turpentine. The prep. of bornyl chloride and borneol is discussed. CH. ABS. (e)

**Determination of anthranilic acid.** L. N. PETROVA and N. NIKOLAEV (J. Appl. Chem. Russ., 1935, 8, 933—934).—20 ml. of 0.5N- $\text{Cu}(\text{OAc})_2$  are added to a solution containing 0.2—0.3 g. of anthranilic acid, at  $> 10^\circ$ , the suspension of Cu salt is filtered after 5 min., the ppt. washed with cold  $\text{H}_2\text{O}$ , and excess of  $\text{Cu}^{\text{II}}$  determined in the filtrate + washings. R. T.

Pyrocatechol and pyrogallol from wood tars. Guaiacol from wood creosote. Ethylcyclohexane from petroleum. Hydrogenation of crude anthracene. Amyl alcohols and chlorides from cracked gasoline. Naphthenes from gasoline fraction. Humic substances from mineral oils.—See II. Oxidation of aniline oil.—See IV. EtOH from wood waste.—See IX.  $C_2H_2$ .—See XI. Fractionation of fatty acids and alcohols. Determination of OH groups.—See XII.  $H_2C_2O_4$  from agricultural materials.—See XVI. Gluconic acid.—See XVIII.

See also A., Oct., 1223, Esterification of OH-acids and polyhydric alcohols. 1224, Electrolytic reduction of ketones. 1232, Prep. of  $\beta$ -phenylethylamines. Electrolytic reduction of *m*-halogenonitrobenzenes. 1223, Prep. of 2- and 4-allylresorcinol and derivatives. 1239, Azoaldehydes. 1241, Prep. of thioketones. 1249, Isomeric thiophthens. 1282, Prep. of cryst. dihydroxyacetone.

## PATENTS.

**Manufacture of vinyl alcohol.** CHEM. FORSCHUNGSGES. M.B.H. (B.P. 434,580, 24.11.34. Ger., 25.11.33).—Hydrolysis of monomeric vinyl esters, e.g.,  $CH_2=CH\cdot OAc$ , or ethers with alkali or acid where appropriate, at low temp., e.g., at 20°, followed by isolation at low temp., e.g., by extraction with  $Et_2O$  and fractional distillation under reduced pressure, is claimed to yield  $CH_2=CH\cdot OH$  practically free from  $MeCHO$ . A. W. B.

**Manufacture of open-chain and cyclic ethers.** E. I. DU PONT DE NEMOURS & Co. (B.P. 435,110, 14.3.34. U.S., 14.3.33).—Halogenated dialkyl ethers are heated with finely-divided metals, e.g., Cu, Ni, Pt, at 50–100°/200 atm. in the liquid phase or at 100–250° (at  $\leq$  100 atm.) in the gaseous phase. E.g.,  $CH_2Cl\cdot OMe$  and Na at 100° give  $(CH_2)_2O$  and ethers of  $C_2H_4(OH)_2$ , "dichlorodiethyl ether" and Cu at 150°/150 atm. give  $(CH_2)_2O$  and dioxan. H. A. P.

**Manufacture of organic disulphides.** I. G. FARBENIND. A.-G. (B.P. 435,113, 14.3.34. Ger., 21.3.33).—The corresponding thiol (mercaptobenzthiazole) is oxidised in aq. solution or suspension with  $HClO_3$  or its salts (+ $OsO_4$ ). H. A. P.

**Conducting chemical reactions in alkaline media.** [Preparation of phenol.] J. J. GREBE and J. H. REILLY, Assrs. to DOW CHEM. Co. (U.S.P. 1,986,194, 1.1.35. Appl., 6.3.30).—In the prep. of PhOH by reaction of PhCl and aq. NaOH at 300–400° in Fe tubes,  $\approx$  1% of soap is added to prevent formation of  $Fe_3O_4$  on the tube walls, such scale being liable to break off and block the tubes. B. M. V.

**Pressure-transmitting fluid.**—See I.

## IV.—DYESTUFFS.

**Electrolytic oxidation of aniline oil.** T. YASUI (Bull. Chem. Soc. Japan, 1935, 10, 305–311).—Electrolytic oxidation at 80–90° of an acid solution of  $NH_2Ph$ , *o*- and *p*-NHPHMe, using a c.d. of 2 amp. per sq. dm., gives *p*-NHPH $\cdot C_6H_4Me$ , emeraldine, and aposafranine, together with their *o*- and *p*-Me derivatives.  $NH_2Ph$ -black is formed, but not safranine or fuchsin.

F. R. G.

**Substitution of diazo compounds in azo dyes.** S. F. FILLIPITSHEV and M. A. TSCHOKALIN (Anilinokras. Prom., 1935, 5, 76–82).—Diazonium salts may be arranged in the following order, according to whether they displace or are displaced by other diazo components of azo dyes: activity of the diazonium salt of  $p-NH_2\cdot C_6H_4\cdot NO_2 >$  benzidine  $>$  dianisidine  $>$  amino-*C*-acid  $>$   $\alpha-C_{10}H_7\cdot NH_2 >$  *m*-xylylene  $>$   $NH_2Ph >$  4-aminosalicylic acid; the same order is followed for reactivity in the reaction of coupling. Various special cases of the reaction in question are described, and a mechanism, involving formation of an unstable additive compound of the azo dye with the diazonium salt, followed by elimination of the less electronegative component, is proposed for the reaction. R. T.

See also A., Oct., 1232, Fat-sol. azo dyes. 1239, [Dyes from] azoaldehydes. 1243, Diazomethane derivatives [1-*p*-sulphobenzeneazo dye]. 1244, Red dye of *Alkanna* root. 1249, Indigoid dyes. 1255, Colour reactions of pyrrolidine and proline [and dye derivatives].

## PATENTS.

**Manufacture of [chromable] azo dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 431,201, 29.12.33).—A diazotised *o*-amino-phenol or -naphthol, carrying  $\leq$  1  $NO_2$  and/or halogen, is coupled with the condensation product from a ketone and 2 mols. of a phenol or phenolsulphonic acid. Examples are: 4-nitro-*o*-aminophenol-6-sulphonic acid  $\rightarrow$  product from PhOH and  $COMe_2$  or cyclohexanone, or from *o*-cresol and  $COMe_2$ , or from PhOH and  $COMeEt$  (chrome-browns). C. H.

**Manufacture of [vat] dye preparations.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 431,278, 24.2.34).—Dry vat dye is mixed with alkali metasilicate (cf. B.P. 391,407; B., 1933, 506) and  $Na_2S_2O_4$ , with or without dispersing agent. The mixture gives a vat with  $H_2O$ . C. H.

**Manufacture of unsymmetrical pentacarbocyanine dyes.** I. G. FARBENIND. A.-G. (B.P. 434,234, 4.6.34. Ger., 3.6.33 and 26.5.34).—For preparing a dicarbocyanine intermediate from a quaternary heterocyclic  $NH_4$  salt and a compound  $RArN\cdot CH\cdot CH\cdot CH\cdot NArRX$ , an alkaline condensing agent is advantageous. So is it, also, in condensing the intermediate with a second mol. of quaternary salt to form an unsymmetrical dicarbocyanine (cf. B.P. 355,693; B., 1932, 57). The 27 examples include seleno-, seleno-2', seleno-4', selenathia-, selenathiazolo-, thia-, thia-2', thia-4', thia-thiazolo-, thiazolo-2', and thiazolo-4'-dicarbocyanines, including dyes substituted on the polymethine chain.

F. M. H.

**Manufacture of cyanine dyes.** KODAK, LTD., and B. BEILENSON (B.P. 435,542, 19.12.33).—In the prep. of cyanine dyes, and especially in the  $\psi$ -cyanine condensation, improved yields and cleaner products result on using, as condensing agent, a finely-divided alkali salt of a weak inorg. acid, e.g.,  $K_2CO_3$ . The 16 examples include dyes of new types derived from 2:5-dimethylpyrazine methiodide: 1:5-dimethyl-1'-ethyl-5':6'-benz-2:2'-pyrazinopyridocyanine iodide and 5'-methyl-2:1'-diethylthia-2'-pyrazinocarbocyanine iodide. F. M. H.

**Errata.** B., 1935, 444, col. 1, third abstract, in each case (except the benzimidazole) "2" should be "1"; also in lines 8 and 10 of the abstract, "4" should be "5."

B., 1935, 842, col. 1, last line, for "1:1'" read "2:2,'" and similarly on lines 3, 7, 8, 10, 16, 18, *et seq.* on col. 2. *Ibid.*, col. 2, line 6—7 should read "2:2'-dimethyl-3:4:3':4'-benzbenzthiacyanine." Line 10, for "1:5:1':5'" read "3:4:3':4.'" Page 843, col. 1, lines 1, 3, and 4, for "1:1'" read "2:2'"; lines 21, 28, 33, and 37, for "2'" read "1-."

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

### Fish-net preservatives. I. Preservatives mixed with antiseptic metallic compounds. II, III. Oily preservatives mixed with copper compounds.

M. MURATA (J. Soc. Chem. Ind., Japan, 1935, 38, 425—427 B, 427—430 B).—I. The preservative action of coal tar is improved by the addition of  $\text{CuSO}_4$ , Cu arsenite,  $\text{PbO}$ , malenit, and Cu oleate. Pptn. of  $\text{CuS}$ ,  $\text{Cu}_2\text{Fe}(\text{CN})_6$ , or  $\text{PbS}$  in boiled twine, or treatment with oils, was also effective but not easily carried out. Cu oleate in petrol lasts only a short time.

II, III. Good preservatives are obtained by the addition of about 5% of powdered  $\text{CuSO}_4$ , Cu arsenite,  $\text{CuO}$ , or basic Cu carbonate to coal tar. Dissolved Cu oleate is less effective, and heavy petroleum oil is of little use.  
A. G.

### Determination of crêpage in yarns and fabrics.

I. J. SAXL (Text. World, 1935, 85, 1846—1847).—An apparatus for measuring shrinkage is described.

A. J. H.

### Effect of protective coatings on absorption of moisture by gelatin-latex gas-cell fabrics. D. F. HOUSTON (J. Res. Nat. Bur. Stand., 1935, 15, 163—172).

—The absorptive capacity ( $A$ ) and rate of absorption ( $R$ ) for  $\text{H}_2\text{O}$  absorbed by Zeppelin gas-container fabrics [consisting of layers of cloth, gelatin (I), and rubber], with various protective coatings, has been determined at 21°. With  $R.H. < 94\%$   $A$  is unaffected by variation in a protective coating of paraffin, but  $R$  decreases with increasing thickness of coating, and is less when the coating is applied to both surfaces than when the same wt. is applied to one surface.  $R$  increases when a varnish containing Al powder is used as a coating, instead of paraffin, and  $A$  is slightly increased, owing to absorption of  $\text{H}_2\text{O}$  by the varnish. A reduction in the quantity of hygroscopic (I) layer which has been plasticised by glycerol gives a lower val. of  $A$ . At  $R.H. > 94\%$  the fabrics lose wt. owing to mould growth and leaching of (I) and glycerol. The results are discussed in terms of absorption, mainly by (I), and permeability of the adjacent layers.  
R. S. B.

### Analysis of textiles for cellulose acetate rayon, silk, regenerated cellulose rayon, cotton, and wool.

R. T. MEASE and D. A. JESSUP (J. Res. Nat. Bur. Stand., 1935, 15, 189—198).—Quant. analysis of mixed fibres for which mechanical estimations are impracticable may be conducted by extracting the dried specimen (wt. =  $A$ , approx. 5 g.) with  $\text{CCl}_4$  for 2 hr., drying, washing, and removing excess of  $\text{H}_2\text{O}$ . The fibre is then immersed in a 0.5% solution of starch and protein-

hydrolysing enzyme at 50°, is heated to 70° for 15 min., rinsed, dried, and weighed ( $B$ ), the % of non-fibrous material being  $100(A-B)/A$ . Cellulose acetate rayon is determined by then agitating with  $\text{COMe}_2$  at room temp. for 15 min., rinsing with  $\text{COMe}_2$ , drying, immersing in  $\text{H}_2\text{O}$  at 70°, and drying to const. wt. ( $C$ ), when the required % =  $100(B-C)/A$ . Silk is determined by then agitating for 1 hr. at 70° with 200 c.c. of  $\text{Ca}(\text{CNS})_2$  solution ( $d$  1.20—1.21) made just acid with  $\text{AcOH}$ , filtering, agitating the filtered fibres for 5 min. in 200 c.c. of  $\text{Ca}(\text{CNS})_2$  at 70°, filtering, washing, and drying to const. wt. ( $D$ ); the % of silk =  $100(C-D)/A$ . Regenerated cellulose rayon is then determined as for silk, but using  $\text{Ca}(\text{CNS})_2$  of  $d$  1.35—1.36. Wool-protein is then determined by boiling with  $\text{AlCl}_3$ , heating at 105—110°, treating with  $\text{HCl}$ , washing, and drying. Cotton may also be determined by dissolving the wool in  $\text{KOH}$ , leaving the cotton. The accuracy is within 2%.

R. S. B.

### Modified procedure for determining amount of lint on cottonseed. E. FREYER (Oil & Soap, 1935, 12, 208—211).

—The amount of lint may be determined more rapidly and probably more accurately by applying the modified A.O.C.S. method to the cottonseed rather than to the hulls. 15 g. of seed are steeped in 40 c.c. of conc.  $\text{H}_2\text{SO}_4$  for 45 sec., and the mixture is poured into 500 c.c. of  $\text{H}_2\text{O}$  and then washed in a perforated cup under running  $\text{H}_2\text{O}$ ; the washed seed is drained and dried (*e.g.*, at 130° under forced draught) at the same time as a duplicate test sample and a sample of the original seed are treated, and the difference between the loss in wt. of the acid-treated and untreated samples is reported as lint. Duplicates should agree to within  $\pm 0.3$ .  
E. L.

### Comparison of chemical methods for determining the degradation of cotton linters. BRISAUD (Mém. Poudres, 1934—5, 26, 204—238).

—The relations between I val., Cu, Ag,  $\text{KOH}$ , and methylene-blue nos., the  $\alpha$ -cellulose content, and  $\eta$  in cuprammonium hydroxide solution were determined for about 40 samples of cotton linters and are shown graphically. The N content and yields of the nitrated products are independent of the characteristics of the linters, but  $\eta$  shows a certain dependence; the curve relating  $\eta$  of the linters in cuprammonium solution and that of nitrocellulose in  $\text{COMe}_2$  is not linear, the ratio of the latter to the former decreasing as  $\eta$  increases. The  $\eta$  of the nitrocellulose is influenced also by the Cu no. of the linters. Solubility in methylated  $\text{EtOH}$  increases only qualitatively with the various nos. of the linters. In general, although the properties of the nitrated product reflect those of the raw material, other variable factors, *e.g.*, nitration temp. and time of steeping, must be taken into account.  
W. J. W.

**Applicability of the modified single-stage process as a method of determining cellulose.** Y. C. TANG and H. L. WANG (Cellulosechem., 1935, 16, 57—64; cf. B., 1935, 844).—If the concns. of  $\text{ClO}_2$  and of  $\text{C}_5\text{H}_5\text{N}$  are increased to 1.5 and 1.0%, respectively, the yield of skeletal substances is diminished. For the determination of cellulose alone the concns. may be raised to 1.5 and 1.5%, or to 3.0 and 5.0%,

and the length of the treatment reduced to 9 or 7 days, respectively. A. G.

**Action of acetone on nitrocellulose.** J. DESMAROUX and M. MATHIEU (Mém. Poudres, 1934—5, 26, 180—203).—Samples of nitroramie (11.6 and 13.52% N) were suspended in atm. at 40° containing 0.0123—1.0 g. of  $\text{COMe}_2$  (I) per g., the "activities" of the latter being calc (activity = v.p. of  $\text{COMe}_2$  in test + max. v.p. of  $\text{COMe}_2$  at 40°). The curves correlating the mol. concn. of the (I) in the nitroramie and the activities were nearly straight and were similar for both samples. X-Ray diagrams indicate that the (I) is accommodated by an expansion of the nitrocellulose lattice similar to that of the cellulose lattice on nitration. The mechanisms of nitration and gelatinisation are the same. The fixation of (I) in the fibre is reversible so long as the fibrous structure is maintained; if a gel has once been formed the primitive structure is never regained.

W. J. W.

**Bagasse. VII. Comparison of bagasse and wood lignins.** Y. HACHIHAMA, H. SAEGUSA, and W. TAKEMURA (J. Soc. Chem. Ind., Japan, 1935, 38, 416—417 B; cf. B., 1935, 184).—Bagasse lignin differs from softwood lignin, but resembles hardwood lignin, in its chemical and physical properties. E. A. H. R.

**Use of the wood of *Pinus insignis* for paper-making.** VIDAL, BROT, and ARIBERT (Bull. Inst. Pin, 1935, 181—185).—This wood is suitable for manufacture of kraft (by  $\text{NaOH-Na}_2\text{S}$ ) and ordinary (by  $\text{NaOH}$ ) paper. R. S. C.

**Blue-stain development in peeled shortleaf and loblolly pine pulpwood.** G. H. HEPTING (Paper Ind., Sept., 1935, 402—404).—Both kinds of pine (30 years old and containing very little heartwood), suitably stacked, developed blue stain on about 35 vol.-% of the hand-peeled wood during the first 1½ months after cutting. Very little further staining occurred after that time up to 5½ months. Machine-barked wood developed less stain, possibly because of the rapid surface drying resulting from the bruising of the wood surface. H. A. H.

**[Manufacture of] rayon pulp from southern pine.** C. H. HERTY (Text. World, 1935, 85, 1840).—Further details are given (B., 1935, 398, 666) of the cellulose made from spring and summer woods obtained from fast- and slow-growing pine trees. A. J. H.

**Hydrolysis of wood with formic acid.** SOLETSCHNIK (Lesokhim. Prom., 1933, 2, No. 3, 1—10).—Optimum results were obtained by soaking for 1½ hr. at room temp. in a mixture of  $\text{HCO}_2\text{H}$  77.5,  $\text{HCl}$  14.2, and  $\text{H}_2\text{O}$  8.3%, followed by heating at 70° for ½ hr. and hydrolysing for 1 hr. The yield of reducing sugars was 48—55% of the dry pulp. In regenerating the spent acid, 6—8% was not recoverable from the pulp. Glucose was almost absent in the hydrolysis with 5%  $\text{HCO}_2\text{H}$  in an alcoholic medium. In some cases 50% of all the pentosan was converted into pentose and furfuraldehyde. CH. ABS. (e)

**Hydration of vegetable fibres during beating and its effect on paper strength.** T. G. CHINTSCHIN (Zellstoff u. Papier, 1935, 15, 399—400).—The mechanism of strength increase during beating is briefly dis-

cussed and one or two of the more recent theories are advanced. The main factor in producing the strength increase is considered to be the building up on the fibres of a surface "slime" composed of fibrils. Static pressure alone was ineffective in increasing strength. D. A. C.

**Suitability of sweet-potato starch for beater sizing of paper.** C. G. WEBER, M. B. SHAW, and M. J. O'LEARY (U.S. Bur. Stand. Misc. Publ. M150, June, 1935, 7 pp.).—The relative effects of maize, cassava, and sweet-potato starches on both the retention of starch and clay and the properties of sulphite-soda, rag sulphite, and all-rag book papers were investigated. In all papers the presence of starch improved the bursting strength and in the first two kinds it improved the clay retention. In sulphite-soda it materially increased, but in rag sulphite slightly decreased, the resistance to air-permeability. In all cases starch reduced the tear and opacity. Papers containing sweet-potato starch were as strong as the best papers containing the other starches, but generally showed superior starch and clay retention and in some cases superior resistance to air-permeability, which was assumed to be a measure of the extent to which the paper was "closed up." Accelerated ageing of sulphite-soda paper showed equal stability with all starches. D. A. C.

**Testing fibre building boards and pulp.** E. C. JAHN (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 148—153).—Some 27 existing tests employed to control the manufacture of wall, insulation, and hard-pressed boards are described. These deal with the measurement of freeness of pulp stock, and of thickness,  $d$ , strength (of various kinds), and moisture absorption of boards; they include also a no. of tests for such special properties as vermin- and fire-resistance. Some experimental data on the measurement of strength, hardness, and fire-resistance are included, the Bureau of Standards sheet machine being used for the prep. of test boards. H. A. H.

**Newsprint from 100% groundwood.** A. A. BECHTER, L. M. SADOVNIKOV, and A. O. LINEV (Zellstoff u. Papier, 1935, 15, 402—403).—Newsprint of 53 g. per sq. m. basis wt. and having a breaking length of 2270 m. was made satisfactorily at a speed of 225 m. per min., using 100% groundwood furnish. The groundwood, which at 68—72° S.-R. had a breaking length of 3500 m., contained 10—15% of refiner stock which had been treated with 5% of  $\text{NaOH}$ . D. A. C.

**Testing of newsprint with respect to printing quality.** H. H. GRANTHAM and W. URE (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 143—147).—Comparative tests on newsprint have been made, employing oil-penetration and -absorption methods. The first is believed not to give reliable indications of printing quality, since the paper is exposed to the action of a large excess of penetrating medium. The castor oil flotation test in particular is not capable of indicating variations due to calendering, and gives contradictory results with papers of different fibre composition. The drop-absorption test is very sensitive to both these variables, and is believed to show promise as a means of predicting printing behaviour. A suitable technique is described. H. A. H.

**Factors affecting the parchmentising and the properties of vulcanised fibre during its production.** F. I. KORTSCHEMKIN and M. E. POMORZEV (Zellstoff u. Papier, 1935, 15, 400—402).—Some variables in the manufacture of vulcanised fibre are investigated. Rise in temp. and increase in concn. of the  $ZnCl_2$  solution accelerate the parchmentising of the paper surface, thereby retarding the penetration of the  $ZnCl_2$ . Furthermore, increase in  $[ZnCl_2]$  increases not only the tensile strength of the fibre, but also the period of pressing required and its tendency to shrink during pressing. Immersion for 2—3 sec. in the  $ZnCl_2$  bath appeared to give the best results. Rise in temp. during pressing reduces the  $d$  of vulcanised fibre, its shrinkage, and its tensile strength, but also the pressing time required. If the pressing period is too short the fibre tends to produce creases as it leaves the press and blister during washing. The electrical properties of the fibre depend on its purity and are governed mainly by the parchmentising conditions. D. A. C.

**Penetration of papers by various oils and varnishes.** G. A. ALBERT (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 127—131).—A direct relation exists between the rate of penetration ( $P$ ) into absorbent papers of phenolic resin varnishes, and such oils as castor and sperm oil, in spite of the marked difference in their viscosities. The  $P$  of oils can therefore be employed as criteria of the ability of paper to be impregnated with varnish.  $P$  with a given varnish is inversely  $\propto$  its  $\eta$  when diluted with EtOH, but  $P$  with different types of oil or varnish is not related to their respective  $\eta$ . For papers having air-permeability vals. between 10 and 150 sec., Gurley, there is a linear relation between air permeability and  $P/T^2$ , where  $T$  is the thickness.  $H_2O$  absorption is not related to oil or varnish absorption. An apparatus for conducting penetration tests is described. H. A. H.

**Expansion and treatment of offset papers.** C. G. WEBER (Paper Mill, July 20, 1935, 16—20).—Some of the causes of misregister during multi-colour printing are investigated. Both R.H. and temp. at const. humidity affect the moisture content of paper, and consequently its dimensions. The dimensional effect is one of true expansion, and is not due to mechanical stretch during printing. The temp. effect is not a thermal one, but is due to moisture resulting from variation in v.p., i.e., the dimensions are dependent on moisture regardless of how it is controlled. The moisture content at a given R.H. may vary  $> 1\%$ , depending on the original hygrometric state of the paper. It is not sufficient to pre-condition paper to equilibrium with the printing room, since paper so conditioned expands during the first two or three printings; it is recommended to condition to a moisture content of 0.5% above that corresponding to such equilibrium. Other things being equal, chemical wood-pulp papers made with a min. of hydration and with max. fibre length in order to obtain the greatest directional difference in fibre orientation show the best printing results. Mineral-coated papers have a higher coeff. of expansion than uncoated papers. Rosin sizing affects only the rate, and not the extent, of expansion. H. A. H.

**Converting  $Na_2S$  into  $Na_2CO_3$ .**—See VII. [Fibre from] nettles.—See XVI. Hydrolysis etc. of sawdusts. Xylose from aspen wood.—See XVII. Fibre in potato flakes.—See XIX. Undeformable cellulose acetate films.—See XXI.

—See also A., Oct., 1226, Acetolysis of cellulose. 1227, Benzoylation of cellulose. 1239, Alkyl derivatives of bagasse lignin. 1259, Reagent for lignin.

## PATENTS.

**Purification of bast fibres.** F. H. SNYDER, AssT. to F. H. SNYDER, INC. (U.S.P. 1,983,008, 4.12.34. Appl., 23.1.34).—Substantially debarked bast fibres (e.g., crude pita) are cut into suitable lengths, heated with steam to about  $100^\circ$ , and digested for 1—2 hr. at about  $165^\circ$  with an aq. alkali sulphite (or sulphite-thiosulphate mixture) containing a wetting-out agent. D. A. C.

**Manufacture of alkali-cellulose.** W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 434,540, 16.3.34).—Moist cellulose pulp (25—75% of cellulose) is shredded and sprayed simultaneously or successively with alkali sulphide and alkali in the form of a fine spray, the mass being cooled to  $< 20^\circ$ . F. R. E.

**Manufacture of artificial silk, threads, sheets, ribbons, or the like.** I. G. FARBENIND. A.-G. (B.P. 434,547, 20.4.34. Ger., 20.4.33).—Bleached pulp from the  $HNO_3$  digestion of cellulosic material is converted without drying into alkali-cellulose by means of alkali and alkali sulphide solutions, treated with air or  $O_2$ , xanthated, dissolved to form a viscose containing  $> 5\%$  of cellulose, and spun in the usual way. F. R. E.

**Manufacture of artificial staple fibres.** BRIT. CELANESE, LTD. (B.P. 434,858, 14.11.34. U.S., 14.11.33).—Products of interaction (I) of higher fatty acids with polyhydric alcohols, alkylolamines, or  $NH_3$ , which are dispersible in aq. media, are added to spinning solutions of org. derivatives of cellulose (II) [3—7% of (I) on wt. of (II)]. The continuous filament obtained is readily delusted and crinkled by aq. treatment (0.2% soap solution) at  $95^\circ$ ; it may be converted into staple fibre before or after such treatment. A. W. B.

**Treatment of artificial filaments, threads, yarns, fabrics, and the like.** BRIT. CELANESE, LTD., A. MELLOR, and R. J. MANN (B.P. 434,203, 28.2.34).—The materials are treated with a solvent, swelling, or softening agent of low volatility and/or low softening power under conditions such that penetration is incomplete, and are afterwards dyed or otherwise wet-treated in rope or other folded form. F. R. E.

**Manufacture of artificial filaments, yarns, and the like.** BRIT. CELANESE, LTD., and P. F. C. SOWTER (B.P. 434,425, 1.3.34).—A solution of cellulose acetate is extruded into a coagulating bath containing  $\leq 40\%$  (43—47%) of  $COMe_2$  in a diluent having no softening action on the ester. F. R. E.

**Manufacture of artificial filaments, foils, and the like containing organic derivatives of cellulose.** BRIT. CELANESE, LTD., and P. F. C. SOWTER (B.P. 434,953, 8.3.34).—A solution of an org. cellulose derivative in a volatile solvent ( $COMe_2$ ) is extruded into an aq. coagulating medium which contains a solvent or a softening



agent for the cellulose derivative having b.p.  $> 100^\circ$  (e.g., glycol monoacetate, Et lactate) and is maintained at  $\leq$  the b.p. of the volatile solvent. F. R. E.

**After-treatment and drying of freshly spun and washed cellulose hydrate artificial silk in wound form.** BRIT. BEMBERG, LTD. (B.P. 434,320, 27.12.34. Ger., 26.1.34).—The artificial silk windings, before drying, are treated with aq. emulsions of fats and oils at  $> 70^\circ$  and preferably a little below b.p., the temp. depending on the degree of swelling of the cellulose hydrate. They are then freed from excess of adhering liquid and dried without washing. F. R. E.

**Treatment of artificial [viscose rayon] threads.** T. F. BANIGAN, ASSR. to DU PONT RAYON Co. (U.S.P. 1,979,929, 6.11.34. Appl., 12.2.30).—Purification (by treatment with aq. liquors) of tightly wound bobbins of freshly spun viscose threads is facilitated by first desulphurising them by steeping in aq.  $\text{Na}_2\text{S}$ . A previous drying of the bobbin is also beneficial. A. J. H.

**Manufacture of articles by using viscose-sponge masses.** I. G. FARBENIND. A.-G. (B.P. 435,128, 16.3.34. Ger., 17.3.33).—An uncoagulated viscose-sponge paste containing a fusible or sol. pore-forming substance is applied to a cellulose-containing support, e.g., paper, fabric, wood, which is moistened with  $\text{H}_2\text{O}$ , alkali, or viscose to assist adhesion, and is finally coagulated. F. R. E.

**Manufacture of transparent sheets or coatings [from casein].** W. W. TRIGGS. From KRAFT-PHENIX CHEESE CORP. (B.P. 434,993, 30.7.34).—A highly conc. (15%) solution of casein of  $p_H$  7.2 is filtered under high pressure to remove insol. mineral salts and other impurities, and, after addition of a plasticiser (glycerin), is treated with a deficiency of a suitable setting agent, e.g.,  $\text{CH}_2\text{O}$ , before or after coating on the base, and is finally dried. F. R. E.

**Manufacture of [gas- and fire-proof] sheeted material.** D. HAACK and R. SCHMIDT (B.P. 435,088, 18.3.35. Ger., 16.3.34).—A poison gas-proof layer of rubber is firmly united with an outer layer consisting essentially of kieselguhr (I). The latter is applied by rollers in the form of a flakey mass obtained by treatment of (I) with Na silicate and other chemicals, such as  $\text{H}_2\text{SO}_4$ ,  $\text{NH}_3$ , or  $\text{KOH}$ , or as a fabric obtained by spinning the flakey mass with or without cotton. The finished material may also be further fireproofed with  $\text{Al}_2(\text{SO}_4)_3$  and may be reinforced by thin metallic netting. F. R. E.

**Preservation of vegetable cellulosic material.** C. H. SIEVER (U.S.P. 1,983,248, 4.12.34. Appl., 6.10.30).—Wood is impregnated for a period of about 3 hr., using heat and pressure, with a 1:1 mixture of creosote and  $\text{COME}_2$  containing about 1% of a toxic substance (e.g.,  $\text{HgCl}_2$ ). D. A. C.

**Chemical pulping process.** G. A. RICHTER, ASSR. to BROWN Co. (U.S.P. 1,974,751, 25.9.34. Appl., 6.1.34).—Wood chips are impregnated with aq.  $\text{Na}_2\text{S}$ , which may contain  $\text{Na}_2\text{CO}_3$  and/or  $\text{NaOH}$ , under conditions which will not cause complete fibre liberation. The liquor is then drained and the chips are digested under heat and pressure with aq.  $\text{Na}_2\text{SO}_3$ . The spent  $\text{Na}_2\text{SO}_3$  liquor (containing  $\text{Na}_2\text{S}$  and  $\text{Na}_2\text{CO}_3$ ) may be recovered by

smelting and selectively crystallising out  $\text{Na}_2\text{CO}_3$ , which is then reconverted into  $\text{Na}_2\text{SO}_3$ . D. A. C.

**Forming paper for corrugating purposes.** P. DREWSEN, ASSR. to HINDE & DAUCH PAPER Co. (U.S.P. 1,966,238, 10.7.34. Appl., 19.4.33).—Mixed paper stock, e.g., that used in the manufacture of "chip" paper, is mixed with 0.01N- $\text{NaOH}$  and passed to the usual forming devices. A. R. P.

**Maturing of paper.** STURTEVANT ENG. Co., LTD., and W. ARDILL (B.P. 434,837, 4.5.34).—Paper direct from the paper-machine calenders is both passed over cooling cylinders and reeled in a closed chamber into which conditioned air is introduced. D. A. C.

**Safety papers.** H. A. SCHOELLER GES.M.B.H. (B.P. 434,867, 1.2.35. Ger., 8.2.34).—Compounds having bright colour reactions, e.g., Ag or Pb salts with S, sulphides, or chromates, or Fe salts with tannic or gallotannic acid, are incorporated in two separate layers of paper which are then joined together with an intermediate protective layer of starch, animal size, casein, etc. D. A. C.

**[Manufacture of] rubber-impregnated fibrous sheet material.** S. B. NEILEY, ASSR. to DEWEY & ALMY CHEM. Co. (U.S.P. 1,978,385, 23.10.34. Appl., 29.4.33).—A highly absorptive, yet strong, paper is made from a mixture of long- and short-fibred pulps which is sheeted and then impregnated with rubber latex. A. J. H.

**Feeding of [paper-mill] black liquor to a smelting furnace.** A. G. KERNIN, ASSR. to MOSINEE PAPER MILLS Co. (U.S.P. 1,985,504, 25.12.34. Appl., 9.1.32).—Air and  $\text{Na}_2\text{SO}_4$  are first mixed and directed towards the furnace, and the black liquor is sprayed into the stream immediately before entry therein. B. M. V.

**[Self-supporting winding in] manufacture of artificial threads and the like.** I. G. FARBENIND. A.-G. (B.P. 434,881, 9.3.34. Ger., 9.3.33).

**Plaster board.**—See IX. **Decorative sheet material.** Articles from cellulose derivatives.—See XIII. **Paper-mill wastes.**—See XXIII.

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

**Loss of weight in bleaching [cotton] knitted goods.** ANON. (Text. World, 1935, 85, 1866).—Records over 15 years covering the treatment of 35 million lb. show the losses for kier-boiled and Cl-bleached, and scoured and  $\text{H}_2\text{O}_2$ -bleached, goods to be 6 and 5%, respectively. A. J. H.

**Problem of lime soap in textile treatment [scouring].** A. FOULON (Allgem. Oel- u. Fett-Ztg., 1935, 32, 363—365).—The advantages of  $(\text{NaPO}_3)_6$  as a  $\text{H}_2\text{O}$ -softener and for re-dissolving pptd. Ca soaps in wash-waters etc. are stressed. E. L.

**[Finishes for] textiles, and the newer synthetic organic chemicals.** B. A. HAROLD (Amer. Dyestuff Rep., 1935, 24, 543—546).—Production of special finishes by application of synthetic rubbers and resins are described. A. J. H.

**Protective coatings for gas-cell fabrics.**—See V.

## PATENTS.

**Treatment of textile goods and the like with liquids.** A. MASSUE (B.P. 434,379, 8.6.34).—Of two co-axial rotating containers the inner, perforated, one contains the materials and the outer the liquid. Treatment is thus carried out under high pressure (centrifugal) without circulation of the liquid. F. R. E.

**Bleaching of vegetable fibres.** B. LAPORTE, LTD., and I. E. WEBER (B.P. 434,599, 5.3.34).—Addition of  $\text{HPO}_3$  or its salts to peroxide bleaching baths, with or without addition of alkali, e.g., Na silicate, is claimed to give better and clearer whites. A. W. B.

**Stripping of dyestuffs.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 434,810, 3.3.34).—Fabrics are practically freed from vat, azo, or basic dyes by treatment with  $\text{SO}_3\text{H}$ -free sulphonium or phosphonium salts containing a radical  $\leftarrow \text{C}_6$ , e.g.,  $\text{C}_{16}\text{H}_{33}\text{Me}_2\cdot\text{S}\cdot\text{SO}_4\text{Me}$ ,  $\text{C}_{12}\text{H}_{25}\text{Me}_3\cdot\text{PBr}$ , in 0.05–0.5% aq. solution in presence of alkali and, if desired, reducing agents, e.g.,  $\text{Na}_2\text{S}_2\text{O}_4$ , at 50–100°. Addition also of wetting, dispersing, or washing agents or protective colloids, e.g.,  $\text{C}_{16}\text{H}_{33}\cdot\text{O}\cdot\text{SO}_3\text{Na}$ , condensation products of  $(\text{CH}_2)_2\text{O}$  with compounds of high mol. wt., is described but not claimed. A. W. B.

**Treatment of dyeings.** DEUTS. HYDRIERWERKE A.-G. (B.P. 434,911, 19.12.34. Ger., 19.12.33).—Dyed fabrics are after-treated with aq. solutions of quaternary  $\text{NH}_4$  salts (I), containing a radical  $\leftarrow \text{C}_{10}$ , derived from saturated *tert.*-amines and  $\alpha$ -halogeno-ethers (cf. B.P. 394,196; B., 1933, 823), e.g., the product from  $\text{C}_{18}\text{H}_{37}\cdot\text{O}\cdot\text{CH}_2\text{Cl}$  and  $\text{NMe}_3$ ; washing fastness is increased. This process is superior to those of B.P. 390,553 and 398,175 (B., 1933, 667, 961) owing to the great stability of (I). A. W. B.

**Textile printing.** IMPERIAL CHEM. INDUSTRIES, LTD., and A. WORMALD (B.P. 435,111, 14.3.34).—White resist styles are obtained on cellulosic (cotton) material by local application of one or more of the following: potash, chrome, or  $\text{Fe}^{\text{II}}\text{NH}_4$  alum,  $\text{Al}_2(\text{SO}_4)_3$ ,  $\text{Al}(\text{CNS})_3$ ,  $\text{SnCl}_2$ , or  $\text{Sn}(\text{C}_2\text{O}_4)_2$ , followed by drying and printing or padding with sulphuric esters of leuco-vat dyes having affinity for cotton and developing the colour. A. W. B.

**Manufacture of printing pastes for textile materials.** E. I. DU PONT DE NEMOURS & Co. (B.P. 434,736, 8.3.34. U.S., 8.3.33).—Yellow or orange vat dyes having poor printing properties (e.g., 1:5-dibenzamidoanthraquinone) are improved by admixture with a 1:8-diacylamidoanthraquinone of similar shade. H. A. P.

**Treatment of cellulose esters in alkaline liquors.** I. G. FARBENIND. A.-G. (B.P. 435,129, 16.3.34. Ger., 25.3.33).—Saponification of the esters in hot alkaline treatment (dyeing) baths, leading to, e.g., dyeing of the effect threads in mixed fabrics and necessitating absence of alkali and low-temp. dyeing, is inhibited by presence of glycerin or its salts. A. W. B.

**Production of coated fabrics.** M. G. THOMSON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 434,359, 30.1.34).— $(\text{C}_6\text{H}_4\text{Me})_3\text{PO}_4$  (I), brominated in the nucleus (to 27–30.5% Br), is used as a softening agent for nitrocellulose (containing 10.5–10.8% N) compositions; vegetable oils may be used in addition. The undesirable

thermoplastic properties of such compositions containing (I) are thereby reduced. A. W. B.

**Apparatus for heating liquors in the textile industry.** W. F. HOBDELL (B.P. 434,211, 28.2.34).

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

**Electrochemical purification of phosphoric acid.** Z. A. JOFA, E. B. BRUTZKUS, and V. J. VENGEROVA (J. Appl. Chem. Russ., 1935, 8, 840–847).—Excess of  $\text{Cu}^{\text{II}}$  is added to the 70% acid, and the solution electrolysed at 50°, using a Pt anode and a Cu cathode (c.d. 0.01 amp./sq. cm.). The consumption of current necessary for elimination of As and Pb is 65–86 kw.-hr. per ton of acid. R. T.

**Method for converting sodium sulphide into sodium carbonate in the recovery of soda-base sulphite [wood] pulping liquor.** P. S. BELLINGTON, G. H. CHIDESTER, and C. E. CURRAN (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 140–142).—Residual  $\text{Na}_2\text{S}$  present after calcining waste  $\text{NaHSO}_3$  pulping liquor normally forms thiosulphates, polythionates, and free S when the ash is regenerated with  $\text{SO}_2$ , such substances interfering with the normal cooking process by converting the  $\text{HSO}_3'$  into  $\text{SO}_4''$  before the pulping of the wood is complete. A process is described for converting such harmful  $\text{Na}_2\text{S}$  into  $\text{Na}_2\text{CO}_3$ , which may then be used for the prep. of fresh cooking liquor. It consists in burning the evaporated spent liquors and treating the ash with  $\text{NaHCO}_3$ . H. A. H.

**Reduction and causticising of sodium sulphate. III. Causticising with barium hydroxide.** T. OKUNO (J. Soc. Chem. Ind., Japan, 1935, 38, 421–425 B; cf. A., 1935, 703).—Theoretical and practical data are recorded for the reactions  $\text{BaSO}_4 + 4\text{CO} \rightarrow \text{BaS} + 4\text{CO}_2$ ,  $\text{BaS} + \text{CuO} + \text{H}_2\text{O} \rightarrow \text{Ba}(\text{OH})_2 + \text{CuS}$ , and  $\text{Ba}(\text{OH})_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{NaOH}$ . The thermodynamics of the reactions are discussed. J. A. S.

**Effect of admixtures to ammonia-air mixtures on corrosion of platinum gauze.** I. E. ADADUROV and P. D. DIDENKO (J. Appl. Chem. Russ., 1935, 8, 823–832).—Corrosion of Pt gauze is ascribed to formation of volatile Pt–H alloys, and is intensified by adding  $\text{H}_2$ ,  $\text{O}_2$ ,  $\text{H}_2\text{O}$ , or CO to the reaction mixture, owing to higher contact temp., or diminished by  $\text{CO}_2$  or oxides of N. R. T.

**Preparation of sodium perchlorate by electrolysis.** A. F. SAGAJDITSCHNUI, M. I. VASILENKO, and A. O. SKIRSTIMONSKI (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 19, 57–60).—A review. CH. ABS. (e)

**Preparation of potassium persulphate by electrolysis.** E. K. HELIGREN (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 19, 12–23).—The electrolyte for producing  $\text{K}_2\text{S}_2\text{O}_8$  (I) contains 575 g. of  $(\text{NH}_4)_2\text{SO}_4$  and 2 g. of  $\text{K}_2\text{Cr}_2\text{O}_7$  per litre, the latter preventing disintegration of the cathode. Periodic additions of  $\text{KHSO}_4$  are made. The construction of a 150-amp. cell is described. The anode and cathode c.d. are 4 and 1 amp./sq. cm., respectively. Crystallisation begins at 12 g. of (I) per litre. CH. ABS. (e)

**Determination of ammonium salts.** V. TORSUEV (Kozh.-Obuvn. Prom., S.S.S.R., 1933, 12, 495).—Excess of 0.5*N*-NaOH is added, NH<sub>3</sub> boiled off, and excess of NaOH titrated with acid (phenolphthalein). In determining NH<sub>4</sub> salts in Oropon etc., the substance is extracted several times with hot H<sub>2</sub>O and filtered. The method is suitable for plant conditions.

CH. ABS. (e)

**Quantitative emission-spectrum analysis of lead and cadmium contained in zinc oxide.** A. IWAMURA (Bull. Chem. Soc. Japan, 1935, 10, 346–352).—The sensitivity of the method and the influence of other impurities thereon have been determined. R. S.

**Preparation of litharge by electrolysis.** A. O. SKIRSTIMONSKI and M. I. VASILENKO (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, 19, 60–86).—The electrolyte used in a linen-diaphragm cell was 15–20% NaClO<sub>4</sub>, the c.d. being 0.03–0.04 amp./sq. cm. Regeneration of electrolyte consisted of freeing the anolyte from Pb(ClO<sub>4</sub>)<sub>2</sub> by uniting it with the catholyte (0.3*N*-NaOH). Pb(OH)<sub>2</sub> is pptd. more rapidly on heating the solution. It is next dehydrated and changed to PbO by adding aq. NaOH and heating. An important factor in the dehydration is the presence of sol. Pb salts. NaClO<sub>4</sub> is washed out of the PbO with H<sub>2</sub>O, and the PbO is then dried at 120–200°.

CH. ABS. (e)

**Melting of cryolite.** N. S. NIKOLAEV and S. G. KOLTUPIN (Legk. Metal., 1934, 3, No. 8, 38–43).—Artificially prepared cryolite (I) shows a smaller volatilisation loss at 850° and 1000° than natural (I). Excess AlF<sub>3</sub> in artificial (I) increases volatilisation, excess NaF having little effect. Preliminary melting of artificial (I) is advisable before using it in electrolytic cells.

CH. ABS. (e)

**Rapid test for silica in hydrogen peroxide solutions.** PHILADELPHIA QUARTZ Co. (Text. World, 1935, 85, 1884).—10 g. of powdered NaF are added to > 500 c.c. of the aq. H<sub>2</sub>O<sub>2</sub> and the mixture (dissolution of NaF is incomplete) is titrated (Me-red) with 2*N*-HCl; the SiO<sub>2</sub> content is calc. from 6NaF + SiO<sub>2</sub> + 4HCl = Na<sub>2</sub>SiF<sub>6</sub> + 4NaCl + 2H<sub>2</sub>O, and corr. for the alkalinity of the aq. H<sub>2</sub>O<sub>2</sub> [determined by titration (Me-orange) with aq. HCl] and the vol. of 2*N*-HCl required to neutralise 10 g. of NaF. The end-point coloration in the SiO<sub>2</sub> titration fades rapidly at first and more slowly as the reaction nears completion.

A. J. H.

**Steels for chemical plant. Acid corrosion of technical Fe.**—See X. CO alarm.—See XXIII.

See also A., Oct., 1214, **Bleaching powder.**

#### PATENTS.

**Apparatus for the manufacture of salt.** M. J. GEARING and W. F. DOWNING, JUN., Assrs. to GEN. FOODS CORP. (U.S.P. 1,986,334, 1.1.35. Appl., 22.8.30).—A heat-recovery system, including a steam-operated prime mover, for use in connexion with an evaporator of the flash type is described. B. M. V.

**Manufacture of cyanides.** A. D. MACALLUM, Assr. to E. I. DU PONT DE NEMOURS & Co., INC. (U.S.P. 1,966,253, 10.7.34. Appl., 8.8.33).—Anhyd. HCN or HCO·NH<sub>2</sub> is passed over finely-divided Na<sub>2</sub>CO<sub>3</sub> at 420°

and the gases are treated to remove CO<sub>2</sub> and H<sub>2</sub>O before being passed over further quantities of Na<sub>2</sub>CO<sub>3</sub>.

A. R. P.

**Calcination of diatomaceous earth.** M. STOCKTON, Assr. to DIGALITE CO. (U.S.P. 1,966,362–3, 10.7.34. Appl., 29.3.34).—(A) A mixture of the finely-divided earth with a portion of the fuel required is passed down a long, inclined kiln into the far end of which are injected the hot gases produced from the burning of the remainder of the fuel, together with sufficient air to burn the fuel in the earth mixture. (B) The fuel-earth mixture is briquetted and the briquettes are fired in a vertical kiln into the bottom of which the necessary air is passed.

A. R. P.

**Production of available-chlorine compositions.** H. G. ELLEDGE and A. HIRSCH, Assrs. to DIAMOND ALKALI Co. (U.S.P. 1,966,383, 10.7.34. Appl., 13.7.31).—A solution containing 46.5% Na<sub>2</sub>SiO<sub>3</sub> (6365) is mixed with 12% NaOCl solution containing 10% of NaCl and 1% of NaOH (700 pts.) at 50° and, after cooling, the mixture is seeded with Na<sub>2</sub>SiO<sub>3</sub> crystals.

A. R. P.

**[Dust catcher for pyrites] concentrate burner.** C. A. MACDONALD, Assr. to GEN. CHEM. Co. (U.S.P. 1,985,902, 1.1.35. Appl., 5.6.31).—Hot (925–1090°) gases from the combustion of pulverised pyritic matter are passed through a vertical tubular boiler to lower their temp. to 260–315°, and then through a cyclone separator.

B. M. V.

**Paper-mill black liquor.**—See V. **Therapeutic Ca preps.**—See XX.

#### VIII.—GLASS; CERAMICS.

**Potting clays.** A. RIGBY (Trans. Ceram. Soc., 1935, 34, 381–391).—The nature, formation, winning, testing, and uses of various types of clay are reviewed.

J. A. S.

**Promotion of the drying of clay by the coagulating effect of acid.** H. H. MACEY (Trans. Ceram. Soc., 1935, 34, 396–416).—The effects of HCl on the settling of slips of 24 fireclays and brick clays were studied and correlated with the tendency of the clay to cracking during drying. The rate of settling of some clays is greatly increased by the optimum addition of acid (> 0.25%, on dry wt. of clay), whilst that of other clays is little affected. Clays which are sensitive to the acid also show a decreased tendency to crack on drying. This effect is due to the opening up of H<sub>2</sub>O capillaries in the clay, as is shown by the decrease in drying shrinkage. Some clays show a reversal of coagulation by the addition of excess of acid, with a corresponding reversal of the tendency to reduced cracking. The settling test indicates which clays will benefit by acid treatment, and determines the optimum amount of acid. The beneficial effect of acid is not nullified by any increased tendency to kiln-cracking, although there is a slight increase in firing-shrinkage. Some increase in scumming is noticeable, especially with excess of acid. The cost of acid treatment is approx. 3s. per ton of dry clay. J. A. S.

**Products of hydrothermal reaction on clayey substances.** I. S. NAGAI and T. SUZUKI (J. Soc. Chem. Ind., Japan, 1935, 38, 371–373 B).—When clay,

$\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ , is heated with  $\text{NaOH}$  (or  $\text{KOH}$ ) solution at  $375^\circ$ , a substance  $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot \text{H}_2\text{O}$  is formed which undergoes some degree of base exchange with  $\text{CaO}$ . J. A. S.

**Resistance of clays to gas penetration.** F. G. JACKSON (Bull. Amer. Ceram. Soc., 1935, 14, 298—299).—The complete removal of S and C during the oxidation period of the firing schedule is dependent on high gas-permeability of the clay. A simple apparatus for comparing permeability is described. J. A. S.

**De-airing of floor tile.** D. F. STEVENS and R. P. STEVENS (Bull. Amer. Ceram. Soc., 1935, 14, 291—293).—De-airing eliminates the necessity for die lubrication, removes lamination, increases the strength and  $d$  of the ware, and reduces the drying—but increases the firing-shrinkage. The rate of drying is less and a longer firing schedule is necessary to produce the same dark colours. The conversion of an existing pug into a de-airing machine is described. J. A. S.

**Crystal modifications of zirconia. Clear, fused zirconia produced in the sun furnace.** W. M. COHN (Trans. Electrochem. Soc., 1935, 68, 333—339).— $\text{ZrO}_2$  exists in three polymorphic modifications, viz., monoclinic (stable between  $0$ — $1000^\circ$ ), tetragonal, and trigonal, having widely differing coeffs. of expansion, which explain the cracking and disintegration often experienced with commercial  $\text{ZrO}_2$  refractories. Clear, fused  $\text{ZrO}_2$  was prepared in a sun furnace having a 100-in. mirror and producing a temp. of  $> 2700^\circ$ . It is transparent, yellowish, very hard, and highly resistant to acids and slags. S. J. G.

**Thermocouples. Drying of solid materials.**—See I. Glass-lined steel equipment.—See X. Radiation furnaces [for refractories].—See XI.

See also A., Oct., 1189, Constitution of glasses.

#### PATENTS.

**Fused preparation for glass batches.** F. C. FLINT, Assr. to HAZEL-ATLAS GLASS Co. (U.S.P. 1,986,720, 1.1.35. Appl., 1.6.33).— $\text{BaSO}_4$  and one or more alkali halides are fused together and disintegrated. B. M. V.

**Lehrs for annealing glassware.** O. MAETZ (B.P. 434,513, 11.10.34).—A conveyor of the walking-beam type is described. B. M. V.

**Tempering of plates or sheets of glass.** Soc. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CREY (B.P. 434,331, 1.2.2.35. Fr., 17.2.34).—Glass is heated in a vertical furnace comprising electric heaters with reflectors alternating with rows of nozzles for cooling fluid, whereby heating may change to chilling without time interval and without moving the glass. B. M. V.

**Manufacture of safety glass.** W. H. SIMMONS, H. TIMMS, and PLASTIC SAFEGLOSS SYND., LTD. (B.P. 434,229, 15.5.34).—A fusible vinyl acetate polymeride is dissolved in  $\text{BuOAc}$  (I), or other low-b.p. solvent, together with a high-b.p. plasticiser, e.g.,  $\text{CH}_2\text{Ph}\cdot\text{OH}$ , and spread over a glass sheet; (I) is evaporated at  $< 38^\circ$ , a second sheet is wetted with (I), applied, and the whole pressed at approx.  $65^\circ$ . S. M.

**Laminated glass.** AMER. WINDOW GLASS Co., Asses. of W. L. MONRO (B.P. 434,314, 9.11.34. U.S., 18.12.33).—One sheet of drawn glass has both surfaces fire-polished; the other has its outward face ground and polished and is preferably thicker. The safety layer should have  $n$  approx. = that of the glass. B. M. V.

**Production of non-splintering, laminated glass.** A. KÄMPFER (B.P. 434,640, 21.1.35. Ger., 23.1.34).—Evaporation of the solvent of the material of the safety layer is effected in a closed supply of air, saturated air being replaced by unsaturated (from a condenser) in controllable amounts; alternatively, or in combination, the temp. of the air is raised in steps. In an apparatus described, the increase in pressure caused by rise of temp. of the fixed mass of air regulates the air replacement. B. M. V.

**Manufacture of articles of porcelain and stoneware.** G. FUSCHI and M. KORACH (B.P. 434,494, 27.2.34).—During casting in porous moulds, the clay slip is continuously circulated to and from a storage mixer through the mould until the necessary thickness is obtained. B. M. V.

**Refractory material.** B. J. PATTON (U.S.P. 1,984,759, 18.12.34. Appl., 21.11.31).—A composition especially for the hot tops of ingot moulds comprises Cr ore 8—10, basic slag 2—5, magnesite 10—12, calcined fireclay 50—30, plastic clay 10—15, and fireclay 20—28%. B. M. V.

**Euhedral corundum crystal.** E. L. HAUMAN, Assr. to EXOLON Co. (U.S.P. 1,966,406, 10.7.33. Appl., 8.10.28. Renewed 5.12.33).—A mixture of  $\text{Al}_2\text{O}_3$  70,  $\text{SiO}_2$  25, and  $\text{MgO}$  5% is fused in an electric furnace to give a product consisting of  $\alpha$ -corundum in a glassy matrix. A. R. P.

**Manufacture of abrasive bodies.** P. VÖGELI-JAGGI, and DIAMANTSCHLEIFEREI VÖGELI & WIRZ A.-G. (B.P. 434,402, 1.4.35. Switz., 27.4.34).—The abrasive comprises, e.g., diamond particles 26, graphite 50, powdered charcoal 50,  $\text{Fe}_2\text{O}_3$  (English red or colcothar) 75 pts., bonded by a phenol-aldehyde resin. B. M. V.

#### IX.—BUILDING MATERIALS.

**[Cement-kiln] slurry rings.** II. T. YOSII (J. Soc. Chem. Ind., Japan, 1935, 38, 393—398 B; cf. B., 1935, 881).—Rings tend to form at the point where the cross-section of the kiln enlarges into the sintering zone because the greater inclination causes partly roasted meal to run ahead and fuse to the lining. It is difficult to correlate ring formation with irregular flow of the flames, but it is likely that a spindle-shaped kiln would be better in this respect. Ring formation is minimised by (a) using an inert (high- $\text{Al}_2\text{O}_3$ ) refractory having a thermal expansion differing as much as possible from that of the ring, (b) fluctuating the temp. of the kiln, which tends to crack the ring and break it away, (c) correctly regulating the temp. gradient along the kiln (by adjusting the draught, flame, and speed of rotation). J. A. S.

**Study of cement composition in relation to strength, length changes, resistance to sulphate**

waters and to freezing and thawing of mortars and concrete. H. F. GONNERMAN (Proc. Amer. Soc. Test. Mat., 1934, 34, 244—302).— $3\text{CaO}\cdot\text{SiO}_2$  (I) and  $2\text{CaO}\cdot\text{SiO}_2$  are the chief strength-giving constituents. (I) has the max. effect in increasing contraction in air and decreasing the resistance to sulphate solutions and to freezing. The resistance to 2% aq.  $\text{MgSO}_4$  was good with < 6—7% of (I); that to 2% aq.  $\text{Na}_2\text{SO}_4$  was good with < 6—10% of (I).  $\text{MgO}$  additions decreased the strength and increased the expansion in  $\text{H}_2\text{O}$ , in sulphate solutions, and when subjected to freezing and thawing. CH. ABS. (e)

**Limit of lime saturation in high-grade cements.** V. M. LEZHOEV (Tzement, 1934, 2, No. 7, 24—30).—The optimum saturation with  $\text{CaO}$  may be computed from  $S = 100 - 3.25C$  (where  $S$  = degree of saturation,  $C$  = silicate modulus). The limits of saturation of high-grade cements must be:  $S_{\text{max.}} = 102 - 3.5C$ ;  $S_{\text{min.}} = 93 - 3.0C$ . CH. ABS. (e)

**Corrosion of Portland cement by water.** E. B. R. PRIDEAUX and B. G. LIMMER (J.S.C.I., 1935, 54, 348—354r).—Extraction of set cement by distilled  $\text{H}_2\text{O}$  yields lime solutions of various concns. up to that of saturated "fine lime," depending on the relative amounts of  $\text{H}_2\text{O}$  and cement. The amounts extracted in a few days are approx. 3 g. per litre of  $\text{H}_2\text{O}$  and sq. dm. of cement surface. The yield of lime is progressively diminished in successive extractions. The presence of sand aggregate has little effect on the initial corrosion, but subsequently diminishes the rate. Powders lost about two thirds of their lime when successively extracted with  $\text{H}_2\text{O}$  in large excess ( $\times 1000$ ), but particles of diam.  $0.5-1.0\mu$  still yielded more lime when ground. The velocities of extraction at first follow a unimol. law similar to that governing the dissolution of a homogeneous solid, but the rate falls off as surface layers become exhausted. Hard  $\text{H}_2\text{O}$  containing  $\text{Ca}$  as  $\text{Ca}(\text{HCO}_3)_2$  and  $\text{CaSO}_4$  extracted about 3 times as much lime as distilled  $\text{H}_2\text{O}$ .

**Mechanism of decay of wood.** II. E. A. RUDGE and H. LEWIS (J.S.C.I., 1935, 54, 302—305 r).—A reply to the criticism of Campbell *et al.* (B., 1935, 456). A chemical interpretation of decay is put forward, and on this the action of aq.  $\text{Ca}(\text{HCO}_3)_2$  at  $65^\circ$  is re-examined. It is shown that incipient degradation of the wood is effected, and this evidence is claimed to support the infiltration theory of decay.

**Mechanism of decay in wood.** A. G. NORMAN (Chem. & Ind., 1935, 854—855).—Rudge's conclusions (see above) are criticised. It is considered that his results do not prove that  $\text{Ca}(\text{HCO}_3)_2$  is responsible for the decay, and that they are not typical of genuine wood decay. The infiltration of  $\text{Ca}$  and  $\text{Al}$  salts may, by neutralising org. acids, assist biological decay, and there is no evidence of genuine decay under conditions in which biological decay is impossible. D. K. M.

**Ethyl alcohol from wood waste.** L. VOL-RABINOVITSCH (Lesokhim. Prom., 1933, 2, No. 5, 19—32).—Increase in pressure up to 7.5 atm. and rise of temp. up to a certain limit favours fermentation of some of the monosaccharides. The optimum amount of  $\text{H}_2\text{SO}_4$  was 2.7—5.3% of the dry fibre. The introduction of catalysts (*e.g.*, phosphates) for the biochemical process

raised the  $\text{EtOH}$  yield, which was 18—19 litres per 100 kg. of dry fibre. CH. ABS. (e)

**Present position of wood preservation.** A. RABANUS (Chem.-Ztg., 1935, 59, 801—803).—A review.

**Application of shale ash. Road tar. Luting in construction work.**—See II. **Utilising waste from AcOH manufacture. Extraction of AcOH.**—See III. **Hydrolysis of wood. Testing fibre boards.**—See V. **[Slag from] Al-Fe ores.**—See X. **Rosin from wood.**—See XIII.

## PATENTS.

**Manufacture of cement.** E. J. MAUST, Assr. to DORR Co., Inc. (U.S.P. 1,985,868, 25.12.34. Appl., 21.10.31).—In the wet process the overflow from the classifier in the grinding circuit is divided among several storage thickeners ( $S$ ) and on its way is sampled at intervals, thus enabling the original feed to be varied for future production and also determining the composition of the current thick slurry in each  $S$  so that it may be withdrawn in the right proportion to a final slurry mixer. B. M. V.

**Manufacture of cellular concrete.** J. A. RICE, Assr. to BUBBLESTONE Co. (U.S.P. 1,985,905, 1.1.35. Appl., 26.10.26).—Slurry and a foaming compound are prepared separately and then mixed by driving into each other from opposite directions in a suitable agitator. The foam producer comprises casein 100,  $\text{H}_2\text{O}$  500,  $\text{Ca}(\text{OH})_2$  25,  $\text{BzOH}$  7 pts. by wt.,  $\beta\text{-C}_{10}\text{H}_7\text{OH}$  1, and  $\text{As}_2\text{O}_3$  1 pt. by wt. B. M. V.

**Compositions for use as putty.** D. H. B. COWMAN (B.P. 434,447, 20.11.34).—Two compositions are put up in separate tins and mixed just before use: (a) whiting, linseed oil,  $\text{H}_2\text{O}$ , and  $\text{CCl}_4$ ; (b)  $\text{BaO}_2$ ,  $\text{CaO}$ ,  $\text{Pb}(\text{OAc})_2$ , whiting,  $\text{PbO}_2$ , vaseline, and  $\text{PhNO}_2$ . B. M. V.

**Manufacture of plaster board and papers used therein.** W. A. RICHARDSON (B.P. 434,778, 18.5.35).—Sufficient  $\text{CaSO}_4$ , anhyd. or hydrated, is added at an early stage in the manufacture of the paper to ensure that the finished paper shall not retard or shall accelerate the setting of the plaster of Paris which is subsequently applied to it. F. R. E.

**Manufacture of porous [acoustic-insulating] material.** H. E. HOLCOMB, Assr. to JOHNS-MANVILLE CORP. (U.S.P. 1,985,994, 1.1.35. Appl., 13.1.32).—Nodulated fibrous material is cemented with alkaline casein or other adhesive emulsified with petrol or other insol. liquid, to form a block having  $d$  17—21 lb. per cu. ft., the voids intercommunicating with each other and with the outer surface. B. M. V.

**Preparation of road-building composition.** D. W. JOHNSTON, Assr. to FLINTKOTE Co. (U.S.P. 1,985,572, 25.12.34. Appl., 18.7.30).—An aq. bitumen emulsion is violently mixed with coarse aggregate in order to break the emulsion and coat the stone, then a finer aggregate is added, and lastly an emulsion of harder bitumen, mixing being effected carefully in order not to break the emulsion, but to leave a plastic mortar. B. M. V.

**Preservation of wood.** L. P. CURTIN and W. THORDARSON, Assrs. to WESTERN UNION TELEGRAPH

Co. (U.S.P. 1,984,254, 11.12.34. Appl., 20.7.33).—The wood is impregnated with a solution containing  $\text{As}_2\text{O}_3$  12,  $\text{Zn}(\text{OAc})_2 \cdot 3\text{H}_2\text{O}$  (I) 21.3, and glacial  $\text{AcOH}$  2.5 g. per litre, whereby  $\text{Zn}(\text{AsO}_2)_2$  (II) is deposited in the pores. Addition of a larger amount of (I) or of a Zn salt of another volatile acid accelerates deposition of (II). A. R. P.

**Building and refractory bricks or blocks.** L. E. HAMSON, and BRIXWORTH BRICK & TILE CO., LTD. (B.P. 434,127, 23.2.34).

**Rotary kilns.**—See I. Treating [road] tars.—See II. Preserving cellulosic material.—See V. Glueing.—See XV.

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

**Observations and theory on slack-wind blast-furnace operation.** F. M. RICH (Iron Age, 1935, 135, No. 9, 30—32, 38).—A comprehensive review and discussion. CH. ABS. (e)

**Metallurgical experiments with Hungarian aluminium-iron ores in crucible, open-hearth, and electric furnaces.** A. NAHOZKY (Publ. Dept. Min. Met. Palatin-Joseph Univ., 1934, 6, 120—136).—A graphite crucible furnace charged with bauxite, powdered coke, and powdered limestone gave a product similar to pig Fe. Twice as much C was used as was needed for reduction of Fe oxides. The slag was unsuitable for cement manufacture. An open-hearth furnace with a similar charge gave a slag suitable for cement. Experiments with an electric furnace were unsuccessful. CH. ABS. (e)

**Chemistry of an open-hearth heat.** I. L. H. NELSON (Blast Furnace Steel Plant, 1934, 22, 687—688, 698; 1935, 23, 126—128, 136, 150).—A comprehensive review and discussion. CH. ABS. (e)

**Determination of open-hearth slag composition.** I. N. GOFF (Blast Furnace Steel Plant, 1934, 22, 640—641, 656, 693—694).—The rapid determination of  $\text{FeO}$ ,  $\text{Fe}_2\text{O}_3$ , and  $\text{MnO}$  is described. An approx. analysis can often be made by determining the  $d$ . CH. ABS. (e)

**Spectral analysis of Magnetigorsk pig iron and slag.** J. M. TOLMATSHEV (J. Appl. Chem. Russ., 1935, 8, 926—932).—The cast Fe contains  $\approx 0.1\%$  of Ti, chiefly as  $\text{TiC}$ , together with traces of V, Cr, Co, Ni, Ca, Mg, Al, Na, Cu, and Be. The slag contains, apart from the usual constituents, Sr, Ba, Ti, Be, Cr, and V. R. T.

**Duplicating the intrinsic properties of cold-blast pig iron.** J. E. HURST (Found. Tr. J., 1935, 52, 137—138).—Chemical and mechanical properties can be closely duplicated by synthetic mixtures. CH. ABS. (e)

**Effect of copper in malleable iron.** C. H. LORIG and C. S. SMITH (Trans. Amer. Found. Assoc., 1935, 6, 211—236).—No appreciable modification of tensile and yield properties of malleable Fe occurs with  $< 0.70\%$  of Cu. Cu refines the grain and produces smaller and more numerous graphite nodules. Endurance properties are improved and galvanising or intergranular-embrittlement susceptibility is reduced. At least 3% of Cu can be taken up by the Fe. CH. ABS. (e)

**Bright normalising and deoxidising (gas pickling) of [metal] sheet and strip.** R. R. LA PELLE (Iron Age, 1935, 135, No. 7, 26—29).—An electrically heated normalising furnace and its operation are described. CH. ABS. (e)

**Composition of common cast iron for boilers.** G. SIROVICH and G. VANZETTI (Trans. Amer. Found. Assoc., 1934, 5, No. 6, 71—93).—Tests on irons of various compositions are described. Fe containing Si 2.40, total C 3.00, P 1.00, and Mn 0.50% is cheap and superior in physical properties to low-P Fe. The influence of P depends on the concn. of other elements. A lower C content counteracts the tendency of P to cause brittleness. CH. ABS. (e)

**Growth of cast iron by heating at elevated temperature.** T. KIKUTA (Kinzoku, 1934, 4, 219—223, 299—305, 327—332, 369—374, 403—408).—Data are given for the  $d$  and expansion of grey and white cast Fe after various heat-treatments. Theories of growth are discussed. CH. ABS. (e)

**Metallography of ferrite in malleable cast iron.** H. A. SCHWARTZ and C. H. JUNGE (Trans. Amer. Found. Assoc., 1934, 5, No. 6, 94—100).—An etching solution of hot conc. alkali picrate attacks the areas in completely graphitised malleable Fe which were originally cementite (C) more vigorously than those which were austenite (A). Temper-C nodules form preferentially on the A-C interfaces. The ferrite and temper-C structure is related to the original hard-Fe pattern, and persists after malleableising. CH. ABS. (e)

**Corrosion tests on a galvanised iron.** A. L. SAVVATEEV (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 21, 67—69).—Tests on the corrosion in  $\text{H}_2\text{O}$  saturated with  $\text{O}_2$  of Fe, coated with Zn under various conditions, are recorded. The resistance was greater for coatings deposited slowly at low c.d. CH. ABS. (e)

**Heat-treatment of steel.** R. T. PERCIVAL (Iron Steel Ind., 1935, 8, 221—222).—A review. CH. ABS. (e)

**Fatigue properties of patented steel wires. II. Effect of low-temperature heat-treatment.** E. T. GILL and R. GOODACRE (Iron and Steel Inst., Sept., 1935. Advance copy, No. 4, 23 pp.; cf. B., 1934, 1103).—The effect of tempering for 20 min. at 150°, 200°, 300°, and 400° of steels containing C 0.37, 0.55, 0.79, and 0.86% drawn to various reductions (R) from 25 to 90% has been examined. The limiting fatigue strength (S) is usually increased, but when R exceeds a val. which is lowered by increase of C content it may decrease. The optimum tempering temp. is usually 200°. S as high as  $\pm 44.9$  tons/sq. in. was obtained on unpolished wires free from decarburisation. The effect of tempering may be explained as involving age-hardening. No direct relation has been found between other mechanical properties and S. E. H. B.

**Piobert effect in iron and soft steel.** E. W. FELL (Iron and Steel Inst., Sept., 1935. Advance copy, No. 3, 17 pp.).—The surface markings which appear on polycryst. specimens of Fe and soft steel at or near the yield point are discussed and examined by means of ruled test-pieces. E. H. B.

**Creep tests [on steels] by W. Rohn's method.** R. SCHERER and H. GEIPEL (Arch. Eisenhüttenw., 1935—6, 9, 99—102; cf. B., 1932, 801).—Sources of error in the method are discussed and means of avoiding them described. A. R. P.

**Subcutaneous effects during the scaling of steel.** R. GRIFFITHS (Iron and Steel Inst., Sept., 1935. Advance copy, No. 7, 5 pp.).—On heating in air, in vac., or in coal gas a no. of specimens of Fe and of C- and low-alloy steels, in which a cavity had been filled with FeO and plugged, oxide particles appeared around the cavity, and in vac. and coal gas they appeared also near the outside of the specimens. In air the steels were partly, and in vac. completely, decarburised. The development of the oxide particles is associated with the presence of elements (Mn, Cr, etc.) having a higher affinity than has Fe for O. E. H. B.

**Spectrophotometric determination of manganese in steel.** R. H. MÜLLER (Ind. Eng. Chem. [Anal.], 1935, 7, 361).—A criticism (cf. B., 1935, 272). E. S. H.

**[Spectrophotometric determination of manganese in steel.]** J. P. MEHLIG (Ind. Eng. Chem. [Anal.], 1935, 7, 361—362).—A reply (cf. preceding abstract). E. S. H.

**Non-metallic inclusions in steel.** G. R. BOLSOVER (Metallurgia, 1935, 12, 83—84).—To assess the quality of steel with regard to non-metallic inclusions, samples taken from the top, centre, and bottom of the ingot are forged and rolled to 1½-in. bar and then two cross-sections are examined at a magnification of 130 diam. The 60 fields examined are graded 1—4 according to the content of inclusions, and the sum of the grade nos. is taken as an index of the inclusion content of the steel. E. H. B.

**Effect of sulphur on forging steel. Report of Joint Committee on investigation of the effect of phosphorus and sulphur in steel.** H. S. RAWDON (Proc. Amer. Soc. Test. Mat., 1934, 34, 87—112).—Simple C forging steels containing residual S in increasing amounts (0.02—0.14%) were studied in the annealed and quenched-and-tempered states. Tensile strength and associated properties show a slight downward trend with increasing S; ductility, elongation, etc. show no marked changes, and resistance to impact no consistent relationship. CH. ABS. (e)

**Elastic properties of certain specimens of mild steel.** J. E. HURST (Metallurgia, 1935, 12, 85—86).—Test-rings machined from a mild-steel tube (C 0.14, Si 0.02, Mn 0.52%) have been tested according to B.S.I. Spec. No. 5004 for internal stress, modulus of elasticity, permanent set, and hysteresis, after quenching from 500°, 600°, 650°, 700°, and 750°. The test-ring quenched from 750° was free from internal stress and had no permanent set or hysteresis after stressing to 11.2 tons/sq. in. E. H. B.

**Penetration of molten white metals into stressed steels.** W. E. GOODRICH (Iron and Steel Inst., Sept., 1935. Advance copy, No. 5, 22 pp.).—In flexure tests on steel beams at 250° and 350° the presence of molten solder or bearing metal on the tension face lowers the

yield point and max. stress. Tensile tests on C-, Ni- (<1.2% Ni), Ni-Cr- (3.4—3.7% Ni, 0.2—1.1% Cr), Ni-Cr-Mo- (1.5—4% Ni, 0.1—1.4% Cr, 0.05—0.6% Mo), and austenitic (9% Ni, 4% Cr) steels showed that the resistance to penetration by white metals was usually lower at 350° than at 250° and was dictated by the microstructure rather than by the tensile properties. Temper-brittleness is without effect on the penetration. A network of ferrite is generally beneficial at 250°, but not markedly so at 350°. The alloy steels are superior to the C steels when the microstructure consists of fine sorbite with a small amount of intermingled ferrite. Fine grain is advantageous, especially at 250° and in austenitic steels. E. H. B.

**Influence of chemical composition of the steel on the sticking of thin sheet.** O. ANDRIEU (Stahl u. Eisen, 1935, 55, 925—930).—Thin steel sheet is produced by hot-rolling several thicker sheets together. Whilst the pressure, temp., variation in the rolls and the bearings etc. each contributes to the sticking together of adjacent sheets, a most important factor appears to be the chemical composition in so far as a low C and Mn content is favourable to the easy welding of surfaces in contact. W. P. R.

**Cold-work action on stainless steel.** R. SAXTON (Metallurgia, 1935, 12, 119—120).—Ni-Cr austenitic steel is annealed at 1050°, quenched in H<sub>2</sub>O, and immersed in acid prior to wire-drawing. After a reduction of 60% the material is re-annealed at 950°. Steel, WC, and diamond dies are used in succession. E. H. B.

**High-speed steel.** E. WIDDOWSON (Mech. World, 1934, 95, 358—360).—The properties of special steels (C 0.65—0.80, W 14.0—22.0, Cr 3.5—5.0, V 1.0—2.07, and Co 5.0—12.0%) are discussed. CH. ABS. (e)

**Molybdenum high-speed steels with low tungsten content. Report No. 322 of the Materials Committee of the Association of German Steel Manufacturers (Stahl u. Eisen, 1935, 55, 1001—1005).**—A comparison of 3 high-speed steels with 6—8% Mo and > 2.0% W against the more usual 20% W steel indicates that the Mo steels are somewhat variable in behaviour. Difficulties in heat-treatment are caused by the high volatility of Mo and the ease with which surface decarburisation occurs during heat-treatment of the Mo steels. W. P. R.

**Foreign raw materials in special steels for [German] chemical plant.** P. SCHAFMEISTER (Chem. Fabr., 1935, 8, 375—380).—Attempts have been made to restrict consumption of Cr, Ni, and Mo in German steels. For HNO<sub>3</sub> plant Cr steel without Ni is possible. For oil-cracking a content of 5% Cr and 0.5% Mo is sufficient. Mn is an inferior substitute for Ni, but may be used in some cases. Economy can be obtained by using Fe apparatus plated with special steel and by replacing castings by welded units. C. I.

**Prevention of corrosion in gas condensers.** J. A. KORANY and E. M. BLISS (Gas Age-Rec., 1935, 75, 33—34).—Condenser corrosion was reduced 98.8% by making the system cathodic with the use of 5 amp. d.c. per 1000 cu. ft. of cooling surface. The anodes were soft-Fe bars near the side walls. CH. ABS. (e)

**Corrosion of petroleum-distillation equipment and its prevention.** S. M. SILAKOV (Groz. Neft., 1934, 4, No. 8, 35—41).—A discussion. CH. ABS. (e)

**Cathodic protection of pipe-lines from soil corrosion.** S. EWING (Nat. Gas, 1935, 16, No. 3, 5—10).—A discussion. CH. ABS. (e)

**Use and evaluation of alloyed steel tubes for manufacture of petroleum.** K. BISCHOFF and W. JAMM (Oel u. Kohle, 1935, 11, 658—662).—The development of special alloy Cr steels resistant to corrosion, shock, etc. (e.g., with Cu, Mo, Ni) for use in the petroleum industry is summarised. C. C.

**History, development, and manufacture of glass-lined steel equipment for the brewing and kindred industries.** S. W. McCANN (J. Inst. Brew., 1935, 41, 403—406).—A lecture. I. A. P.

**Corrosion of technical iron by acids in presence of sulphur dioxide and hydrogen sulphide.** V. A. KARNITZKI and N. A. GOLUBEV (J. Appl. Chem. Russ., 1935, 8, 864—871; cf. B., 1935, 633).—Augmented corrosion of Fe containers by HCl or H<sub>2</sub>SO<sub>4</sub> in presence of SO<sub>2</sub> or H<sub>2</sub>S is ascribed to local currents arising from FeS-Fe couples on the metal surface. In the case of H<sub>2</sub>SO<sub>4</sub>, the max. corrosive action of H<sub>2</sub>S or SO<sub>2</sub> is found in 30% acid. R. T.

**Corrosion of iron and steel. Report of Committee A-5.** H. E. SMITH (Proc. Amer. Soc. Test. Mat., 1934, 34, 154—156).—Tests on the corrosion of Cu-bearing sheet, total-immersion tests, and the properties of metal-coated products are reviewed. CH. ABS. (e)

**Corrosion and hot-galvanising of iron and steel.** A. B. DOVE (Wire and Wire Prod., 1934, 9, 298—302, 350).—A review and discussion. CH. ABS. (e)

**Corrosion of steel in water vapour at high temperatures and pressures.** N. N. GRATZINSKI and K. N. IVANOV (Khim. Mashinostr., 1934, No. 5, 31—33).—Tests on a steel autoclave (Si 0.116, P 0.08, S 0.05, C 0.13%) at 300—350°/80—200 atm. are described. The gas mixture used had H<sub>2</sub> 67, CO 20, CH<sub>4</sub> 4, CO<sub>2</sub> 1, and N<sub>2</sub> 8%. Cementation was almost counterbalanced by decarburisation. CH. ABS. (e)

**Corrosion in liquids. Report of Sub-Committee VII (B-3).** R. J. MCKAY (Proc. Amer. Soc. Test. Mat., 1934, 34, 222—235).—Considerable variation in the corrosive action of pickle liquors occurs, some metals showing a low rate when measured in terms of wt. loss, whereas, based on the loss of strength and ductility, the corrosion is very great. CH. ABS. (e)

**Influence of certain organic hydroxy-compounds on corrosion of iron in oxygenated salt solution.** W. S. PATTERSON and R. C. A. CULBERT (J.S.C.I., 1935, 54, 327—331 T).—The corrosion of Fe by restricted amounts of dissolved O shows firstly that at high concns. of O the process is independent of the concn., then at lower concns. the rate becomes  $\propto$  concn., and finally the rate of corrosion is dependent on the reaction between Fe and the corrosion products. Addition of glycol, glycerol, erythritol, mannitol, and sorbitol reduces the amount of corrosion. The reduction increases with the no. of OH groups in the inhibitors and is modified by their spatial arrangement within the

mol. It is suggested that the effect is associated with the adsorption of the inhibitors on the corrosion products.

**Protecting iron tanks against corrosion by chlorine during electrolysis of salt solutions.** M. V. BORODULIN and R. I. ROMANOVSKAJA (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 21, 34—35).—Fe-plate samples were placed in solutions containing 300 g. of NaCl, 0.1 g. of NaHCO<sub>3</sub>, and 0.016—0.032 g. of NaOH per litre. At 95° the loss of metal in the agitated solution was 0.79—1.03 g., and in the stationary solution was 0.04—0.10 g./sq. m./hr. CH. ABS. (e)

**Galvanic and electrolytic corrosion. Report of Sub-Committee VII (B-3).** C. L. HIPPENSTEEL (Proc. Amer. Soc. Test. Mat., 1934, 34, 236—243).—Tests are described with Fe, Cu, Ni, Sn, Al, Pb, and Zn, the factors responsible for corrosion being discussed. CH. ABS. (e)

**Determination of corrosion-resistance of chromium and chromium-nickel steels.** C. M. JOHNSON (Iron Age, 1935, 135, No. 6, 12—15, 84).—A modification of the Huey method of prolonged boiling in 65% HNO<sub>3</sub> is described. CH. ABS. (e)

**Copper stools for ingot moulds. II.** C. E. WILLIAMS and H. B. KINNEAR (Met. & Alloys, 1935, 6, 213—217).—The use of Cu instead of cast Fe for mould stools in the casting of rimmed steel ingots increases ease of stripping and life of moulds and of stools. The temp. within Cu stools is more uniform and lower. E. H. B.

**Deoxidation and degasification of yellow brass.** L. A. WARD (Trans. Amer. Found. Assoc., 1935, 6, 173—183).—Cu<sub>2</sub>O does not exist in yellow brass because of the reducing action of Zn, but a large amount of ZnO can be present in such a fine state of subdivision that it cannot be removed by skimming. The effect of retained oxides is discussed. Common deoxidisers may act more as fluidisers than as deoxidisers. Al, P, and Si increase fluidity and tend to increase grain size. The best casting procedure for degasification is to pour at as low a temp. as possible, and to use proper mould-venting. A table is given showing the effects of casting temp. and deoxidiser on the physical properties of yellow brasses. CH. ABS. (e)

**Deoxidation and degasification of red brass and bronze. Report of Committee of A.F.A. Non-Ferrous Division.** O. W. ELLIS (Trans. Amer. Found. Assoc., 1935, 6, 160—172).—O<sub>2</sub> alone cannot cause blowholes in Cu. Any Cu<sub>2</sub>O left in the melt reacts with C, the resulting gas causing unsoundness. SO<sub>2</sub> is sol. in molten Cu, and the ingot is unsound even in absence of Cu<sub>2</sub>O. H unsoundness is discussed. Addition of Sn or Zn to Cu involves a reversible reaction with Cu<sub>2</sub>O, and in presence of H<sub>2</sub> the SnO<sub>2</sub> and ZnO form steam on rejection from the solidifying melt, with consequent blowhole formation. The formation of "oxidised" red brass and the occurrence of incipient shrinkage are explained. Presence of Si or Al increases the tendency to incipient shrinkage. Methods of overcoming the presence of excessive amounts of reactive oxides in the melt are discussed. CH. ABS. (e)

**Dilatometric study of cast copper bronzes. Solid-solubility of the alloys. II.** D. UNO, S.



KATORI, and M. FUJII (Bull. Chem. Soc. Japan, 1935, 10, 397—407).—The relation between microscopical structure and dilatometric measurements has been studied. The abnormal expansion is accompanied by interdiffusion of the Cu and Sn. R. S.

**Prevention of crusting on boiler safety plugs.** H. N. BASSETT (Mech. World, 1934, 95, 275—276).—Analyses of different scales are tabulated and discussed. It is advisable to use a bronze with a min. of Zn for the body of the plug. < 1% of Cu reduces the m.p. of the Sn filling; greater amounts increase it.

CH. ABS. (e)

**Length variation of nickel on quenching.** H. G. JONES (Metallurgia, 1935, 12, 86).—Ni quenched from 525° contracts for about 10 min., then is little changed in length for some hr., and later a gradual contraction occurs. E. H. B.

**Electrical resistance alloys: why nickel-chromium so successfully serves as heating-element material.** F. P. PETERS (Trans. Electrochem. Soc., 1935, 68, 351—362).—The desirable properties required of a high-temp. metal resistor are discussed, the most important of which is that it should have a high resistance to oxidation and scaling at temp. up to 1150°, unless the metal is used in a protective atm. Oxidation resistance demands that the oxide formed (e.g., Ag<sub>2</sub>O) shall have a high dissociation pressure, or high "protectiveness," i.e., ability to hinder further oxidation of the underlying metal. To prevent scaling the coeff. of expansion of the oxide should be near that of the metal, and its  $d$  lower. All these properties are possessed pre-eminently by 80:20 Ni-Cr alloy. S. J. G.

**White gold.** P. NICOLET (Chim. et Ind., 1935, 34, 535—536).—A review of the composition of various white-Au alloys and of methods of analysis.

H. J. E.

**Use of charcoal in the non-ferrous foundry.** R. J. KEELEY (Trans. Amer. Found. Assoc., 1935, 6, 184—198).—A review. CH. ABS. (e)

**Deoxidation and degasification of non-ferrous casting alloys. General principles.** C. H. LORIG (Trans. Amer. Found. Assoc., 1935, 6, 152—159).—Sources of contamination, the removal of dissolved gases, and methods of protecting metals against the furnace atm. are discussed. CH. ABS. (e)

**Determination of stibnite sulphur in ores and minerals.** J. A. TSCHERNIKHOV and T. A. USPENSKAJA (Ind. Eng. Chem. [Anal.], 1935, 7, 309—310).—The sample is extracted with hot aq. NaOH; Al powder is added, pptg. Sb and leaving S' in solution, which is then determined by pouring the solution into a measured excess of standard I and titrating with Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. Accurate results are obtained in presence of PbS, Cu<sub>2</sub>S, HgS, and FeS<sub>2</sub>, but As<sub>2</sub>S<sub>3</sub> and free S interfere, if present. E. S. H.

**Cleaning of tinned surfaces.** E. KLIKA (Metal Clean. Finish., 1935, 7, 76).—The tarnish on tinned articles can be removed and the original lustre restored by immersing for 2—3 min. in palm oil at 150°. After draining, excess of oil is blown off with an air blast.

Another method is to immerse the preheated articles in 2% HNO<sub>3</sub> for a predetermined optimum time, rinse in kerosene oil, and dry in heated sawdust.

CH. ABS. (e)

**Viscosity and plasticity of fused slags and furnace rock.** M. P. VOLAROVITSCH (J. Phys. Chem. U.S.S.R., 1933, 4, 807—814).—A revolving-cylinder method was used, the results differing from the McCaffery and the Feild-Royster methods. The plasticity of titanous slags, produced by the fusion of titanomagnetites, arises in the beginning of the interval of crystallisation, and is connected with the primary crystal phase. Fused basalt, trachyte, and pitch show a low plasticity, this accounting for their glass-like condition. CH. ABS. (e)

**Use of the Hele-Shaw apparatus in the investigation of the flow of metals.** A. M. HERBERT and F. C. THOMPSON (Iron and Steel Inst., Sept., 1935. Advance copy, No. 8, 8 pp.).—This apparatus, in which alternate streams of red and clear glycerin are pumped through a die, has been used in investigating streamline flow; it is shown that the flow-lines yielded by this apparatus agree well with those shown by etching etc. of forgings, tubes, and wire. As, however, a metal rod passed through a die is subjected to shear, which occurs largely in the first pass and renders the metal non-isotropic, quant. use of the Hele-Shaw results can be made to provide a picture only of the deformation in the initial pass. E. H. B.

**Effect of annealing on recrystallisation of deformed aluminium wire.** M. O. KORNFELD and V. PAVLOV (Physikal. Z. Sovietunion, 1934, 6, 537—548).—Hard-drawn, polycryst. Al wire, after tensile deformation, was annealed at < 370° and recryst. at 450—500°. The linear crystallisation velocity at 450° was 0.6 mm./min. in both annealed and unannealed specimens. The incubation period (zero velocity) was much greater in the annealed wire. CH. ABS. (e)

**Action of chloride fluxes on oxides contained in aluminium.** T. HARADA (Bull. Chem. Soc. Japan, 1935, 10, 379—390).—The cleaning action of chloride fluxes is due to the mechanical removal of oxide by the liberated Cl<sub>2</sub>. N<sub>2</sub> is similarly effective. R. S.

**Production of aluminium-silicon alloys by the Dnieper Aluminium Combine.** V. N. VERIGIN (Legk. Metal., 1934, 3, No. 10, 1—9).—Kaolin (approx. 1.5% Fe<sub>2</sub>O<sub>3</sub>) and quartz sand (0.5% Fe<sub>2</sub>O<sub>3</sub>) are reduced by C in an electric furnace to silicoaluminium (Si 75, Fe 1.5%). This is alloyed with Al directly or added to electrolytic Al baths to produce silumin and other Al alloys. The consumption per ton of silicoaluminium was kaolin 1.5, quartz sand 0.9, charcoal 1.3 tons, NaCl 0.4, and graphite electrodes 0.24 ton (and 16,000—22,000 kw.-hr.). CH. ABS. (e)

**Welded aluminium bus-bars.** L. K. MILANOV (Legk. Metal., 1934, 3, No. 10, 23—27).—LiCl need not be used as a flux. A mixture of KCl 79, NaCl 16, and KHSO<sub>4</sub> 5% gave good results. On electrowelding Al containing 4% of Si with this flux the electrical conductivity and tensile strength of the weld were approx. 90% of the vals. for the base metal. CH. ABS. (e)

**Modern methods of welding.** C. H. DAVY (Inst. Chem. Eng., Preprint, Oct., 1935, 23 pp.).—Welding methods applied to the manufacture of steam-raising plant are discussed. W. P. R.

**Welding or cutting certain types of container which have held combustibles.** ANON. (Amer. Welding Soc. J., 1935, 14, 11—14).—The use of sufficient inert gas to prevent ignition of residual gas or vapour is suggested. Methods of cleaning are described.

CH. ABS. (e)

**Welding and coating with ferrosilid.** S. V. MALASCHENKO (Khim. Mashinost., 1934, No. 5, 27—30).—Ferrosilid (an Fe alloy containing Si 14—18, C 0.7—0.2, Mn 0.3, P and S < 0.1%) can be satisfactorily welded electrically. A putty with chalk 80,  $Al_2O_3$  10, and borax 5% was used in welding with a.c.

CH. ABS. (e)

**Energetic relations in the electrodes of a metal arc (direct-current welding arc).** A. VON ENGEL (Wiss. Veröff. Siemens-Werk., 1935, 14, 38—52). W. R. A.

**Magnetic properties of electrolytically-produced iron sheets. Effects of grain size, thickness, and additions of arsenic.** O. DAHL, F. PAWLEK, and J. PFAFFENBERGER (Arch. Eisenhüttenw., 1935—6, 9, 103—112).—Electrolytic Fe which has been annealed at 900—1000° in vac. to remove adsorbed  $H_2$  and produce recrystallisation has a Brinell hardness of about 45, a high magnetic induction, and a low coercivity and hysteresis, and is practically insensitive to mechanical stresses and ageing phenomena; on the other hand, it has a high watt loss when used in transformers. The coercivity and hysteresis decrease with increasing thickness of sheet and with increase in grain size, but the watt loss is unaffected. The introduction of 0.5—1% As by cementation and diffusion has little effect on the magnetic properties, but considerably reduces the watt loss. Introduction of other elements during the electrolytic production of the Fe has no beneficial action.

A. R. P.

**Analysis of plating solutions and deposits.** W. R. MEYER (Metal Clean. Finish., 1935, 7, 61—64, 68).—A crit. review of recently developed methods.

CH. ABS. (e)

**Copper-plating of iron at high current densities.** N. P. LAPIN, V. N. CHARLAMOV, and G. S. GONIEV (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 21, 46—56).—Thick Cu coatings on Fe were obtained from a  $Cu(OAc)_2$  bath with an anode c.d. of 5 amp./sq. dm. A higher c.d. gave a coarse cryst. deposit. The min. Cu thickness for protection against corrosion by aq. NaCl and AcOH of Cu-coated, hot-tinned Fe plates was 0.04 mm. Fe samples coated with Cu when placed in an acid Cu cell ( $CuSO_4$  250 g.,  $H_2SO_4$  75 g. per litre of  $H_2O$ , mechanically stirred) gave fine cryst. Cu deposits at 5—18 amp./sq. dm. The appearance of the deposit was improved by addition of 1 g. of  $C_6H_4(OH)SO_3H$  per litre. The deposition of 0.15-mm. thick Cu coatings, from a Hull and Blum cell, on top of a cyanide Cu flash-coat gave adherent, but coarsely cryst., deposits.

CH. ABS. (e)

**Deposition of metallic copper on antique silver coins during electrolytic cleaning and a method for**

**its removal.** E. R. CALEY (Tech. Studies Field Fine Arts, 1935, 3, 123—132).—The coin is immersed for 5—10 min. in 5% aq.  $AgNO_3$  and turned at frequent intervals. It is washed in  $H_2O$ , rubbed with moist sea-sand or a brush, and polished. For Ag coins with incrustations containing considerable Cu, only electrolysis in alkali cyanide solution is effective.

CH. ABS. (e)

**Improvement in the quality of tinplate by superimposed electrodeposition of tin.** A. W. HOTHERSALL and W. N. BRADSHAW (J.S.C.I., 1935, 54, 320—326t).—An investigation of Macnaughtan's process (B.P. 417,411; B., 1935, 157) confirmed that the porosity of Sn coatings on steel formed by hot-dipping (e.g., tinplate) can be considerably reduced or even eliminated by electrodeposition of a small thickness of Sn from the Na stannate bath. Average porosity figures for tinplate, quality 1 lb. 8 oz. of Sn per base box (16.8 g. per sq. m.), were (in pores per sq. dm.) 1000, 135, 44, 30, 5, 0 when the amount of Sn added by plating was nil, 0.25, 1.0, 2.0, 4.0, and 8.0 lb. per base box, respectively. Acid baths were not effective. The severe local porosity produced at bends and folds during fabrication of tinplate was greatly reduced, especially when electrodeposition was carried out after fabrication. The process was most effective when the tinplate has been thoroughly cleaned and when electrodeposition was carried out at low c.d. Good results were obtained by cleaning with  $C_2H_5Cl$  followed by deposition at 15 amp. per sq. ft. (deposition of 0.25 lb. of Sn per base box required 1.3 min.). The composite coating could be polished without impairing its protective val.

**Comparative study of various electro-galvanising solutions and the properties of the zinc coatings obtained.** N. P. LAPIN, E. T. VILIAMOVICH, and M. V. DMITRIEVA (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 21, 56—67).—Results with the following baths are compared: (1)  $ZnSO_4 \cdot 7H_2O$  (I) 200 g.,  $Na_2SO_4 \cdot 10H_2O$  (II) 70 g., potash alum (III) 30 g.,  $H_2O$  1 litre; (2) (I) 3,  $H_3BO_3$  1 (II) 1—2%, (III) 2,  $Na_2S_2O_8$  0.1; (3) (I) 360 g.,  $NH_4Cl$  30 g.,  $NaOAc \cdot 3H_2O$  120 g.,  $H_2O$  1 litre; (4)  $ZnO$  45 g.,  $NaCN$  75 g.,  $NaOH$  15 g.,  $H_2O$  1 litre; (5) (I) 250 g.,  $MgSO_4 \cdot 7H_2O$  45 g.,  $H_3BO_3$  45 g.,  $H_2O$  1 litre, + a little liquorice-root extract. Optimum results were obtained with (4) or (5) on a sample with a Zn undercoat from a cyanide bath. CH. ABS. (e)

**Detection of unsound spots in zinc coatings on steel.** G. GARRE (Arch. Eisenhüttenw., 1935—6, 9, 91—94).—Porosity of Zn coatings can be detected by immersing the metal in aq.  $K_3Fe(CN)_6$  containing  $H_2O_2$  and  $H_2C_2O_4$ , a blue colour indicating spots where the Fe is exposed; or in 0.001—0.004N- $KMnO_4$ , a brown colour indicating exposed Fe. A much more certain and rapid method of detecting exposed Fe consists in making the metal the anode in a solution containing  $K_4Fe(CN)_6$  40 and  $MgSO_4$  2 g. per litre, using current from a 4-volt accumulator; pores and fissures which are revealed only after a 24-hr. salt-spray test are indicated by blue spots or lines within a few sec.

A. R. P.

**Electrodeposition of zinc from acid solutions.** H. KIYOTA (Bull. Chem. Soc. Japan, 1935, 10, 353—

354).—A cryst. deposit is obtained with an electrolyte containing  $ZnSO_4$ ,  $AcOH$ , and  $NaOAc$ , using a low c.d. A method for the electrolytic determination of Zn is outlined. R. S.

**Influence of bath concentration on chromium [plate] hardness.** R. J. PIERSON (Metal Clean. Finish., 1935, 7, 73—76; cf. B., 1935, 554).—The optimum  $[CrO_3]$  for hard Cr-plating was 250 g. per litre when the bath was operated with a sulphate content of 2.5 g. per litre and an equilibrium val. of  $Cr^{III}$ , as maintained with Pb anodes, at 46°. This concn. also gives the max. deposition rate for a given c.d. CH. ABS. (e)

**Modified Betts process yields refined lead bullion.** T. E. HARPER, JUN., and G. REINBERG (Eng. Min. J., 1935, 136, 119—120).—In a new electrolytic Pb plant the Betts process was modified by limiting the corrosion period of the anode, and by recovering by countercurrent dip-washing the conc. fluosilicate solution residue in the pores of the slime blanket.

CH. ABS. (e)

**Sensitive test for non-metallic impurities in metals.** K. W. FRÖHLICH (Angew. Chem., 1935, 48, 624—627).—The metal specimen is used as cathode in the electrolysis of 5%  $H_2SO_4$  or 5%  $NaOH$  + 5%  $KCN$ . P, As, Sb, S, Se, and Te, combined or in solid solution, are reduced to their hydrides, and identified by the action of the gas evolved on filter-paper impregnated with  $AgNO_3$  (dry for As, or ammoniacal for P or As),  $Cd(OAc)_2$ , or  $Na_2PbO_2$  (for S), or by formation of mirrors (As, Sb). 0.001% of P, As, Sb, or S, and 1% of Se or Te, may be detected. The method may be made semi-quant. J. S. A.

**Thermocouples.**—See I. Under- $H_2O$  paints.—See XIII.

See also A., Oct., 1198, Cu-Ag, Au-Cu, Cu-Sn, Ag-Cd, and Ag-Zn alloys. 1199, Mg-Al-Cd, Fe-Ni, Al-Mg, Fe-Ta, Ni, and Pt-Fe alloys. 1200, Unstable mixed crystals. Perfect ternary solid solutions. 1202, Pt sols.

#### PATENTS.

**Separation of composite materials [Fe blast-furnace dust].** F. TSCHUDY (U.S.P. 1,984,386, 18.12.34. Appl., 4.12.28).—The dust is subjected to a first bubble flotation, carbonaceous material being floated and purified by re-treatment. Metallic vals. are then floated in a second flotation. The gas of the bubbles should be strongly and "controllably ionised." (Cf. U.S.P. 1,840,267; B., 1932, 964.) B. M. V.

**Manufacture of sponge iron.** W. D. BROWN (U.S.P. 1,984,727, 18.12.34. Appl., 29.9.31).—Fe ore is reduced by gases at 1100° in a reducing chamber (R), the greater part of the waste gases being passed through a heat exchanger (A), a gas preheater (B), and a carburator (C) to remove  $CO_2$ , back to R. Intermittently air is passed through A and part of it proceeds through C (to make gas) and is burned in B with the other part. B. M. V.

**Welding of copper.** W. C. SWIFT, Assr. to AMER. BRASS CO. (U.S.P. 1,986,303, 1.1.35. Appl., 31.3.34).—An arc  $\frac{1}{2}$ — $1\frac{1}{2}$  in. long is maintained between a negative C electrode and the positive work, the joint being fed

with metal containing a deoxidiser. The method is also applicable to alloys rich in Cu. B. M. V.

**Copper-alloy welding rod and its use.** E. L. MUNSON, Assr. to AMER. BRASS CO. (U.S.P. 1,966,260, 10.7.34. Appl., 12.5.32).—Cu or Cu-base welding rods containing  $\geq 5\%$  Ba are claimed. A. R. P.

**Pyro-electric metallurgical furnace and process [for zinc recovery from ores].** G. F. WEATON, Assr. to ST. JOSEPH LEAD CO. (U.S.P. 1,967,274, 24.7.34. Appl., 14.3.32).—A loose, porous charge of roasted Zn ore and coke is passed continuously downwards through a vertical, externally-heated column containing several series of vertical electrodes, by the aid of which a current can be passed through the charge to assist in the reduction of the ZnO. A. R. P.

**Surface treatment for zinc-base alloys.** W. C. MAGRUDER, JUN., Assr. to CARTER CARBURETOR CORP. (U.S.P. 1,967,715, 24.7.34. Appl., 2.6.33).—The articles are immersed in a solution containing  $NiCl_2$  4,  $ZnCl_2$  6,  $NH_4Cl$  0.5,  $NH_4CNS$  2, and  $K_2CrO_4$  0.5 oz. per (U.S.) gal. A. R. P.

**Deoxidation of non-ferrous metals.** W. CLAUS, Assr. to E. BRANDUS (U.S.P. 1,967,810, 24.7.34. Appl., 22.10.31. Ger., 12.5.30).—The deoxidiser consists of a compressed pellet of Zn dust, red P, and a binder. A. R. P.

**Oxidising furnace [for molybdenite].** Z. T. PARKER (U.S.P. 1,966,643, 17.7.34. Appl., 27.6.33).—The furnace comprises a horizontal cylinder (C) flattened on the bottom and arranged inside a tubular, refractory-lined shell above a fire grate, the ore being disposed on a series of superimposed trays carried on shelves in C. A. R. P.

**[Hardening] treatment of metals [gold].** H. F. FRUTH, Assr. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,966,496, 17.7.34. Appl., 10.12.30).—The Au is made an electrode in a cathode-sputtering device and a high voltage is applied to it to produce a corona discharge which hardens the metal in a manner similar to cold-work. A. R. P.

**Material for removing soldering fluxes.** J. H. GRAVELL, Assr. to AMER. CHEM. PAINT CO. (U.S.P. 1,966,203, 10.7.34. Appl., 26.3.32).—The article is washed with a solution containing a salt of a sulphonated aromatic hydrocarbon having a  $Pr^8$  group attached to the nucleus, e.g., "Neomerpin" 4 and  $Na_3PO_4$  cryst. 96% dissolved in  $H_2O$  (8 oz. per gal.). A. R. P.

**Metallic composition.** W. J. HARSHAW, Assr. to HARSHAW CHEM. CO. (U.S.P. 1,986,197, 1.1.35. Appl., 10.3.32).—Metallic powder is electroplated with another metal and the product, after washing, is compressed and heated to form an alloy. By a repetition of the process a quadruple alloy may be formed. B. M. V.

**Apparatus for use with acid cleaning equipment.** C. E. SMITH, Assr. to DUPLATE CORP. (U.S.P. 1,984,899, 18.12.34. Appl., 17.2.34).—In a tank containing conc.  $H_2SO_4$  is suspended a positive electrode comprising plates alternately of (1) Cu, Pb, Sn, or Zn and (2) Cr, Fe, Ni, or alloy thereof, the tank being the negative electrode. B. M. V.

**Coating of [iron] articles [with rubber].** R. K. LEE, Assr. to CHRYSLER CORP. (U.S.P. 1,967,031, 17.7.34. Appl., 22.11.30).—The article is heated inductively alternately in a vulcanising bath and in air until the rubber coating is sufficiently thick. A. R. P.

**Manufacture of chromium-plating bath.** E. SOHN and E. D. MEANOR, Assrs. to STANDARD SANITARY MFG. Co. (U.S.P. 1,967,789, 24.7.34. Appl., 10.7.33).—The bath contains  $\text{CrO}_3$  450–1350,  $\text{Na}_2\text{S}_2\text{O}_8$  1–10, and  $\text{NaBO}_3$  1–56 g. per (U.S.) gal. A. R. P.

**Chromium plating.** H. MAHLSTEDT, Assr. to UNITED CHROMIUM, INC. (U.S.P. 1,967,716, 24.7.34. Appl., 9.1.32).—The bath contains 40%  $\text{CrO}_3$  and 0.4%  $\text{SO}_4^{--}$  and is operated at  $> 45^\circ$  ( $55^\circ$ ) at 2.25 amp. per sq. in. to obtain bright plates with min. porosity. A. R. P.

**Heat-treating furnaces. Sealing metal cans.**—See I. **Corrosion-inhibiting lubricants.**—See II. **Electrometallurgical furnaces. Welding electrodes.**—See XI. **Anticorrosion coating.**—See XIII.

### XI.—ELECTROTECHNICS.

**Graphite-resistor radiation furnaces and their applications to high temperatures.** H. GEORGE (Trans. Electrochem. Soc., 1935, 68, 317–322).—A cylindrical furnace which may be rocked or revolved about its longitudinal axis is heated by means of one or more graphite rods placed approx. along the axis. Refractories such as thoria can be melted without C contamination by revolving the furnace at high speed, when the charge itself then acts as a lining. W. P. R.

**Installation and maintenance of thermoelectric pyrometers.** II. G. H. BARKER (Metallurgia, 1935, 12, 87–89, 121–122; cf. B., 1935, 721).—The composition of thermocouple wires and protecting sheaths, the use of compensating leads, calibration, and the use of non-optical radiation pyrometers are discussed. E. H. B.

**Effect of temperature and rate of discharge on capacity of lead-acid storage batteries.** M. F. CHUBB and H. R. HARNER (Trans. Electrochem. Soc., 1935, 68, 341–349).—A series of curves are given for the range  $-18^\circ$  to  $38^\circ$ , relating the capacity of Pb storage batteries, of the starting, lighting, and ignition type, with the rate of discharge. With their aid it is possible to predict the capacity for a specified discharge time and temp., given results of a test carried out at any other time and temp. S. J. G.

**Tests of non-graphitic linings [for the Hall cell].** L. K. MILANOV and E. M. SHVARTZMAN (Legk. Metal., 1934, 3, No. 10, 16–23).—A 6000-amp. cell lined with magnesite had an 89% efficiency, compared with 70% for a cell lined with graphite. The heat losses through the walls were decreased by 10%. No Mg entered the Al and no accumulation of  $\text{MgO}$  in the electrolyte occurred. After a 6 months' run, only about 10% of the lining was destroyed. A corundum lining gave poor results and was destroyed in 5 months. CH. ABS. (e)

**Relationships of service characteristics of dry cells.** H. E. LAWSON (Trans. Electrochem. Soc., 1935, 68, 363–380).—The capacity of commercial Leclanché

dry cells is a fairly well-defined function of the length and diam. of the depolarising core, and the capacities of individual cells are related to the rate of discharge for either continuous or intermittent service. Methods of estimating the capacity to any required end-point voltage are discussed. The effects of temp. and of age on cell capacity may be estimated from certain rapid-discharge characteristics. S. J. G.

**Manufacture of acetylene by the electric arc in liquid hydrocarbons.** GOBERT (J. Acetylene, 1934, No. 92, 948–950; Chim. et Ind., 1935, 33, 103).—Heavy oils were circulated continuously through a furnace, the gas produced containing  $\text{H}_2$  35–40,  $\text{C}_2\text{H}_2$  35–40,  $\text{C}_2\text{H}_4$  derivatives 5–10%, and some  $\text{CH}_4$  and  $\text{N}_2$ . The  $\text{C}_2\text{H}_2$  may be separated by dissolving in  $\text{H}_2\text{O}$  under pressure. 1 cu. m. of gas (40%  $\text{C}_2\text{H}_2$ ) required 800 g. of oil and 3.5 kw.-hr. CH. ABS. (e)

**Investigation of conditions governing formation of a layer of tungsten nitride by the method of contact potentials.** I. L. SOKOLSKAJA (J. Exp. Theor. Phys. U.S.S.R., 1934, 4, 613–619).—The formation of nitride layers on a cylindrical anode when a W filament was heated in a  $\text{N}_2$  atm. was studied. At  $\text{N}_2$  pressures  $> 0.5$  mm. the layer was pure W nitride (I); at lower pressures it was a mixture of W and (I). CH. ABS. (e)

**Industrial applications of electrolysis.** H. J. T. ELLINGHAM (Chem. & Ind., 1935, 895–902).—A review.

**Preventing corrosion. Ageing of [transformer] oils.**—See II. **Determining  $\text{H}_2\text{O}$  in  $\text{CO}_2$ .** Substituted naphthols.—See III. **Oxidation of aniline oil.**—See IV.  $\text{H}_3\text{PO}_4$ .  $\text{NaClO}_4$ .  $\text{K}_2\text{S}_2\text{O}_8$ .  $\text{PbO}$ . **Melting cryolite.**—See VII. **Corrosion in gas condensers and of pipe-lines. Protecting tanks. Electrolytic corrosion. Resistance alloys. Al-Si alloys. Welding. Magnetic properties of Fe sheet. Plating solutions etc. Cu on Fe and on Ag. Tinplate. Zn coatings. Cr-plate. Pb bullion. Test for impurities in metals.**—See X. **Irradiation of oils and fats.**—See XII. **Determining alkalis in soil. Comparing [H] of soils.**—See XVI. **X-Ray film. Radiography in India.**—See XXI. **CO alarm. Determining suspended solids in sewage. Effluents poisonous to animals.**—See XXIII.

See also A., 1199, **Fe-Ni electrodeposits. Magnetic properties of Ni alloys, and of Pt-Fe alloys. 1202, Pt sols. 1224, Reduction of ketones. 1232, Reduction of *m*-halogenonitrobenzenes.**

### PATENTS.

**Induction furnace.** E. F. NORTHRUP, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,986,353, 1.1.35. Appl., 21.9.31).—Methods of winding a coreless furnace to improve the inductive coupling are described. Any gaps left between turns, owing to the meeting of coils of opposite or unequal pitch, are filled by a conductor. B. M. V.

**Induction furnace with an open iron yoke.** SIEMENS & HALSKE A.-G. (B.P. 434,909, 25.10.34. Ger., 1.11.33).—The hearth lining of a polyphase induction furnace is of angular cross-section with plane walls, and

a pole of the yoke is arranged at the centre of each wall of the lining. J. S. G. T.

**Furnaces for electrolysis by the fusion process and for electrometallurgy.** L. FERRAND (B.P. 434,001, 12.1.35. Fr., 24.2.34).—Oscillating electrodes are described. If a hearth electrode is used it is formed of C blocks having steel and cast-Fe conduits for cooling-H<sub>2</sub>O embedded therein. B. M. V.

**Supplying liquid to electrolytic apparatus for decomposing water.** MASCHINENFABR. OERLIKON (B.P. 434,348, 29.5.35. Switz., 1.6.34).—The make-up liquid is stored under a pressure many times the pressure of the gas in the cells, and is fed under control only of the level of the liquid in the cells, by means of a float which makes and breaks the circuit of an electromagnet, which in turn interrupts the feed at intervals. B. M. V.

**Welding electrode [for steel].** J. B. AUSTIN, Assr. to UNA WELDING, INC. (U.S.P. 1,967,491, 24.7.34. Appl., 13.11.31).—The electrode consists of a steel rod containing C 0.13—0.25, Mn 0.4—0.8, and Ni 0.5—7% and coated with a pasty mixture of 80% ferromanganese 74, ferrosilicon 0.35, coke dust 2, cellulose-base lacquer 21.3, and solvent 2.37%. A. R. P.

**[Iron] welding electrode.** G. E. DOAN (U.S.P. 1,967,872, 24.7.34. Appl., 14.7.30).—A small quantity of Te, Bi, Ga, Hg, Pb, Sn, Zn, or preferably Sb is alloyed with the Fe or incorporated in the coating to reduce the surface tension and allow the drops of molten metal to fall more freely. A. R. P.

**Production of active metals [in electron-discharge devices].** J. W. MARDEN and E. A. LEDERER, Assrs. to WESTINGHOUSE LAMP Co. (U.S.P. 1,966,254, 10.7.34. Appl., 9.9.27. Renewed 13.9.33).—Cs is introduced into electron-discharge devices as a mixture of CsMnO<sub>4</sub> (1 pt.) and finely-divided Si (3 pts.) with a small amount of Al, which, after evacuation of the device, is electrically heated to produce an exothermic reaction which liberates Cs vapour. A. R. P.

**Preparation of [emission] cathode.** D. V. EDWARDS and E. K. SMITH, Assrs. to ELECTRONS, INC. (U.S.P. 1,985,855, 25.12.34. Appl., 30.7.32).—A Ni core is coated with BaCO<sub>3</sub> and heated in O<sub>2</sub> until white BaO forms (800°), again heated until the BaO blackens, melts (900—1000°), and dissolves in the Ni, and is finally heated at 1100° in vac. until the whole acquires a metallic lustre resembling that of Ni. B. M. V.

**Photoelectric tube.** J. H. DE BOER and M. C. TEVES, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 1,966,236, 10.7.34. Appl., 28.11.31. Ger., 6.12.30).—The cathode consists of Ag on the surface of which is a finely-divided mixture of Ag, Cs, and Cs<sub>2</sub>O covered with a thin film of Cs. A. R. P.

**Production of photoelectric tubes.** H. C. RENTSCHLER and D. E. HENRY, Assrs. to WESTINGHOUSE LAMP Co. (U.S.P. 1,966,219—20, 10.7.34. Appl., [A] 28.2.29, [B] 18.4.31).—Claim is made for means for removing excess Cs by means of substances with which it forms stable compounds; e.g., the lower part of the stem carrying the anode is made of Pb glass which absorbs Cs vapour when the tube is evacuated. A. R. P.

**Vac. distillation. Apparatus for gas reactions.**—See I. Insulating compositions.—See II. Welding Cu. Cu-alloy welding rod. Metallic composition. Acid cleaning equipment. Pyro-electric furnace. Hardening Au. Coating Fe with rubber. Cr-plate.—See X. Antirachitic substances.—See XX.

## XII.—FATS; OILS; WAXES.

**Rate of formation of fully-saturated glycerides during hydrogenation of different natural fats.** T. P. HILDITCH and H. PAUL (J.S.C.I., 1935, 54, 336—338 T).—The rate of formation of fully-saturated glycerides during partial hydrogenation of a series of five vegetable fats and pig-back fat has been compared graphically. In the vegetable fats fully-saturated glycerides are more rapidly produced, for a given amount of hydrogenation, when the original fat contained more saturated (mainly palmitic) acid in combination, i.e., contained higher proportions of mono-saturated (palmito)-diunsaturated glycerides. The pig-back fat does not align itself with the vegetable fats when the proportion of fully-saturated glycerides is plotted against the amount of saturated acids produced by catalytic hydrogenation. If, however, the stearic acid present in the original pig fat is taken into account as already having been produced by saturation of oleo-glycerides, the resulting graph falls into line with those for the vegetable fats; this further supports the view that the palmitostearo-glycerides in animal depôt fats have resulted from a partial reduction of preformed palmito-oleo-glycerides.

**Kaufmann's thiocyanogen value of Indian butter fat (ghee).** U. D. BUDHALAKOTI and K. C. MUKHERJI (J. Indian Chem. Soc., 1935, 12, 455—458).—The linoleic acid content of authenticated samples of butter fat, as determined by means of Kaufmann's CNS and I vals., is fairly const. (3.5—5.4%) (cf. B., 1932, 1102). The I vals. vary between 30 and 50. H. G. M.

**Improved Swift fat-stability apparatus for approximating the end of the induction period.** V. C. STEBNITZ and H. H. SOMMER (Oil & Soap, 1935, 12, 201—202).—If the vapours from each test-sample are bubbled through a suitable amount (e.g., 1 c.c. for butter fat and lard) of 0.01N-NaOH containing Me-red, the colour change may be taken as an approx. indication of the end of the induction period, which is accompanied by a marked increase in the evolution of volatile acids; after the first, but before the third, indicator tube has changed colour, the samples are removed and the peroxide vals. are determined in the usual manner. E. L.

**Fractional distillation of the saturated fatty acids of highly hydrogenated [fish] oils.** S. UENO and S. MATSUDA (J. Soc. Chem. Ind., Japan, 1935, 38, 398—400 B).—Refined fish oils were hydrogenated at high pressure, the hardened oil was saponified, and the mixed fatty acids were separated by fractional distillation. In this way the relative proportions of the C<sub>22</sub> acids (*n* = 7—12) were determined; the C<sub>18</sub> acid was the most abundant in every case. E. A. H. R.

**Apparatus for fractional distillation of solid fatty acids and alcohols under reduced pressure and in superheated steam.** S. UENO (J. Soc. Chem. Ind., Japan, 1935, 38, 401—402 B).—Solidification in the condenser tube was prevented by passing hot H<sub>2</sub>O through the condenser jacket and by an electrically heated Pt or Ag wire in the inner tube. E. A. H. R.

**Determination of free hydroxyl groups in fatty acids and the higher fatty alcohols.** C. STEINER (Chem.-Ztg., 1935, 59, 795—796).—Fats are acetylated with NaOAc and Ac<sub>2</sub>O and the OAc is determined.

F. R. G.

**Apparatus for ultra-violet irradiation of oils and fats.** A. KARSTEN (Allgem. Oel- u. Fett-Ztg., 1935, 32, 358—361).—An a.-c. Hg-vapour lamp, which can be turned on by a switch without tilting, and apparatus for irradiating flowing gases or liquids are described.

E. L.

**Extraction [of oil seeds] in [Russian] practice.** R. HEUBLUM (Allgem. Oel- u. Fett-Ztg., 1935, 32, 353—358; cf. B., 1935, 639).—Works figures for quantities, times, etc. illustrate a discussion of Russian technical practice in the extraction (with light petroleum) of cottonseed etc.

E. L.

**Composition of Egyptian linseed oil.** M. A. HIMMAT (J. Oil Col. Chem. Assoc., 1935, 18, 526—529).—A cold-pressed oil had fatty acids 94.7%, acid val. 5.6, unsaponifiable matter 0.6%, I val. (Wijs) 190—192, CNS val. 113.1,  $d^{15.5}$  0.933,  $n_D^{25}$  1.481. G. H. C.

**Tobacco-seed oil.** M. N. DSHAN-PUSCHKIN (Rept. U.S.S.R. Fat and Margarine Inst., 1935, No. 2, 40—42).—The analytical data recorded point to the applicability of the oil to the paint industry.

R. T.

**Phytochemical study of the seed of the digger pine.** J. SEMB (J. Amer. Pharm. Assoc., 1935, 24, 609—613).—This seed gives to light petroleum a neutral oil, yielding on hydrolysis saturated acids (mostly palmitic and stearic) 5, oleic 50, and linoleic acid 45%.

R. S. C.

**Component fatty acids and glycerides of partly-hydrogenated rape oil.** T. P. HILDITCH and H. PAUL (J.S.C.I., 1935, 54, 331—336 r).—Rape oil, and also the Me esters prepared from the mixed fatty acids of the oil, have been submitted to progressive hydrogenation. In the mixed esters, hydrogenation of the linoleates proceeds selectively (as compared with that of the oleates), and oleate is converted into stearate somewhat more readily than erucate into behenate. In the glycerides, the selectivity of the linoleic-oleic hydrogenation is much less marked, whilst subsequently stearic and behenic glycerides appear at almost the same rate throughout. The differences in hydrogenation, as between the glycerides and the mixed esters, may be due to the configurative positions of the unsaturated radicals in combination in the glycerides. The proportions and composition of the fully-saturated glycerides produced during progressive hydrogenation of rape oil have been investigated. Tri-C<sub>18</sub> glycerides and trierucin are not present in rape oil, which conforms closely to the usual "even distribution" rule characteristic of the glyceride structure of seed fats.

Apart from about 6% of mixed palmito-oleo- (or linoleo-)erucins, the oil contained about 50% of di-C<sub>18</sub>-erucin and about 44% of mono-C<sub>18</sub>-dierucin (the C<sub>18</sub> acid being either oleic or linoleic). Both  $\alpha$ - and  $\beta$ -oleo-(linoleo-)erucins and  $\alpha$ - and  $\beta$ -eruco-dioleins (linoleins) are probably present in the oil.

**Fish oil-stand oil as substitute for linseed oil-stand oil.** G. KAEMPFE (Farben-Ztg., 1935, 40, 1009).—By a distillation process, raw fish oil yields fractions comprising lower fatty acids, aldehydes, etc. (a few %), saturated acids and acids of low degree of unsaturation (20—35%), and polymerised highly unsaturated acids (main fraction). This last material—"fish oil-stand oil"—is completely deodorised and in drying properties in conjunction with various driers it closely resembles linseed stand oil. As at present produced it is red-brown, but on the laboratory scale pale products have been obtained. Typical formulæ for its use in oleo-resinous varnishes as a substitute for or adjunct to linseed oil, tung oil, etc. are given, and this material is regarded as of definite promise in the varnish field.

S. S. W.

**Theory and practice of bleaching fatty oils.** H. ODEEN and H. D. SLOSSON (Oil & Soap, 1935, 12, 211—215).—A discussion. It is not considered necessary completely to dehydrate the oil before contact with the bleaching earth. Addition of the requisite amount of earth in one batch gives markedly better results than application of the same total quantity in successive small portions.

E. L.

**Humic substances from oleic acid. Analysis of oil emulsions.**—See II. **Lint on cottonseed.**—See V. **Oils for varnishes.**—See XIII. **Determining NaCl in butter. Beef suet.**—See XIX.

See also A., Oct., 1223, **Sardine oil. Esterification of OH-acids and polyhydric alcohols.** 1232, **Dyes from palmitic acid.** 1286—7, **Vitamins.**

PATENT.

**Distillation apparatus [for glycerin].**—See I.

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

**Composition of American wood turpentine.** G. DUPONT, (MME.) RAMBAUD, and BONICHON (Bull. Inst. Pin, 1935, 121—124).—Wood turpentine (I) can be distinguished from true turpentine by Raman spectra (given). An American (I) is shown to contain pinene 76, nopinene about 4,  $\alpha$ -8.2 and  $\gamma$ -terpinene traces, limonene 9.8, and terpinolene 2%. R. S. C.

**Composition of turpentine from fir scrape.** I. A. ARBUZOVA (J. Appl. Chem. Russ., 1935, 8, 884—888).—The turpentine contains  $\alpha$ -30,  $\beta$ -pinene 42, *l*-limonene 8.9, phellandrene 18, and higher-b.p. fractions 1.1%.

R. T.

**Use of bituminous material as under-water paints.** E. KINDSCHER (Oel u. Kohle, 1935, 11, 669—672).—The constitution and application of bituminous paints for protecting Fe, steel, and other surfaces under H<sub>2</sub>O are summarised.

C. C.

**Use of bituminous material for waterproofing against underground water, with particular reference to the construction of Berlin subways.** J.

SCHÄFER (Oel u. Kohle, 1935, 11, 672—674).—The application of bitumen as a luting material in conjunction with cardboard, concrete, metal sheets (Pb, Fe), etc. is discussed. C. C.

**Adhesion of paint materials.** K. BUSER (Farben-Ztg., 1935, 40, 1011—1012).—The sp. adhesion of individual paint raw materials is discussed, and it is considered that a material of poor inherent adhesion will produce films of satisfactory original and maintained adhesion only if the final gel structure of the dried film retains a sol of dispersion medium. The use of plasticisers in nitrocellulose and chlorinated rubber lacquers, admixture of linseed with tung oil, effect of triolein on linseed oil, and the formation of mixed (saturated and unsaturated) glycerides are discussed in this connexion. The sp. adhesion and elasticity of oil films vary inversely as the degree of unsaturation of their constituent fatty acids, but the drying time of the product has also to be borne in mind for paints. S. S. W.

**Luminescence analysis in paint and varnish investigations.** A. KUFFERATH (Farbe u. Lack, 1935, 473—474).—A general review is given of the work that has been done on the qual. examination of paint and varnish raw materials by observation of their characteristic fluorescence (and/or phosphorescence) under the ultra-violet lamp. The desirability of extending this work to a quant. basis is urged, but the inherent difficulties are pointed out. S. S. W.

**“Chalking” of titanium-white.** L. V. LUTIN and E. V. GUSJATZKAJA (J. Appl. Chem. Russ., 1935, 8, 833—839).—The “chalking” of layers of Ti-white paint is due to the action of atm. factors on the oil, catalysed by the  $TiO_2$ ; the process may be inhibited by covering the layer with a different, stable layer, not containing  $TiO_2$ , or by covering the  $TiO_2$  particles with an adsorbed layer of  $Fe(OH)_3$  or  $Al(OH)_3$  before suspending them in oil, but not by covering them with lyophile substances such as Al soaps. R. T.

**Pigment or “adulterated pigment” for oil enamel manufacture.** H. RASQUIN (Farben-Ztg., 1935, 40, 1038—1039).—Polemical with Zerr (B., 1935, 417). S. S. W.

**History of the modern printing-ink mill.** ANON. (Amer. Ink Maker, 1935, 13, No. 19, 15—18). D. R. D.

**Oils of interest in varnish technology.** H. ULRICH (Farben-Ztg., 1935, 40, 1037).—Brief general notes are given on various “modern” oils. Drying oils obtained from castor oil by known treatments and its use in conjunction with phthalic acid resins are considered. Other oils discussed are oiticica oil (as a tung oil substitute), and blown linseed, soya-bean, and fish oils. S. S. W.

**Driers and alkyds.** W. KRUMBHAAR (J. Oil Col. Chem. Assoc., 1935, 18, 294—309).—Ordinary turpentine (I) has a peroxide content equiv. to about 1 mg. of  $O_2$  per c.c. The rate of drying of varnishes increases with the peroxide content of the (I) used, but on ageing reaches a val. = that of a fresh varnish containing (I) with a peroxide content of 1 mg. per c.c. Addition

of oxidised (I) causes blue Co drier solutions to turn green, and yellow Mn solutions (less readily) to become brown, the change being completed by the equiv. of 1 mol. of  $O_2$  to 2 mols. of  $Co_2O_3$ . The change is ascribed to oxidation of the metal and is reversed by heating. Colloidal metals have no action as driers. G. H. C.

**“Frosting” of tung oil varnishes.** H. WOLFF and G. ZEDLER (Farben-Ztg., 1935, 40, 1010).—By addition of a frosting inhibitor (“Mittel 109 J”) to single and mixed tung oil varnishes, deliberately undercooked so as to produce frosting, and containing Pb-Mn and Co driers, respectively, it was shown that the effect of the inhibitor is bound up with the action of the driers, Pb-Mn counteracting and Co assisting its anti-frosting action. The advantage of the use of the inhibitor was definitely established. S. S. W.

**Bronzing lacquers.** W. VON BERG (Amer. Paint J., 1935, 19, No. 48, 21, 40—41).—Their formulation and manufacture are discussed. D. R. D.

**Extraction of rosin [from wood chips] with organic solvents.** I. V. FILIPOVITSCH (Lesokhim. Prom., 1933, 2, No. 3, 30—33; No. 5, 39—45).—Extraction of wood chips from stumps with  $C_2H_4Cl_2$ ,  $C_3H_6Cl_2$ , and  $Et_2O$  removed 20.93, 21.39, and 26.79% of rosin, respectively. CH. ABS. (e)

**Purification and standardisation of kauri gum.** J. R. HOSKING (New Zealand J. Sci. Tech., 1935, 17, 369—387).—Methods of purification and uses of the gum are discussed. Solvent processes yield a better product than does flotation. A method involving dissolution in  $C_6H_6-COMe_2$  is described. A. G. P.

**Utilisation of solidified pine pitch.** I. N. V. TUCHOVITZKI. II. Preparing rosin soap. I. G. EROSCHEVSKI (Lesokhim. Prom., 1933, 2, No. 4, 30—32, 33—37).—I. The pitch contains an average of 67.8% of rosin-like constituents. The rosin, after extraction, is inferior in softening point and colour.

II. Saponification of the above pitch yields a black viscous mass containing 4.94% of NaOH and 31.8% of incrustation, the analysis of which is recorded.

CH. ABS. (e)

**Plastics based on rubber, with special reference to Rubbone.** W. H. and H. P. STEVENS (Trans. Inst. Rubber Ind., 1935, 11, 182—196; cf. B., 1935, 600).—If rubber dissolved in white spirit containing also a little Co linoleate is aerated, e.g., at 80°, the dissolved material gradually becomes resinous and shows an increasing solubility in  $COMe_2$ . Rubbone is the resinous product obtained by aerating until a sample shows rapid sedimentation, leaving a clear supernatant solution of the oxidised material free from Co. It is a viscid, amber semi-solid of composition approx.  $(C_5H_8)_2O$ . At 100° it becomes fluid but in 24 hr. at 140° it undergoes thermo-setting and becomes insol. in white spirit; certain chemical substances accelerate this change. It is of val. for application in varnishes and as an adhesive. D. F. T.

**Evaporation rates [of coating materials].—See I. Treating solidified pitch. Drying oil from acid sludge. Analysis of oil emulsions.—See II. Solvent power of tetralin etc. Solvent recovery.—See III.**

**Penetration of papers by oils and varnishes.**—See V. PbO by electrolysis.—See VII. Fish oil-stand oil.—See XII. Effluents poisonous to animals.—See XXIII.

See also A., Oct., 1216, **Infra-red photographs of Cr compounds [on paintings].**

#### PATENTS.

**Preparation of binding agent for [chlorinated rubber] paints or lacquers.** N. V. TOT VOORTZETTING DER ZAKEN VAN PIETER SCHOEN & ZOON (B.P. 434,870, 7.2.35. Holl., 15.5.34).—A raw or polymerised drying oil, *e.g.*, stand oil, is incorporated with a mixture of chlorinated rubber and an oil-modified alkyl resin.

S. M.

**Manufacture of coating and binding agent containing rubber.** (MRS.) J. TENGLER, Assee. of J. TENGLER (B.P. 435,270, 15.3.34. Switz., 31.3.33).—A vulcanisable mixture of high I val., other than rubber (*e.g.*, a fish oil freed from stearine and polymerised and hardened by addition of a metal oxide, *e.g.*, CaO if desired, the oily constituent of a cellulose waste liquor), is vulcanised and the resultant solid product is dissolved in a hydrocarbon solvent or a hydrogenated or chlorinated solvent. Rubber is dissolved in this solution and the mixture vulcanised and brought to the desired final consistency with solvents etc.

S. S. W.

**Production of moisture- and air-tight coatings.** W. J. H. HINRICHS (B.P. 435,394, 15.3.34. Ger., 15.3.33).—The object to be protected is coated with one or more coats of rubber latex (which has been conc. by repeated centrifuging to approx. 60% of rubber, and freed from hygroscopic and chemically unstable constituents by treatment with aq. NH<sub>3</sub>), volatile matter is removed, and a cellulose ester layer applied. Alternatively, for sheet materials, two coated sheets may be joined under pressure by means of their latex coatings.

S. S. W.

**Anticorrosion coating composition.** CHEM. FABR. R. BAUMHEIER A.-G. (B.P. 435,003, 7.11.34. Ger., 16.11.33).—An adsorbent, *e.g.*, activated C, kieselguhr, containing an alkali, *e.g.*, NH<sub>3</sub>, or neutral vapour, *e.g.*, C<sub>2</sub>H<sub>2</sub>, is incorporated with a paint, varnish, or other coating composition.

S. M.

**Preparation of articles from cellulose derivatives.** B. ANDERSEN, ASSR. to CELLULOID CORP. (U.S.P. 1,982,778, 4.12.34. Appl., 12.5.32).—A relatively transparent filler, *e.g.*, colloidal Al<sub>2</sub>(OH)<sub>6</sub>, or amorphous diatomaceous SiO<sub>2</sub>, is incorporated in at least the surfaces of foils, films, etc. with a basis of cellulose derivatives, *e.g.*, the acetate, rendering the articles less tacky and eliminating manipulation difficulties due to sticking and static electricity.

S. S. W.

**Apparatus for measuring hiding power and/or opacity of light-diffusing materials.** R. F. HANSTOCK, L. A. JORDAN, and RES. ASSOC. OF BRIT. PAINT, COLOUR, & VARNISH MANUFRS. (B.P. 434,136, 12.3.34).—A wedge-shaped sample of the paint between two glass plates is compared in a flicker photometer with diffused light from the same source after passing through a calibrated diaphragm.

B. M. V.

**Manufacture of lacquers, varnishes, films, filaments, plastic masses, and the like [from cellulose esters or ethers].** DEUTS. HYDRIERWERKE A.-G. (B.P. 435,058, 13.4.34. Ger., 13.4.33).—One of the solvents or softening agents employed is a mono-ether prepared from glycerol and an aliphatic or cyclo-aliphatic alcohol containing  $\leq$  C<sub>8</sub>, *e.g.*, octyl glyceryl ether. Any free OH groups may be esterified with org. acids.

S. M.

**Printers' varnishes.** W. K. R. and C. P. E. HARTMANN (CHEM. FABR. HALLE-AMMENDORF GEBR. HARTMANN) (B.P. 434,450, 29.6.34. Ger., 20.12.33).—A small amount of an oil-swellable org. salt, *e.g.*, a soap, of the Mg, alkaline-earth, or earth-metal group, *e.g.*, Al stearate (prepared, if desired, *in situ*), is incorporated into known oleoresinous, glossy, overprint varnishes.

S. S. W.

**Non-yellowing baking enamel [containing alkyd resins].** H. H. HOPKINS and F. S. STEWART, ASSRS. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,983,460, 4.12.34. Appl., 8.3.32).—The alkyd resin employed is modified with a fatty oil having I val.  $<$  150 and hexabromide val.  $<$  10, *e.g.*, rape or cottonseed oil. The oil is preferably first incorporated with the glycerol and the product heated with *o*-C<sub>6</sub>H<sub>4</sub>(CO)<sub>2</sub>O. A Ti pigment is used which may contain small proportions of ZnO. 10 examples are given.

S. M.

**Resin from petroleum hydrocarbons.** C. A. THOMAS and W. H. CARMODY, ASSRS. to DAYTON SYNTHETIC CHEMICALS, INC. (U.S.P. 1,982,708, 4.12.34. Appl., 16.3.32; cf. B., 1932, 1126).—A petroleum unsaturated-hydrocarbon distillate (b.p.  $<$  180°) is cracked into 2 mixtures without polymerisation: (i) is rich in mono- and di-olefines, b.p. 25–50°; (ii) is rich in cyclic diolefines, b.p. 125–180°. The fractions are dried and agitated in predetermined proportions at  $<$  40° with AlCl<sub>3</sub> or other catalyst and excess of a diluent, *e.g.*, gasoline, and the product is neutralised with aq. NH<sub>3</sub>-EtOH. A resin remains dissolved in the gasoline and a white insol. polymeride is pptd.; the latter is freed from Al compounds and rendered sol. by heating in absence of air at 300°.

S. M.

**Manufacture of solid, opaque, or transparent [urea-formaldehyde] condensation products.** M. B. ROUSSET and A. V. KELLER (B.P. 434,112, 21.12.33).—A nearly neutral or slightly alkaline solution of CH<sub>2</sub>O (2.5–3.5 mols.) is allowed to react with urea (1 mol.) or derivative thereof in presence of a (monohydric) low-m.p. phenol, *e.g.*, *o*-cresol (0.15–0.5 mol.). The proportions are so chosen as to produce a gradual increase in the acidity of the mixture during the reaction.

S. M.

**Condensation products of carbohydrate derivatives.** J. V. MEIGS, ASSR. to SWEETS LABORATORIES, INC. (U.S.P. 1,982,822, 4.12.34. Appl., 26.8.29).—Glucose or other suitable carbohydrate is digested with NaOH; HCl is added to liberate the org. acids formed and the product is heated with a monohydric alcohol, *e.g.*, BuOH; H<sub>2</sub>O is distilled off and the org. ester produced extracted with a solvent. By using a polyhydric alcohol a resin is obtained.

S. M.



**Manufacture of urea-formaldehyde reaction products.** M. C. DEARING, Assr. to ECONOMY FUSE & MANUFG. CO. (U.S.P. 1,982,794—6, 4.12.34. Appl., [A] 27.8.32, [B, C] 6.9.32).—(A) A substantial amount of  $\text{CH}_2\text{O}$  is removed by distillation, dialysis, etc. from the initial sol. reaction product of urea (1 mol.) and aq.  $\text{CH}_2\text{O}$  (2 mols.), and the reaction product is pptd. by dilution with an equal vol. of  $\text{H}_2\text{O}$ . (B) Urea is caused to react with aq.  $\text{CH}_2\text{O}$ , gum acacia is added to the solution, and part of the  $\text{H}_2\text{O}$  is distilled therefrom until a solution of casting consistency is obtained. (C) Urea (1 mol.) is caused to react with aq.  $\text{CH}_2\text{O}$  (2 mols.) at  $p_{\text{H}}$  approx. 5, the solution is diluted with a relatively large vol. of dil. HCl, and further heated until a  $\text{H}_2\text{O}$ -insol. ppt. is formed. S. S. W.

**Synthetic resin composition.** S. L. M. SAUNDERS (B.P. 434,850, 13.8.34).—A phenol dialcohol (1 mol.), e.g., 2:6-dimethylol-*p*-cresol, is heated at  $\ll 100^\circ$  in presence of HCl or other acid catalyst with a phenol ( $< 2$  mols.) which may be dihydric-dinuclear, e.g., diphenylolethane. The product may be modified with a vegetable oil and/or resin acids. 8 examples are given. S. M.

**Polymerisation of vinylnaphthalene.** W. E. LAWSON, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,982,676, 4.12.34. Appl., 21.8.29).—Resins suitable for lacquers are produced by heating 1- or 2-vinylnaphthalene with  $\text{Bz}_2\text{O}_2$ ,  $\text{SnCl}_4$ , or other catalyst. The resins are sol. in  $\text{MeOAc}$ , aromatic hydrocarbons, etc. S. M.

**Cellulose ester compositions particularly for moulding purposes.** DISTILLERS CO., LTD., H. A. AUDEN, H. P. STAUDINGER, and P. EAGLESFIELD (B.P. 434,970, 9.5.34).—Org. lactides or anhydrides, free from halogen, of b.p.  $\ll 200^\circ/1$  atm., e.g., lactide of fermentation lactic acid, maleic or succinic anhydrides, are added, in 5–20% proportion, to cellulose ester (triacetate) compositions which may also contain the usual fillers, plasticisers, and solvents. Moulding can then be effected at lower temp., e.g.,  $120$ – $180^\circ$ , and at lower pressure, e.g., 2000–3000 lb. per sq. in. A. W. B.

**Hot-moulding composition.** O. A. CHERRY, Assr. to ECONOMY FUSE & MANUFG. CO. (U.S.P. 1,982,787, 4.12.34. Appl., 28.4.30).—Moulding compositions comprising a potentially reactive phenolic condensation product and, as lubricant and plasticiser, a Ph ester of a saturated aliphatic carboxylic acid ( $> \text{C}_{10}$ ), e.g., Ph stearate, are claimed. S. S. W.

**Manufacture of [resinous] composition adapted for cold-moulding.** C. A. HERBST and J. D. ENDRIZ, Assrs. to ECONOMY FUSE & MANUFG. CO. (U.S.P. 1,982,809, 4.12.34. Appl., 28.9.31).—S (69%) is mixed with a coumarone-indene resin (31%), the product after final reaction containing approx. 40% of combined S, and fillers are incorporated as desired. The mass is cold-moulded and subsequently heated for approx. 6 hr. at  $249$ – $260^\circ$  in a non-oxidising atm. S. S. W.

**Manufacture of decorative (A) sheet material, (B) coverings.** SANDURA CO., INC. (B.P. 434,489–90, 24.2.34. U.S., 2.3.33).—(A) Sufficient of a paint, lacquer, etc. is spread on the back of a fibrous sheet to

penetrate it without filling the spaces between the fibres; a paint, dye, or ink is then applied to the surface so as to penetrate the sheet to the backing composition. Apparatus is claimed. (B) A fibrous sheet is printed and treated with a toughening agent, e.g., linseed oil or latex dissolved in suitable solvents, so that voids remain between the fibres after drying. The product is preferably finished with a (nitrocellulose) lacquer. S. M.

**Treating tars [for varnishes].**—See II. **Coatings from casein.**—See V. **Coated fabrics.**—See VI. **Safety and laminated glass.**—See VIII. **Leather finishes.**—See XV.

#### XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Rubber latex as a manufacturing material.** D. F. TWISS (J. Soc. Arts, 1935, 83, 1075–1096).—A lecture.

**Brass-wire gauze for straining [rubber] latex.** B. J. EATON (J. Rubber Res. Inst. Malaya, 1935, 6, 47–48).—The detrimental effect of Cu compounds on rubber is such that sieves with corroded wire gauze should not be used for straining latex. In no case should latex to which  $\text{NH}_3$  has been added be passed through brass-wire sieves. D. F. T.

**Deterioration of raw rubber by manganese contamination.** J. D. HASTINGS and E. RHODES (J. Rubber Res. Inst. Malaya, 1935, 6, 42–46).—A large consignment of smoked sheet rubber when stored for 2 years developed such serious tackiness as to become virtually useless. The cause was found to be the presence of up to 0.026% Mn, derived from the  $\text{H}_2\text{O}$  supply on the plantation. D. F. T.

**Acetone extraction of raw rubber.** V. **Influence of heating at  $100^\circ$  and storing the acetone extract on the saponification value.** VI. **Saponification value of the acetone-extracted residue of raw rubber.** H. ENDOH (J. Soc. Chem. Ind., Japan, 1935, 38, 389–391 B, 453–456 B; cf. B., 1935, 915).—V. The sap. val. is determined by evaporating the  $\text{COMe}_2$  as soon as possible and drying the residue in the flask at  $100^\circ$  for 5–15 min. After weighing and adding 0.5N-KOH-EtOH, the flask is heated on a water-bath for 1 hr. and the excess of alkali titrated (phenolphthalein) with 0.1N-HCl. Prolonged heating of the  $\text{COMe}_2$  extract at  $100^\circ$  causes the sap. val. first to decrease and then to increase; storage of the wet  $\text{COMe}_2$  extract causes an increased followed by a decrease.

VI. The effect of various degrees of drying of the extracted residue is investigated. The most satisfactory procedure is to dry in a desiccator for 1 hr. and then to heat with 0.5N-KOH-EtOH for  $\frac{1}{2}$  hr. D. F. T.

**Porosity in vulcanised rubber.** W. H. BODGER (Trans. Inst. Rubber Ind., 1935, 11, 197–223).—Of the various effects of porosity in rubber, decrease in  $d$  provides the most satisfactory method for assessing the degree of porosity. Factors favourable to the development of porosity during vulcanisation include overworking and the incorporation of softening agents, presence of moisture in the mixed rubber, and insufficient pressure in the vulcanisation process. The conditions

during the initial stages of vulcanisation also influence the degree of porosity; thus a very active accelerator, by causing early vulcanisation, can prevent the escape of entrapped gases. Stiffening fillers tend to prevent porosity. D. F. T.

**Rationalisation of hardness-testing of rubber.** J. R. SCOTT (Trans. Inst. Rubber Ind., 1935, 11, 224—240).—The force necessary to make a rigid ball indent the surface of a mass of rubber depends on the elastic modulus of the rubber (at small deformations), the radius of the ball, and the ratio of the depth of indentation to this radius. The relation of the force to the modulus and the ball radius, the third factor being const., is deduced mathematically. Experiments to determine the relation between (1) modulus and force required to produce a given indentation, (2) force and indentation, (3) ball radius and indentation, confirm the theoretically calc. relationships between force and modulus or ball radius, respectively, and show how the force is related to depth of indentation. From knowledge of these relationships it is possible to calculate from hardness tests the elastic modulus of rubber for small elongations or compressions. It also becomes possible to interconvert the readings of any hardness-testing instruments using spherical indentors under definite loads. D. F. T.

**Recovery of solvents in the rubber industry.** E. REISEMANN (Kautschuk, 1935, 11, 151—154, 168—172, 185—186).—The three methods of recovery based, respectively, on condensation, oil-scrubbing, and adsorption by activated C or SiO<sub>2</sub> gel are described. From consideration of the fundamental principles and the conditions to be met, the activated-C method is preferred to the solvent and condensation methods. D. F. T.

**Fire risks [in the rubber industry] and their prevention.** D. W. WOOD (Trans. Inst. Rubber Ind., 1935, 11, 150—161).—A no. of relevant factors in the design, construction, heating, and lighting of the works are discussed, also fire hazards arising from, or in the use of, certain raw materials such as C black and org. solvents. Rubber is capable of emitting inflammable vapours at 260°. D. F. T.

**Risks in the rubber industry.** E. R. A. MEREWETHER (Trans. Inst. Rubber Ind., 1935, 11, 162—181).—The risks considered include those associated with machinery, electricity, and fire; with materials used in the manufacturing processes, e.g., NH<sub>3</sub> in latex, compounding ingredients, especially those containing such metals as Pb, Cd, or Sb, accelerators such as *p*-nitrosodimethylaniline and (CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub>, and solvents such as C<sub>6</sub>H<sub>6</sub> and CS<sub>2</sub>; with finishing processes, e.g., sand-blasting; and with radioactive materials and laboratory work. D. F. T.

**Rubbone.**—See XIII.

See also A., Oct., 1221, Synthetic rubber "sovereign."

#### PATENTS.

**Improving the properties of rubber latex.** METALLGES. A.-G., and J. JAENICKE (B.P. 434,214, 6.3.34).—The dark coloration of rubber latex which is due to the formation of sulphides such as FeS is prevented or removed by treatment with alkaline stabilising

agents and small amounts (e.g., 0.05—1.5 pts. per 100 pts. of rubber) of Zn compounds, such as ZnO, ZnCO<sub>3</sub>, etc., under such conditions that no substantial thickening occurs. D. F. T.

**Process and separator for preparing concentrated creams of saps.** A. NYROP, and KOEFOED, HAUBERG, MARSTRAND, & HELWEG A./S. TITAN (B.P. 434,263, 24.1.35).—Rubber latex or the like is passed through a centrifugal separator designed to allow the lighter constituent to follow a short path and the heavier a long path, and provided with adjustable outlets for the latter. B. M. V.

**Preservation of rubber.** IMPERIAL CHEM. INDUSTRIES, LTD., and W. BAIRD (B.P. 434,951 and Addn. B.P. 435,024, 6.2.34).—Antioxidant properties and a high degree of resistance to flex-cracking are imparted to rubber by incorporating before vulcanisation (A) 4 : 4'-dimethoxydiphenylamine, (B) some other alkoxy- or polyalkoxy-diarylamine (aryl = Ph, tolyl, or xylyl) in which the alkoxy-groups occupy positions 3, 3', 4, 4', 5, and/or 5' (NH = 1 and 1'). D. F. T.

**Treating tars [for rubber compounding].**—See II. **Rubber-impregnated sheet.**—See V. **Coating Fe with rubber.**—See X. **Chlorinated rubber paints.** **Airtight coatings.** Coating etc. agent containing rubber.—See XIII.

#### XV.—LEATHER; GLUE.

**Volumetric determination of iron in leather.** **Wet oxidation of organic matter, using mixed nitric, perchloric, and sulphuric acids, and titration of iron, using titanous chloride.** G. F. SMITH and V. R. SULLIVAN (Ind. Eng. Chem. [Anal.], 1935, 7, 301—305).—After wet oxidation, Cr<sup>VI</sup> is reduced by boiling with HCl, and Fe<sup>III</sup> is determined by titration with TiCl<sub>3</sub>, with NH<sub>4</sub>CNS as indicator. Alternatively, Fe<sup>III</sup> may be separated from Cr<sup>VI</sup> by pptn. with aq. NH<sub>3</sub> and then determined with TiCl<sub>3</sub>. The method is accurate within ±0.01% of the Fe<sub>2</sub>O<sub>3</sub> present in chrome-tanned leathers, and ±10% in vegetable-tanned leathers for 0.01—0.03% total Fe<sub>2</sub>O<sub>3</sub> content. E. S. H.

**Effect of perspiration on leather.** P. WHITE and F. G. CAUGHLEY (New Zealand J. Sci. Tech., 1935, 17, 412—417).—The NH<sub>3</sub> formed by decomp. of perspiration increases the *p*<sub>H</sub> of worn sole leather, thus facilitating the oxidation of tannin to insol. products, and of hide substance to sol. substances. The extent of the latter is an index of deterioration of the leather. A. G. P.

**NH<sub>4</sub> salts.**—See VII. **Rubbone.**—See XIII.

#### PATENTS.

**Production of leather.** W. J. TENNANT. From RITTER CHEM. Co. (B.P. 434,745, 13.4.34).—Pickled pelts are treated with a mixture of NaOAc, Na<sub>2</sub>SO<sub>4</sub>, and AcOH, subsequently Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub> and Na<sub>2</sub>SO<sub>4</sub> are added, and after further agitation the pelts are chrome-tanned at *p*<sub>H</sub> 5—6. D. W.

**Application of cellulose ether finishes to leather.** IMPERIAL CHEM. INDUSTRIES, LTD., A. A. HARRISON, and G. S. J. WHITE (B.P. 434,423, 27.2.34).—Ethyl-cellulose, together with a softening agent, e.g., an

aliphatic,  $\leq C_8$ , alcohol or acid, castor or neatsfoot oil, carnauba wax,  $(C_6H_4Me)_3PO_4$ , in solution in a lower alcohol, e.g., EtOH, is claimed to impart to leather a flexible finish of good fastness to wet and dry rubbing. Alcohols, esters, or ethers of b.p. 90—160°, to retard drying, and adhesives, e.g., gums, resins, may also be added. A. W. B.

**Glueing or sticking.** I. G. FARBENIND. A.-G. (B.P. 434,266, 9.7.34. Ger., 8.7.33).—Polymerides (mol. wt. > 1000) of aliphatic mono-olefines having branched C chains, e.g., isobutylene, are used for articles of wood, glass, etc. S. M.

**Impregnating leather.**—See I.

## XVI.—AGRICULTURE.

**Forest soils.** G. KRAUSS and F. HERTEL (Soil Res., 1935, 4, 207—216).—A discussion of types and classification. A. G. P.

**Origin of Kwanto loam.** M. HARADA (J. Agric. Chem. Soc., Japan, 1935, 11, 242—249).—An account of the volcanic origin and mineralogical composition of various pumice soils is given. E. A. H. R.

**Nitrogenous constituents of natural humic acids.** III. S. S. DRAGUNOV and E. F. BACHTINA (J. Appl. Chem. Russ., 1935, 8, 919—925; cf. B., 1935, 324).—The chief nitrogenous constituents of peat humic acid are proteins and their decom. products, readily separated by acid hydrolysis. Part of the remaining N is in the form of  $NH_3$ , whilst the remainder is not eliminated by treatment with acids or alkalis. No direct relation is established between the N content of peats and their degree of mineralisation, but the content of N eliminable by acid hydrolysis falls with increasing humic acid content, and is increased by drying the peat. R. T.

**Suggested units of classification and mapping, particularly for East African soils.** G. MILNE (Soil Res., 1935, 4, 183—198).—New and more sp. terms are suggested for the grouping of soils into intermediate classes according to the intensity of weathering, drainage, and genetic factors. A. G. P.

**Nomogram for correction of results of mechanical analysis of soils.** J. GOLLAN (Soil Res., 1935, 4, 199—206).—Particle sizes are corr. for differences in temp. of the suspension, and in soil *d*. A. G. P.

**Carbon:nitrogen ratios of Australian soils.** J. S. HOSKING (Soil Res., 1935, 4, 253—268).—No general relation is apparent between C:N ratio and soil type or climate or depth in the soil profile. Distinctive differences in the distribution of vals. in forest and grassland soils, however, are shown. A. G. P.

**Influence of temperature on the carbon:nitrogen ratio of soils.** N. R. DHAR and S. K. MUKHERJI (J. Indian Chem. Soc., 1935, 12, 436—440).—The C:N ratio of certain Indian soils has been determined. Comparison with data from other countries supports the view that C:N increases with the temp. R. S.

**Theory of bacterial activity in agricultural soils.** G. ROSSI (Soil Res., 1935, 4, 316—349).—The microbiological population of soils is discussed in

relation to soil type and usage. Technique for characterising soil organisms is described. A. G. P.

**Rapid determination of alkalis [in soil analysis].** K. ABRESCH (Chem. Fabr., 1935, 8, 380—381).—If a solution of K or Na is electrolysed, using a Hg electrode and a gradually increasing e.m.f., the current is at first const. When a measurable no. of cations are reduced it begins to rise. When it reaches the point where it is controlled not by electrode polarisation but by ionic concn. near the cathode it again becomes const. The difference between the two const. currents  $\propto$  the [K] or [Na] provided the temp. is const. An apparatus based on this principle is described. A compensating circuit neutralises the low const. e.m.f. and the potential at which the "saturation current" is reached is recorded. The method can be used for Pb and Cu determinations. C. I.

**Determination of calcium in soil.** O. G. CAVETZ (Soil Res., 1935, 4, 251—252).—Pptn. of Ca, in presence of Fe and Al, by  $(NH_4)_2C_2O_4$  in solutions made faintly acid with AcOH gives satisfactory results. A. G. P.

**Relation of soil fertility and exchangeable acidity.** C. ICHIKAWA (J. Agric. Chem. Soc. Japan, 1935, 11, 190—193).—Fertile soil has a lower exchangeable acidity and Aland Fe content, but a higher Ca content, than sick soil. E. A. H. R.

**Comparison of glass and quinhydrone electrodes for determining the [H<sup>+</sup>] of some Iowa soils.** II. Variability of results. III. Change of  $p_H$  in soil-water mixtures with time. H. L. DEAN and R. H. WALKER (J. Amer. Soc. Agron., 1935, 27, 519—525, 585—595; cf. B., 1935, 917).—II. In a no. of soils examined the variability of vals. recorded by either electrode was of little practical significance. The error resulting from the addition of quinhydrone to soil is small.

III. The variability of recorded vals. obtained with the soil suspension or with the supernatant liquid after a given period was comparatively small. Vals. changed little within 6—12 hr., but subsequently increased in acid soils and decreased in basic soils. The glass electrode gave very slightly lower vals. in nearly all cases. Repeated up-and-down movement of the glass electrode in the suspension tended to lower the  $p_H$  recorded. A. G. P.

**Determination of exchangeable bases and of the S value in soils containing both calcium carbonate and calcium sulphate.** A. A. J. DE SIGMUND and M. A. S. IYENGAR (Soil Res., 1935, 4, 217—222).—Modifications of di Gleria's method are recommended. Exchangeable Mg, K, and Na are determined by leaching with 500 c.c. of *N*- $NH_4Cl$ . A second sample is leached with  $BaCl_2$ , excess of chloride removed by washing with  $H_2O$ , and the adsorbed Ba displaced by washing with *N*- $NH_4NO_3$  and determined in the usual manner. After correcting for residual  $BaCl_2$  (from determination of Cl<sup>-</sup>), exchangeable Ca<sup>++</sup> is calc. by diff. between the adsorbed Ba<sup>++</sup> (i.e., S val.) and the Mg, K, and Na eqvts. found as above. A. G. P.

**Comparison of methods used in extracting soil phosphates, with a proposed new method.** C. L. WRENSHALL and R. R. MCKIBBIN (J. Amer. Soc. Agron.,

1935, 27, 511—518).—The relative  $\text{PO}_4'''$ -extracting powers of solutions of  $\text{Ca}(\text{HSO}_4)_2$ ,  $\text{KHSO}_4$ ,  $(\text{NH}_4)_2\text{SO}_4$  (I), and  $\text{CaSO}_4$  (II) indicate an influence of the cation on  $\text{PO}_4'''$ -solubility. The amount of  $\text{PO}_4'''$  removed from soil by acid solutions of (I) and (II) is dependent on the  $p_{\text{H}}$  attained. Extraction at  $p_{\text{H}}$  2.0 causes drastic decomp. of the soil. An extractant containing  $\text{Ca}''$  500,  $\text{SO}_4''$  12,700 p.p.m., with  $p_{\text{H}}$  3.0, probably gives results very closely related to the availability of  $\text{PO}_4'''$  to plants. A. G. P.

**Physico-chemical laws for cation exchange in mineral soils.** F. ALTEN and B. KURMIES (Angew. Chem., 1935, 48, 584—585).—Vageler's method may be used in determining the end-vals. of  $T$  and  $S$ . The hydration may be calc. from the cation coating. Al is bound in the adsorption complex as an ionogen, and exchanges directly with cations of neutral salts. H. J. E.

**Chemical and X-ray investigation of the mineral adsorption substance in the soil.** A. JACOB, U. HOFMANN, H. LOOFMANN, and E. MAEGDEFRAU (Angew. Chem., 1935, 48, 585—586).—The gels in soil do not act as carriers for the exchange adsorption. The base exchange is due to the cryst. clay minerals kaolinite and montmorillonite, and to an unknown cryst. mineral which was detected by its X-ray spectrum. The clay minerals are stable decomp. products of soil minerals, and are not formed from amorphous materials. H. J. E.

**Solar ultra-violet rays. IV.** T. HANZAWA (J. Agric. Chem. Soc. Japan, 1935, 11, 206—215).—A relation between ultra-violet light intensity and weather types leading to good or bad harvests is suggested. E. A. H. R.

**Iodine content of soils of Japan. II. Influence of natural conditions and manuring on iodine contents.** A. ITANO and Y. TSUJI (Ber. Ohara Inst. landw. Forsch., 1935, 7, 103—114; cf. A., 1935, 191).—Virgin soils near the sea contained more I than those more remote. Differences were less marked in arable soils. The I content of surface layers of the virgin and dry farm soils was  $>$  that of subsoils. The reverse was the case under paddy-field conditions. Manures increased the amount of I in soils, those of animal being more effective than those of vegetable origin. No relationship was apparent between the  $\text{H}_2\text{O}$ -sol. I content and the type of soil. I and Cl contents were unrelated although both were similarly affected by proximity to the sea. A. G. P.

**Soil examination by field trials and by the seedling method in relation to other methods of investigation.** H. NEUBAUER (Soil Res., 1935, 4, 234—250).—A discussion. A. G. P.

**Loss of water-soluble potash in fertiliser mixtures.** W. H. ROSS, K. C. BEESON, L. M. WHITE, and A. R. MERZ (Ind. Eng. Chem. [Anal.], 1935, 7, 305—308).—The loss of K in its determination in mixed fertilisers containing superphosphate is due to adsorption by the basic Fe and Al phosphates formed during the extraction by the usual method. The loss varies with the Fe and Al contents of the mixture, is greater when the mixture contains  $\text{K}_2\text{SO}_4$  than when it contains KCl, and is greater in aged than in freshly-prepared mixtures. E. S. H.

**Nutrient control of soils on the basis of static manurial trials with the help of the Mitscherlich and Neubauer methods.** K. OPITZ and K. RATHSACK (Landw. Jahrb., 1935, 81, 129—175).—Comparison is made of these two methods for determining available K and P in soils with the results of field trials. The relative applicability of the methods and the interpretation of results obtained are discussed. A. G. P.

**Manuring high-moor pastures with nitrogen.** F. BRÜNE and H. IGEL (Landw. Jahrb., 1935, 81, 251—271).—The relatively small effect of N fertilisers [ $(\text{NH}_4)_2\text{SO}_4$  and  $\text{NaNO}_3$ ] on the live-wt. increases of fattening cattle in these pastures is attributed to their inhibitory action on the growth of white clover. The beneficial action of K and P fertilisers is demonstrated. A. G. P.

**Nitrogenous manuring of Leguminosae.** PICHARD (Compt. rend. Acad. Agric. France, 1935, 21, 199—203).—Small applications of  $\text{NO}_3'$  (15—16 kg. of N per hectare) improved the growth of beans without affecting N fixation by nodule organisms. The % N in plants was unchanged. A. G. P.

**Manuring of soils for improvement.** G. TOMMASI (Ann. R. Staz. Chim.-Agrar. Sperim., 1934, 14, No. 321, 36 pp.).—An address. R. N. C.

**Nitrogen manuring.** G. TOMMASI (Ann. R. Staz. Chim.-Agrar. Sperim., 1934, 14, No. 307, 42 pp.).—An address. R. N. C.

**Improvement of the Agro Pontino. II. Agrarian tests for the evaluation of the improved soil.** G. TOMMASI (Ann. R. Staz. Chim.-Agrar. Sperim., 1934, 14, No. 310, 39 pp.; cf. B., 1935, 71).—Results of manuring and cultivating experiments on a no. of soils are reported. R. N. C.

**Influence of potassium salts, especially of the anions, and of silicic acid and nitrogen, on the resistance to mildew of cereals and fodder crops.** E. LOWIG (Landw. Jahrb., 1935, 81, 273—335).—Incidence of mildew was high in K-deficient plants, or when K was supplied as citrate or carbonate. Use of KCl or  $\text{K}_2\text{SO}_4$  increased the resistance of the plants to infection. K silicate was still more effective. The protective action of silicates is related to the accumulation of  $\text{SiO}_2$  in the epidermal membranes of leaves. In pot trials application of silicates had no uniform effect on the intake of other nutrients. A direct proportionality is shown between the N contents of plants and the incidence of mildew. A. G. P.

**Is it possible to influence the nutrient intake of early, mid-season, and late varieties of potatoes by manuring with potash in different forms and at different periods?** F. BERKNER (Landw. Jahrb., 1935, 81, 71—83).—K manuring tended to increase the intake of all other nutrients, KCl being more effective than  $\text{K}_2\text{SO}_4$  in this respect. Absorption of Ca by plants ceased approx. 14 days earlier than did that of K, and was relatively more advanced in the case of plants receiving no K. The intake of Cl was increased by use of Cl-containing salts and was accelerated by spring and somewhat retarded by autumn dressings. The decline in Ca contents of plants at the end of the growth period was more rapid than that of K, was more marked

after KCl manuring than after  $K_2SO_4$ , and smaller when the fertiliser was applied in autumn than in spring. The P intake was relatively slower and more uniform than that of other nutrients, and increased somewhat after KCl treatment. A. G. P.

**Contents of carotene and vitamin-C in vegetables and feeding-stuffs.** G. PRÜTZER and C. PFAFF (*Angew. Chem.*, 1935, **48**, 581—583).—The carotene (I) content of vegetables is markedly increased by fertilisation ( $N + P_2O_5 + K_2O$ ) of the soil in which they are grown; the vitamin-C (II) content generally remains approx. const., but occasionally increases. Irradiation (Ne light) of parsley, chive, and spinach increases the yield and content of (I) and (II). Faulty storage or delayed harvesting produces loss of (I) and (II). F. O. H.

**Cold-resistance of winter-hard crop plants with special reference to the influence of varied mineral nutrition and of the nitrogen metabolism.** A. F. WILHELM (*Phytopath. Z.*, 1935, **8**, 111—156).—Nutritional conditions affected the frost-resistance of rape and spinach in a similar manner to that of cereals. No close relation existed between the frost-resistance and protein content of plants. Protein breakdown in plants exposed to  $-7^\circ$  was slower than in those at  $-2^\circ$  and could not be correlated with frost-resistance. The favourable effect of K is attributed partly to its effect in increasing sap concn. and partly to a sp. influence on the condition of cell colloids. The action of P and N fertilisers on resistance to cold is unrelated to their influence on the  $p_H$ , osmotic pressure, sugar or N contents of the plant juices, but is associated with differences in phosphatide content. Exposure to cold of N- or P-deficient plants results in a slower decline in sugar content than occurs when the supply of these nutrients is adequate. A. G. P.

**Organic soils and epinastic response.** W. N. JONES (*Nature*, 1935, **136**, 554).—A gas has been extracted from certain infertile org. soils which produces the same curvature effects on tomato plants as do traces of  $C_2H_4$ . When added to  $H_2O$ -culture solutions these extracts produce similar curvatures on cuttings and affect their rooting and manner of growth. L. S. T.

**Influence of the time of cutting on the yield of high-moor meadows and the nutrient content of the hay.** F. BRÜNE (*Landw. Jahrb.*, 1935, **81**, 21—43).—Analyses and results of digestibility trials are recorded. Best returns resulted from cutting in late June and again in mid-September. A. G. P.

**Chemical composition of certain pasture species at flowering and maturity.** R. E. SHAPTER (*J. Counc. Sci. Ind. Res.*, Australia, 1935, **8**, 187—194).—Data for numerous species of grasses, legumes, and miscellaneous species are given. A. G. P.

**Nettles of the U.S.S.R., their composition, distribution, and utilisation.** P. F. MEDVEDEV (*Bull. Appl. Bot. Genetics, Plant Breeding*, 1934, Suppl. No. 71, 56—67).—Nettles are utilised as a green feed for poultry, in silage for cattle, as salad, and for fibre production. Their composition and medicinal properties are discussed. CH. ABS. (p)

**Effect of certain fertiliser materials on the iodine content of important foods.** J. S. McHARGUE, D. W. YOUNG, and R. K. CALFEE (*J. Amer. Soc. Agron.*, 1935, **27**, 559—565).—Crude Chili nitre, rock phosphates, and limestone rocks may contain sufficient I to increase the I content of forage crops when applied in appropriate amounts to I-deficient soils. Plants absorb considerable amounts of I without symptoms of toxicity. A considerable proportion of the I in plants exists in org. combination. A. G. P.

**Rate of growth and nitrogen assimilation of Havana seed tobacco.** M. F. MORGAN and O. E. STREET (*J. Agric. Res.*, 1935, **51**, 163—172).—Growth and N intake were small during the first 30 days after setting, but increased rapidly up to the period of topping (approx. 54 days), when 50% of the total dry matter had been formed and 60% of the total N assimilated. Topping retarded development, but differences in dry wt. and N of topped and untopped plants at harvest were largely accounted for by increased stem growth in untopped plants. Results are discussed in relation to the form and period of application of N fertilisers. A. G. P.

**Change in physical and chemical properties of hempseed due to spontaneous heating.** V. G. SVITALSKI (*Sci. Inst. Cereal Res. [Moscow]*, 1933, No. 11, 33—38).—Effects include increased acidity and decreased protein content. At  $60^\circ$  the lipase is destroyed. CH. ABS. (p)

**Relation of fungi to respiration and fermentation occurring in stored hay.** A. L. BAKKE and E. R. HENSON (*Iowa Agric. Exp. Sta. Rept.*, 1933, 51; cf. A., 1934, 121).—A no. of species of thermogenic fungi occurred in heating hay. Although in many cases  $CO_2$  evolution and heat production were parallel, formation of  $CO_2$  in flasks containing hay was not a measure of thermogenesis. CH. ABS. (p)

**Evaluation of Australian-grown pyrethrum flowers.** A. B. JAFFRAY (*J. Counc. Sci. Ind. Res.*, Australia, 1935, **8**, 231—233).—Data for Swiss and Japanese strains are given. Use of  $COMe_2$  in place of light petroleum for extraction leads to results of the same order, but with some divergence in vals. A. G. P.

**Calcium cyanamide in relation to control of clubroot of cabbage.** J. C. WALKER and R. H. LARSON (*J. Agric. Res.*, 1935, **51**, 183—189; cf. B., 1934, 852).—The efficiency of  $CaCN_2$  in preventing club-root infection is due to the  $CN_2$  as well as to the alkalinity produced in the soil. Higher dosages are necessary in field than in greenhouse soils.  $CaCN_2$  has approx. double the effectiveness of  $Ca(OH)_2$ , wt. for wt. A. G. P.

**Downy mildew (blue mould) of tobacco; its control by benzol and toluol vapours in covered seed-beds.** H. R. ANGELL, A. V. HILL, and J. M. ALLAN (*J. Counc. Sci. Ind. Res. Australia*, 1935, **8**, 203—213).—Effective concns. of the vapours are maintained by placing the liquids in pans of a size to give 2 sq. in. of evaporating surface per sq. ft. of soil. Frames may be covered with glass, Windolite, or calico. A. G. P.

**Apple thrips (*Thrips imaginis*, Bagnall).** J. DAVIDSON (J. Council Sci. Ind. Res., Australia, 1935, 8, 234—236).—Promising results were obtained with a kaolin-derris-pyrethrum dust. Sprays were less successful, but a 2–5–100 derris-soap spray is suggested.

A. G. P.

**Arsenical injury of the peach.** R. F. POOLE (North Carolina Agric. Exp. Sta. Tech. Bull., 1935, No. 49, 13 pp.).—Injury from Pb arsenate sprays was most prominent in leaves, twigs, and buds of vigorous trees, and on fruit of weakened trees. The damage was intensified under humid conditions. Temp. was an unimportant factor. Coarse limes were less effective in reducing As injury than was chemically prepared  $\text{Ca}(\text{OH})_2$ . Use of  $\text{ZnSO}_4$  3–4 lb., with  $\text{CaO}$  5 lb. per 100 gals. in all As sprays applied after leaves appeared reduced As injury. Various forms of S may be added to this mixture and applied successfully.

A. G. P.

**Production of oxalic acid from cellulosic agricultural materials.** H. A. WEBBER (Iowa Eng. Exp. Sta. Bull., 1934, 118, 55 pp.).—The production of  $\text{H}_2\text{C}_2\text{O}_4$  from corncobs by means of  $\text{HNO}_3$  and from corncobs, cornstalks, oat hulls and the furfuraldehyde residues therefrom, by  $\text{NaOH}$  fusion is discussed from the commercial viewpoint. The best process is to treat the corncobs with 3 pts. of 95%  $\text{HNO}_3$ , heat to complete dissolution, cool, add 3 pts. of 50–55%  $\text{HNO}_3$  and 0.1% of  $\text{V}_2\text{O}_5$ , and set aside for 2–3 days. The mixture obtained in the fusion process has some possibilities as a  $\text{H}_2\text{O}$  softener.

CH. ABS. (r)

**Pipe-line corrosion.**—See X. **Sewage sludge as fertiliser.**—See XXIII.

See also A., Oct., 1258, **Determining org. C [in soils].** 1288, **Effect of frost on wheat.**

## PATENTS.

**Production of a fertiliser.** R. M. JONES, Assr. to BARRETT Co. (U.S.P. 1,966,820, 17.7.34. Appl., 28.3.31).—Claim is made for a fertiliser containing  $\text{KCl}$  and urea and free from impurities which render it hygroscopic. *E.g.*, a mixed fertiliser may contain  $\text{Ca}$  superphosphate 82,  $\text{NH}_3$  3.33, urea 20,  $\text{KCl}$  13, and  $\text{MgCl}_2 + \text{NaCl}$  < 5%.

A. R. P.

**Weed-destroying composition.** C. R. ROSE (U.S.P. 1,967,628, 24.7.34. Appl., 31.7.33).—Claim is made for a 1:1-vol. mixture of 75%  $\text{H}_3\text{AsO}_4$  and 99%  $\text{H}_2\text{SO}_4$ , which is diluted to a 1–2%  $\text{H}_2\text{SO}_4$  solution for use as a spray.

A. R. P.

**Insecticide.** S. C. FULTON, Assr. to STANCO, INC. (U.S.P. 1,967,024, 17.7.34. Appl., 6.6.29).—Pyrethrum flowers are extracted with kerosene and the solution is saturated with rotenone (I) (0.025%); addition of 1% of  $\text{CHCl}_3$  increases the solubility of (I) to 1%.

A. R. P.

(A) **Production of insecticide.** (B) **Destruction of insects and vermin.** E. G. A. WIKSTRÖM (B.P. 434,660—1, [A] 19.3.34, [B] 6.3.34).—(A) Mixtures of cymol or its derivatives and the active constituents of pyrethrum, derris, quassia, or other vegetable vermicide are specified. Chlorinated or sulphated essential oils, soaps,  $\text{H}_2\text{O}$ , and/or emulsifying agents may be added. (B) A combination of cymol and the

essential oil derivatives, with or without soap or emulsifying agent, is claimed.

E. H. S.

**Treating org. waste.**—See XXIII.

## XVII.—SUGARS; STARCHES; GUMS.

**Determination of fibre per cent. cane by an indirect method.** S. SANYAL (Internat. Sugar J., 1935, 37, 390–391).—Brix (corr.) of the primary or crusher juice of the shift is multiplied by the dry-milling factor to give the Brix of the abs. juice. Fibre (% cane) is:  $100 - 100W/(100 - B)$ , where  $W$  is the  $\text{H}_2\text{O}$  (% cane) and  $B$  the Brix of the abs. juice. This method demands careful sampling and sub-sampling of the cane.

J. P. O.

**Thermal value of bagasse.** E. R. BEHNE (Internat. Sugar J., 1935, 37, 359).—Calorimetric determinations of the thermal val. of Queensland bagasse from Badila, B 208, HQ 426, EK 28, M 1900, and other canes, show it to have an average calorific val. on the dry basis of about 8200 B.Th.U. per lb., and, on the dry ash-free basis, of about 8400. Vals. obtained for bagasse constituents were: cellulose 7533, sucrose 7119, reducing sugars 6750, starch 7528, dextran 7402. Woods which are used as “extra fuel” gave: beech 8593, birch 8588, oak 8316, pine 9153.

J. P. O.

**Manufacture of “invert syrup” from surplus cane.** C. W. WADDELL (Internat. Sugar J., 1935, 37, 392–393).—Juice, crushed from cane > 2–3 days old, is tempered with as little  $\text{CaO}$  as possible to secure a moderately good clarification, and if a clear juice cannot be obtained at  $p_{\text{H}}$  5.5–6.0 the process must be worked at about 6.8–7.0.  $\text{H}_2\text{SO}_4$  at about 30° Brix is added to the juice just before it enters the evaporators, using about 0.54 litre (at  $d$  1.18) per ton of cane. Syrup from the evaporators at 70–75° Brix is brought to  $p_{\text{H}}$  7.0 with  $\text{CaO}$ , and further conc. in the vac. pans to about 86° Brix. Some factory results are: Brix 88.12%, invert sugar 62.86%, sucrose 18.84%, ash 1.76%, invert sugar/sucrose ratio 333.65, total sugars as invert sugar recovered as syrup 95.05%.

J. P. O.

**Milling extraction: control by juice-density curves.** R. AVICE (Rev. Agric. [Mauritius], 1935, No. 79, 19–23; Internat. Sugar J., 1935, 37, 364).—Smith's method of determining the Brix of the juice expressed by the top and back rollers of each unit with the plotting of the figures obtained has been satisfactorily applied by the author. These curves show that often in Mauritius the  $d$  of the juice is not sufficiently lowered by the first units of the tandems, due to the insufficient prep. of the cane for an intimate admixture of added  $\text{H}_2\text{O}$  and residual juice. In order to bring about the max. extraction obtainable by successive crushings, one or two sets of knives followed by a shredder should be used.

J. P. O.

**Distribution of solids with a four-massecuite formula.** M. A. DOOLAN (Proc. Queensland Soc. Sugar Cane Tech., 1934, 107–112; Internat. Sugar J., 1935, 37, 364–365).—A method of calculating a 4-massecuite flow-sheet is given, which gives information, *inter alia*, on: the syrup boiled in each grade of massecuite, % total syrup; the sucrose in each grade of sugar

and in the final molasses, % total sucrose; the impurities in each grade of sugar and in the final molasses, % total impurities; the wt. of solids re-boiled, % total solids; and the wt. of the several massecuites, % total massecuite.

J. P. O.

**Cane syrup manufacture.** T. B. McCLELLAND (Repts. Puerto Rico Agric. Exp. Sta., 1935, 9—12; Internat. Sugar J., 1935, 37, 361—362).—Treatment with CaO alone or in conjunction with  $H_3PO_4$  gave an almost brilliant juice, which, however, darkened with subsequent boiling with some loss of flavour; simple filtration through kieselguhr, however, gave on concn. the clearest and best-flavoured syrup. Partial fermentation of the juice prior to filtration gave good results. Boiling and concn. had the greatest influence on the colour and flavour. A slight acidification with tartaric acid lightened the colour to a golden-yellow or light brown. Part of the sucrose was inverted with invertase or by fermenting with a pure yeast culture prior to filtration.

J. P. O.

**Pectic matters in the sugar beet and in sugar juices.** H. COLIN (Bull. Assoc. Chim. Sucr., 1935, 52, 625—628; cf. B., 1935, 648, 869).—A survey of present knowledge.

J. H. L.

**Working of frozen beets.** N. E. LOGINOV *et al.* (Trudi Z.I.N.S., 1934, 2, No. 20, 3—22; Internat. Sugar J., 1935, 37, 362).—Operating on frozen beets that had been carried through the winter, work proceeded considerably slower than with fresh roots, the diffuser cycle being 129 min. instead of 91. Losses of sugar were 5.78 compared with 3.25, and the yield of final molasses 5.77 instead of 3.35%. The quality of the finished sugar, however, was not inferior.

J. P. O.

**De-sugaring molasses with regenerated press-cake.** N. E. LOGINOV and J. A. GELFMAN (Trudi Z.I.N.S., 1934, 2, No. 20, 23—51; Internat. Sugar J., 1935, 37, 362).—CaO produced by burning filter-press cake in a rotating furnace was found well suited for making Ca saccharate for the exhaustion of molasses, which was diluted to contain 5—6% of sucrose (I), the reaction being carried out at 5—8°, using 130 pts. of CaO to 100 pts. of (I). The finely-powdered CaO was added in small portions over a period of 20 min., with stirring and cooling, the stirring being continued for 10 min. after all the CaO had been added. After filtering and washing, the saccharate was decomposed with  $CO_2$  and the filtrate evaporated as usual. Yields by the cold and hot saccharate processes were about 91 and 95%, respectively.

J. P. O.

**Influence of maturity of beets on the purification effect.** J. DĚDEK (Publ. Inst. Belge Amél. Betterave, 1935, 3, 151—174).—It is nearly impossible to purify the juice of beets that have been prematurely harvested, the elimination of non-sugar being only about 3%. A max. purification effect is reached about the beginning of November in normal seasons.

J. P. O.

**Conductometric determination of ash in crude beet juice.** K. SMOLENSKI and T. PIETRZYKOWSKI (Sucr. Belge, 1935, 54, 321—330, 344—353; Internat. Sugar J., 1935, 37, 402).—The ratio between the conductivity of sugar solutions at 3.5% concn. and their

ash content % dry substance is about 265 for sugar beets and about 355 for fodder beets. This method can be used to distinguish between high-sugar and high-tonnage beets.

J. P. O.

**Pre-defecation in beet-sugar factories.** G. HRUDKA (Internat. Sugar J., 1935, 37, 350—352).—Plant installed in 3 beet-sugar factories in the Irish Free State for operating the DĚdek-Vašátko process of cold, multiple-stage pre-defecation is described, the main feature of which is the Mühlbeck CaO-dosing valve, which is continuous and adjustable. Another apparatus recommended for the same purpose is the Wintzell-Weibull doser, which has the advantage of automatically taking into account fluctuations in the slicing performance. Pre-defecation in this process ranges from 0.30 to 0.35% CaO, on the beets, and the main defecation averages 0.80—1.2%, depending on the quality of the roots. Besides effecting a considerable economy in CaO, it gives a lighter-coloured juice, a better rate of filtration, and lower Ca salts than are obtained in the ordinary method of working.

J. P. O.

**Clarification of [beet] juice by the W.N.J.S. method.** I. B. MINTZ and B. E. KRASILSCHIKOV (Zapiski, 1934, 61—65; Internat. Sugar J., 1935, 37, 399).—Diffusion juice is sulphited to  $p_H$  4.5—5.0 and then pre-defecated to bring its  $p_H$  to 10.5—11.0, whereby the isoelectric points in both the acid and alkaline regions are traversed and a good coagulation of the colloids is secured. Clarification is said to be 30—35% better than that obtained ordinarily.

J. P. O.

**"Micro-flotation" for clarification of sugar juices.** V. VOLOCHVJANSKI (Zapiski, 1934, 37—38, 38—58; Internat. Sugar J., 1935, 37, 399).—Diffusion juice at 45—50° is defecated with the usual amount of CaO, carbonatated, and the froth separated. After the froth has abated, the liquid resulting from it is again limed and carbonatated, and its froth treated in the same way. Then the liquid resulting from the two froths is added to the original juice, which is heated to 89—90°, filtered, and passed through the usual factory operations.

J. P. O.

**Regenerative evaporation by thermo-compressors [for sugar factories].** L. A. TROMP (Internat. Sugar J., 1935, 37, 386—389).—Where an excess of heating surface in the first stage of the evaporating station is available, thermo-compressors can be used with advantage for converting the exhaust from the first evaporating body to a higher pressure and an equiv. higher temp. for use elsewhere, *e.g.*, at the vac. pans. A single- or multiple-jet steam nozzle is recommended. Examples are given of its applications in the cane-sugar factory.

J. P. O.

**Addition of active carbon in the [sugar-juice] evaporators.** S. I. KORALOV *et al.* (Trudi Z.I.N.S., 1934, 2, 90—113; Internat. Sugar J., 1935, 37, 402).—When active C is added to the juice in the evaporators in an amount = 0.4% on the wt. of sucrose, the colour is improved about 25—30%, the salt content is lowered, and the  $\eta$  reduced. There is little or no change in the  $p_H$ . These results, however, are no better than are

obtained by treating thick juices and remelt syrups with C in the usual way. J. P. O.

**Horizontal or vertical crystallisation [of beet-sugar strikes]** F. GUILBERT (Bull. Assoc. Chim. Sucr., 1935, 52, 661—669).—Exhaustion of beet molasses is now often less complete than when second- and after-product strikes were boiled string-proof and discharged into very large vertical mixing tanks already containing previous strikes in an advanced stage of crystallisation and cooling. A method of working on these lines is described. From time to time massecuite is drawn off from the bottom of the tanks, for centrifuging, and fresh strikes are introduced at the top. Crystallisation is slow, but an excellent grain is formed, and, owing to the high crystal concn. at the bottom of the tanks, the mother-syrup in the massecuite drawn off is highly exhausted. J. H. L.

**Influence of sucrose on the  $p_H$  of alkaline solutions.** K. SMOLENSKI and W. KOZLOWSKI (Rept. Centr. Lab. Ind. Sucr. Polonaise, 1934, 133—141; Internat. Sugar J., 1935, 37, 402).—Numerous experimental data lead to the conclusion that the reduction of  $p_H$  when NaOH is made to react with sucrose (I) solutions is due to the acidic character of the disaccharide. Its dissociation const. is  $\propto$  the (I) : NaOH ratio, and indications are that the (I) acts as a bivalent acid. J. P. O.

**Manufacture of glucose.** P. SMIT (J. Fabr. Sucre, 1935, 76, 680—684; Internat. Sugar J., 1935, 37, 408).—Decolorising C (Activit), containing the  $H_2SO_4$  which has been used in its manufacture, is added to the converter, the acid serving for the hydrolysis of the starch, and the C absorbing all colouring matter *in statu nascendi*. J. P. O.

**Preparation of xylose syrup from aspen wood.** V. I. SCHARKOV and A. P. PETROTSCHENKO (Lesokhim. Prom., 1933, 2, No. 3, 11—15).—Aspen cellulose contains considerable amounts of pentosans, and can be used in preparing xylose syrup. The conversion into sol. products increases with the pressure and temp. of hydrolysis. Overheating causes decomp. to furfural-dehyde. CH. ABS. (e)

**Hydrolysis and fermentation of sawdusts.** I. SCHEN and P. BÉRAUD. II. SCHEN, P. BÉRAUD, and P. BRÉCHOT (Bull. Inst. Pin, 1935, 90—94, 94—98, and 125—126).—I. Hydrolysis of pine sawdust is best (23.9%) effected by 2%  $H_2SO_4$  at 2 atm. Oak and poplar give 18.95 and 20.25% of reducing sugars, respectively. The neutralised liquors are fermented, the yields being: pine, *S. pombe* 66, *S. X.* 74; oak, *S. pombe* 57, *S. X.* 10; poplar, *S. pombe* 39, *S. X.* 31.2, and *S. cramant* 34.2%.

II. Pine sawdust and conc.  $H_2SO_4$  give a 55% yield of reducing sugars, of which the % fermentable is: *S. pombe* 82, *S. cramant* 79, and *S. X.* 53—60%. 72%  $H_2SO_4$  gives higher yields of similar sugars, but rather intractable gels are formed. Conc. HCl gives difficultly fermentable sugars. R. S. C.

**Refractometric determination of dissolved solids in sugar syrups containing invert sugar.** H. C. S. DE WHALLEY (Internat. Sugar J., 1935, 37, 353—355).—

Comparison of the total solids by drying and from the refractometric index shows differences which are due, wholly or partly, to the assumption that glucose (I) and fructose (II) (present as invert sugar) have  $n$  vals. identical with those of sucrose (III) of the same concn. Determinations of total sugars made by  $n$  and (III) tables on partly inverted (III) solutions of known composition, and total sugars obtained by calculation after determination of invert sugar by Fehling's solution, show the former to be < the latter by 0.02% for each 1% of invert sugar present. Similar determinations made with solutions of equal parts of (I) and (II) (Kahlbaum), however, gave a lower result, the necessary addition to the  $n$  being 0.007—0.009% for each 1% of invert sugar present, suggesting that these sugars are not identical with those obtained by the acid or invertase hydrolysis of (III). J. P. O.

**Determination of starch.** J. T. SULLIVAN (Ind. Eng. Chem. [Anal.], 1935, 7, 311—314).—The technique and accuracy of various methods (acid- and diastase-hydrolysis, pptn. by HCl or I) are discussed. F. O. H.

**Determination of the alkali-labile value of starches and starch products.** T. C. TAYLOR, H. H. FLETCHER, and M. H. ADAMS (Ind. Eng. Chem. [Anal.], 1935, 7, 321—324).—The alkali-labile val. (A., 1933, 261) varies with the time between digestion and iodometric titration and with the alkalinity or acidity during this period. Completion of the digestion should be followed by rapid cooling and acidification. This, together with a standard method of iodometric titration, affords a technique of greater accuracy and reproducibility. F. O. H.

**Sugar crystallisers.**—See I. Solvent power of tetralin etc.—See III. Bagasse lignin. Hydrolysis of wood. Sweet-potato starch as paper size.—See V. Gluconic acid from sugar.—See XVIII.

See also A., Oct., 1225, Anhydro-osazones. 1239, Bagasse lignin.

#### PATENTS.

**Manufacture of powdered molasses.** T. BLACK and J. DREW, Assrs. to MOLASKA CORP. (U.S.P. 1,983,434, 4.12.34. Appl., 29.11.33).—Molasses, preferably after filtration with a filter aid, is heated in vac. at  $\geq 66^\circ$  until deprived of most of its  $H_2O$ , and then sprayed at about  $93$ — $114^\circ$  downwards through a zone of air at about  $185$ — $196^\circ$ , into a zone of air at  $< 32^\circ$  having  $< 40\%$  R.H., by which the dried particles are rendered hard before being collected. Suitable apparatus is described. J. H. L.

**Manufacture of beet sugar [from molasses].** G. M. DARBY, Assr. to DORR Co., INC. (U.S.P. 1,980,257, 13.11.34. Appl., 22.9.30).—In the Steffen process for recovering sucrose from beet molasses, in which part of the Ca saccharate is pptd. and separated in the cold and the remainder recovered from the mother-liquor or "cold waste" by heating and sedimentation, about 10% of the resulting sediment is added as seed to the next batch of "cold waste" before heating, to improve pptn. J. H. L.

**Manufacture of anhydrous glucose.** W. B. NEWKIRK, Assr. to INTERNAT. PATENTS DEVELOPMENT



Co. (U.S.P. 1,976,361, 9.10.34. Appl., 19.7.30).—In the process of U.S.P. 1,722,761 (B., 1929, 833) crystallisation is carried out in the vac. pan. Grain is formed by boiling a small quantity of syrup, or added as seed grain, and then built up by successive small intakes of syrup until the pan is full. For the production of  $\alpha$ -glucose the syrup may have  $d$  1.26, grain formation being carried out at 60° and subsequent boiling at about 77°; for  $\beta$ -glucose the syrup should have  $d$  1.45 and be boiled at 71° for granulation and 88° afterwards. Strikes may be discharged into crystallisers or centrifuged directly; in the latter case pan temp. should be lowered somewhat during the final stages of boiling. J. H. L.

**Manufacture of edible sugar syrup.** A. L. VAN SCHERPENBERG (U.S.P. 1,979,781, 6.11.34. Appl., 11.2.31. Holl., 30.11.29).—Syrups of 60–80° Brix, made from raw beet or cane sugars, are stirred with  $\gt$  3% of C or bone char and heated at  $\gt$  100°, e.g., for  $\frac{1}{2}$  hr. at 120°, to eliminate objectionable flavours, and are then filtered. Subsequent crystallisation of sucrose may be prevented by addition of invert sugar syrup. J. H. L.

**Manufacture of a sugar preparation from starch, and of a milk suitable for infants.** ALLGÄUER ALPENMILCH A.-G. (B.P. 435,034, 7.3.34. Ger., 7.3.33 and 25.7.33).—Products consisting mainly of maltose and dextrans, for which special nutritive val. is claimed, are made by conversion of starch with amylases which, like pancreatic amylase, liberate the maltose in the  $\alpha$ -form. E.g., starch suspensions, adjusted to  $p_H$  5 with citric acid, are converted at 65° by the enzymes of *Aspergillus oryzae*, and afterwards heated to 80° to destroy the enzymes, filtered, and evaporated in vac. Dried-milk preps. containing these products, with or without pectin or the like, are also claimed. J. H. L.

**Manufacture of [cold-swelling] starch product.** F. O. GISECKE, Assr. to INTERNAT. PATENTS DEVELOPMENT Co. (U.S.P. 1,979,257, 6.11.34. Appl., 26.12.28).—Cold-swelling products for adhesive or other purposes are made from intermediate products of the manufacture of maize starch, e.g., from moist tabled starch, mill starch, or glutinous starch fractions, by bringing them to a H<sub>2</sub>O content of about 38–45%, and subjecting them to momentary high pressures and temp. about 150°, e.g., between heated rollers, and then grinding-sifting. Dextrans or other ingredients may be incorporated. Apparatus is described. J. H. L.

**Condensation products of carbohydrates.**—See XIII. **Purifying industrial wastes.**—See XXIII.

## XVIII.—FERMENTATION INDUSTRIES.

**Determination of saccharifying power of malt-diastase.** H. C. GORE and H. K. STEELE (Ind. Eng. Chem. [Anal.], 1935, 7, 324–326).—The application of Blish and Sandstedt's method (B., 1933, 602) to malt-diastase preps. is described. F. O. H.

**Determination of citric acid in wine.** A. HEIDUSCHKA and H. SOMMER (Pharm. Zentr., 1935, 76, 593–595).—Citric acid ( $\gt$  20 mg.) is separated from the bulk

of other wine constituents by pptn. as the Ba salt which is then converted into acetonedicarboxylic acid (I) by treatment with conc. H<sub>2</sub>SO<sub>4</sub> at 30–35°. (I) by boiling is converted into COMe<sub>2</sub>, which is distilled off, treated with dil. KMnO<sub>4</sub> to destroy MeCHO, and after a second distillation determined iodometrically. Details of procedure are described. I. A. P.

**Detection of illicit rum.** R. LINCOLN (Rept. Dept. Agric. Mauritius, 1933, 29; Internat. Sugar J., 1935, 37, 366).—Furfuraldehyde (I) being present in pot-still rum, but not in patent-still spirit, it is recommended that only rum free from (I) be allowed to leave the general warehouse, and that spirits containing  $\gt$  0.1 g. of (I) per hectolitre of 100° proof spirit shall be deemed illicit. J. P. O.

**Cider.** D. W. STEUART (Chem. & Ind., 1935, 879–881).—A brief account of manufacture and composition.

**[Production of] gluconic acid from sugar, using aerobic technique.** H. T. HERRICK, R. HELLBACH, and O. E. MAY (Internat. Sugar J., 1935, 37, 408).—A large-scale technique has been evolved for the production of gluconic acid by an aerobic mould fermentation, according to which 10 lb. of sugar yield 8 lb. of gluconic acid. Ca gluconate can now probably be sold for  $\lt$  50 cents per lb. (Cf. A., 1928, 804; 1934, 810.) J. P. O.

**EtOH from wood waste.**—See IX. **Glass-lined steel equipment.**—See X. **Fermentation of sawdusts.**—See XVII.

See also A., Oct., 1210, **Catalytic dehydration of EtOH.** 1282, **Prep. of cryst. dihydroxyacetone.**

## XIX.—FOODS.

**Quality of Australian wheat and its improvement.** I. General considerations. II. Influence of climate on quality. H. WENHOLZ. III. Need for improvement in baking quality. H. WENHOLZ and S. L. MACINDOE. IV. Milling qualities. V. Dough characters and baking quality. E. GRIFFITHS, G. W. NORRIS, and H. WENHOLZ. VI. Experimental baking tests: their value and interpretation. E. GRIFFITHS, L. S. CAYZER, G. W. NORRIS, and H. WENHOLZ. VII. Breeding wheat for improved quality. H. WENHOLZ (Dept. Agric. N.S. Wales Sci. Bull., 1933, 44, 4–10, 11–18, 19–28, 29–34, 35–40).—A general discussion. CH. ABS. (p)

**Food-chemical studies of oats.** V. E. TAKAHASHI, S. TASE, and Y. SAEKI (J. Agric. Chem. Soc. Japan, 1935, 11, 199–205).—Less lower fatty acid is found in Kusa than in White Bergium No. 1 oats, but no conspicuous differences are found in the amount of oleic, linoleic, and palmitic acids in the two varieties. E. A. H. R.

**Storage of rice.** XIII. **Storage in tin containers with calcium chloride, with special reference to the underdried product.** II. M. KONDO and T. OKAMURA (Ber. Ohara Inst. landw. Forsch., 1935, 7, 99–102; cf. B., 1935, 377).—Successful drying and storage of rice by sealing in Sn containers is reported. Drying took place more rapidly in warmer periods. A. G. P.

**Manufacture of dairy products in Europe.** H. A. BENDIXEN (Proc. 7th Ann. State Coll. Washington Inst. Dairying, 1934, 31—38).—Processes are outlined and chemical factors discussed. CH. ABS. (p)

**Commercial soft-curd milk.** D. S. COURTNEY (Proc. 6th Ann. State Coll. Washington Inst. Dairying, 1933, 61—67).—The technique of pasteurisation and homogenisation is described. Softening of the curd during homogenisation is caused by the more complete distribution of fat particles among broken-up particles of casein. Treated milk is the more viscous and has the better flavour. CH. ABS. (p)

**New Minnesota Babcock test reagent.** (A) H. A. BENDIXEN. (B) J. F. LOOP (Proc. 5th Ann. State Coll. Washington Inst. Dairying, 1932, 89—93, 94—102).—(A) The Petersen and Herreid reagent (B., 1930, 1128) gives clear fat columns of good colour.

(B) Comparison is made of results obtained by the above, the Babcock, and the Majonnier tests.

CH. ABS. (p)

**Detection of mastitis milk.** C. C. PROUTY (Proc. 5th Ann. State Coll. Washington Inst. Dairying, 1932, 152—154).—Chemical and biological tests are discussed. None accurately detects mastitis in market milk.

CH. ABS. (p)

**Heat-resistant and heat-loving bacteria and their control in pasteurising plants.** O. W. ESPE (Proc. 7th Ann. State Coll. Washington Inst. Dairying, 1934, 65—71).—Milk stone deposited on dairy equipment harboured large nos. of heat-resistant bacteria which when imbedded in the stone withstood 100° for 1 hr. Formation of milk stone was prevented by substituting a cleansing prep. containing  $\text{Na}_3\text{PO}_4$  for  $\text{Na}_2\text{CO}_3$ .

CH. ABS. (p)

**Heat-resistant organisms in evaporated milk.** D. R. THEOPHILUS (Proc. 6th Ann. State Coll. Washington Inst. Dairying, 1933, 67—72).—Gassy fermentation and bitterness in evaporated milk are caused by sporing anaerobic organisms commonly found in soil. Means of eliminating the defects are discussed. CH. ABS. (p)

**Irradiation process successfully applied to evaporated milk.** K. G. WECKEL and H. C. JACKSON (Wisconsin Agric. Exp. Sta. Ann. Rept. [1932—3], 1934, 33—35).—Irradiation is best carried out after evaporation and homogenisation. After reconstruction the milk contained 135 U.S.P. units of vitamin-D. Development of acidity in milk was somewhat slower after irradiation. Cream may be irradiated without formation of undesirable flavour or chemical deterioration.

CH. ABS. (p)

**Influence of metals on flavour of condensed-milk products.** Z. D. ROUNOY and H. C. JACKSON (Wisconsin Agric. Exp. Sta. Ann. Rept. [1932—3], 1934, 35—36).—Dissolution of metal during evaporation in Cu, Ni, and stainless-steel pans is examined. Milk and ice-cream mixtures prepared in Cu pans developed a tallowy flavour in storage.

CH. ABS. (p)

**Developments in chemical sterilisation [of dairy equipment].** C. C. PROUTY (Proc. 7th Ann. State Coll. Washington Inst. Dairying, 1934, 61—64).—In making dilutions for bacterial counts of chlorinated

solutions the presence of  $\text{Na}_2\text{S}_2\text{O}_3$  neutralised the action of Cl and permitted the growth of organisms which would not otherwise develop. CH. ABS. (p)

**Coffee-cream and whipping-cream problems.** G. W. WILSON (Proc. 5th Ann. State Coll. Washington Inst. Dairying, 1932, 21—26).—Factors affecting the formation of large fat globules and of "cream plugs" are examined. Acidity of coffee cream should be < 0.18% to avoid feathering. Homogenisation of coffee cream should be carried out at low temp. with material of low acidity. Whipping cream should be aged at low temp. for < 24 hr., and should contain < 30% of fat. Whipping should take place at > 10°. CH. ABS. (p)

**Fermentation of proteins in cream.** C. C. PROUTY (Proc. 6th Ann. State Coll. Washington Inst. Dairying, 1933, 59—61).—Protein changes during fermentation cannot be predicted from the acid content. Samples of similar origin attained the same level of acidity after prolonged incubation, whether at 20° or 37°, but the  $\text{NH}_3$  content was higher at 37°. CH. ABS. (p)

**Preservation of composite samples [of milk and cream].** G. W. WILSON (Proc. 6th Ann. State Coll. Washington Inst. Dairying, 1933, 59—61).—Reaction between milk fat and  $\text{HgCl}_2$  is marked by a visible deposit of Hg on the walls of the sample bottle. S in rubber stoppers reacts with decomp. products of milk-fat acids, forming a gummy deposit on the stopper. This is prevented by a covering of Sn foil. Na salicylate, NaOBz, eugenol, CaS, and  $\text{K}_2\text{Cr}_2\text{O}_7$  were fairly good preservatives for milk at low temp., but were unsatisfactory at room temp.  $\text{HgCl}_2$  gave best results. Mixing of samples by rotary motion (avoiding any churning action) reduces curd formation and facilitates the final laboratory sampling. CH. ABS. (p)

**Determination of salt in butter.** F. H. McDOWALL and C. L. MACDONALD (New Zealand J. Sci. Tech., 1935, 17, 417—419).—The standard method is adequate for all but those samples having nearly the max. permissible NaCl content. For these the  $\text{COMe}_2$  method is more accurate. Variations in NaCl content in individual boxes of butter from a single churning are examined.

A. G. P.

**Influence of feeding on composition and properties of beef suet.** V. N. DSHONS, M. G. SERGEEVA, and M. N. DSHAN-PUSCHKIN (Rept. U.S.S.R. Fat and Margarine Inst., 1935, No. 2, 27—39).—Analytical data are recorded, relating to differences in diet. R. T.

**Canning of apple juice.** D. A. TUCKER, G. L. MARSH, and W. V. CRUESS (Fruit Products J., 1935, 15, 7—8). E. B. H.

**Digestible nutrients of Napier grass and *Crotalaria intermedia* silages, Natal-grass hay, and dried refusés of grapefruit and orange canneries.** W. M. NEAL, R. B. BECKER, and P. T. D. ARNOLD (J. Agric. Res., 1935, 51, 173—177).—Nutrient analyses and digestibility trials are recorded. A. G. P.

**Determination of fibre in potato flakes.** B. LAMPE and R. DEPLANQUE (Z. Spiritusind., 1935, 58, 300).—The flakes, 15 min. after treatment with  $\text{H}_2\text{O}$  at 60°, are poured on to a special metal sieve (144 meshes/

sq. cm.) and the starch is washed through by means of a stream of  $H_2O$ . The residue, after removal of surplus  $H_2O$  on a silk gauze, is transferred to a flask and treated for 1 hr. with boiling dil. HCl, the residual washed fibre being dried and weighed. In the flakes thus investigated, the normal fibre content was 0.4—1.0%.

I. A. P.

CNS val. of butter fat.—See XII. Carotene and vitamin-C in vegetables etc. Winter-hard crop plants. High-moor hay. Nettles [as feed].—See XVI.

See also A., Oct., 1286—7, **Vitamins**. 1290, **Proteins of wheat flour**.

## PATENTS.

**Cereal food products.** H. JEPHCOTT (B.P. 435,002, 9.10.34).—A mixture of wheatmeal, wheat germ, bone meal, dry yeast, and salt is suspended in  $H_2O$  and the suspension fed on to steam-heated rotating cylinders, so that the starch is gelatinised and the product cooked and dried in one operation, the finished product being in powdered or flakey form.

E. B. H.

**Manufacture of acidophilus milk.** J. H. KELLOGG (U.S.P. 1,982,994, 4.12.34. Appl., 14.6.33).—Soya-bean milk, in which *B. acidophilus* grows more readily than in cow's milk, is used for the prep. of acidophilus milk.

E. B. H.

**Drying of [edible] organic materials.** C. W. WILSON, Assr. to CALIFORNIA FRUIT GROWERS' EXCHANGE (U.S.P. 1,975,998, 9.10.34. Appl., 20.6.30).—The addition of an approx. 5% solution of a pectate to a liquid such as fruit juices, whey, etc. enables such a liquid to be dried to a non-hygroscopic powder.

E. B. H.

**Preparation of whey concentrates.** W. W. TRIGGS. From KRAFT-PHENIX CHEESE CORP. (B.P. 434,058, 27.10.34).—Vac. evaporation of whey is carried out after the addition of  $H_3PO_4$  (or other suitable acid) to give  $p_H$  5.5—6; the acid may be neutralised subsequently with CaO, NaOH, or MgO. If the whey is a by-product of HCl pptn. of casein, excess HCl may be removed by electrolysis. It is claimed that the process prevents destruction of vitamin- $B_2$ , reduces frothing during evaporation, and improves colour.

E. B. H.

**Preservation of rindless cheese.** F. ZWICK (SCHACHELKÄSEFABR. F. ZWICK) (B.P. 434,324, 16.1.35. Ger., 23.1. and 26.9.34).—Bacterial action in rindless "full-fat" cheese is prevented by treatment with 0.1—0.3% of ( $\leq$  35%)  $H_2O_2$  prior to heating to 65°. "Low-fat" cheese is heated to 65°, the  $H_2O_2$  added, mixed, and later heated to 80°.

E. B. H.

**Preservation of egg-yolks, egg-whites, or both.** G. MÖLLER (B.P. 435,242, 22.2.35).—Egg-yolks or -whites are stored in an atm. of  $CO_2$  in a dry, sterilised container (C). Air should previously be removed from the egg material by treatment with  $CO_2$  under pressure, and the whole pasteurised at  $< 63^\circ$  before C is hermetically sealed.

E. B. H.

**Preservation of perishable substances [e.g., meat] during transport or storage.** CARBA DRY ICE (AUSTRALIA), LTD. (B.P. 434,458, 10.12.34. Austral.,

22.12.33).—Solid  $CO_2$  is used to maintain [ $CO_2$ ] in gas storage. Insulation of the container is such that the max. calc. heat leakage will sublime less  $CO_2$  than is lost by gas leakage. Sublimation of additional  $CO_2$  is produced by electric heating of solid  $CO_2$ , this being controlled automatically by an electric  $CO_2$  meter.

E. B. H.

**Coating of fresh fruit in preparation for the market.** M. L. TROWBRIDGE, Assr. to BROGDEN CO. (U.S.P. 1,985,846, 25.12.34. Appl., 28.8.29).—The fruit is first coated with an alkali (e.g., borax, or NaOH if suitably diluted) and then, with the aid of heating and rubbing, with oleaginous saponifiable material.

B. M. V.

**Preservation of fruit.** W. J. H. HINRICHS (B.P. 434,137, 15.3.34. Ger., 15.3.33).—A preservative covering for bananas, melons, citrus fruits, etc. is prepared from rubber latex washed free from unstable impurities, conc., diluted with tap  $H_2O$ , and preserved with  $H_3BO_3$  or salicylic acid.

E. B. H.

**Disintegration of cocoa by means of lime.** R. DIERBACH (B.P. 434,750, 17.5.34).—"Decomp." of roasted cacao nibs by addition of  $\geq 3\%$  of Ca salts, either in powdered form before milling, or in solution after milling, yielding a characteristic "lime-cacao," is described.

E. B. H.

**Casein sheets.**—See V. **Sugar syrup. Milk for infants.**—See XVII.

## XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Stabilisation and sterilisation of solutions in pharmaceutical practice.** H. ESCHENBRENNER (Pharm. Ztg., 1935, 80, 961—963, 976—977).—The uses of chemical agents, filters, and heating processes are discussed and compared. Amounts and methods of addition of Nipagin (I), Nipazol (II), Na-Nipazol, and a mixture of 65% of (I) and 35% of (II), to various pharmaceutical preps. are given. Autoclaving at 120° may be avoided by combining steaming at 100° with chemical sterilisation, e.g., with the "Nipa-Sterilisor."

F. A. A.

**Synthesis of vanillin.** G. V. TSCHELINCEV and B. N. RODNEVITSCH (J. Appl. Chem. Russ., 1935, 8, 909—911).—The method described in B.P. 401,562 (B., 1934, 86) gives 80% yields.

R. T.

**Separation of strychnine from cinchona alkaloids.** G. E. MALLORY and P. VALAER, JUN. (Amer. J. Pharm., 1935, 107, 349—351).—Traces of strychnine (I) in presence of large amounts of other herb extracts are detected by extraction of the dried total alkaloids, isolated as usual, with 3 c.c. of  $H_2O$  on the steam-bath for  $\leq 10$  min. The filtered extract is evaporated to dryness and (I) detected by the  $H_2SO_4$ - $K_2Cr_2O_7$  test. Colloidal material needs preliminary boiling with 15 wt.-% of  $H_2SO_4$  for 6 hr.

E. J. B.

**Determination of morphine.** V. **Methods of determination in opium.** H. BAGGESGAARD-RASMUSSEN and F. REIMERS (Dansk Tidsskr. Farm., 1935, 9, 229—243; cf. B., 1934, 986).—A crit. investigation is made of the known methods of extraction, purification, and determination, which are found to give varying results.

The authors suggest that a labile phenolic alkaloid may account for this, and advocate the use of a method based on extraction of the alkaloids by  $\text{CHCl}_3$ - $\text{Pr}^n\text{OH}$  (3:1) mixture at  $p_H$  about 9 after treatment with  $\text{Ca}(\text{OH})_2$  according to the International method, purification as in the case of tetrapon (cf. B., 1931, 565), further separation by extraction with  $\text{C}_6\text{H}_6$ , and titration of the MeOH solution of the purified morphine by HCl (Me-red).

E. J. B.

**Constituents of pyrethrum flowers. Determination of pyrethrin-II.** H. L. HALLER and F. ACREE, JUN. (Ind. Eng. Chem. [Anal.], 1935, 7, 343—344).—The material extracted by light petroleum from dried pyrethrum flowers is heated with PhOH and HI, the MeI liberated is absorbed in AcOH-KOAc-Br, the latter reagent is subsequently treated with  $\text{HCO}_2\text{H}$  (to remove excess Br), aq. KI, and  $\text{H}_2\text{SO}_4$ , and the liberated I is titrated with 0.05N- $\text{Na}_2\text{S}_2\text{O}_3$ . F. O. H.

**Chemical examination of alkaloid-free yellow lupins.** F. E. NOTTBOHM and F. MAYER (Landw. Jahrb., 1935, 81, 1—19).—Methods for determining sparteine and lupinine are described and vals. obtained for sweet and bitter lupins are recorded. A. G. P.

**Technology of agar-agar.** A. KORENTZVIT (J. Appl. Chem. Russ., 1935, 8, 912—918).—The highest yields of agar-agar are obtained by extracting Black Sea *Phyllophora* with  $\text{H}_2\text{O}$  at 90—95°, in tanks > 1 m. in depth. Diffusion batteries should not be employed. R. T.

**Drug extraction. IV. Effect of variation in solvents on extraction of jalap.** W. J. HUSA and P. FEHDER (J. Amer. Pharm. Assoc., 1935, 24, 615—619; cf. B., 1935, 973).—Comparison of  $\text{H}_2\text{O}$ , EtOH, and glycerol shows that EtOH (abs. or U.S.P. standard) is the best solvent for extraction of the resin from jalap.

R. S. C.

**Determination of mercury in iodinated organic mercury compounds.** R. B. SANDIN and E. T. MARGOLIS (Ind. Eng. Chem. [Anal.], 1935, 7, 293—294).—The sample (< 0.3 g.) is heated in a Carius tube with fuming  $\text{HNO}_3$  and the  $\text{HgI}_2$  formed is dissolved in aq.  $\text{NH}_3$ , KI, and, if free I is present, NaOH. The solution is treated with  $\text{CuSO}_4$ -propylenediamine reagent (A., 1932, 1011) at the b.p., the resulting ppt. after washing and drying containing 21.81% of Hg.

F. O. H.

**Behaviour of drugs at high oxidation potentials. Tillmans' chloramine value.** P. W. DANCKWORTZ [with W. DIETRICH and G. WILKENS] (Arch. Pharm., 1935, 273, 403—408).—The "chloramine val." (cf. B., 1929, 926) of 49 drugs is determined. It is only partly due to the tannin content and is to some extent characteristic of each drug. R. S. C.

**Determination of essential oils in drugs. Oil content of peppermint, sage, fennel, and caraway.** L. KOFLER and G. VON HERRENSCHWAND (Arch. Pharm., 1935, 273, 388—402).—A method for volumetric determination of volatile oil in drugs is described; it involves steam-distillation and collection of the condensate over NaCl. Whole *Mentha* and *Salvia* yield more oil than when ground. The oil content of the samples examined

varied widely and, particularly in the case of powders, was often < Pharmacopœia standards. R. S. C.

**Leaf oils of Washington conifers. VII. Juniperus occidentalis, Hook.** E. V. LYNN and L. FISCHER (J. Amer. Pharm. Assoc., 1935, 24, 613—615; cf. B., 1933, 571).—The fresh leaves and branches of this tree give on steam-distillation 0.36% of oil,  $d_{25}^{25}$  0.9212,  $n_D^{25}$  1.4745,  $[\alpha]_D^{25}$  +21.91°, acid val. 2.61, sap. val. 110.53 (38.17% of bornyl acetate), after acetylation 149.58 (11.06% of free borneol, 41.05% of total borneol). Aldehydes, ketones, and primary alcohols were absent, or present only in very small quantities. It contained bornyl acetate 40, borneol 11, AcOH 0.2, phenols 0.5, and  $\alpha$ -phellandrene + cymene + camphene (?) 35%. R. S. C.

**Tobacco-seed oil.**—See XII. Tobacco. **Pyrethrum flowers.**—See XVI. Gluconic acid.—See XVIII.

See also A., Oct., 1228, Derivatives of carbamylcholine. 1233, Aryl esters of hydroxydiphenyls. 1242, Prep. of dehydroandrosterone. 1244, Prep. of bixin. 1251, Antimalarials. 1255—7, Alkaloids. 1259, Detection of citric acid. Determining [mixed] anæsthesin and novocaine, and quinidine. 1260, Determining hydroxydimorphine. 1286—7, Vitamins.

## PATENTS.

**Production of antirachitic substances.** A. J. PACINI, ASSR. to AMER. RESEARCH PRODUCTS, INC. (U.S.P. 1,983,944, 11.12.34. Appl., 13.8.28).—An activatable substance, e.g., cholesterol, is treated with cathode-ray radiation in presence of a photocatalyst.

E. H. S.

**Purifying the hormones of the corpus luteum.** SOC. CHEM. IND. IN BASLE (B.P. 435,830, 5.9.34. Switz., 6.9.33).—A prep. containing the hormone is treated with a reagent which reacts with the :CO group, e.g.,  $\text{NH}_2\text{OH}\cdot\text{HCl}$ , and the reaction product is isolated and decomposed. E. H. S.

**Manufacture of hormone preparations.** I. G. FARBENIND. A.-G. (B.P. 435,195, 17.3.34. Ger., 18.3.33).—The hormone or substance containing it is dissolved, together with a protein compound of high mol. wt., e.g., Na protalbinat, in a common solvent, and a common precipitant, e.g.,  $\text{Et}_2\text{O}\text{-COME}_2$ , is added. The separated and dried powder may be diluted with an indifferent material, e.g., lactose. E. H. S.

**Production of concentrated aqueous solutions of the follicular hormone.** F. HOFFMANN-LA ROCHE & Co. A.-G. (B.P. 434,406, 9.4.35. Ger., 17.5.34).—The hormone is dissolved in aq. resorcinol solutions, e.g., 15%. E. H. S.

**Production of therapeutically valuable saturated alcohols from germinal-gland hormones.** SCHERING-KAHLBAUM A.-G. (B.P. 434,390, 7.12.34. Ger., 7.12.33).—Aromatic or unsaturated *tert.*-alcohols obtained by treatment of germinal-gland hormones with organo-metallic compounds are hydrogenated; e.g.,  $\text{C}_{19}\text{H}_{26}\text{O}_2$ , from follicle hormone ( $\text{MgMeI}$ ), gives  $\text{C}_{19}\text{H}_{32}\text{O}_2$ . E. H. S.

**Manufacture of therapeutic calcium preparations.**

V. CHRISTINA, Assr. to INTRAVENOUS PRODUCTS CO. OF AMERICA, INC. (U.S.P. 1,983,344, 4.12.34. Appl., 17.3.33).—Stable 10% solutions of Ca gluconate in cold H<sub>2</sub>O are prepared by maintaining the *p*<sub>H</sub> of the solution at either 6 or 8. E. H. S.

**Preparation of medicine [for calcium therapy].**

G. C. TAYLOR, Assr. to FLINT EATON & CO. (U.S.P. 1,983,954, 11.12.34. Appl., 20.5.33).—A dry, fused mixture of Ca gluconate, an edible org. acid, *e.g.*, citric, and a substance which liberates CO<sub>2</sub> in presence of the acid and H<sub>2</sub>O, *e.g.*, NaHCO<sub>3</sub>, is specified. E. H. S.

**Manufacture of acridinium compounds [pharmaceuticals].** I. G. FARBENIND. A.-G. (B.P. 434,497, 3.3.34. Ger., 4.3.33).—A 3:6-diamino-10-alkyl- or -10-benzyl-acridinium compound is condensed with an aliphatic, hydroaromatic, or aliphatic-aromatic ketone in presence of aq. alkali. The compounds from 3:6-diamino-10-methylacridinium chloride and COMe<sub>2</sub>, m.p. 188°, and COPhMe, m.p. 175°, from the corresponding sulphate and cyclohexanone, m.p. 236°, from 3:6-diamino-10-benzylacridinium chloride and COMe<sub>2</sub>, m.p. 163°, and from 3:6-diamino-2:7:10-trimethylacridinium chloride and COMe<sub>2</sub>, m.p. > 300°, are described. H. A. P.

**Insecticide.**—See XVI.

## XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Problem of [photographic] emulsion gelatin.**

A. STEIGMANN (Chem.-Ztg., 1935, 59, 821—823).—A discussion is given of the restraining and sensitising compounds in gelatin as used in the prep. of the emulsions, and the theory of their action. J. L.

**X-Ray film: its manufacture and some properties.** H. A. EDGERTON (Brit. J. Radiol., 1934, 7, 767—773).—The relations between *d* and thickness of an Al step-wedge, through which the film was exposed, are shown for exposures with plain X-rays and with intensifying screens. Data for the effect of tube voltage and of developer are recorded. CH. ABS. (e)

**I. Deformation of photographic films. II. Production of undeformable cellulose acetate films for photogrammetric purposes.** A. CHARRIQU and (MLLE.) S. VALETTE (Bull. Photogrammetrie, 1934, 4, 97—100, 100—103, and Phot. J., 1935, 75, 516—522).—I. Films of cellulose nitrate or acetate expand and contract proportionally with increase or decrease, respectively, of R.H. The action of developing etc. solutions is the same as that of H<sub>2</sub>O. New films, after wetting and drying, show a permanent shrinkage to a length < that of the original film. The effects are partly due to simple swelling of the cellulosic material, and are also affected by fixing, method of drying, and dissolution of plasticisers.

II. Films decrease in deformability with increasing acetate and plasticiser contents; the composition and production of an undeformable film has already been described (B., 1935, 95). J. L.

**Control of [photographic] graininess.** J. LANCROT (Amer. Ann. Phot., 1935, 49, 53—55).—For equally

exposed negatives graininess was a min. when using Odell's method of physical development, greater when using a metol-quinol (I) developer containing borax and much sulphite, and a max. for development in (I), followed by treatment with a Cu mordanting bath and dye-toning. CH. ABS. (e)

**[Photographic] ultra-fine grain by modified physical development.** L. S. AREY (Amer. Phot., 1934, 28, 682—693).—Odell's physical developer does not produce finer grain than does the Eastman D-76. Baur and Imhof's observation of reduced graininess on bathing the film in Pinakryptol-green prior to development in the Odell solution was confirmed. This reduced graininess was not observed when desensitising was followed by chemical development. CH. ABS. (e)

**[Photographic] sensitisation by "Herschel treatment."** LÜPPO-CRAMER (Phot. Ind., 1935, 33, 846).—Plates exposed to red light before normal exposure show the production of increased sensitivity, without fogging. In the normal Herschel treatment bleaching is produced, but if a plate is first exposed under a wedge, and then to red light, the image near the threshold is intensified; infra-red light does not produce this effect. J. L.

**Contrast variation obtained with the chromium [photographic] intensifier.** P. E. BOUCHER (Amer. Ann. Phot., 1935, 49, 59—65).—A discussion. CH. ABS. (e)

**Radiography in southern India.** E. A. HARLOW (Brit. J. Radiol., 1935, 7, 3—6).—Films do not keep satisfactorily for > 1 month. Processing is accomplished by leaving the film in the various solutions and wash-water for the min. time. CH. ABS. (e)

**Pyrogallol from wood tar.**—See II. **Effluents poisonous to animals.**—See XXIII.

See also A., Oct., 1216, **Infra-red photographs of Cr compounds [on paintings].**

### PATENTS.

**Sensitisation of silver halide gelatin emulsions.** I. G. FARBENIND. A.-G. (B.P. 434,235, 4.6.34. Ger., 3.6. and 26.5.34).—Unsymmetrical dicarbocyanines such as those described in B.P. 434,234 (B., 1935, 1037) are sensitisers for deep red and infra-red light. Of the 28 examples, the sensitising maxima vary from 680 to 790 mμ. F. M. H.

**Photographic material for making coloured prints.** M. W. SEYMOUR, Assr. to EASTMAN KODAK CO. (U.S.P. 1,984,090, 11.12.34. Appl., 29.2.32).—Dichromated gelatin layers containing AgI on which suitable basic dyes are adsorbed are used as in the ordinary C processes. Such emulsions are sensitive to all colours of the spectrum, and, further, give images of varying contrast according to the colour of the printing light, the greatest contrast being obtained when printed by the colour least absorbed by the emulsion; *e.g.*, if Turquoise-blue G is used, the emulsion absorbs chiefly red and blue light, and gives the most contrast when printed by green light. The emulsions may be prepared by making a suitable dyed AgI emulsion, the finished plate being bathed in (NH<sub>4</sub>)<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> and aq. NH<sub>3</sub>. J. L.

**Manufacture of photographic emulsion.** E. GOVETT, Assr. to GOVETT, LTD. (U.S.P. 1,982,802, 4.12.34. Appl., 31.5.29).—Emulsions are prepared by the interaction, in gelatin, of a Ag salt with "colloidal Br" a term including colloidal HBr or Br hydrate  $[\text{Br}_2 \cdot 5\text{H}_2\text{O} (\text{I})]$ , the latter being prepared by interaction of  $\text{KBrO}_3$  and tannic acid, giving HBr in solution, or, on evaporating to dryness, (I). The AgBr produced is gelatinous in nature, and much less gelatin than usual is required; a substantially grainless image is produced, and therefore only half the usual Ag content is necessary in the emulsion, and thus very thin emulsions are possible. J. L.

**Production of negative photographic prints by means of diazonium compounds.** N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 434,761, 21.11.34. Ger., 4.1.34).—After exposure the negative [sensitised, e.g., with 1:4:2-OH·C<sub>6</sub>H<sub>3</sub>(SO<sub>3</sub>H)·N<sub>2</sub>Cl or 2:4:1-OH·C<sub>10</sub>H<sub>7</sub>(SO<sub>3</sub>H)·N<sub>2</sub>Cl and  $\text{Cu}(\text{NO}_3)_2$ ] is subjected to moisture or to moisture + heat (75–120°), whereby the unexposed diazonium salt is completely decomposed into colourless products. H. A. P.

**Production of a negative by reversal.** R. H. HARRISON (U.S.P. 1,984,580, 18.12.34. Appl., 9.9.29).—The lines, dots, or design ultimately required in negative are applied in greasy ink (or other chemical resist) to a celluloid or gelatin base. The unprotected parts are treated with liquid or gaseous I, and afterwards with Me-violet, which combines with the I to give an opaque surface-coating; a second intensifying application of I may be made. The greasy resist is then dissolved away, leaving a clear negative of the required design. J. L.

**Processing of photographic elements.** H. D. RUSSELL, Assr. to EASTMAN KODAK Co. (U.S.P. 1,984,086, 11.12.34. Appl., 27.9.32).—A preliminary or stop-bath to be employed before using acid hardening fixing baths comprises a solution containing borax,  $\text{H}_3\text{BO}_3$ ,  $\text{B}(\text{OAc})_3$ , or other compound yielding  $\text{BO}_3^{3-}$  in solution. The bath increases the life of the fixing solution by reducing the transfer of alkali from the developer. J. L.

**Colour photography.** H. D. MURRAY, H. BAINES, R. A. S. GRIST, and DUFAYCOLOR, LTD. (B.P. 435,484, 23.3.34).—A varnish layer (to be interposed between a colour screen and a superimposed emulsion) which shall not affect the dyes or the emulsion, while giving a good inherent surface, is prepared by combining a glyptal resin with a drying oil, e.g., linseed and/or tung. Drying agents, plasticisers, and wetting agents may be added. Various formulæ are detailed. J. L.

**Production of multicolour photographic images on coloured and differently sensitised multilayer photographic material.** B. GASPAR (B.P. 434,875, 5.2.34. Ger., 8.2.33).—The respective colour filters have light-transmission ranges both in the visible and invisible portions of the spectrum, thus allowing them to be used both for recording and copying purposes. E.g., a blue filter element, transmitting light of  $\lambda$  400–500 and 660–690 m $\mu$ , is coloured by a mixture of rescin, methylene-blue, rhodamine, and Berlin- or Prussian-blue. Use in connexion with lenticular screen images is claimed. H. A. P.

**Photographic copying process.** SIEMENS & HALSKE A.-G. (B.P. 435,184, 12.2.34. Ger., 10.2.33. Addn. to B.P. 407,830; B., 1934, 477).—The image on the Al or Al-alloy plate is caused to be negative and is copied in positive form by X-rays; improved opacity to those rays is attained by conversion (by toning) of the Ag image into Au, Pt, or Pb salt, etc. B. M. V.

**[Grating-dispersing-prism device for] colour photography.** F. PREINERSTORFER (B.P. 435,006, 3.12.34. Austr., 30.12.33).

**[Ensuring correct registration in] colour photography.** H. WEBERLING (B.P. 435,123, 16.3.34).

Pentacarbocyanine dyes.—See IV.

## XXII.—EXPLOSIVES; MATCHES.

**Influence of the nature of the surrounding gas on the luminosity associated with the detonation of explosives.** H. MURAOUR and A. MICHEL-LÉVY (Mem. Poudres, 1934–35, 26, 171–179).—Investigations are summarised and various hypotheses to account for the phenomena discussed with special reference to mixtures of  $\text{C}(\text{NO}_2)_4$  and PhMe. W. J. W.

**Degradation of cotton linters. Nitrocellulose.**—See V.

### PATENT.

**Explosive.** H. T. SIMPSON (B.P. 435,588, 19.10.34).—An intimate mixture of finely-divided Al (or alloy thereof) and a metallic oxide ( $\text{MnO}_2$ ,  $\text{Fe}_2\text{O}_3$ ) is mixed with  $\text{NH}_4\text{NO}_3$ ,  $\text{NaNO}_3$ , or  $\text{KNO}_3$ . A suitable composition contains  $\text{NH}_4\text{NO}_3$  90, Al 6.5,  $\text{MnO}_2$  3.5%. W. J. W.

## XXIII.—SANITATION; WATER PURIFICATION.

**Influence of the breath-resistance of a gas-mask on the working capacity of the wearer of the mask.** H. HERBST (Chem.-Ztg., 1935, 59, 823–824).—The relation of the exhalation resistance in a gas-mask to the capacity for work of the wearer is shown graphically, and demonstrates that resistances equal to 10, 15, and 20 mm. of  $\text{H}_2\text{O}$  reduce the working capacity to 60, 30, and 10% of the initial val., respectively. The resistance increases with use of the mask, owing to accumulation of moisture. With high resistances, breathing difficulties cause a reduction of air pressure within the mask, and there is a danger of leaks at the edges and elsewhere. Masks with < 10 mm. of  $\text{H}_2\text{O}$  resistance are recommended. J. L.

**Corrosion of air-conditioning equipment.** C. M. STERNE (Mech. World, 1935, 98, 403–404).—Metal test-panels were exposed in various portions of an air-conditioning plant and corrosion was estimated in terms of the loss in wt. after a standard cleaning process. Addition of NaOH or Na silicate and particularly  $\text{Na}_2\text{Cr}_2\text{O}_7$  to the wash- $\text{H}_2\text{O}$  gave protection, and the latter helped to remove org. odours from the air. G. H. C.

**Carbon monoxide alarm and ventilation control.** F. C. HOUGHTEN and L. THIESSEN (Heating, Piping, Air Condit., 1935, 7, 149–151).—The temp. rise of air passing through a Hopcalite catalyst which oxidises the CO to  $\text{CO}_2$  is recorded as an e.m.f. by a sensitive thermocouple placed in the air stream. CH. ABS. (e)

**Fumigants [insecticides].** C. R. TWINN (Quebec Soc. Protection Plants, 25th and 26th Ann. Repts. [1932—34], 1934, 52—57).—Use of  $(\text{CH}_2)_2\text{O}-\text{CO}_2$  for the control of storage pests is described. The gas penetrated all containers except boxes (of chocolate) wrapped in 3 layers of Cellophane. The influence of temp., R.H., and time on the efficiency of fumigation is examined. Mixtures of  $\text{C}_2\text{H}_4\text{Cl}_2-\text{CCl}_4$  penetrate less easily than  $(\text{CH}_2)_2\text{O}-\text{CO}_2$ ; they are less agreeable to handle but have no ill effects on workers even when inhaled in considerable amounts. CH. ABS. (p)

**Determination of suspended solids in sewage by light absorption.** G. W. HOLMES (Sewage Works J., 1935, 7, 640—657).—If the sewage solids are reduced in size by passage through a colloid mill the light absorbed in passing through  $\frac{1}{2}$  in. distance in the sewage bears a close relation to the suspended-matter content as measured by the Gooch-crucible method. In the apparatus described the intensity of the light is measured by an electronic cell. C. J.

**Filtration of settled sewage.** W. RUDOLFS, J. H. BRENDLEN, and W. T. CARPENTER (Sewage Works J., 1935, 7, 628—639).—Experiments made at Coney Island indicate that by the subsequent use of a Laughlin magnetic filter at rates up to  $200 \times 10^6$  gals. per acre per day, the detention period of sewage in a settlement tank may be reduced from 2 hr. to 1 hr. with improved removal of biochemical O demand and suspended solids. C. J.

**Digestion of garbage in a sewage-treatment plant.** H. E. BABBITT (Sewage Works J., 1935, 7, 658—662).—Experiments made at the University of Illinois indicate that the volatile solids of garbage are not readily amenable to digestion, and under American conditions if the full garbage waste of the community were added to the sewage the amount of total and volatile solids would be doubled, the grease content  $>$  doubled, and the biochemical O demand increased by 25%. C. J.

**Cation-exchange capacity of activated [sewage] sludge.** L. R. SETTER, G. M. RIDENOUR, and C. N. HENDERSON (Ind. Eng. Chem., 1935, 27, 1228—1230).—Activated sludge produced under normal operating conditions was used to study the cation-exchange capacity as a measure of the colloidal property of the floc. Under conditions of sufficient  $\text{O}_2$  tension and good purification the sludge has the colloidal property of having exchangeable cations of a magnitude similar to that of clays of high  $\text{SiO}_2$ : sesquioxide ratio, e.g., bentonite, and its settling character improves with an increase in the cation-exchange capacity and with a decrease in the total fat and fatty acid content. C. J.

**Adaptability of sewage sludge as a fertiliser.** E. E. DE TURK (Sewage Works J., 1935, 7, 597—610).—Activated sludge contains 5—6% of N of which 40—50% is as readily available for plant nutrition as is that in  $\text{NaNO}_3$ . In comparison with artificial fertilisers its val. is barely high enough to permit processing dry unless used as a conditioner to prevent caking and to assist when drilling other fertilisers along with the seed; it may, however, be applied in the moist condition. Digested sludge contains  $<$  2% of N of a comparatively low order of availability and its fertiliser val. is too low

to pay for dewatering beyond what is necessary for economic transportation. C. J.

**Public health significance of sewage sludge when used as a fertiliser.** F. W. TANNER (Sewage Works J., 1935, 7, 611—617).—It is dangerous to apply sewage sludge to land on which vegetables which may be eaten raw are grown, owing to the possible presence of pathogenic bacteria. If used it should be applied in the winter weather. C. J.

**Determination of chloroamine in water supplies.** P. D. McNAMEE (Ind. Eng. Chem. [Anal.], 1935, 7, 333—334).—The amount of  $\text{NH}_4^+$  formed on adding HCl is determined. The procedure is suitable in presence of free  $\text{NO}_2^+$  and for differentiation between  $\text{NH}_2\text{Cl}$  and  $\text{Cl}_2$ . E. S. H.

**Limiting standards of bacterial quality for sources of purified water supplies.** H. W. STREETER (J. Amer. Water Works Assoc., 1935, 27, 1110—1119; cf. B., 1935, 336).—Extensive studies by the U.S. Public Health service indicate that in order to deliver effluents having an average *B. coli* index  $<$  1.0 per 100 c.c. the raw  $\text{H}_2\text{O}$  should contain  $\nabla$  50 *B. coli* per 100 c.c. where the treatment consists of simple chlorination,  $\nabla$  5000 when the  $\text{H}_2\text{O}$  is passed through rapid sand filters and is post-chlorinated, and  $\nabla$  20,000 when additional prechlorination is practised. C. J.

**Results of algal activity [in water].** W. C. PURDY (J. Amer. Water Works Assoc., 1935, 27, 1120—1133).—In addition to causing unpleasant tastes and odours, clogging of filters, etc., blue-green alga may produce, under certain conditions, toxic products which cause intestinal trouble. Tests show that under average conditions of sunlight sufficient algae to tint the  $\text{H}_2\text{O}$  a scarcely perceptible green produced measurable amounts of dissolved  $\text{O}_2$  which proved sufficient to sustain in a simulated heavily polluted  $\text{H}_2\text{O}$  a bacterial content which reached maxima of from 5 to  $13 \times 10^6$  per c.c. C. J.

**Selective media for coli-aerogenes isolation [from water].** C. C. RUCHHOFT and J. F. NORTON (J. Amer. Water Works Assoc., 1935, 27, 1134—1142).—Suggested media have been studied to determine the feasibility of using a more selective medium than the standard lactose broth without sacrificing sensitivity to any strains of the *coli-aerogenes* group. None of the media tested proved equal to standard broth, the next two in order of productivity being the same broth with the addition (per litre) of 0.015 g. of basic fuchsin and 2.0 g. of  $\text{K}_2\text{HPO}_4$ , respectively. Other media proved to be very selective but too inhibitive for use as primary isolation media, and may be useful in confirmatory procedure. C. J.

**Relative productivity of certain culture media [for B. coli in water].** R. E. NOBLE (J. Amer. Water Works Assoc., 1935, 27, 1143—1160).—In tests using pure cultures, lactose broth buffered with 2.0 g. of  $\text{K}_2\text{HPO}_4$  per litre and brilliant-green lactose bile agar approached standard broth in productivity. Brilliant-green lactose bile broth and agar appear less productive when planted with raw  $\text{H}_2\text{O}$  instead of pure cultures, whereas ferrocyanide-citrate agar appears to be unaffected. C. J.

**Determining the bacteriological quality of drinking water.** J. K. HOSKINS and C. T. BUTTERFIELD (J. Amer. Water Works Assoc., 1935, 27, 1101—1109).—The lactose-broth dilution method is discussed with special reference to the size of the sample to be taken and the interpretation of the results obtained. An accurate enumeration cannot be obtained in this way and an acceptable and dependable method is an urgent necessity. In the discussion, R. E. NOBLE refers to other organisms which have an inhibitory influence on the growth of the *coli-aërogenes* group and urges further research on direct plating media. C. J.

**Colorimetric determination of dissolved oxygen [in water].** F. W. GILCREAS (J. Amer. Water Works Assoc., 1935, 27, 1166—1177).—The amidol-citrate coloration method (cf. B., 1935, 928) is modified by substituting 2-oz. square bottles for the original narrow test-tubes and by adding the citrate as a solution. The test is suitable for use with sewage and effluents provided that the amount of oxidising and reducing agents present is small; limiting amounts are:  $\text{Cl}_2$  1.5,  $\text{Fe}^{\text{III}}$  5.0, nitrite 2.0, sulphite 3.0, and  $\text{H}_2\text{S}$  5.0 p.p.m. C. J.

**Effect of excess lime hydrate [calcium hydroxide] on corrosive soft water.** F. E. HALE (J. Amer. Water Works Assoc., 1935, 27, 1199—1224).—Corrosion of pipe lines etc. can be greatly diminished if a soft, low-alkalinity  $\text{H}_2\text{O}$  containing a little  $\text{CO}_2$  is treated with  $\text{Ca}(\text{OH})_2$  (I) in moderate excess. The excess (I) should be regulated so as to avoid serious deposition of  $\text{CaCO}_3$  in the mains. The (I) is unlikely to have an ill-effect on health, and the taste would be hardly noticeable in amounts  $< 50$  p.p.m., but the effect on industry might be serious. C. J.

**[Committee report on] chemical hazards in waterworks plant.** Chlorine. ANON. (J. Amer. Water Works Assoc., 1935, 27, 1225—1248).—A full description is given of precautions which should be observed when handling  $\text{Cl}_2$  and of first-aid methods in case of accident. C. J.

**Progress report of Committee on tentative methods for testing zeolites.** ANON. (J. Amer. Water Works Assoc., 1935, 27, 1178—1185).—Five laboratory tests are described in detail. C. J.

**Acid mine-drainage control on upper Ohio river tributaries.** E. S. TISDALE and E. W. LYON (J. Amer. Water Works Assoc., 1935, 27, 1186—1198).—Acid wastes from abandoned bituminous coal mines or workings can be prevented by sealing off from currents of air without preventing drainage. C. J.

**Poisoning of animals by cyanides present in some industrial effluents.** G. W. CLOUGH (Vet. Rec., 1933, 13, 538).—Effluents from electrical, photographic, and aeroplane factories contained 0.02—6.0 grains of HCN per gal., in some cases with Cd and Cu. The waters were fatal to cows and ducks. CH. ABS. (p)

**Toxicity to river fish of certain hydrocarbons present in industrial effluents.** L. ROULE (Compt. rend. Acad. Agric. France, 1935, 21, 228—231).— $\text{C}_7\text{H}_{16}$  is considerably more toxic to *Gardonus nutilus*, Lin., than is  $\text{C}_5\text{H}_{12}$ . A. G. P.

## PATENTS.

**Purification of air vitiated with mercury vapour.** A. STOCK, Assr. to DEGEA A.-G. (AUERGES.) (U.S.P. 1,984,164, 11.12.34. Appl., 27.6.32. Ger., 30.6.31).—Claim is made for an adsorption agent, e.g., active C or  $\text{SiO}_2$  gel, impregnated with a halogen, e.g., I, for use in respirators or the like. A. R. P.

**Sewage treatment.** A. J. FISCHER, Assr. to DORR Co., Inc. (U.S.P. 1,986,332, 1.1.35. Appl., 29.7.32).—Sludges from different stages (and methods) of treatment are mixed together and dewatered by filtering. B. M. V.

**Treatment of sewage and like liquids.** J. HOPWOOD, and ADAMS-HYDRAULICS, LTD. (B.P. 435,862, 22.3.34).—Paddles which swing with a pendulum-like motion are employed to aid flocculation by gentle agitation of the sewage and a coagulant. C. J.

**Sewage aëerator.** F. A. DOWNES, Assr. to DORR Co., Inc. (U.S.P. 1,985,854, 25.12.34. Appl., 21.11.31).—Air is positively carried under the sewage and released by means of elongated scoops on a suitable rotor. B. M. V.

**Sewage-disposal plant.** M. J. MULLIN (U.S.P. 1,985,738, 25.12.34. Appl., 3.10.30).—A main sewer terminates in a pit provided with a perforated cover through which liquid leaves, the sludge passing straight on down a slope to an outlet. B. M. V.

**Treatment of organic waste.** W. W. TRIGGS. From G. H. EARP-THOMAS (B.P. 435,380, 15.12.33).—Partly-dried comminuted garbage, sewage sludge, etc. is fermented aëroically at 40—65°. A non-gas-forming, inoculating medium is prepared from soil, peat humus, powdered  $\text{CaCO}_3$ , and  $\text{CaSO}_4$ . The final product is suitable as a fertiliser. C. J.

**Treatment of paper-mill wastes.** J. DICKINSON & Co., LTD., J. GRANT, DORR-OLIVER Co., LTD., R. F. STEWART, and P. EVANS (B.P. 434,225, 7.5.34).— $\text{O}_2$ -absorbing paper-mill wastes, e.g., esparto washings, are agitated and aërated in presence of bleach residues and the sludge (containing mainly  $\text{CaCO}_3$ ) from the causticising section of the esparto-boiling plant. The mixture is then clarified by settling and the settled solids are separated with the aid of a continuous rotary vac. filter. To facilitate filtration a portion of the sludge may be added to the settled solids together with paper-machine effluents. D. A. C.

**Purification of industrial waste liquids.** E. NOLTE, H. J. MEYER, and E. FROMKE (B.P. 435,363, 6.3.35. Ger., 6.3.34).—Certain wastes, e.g., those containing  $\text{PhOH}$  or  $(\text{PrCO}_2)_2\text{Ca}$ , which inhibit biological processes unless greatly diluted, e.g. with sewage, may be purified directly by the activated-sludge process if a small proportion of a sol. phosphate has previously been added. C. J.

**Purification of water.** H. A. REIMERS, Assr. to DOW CHEM. Co. (U.S.P. 1,966,733, 17.7.34. Appl., 3.8.32).—Sol.  $\text{SiO}_2$  is removed from  $\text{H}_2\text{O}$  by adding a sol. salt of Cd, Mn, or Zn, followed by  $\text{Ca}(\text{OH})_2$ , NaOH, or  $\text{Na}_2\text{CO}_3$  to flocculate the  $\text{SiO}_2$  compound and ppt. the hydroxide of the added metal. A. R. P.

**Proofed sheeted material.**—See V.