

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAY 10 and 17, 1935.*

I.—GENERAL; PLANT; MACHINERY.

Pressed materials impregnated with synthetic resins for bearings. W. STODT (Stahl u. Eisen, 1935, 55, 183—185).—Compressed paper or textile materials impregnated with synthetic resins may replace bearing metals (in rolling-mill plant etc.) if the properties of the material are fully used. It has a low bending strength and must be strengthened with a metal base, and because of its low coeff. of expansion special precautions must be taken to overcome the effects of heat generated in the bearing. Lubrication by H_2O or alkali-free oil is suitable.

W. P. R.

Pulverising in the chemical industry. R. RASCH (Chem.-Ztg., 1935, 59, 95—96, 114—115).—The principles and theory of grinding are briefly discussed and some modern types of grinding machinery described.

A. R. P.

Rapid method of filtration. A. L. MILOVIDOVA (Zavod. Lab., 1934, 3, 1132).—Suspensions are filtered through a 1-cm. layer of filter-paper pulp, with exclusion of air from the part of the funnel below the filter.

R. T.

Thawing of frozen water-pipes. H. BRINTZINGER (Chem.-Ztg., 1935, 59, 97).—Introduction of saturated aq. NaCl through the tap will thaw the ice in a few hr., but quicker thawing is obtained by connecting the tap to an NH_3 cylinder; the heat generated by the dissolution of the NH_3 and the rapid diffusion of the gas into the ice greatly assists the thawing.

A. R. P.

Heat economy with town gas. Steam raising.—See II. **Thermal conductivities of refractories.**—See VIII. **Sprayed metal coatings.**—See X.

See also A., Apr., 451, **Intensive drying.** 554, **Mill for fine grinding of difficult substances.**

PATENTS.

Furnace. C. L. IPSEN and R. E. COX, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,963,846, 19.6.34. Appl., 26.2.32).—A truck suitable for lifting into a furnace from below comprises, in order upwards: (1) a pair of longitudinal beams carrying the wheels; (2) a no. of cross-beams, (3) a metal floor, (4) a no. of longitudinal beams, (5) a no. of columns. (4) and (5) are embedded in powdered insulating material.

B. M. V.

Kilns for manufacture of glassware and for other purposes. E. A. HAILWOOD (B.P. 423,589, 4.7.33).—The ware (etc.) is placed under a bell (B_1) or other container constructed of heat-conducting plates and is again surrounded by a refractory bell (B_2) with formation of a heating space between the two. Sighting apertures are formed, in line, in the walls of both B_1 and B_2 ,

and at the end of a heat B_2 may be transferred to another, ready-charged, B_1 to conserve heat.

B. M. V.

Carrying out exothermic catalytic chemical reactions. A. ETIENNE and R. DU CHAFFAUT, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,962,301, 12.6.34. Appl., 26.4.28. Fr., 30.4.27).—In the operation of an exothermic reaction in a catalyst (M) which is cooled by the ingoing gases, greater latitude of control is attained by dividing M into portions of unequal size and the gases into corresponding streams in parallel and in adjustable proportion during the preliminary heat-exchange pass.

B. M. V.

Apparatus for distribution of reactant, regenerating, and like fluids to catalytic and similar contact materials. HOUDRY PROCESS CORP., Asses. of J. W. HARRISON and R. C. LASSIAT (B.P. 423,866, 9.8.33. U.S., 24.8. and 21.11.32).—A perforated tube is embedded in the catalyst mass (M) and axially within it is a gas-supply tube (T) open at one end; various forms of skirts and other baffles are described to shield T from the exothermic heat of M in a graduated manner. A no. of units are embedded in one M .

B. M. V.

Apparatus for sintering and fusing finely-divided material. A. B. HASWELL and F. G. CUTLER (U.S.P. 1,964,915, 3.7.34. Appl., 14.5.31).—Blast-furnace dust or the like is mixed with slag-forming and reducing (R) material and is blown into the upper part of a H_2O -cooled, refractory-lined stack which is held at a smelting temp. either by the use of excess R in the feed mixture or by separate tangential burners. The slag and metal are collected on the hearth, adjacent to which is the entrance to the outlet flue in which waste-heat boilers and air preheaters may be placed.

B. M. V.

Sintering method. E. W. SHALLOCK, Assr. to AMER. ORE RECLAMATION Co. (U.S.P. 1,965,320, 3.7.34. Appl., 3.10.32).—A form of the machine claimed in U.S.P. 1,902,911 (B., 1934, 128) is employed.

B. M. V.

Dryer. R. S. KENT (U.S.P. 1,962,643, 12.6.34. Appl., 14.6.33).—A no. of A-frames are arranged abreast and connected by a double series of loosely mounted louvre plates (L) down each limb, forming two downward passages for the comminuted material and permitting transverse flow of drying gases.

B. M. V.

Dryer and the like. H. L. GALSON, Assr. to PHILADELPHIA DRYING MACHINERY Co. (U.S.P. 1,965,229, 3.7.34. Appl., 30.10.30).—Means for heating and circulating air in a dryer of the type in which material is conveyed through a casing on trays are described.

B. M. V.

Treatment of non-gaseous materials [with a gaseous medium]. D. D. PEBBLES (U.S.P. 1,964,858,

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

3.7.34. Appl., 10.6.31. Holl., 12.1.31).—Apparatus for spray desiccation or the like, employing both hotter and cooler drying media, is described. B. M. V.

Apparatus for drying coal or other granular materials. R. M. NORTON (B.P. 424,236, 12.2.34).—The coal (etc.) is forced by a helical conveyor through a cylindrical passage (*C*) and drying gases (*G*) are forced countercurrent in actual contact with it, the helical blades being in some zones solid so that *G* must take a helical course and in others cut away so that *G* may flow directly and against less resistance. Previously the *G* are caused to flow concurrent, out of contact, in a semi-annular jacket (*J*) embracing the lower part of *C*. Besides the main return of *G* at the discharge end, by-passes from *J* to *G* are provided in the form of external pipes with valves at a no. of distributed points. B. M. V.

Drying of materials susceptible to overheating. J. M. and R. V. PEHRSON (B.P. 424,581, 23.8.33).—The material is removed from the dryer proper (*D*) when the more easily dried constituents (*A*) are alone dry, and is subjected to classification by falling through air, the draught being regulated to lift and remove *A*, the remainder being passed back to *D*. B. M. V.

Method of treating and drying material. T. ALLSOP, ASSR. to PHILADELPHIA DRYING MACHINERY CO. (U.S.P. 1,965,209, 3.7.34. Appl., 18.8.31).—Suspended material is carried through a long casing in which it makes contact in turn with transversely circulating, generally countercurrent, streams of heated fresh air, then, if desired, with cold fresh air, and finally with highly saturated air. B. M. V.

Heat-exchange apparatus. P. F. BRUINS, ASSR. to A. O. SMITH CORP. (U.S.P. 1,962,803, 12.6.34. Appl., 21.12.31).—A hollow, truncated conical rotor with hollow walls (*W*) is rotated in the liquid to be heated or cooled, and baffles are provided to prevent the whole liquid acquiring rotation. The heating/cooling medium is passed through *W* by way of passages in the shaft. B. M. V.

Manufacture of [cellular] heat-insulating material [containing rubber]. H. R. MINOR, ASSR. to LIQUID CARBONIC CORP. (U.S.P. 1,964,740, 3.7.34. Appl., 13.12.32).—A rubber mix containing a powerful accelerator (e.g., 2-mercaptobenzthiazole) is placed in a gastight mould (so as not completely to fill it) and subjected to CO₂ under pressure (e.g., 850—200 lb./sq.in.) for several hr. until absorbed; the pressure is then released gradually (e.g., during 1 min.) and the mass vulcanised quickly by heat until it is hard and rigid although cellular. B. M. V.

(A) Mercury boiler. (B) Mercury-vapour generator and the like. (C) Cleaning of mercury boilers. (A—C) A. J. NERAD and (C) B. L. NEWKIRK, ASSRS. to GEN. ELECTRIC CO. (U.S.P. 1,964,592—4, 26.6.34. Appl., [A] 17.8.31, [B] 1.7.33, [C] 26.1.33).—(A) The heat-transmitting surfaces are made chemically clean, so that the Hg wets the steel, and the possible rate of heat transmission is raised above anything desired. The cleaning agent may be Na dissolved in the Hg. (B) An inhibitor is added to the Hg to prevent it from dissolving Fe at regions of higher temp. and depositing it at cooler

points. E.g., Al, Ni, Mg, Ca, or Cr. (c) The Hg is removed by slow evaporation, preferably under vac., the cleaning solution (e.g., dil. HCl) is added, the drums are flushed with a large quantity of H₂O, and the tubes are heated moderately to cause circulation and gradual working-out of the reagent. An alkali is added if desired. The Hg is added before draining, and drying is effected at temp. between the b.p. of H₂O and Hg. B. M. V.

Treatment of steam-boiler feed water. R. E. HALL, ASSR. to HALL LABS., INC. (U.S.P. 1,965,339, 3.7.34. Appl., 18.8.33).—Hard H₂O is treated with an alkali pyrophosphate (*I*) in sufficient quantity to prevent pptn. of Mg in the base-exchange softener through which it is next passed. The Mg prevents excessive alkalinity and combines with SiO₂; (*I*) is converted into orthophosphate at the temp. of the boiler. B. M. V.

Preventing [formation of] and removing boiler scale. L. E. ZAGREB (U.S.P. 1,964,704, 26.6.34. Appl., 25.5.32. Yugoslav., 31.12.31).—The secondary of a transformer is divided into two parts, a rectifier is placed between them, and the outer ends are connected to the boiler through condensers which are placed in each lead. B. M. V.

Preparation of filling material for generator-absorbers of absorption refrigerating apparatus. SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 424,456, 4.4.34. Ger., 5.4. and 29.5.33).—The solid absorbent (*A*) usually swells when charged with refrigerant (e.g., NH₃); a no. of masses of *A* are placed in boxes without lids and those are inserted in the upper part of a vac. vessel (*V*). After evacuation, liquid NH₃ is admitted to the lower part of *V*, the heat of absorption being roughly balanced by the latent heat and causing the absorption and swelling to be quicker than if gaseous NH₃ were supplied. B. M. V.

Hammer mill. F. N. C. KRANICK, ASSR. to J. I. CASE CO. (U.S.P. 1,962,778, 12.6.34. Appl., 27.12.32).—A grinding mill of the hammer type is rendered suitable for the treatment of stock-feed roughage, which is liable to form slugs on excess feeding, by arranging a free roller in the upper part of the crushing zone, which is lifted by excessive impact and stops the feed conveyor. B. M. V.

Machine for effecting kneading, crushing, mixing, and similar operations. H. G. TORULF (Assee.) and B. ZETTERGREN (U.S.P. 1,963,534, 19.6.34. Appl., 26.2.31. Swed., 14.8.29).—A roller (*R*) having a vertical axis is pressed against the wall of a rotating bowl (*B*). *R* is driven by the inturned top rim of *B* engaging with a grooved pulley on *R*. B. M. V.

Grinding mill with air-sealing device. R. M. HARDGROVE, ASSR. to FULLER LEHIGH CO. (U.S.P. 1,965,186, 3.7.34. Appl., 15.9.30).—Superposed on a mill of the ball-race type is an inverted conical air separator which discharges the oversize through the point (*P*) of the cone, i.e., in the middle of the ascending air stream; *P* is obstructed in an adjustable manner by a centrifugal feeding disc rotated by an upward extension of the main drive shaft. B. M. V.

Means for reducing or comminuting and in some cases classifying or grading ore and other

materials. G. C. E. KEET (B.P. 424,210, 21.8.33).—The outer element (*O*) comprises two cones placed base to base and is rotated; the inner element (*I*) is free to rotate on a shaft eccentric to *O* and is also V-shaped at the circumference. The passage of the material is downwards through ports formed in *I*, upwards through the nip around *I*, and centrifugally out over the upper part of *O* through adjustable discharge apertures into a collecting gutter. B. M. V.

Wet screening of coal and other materials. S. HUNTER (B.P. 424,258, 13.7.33).—The coal is subjected to jets of H₂O under high pressure (400 lb./sq. in.) while passing over grids formed of tapered bars situated between the several perforated sections of a shaking screen. B. M. V.

Mixing apparatus. G. H. HAINES, Assr. to GRAIN MACHINERY Co. (U.S.P. 1,962,642, 12.6.34. Appl., 8.6.31).—In the continuous mixing of a solid (*S*) with viscous liquid (*L*) such as molasses, no means of feeding can be relied on to give const. delivery when η varies so much with temp. Flow-meters are therefore placed in the delivery pipes of both *L* and *S* and their indications transmitted to two rotating hands on the same dial, the transmission to one hand being through a variable-speed gear which is set to the proportion desired, and the delivery of the materials is controlled manually to keep the hands coincident. B. M. V.

Multiplex rotary filter. F. W. BECRAFT, Assr. to DORR Co., Inc. (U.S.P. 1,963,610, 19.6.34. Appl., 17.10.30. Renewed 15.8.33).—Two stages of an internal rotary drum filter are joined end to end and supported in a single pair of hollow trunnions, that at the feed end accommodating feed- and H₂O-pipes and the driving shaft for the axial conveyor, which serves to re-pulp the first cake and discharge the second cake through the other trunnion. B. M. V.

Filter-presses. J. W. HARTLEY (B.P. 424,502, 31.8.33 and 21.8.34).—Filter-plates are suspended from the lower flanges of an overhead runway beam by means of bogies having two wheels (*W*) which are neither abreast nor in line. Idle, not wt.-supporting, rollers may be provided to prevent *W* from falling off by twisting. B. M. V.

Filter. H. A. WIENEKE (U.S.P. 1,962,542, 12.6.34. Appl., 24.9.31).—Mechanically weak filter material, e.g., asbestos, is rammed into recesses having drain holes which are formed in supports of acid-resisting, e.g., ceramic, material. B. M. V.

Filter-cake thickness control. A. J. FISCHER, Assr. to DORR Co., Inc. (U.S.P. 1,963,616, 19.6.34. Appl., 14.5.31).—An internal rotary drum filter is provided with a knife to regulate the thickness of cake by peeling excess back into the prefilter bath at the point where the cake emerges therefrom. B. M. V.

Thickener. L. H. LOGUE, Assr. to DENVER EQUIPMENT Co. (U.S.P. 1,962,646, 12.6.34. Appl., 2.3.31).—Besides the manual adjustment of the rakes (*R*) in relation to the bottom of the tank, a driving device comprising a yoke and drag-link chains is provided, above the liquid level, which automatically raises *R* when the load increases. B. M. V.

Centrifugal separator. G. KNOPP, Assr. to CENTRIFUGAL ENG. & PATENTS CORP. (U.S.P. 1,964,992, 3.7.34. Appl., 27.8.29. Ger., 12.8.29).—Purification of, e.g., paper pulp (*P*) is effected in two stages (I, II). In (I) *P* flows in a thin layer over a mat of consolidated *P*, the rough surface of which forms a comb to collect heavy material; between (I) and (II) *P* falls over a weir with sufficient shock to break up any remaining lumps, and at the outlet of (II) an intermediate layer of clean *P* is separated by a skimming ring. B. M. V.

Counterflow leaching system. A. FLEISCHER, Assr. to KALUNITE Co. (U.S.P. 1,964,382, 26.6.34. Appl., 30.6.33).—The ore (e.g., of alunite) is classified after crushing; the coarse is sent through all stages and the fine re-mixed with it at an intermediate stage. B. M. V.

Surface-tension dialysing element and its construction. L. CAMMEN, Assr. to P. DAVIE (U.S.P. 1,965,172, 3.7.34. Appl., 10.12.32).—A filter or dialysing element is formed of a metal strip bent zigzag on itself and provided with very fine transverse grooves (*G*) on parts of the strip so situated that when assembled all the *G* face the same way. In manufacture, *G* are formed alternately with flat zones on both sides of the strip by a pair of geared rolls provided with corrugations on slightly < half the circumference of each. B. M. V.

Manufacture of aqueous emulsions. J. M. FAIN, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,963,231, 19.6.34. Appl., 6.1.30).—Hydrophilic colloids, e.g., bentonite or starch, preparatory to use as emulsifying agents, are treated with H₂O in a colloid mill until there is a substantial increase in η , i.e., until substantial hydration has taken place after peptisation. Then, if desired, η may be further increased by addition of an electrolyte to produce partial flocculation. Bitumen or the like can then be dispersed by comparatively mild agitation. B. M. V.

Foam prevention. H. R. MATHIAS, Assr. to STANDARD OIL Co. (U.S.P. 1,964,641, 26.6.34. Appl., 30.6.32).—A sulphonated soap of a vegetable, animal, or mineral oil, mixed with a non-volatile petroleum, is dispersed on the surface of the solution tending to foam, e.g., a limed beet extract. B. M. V.

Fractionating tower control system. J. H. ERTER, Assr. to ALCO PRODUCTS, Inc. (U.S.P. 1,965,225, 3.7.34. Appl., 14.3.32).—The quality of a side stream removed from a main tower (*M*) is controlled by a stripping tower the rate of feed to which is controlled by a thermocouple in *M*. B. M. V.

Reflux control system for stabilising towers. H. N. WADE (U.S.P. 1,965,088, 3.7.34. Appl., 24.3.33).—A const. vol. of reflux is returned to the top of a tower (*T*) (suitable for stabilising petrol or the like) from a reservoir (*R*) which is at such a level in relation to the condenser (*C*) that more surface of *C* is exposed when the level of liquid drops in *R*, by means of a positive pump (*P*) the stroke of which is const. but adjustable; *P* works against a const. head determined by suitable automatic regulators in the vapour pipe from *T*. B. M. V.

Concurrent evaporator with countercurrent condensation for fractional liquefaction. M. FRÄNKL,

Assr. to AMER. OXYTHERMIC CORP. (U.S.P. 1,963,841, 19.6.34. Appl., 14.10.31. Ger., 24.7.31).—A heat exchanger comprises a vertical bundle of tubes having an external conduit extending from the upper surface of the lower tube plate to the upper surface of the upper plate, so that any condensate formed in the outer space can be transferred by its own excess pressure to the inner space. The apparatus is suitable for use in the separation of O_2 and N_2 from air. B. M. V.

Apparatus for distillation of liquids such as water. R. E. SKOW, V. BALLOU, and H. L. McLAUGHLIN, Assrs. to NAT. PURE WATER CORP. (U.S.P. 1,964,708, 26.6.34. Appl., 27.12.32).—A simple form of still heated by steam coils is described. B. M. V.

Apparatus for proportional determination. K. E. STUART, Assr. to HOOKER ELECTROCHEM. CO. (U.S.P. 1,964,775, 3.7.34. Appl., 7.12.32).—A sample of a liquid, true as regards quality and exactly $1/n$ (or, by repetition of the process, $1/nm$, $1/nml$, ...) of the whole is taken by a device (D) comprising a no. (n , m , ...) of exactly similar orifices spaced equally on a circle concentric with the wall of a vertical cylindrical vessel having at the centre above D means for reducing swirling and permitting air to escape. The nozzles of any one D are cut from the same length of seamless tube to ensure equality. B. M. V.

Viscosimeter. G. R. ERICSON (U.S.P. 1,962,861, 12.6.34. Appl., 4.5.31).—Apparatus for the testing of used crank-case oil is described. B. M. V.

Viscosity meter. W. ALBERSHEIM and H. S. KONHEIM (U.S.P. 1,963,011, 12.6.34. Appl., 31.3.28).—The liquid is caused to flow from a point (I) through a short orifice to a point (II) and thence through a long throat to a point (III). The pressure drop between (I) and (II) will be independent of η , but will be $\propto v^2$ and that between (II) and (III) $\propto \eta v$; the two pressures are combined by mechanical or electrical means to give a direct reading of η . (Cf. B.P. 376,253; B., 1932, 823.) B. M. V.

Apparatus for treating gases with liquids. W. LEARMONTH, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 424,414, 21.6.33).—The packing of a tower comprises thin strips (S), spaced at pitch (p) with their width (w) vertical and length running at right angles in alternate layers. Methods are described for the distribution of the liquid so as to form films and not fall through the free spaces, which are $< 70\%$, p being > 2.5 or 1.5 in. and ranging $\frac{1}{3}$ – $3w$. The lowest (and dirtiest) section of S can be removed without disturbing the rest. B. M. V.

Apparatus for liquefying gases. J. C. SWAN (U.S.P. 1,965,010, 3.7.34. Appl., 25.7.33).—A condenser comprises a no. of layers of radial tubes which are blind at the inner end, and open out at the outer end into the annular space between a cylindrical tube sheet and an outer wall. A liquid refrigerant is sprayed from holes in a central vertical tube. The apparatus is constructed in Cu or Cu-lined steel to resist pressure. B. M. V.

Separation by rectification of gaseous mixtures or complex liquids. M. FRÄNKEL (B.P. 424,554,

15.10.34. Ger., 14.10.33).—In the separation of ≤ 3 components, the b.p. of ≤ 1 intermediate (II) being near that of the most volatile (I) component, part of the liquid (L) from the main column (M) containing (II) is rectified in a by-column and is there heated by a surface heater supplied with vapour (V) withdrawn from M under self-pressure and returned to M as condensate at a point appropriate to its composition. V preferably contains the least volatile constituent (IV) and is preferably only partly condensed so that it is rectified, the remaining gas being an intermediate component (II) or (III). B. M. V.

Scrubber. S. G. KETTERER, Assr. to SCHUTTE & KOERTING Co. (U.S.P. 1,964,357, 26.6.34. Appl., 12.12.31).—The gas is passed downwards (*i.e.*, concurrent) through a tower which is divided by horizontal partitions pierced by throat-like devices (T) which are completely filled with sprays from nozzles above each, the spray after passing through T spreading out and completely filling the cross-section of the tower. B. M. V.

Smoke-treating apparatus. M. D. GILBERT (U.S.P. 1,964,794, 3.7.34. Appl., 20.10.31).—Flue gases are blown by a fan through a conduit inclined downwards through a wall of a tank into a pool of purifying liquid, the spray from which is caught on hinged and fixed baffles above. B. M. V.

Production of high vacua. H. S. COOPER, Assr. to KEMET LABS. Co., INC. (U.S.P. 1,963,829, 19.6.34. Appl., 5.12.31).—For use as a clean-up agent Ni is alloyed with Ba, Sr, or Ca and placed in intimate contact with Al by powdering and mixing or by placing in alternate laminations; alloying of the Al and Ni takes place only when the composition is flashed in the bulb. B. M. V.

Moulded brake-lining material. A. T. K. TSENG, A. B. KEMPEL, and R. SCHAR, Assrs. to REX-HIDE RUBBER MANUF. Co. (U.S.P. 1,963,511, 19.6.34. Appl., 7.5.32).—A lining which is non-absorptive of oil or H_2O comprises asbestos 29.7, C black 7.7, $BaSO_4$ 12.8, PbO 2.0, rubber 33.2, S 4.6, and an aq. suspension of a phenolic or other infusible resin 10 vol.-%. B. M. V.

Electrical pptn. for gases.—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Importance of coal petrography in the gas industry. H. BRÜCKNER and W. LUDEWIG (Gas- u. Wasserfach, 1935, 78, 109–113).—Methods of microscopic examination of coal are described. The origin and behaviour on carbonisation of the various coal constituents are indicated. E. H. M. B.

Chemical composition of petrographic ingredients present in Moscow coal. K. I. SUISKOV (Khim. Tverd. Topl., 1934, 5, 224–229).—The pyrite S ($< 2.62\%$) in Moscow coal is conc. mainly in the fusain. Org. S ($< 2.5\%$) is fairly uniformly distributed. Sulphate S is low ($< 0.14\%$). CH. ABS. (e)

Evaluation of coal, with particular reference to small coal for steam-raising. E. S. GRUMELL (Proc. Inst. Mech. Eng., 1934, 127, 341–354).—The advantages of the sale and purchase of coal for steam

generation on the basis of its calorific val. are discussed. The evaluation of a coal by the short boiler-trial method may give misleading results because of the variability of the coal. It is considered probable that ≤ 100 tons should be so tested before a reliable val. could be obtained. An alternative method combining max. accuracy with min. cost of ascertainment is based on the correct sampling and analysis of the coal, together with a knowledge of the effect of the H_2O and ash contents and coking power on the performance of the coal. This method is at present being used as a basis for comparing coals for varied industrial purposes. E. S.

Calculation of water-vapour corrections in determining the calorific value of fuels. S. P. MAXIMOV (*Zavod. Lab.*, 1934, 3, 1126—1127).—The correction is given by $54H + (6 - 0.54H)W - 0.54HA$, where H , W , and A are, respectively, the H , H_2O , and ash contents of the fuel. R. T.

Analysis of solid fuels. G. L. STADNIKOV (*Khim. Tverd. Topl.*, 1934, 5, 193—200).—Methods of analysis of coals, shales, and primary tars are reviewed. CH. ABS. (e)

Coal ash. Form of combination of the inorganic constituents and the true ash content. E. TERRES and A. ROST (*Gas- u. Wasserfach*, 1935, 78, 129—136).—A complete examination of the mineral constituents of a no. of coals (by analyses of the ash and of the aq. and acid extracts etc.) has shown that in brown coals a large proportion of these constituents may exist as salts of humic acids or of resin and wax acids. The proportion of such salts in the mineral constituents of bituminous coals is negligible. No simple quant. relation exists between the true mineral matter content of the coals and the quantity of ash obtained on incineration. A. B. M.

Dry-cleaning of steam coal in South Wales. W. B. DAVIES (*Proc. S. Wales Inst. Eng.*, 1935, 51, 21—63).—Alternative methods of cleaning the particular coal are discussed and the dry-cleaning plant installed is described in detail. W. H. B.

Flow of gas through coal. S. P. BURKE and V. F. PARRY (*Amer. Inst. Min. Met. Eng.*, 1935, Tech. Publ. No. 607, 15 pp.).—Previous investigators have determined the distribution of pressures in a small section of a coal seam by drilling holes into the coal rib to various depths and at various distances from the coal face. Measurements of the rate of gas liberation from the surface of the coal rib, at locations directly behind which the pressures had been determined, have now been made. The laws governing the movement of gas in coal seams are given, and it is concluded that the flow is streamline. W. H. B.

Briquette investigations. II. Physico-chemical nature of lignite in relation to properties of technical briquettes. H. HOCK and H. FISCHER (*Braunkohle*, 1934, 33, 245—251; *Chem. Zentr.*, 1934, ii, 375—376).—Binding is due to H_2O films and to aq. colloidal humic acid (I). Subsequent swelling of (I) is avoided by transforming it into humin. Mechanical drying of the lignite is detrimental. Admixture of

resins and waxes is better than the use of these for coating the briquettes. H. J. E.

Distribution of coal-sulphur among the low-temperature products of coal distillation. G. L. STADNIKOV and V. A. LARINA (*Khim. Tverd. Topl.*, 1934, 5, 234—237).—When the coal is high in org. S, the primary tars (I) are also high in S. The org. S compounds in boghead and bituminous coal are more stable than those in lignite, and are found in considerable quantities in the tar. Pyrite S when added to Moscow coal raises the amount of S compounds in (I). It acts as a dehydrogenation agent. CH. ABS. (e)

Gasification of fuel by air enriched with oxygen. M. K. GRODZOVSKI and Z. F. TSCHUCHANOV (*J. Appl. Chem. Russ.*, 1934, 7, 1398—1422).—The main reaction taking place when air is passed over C at $> 950^\circ$ is $2C + O_2 \rightarrow 2CO$, with $C + O_2 \rightarrow CO_2$ as a side-reaction; the reaction $CO_2 + C \rightarrow 2CO$ does not take place to any significant extent, whilst oxidation of CO proceeds appreciably when the velocity of flow is small. The length of the combustion zone (I) diminishes, and its temp. rises, with increasing $[O_2]$; increasing the rate of flow has the opposite effect, owing to the more intense oxidation due to the increased O_2 supply. The quotient CO/CO_2 increases with increase in the active surface of the C, in the rate of flow, and in the $[O_2]$. R. T.

Gas for synthetic purposes from low-grade fuels. A. THAU (*Brennstoff-Chem.*, 1935, 16, 61—67).—Gas-producer plant, operating the Szigeth process and erected by the Didier Werke A.-G. at Petfördö (Hungary), is described. It comprises a setting of externally-heated, continuous vertical chamber ovens (A) so designed that the coal passes successively through a drying, a tar-evolution, a decomp., and a water-gas zone, the volatile hydrocarbons evolved being decomposed by being passed through the incandescent coke. The gas produced has the approx. composition CO 29, H_2 50, CH_4 6, CO_2 9, C_nH_m 0.7, N 5—6%; if desired, however, the method of operation may be so varied as to reduce the CH_4 and C_nH_m to negligible proportions. Coke is withdrawn continuously from the bottom of A; part of it is charged into a separate producer for conversion into gas which is used for heating A. A lignitic brown coal is used as fuel. The gas is converted, by the usual means, into $3H_2 : N_2$ and used for the synthesis of NH_3 . The plant has been in successful operation for some years. A. B. M.

Heat economy in the industrial applications of town gas. L. G. A. LEONARD (*Gas World*, 1935, 102, *Ind. Gas Suppl.*, 15—18).—The sources of heat losses in various types of gas-fired industrial furnaces and the methods by which they can be combated are described. E. S.

Method of assessing gas-making results. S. PEXTON (*Gas J.*, 1935, 209, 371—378).—Gas-making results are reviewed in the light of an index termed the "hydrocarbon enrichment val." (E). E is independent of the amount of blue water-gas present, and in conjunction with the tar yield indicates the cracking conditions in the plant. A chart based on vals. of E shows the quantities of coal and gas oil used and net coke produced per unit of gas sold. E. H. M. B.

Dynamic law of combustion. P. ROSIN and H. G. KAYSER (Chaleur et Ind., 1934, 15, 109—122; Chem. Zentr., 1934, ii, 873).—A theoretical discussion. H. J. E.

Removal of smoke and acid constituents from flue gases by a non-effluent water process. J. L. PEARSON, G. NONHEBEL, and P. H. N. ULANDER (Inst. Fuel, Jan., 1935. Advance copy, 40 pp.).—Grit, dust, and oxides of S are simultaneously removed in a specially designed scrubber (*S*) by recirculating a liquor containing CaO (I) or CaCO₃ (II). The absorptive agent is Ca(HCO₃)₂ (III), which is continuously formed from (II) as absorption and neutralisation of the acid constituents proceed. (I) slurry is added to the circulating liquor so that the p_H of the liquor leaving *S* is maintained at 6.2 ± 0.2 ; to facilitate control an "all-mains" p_H recorder has been designed. The plant consists of: (i) the (I) section, comprising (I) or (II) storage, mixing apparatus, and slurry stock tanks; (ii) the flue-gas scrubbing system, comprising absorption towers and main liquor-recirculating system (*M*); (iii) the section for separating solids, comprising settlers and filters (or centrifuges), arrangements for returning the clarified liquor to *M* and the necessary storage for the solids. The rate of purge of liquor from the main liquor system to the settlers is such that the concn. of the solids in suspension in the circulating liquor is 10—15 wt.-%. The liquor passing down *S* contains (a) in suspension, ash, (II), CaSO₄ (IV), CaSO₃ (V); (b) in solution, at or above saturation, (IV) and (V); (c) in solution, not at saturation, (III), CaCl₂, Ca(NO₂)₂, and accumulations of salts remaining from continuous evaporation of H₂O. A substantial part of the (V) originally produced by the absorption of SO₂ is oxidised to (IV), the oxidation being catalysed by salts of Fe and Mn, traces of which occur in the coal ash and in the (I) added. The major problems encountered during the development of the process were due to the liquor being saturated or slightly supersaturated with (IV) and (V). To prevent the deposition of these salts (scaling) on the absorbing surfaces the liquor is allowed to become only slightly supersaturated during its passage through *S*, and the slight supersaturation thus acquired is destroyed by salt pptn. in a "liquor-delay tank" before the liquor returns to *S*. The lower 10—15% of the *S* packing is chosen on the basis of max. scaling-resistance (*R*). *R* is stated to depend on the sp. *R* of the material of the packing, the initial smoothness of the surface and its subsequent behaviour under corrosion, and on the liquor velocity over the surfaces. These factors are so chosen that *R* is > the scaling potential resulting from the slight supersaturation, and complete immunity from scaling of the tower packing is thus secured. The efficiency of removal of dust and oxides of S is 97—98%, and the cost of the process for a large power station is estimated to be 2s. 1d.—2s. 4d. per ton of coal fired. W. H. B.

Measurement of large amounts of hydrogen sulphide in lignite-distillation gases in the Hempel method of volumetric gas analysis. A. LANDGRAF (Chem. Fabr., 1935, 8, 71—72).—A (modified Bunsen) method of determining large amounts (e.g., 40%) of H₂S in the above, or illuminating, gases, without loss of other

gas constituents in the reagents, is described. The absorption medium, used in a special pipette, consists of pellets of MnO₂ soaked in syrupy H₃PO₄, and degassed before use. In tests with 90—100 c.c. of mixtures of illuminating gas and H₂S, 75—80% of the H₂S was taken up in 20 min., the remainder being absorbed in CuSO₄-H₂SO₄ solution (error = approx. + 0.1—0.2%). A. L. R.

Poisoning by illuminating gas. K. WINZER (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 694—696; Chem. Zentr., 1934, ii, 1061).—A discussion of methods of removing CO from illuminating gas. H. J. E.

Thio-bacterial action in [gas] purifiers. W. F. THORNE (Gas J., 1935, 209, 370).—H₂S can be produced from CS₂ by old sawdust or bog ore. The action is due to thio-bacteria and can be prevented by prolonged exposure of the ore and sawdust to light and air. E. H. M. B.

Transformation of carbon monoxide and carbon dioxide into methane at high pressure. F. FISCHER and H. PICHLER (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 386—394; Chem. Zentr., 1934, ii, 1062).—CH₄ formation from CO occurs without a catalyst at 700°/70—80 atm. For CO₂ a temp. of 600° and 300 atm. are necessary. Mo is the best catalyst. With Ag, C₂H₆ formation is noticeable. Pressure treatment of magnesite with H₂ gave CH₄ and C₂H₆. H. J. E.

Synthesis of higher hydrocarbons from methane and carbon monoxide. W. FUCHS and R. DAUR (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 327—329; Chem. Zentr., 1934, ii, 1062).—A 2 : 1 CH₄-CO mixture passed over glowing pumice gave some propylene (I). At 500—550°/240 atm. (I) and liquid hydrocarbons were formed in small yield. H. J. E.

Reaction of carbon monoxide and hydrogen in coke-oven gas with molybdenum catalysts. K. MEYER and O. HORN (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 389—394; Chem. Zentr., 1934, ii, 875—876).—No reduction of CO occurs at 1 atm. At 100 atm. reduction to CH₄ occurs, but a higher temp. (400°) is needed with a Mo than with a Ni catalyst. Mo is activated by Mn, Cr, Th, and Cu, but not by W. Alkali destroys the activity. Mo and Mo-Th catalysts for the hydrogenation of C₂H₄ are not poisoned by H₂S. H. J. E.

Use of coke-oven gas in benzene synthesis. F. FISCHER and K. MEYER (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 497—500; Chem. Zentr., 1934, ii, 1061).—Coke-oven gas (I) with 5—6% CO is suitable for benzene (II) synthesis with a Ni-Mn-Al catalyst at 160°. Working with a 20—25% contraction, all the CO and no CO₂ is used, 20—22 c.c. of hydrocarbon [75% of (II)] being formed per cu. m. of (I). Owing to the S content of (I) the reaction temp. must be raised slowly (25° in 4 weeks) to compensate for poisoning of the catalyst, which absorbs all the S, and must be renewed in 4 weeks. H. J. E.

Low-temperature tar from bituminous coal. M. NAPHTALI (Brennstoff-Chem., 1935, 16, 67—72).—Recent developments in the production, investigation of the composition, and various applications, of low-temp. tar are reviewed. A. B. M.

Low-boiling phenols from low-temperature tar. M. KUZNETZOV and K. BELOV (Khim. Tverd. Topl., 1933, 4, 592—597).—Hydrogenation experiments are described, using a primary tar containing 50% of phenols (cresols 15, xylenols 15, higher-boiling homologues 70%), and $\text{Al}(\text{OH})_3$ as catalyst at $470^\circ/175$ atm. Better results were obtained with H_2O instead of H_2 .

CH. ABS. (e)

Hydrogenation of pitch and heavy distillates from primary brown-coal tars to Diesel fuel. A. D. PETROV and E. A. POZHILTEVA (Khim. Tverd. Topl., 1934, 5, 273—280).—Hydrogenation with MoS_3 or Na as catalyst at 320 — 330° gave medium and heavy aromatic and hydroaromatic hydrocarbon distillates (Diesel fuel), gasoline ($> 10\%$), coke, and cracked gases.

CH. ABS. (e)

Breaking of bituminous emulsions with stones. G. H. KLINKMANN (Asphalt u. Teer, 1933, 33, 842—844, 873—876; Chem. Zentr., 1934, ii, 882).—Results are recorded for a no. of emulsions and types of stone (1.2—2-mm. size).

H. J. E.

Natural gas and its occurrence in the Nienhagen oilfield. ANON. (Chem.-Ztg., 1935, 59, 136—137).—A brief outline is given of the composition, production, and applications of natural gas (I). The approx. average composition (by vol.) of (I) from the Nienhagen field is: CO_2 0.5, CH_4 80, other paraffins 15, N_2 4.5%; it has d (air = 1) 0.7—0.8.

C. C.

Mineral content of petroleum. E. LONGOBARDI (J. Inst. Petroleum Tech., 1935, 21, 132—134).—A survey of published investigations, with particular reference to the occurrence of V.

C. C.

Determination of the f.p. of crude petroleum and paraffin-containing mazouts. L. CODARCEA (An. Min. Romania, 1934, 17, 131—135, 183—187; Chem. Zentr., 1934, ii, 1240—1241).—Before determining the f.p. the material must be kept for 3—6 hr. at 0° , it should not have been heated to a higher temp. before the test, and should not be stirred or shaken.

H. J. E.

Determination of paraffin in mineral oil products. R. HEINZE and A. ZWARGAL (Öl u. Kohle, 1934, 2, 7—12, 154—157; Chem. Zentr., 1934, ii, 883).—The material is dissolved in a sp. solvent (e.g., Et_2O or CHCl_3) and its paraffin (I) content pptd. with, e.g., 1:1 Et_2O — EtOH under specified conditions. The (I) cake is washed, redissolved, and repptd. The material must first be freed from asphalt, if present.

H. J. E.

Sulphur determination in mineral oils. I. S. ZELIKOV, A. N. KOTRELEV, and E. I. FOGELSON (Nefit-Khoz., 1934, 26, No. 5, 58—59).—The Holthaus method for S in steel has been applied in determining S in mineral oil, 0.1—0.15 g. of the oil being burned in dry O_2 first at 450 — 650° and finally at 1000 — 1150° .

CH. ABS. (e)

Composition of Fushun shale oil. I. Fractional distillation up to 150° . II. Saturated hydrocarbons boiling below 40° . III. Unsaturated hydrocarbons boiling below 40° . F. HORIE (J. Soc. Chem. Ind., Japan, 1935, 38, 3—5 B, 5—6 B, 6—7 B).—I. Fractionation of the crude gasoline with an efficient column gave large fractions \equiv the b.p. of the *n*-paraffins

and -olefines, but very small fractions \equiv the b.p. of aromatic and saturated cyclic hydrocarbons.

II. S compounds present in the fraction of b.p. $< 40^\circ$ were probably Me_2S and EtSH . The saturated hydrocarbons in this fraction were separated from the unsaturated by bromination of the latter and distillation from the bromides; they comprised about 64% of the fraction and consisted principally of *n*- C_5H_{12} , with a small proportion of *iso*- C_5H_{12} .

III. Examination of the bromides showed that the unsaturated hydrocarbons in this fraction consisted principally of Δ^2 -pentene, with small proportions of Δ^1 -pentene and β -methyl- Δ^1 -butene.

A. B. M.

Comparison of crude oil analyses. W. TIRASPOLSKY (Petroleum, 1934, 30, No. 51, 1—3).—Crude oils (I) obtained from the same productive area, or different samples from the same well, show widely varying physical properties, mainly due to loss of the lighter fractions. To obtain the true characteristics of the product of a well, the condensable gases present in the natural gas should be included with (I). It is claimed that comparative figures can be obtained from the liquid product by determining the fraction $< 125^\circ$ and expressing all results as a % on the stabilised residue.

C. C.

Barytes recovery from [oil field drilling] muds. G. H. SCOTT (J. Inst. Petroleum Tech., 1935, 21, 89—100).—Drilling muds can be reconditioned by diluting and separating the sand and then either thickening the clay-barytes (I) suspension or separating (I). Three processes are available for the latter purpose, viz., pneumatic, centrifugal, and hydraulic (II) separations. The general principles governing (II) methods are discussed. A small plant based on laboratory experience is described.

C. C.

Pyrolysis of hydrocarbons considered from the viewpoint of classical organic chemistry, chemical thermodynamics, and chemical kinetics. M. W. TRAVERS (J. Inst. Fuel, 1935, 8, 157—169).—The relations between the equilibrium const., heat of reaction, and the entropy and free-energy changes in a system are explained briefly and applied to a no. of reactions involving the thermal decomp. of hydrocarbons (cf. A., 1932, 701; 1935, 40). The determination of the heat of activation and the use of this concept in the analysis of such reactions is discussed.

A. B. M.

Cracking of hydrocarbons and petroleum. E. TERRES, C. WALTHER, H. SCHMIDT, J. POMERANIEC, and O. FOCSANER (Öl u. Kohle, 1934, 2, 2—6, 53—56; Chem. Zentr., 1934, ii, 880).—The decomp. of C_6H_{14} (I) at 670 — 750° yields CH_4 , C_2H_4 , and C_3H_6 together with tar and coke. The latter were not formed when H_2O vapour was added to (I). C_9H_{20} decomposes thermally into $\text{C}_5\text{H}_{10} + \text{C}_4\text{H}_{10}$, $\text{C}_8\text{H}_{16} + \text{CH}_4$, or $\text{C}_7\text{H}_{14} + \text{C}_2\text{H}_6$. Further decomp. of these hydrocarbons occurs. *cyclo*-Hexane at 600 — 700° forms tetra- (II) and di-hydrobenzene and C_6H_6 . (II) forms butadiene and C_2H_4 . A similar dehydrogenation occurs for decahydronaphthalene.

H. J. E.

Benzol production and gas purification by refrigeration. J. WUCHERER (Gas- u. Wasserfach,

1935, 78, 118—121).—The cost of benzol production by refrigeration compares favourably with oil or C processes. In addition, the gas is dried. Some details of the process and costs are given. E. H. M. B.

Benzol recovery and production of motor benzol. W. HODKINSON (Gas World, 1935, 102, 161—164).—Working results for 1 year are given for the benzol (I) plant at Stretford. A blended spindle oil showed little thickening. The (I) is washed with H_2SO_4 to remove S. The vapours from the rectification still are washed with hot aq. NaOH in a vessel on top of the dephlegmator. Losses of forerunnings in distilling off CS_2 are reduced by working with a back-pressure of 4 lb./sq. in. on the still. A modified acid wash is described. E. H. M. B.

Discontinuous fractionating column for separation of benzene, toluene, and xylene from the gasoline fraction of Shukoko crude. III. Number of fractionating plates required for separation of toluene from the toluene fraction. M. MIZUTA (J. Soc. Chem. Ind., Japan, 1935, 38, 21—22 B; cf. B., 1935, 179).—PhMe of about 70% concn. can be obtained from the PhMe fraction of Shukoko crude by fractionation with an industrial column having 24 plates.

A. B. M.

Analysis of gaseous hydrocarbons. Determination of ethylene, propylene, and butylene. H. TROPSCH and W. J. MATTOX (Ind. Eng. Chem. [Anal.], 1934, 6, 404—405).—A rapid routine method of analysis of refinery gases is described, based on the determination of the d by means of the magnetic gas balance (cf. A., 1934, 1016) before and after absorption of propylene and butylene in 87% H_2SO_4 . C_2H_4 is then determined by absorption in conc. H_2SO_4 containing $NiSO_4$ and Ag_2SO_4 . The absorption apparatus is described. S. C.

[Gasoline] absorption [from hydrocarbon gases]. A. NEWTON (J. Inst. Petroleum Tech., 1935, 21, 75—81).—The charcoal (I) and oil-absorption processes in general use for recovering gasoline from hydrocarbon gases are discussed. (I) is particularly adapted for stripping relatively dry gases. C. C.

Catalytic desulphurisation of shale gasolines from Kashpira tar in presence of hydrogen and under atmospheric pressure. A. S. BROUN (Khim. Tverd. Topl., 1934, 5, 267—273).—A fraction (final b.p. 200°) was hydrogenated at 300—400°/1 atm. with a catalyst containing NiO 8.8, Al_2O_3 1, MgO 0.2, and CoO 0.8 g. Dilution of the shale gasoline with petroleum gasoline favours removal of S. CH. ABS. (e)

Chemical stability of automobile oils. L. NIKIFOROV, M. VORONENKO, S. BEIDER, N. D. GRAMENITZKI, M. M. FAINGAR, V. P. NIKOLSKAJA, I. T. IGNATOVSKAJA, and E. A. VLASOVA (Neft. Khoz., 1934, 26, No. 4, 44—48).—Tests under operating conditions in motors are described. The changes are mainly cracking, due to the contact action of metals at high temp.

CH. ABS. (e)

Increased yield of petroleum sulphonic acids on adding naphthenic acids to the oil to be sulphated. F. SHNEIDER and A. KHEIFETZ (Neft. Khoz., 1934, 26, No. 5, 59).—A gas oil used in the prep.

of sulphonic acids (I) by treatment with SO_3 yielded 50% more of (I) on adding to it 4% of naphthenic acids.

CH. ABS. (e)

Preparation of higher alcohols from petroleum products. E. MEZHREOVSKAYA (Azerb. Neft. Khoz., 1933, No. 6—7, 53—56).—The gas used contained CH_4 + air + H_2 16.70, C_2H_4 — C_2H_6 7.60, C_3H_6 — C_3H_8 9.81, C_4H_8 — C_4H_{10} 47.11, and amylenes and higher homologues 8.65%. The optimum yields were formed with 75—65% of H_2SO_4 at -10° to 10° , depending on the $[H_2SO_4]$.

CH. ABS. (e)

Size-frequency analysis of graphite-oil suspensions. L. V. LIUTIN and V. A. KIRIUSCHKIN (Petroleum, 1934, 30, No. 49, 1—4).—The suspension is diluted with dry C_6H_6 or oil and the η adjusted to a definite val. by the addition of one component. The mixture is shaken in a cylinder and the content of graphite (I) immediately determined. After a measured period of settling, a sample is removed from a definite depth and (I) again determined. Calculations are made with the usual formula based on Stokes' law. (I) content is determined by filtration through a porous "Berlin" crucible, which is then washed with C_6H_6 and heated at 350° to remove adsorbed resin, present in the suspension as a stabiliser. (I) is not oxidised at this temp. Alternatively (I) is coagulated by $COMe_2$ and filtered through a Gooch crucible with 3 layers of filter-paper.

C. C.

Preparation of lubricating oil, paraffin, and asphalt from distillation residues from German crude petroleum. WIDDECKE (Angew. Chem., 1935, 48, 110—112).—The residue is dissolved in $C_5H_{11}OH$ (I) at 40 — 60° and the solution cooled to 0° , when a mixture (II) of paraffin (III) and asphalt (IV) separates. From the extract, soft (III) is obtained by cooling to -10° , while lubricating oil is recovered by distilling off the solvent. (II) is dissolved in aq. (I) at 75° and cooled to 40° . Hard (III) is separated and (IV) recovered from the (I) solution. C. C.

Analysis of lubricating oil acid sludge. B. M. RUBAK and I. BLUMIN (Azerb. Neft. Khoz., 1934, No. 3 27—32).—Free H_2SO_4 is determined by dissolving 2.5—3 g. of the sample in 50 c.c. of C_6H_6 , removing the acid with an aq. sulphate solution, and titrating. Details of the determination of total org. substances, oil, and H_2O are given. CH. ABS. (e)

Influence of solvents on hydrogenation of montan wax under pressure. F. SCHMELING (Öl u. Kohle, 1934, 2, 58—61; Chem. Zentr., 1934, ii, 1063).—With decreasing volatility of the solvent (e.g., C_6H_6 , NH_2Ph , $C_{10}H_8$) decomp. and polymerisation processes were hindered. Solvents such as C_5H_5N , MeOH, or cyclohexanol are useless, since they are partly decomposed and partly hydrogenated. H. J. E.

Hydrogenation of C_2H_2 . Alcohols from C_2H_4 .—See III. Sizes for rayon.—See VI. Fe humate. Hydrogenation catalysts.—See VII. Philippine vegetable oils.—See XII. [Mineral oil-proof] chlorinated rubber.—See XIV. Tannins [from peat]. Treating hides with petroleum sludge etc.—See XV. Removing poisonous gases from the atm. Oilfield H_2O analysis.—See XXIII.

See also A., Apr., 451, **Flame gases. Theory of combustion.** 453, **Reactivity of C.**

PATENTS.

Treatment of coal. A. NAGELVOORT, Assr. to DELAWARE CHEM. ENG. CO. (U.S.P. 1,960,917, 29.5.34. Appl., 9.9.32).—The drainage of H_2O from lump coal is facilitated by spraying the washed coal with a dil. oil emulsion. A. B. M.

Production of a fuel composition. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,963,589, 19.6.34. Appl., 5.1.28).—A pitch of low C content and m.p. $> 150^\circ$ (70 – 83°) is obtained by distillation of tar in spray contact with hot coal gas and blended immediately with petroleum oils. B. M. V.

Solid fuels ignitable by means of a spark. A. APOSTOLOU (B.P. 422,598, 19.1.34. Fr., 19.1.33).—80 pts. of $C_{10}H_8$, or of a mixture thereof with hard paraffin, a solid ketone (e.g., camphor), or a solid ether, are mixed with 20 pts. of pyroxylin in the form of fibre or pulp, and the mixture is compressed into moulds. A. B. M.

Coking of hydrocarbons. BRASSERT-TIDEWATER DEVELOPMENT CORP. (B.P. 422,899, 13.6.33. U.S., 24.6.32. Cf. B.P. 421,408; B., 1935, 259).—The heavy fluid residue from a fractionating tower (*A*) is carbonised in an externally heated coking chamber, the volatile products being returned to *A*. The preheated charging stock is also introduced into *A*. The additional heat required for the operation of *A* is provided by passing a suitable condensate therefrom through a pipe-still and returning it to *A*. A. B. M.

Carbonisation of fuel briquettes. SOC. DE CARBONISATION DE MOLIÈRES-SUR-CEZE (B.P. 422,943, 1.3.34. Fr., 4.4.33).—Briquettes formed of pulverised coal and pitch are carbonised in externally-heated, narrow, vertical ovens, the temp. in the upper half (*A*) of which is 750 – 800° , and in the lower half (*B*) 850 – 1100° . At about $1\frac{1}{2}$ -hr. intervals the briquettes in *B* are discharged, permitting those in *A* to descend into *B*, and another charge of raw briquettes is introduced into *A*. A. B. M.

[Combustion assay] furnace. P. B. CROCKER, Assr. to SENTRY Co. (U.S.P. 1,962,482, 12.6.34. Appl., 30.7.31).—A furnace for heating a combustion tube (*T*) is described. *T* is tapered at the outlet end. B. M. V.

Destructive hydrogenation of solid distillable carbonaceous material. INTERNAT. HYDROGENATION PATENTS Co., LTD., Assees. of I. G. FARBENIND. A.-G. (B.P. 422,892, 8.8.34. Ger., 18.8.33).—Coal etc., prior to destructive hydrogenation, is pulverised and soaked in a solution of a suitable catalyst, e.g., aq. NH_4 molybdate, thiomolybdate, or tungstate, Sn oxalate, etc., in presence of an acidic wetting agent, e.g., oleic acid, sulphonated alkylnaphthalenes, etc. A. B. M.

Hydrogenation of carbonaceous materials. G. H. B. DAVIS, Assr. to STANDARD-I. G. Co. (U.S.P. 1,960,204, 22.5.34. Appl., 8.1.31).—The NH_3 in the residual gas obtained in the destructive hydrogenation of carbonaceous materials containing N is recovered as $(NH_4)_2CO_3$ by scrubbing the gas while still under pressure

with H_2O containing a high $[CO_2]$. If desired, the gas may first be oil-scrubbed, whereby a substantial proportion of the H_2S is removed. A. B. M.

Separation of oils from mixtures thereof with solid matter and asphalts, obtained as residues in the destructive hydrogenation of distillable carbonaceous materials. INTERNAT. HYDROGENATION PATENTS Co., LTD., Assees. of I. G. FARBENIND. A.-G. (B.P. 422,742, 10.2.34. Ger., 24.3.33).—The residues are agitated at an elevated temp. (70 – 90°) with dil. acid, e.g., 25% H_2SO_4 , until an acid reaction is obtained and some or all of the asphalt, and all the solid constituents and the H_2O , separate from the oil. A. B. M.

Removal of oxygen from combustible gases. J. C. WALKER, Assr. to EMPIRE OIL & REFINING Co. (U.S.P. 1,960,212, 22.5.34. Appl., 3.2.27).—Natural gas etc. containing small amounts of O_2 is freed therefrom by adding a further regulated amount of O_2 or air and passing the mixture over a catalyst, e.g., Pt, MnO_2 , or CuO, which brings about reaction between the O_2 and the gas at a convenient temp. The amount of O_2 added may be so regulated that the product has a calorific val. suitable for domestic heating etc. A. B. M.

Dehydration of and removal of hydrocarbons from fuel gases. WHESOE FOUNDRY & ENG. Co., LTD., A. G. GRANT, and A. E. TAYLOR (B.P. 422,636, 14.9.33 and 14.9.34).—The gas is sprayed with a mixture of brine and gas oil at a low temp. After leaving the scrubber the brine and oil are separated; the latter is passed through a refrigerator and recirculated, and the former recirculated directly. Part of the brine is withdrawn and reconc. before being returned to the system. Part of the oil is similarly withdrawn and freed from $C_{10}H_8$ and C_6H_6 before being recirculated. A. B. M.

Removal of acetylene from gases. H. P. A. GROLL and J. H. BURGIN, Assrs. to SHELL DEVELOPMENT Co. (U.S.P. 1,965,100, 3.7.34. Appl., 23.2.32).—The use as solvents for C_2H_2 of polyglycols or their ethers or esters (diethylene glycol Et ether, diacetate, or Et ether acetate) is claimed. H. A. P.

Contact substances. NON-POISONOUS GAS HOLDING Co., LTD., and H. COHN (B.P. 424,478, 27.8.34).—A catalyst suitable for effecting the reaction $CO + H_2O = CO_2 + H_2$ at 400° and for thus removing CO from illuminating gas comprises < 1 Fe compound, e.g., $Fe(OH)_3$; < 1 alkali-metal compound, e.g., K_2CO_3 , comprising $< 5\%$ of the total; and a H_2O -eliminating binder, e.g., Portland cement. B. M. V.

Fractionation of coal-tar materials. G. L. PARKHURST, Assr. to STANDARD OIL Co. (U.S.P. 1,960,679, 29.5.34. Appl., 3.10.32).—Coal tar, tar fractions, or tar products are separated into a hydrocarbon and a non-hydrocarbon fraction by treatment with a liquefied, normally gaseous, hydrocarbon, e.g., C_3H_8 . The method may be used for purifying crude phenols from hydrocarbon impurities, or for removing non-hydrocarbon impurities from hydrocarbons boiling within the lubricating oil range, etc. Apparatus is described. A. B. M.

Hydrogenation of pressure tar. R. E. WILSON, Assr. to STANDARD OIL Co. (INDIANA) (U.S.P. 1,960,885, 29.5.34. Appl., 21.5.30).—The "pressure tar," i.e.,

heavy oil formed as a by-product in cracking plants, is mixed with H_2 under pressure and heated to $<$ its coking temp., e.g., 345–400°; simultaneously an oil which has no tendency to coke, e.g., gas oil, also admixed with H_2 , is heated to 400–500°. The two oil supplies are charged together into the reaction chamber which is packed with a suitable catalyst, e.g., Cr_2O_3 – MoO_3 . No coke is formed. The products are recovered in known manner. The residual gas may be oil-scrubbed to remove hydrocarbons and then recirculated.

A. B. M.

Manufacture of aqueous bituminous dispersions.

Z. C. LOEBEL, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,960,115, 22.5.34. Appl., 8.10.28).—The "gelling" of dispersions in which gelatin is used as the emulsifying agent is prevented by the addition of a small quantity of NaCl, $MgCl_2$, KI, NaOBz, H_3PO_4 , etc.

A. B. M.

Treatment of deep wells. R. H. BOUNDY and J. E. PIERCE, Assrs. to DOW CHEM. CO. (U.S.P. 1,963,072, 19.6.34. Appl., 8.5.33).—To increase the yield of an oil- or gas-well, especially in $CaCO_3$ formation, anhyd. $AlCl_3$ is sent down, together with, if the well is dry, sufficient H_2O to dissolve it; or a hot solution may be used. The spent liquor is removed after the action.

B. M. V.

Production of [liquid] hydrocarbons.

M. PIER, Assr. to STANDARD-I. G. CO. (U.S.P. 1,960,794, 29.5.34. Appl., 21.8.30. Ger., 27.8.29).—Liquid hydrocarbons, of which $<$ 75% boils above 80° and 100% below 325° (e.g., a heavy benzine of b.p. 130–200°), are hydrogenated in the vapour phase at 500–650°, in presence of a catalyst immune to S poisoning (e.g., WO_3 + MgO , Si + Co, etc.), under conditions such that the partial pressure of H_2 is sufficiently low to prevent the formation of saturated hydrocarbons and yet high enough to prevent coke formation, the partial pressure of the improved products (of b.p. $<$ 200°) being maintained at $>$ 10% of the total pressure. The product possesses high antiknock val.

A. B. M.

Refining of hydrocarbon materials.

W. A. SMITH (U.S.P. 1,964,087, 26.6.34. Appl., 22.11.30).—A polymerising and absorption agent for gum-forming materials comprises dry CuO_x · $xSiO_2$ ($x >$ 1). It is re-vivified by org. solvents.

B. M. V.

Preparation of emulsifiable oxidised hydrocarbon.

J. HYMAN, Assr. to VELSICAL CORP. (U.S.P. 1,965,191, 3.7.34. Appl., 15.1.34).—Naphtha-insol., unsaturated hydrocarbons resulting from the polymerisation of cracked gasoline are treated, in presence of active contact masses, in the liquid phase with O_2 and Mn soap or other driers at $<$ 105° with violent agitation. The oxidised polymerides are pptd. by petroleum distillate and treated with aq. alkali to form emulsifiable compounds for use in the sizing of paper.

B. M. V.

Inhibition of deterioration in olefinic oils and spirits. E. W. J. MARDLES and W. HELMORE (B.P. 423,938, 10.8.33).—The addition of aryl derivatives of hydrazines, primary and sec.-amines, and diamines (0.05–0.25%), e.g., $NHAc$ · $NHPh$, $NaCPh_2$, $o-C_6H_4(CO)_2NH$, is claimed.

H. A. P.

Production of graphite lubricants. E. KRAMER (B.P. 424,607, 6.7.34).—Graphite is mechanically reduced to the colloidal condition and mixed with train oil, in one operation if desired, the temp. in the later stage being $>$ 30–40°.

B. M. V.

Gear lubricant. G. M. MAVERICK, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,963,239, 19.6.34. Appl., 15.4.31).—The fluidity and plasticity of gear oil at low temp. are increased by admixture of a few % of a hydrocarbon condensation product (A) and $>$ 10% of a metallic soap which is sol. in the mixture, A being prepared from hydrocarbons having mol. wt. $<$ 170 and a H : C ratio of $<$ 13.5 : 100.

B. M. V.

Drying coal etc. Wet screening of coal. Aq. emulsions. Foam prevention. Reflux control system for stabilising towers. Viscosimeters.—See I. Sulphation of olefines. Alcohols from olefines.—See III. H_2 . Substances [S] in purified form.—See VII. Macadam roads.—See IX. Dehydrator for [oil- H_2O] emulsion.—See XI.

III.—ORGANIC INTERMEDIATES.

Modification of Chavaleston's method for determination of high-percentage acetylene. D. F. NOVOTNÝ (Coll. Czech. Chem. Comm., 1935, 7, 84–89).— C_2H_2 is shaken with standard $AgNO_3$ solution, the ppt. of Ag_2C_2 · $AgNO_3$ filtered off, and the excess of $AgNO_3$ titrated with 0.1N- NH_4CNS or determined gravimetrically as $AgCl$. The deviations are $<$ \pm 1%.

F. R. G.

(A) **Hydrogenation of acetylene to ethylene.** (B) **Polymerisation of acetylene at high temperatures.** H. PICHLER (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 395–401, 401–403; Chem. Zentr., 1934, ii, 878).—(A) Fe and Mo are inactive at 300° in the hydrogenation of a 9 : 1 H_2 – C_2H_2 mixture, but catalyse C_2H_2 decomp. C_2H_4 is formed readily with Co at 250°, but the activity falls rapidly. Ni yields both C_2H_4 and C_2H_6 , the C_2H_6 increasing with the temp. A Ni–Mo catalyst gave almost pure C_2H_4 at 50°, but at 70° gave a 1 : 1 C_2H_4 – C_2H_6 mixture. This ratio is also influenced by the gas velocity. Pressure reduction favours C_2H_4 production.

(B) In the polymerisation of C_2H_2 at 950–1050°, N_2 reduces the CH_4 but does not influence the C or compounds of high mol. wt. formed. H_2 favours CH_4 formation. Addition of CH_4 suppresses its further formation.

H. J. E.

Formation of liquid hydrocarbons from acetylene. IV. **Catalytic hydrogenation and polymerisation of acetylene with complex catalysts.** K. PETERS and L. NEUMANN. V. **Composition of liquid hydrocarbons formed on an iron-nickel catalyst from coke-oven gas treated in an electric discharge.** L. NEUMANN (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 423–433, 434–440; Chem. Zentr., 1934, ii, 878–879; cf. B., 1933, 533).—IV. Small amounts of Ni activate an Fe catalyst, larger proportions ($>$ 10%) resulting in hydrogenation. With 9 Fe–0.5 Ni–0.5 Cu a 60–64% yield of liquid hydrocarbons (I) is formed from C_2H_2 . With Fe–Ni on SiO_2 gel the yield of (I) falls at $>$ 250°. No activation was obtained with WO_3 or rare-earth oxides. Pd and Pt favour hydrogenation and separation of C

ThO₂ has an activating action at 170°. Pure Fe loses its activity rapidly.

V. Data for the fractional distillation of liquid products are recorded. No paraffins were found.

H. J. E.

Production of alcohol from ethylene by catalytic hydration. A. A. VANSCHIEDT and E. M. KAGANOVA (J. Appl. Chem. Russ., 1934, 7, 1461—1475).—Of a no. of catalysts tested, the highest yields (> 0.5%) of EtOH were obtained when using Cd₃(PO₄)₂ at 250°/1 atm. At higher temp. and pressure (275°/60 atm.) > 6% yields are obtained, using kaolin (I) as catalyst; the activity of (I) is destroyed by heating at > 380°.

R. T.

Preparation of alcohol from ethylene obtained from cracked gas. II. Reactivation of active carbon with steam. M. A. DALIN and V. S. GUTUIRYA (Azerb. Neft. Khoz., 1933, No. 8, 40—43; 1934, No. 2, 90—93; cf. B., 1933, 997).—The charge of C was preheated and treated with superheated steam. The H₂SO₄ consumption in the prep. of EtOH was 3.2 kg. per kg. of 100% EtOH (at 80°). At 15 atm. the consumption was 2.4 kg. Pr^oOH (I) was prepared at 25° from cracked gases, using 90% H₂SO₄. The acid consumption was 4—4.2 kg. per kg. of (I).

CH. ABS. (e)

Catalytic preparation of butyl acetate and butyl butyrate. M. B. TUROVA, A. A. BALANDIN, M. S. MERKUROVA, and M. V. GUSEVA (J. Appl. Chem. Russ., 1934, 7, 1454—1460).—Wood-C is treated successively with aq. NaOH, conc. HNO₃, and H₂O, dried at 110—120°, soaked in H₃PO₄ (*d* 1.3), and heated at a dull red heat in N₂ for 3 hr. BuOAc is obtained in 97% yield by passing 1 : 6 BuOH—AcOH vapours over the catalyst at 150°, and PrCO₂Bu from 1 : 2 BuOH—PrCO₂H at 180°. The catalyst does not undergo inactivation after 6 months of continual use. The effect of varying the rate of flow and the reaction temp. has been studied.

R. T.

Determination of water in mixtures of solvents with water. A. N. JUZICHIN (Zavod. Lab., 1934, 3, 1129—1131).—A stream of air is passed over 0.1—1.0 g. of the solvent at 30—40°, and the vapours are passed through a weighed U-tube containing CaC₂, which is again weighed 15 min. after the last trace of solvent has evaporated; then H₂O % = 359.74*b*/*a*, where *b* is the increment in wt. and *a* the wt. of solvent taken. The method gives trustworthy results for EtOH—H₂O and EtOAc—EtOH—H₂O mixtures containing 0.5—83% of H₂O.

R. T.

Higher hydrocarbons from CH₄ and CO. Phenols from low-temp. tar. Determining C₂H₄, C₃H₆, and C₄H₈. Alcohols and sulphonic acids from petroleum.—See II. Hydrogenation catalysts.—See VII. Determining MeOH in EtOH. EtCO₂H and citric acid fermentation.—See XVIII. Removing poisonous gases from the atm.—See XXIII.

See also A., Apr., 462, Prep. of diphenylbenzidine. 472, Electrolysis of propionates + nitrates. 525, MeCl poisoning.

PATENTS.

(A) Preparation of halogen-containing compounds. [Halogenation of βδ-dichloro-Δ^β-butylene.] (B) Production of chemical products. [Halo-

genation of hydrogen halide adducts of vinylacetylene.] (A) D. D. COFFMAN, (B) W. H. CAROTHERS and G. J. BERCHET, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,964,720 and 1,965,369, 3.7.34. Appl., [A, B] 26.1.32).—(A) Chlorination of βδ-dichloro-Δ^β-butylene (in CCl₄) at -80° up to its b.p. gives βγδ-trichloro-Δ-butylene (I), b.p. 65—67°/39 mm., and ββγδ-tetra, b.p. 90°/32 mm. (II), and αββγδ-penta-chlorobutane (III), b.p. 85°/10 mm. (B) Chlorination of δ-chloro-Δ^{αβ}-butadiene at -50° to 50° gives αβδ-trichloro-Δ^β-butylene, b.p. 65°/10 mm., a tetrachlorobutylene [(II)?], b.p. 74—77°/11 mm., and (III). Dehydrohalogenation (KOH—MeOH) gives [from (I)] βγ-dichlorobutadiene (IV), b.p. 40—45/85 mm., 98°/1 atm., and [from (III)] αβγ-trichlorobutadiene (V), b.p. 34°/7 mm., and αββγ-tetrachloro-Δ^γ-butylene, b.p. 42°/7 mm. (IV) and (V) are polymerised by the usual agencies to hard, somewhat rubbery, and soft plastic polymerides, respectively. Elastic interpolymerides from (IV) [or (V)] and β-chlorobutadiene are specifically claimed. Bromination of β-bromobutadiene in CHCl₃ at room temp. gives a tribromobutylene, b.p. 129—132°/7 mm.; a chlorodibromobutylene, b.p. 119—122°/27 mm. is also described.

H. A. P.

Sulphation of olefines. R. F. LE BARON, Assr. to STANDARD ALCOHOL Co. (U.S.P. 1,966,072, 10.7.34. Appl., 4.4.30).—Apparatus is described in which a mixture of olefines is made to react in a series of stages with aq. H₂SO₄ of progressively increasing concn. at the appropriate temp. for each stage, and the product is separately withdrawn from each stage and separated from unchanged hydrocarbons.

H. A. P.

Production of alcohols from olefines. J. A. DAVIES, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,966,166, 10.7.34. Appl., 12.11.31).—To a solution of an olefine > C₂H₄ in aq. H₂SO₄ is added sufficient of an org. liquid miscible with both phases to form a homogeneous solution (MeOH, EtOH, COMe₂); the product is distilled and the distillate fractionated. The prep. of BuOH from C₄H₈ (Δ^α+Δ^β) is described.

H. A. P.

Manufacture of *n*-butanol [butyl alcohol]. C. O. YOUNG, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,966,157, 10.7.34. Appl., 7.12.31).—Crotonaldehyde and H₂ are passed at 170—210°/25—60 lb. per sq. in. (180°/30 lb. per sq. in.) over Ni + 1—5% of Cr (as Cr₂O₃) on an inert carrier.

H. A. P.

Preparation of ethylene glycol from dichloroethane. SOC. CARBOCHIMIQUE, Soc. ANON. (B.P. 424,159, 20.7.34. Fr., 28.8.33).—s-C₂H₄Cl₂ (I) is hydrolysed by NH₃ or an NH₄ salt (in presence of an alkali or alkaline-earth base or salt); e.g., (I) is heated with aq. CaCO₃ at 160—170° in an autoclave with gradual introduction of (NH₄)₂SO₄, or with H₂O at 160—170° with gradual introduction of NH₃.

H. A. P.

(A) Hydrogenation of aliphatic polyhydric alcohols. (B) Catalytic production of [*n*]butyl alcohol. (C) Production of polyhydroxy- [polyhydric] alcohols. (D) Catalytic hydrogenation process. (E) Catalytic preparation of organic compounds. (A—C) A. W. LARCHAR and (D, E) W. A. LAZIER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P.

1,963,997—1,964,001, 26.6.34. Appl., [A, B] 11.11.29, [C] 12.5.30, [D] 27.5.30, [E] 23.7.30. Renewed [A] 15.8.33.—(A) Glycols are produced by heating a polyhydric alcohol with H_2 and a combined dehydrating-hydrogenating catalyst (I) at $< 200^\circ / < 2000$ lb. per sq. in. The preferred catalyst is Ni-Cr oxide (II), obtained by reduction of Ni chromate (H_2 at 500 — 550°). Other examples are Cu, Fe, Co-Cr, Al, W, Mo, U, or Th oxides. Sorbitol with (II) and H_2 in H_2O at 250 — $270^\circ / 3000$ lb. per sq. in. gives 33 wt.-% of $OH\cdot CHMe\cdot CH_2\cdot OH$ (III); glucose and glycerol likewise give (III) under similar conditions. (B) Aldol (IV) or $\alpha\gamma$ -butylene glycol (V) is heated with H_2 and (I) [(II)] at 200 — $300^\circ / < 2000$ lb. per sq. in., or (IV) is converted into (V) at 100 — $120^\circ / < 1000$ lb. per sq. in., and this is further reduced at 200 — $250^\circ / 3000$ lb. per sq. in. (c) Sugars containing $> C_{12}$ are reduced to the corresponding alcohols by heating with H_2 and Ni-kieselguhr, Cu-Zn, or (II) at 100 — $150^\circ / > 20$ atm. Examples include the reduction of galactose, *l*-xylose, lactose, sucrose, and glucose (at 130 — $150^\circ / 1000$ — 1400 lb. per sq. in.). (d) Catalysts of type (I) are obtained by pptn. of an appropriate metal salt with an NH_4 chromate, igniting the resulting double NH_4 chromate, and reducing with H_2 ; e.g., basic Cu NH_4 chromate is ignited at 400° and heated with H_2 at 300 — 350° or the salt $(NH_4)_2NiCrO_4\cdot 6H_2O$ is heated with H_2 at 400° . Their use in hydrogenation (of crude BuOH, containing reducible impurities, and obtained by catalytic dehydrogenation of EtOH) is claimed. (e) Mixed chromites of hydrogenating metals forming easily and difficultly reducible oxides, respectively, are formed as in (d). Examples are Cd-Zn, Zn-Cu, Pb-Zn, Bi-Zn, Ni-Zn, and Cd-Cu chromites. Their use is claimed for (a) dehydrogenation of EtOH (to EtOAc, BuOH, MeCHO), (b) synthesis of MeOH from CO and H_2 , reduction of aliphatic esters of acids $> HCO_2H$ to alcohols, and (d) bringing about interaction of H_2 with reducible and oxidisable org. compounds. H. A. P.

Purification of esters. J. P. BURKE and C. A. DORAN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,963,968, 26.6.34. Appl., 16.2.32).—Aldehydes are removed from esters, e.g., EtOAc, BuOAc, by heating with a primary or *sec.* amine (NH_2Ph) (and a small amount of inorg. acid). Apparatus is described for continuous operation on a countercurrent principle. H. A. P.

Preparation of dichloroacetic acid. COMP. DE PROD. CHIM. ET ELECTROMÉTALLURG. ALAIS, FROGES ET CAMARGUE (B.P. 424,047, 4.8.34. Fr., 17.8.33).— C_2HCl_5 is heated with 88—99% H_2SO_4 at 130 — 170° (168°). Preferably 97% H_2SO_4 is used and maintained at this concn. during the reaction by addition of H_2O as needed. H. A. P.

Production of [higher alkyl]sulphonic acids. E. SCHIRAN, Assr. to UNICHEM CHEMICALIEN HANDELS A.-G. (U.S.P. 1,966,187, 10.7.34. Appl., 22.12.31. Ger., 23.12.30).—The appropriate alcohol is converted into halide, this is condensed with Na_2S_n , and the resulting polysulphide oxidised ($HOCl$, $NaClO_3$ + OsO_4 , HNO_3). E.g., cetyl chloride is condensed with Na_2S_2 in EtOH at the b.p., the product oxidised with aq. $KMnO_4$,

and the Na cetylsulphonate produced extracted with BuOH. Production of dodecanesulphonic acid and sulphonic acids from the alcohols from coconut oil and naphthenic acids is described. H. A. P.

Destruction of stability of emulsoids. O. M. URBAIN, Assr. to C. H. LEWIS (U.S.P. 1,964,444, 26.6.34. Appl., 11.5.31).—Pptn. of the suspended matter (e.g., in sewage) is effected by addition of a H_2O -sol. acid of the formula $C_4H_{2n-2}O_2$, e.g., acrylic, α - and β -methylacrylic, angelic, and tiglic acids, in addition to the usual electrolytes. H. A. P.

Manufacture and application of quaternary ammonium compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 423,933, 2.8.33).—The products of B.P. 423,864 (B., 1935, 348) are treated with esters of inorg. or aromatic sulphonic acids (Me_2SO_4 , CH_2PhCl). The quaternary salts formed are applied in aq. solution to textiles (cellulose) dyed with substantive dyes to improve their fastness to H_2O , acids, perspiration, and washing. H. A. P.

Hydrolysis of halogenated hydrocarbons. J. A. BERTSCH, Assr. to MONSANTO CHEM. Co. (U.S.P. 1,966,281, 10.7.34. Appl., 31.1.31).—An aryl halide ($PhCl$) and steam are passed over a synthetic zeolite containing Cu (e.g., a hydrated Na Cu silicate) at 325 — 450° .

H. A. P.

Purification of crude aromatic nitro-compounds. C. W. DAVIS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,964,792, 3.7.34. Appl., 17.7.31).—Crude trinitrotoluene is washed with 40—70% (60%) aq. $COMe_2$ at $< 30^\circ$ (20°). H. A. P.

(A) Nitration of *N*-acetyl-*p*-toluidine. (B) **Manufacture of 5-nitro-2-aminoanisole [-*o*-anisidine].** J. M. TINKER and L. SPIEGLER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,963,597—8, 19.6.34. Appl., [A, B] 25.1.32).—(A) Formation of 3-nitroacet-*p*-toluidide is promoted by use of HNO_3 and 40—78% H_2SO_4 at 15 — 30° . (B) *o*- $NHAc\cdot C_6H_4\cdot OMe$ is nitrated with HNO_3 and 55—78% aq. H_2SO_4 at 15 — 30° (18—25%), the product is hydrolysed (5% H_2SO_4), and the base isolated as sulphate. H. A. P.

Manufacture of phenols from halogenated hydrocarbons. F. A. STEINGROEVER and R. ZELLMANN, Assrs. to CHEM. FABR. VON HEYDEN A.-G. (U.S.P. 1,961,834, 5.6.34. Appl., 24.10.31. Ger., 25.10.30).— $PhCl$ etc. is heated with H_2O and a catalyst comprising an oxide, hydroxide, or salt of Al, Mg, Fe, Th, Ti, Zr, or W and Zn, Cu, Ni, or Cd, or their derivatives as above (Al_2O_3 -Cu phosphate, ZnO obtained by burning Zn) at 350 — 600° (500°). Apparatus is described. (Cf. B.P. 404,164; B., 1934, 232.) H. A. P.

Purification of phenols. W. W. TRIGGS. From E. I. DU PONT DE NEMOURS & Co. (B.P. 424,191, 18.5.33).—Catalyst poisons are removed from phenols (cresylic acid) by agitation with (78—80%) H_2SO_4 (10—30 wt.-%) at $> 35^\circ$ (15—25°/20 hr.), separating the acid layer, and washing with H_2O (+ a little NaOH). H. A. P.

Solubilisation of chlorocarvacrol derivatives. C. PHILIPP, Assr. to CHEM. FABR. VON HEYDEN A.-G. (U.S.P. 1,964,999, 3.7.34. Appl., 14.8.30. Ger., 2.4.28).—The chlorocarvacrol etc. is dissolved in an aq. solution

of Na carvacroxyacetate, benzoate, *p*-toluenesulphonate, chloride, palmitate, stearate, or oleate. Wetting agents may be added. H. A. P.

Production of monocarboxylic acids. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,964,516, 26.6.34. Appl., 3.10.27).—Polycarboxylic acids or their anhydrides (and steam) are passed over a strongly alkaline contact mass, *e.g.*, Cu carbonate—Ca(OH)₂—pumice, Na aluminate zeolites (at 320—450°). The products from vapour-phase oxidation of C₁₀H₈ may be mixed with H₂O and used direct for prep. of BzOH. H. A. P.

Preparation of acid halides. L. E. MILLS, Assr. to DOW CHEM. Co. (U.S.P. 1,965,556, 3.7.34. Appl., 6.3.30. Cf. U.S.P. 1,921,767; B., 1934, 492).—A benzotrihalide (CPhCl₃) is made to react with an org. carboxylic acid at < 150° in presence of H₂SO₄, H₃PO₄, or HClO₄. *E.g.*, CPhCl₃, AcOH (equimols.), and H₂SO₄ (0.8%) at 90° give BzCl (96%) and AcCl (92.5% of theory). H. A. P.

Sulphonation of anthraquinone and derivatives. D. G. ROGERS, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,963,383, 19.6.34. Appl., 20.3.30).—Sulphonation is conducted with oleum in presence of the sulphate of an alkali or alkaline-earth metal, Mg, or NH₄ and occurs under milder conditions. *E.g.*, anthraquinone is heated with 26% oleum, Na₂SO₄, and a little Hg₂SO₄ at 120—125°, separation of Na 1:5- and 1:8-disulphonate being induced by seeding. H. A. P.

Production of quinoline-yellow bases. J. OGILVIE, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,963,374, 19.6.34. Appl., 30.4.29).—The condensation of *o*-C₆H₄(CO₂)O (I) with picolines and quinaldines is carried out in an inert diluent (solvent for the phthalone, *b.p.* 160—190°); *e.g.*, quinaldine (675 pts.) is heated with (I) (810 pts.) in *o*-C₆H₄Cl₂ (675 pts.) at 183—184°, H₂O being distilled off with the solvent. Further (II) (940 pts.) is then added and the product allowed to crystallise. No condensing agent is needed. H. A. P.

Hydrocarbons from fuel gases. Fractionating coal-tar materials.—See II. Mg xylonate.—See VII.

IV.—DYESTUFFS.

See A., Apr., 504, S dyes.

PATENTS.

Manufacture of [green] dyes [of the anthraquinone series for wool and acetate silk]. Soc. CHEM. IND. IN BASLE (B.P. 423,256, 20.9.33. Switz., 20.9.32 and 8.4.33).—Anthraquinones containing a 1-hydroxyalkylamino- (I) and a 4-*p*-amino- or -hydroxyphenyl-amino- (II) group are made by substitution of OH, OR (R = alkyl or aryl), NO₂, or halogen either by (I) or (II), and, if desired, sulphated or sulphonated. The shades are green-blue to blue-green. C. H.

[Vat] dyes of the anthraquinone series and their production. E. I. DU PONT DE NEMOURS & Co. (B.P. 423,447, 1.8.33. U.S., 1.8.32).—A 2-amino-1-selenoanthraquinone (I) or the corresponding diselenide (II) is condensed with Ⓞ:CRX, (Ⓞ:CX)₂, or (Ⓞ:CX)₂R', where R = alkyl, aryl, or aralkyl, R' = alkylene, arylene, or aralkylene, and X = H or halogen, to give anthra-

quinoneselenazoles which are yellow vat dyes. Examples are products from (I) and terephthaloyl chloride, PhCHO, (CHO)₂, (COCl)₂, adipoyl chloride, and diphenyl-4:4'-dicarboxylic chloride. C. H.

Manufacture of halogenated vat dyes [of the benzanthrone series]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 423,450, 15.8.33 and 15.2.34).—The vat dyes of B.P. 24,604/08 and 339,396 (B., 1909, 832; 1931, 338) are mono- or di-chlorinated; or polyhalogenated derivatives of such vat dyes are partly dehalogenated. Products giving blue-green shades are obtained. Dehalogenation may occur on vatting. C. H.

Vat dye pastes. IMPERIAL CHEM. INDUSTRIES, LTD., H. P. BROWN, R. F. GOLDSTEIN, and A. STEWART (B.P. 424,685, 21.8.33).—A small proportion (> 2%) of alkali-cellulose glycollate is added to the pastes to prevent settling. C. H.

Production of auramine colouring matters. G. W. TALBERT, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,962,368, 12.6.34. Appl., 21.3.30).—The crude hot melt from CH₃(C₆H₄NMe₂)₂, S, and NH₄Cl is added directly to a large bulk of cold H₂O. C. H.

Preparation of [mono]azo dyes [for acetate silk]. H. JORDAN and M. A. DAHLEN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,963,133, 19.6.34. Appl., 19.9.31).—A diazotised arylamine is coupled with a *m*-alkoxyaniline which may carry alkyl, alkoxy, or halogen substituents, both components being free from CO₂H or SO₃H. Examples are: *m*-anisidine < NH₂Ph, *p*-C₆H₄Me·NH₂, or α-C₁₀H₇·NH₂; NH₂Ph → 2:5-dimethoxyaniline. C. H.

Preparation of [mono]azo dyes [for rubber]. H. E. WOODWARD, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,962,226, 12.6.34. Appl., 9.6.32).—An aniline-*o*-sulphonic acid is diazotised and coupled with a phenylmethylpyrazolone (I) in which the Ph may carry alkyl, alkoxy, or halogen substituents. Examples are 6-chloro-*m*-toluidine-4-sulphonic or ortho-anilic acid → (I). C. H.

Preparation of [tris]azo dyes. A. R. MURPHY, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,965,201, 3.7.34. Appl., 21.1.33).—A diazo-azo compound is coupled through a 2:5-dialkoxyaniline with an aminobenzamido- or aminobenzamidobenzamido-naphtholsulphonic acid. The dyes may be diazotised and developed on the fibre. Examples are: aniline-2:5-disulphonic acid → Cleve acid (I) → 2:5-dimethoxyaniline (II) → *p*-aminobenzoyl-J-acid (blue; developed with 1-phenyl-3-methyl-5-pyrazolone for green); 2-naphthylamine-4:8-disulphonic acid → (I) → (II) → *p*-aminobenzyl-*p*-aminobenzamido-J-acid (blue); amino-terephthalic acid → (I) → (II) → *p*-aminobenzoyl-S-acid (blue). C. H.

[Tris- and tetrakis]-azo dyes [containing copper]. IMPERIAL CHEM. INDUSTRIES, LTD., M. MENDOZA, and F. L. ROSE (B.P. 423,237, 23.6.33).—A 4:4'-diamino-3-carboxyazobenzene, carrying in position 3' CO₂H, OMe, or OEt, and in position 2' or 6' H, Br, Cl, Me, Et, NO₂, or SO₃H, is tetrazotised and coupled

with 2 mols. of 1 or 2 *o*-coupling naphthols, and the dyes are coppered in substance or on the fibre. Examples are: 4:4'-diamino-3'-methoxy-3-carboxyazobenzene \rightarrow 2 mols. of N.W.-acid, +Cu (violet-grey), or 2 mols. of 1:8:2:4-aminonaphtholdisulphonic acid, +Cu (green-blue), or 2 mols. of γ -acid, +Cu (grey); azoanthranilic acid \rightarrow 2 mols. of H-acid, +Cu (blue-green), or 2 mols. of *N*- β -hydroxyethyl-J-acid (blue). C. H.

Production of polyazo derivatives of 8-hydroxy-1-naphthylamine [1:8-aminonaphthol]. L. H. FLETT, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,965,635, 10.7.34. Appl., 19.6.31).—A 1:8-aminonaphthol, e.g., H-acid, is coupled acid with a diazo compound, e.g., diazotised *p*-nitroaniline or tetrazotised benzidine, and an arylamine, e.g., NH_2Ph , is added to the azo solution. The arylamine is then diazotised in the mixture, and coupling is effected by pouring into excess of Na_2CO_3 solution. C. H.

Production of tricarboyanine dyes. J. D. KENDALL (B.P. 424,264, 12.8.33).—As pyridinium salts for use in preparing tricarboyanines (cf. B.P. 351,555; B., 1931, 1041), the salts prepared from a 1-halogeno-oxazole and $\text{C}_5\text{H}_5\text{N}$, e.g., 2-benzoxazolylpyridinium chloride, are preferable to those hitherto used. A tricarboyanine may even be prepared in one stage, i.e., without isolation of the pyridinium salt. F. M. H.

Production of compounds of the cyanine type. J. D. KENDALL (B.P. 424,559, 18.5.33).—For preparing cyanine dyes in which the nuclei are linked by CH_2 , a quaternary heterocyclic NH_4 salt, with an α - or γ -alkylmercaptogroup, is condensed with a quaternary heterocyclic NH_4 salt containing a reactive Me group, in a solvent, with an acid-binding substance. Alkyl mercaptan is liberated. E.g., 1-methylmercaptobenzthiazole (I) ethiodide, in alcohol with NaOAc, reacts (a) with 2-methyl- β -naphthoxazole ethiodide to give 2:2'-diethyl-3:4-benzoxathiacyanine iodide [sensitivity max. (S) for chloride emulsions, 430 m μ], (b) with 2:3:3-trimethylindolenine methiodide to give 1:3:3-trimethyl-2'-ethylindothiacyanine iodide (S 470 m μ). The reaction may be carried out in one stage; e.g., by heating (I) and 1-methyl- α -naphthoxazole with Et *p*-toluenesulphonate, and subsequently treating with EtOH, NaOAc, and KI, 2:2'-diethyl-5:6-benzoxathiacyanine iodide is formed. The reactants for preparing 33 other dyes, including representatives of the new classes *oxaox*-, *oxaiso*-, *oxathiazolo*-, *indoza*-, *indothia*-, *pyridothia*- ψ -, and *oxathia*-cyanines, also as-*oxacyanines* and *-thiacyanines*, are stated. M.p. are recorded for the dyes, and their sensitising action on chloride emulsions. F. M. H.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Behaviour of aqueous solutions of domestic cocoons. XIX. Resistance to oxidation of sericin. H. KANEKO and Y. NAKAZAWA (J. Agr. Chem. Soc. Japan, 1934, 10, 600—603; cf. A., 1935, 33).—As sericin-A is changed to -B by the action of heat or steam, drying decreases the resistance of sericin to oxidation. CH. ABS. (e)

Practical use of the titer control of textile fibres. V. ETTORE (Atti. Congr. naz. Chim., 1933, 4, 243—256).—

Application of the author's methods to the examination of defective fibres is examined. A. G. P.

Rayon crêpe fabrics. ANON. (Silk & Rayon, 1934, 8, 414—416, 468—470, 521—524).—The construction of the fabrics and methods of crêping them in hot soap liquors are discussed. The crêpe appearance may be modified by passing the fabric through a special embossing calender before crêping, and it can be reduced by calendering between plain rollers or stentering before or after crêping. A. J. H.

Adsorption compression on cellulose and wood. I. Density measurements in benzene. A. J. STAMM and R. M. SEBORG (J. Physical Chem., 1935, 39, 133—142).—The apparent adsorption compression of H_2O on cellulosic materials has been measured in C_6H_6 . The results indicate that the compressive force is of the order of a few thousand atm. instead of 100,000 atm. as required by the results of Filby *et al.* (A., 1932, 1087). Adsorption compression extends to the fibre-saturation point. M. S. B.

Manufacture of cellulose [for rayon] from American pinewood. C. H. HERTY (Amer. Dyestuff Rep., 1935, 24, 124—126).—Large-scale trials show that cellulose (I) containing 88—90% of α -cellulose suitable for rayon manufacture can be produced at \$35 per ton (usual price \$70) from the young (< 25-year) pine trees which grow on 200,000,000 acres of "cutover" land in the southern states and contain no more resin than does spruce although being 17% heavier. A. J. H.

Retarding effect of metallic salts on the coagulation of viscose. V. DUCHESNOY (Russa, 1934, 9, 641—645).— MgSO_4 does not affect the rate of decomposition of cellulose xanthate, but retards or prevents elimination of the S compounds (I). Na_2SO_4 , $(\text{NH}_4)_2\text{SO}_4$, and ZnSO_4 retard coagulation and elimination of (I), the activity increasing in the above order. CH. ABS. (e)

Inorganic colouring materials for Cellophane. L. A. TEST (Proc. Indiana Acad. Sci., 1934, 43, 139—141).—The following were used in 1—2% solution to colour Dupont Cellophane No. 600: $\text{FeCl}_3 + \text{K}_4\text{Fe}(\text{CN})_6$ (I) (blue); $\text{FeSO}_4 + \text{K}_2\text{Fe}(\text{CN})_6$ (blue); $\text{CdSO}_4 + \text{Na}_2\text{S}$ (yellow); $\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6 + \text{H}_2\text{S}$ (orange); $\text{UO}_2(\text{NO}_3)_2 + (\text{I})$ (burnt orange); $\text{CuSO}_4 + (\text{I})$ (red brown); $\text{K}_2\text{Cr}_2\text{O}_7 + \text{SO}_2$ (light green); $\text{NiCl}_2 + \text{dimethylglyoxime}$ (pink). Other examples are given. CH. ABS. (e)

Cause of milky flecks on viscose silk. STEFAN-POZNANSKI (Rev. univ. Soies, 1934, 9, 179—183, 257—259; Chem. Zentr., 1934, ii, 867).—The effect is attributed to reduction in the amount of CS_2 and the η , increase in NaOH in the viscose, and to addition of small amounts of Na sulphurinate. Other factors are increase in $[\text{H}_2\text{SO}_4]$ and decrease in $[\text{ZnSO}_4]$ in the pptn. bath. H. J. E.

Determination of lignin and cellulose in the same sample of plant product. V. S. SMIRNOV (J. Appl. Chem. Russ., 1934, 7, 1519—1522).—The comminuted material is extracted with EtOH- C_6H_6 (3 hr.), dried at 105°, 1—5 g. of the product are shaken with 10—50 ml. of 72% H_2SO_4 (3 hr. at room temp.), 150—170 ml. of H_2O added, and the solution is boiled under reflux

(3 hr.), filtered, and the residue washed free of $\text{SO}_4^{''}$ and reducing substances, dried, and weighed (lignin). Cellulose is determined from the glucose content of the filtrate + washings. R. T.

Lignins, nitrolignins, and oximinoketones. (Criticism of some lignin questions. Preparation and crystallisation properties of nitrolignins.) K. KÜRSCHNER (Techn. u. Chemie d. Papier- u. Zellstoff-Fabr., 1934, 31, 1—14, 17—35; Chem. Zentr., 1934, ii, 754—755).—The decomp. of pine-wood with a 20 vol.-% solution of HNO_3 in EtOH, the nitration of pure and commercial lignins (I) and humin substances (II) in EtOH, and the combustion of C in the elucidation of commercial (I) are described. No advantage is gained by supplementing or replacing EtOH with other org. solvents. The HNO_3 -EtOH decomp. does not give satisfactory results for the determination of (I) or (II). Nitrated (I) and (II) are crystallised by slow evaporation of their COMe_2 solutions with simultaneous addition of aq. AcOH. R. N. C.

Determination of the variability of pulp wood as an indication of pulp yield. J. D. HALE (Pulp and Paper Canada, 1935, 36, 120—122, 124).—The extent and causes of variation in the d of spruce and balsam wood have been investigated, with particular reference to the variation in mean d of a species in different localities, and to the range of variation of d within a species. H. A. H.

Commercial yield of pulp from wood in the manufacture of sulphite. J. B. JONES (Pulp and Paper Canada, 1935, 36, Conv. issue, 82—84).—Details of a method of measuring accurately the pulp yield, and its val. in assisting control operations, are given. H. A. H.

Hydration of cellulose in beating. L. G. COTTRALL (Paper-Maker, 1934, 88, ts 142—143, 144, 159—160). J. STRACHAN (*Ibid.*, 143—144, 160).—Polemical correspondence, in which the various theories to account for the characteristic condition of beaten pulp and its behaviour in papermaking operations are discussed. H. A. H.

Relation of fibrillation to increase in strength on beating [wood pulp]. S. R. H. EDGE (Paper-Maker, 1935, 89, 32 ts).—Although easy-bleaching sulphite wood pulp which has been disintegrated and beaten in PhMe is highly fibrillated, paper made from it, after removing the solvent and soaking in H_2O , has very low strength and H_2O -resistance. It is maintained that this result is out of accord with every theory so far advanced for explaining the development of strength during ordinary beating. H. A. H.

Heat-requirements for sulphite pulping. O. L. BERGER (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 66).—A Committee report. Replies to a questionnaire are briefly summarised. H. A. H.

Structure of [cellulose] fibre and its influence in the making of paper. W. B. CAMPBELL (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 69—72).—Recent theories are discussed, and the author's views on the mechanism of paper strength, by crystallographic bonding, are reiterated. H. A. H.

Use of white-water in the fine paper industry. G. I. HOOVER (Pulp and Paper Canada, 1935, 36, Conv. issue, 69—72, 74).—Factors influencing the quantity of excess white- H_2O which may be re-used are discussed. H. A. H.

Use of white-water in the newsprint mill. R. W. STERNS (Pulp and Paper Canada, 1935, 36, Conv. issue, 73—74).—Influencing factors are discussed. H. A. H.

Flocculation in papermaking. J. STRACHAN (Paper-Maker, 1935, 89, ts 1—2, ts 17, ts 20).—The conditions under which such varied ingredients as fibres (especially esparto), rosin size, china clay, starch, etc. flocculate at the wet end of the paper machine, and the effect of such flocculation on sheet formation, are discussed. H. A. H.

Adverse function of gases in the manufacture of paper. J. A. DE CEW (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 43—44).—A no. of examples are given. In particular, it is pointed out that air entrained in the fibres has a cushioning effect during beating and so inhibits hydration, whilst its escape leads to frothing troubles and may even stop circulation; that the O_2 of dissolved air may cause oxidation of the cellulose; and that entrained air may adversely affect the rate of drainage of H_2O and the felting properties of the fibres on the paper-machine wire. An intermediate vac. treatment of all paper stock is advocated in order to remove both entrained and dissolved gases. H. A. H.

Properties of paper stock: composition of furnish, freeness, and wetness. J. L. GARTSHORE (Paper-Maker, 1935, 89, ts 27—31).—Examples are given to show that, by varying the proportions of unbeaten fibre, fibrillated fibre, and "flour," several varieties of stock may be synthesised, which when made into laboratory sheets have the same bursting strength (B) but differ in other properties, especially freeness (F) and behaviour on the paper-machine (M) wire. The proportion of flour is the controlling factor in F . The relationship between the B of paper made on M (B_M) and of that made on the British P.M.A. standard apparatus (L) from the same stock may vary with different makings, *i.e.*, $B_M = LK$, where K is always < 1 , and is usually about 0.6, but may vary by as much as 25%. In the case of kraft paper, the lower the F (owing to flour) the lower is K , and, conversely, K increases as the proportion of fibrillated fibre increases. The limitations of the usual types of F tester are discussed, and in particular it is pointed out that no apparatus such as the Canadian standard tester, which measures F only over the consistency (C) range 0.3% to about 1%, can indicate the behaviour of stock on a M wire, where C increases from about 0.3% to 1% at the slice to about 14—17% after the couch roll. A new apparatus is described, in which an attempt is made to work within the limits of the M stock consistencies, and to embody vac. and a time factor. The testing conditions are varied according to the nature of the pulp under examination, and it is claimed that the apparatus is particularly valuable when selecting mechanical pulps for a newsprint furnish. H. A. H.

Production of heavy kraft paper for corrugated board boxes. G. A. HALL (Papier-Fabr., 1935, 33, 89—96).—A lecture.

Heat-conservation during liquor recovery in the cellulose industry. H. SEEGERS (Papier-Fabr., 1935, 33, 68—70).—To regain the loss of efficiency of economisers attached to liquor-recovery plants, caused by deposition on the tubes of inorg. dust, *e.g.*, NaOH, from the gases, the tubes may be sprayed externally with H₂O. The dust is dissolved to form a saturated solution which may then be returned to the liquor system. D. A. C.

Determination of wood pulp in paper by Roe's chlorine number. H. AHLQUIST (Svensk Pappers-Tidn., 1934, 37, 306; Chem. Zentr., 1934, ii, 1230).—The wood pulp content $x = [100(k - 5.0)/34.4] - 5\%$, where k is the Cl. no. of the ash-free paper, and 34.4 the Cl. no. of the wood pulp, in determining which 0.55 g. of the air-dried material is treated for 1 hr. H. J. E.

The permanganate-chlorine number and the Roe-Küng titrimetric chlorine number [of pulp]. A. KÜNG (Papier-Fabr., 1935, 33, 60—63).—To obtain the KMnO₄ no. (P), the pulp, in acid solution, is stirred with excess of KMnO₄ (I); after exactly 60 sec. the oxidation is interrupted by adding FeSO₄ acidified with H₂SO₄. The pulp is filtered off and the filtrate titrated back with (I). The concns. are so adjusted that 1 c.c. of (I) used is equiv. to 1% of Cl. The Roe Cl. no. (C) is modified by using aq. Cl₂ instead of the gas, the chlorination of the pulp being interrupted after 15 min. by adding KI. Excess Cl₂ is determined by titrating the I thus liberated with Na₂S₂O₃. Results obtained with P and C agree well with all classes of pulps; they also agree well with the Sieber-Humm, Johnsen-Noll, and Ostrand methods, except in the case of very hard pulps where P and C give relatively high results. D. A. C.

Water-absorbency tester [for paper]. S. W. REESE and M. A. YOUTZ (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 67—68).—A method is described for delivering 0.1 c.c. of H₂O from a burette with the object of accurately determining the H₂O-absorbency of absorbent tissues and paper towels. H. A. H.

Testing of newsprint for smoothness, ink penetration, and opacity. W. G. DODGE and C. E. TARVIN (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 50—52).—An apparatus for measuring the smoothness of newsprint (N) is described; it is claimed to show good correlation with the Bekk smoothness tester, and to be slightly superior to it as regards accuracy of duplication. There is an optimum region of smoothness for good printing; if the paper is too rough the impression is uneven, whilst if it is too smooth difficulties are encountered in the operation of folding and conveying mechanisms which require a certain amount of frictional resistance. An ink-penetration tester has been devised which indicates the degree of penetration of N as a function of time. The contrast-ratio method of measuring the opacity of N is less accurate than one depending on the direct measurement of the amount of light passing through the sheet. H. A. H.

Evaluation of the printing quality of paper. B. L. WEHMHÖFF (Paper Trade J., 1935, 100; T.A.P.P.I. Sect., 63—66).—A Committee report. Only a few of the many tests proposed at various times have actual val., *viz.*, those for the determination of oil absorption, oil penetration, printing smoothness, thickness, air-permeability, and opacity. Some details of these are given. The Bekk tester measures smoothness under approx. printing pressure, and is therefore more important than are visual methods of measurement. Wax tests for determining the "picking" of coated papers are not reproducible, and give no accurate measure of printing quality. H. A. H.

Bearings.—See I. Swelling of cellulose. Sulphite-cellulose extract as mordant.—See VI. Wood quality [for paper pulp]. Seasoning pulp wood. Determining lignin in wood.—See IX. SO₂ for sulphite pulp. Corrosion in pulp mills.—See X. Artificial leather.—See XIII. Determining sulphite-cellulose tannides.—See XV. Carbohydrates in French prunes. Fibre and cellulose in food-stuffs etc.—See XIX.

See also A., Apr., 550, Beechwood lignin.

PATENTS.

Treatment of filamentary material. G. L. BROWNELL (U.S.P. 1,962,424, 12.6.34. Appl., 8.2.30).—Cord or the like is dipped in a hot liquid and stretched while submerged, the tension being maintained on the receiving spool until the material has set by cooling and drying. B. M. V.

Manufacture from cellulose esters of artificial products such as films, foils, plates, fibres, and the like. C. F. BOEHRINGER & SOEHNE G.M.B.H. (B.P. 424,419, 15.8.33. Ger., 20.8.32).—Cellulosic material is esterified in presence of catalysts, *e.g.*, ZnCl₂-HCl, HClO₄, which do not tend to remain in the mol. and thus cause subsequent decomp. of the ester, with derivatives of AcOH and of another fatty acid (C₃₋₇), so that the primary, unhydrolysed, mixed ester produced, with or without retention of fibrous structure, is insol. in COMe₂ and contains < 1% (calc. as free acid) of acid radical other than Ac. F. R. E.

(A) Manufacture of transparent sheets from *Musa* fibre. (B) Utilising purified *Musa* fibre cellulose. E. C. WORDEN, 1ST, ASST. to HANSON & ORTH (U.S.P. 1,966,474—5, 17.7.34. Appl., [A] 2.8.30, [B] 2.12.30).—(A) Purified α -cellulose from *Musa* is converted in the normal manner into viscose (V) having 6.5—7% alkalinity and cellulose content 6—6.5%, and then ripened to a maturity indicated in the AcOH coagulation tests by 8—8.2 c.c. of 10% AcOH. After clarification and de-aeration in vac., the V is forced through a slit under pressure (60—90 lb./sq. in.) into an acid setting bath, washed, and dried. (B) The cellulose is dried in a finely-divided state, cooled, and agitated with atomised P₂O₅ in a closed container at 20°. Ac₂O and AcOH are then added and the temp. is maintained at 20° until the product is sol. in CHCl₃, when it is pptd. with H₂O, washed until neutral, and dried below 100°. F. R. E.

(A) [Manufacture of] artificial thread. (B) Preparation of cellulose acetates. (A, B) V. L. BOHNSON and (A) F. H. SWEZEY, Assrs. to DU PONT RAYON Co. (U.S.P. 1,966,578—9, 17.7.34. Appl., [A] 26.7.32, [B] 10.11.32).—(A) A homogeneous mixture of cellulose acetates (I), consisting of 50—95 wt.-% (90—96%) of an ester having an Ac val. (calc. as AcOH) of 54—56% (54—55%) and 5—50% (4—10%) of one with Ac val. 43—53% (45—47%), is dissolved in a suitable solvent (COMe₂-EtOH) and dry-spun. (B) (I) is prepared by acetylating cellulose and incorporating with the primary triacetate produced 5—20% of an ester with Ac val. 54—55% and finally hydrolysing the mixture until the average Ac val. is approx. 53—54%. The products are readily delustrated in hot H₂O or soap solution. F. R. E.

Manufacture of [low-lustre] artificial silk. G. HARDT, Assr. to AMER. BEMBERG CORP. (U.S.P. 1,967,206, 17.7.34. Appl., 4.10.32).—An emulsion of casein 10, turpentine 10, and petrolatum 10% (calc. on wt. of cellulose) is added to the spinning solution (viscose, cuprammonium). F. R. E.

Making a beater furnish. RICHARDSON Co., Asses. of E. P. STEVENSON and H. J. BILLINGS (B.P. 424,098, 19.2.34. U.S., 20.2.33).—Condensation products of the phenols with CH₂O are formed in presence of aq. suspension of chemical or rag pulps by heating at 100° with a catalyst (NH₃, Na₂CO₃, etc.) under const. agitation at $\frac{2}{3}$ atm. pressure. When the resin thus produced is in the heat-fusible state, but non-adhesive, the reaction is stopped by addition of cold H₂O. The stock is then lightly beaten and run on to the paper machine, where it can be dried at ordinary cylinder temp. Where PhOH is used the paper should be vac.- or air-dried. D. A. C.

Sized paper. H. V. DUNHAM, Assr. to CASEIN MANUFACTURING CO. OF AMERICA, INC. (U.S.P. 1,965,693, 10.7.34. Appl., 27.3.29).—Peanuts, castor-oil or soya beans, etc. are ground to pass 80-mesh, heated to about 70° with aq. solutions of salts of the alkali or alkaline-earth metals, and finally passed through a colloid mill. D. A. C.

Waterproofing fibrous and other materials. J. A. DE CEW (U.S.P. 1,965,630, 10.7.34. Appl., 13.9.33).—Paper containing alkaline fillers (*F*) (e.g., CaCO₃) is sized by adding NH₄ resinate and alum, in proportions to form a neutral solution, to the beater stock. Alternatively, *F* may be sized by this means independently, and then added to the stock which has been ordinarily sized with Na resinate. D. A. C.

Centrifugal separator [for pulp].—See I. Emulsified oxidised hydrocarbon [for sizing paper].—See II. Adhesive.—See XV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Sulphite-cellulose extract as a mordant improving drum-dyeing [of leather]. A. GUREVICH (Kozh. Obuvn. Prom. U.S.S.R., 1934, 13, 398—399).—Sulphite-cellulose extract (I) produces a colour in leather which decreases the consumption of expensive cover pigments in dyeing. (I) may also be used to improve skins passed through vegetable tannin, provided they are pretanned with (I). CH. ABS. (e)

Determination of weighted dyed silk by ashing. M. BONICATTI (Boll. Uff. Staz. Sperim. Seta, 1934, 4, 33—35).—The sample (0.05—0.2 g.) is treated with 5—6 drops of H₂SO₄ (*d* 1.83) and ashed in a muffle furnace. The factor for the calculation is 1.27.

CH. ABS. (e)

Influence of *p*_H of dyeing solutions on the dyeing of chrome[tanned] leather with acidic and substantive dyes. B. I. TZUKERMAN and R. A. METLITZKAYA (Tzent. Nauch. Issl. Inst. Kozh. Prom. Sborn. Rabot., 1934, No. 2, 56—66).—The glass electrode should be used for *p*_H determinations in leather-dyeing solutions. The max. increase in adsorption of the dye by chrome-tanned leather occurs at *p*_H 3—4.

CH. ABS. (e)

Alkaline treatment of cotton at low temperature. S. SENGOKU (Rep. Imp. Ind. Res. Inst., Osaka, 1934, 15, No. 4, 1—12).—The effect of mercerisation of cotton at —20° on its properties has been studied.

CH. ABS. (e)

Adsorption of caustic soda by cellulose. W. D. BANCROFT and J. B. CALKIN (J. Physical Chem., 1935, 39, 1—9).—Measurement of the change in [NaOH] of a solution in contact with cellulose (I) gives merely the amount of NaOH taken up in excess of the solution adsorbed as such. The true adsorption of NaOH and H₂O by (I) is obtained by centrifuging and determining the point at which a change in concn. of the centrifuged liquid indicates that the mother-liquor has been driven off. In confirmation of the data of other investigators, the amount of H₂O taken up by cotton first increases to a max. with increasing [NaOH] and then diminishes. The true adsorption curve is smooth and gives no indication of the formation of compounds between NaOH and (I). The apparent adsorption of NaOH by cotton is a partly irreversible process, except perhaps for dil. aq. NaOH. This is due to an apparently irreversible change in space lattice, and to a swelling which can be reversed more or less completely by heating at about 105°. The method of investigation may be applied to other systems. M. S. B.

Swelling of cellulose. V. ETTORE (Atti Congr. naz. Chim., 1933, 4, 872—883; Chem. Zentr., 1934, ii, 164).—The rate of swelling of cellulose (I) during mercerisation depends less on the chemical nature of the (I) than on its previous mechanical treatment. Apparatus for measurement of swelling is described. A. G. P.

Treating rayon fabrics. Sizing ingredients that are partly or wholly insoluble and those that are soluble or emulsifiable. H. C. BORGHETTI (Rayon and Melliand Text. Month., 1934, 15, 341).—When emulsified waxes (I) or mineral oils (II) are used in sizes the emulsifying agent may become modified during drying, and removal of (I) or (II) is then difficult. The best treatment for (II) is to soak in sol. pine oil and then soap. A. G.

Velour.—See XV. Cherry processing.—See XIX

PATENTS.

Dyeing of silk-containing textiles. F. L. LA QUE, Assr. to INTERNAT. NICKEL Co., INC. (U.S.P. 1,963,137, 19.6.34. Appl., 31.12.30).—A machine is described for

degumming and dyeing silk goods with sulphocyanine dyes, especially Durol Black (C.I. No. 307), having means for aerating the liquor so that reduction of the dye by sericin and other org. impurities present may be avoided.

A. J. H.

Printing of animal fibres. J. G. KUNDERT, Assr. to HEBERLEIN & Co. A.-G. (U.S.P. 1,962,601, 12.6.34. Appl., 5.5.32. Ger., 21.1.29).—Coloured patterns fast to washing, light, perspiration, etc. are obtained by printing (prechlorinated) wool and silk with a thickened paste containing Indigosol, Leucosol, or similar H₂O-sol. derivatives of vat dyes and NaNO₂, then steaming with wet steam at 99—100° for 7 min., and passing the fabric in open width through dil. H₂SO₄ [50 g. (*d* 1.53) per litre] at 95°, followed by washing and oxidation with a solution at 35—40° containing (per litre) 1.5 g. of Na₂S₂O₈ and 2 g. of H₂SO₄ (*d* 1.015) for 20 min.

A. J. H.

Manufacture of improved [cellulose ester or ether] fabric. C. DREYFUS (U.S.P. 1,962,683, 12.6.34. Appl., 15.12.25).—Cellulose acetate (etc.) fabrics are embossed by passage between engraved rollers heated sufficiently to soften the rayon without producing coalescence of the filaments. Plasticising agents, *e.g.*, camphor substitutes and high-boiling org. solvents, may be applied previous to embossing.

A. J. H.

Protection of cellulose-derivative surfaces. C. DREYFUS (U.S.P. 1,964,039, 26.6.34. Appl., 4.5.32).—Cellulose acetate (etc.) materials are coated with a film of synthetic resin (PhOH- and NH₂Ph-furfuraldehyde resins) by application thereto of an 8—12% solution of such resins in a volatile org. solvent, followed by drying and baking (or exposure to ultra-violet light).

A. J. H.

Manufacture of [water-repellent] fabric. W. B. SERRINGTON, Assr. to CHARAK CHEM. Co. (U.S.P. 1,967,267, 24.7.34. Appl., 7.8.29).—Fabric is impregnated with a solution of 1 pt. of wax (or animal and vegetable fats, greases, or oils) and 1 pt. of a H₂O-shedding substance (*e.g.*, cellulose acetate or nitrate etc.) in an org. volatile solvent (*e.g.*, EtOAc) and then dried, whereby it retains its original softness but becomes H₂O-repellent.

A. J. H.

Alkylsulphonic acids. Application of quaternary NH₄ compounds.—See III. **Resinous condensation products.**—See XIII. **Surgical bandage.**—See XX.

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

Influence of gas velocity on rate of absorption of nitrogen oxides by sulphuric acid. I. N. KUZMINUKH and V. YUDINA (Khimstroi, 1934, 6, 315—317).—The rate of absorption is influenced not only by the concn. of acid, but also by the linear velocity of gas currents in the Gay-Lussac tower. CH. ABS. (*p*)

Determination of selenium and tellurium in the selenium sludge of sulphuric acid factories. Z. A. OSTROUMOV (Zavod. Lab., 1934, 3, 1088—1089).—2 g. of material are digested with 25 c.c. of conc. HNO₃, 10 c.c. of conc. H₂SO₄ are added, heating is continued to elimination of HNO₃, 80 c.c. of H₂O are added, and the solution is filtered from pptd. SiO₂ and PbSO₄.

3 vols. of conc. HCl are added to the filtrate + washings, SO₂ is passed to saturation, the solution boiled under reflux with N₂H₄, H₂SO₄, the Se collected, weighed, and ignited, and the wt. of the residue (chiefly SiO₂) subtracted. Te is determined in the filtrate by adding aq. FeCl₃ and aq. NH₃, collecting the ppt. of Fe(OH)₃, containing the Te, dissolving it in HCl, and pptg. Te by saturation with SO₂ as for Se.

R. T.

Causes of the increase in activity of platinum gauze in the oxidation of ammonia. I. E. ADADUROV and P. D. DIDENKO (J. Appl. Chem. Russ., 1934, 7, 1339—1354).—The activity of Pt catalyst rises after prolonged heating in H₂; at the same time the surface of the wires undergoes corrosion, and the space lattice of the Pt changes. These effects are ascribed to formation of a solid solution of H in Pt, the volatility of which is >, and the m.p. <, that of Pt.

R. T.

Production of sodium sulphide by the thermo-electric method. V. P. ILINSKI, G. Y. TARASOV, and O. Y. KALANI (Trans. State Inst. Appl. Chem. U.S.S.R., 1932, No. 16, 89—101).—Anhyd. Na₂SO₄ (1 mol.) was mixed with C (2 mols.), previously ignited at 200—2000°, briquetted, dried at 100—120°, and heated at 855° for 3—40 min. (optimum 15—25 min.). The product contained Na₂S 88.9, Na₂S₂O₃ 3.2, S 0.14, and Na₂SO₄ 2.21%. The Na₂S yield was unchanged by increasing the proportion of C. At 900° the losses were increased. Addition of K₂SO₄ renders the reduction of Na₂SO₄ to Na₂S more complete.

CH. ABS. (*e*)

Continuous control of precipitate and Ammophos production. V. J. VENGEROVA, E. B. BRUTZKUS, and E. V. PALMER (Zavod. Lab., 1934, 3, 1105—1110).—Sb electrodes are applicable to the electro-titration of H₃PO₄; 3 breaks are observed when H₃PO₄ is titrated with milk-of-CaO, and 2 with aq. NH₃. Apparatus is described for use under factory conditions.

R. T.

Rapid determination of small quantities of sulphates. N. A. TANANAEV and D. N. KILADZE (J. Appl. Chem. Russ., 1934, 7, 1508—1510).—1—3 g. of substance (cement, dolomite, basic slag, glass, or other silicates) are treated with aq. acid, SiO₂ is separated, and BaCl₂ is added to the filtrate, which is then evaporated to dryness. 1 ml. of 10% HCl and 25 ml. of H₂O are added to the residue, the suspension is filtered, and the BaSO₄ weighed.

R. T.

Phosphorite and organic acids. S. N. ROSANOV (Phosphorsäure, 1934, 4, 193—218; Chem. Zentr., 1934, ii, 1184—1185).—Buffer mixtures of citric, tartaric, and malic acids, H₃C₂O₄ and AcOH are good solvents for phosphorite (I), the solubility (*S*) at const. *p*_H depending on the acid concn. *S* depends also on the form of the phosphate, on admixtures (especially CaCO₃), and on the acid used. The assimilation of (I) by certain plants was studied. It could not be correlated with the action of the org. acids.

H. J. E.

Iron humate. E. V. KONDRATEEV and I. M. VENER (Khim. Tverd. Topl., 1934, 5, 219—224).—Fe humates were prepared from humic acid (I) (C 54.20, H 5.19, N 4.70, and OMe 2.23%) by pptn. in neutral solution with Fe^{II} and Fe^{III} salts and by aq. and EtOH-FeCl₃.

Approx. 1 atom of Fe combines with 1 mol. of (I). The oxidising ability increases with the Fe in the humate.

CH. ABS. (e)

Influence of the composition and of the packing of the contact mass on the activity of chromium catalysts. I. E. ADADUROV, M. V. APANASENKO, L. M. ORLOVA, and A. I. RJABTSCHENKO (J. Appl. Chem. Russ., 1934, 7, 1355—1362).—Attempts to substitute other oxides for SnO_2 in compound Cr_2O_3 catalysts of SO_2 oxidation were not successful, the best results (90% conversion) being obtained with $\text{Cr}_2\text{O}_3\text{-Al}_2\text{O}_3$ (I) at 530° . 96% conversion is attained by passing the gas first through (I) at 550° , and then through $\text{Cr}_2\text{O}_3\text{-SnO}_2$ at 450° ; the size of the grains of catalyst should diminish with distance from the point of entry of the gas.

R. T.

Chromal. B. GRILIKHES (Kozh. Obuvn. Prom., 1934, 13, 287—288).—The composition of chromal is: Cr_2O_3 5.1—7.5, Al_2O_3 0—13.7, Fe_2O_3 0—6.1, CaO 0—7.5, H_2O 0—70%. The prep. and applications are reviewed.

CH. ABS. (e)

Hydrogenation catalysts. E. GALLE and W. MICHELITSCH (Petroleum, 1935, 31, No. 8, 1—8).—The function of Mo and its compounds as catalysts (I) in hydrogenation processes has been studied. At atm. pressure, Mo does not react with H_2S or CS_2 below 600° , but sulphide is formed at higher pressures. Under similar conditions at 1 atm. $\text{MoO}_3 \rightarrow \text{MoOS} \rightarrow \text{MoS}_2$. If a carrier is used for (I) the same result is reached more rapidly. At $450\text{--}600^\circ$ $\text{MoS}_3 \rightarrow \text{MoS}_2 + \text{S}$. MoS_2 is stable to H_2S at $450^\circ/30$ atm., but MoS_3 and MoOS are readily reduced by H_2 to MoS_2 . If MoO_3 or MoS_3 are used in the hydrogenation of org. compounds containing S, MoS_2 is ultimately formed, and S is partly eliminated as H_2S . It is suggested that either MoS_2 itself can convert mol. H_2 into the at. state, or that this occurs through the agency of a surface layer of Mo formed by reduction of MoS_3 .

C. C.

Manufacture of titanium dioxide from apatite-sphene ores without the use of sulphuric acid. M. TATARSKI (J. Appl. Chem. Russ., 1934, 7, 1374—1381).—1 pt. of ore, 4 pts. of Na_2SO_4 , and 0.8 pt. of coke are heated at 850° for 90 min., the cooled melt is extracted with H_2O , the extract filtered, the residue washed with 6% aq. SO_2 and then with H_2O , dried, and ignited at $800\text{--}850^\circ$, and the pale yellow residue heated with 12 pts. of KHSO_4 for 5 hr. at 430° . The product is allowed to remain in H_2O for 48 hr., the extract filtered, 6% aq. SO_2 added to the filtrate, the solution boiled, and the pptd. TiO_2 collected and calcined at $500\text{--}550^\circ$ for 3 hr. (yield 52%).

R. T.

Storage of carbon monoxide. O. H. WAGNER (Gesamm. Abh. Kenntn. Kohle, 1934, 11, 287—304; Chem. Zentr., 1934, ii, 813).—Use of org. solvents, adsorptive materials, and Cu-halogen compounds is discussed.

A. G. P.

Solid carbon dioxide. ANON. (Nature, 1935, 135, 293—295).—A summary of production and uses.

L. S. T.

Gas for $[\text{NH}_3]$ syntheses.—See II. Refractories for Na_2S ovens. ThO_2 crucibles.—See VIII. Corro-

sion in $\text{Ca}(\text{ClO}_3)_2$ liquors. Flash-roasting pyrite to SO_2 .—See X. Ti salts as pigments.—See XV. Fertilisers.—See XVI.

See also A., Apr., 429, Phosphors. 444, Colloidal Ga. 455, Synthesis of NH_3 . 456, Conversion of $\text{CO}(\text{NH}_2)_2$ into $\text{CN}\cdot\text{NH}_2$. 460, Prep. of Fe-free Ti solutions. 463, Determination of $\text{Ca}(\text{H}_2\text{PO}_4)_2$.

PATENTS.

Dry lime treatment of [ammoniacal] liquors. D. D. MOHLER and W. N. HENDERSON, ASSRS. TO SOLVAY PROCESS Co. (U.S.P. 1,962,150, 12.6.34. Appl., 11.6.27).—Fixed NH_3 is removed from, e.g., the carbonated liquor in the NH_3 -soda process by dry CaO fed in finely-divided form, but at such velocity and compactness that it forms its own seal against the back-flow of liquid which is under pressure in the still.

B. M. V.

Obtaining substances in purified condition by treatment with miscible liquids of different solvent power and volatility. E. C. PRINS and J. F. LEMMENS (U.S.P. 1,955,016, 17.4.34. Appl., 22.9.31. Holl., 11.9.30).—The substance is extracted with a mixture of 2 miscible liquids, the more volatile one being a good solvent for the desired substance and the less volatile a poor solvent for this but a good solvent for any impurities extracted. Thus caliche (C) is extracted with a 48:52 vol. mixture of liquid NH_3 and MeOH at $25^\circ/4$ atm.; on distilling off the NH_3 from the filtered extract pure NaNO_3 is pptd. and the MeOH contains any NaIO_3 in the C. NaCN may be extracted from the product of heating CaCN_2 with Na salts by means of EtOH containing 10—20% of NH_3 , and S from spent gas-purifier mass by means of a 60:40 mixture of EtOH and CS_2 .

A. R. P.

Crystalline magnesium xylonate and preparation of magnesium salts of aldonic acids. H. S. ISBELL, ASSR. TO U.S.A. (U.S.P. 1,964,734, 3.7.34. Appl., 10.4.33).—A Mg salt of an aldonic acid (e.g., the xylonate or gluconate) is prepared from an aq. solution of the Ca salt by treatment with MgCO_3 and CO_2 , any $\text{Ca}(\text{HCO}_3)_2$ formed being decomposed by warming. Cryst. *Mg xylonate*, $\text{Mg}(\text{C}_5\text{H}_9\text{O}_6)_2 \cdot 3\text{H}_2\text{O}$, is prepared from a solution as above by evaporation to a syrup, seeding, and drying at 40° .

B. M. V.

Preparation of hydrogen. J. C. WOODHOUSE, ASSR. TO E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,960,886, 29.5.34. Appl., 30.9.30).— CH_4 and steam are passed at a high space velocity over a suitable catalyst, e.g., NiNO_3 and $\text{Ce}(\text{NO}_3)_3$ supported on pumice and reduced in H_2 , the reaction products are cooled to $250\text{--}450^\circ$ by heat exchange with the incoming gases, and the CO_2 is removed by absorption, e.g., by MgO , and the CO by conversion into CO_2 followed by absorption. The gases are recycled, whereby substantially complete conversion of CH_4 into H_2 is effected.

A. B. M.

Recovering in concentrated form [sulphur dioxide] gas existing in dilute admixture with other gases. F. W. DE JAHN, ASSR. TO J. D. JENSEN (U.S.P. 1,946,489, 13.2.34. Appl., 17.5.32).— SO_2 is extracted from smelter gases etc. by scrubbing with ice-cold H_2O or, preferably, 8% aq. K_2SO_4 or KCl , circulating

the resulting SO_2 solution through an org. solvent for SO_2 , e.g., $\text{C}_5\text{H}_{11}\cdot\text{OAc}$, PhNO_2 , $\text{COMe}\cdot\text{C}_5\text{H}_{11}$, $(\text{C}_2\text{H}_4\text{Cl})_2\text{O}$, and expelling the SO_2 in pure form by heating the saturated solvent.

A. R. P.

Leaching system. Fractional liquefaction [of gases].—See I. [Products from] hydrogenation of carbonaceous materials.—See II. Treating silicious materials.—See IX. Fertilisers.—See XVI. Baking powder.—See XIX.

VIII.—GLASS; CERAMICS.

Fundamental reactions in the formation of soda-lime-silica glasses. J. T. HOWARTH, R. F. R. SYKES, and W. E. S. TURNER (J. Soc. Glass Tech., 1934, 18, 290—306 τ).—The rates of reaction of fine-grained (150—180-mesh) quartz, calcite, and Na_2CO_3 in the proportions $(\text{Na}_2\text{CO}_3 + \text{CaCO}_3) + \text{SiO}_2$ (A), $+ 4\text{SiO}_2$ (B), $+ 6\text{SiO}_2$ (C), and $+ 8\text{SiO}_2$ were studied at 13 temp. from 600° to 1400°. The rate of reaction increased rapidly with temp. and with mixture C there was 9.5% decomp. after 100 min. at 600°, 95% at 800°, and practically complete decomp. in 10 min. at 900°. The rate also increased with the amount of SiO_2 present. Up to 750—775° the main reaction was $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ and then the reaction $\text{Na}_2\text{CO}_3 + \text{SiO}_2$ became prominent. Sintering took place below 750°. Mixture B melted to a clear glass more rapidly than did mixture A. Mixture C made up with Fontainebleau sand (30—100-mesh), limestone (30—80-mesh), and soda ash showed a reaction rate differing from that of the pure fine-grained mixtures only slightly at 600°, but becoming increasingly slower as 800° was approached.

J. A. S.

Rate of melting and refining of alkali-lime-silica glasses containing both soda and potash. W. MASKILL and W. E. S. TURNER (J. Soc. Glass Tech., 1934, 18, 286—289 τ).—Tests were carried out on a series of glasses of the general composition SiO_2 75, CaO 10, Na_2O — K_2O 15%, the amount of Na_2O varying from 0 to 15%. Glasses containing the mixed alkaline oxides melted more quickly than those containing either oxide alone, but did not refine more quickly than the Na_2O glass. The K_2O glass required a temp. of 1500° for satisfactory refining. The mixed-oxide glasses worked the more easily, the optimum ratio of $\text{Na}_2\text{O}:\text{K}_2\text{O}$ being 1:1.

J. A. S.

Properties of mixed alkali-lime-silica glasses containing lithia, soda, potash, and rubidia. S. C. WATERTON and W. E. S. TURNER (J. Soc. Glass Tech., 1934, 18, 268—285 τ).—The d , thermal expansion (α), transformation and softening points (S) were studied for 4 series of glasses of the formula SiO_2 75, CaO 10, $\text{R}'_2\text{O} + \text{R}''_2\text{O}$ 15%, in which $\text{R}'_2\text{O} + \text{R}''_2\text{O}$ were $\text{Li}_2\text{O} + \text{Na}_2\text{O}$ (A), $\text{Li}_2\text{O} + \text{K}_2\text{O}$, $\text{Na}_2\text{O} + \text{K}_2\text{O}$, and $\text{K}_2\text{O} + \text{Rb}_2\text{O}$ (B), respectively. The amounts of $\text{R}'_2\text{O}$ and $\text{R}''_2\text{O}$ varied from 0 to 15%. In the first 3 series the curves relating the composition to d and α were 2 intersecting straight lines, the break being most marked with A. The curves for B were continuous straight lines. The breaks occurred at the ratios $\text{Li}_2\text{O}:\text{Na}_2\text{O}$, $\text{Li}_2\text{O}:\text{K}_2\text{O}$, and $\text{Na}_2\text{O}:\text{K}_2\text{O}$. The val. of α was greatest for the Li_2O glasses and diminished in

the order Li_2O , Na_2O , K_2O , Rb_2O . 3 transformation points appeared in the composition- α curve of all glasses containing Li_2O , Na_2O , and K_2O (except the 15% K_2O glass), and 2 points in the 15% K_2O glass and the B series. S rises in the order Li_2O , Na_2O , K_2O , Rb_2O , the val. for SiO_2 75, CaO 10, Rb_2O 15% being 740°. It was not possible to produce a batch-free Cs_2O glass before devitrification set in. Factors for the calculation of d and α are given for each oxide.

J. A. S.

Attack of alkali-lime-silica glasses by water. G. KEPPELER and M. THOMAS-WELZOW (Keram. Rundsch., 1934, 42, 69—71, 81—83, 96—99, 122—124, 136—138; Chem. Zentr., 1934, ii, 1000).—Data are recorded. The square of the amount of alkali dissolved from the surface \propto the time.

H. J. E.

Formation of sulphate in soda-glass. I. I. KITAIGORODSKI and Y. A. SHKOLNIKOV (Nauch.-Issl. Inst. Stekla, No. 1, Steklotech., 1934, 114—129).— SO_2 in a gas mixture reacts with the carbonates in molten soda-glass, forming sulphates (I) which produce a film on the surface. The quantity of (I) formed depends on the temp., time of action, and $[\text{SO}_2]$, but not on the batch composition. SO_2 produces bubbles on the surface, giving a matt appearance.

CH. ABS. (e)

Chemical and physical investigation of beryllium glasses. C. A. BECKER (Sprechsaal Keram., 1934, 67, 137—251; Chem. Zentr., 1934, ii, 1000).—The H_2O -resistance, d , hardness, n , ultra-violet transparency, and thermal expansion of a series of Be glasses containing CaO, MgO, and Al_2O_3 are recorded.

H. J. E.

Constitution and colour of uranium glass. W. WEYL and E. THÜMEN (Sprechsaal, 1934, 67, 95; Chem. Zentr., 1934, ii, 306—307).—Addition of reducing agents (e.g., Al) produces a grey-green effect, due to a UO_2 derivative. K or B_2O_3 increases the transmission of red light. Fluorescence is due to UO_2 compounds, formation of which is favoured by addition of borosilicates. The colour is determined by the nature of the oxidation stage.

H. J. E.

Rôle of selenium and arsenious oxide in the decolorisation of glass. A. V. SENIN (Keram. i Steklo, 1934, 10, No. 8, 24—27).—Glass decolorised with Se is always more transparent in the yellow-orange part of the spectrum. As_2O_3 reduces Fe_2O_3 to FeO, thus increasing the transparency to green and blue light.

CH. ABS. (e)

Rate of setting of glass during working. I. I. KITAIGORODSKI and N. V. SOLOMIN (J. Soc. Glass Tech., 1934, 18, 323—335 τ).—Measurements were made of the rate of cooling of 2 glasses of different heat capacity (H) and conductivity (C), and of one of these glasses coloured with Co_2O_3 , FeO, Fe_2O_3 , and Mn_2O_3 . The working range of a glass cannot be specified as a certain change of η , but is the time interval between gathering and the moment when the outer skin of the glass is unworkable. Of glasses with otherwise similar η curves the one with the higher η sets the more quickly. The rate of cooling of colourless glasses depends on their H and C . Colouring substances (FeO, Fe_2O_3 , Co_2O_3) producing an adsorption in the infra-red (1—4 μ) cause an increase in the radiating

power and therefore in rate of setting. Colouring substances not producing an adsorption in the infra-red have no effect on the setting rate. J. A. S.

[Determining] alkalis in silicates. L. BREEMAN, JUN., and S. R. SCHOLLES (Bull. Amer. Ceram. Soc., 13, 334).—Based on the results of analyses of a standard feldspar, the following modifications of the Lawrence Smith method are recommended. After the usual preheating to expel NH_3 , the crucible is heated at $775\text{--}825^\circ$ for 45 min., when a firm cake, easily detached from the crucible and disintegrated in H_2O , is obtained; the ignition to remove NH_4 salts is done at the final evaporation of the alkali chlorides, which reduces the danger of loss by decrepitation. The necessity for blank determinations on reagents is stressed. A. L. R.

Accelerated analysis of glass. O. V. KRASNOVSKI (Nauch.-Issl. Inst. Stekla, No. 1, Steklotek., 1934, 219—224).—A method suitable for $\text{CaO-MgO-Na}_2\text{CO}_3$ glass is described. CH. ABS. (e)

Use of finely-milled enamel slips. F. R. PORTER and H. H. HOLSCHER (J. Amer. Ceram. Soc., 1935, 18, 39—42).—Covercoat slips milled to leave a residue of 12—0.2% on 325-mesh are in use in production on continuous furnaces with the following advantages: (1) higher opacity, (2) less wear on the spray guns, (3) smoother finishes, (4) easier application, (5) better suspension, and (6) lower firing temp. There is no greater tendency to "tearing" than with coarse-grinding. J. A. S.

Use of barium compounds as fluxes. M. A. BAERNSTEIN (Bull. Amer. Ceram. Soc., 1934, 13, 331—333).—A flux (I) consisting of BaCO_3 (witherite) with 10—20% of a special fused BaO , when added to an electric-furnace melt (e.g., 1 lb. per ton of metal), is claimed to form a protective Ba glass on the acid refractory lining and so prevent spalling and disintegration, to free the metal from inclusions present, and to prevent absorption of Si, SiO_2 , and silicates by grey cast Fe. White cast Fe and low-C steels of improved properties are obtained by treatment with (I); the former is rendered less susceptible to absorption of mould gases and metal oxides, and with the latter over-reduction is prevented. (I) also reduces the S content of high-S Fe alloys, aids the introduction of C into alloys, conditions the atm. in the electric furnace, and in certain types of furnace produces a more fluid slag. A. L. R.

Reactions important for adherence when firing groundcoats containing no adherence-promoting oxides. A. DIETZEL and K. MEURES (J. Amer. Ceram. Soc., 1935, 18, 35—37).—The condition of the metal (M)-enamel (E) interface was examined at intervals throughout the firing process. A layer of scale ($\text{Fe}_3\text{O}_4 + \text{FeO}$) was formed immediately, and subsequently 3 distinct stages were noted. (A) The layer of scale was dissolved by E , which was green, in direct contact with M , and non-adherent. E gradually became olive-green and crystals of hastingsite ($\text{Na-Fe}^{\text{II}}\text{-Fe}^{\text{III}}$ silicate) were formed. (B) On further firing, E changed from dark green to black. A green layer was in contact with M and over it was a grey layer containing cubic dendritic crystals of Fe_3O_4 . (Diffusion of air had

oxidised the dissolved FeO .) As long as the green layer was in contact with M there was no adherence. Still further firing turned E entirely black (due to the formation of another scale of Fe_3O_4 between E and M), and there was good adherence (C). On further firing, the "copper-heads" appeared (crystals of Fe_2O_3) and E was completely fired. Measurements of n showed that E contained 37% of FeO , 26% of Fe_3O_4 , and 45% of Fe_2O_3 in the stages A , B , and C , respectively. E without adherence-promoting oxides can be made to adhere by correct firing, but with large articles it may not be possible to fire uniformly enough to bring about stage B over the entire surface. J. A. S.

Adjustment of enamels to sheet steel. A. DIETZEL and K. MEURES (J. Amer. Ceram. Soc., 1935, 18, 37—38).—The thermal expansion (e) of pure enamel and of 100 pts. of enamel + 20 pts. of Fe oxide as (a) FeO , (b) Fe_3O_4 , and (c) Fe_2O_3 was 324, 375, 381, and 403×10^{-7} respectively. The effect of the dissolved oxide is thus very marked. From these results the vals. for the thermal e of the enamel in stages A , B , and C of the firing (cf. preceding abstract) were calc. to be 385, 390, and 480×10^{-7} , respectively. Thus for those stages influencing adherence (A and B) the e of the enamel closely approaches that of the steel (410×10^{-7}). (This figure is not in agreement with the previously accepted val. of Mayer and Havas, viz., $245\text{--}289 \times 10^{-7}$.) Further, the groundcoat is not homogeneous and at least 2 vals. for the coeff. of e must be given, e.g., lower layer 390×10^{-7} , upper layer $350\text{--}360 \times 10^{-7}$. These results show that if the enamel is under-fired its Fe_3O_4 content, and therefore its e , is too low; or if the coat is too thick there is a large e gradient. Both these effects cause poor adherence. J. A. S.

Adhesion of enamel containing cobalt and nickel oxides. F. HEIMES (Sprechsaal, 1934, 67, 231—232; Chem. Zentr., 1934, ii, 306).—A heated enamel (I) was found to conduct electricity well, the anode being strongly corroded. A (I) containing Ni deposits Ni and adheres to the cathode. Adhesion is due to this Ni layer deposited electrically. H. J. E.

Crazing and peeling of glazes. J. W. MELLOR (Trans. Ceram. Soc., 1935, 34, 1—112).—A detailed account of all phases of the subject is concluded with a comprehensive bibliography. Various crazing tests are critically discussed and the method of repeated (dry) temperature cycle is recommended. J. A. S.

Durability of pottery frits, glazes, glasses, and enamels in service. J. W. MELLOR (Trans. Ceram. Soc., 1935, 34, 113—190).—A comprehensive review of the results of investigations on (a) the nature and effects of corrosive agents encountered by glasses, glazes, and enamels (I) in service, and (b) the effect of the constituents of (I) on their resistance to attack. Under (a) is discussed the action on (I) of H_2O (including adsorbed films), acid and alkaline solutions, NH_3 , S gases, and washing machines and detergents; under (b) the effect on the durability of (I) of acidic and basic constituents, and of some sesquioxides (Fe_2O_3 , Al_2O_3 , B_2O_3) is considered. Sb poisoning, and methods of testing the durability of (I), are discussed. An extensive bibliography is included. A. L. R.

Standardisation of tests for terra-cotta bodies and glazes. R. L. CLARE (Bull. Amer. Ceram. Soc., 1934, 13, 333).—Various methods specified for autoclave, absorption, and freezing tests on terra cotta are quoted as illustrating the lack of uniformity of such tests. It is considered that these and other tests (*e.g.*, thermal shock, compressive strength, and modulus of rupture) should be standardised.
A. L. R.

Effect of refiring on sagger bodies containing Lawrence County, Ohio, clay. E. F. LLEWELLYN and A. S. WATTS (Bull. Amer. Ceram. Soc., 1934, 13, 327).—The results of absorption and shrinkage measurements made on various sagger bodies (I) fired once to cone 10 and containing the above fireclay (*F*) (25–30%), ball-clay (0–25), kaolin (0–15), and 50% of firebrick grog, and of modulus of rupture tests on (I) after firing once, 5 and 10 times to cone 10, showed that fireclays used in (I) lose little of their mechanical strength (II) after a few firings at this temp. Those (I) containing most *F* exhibited a slight increase of (II), probably due to increased vitrification, on continued firing.
A. L. R.

Thermal conductivity of refractories under operating conditions. R. H. HEILMAN and R. S. BRADLEY (J. Amer. Ceram. Soc., 1935, 18, 43–48).—Measurements were made on a panel 3 × 3 ft. × 10½ in. The rate of heat flow was determined in terms of the conductivity of a slab of insulating material placed on the outer surface of the panel. The insulating slab was "calibrated" at the Mellon Institute. Results for 6 types of refractories are given.
J. A. S.

Reliability of measurements of the thermal conductivity of refractory brick. J. B. AUSTIN and R. H. H. PIERCE, JUN. (J. Amer. Ceram. Soc., 1935, 18, 48–54).—Measurements were made on a set of SiO₂ bricks in an apparatus of the Wilkes type (B., 1933, 387). The vals. obtained for single measurements on an individual brick differed from the average by $\pm 5\%$, and variation from brick to brick was $<$ the error of the measurement. The variation in vals. reported by several laboratories is therefore due chiefly to the use of different methods.
J. A. S.

Chemically inert heat-refractory materials for ovens for sodium sulphide production. P. P. BUDNIKOV, S. A. SHCHAREVITSCH, and S. D. LUKOVA (J. Appl. Chem. Russ., 1934, 7, 1363–1373).—The brick should contain $< 40\%$ Al₂O₃, and should conform with the following specifications: crushing load < 140 kg./sq. cm., heat-refractoriness (I) $<$ cone 32, commencement of deformation under a load of 2 kg./sq. cm. at 1320°, shrinkage on refiring for 1 hr. at 1400° $\geq 0.5\%$, absorptive capacity for H₂O $\geq 8\%$. Magnesite and chromite-magnesite bricks exhibit unsatisfactory (I).
R. T.

Permeability of refractory materials to gases. E. PRESTON (J. Soc. Glass Tech., 1934, 18, 336–373 T).—The definition, mechanism, and measurement of permeability (*P*) are discussed in detail. A new conception of *P* stresses the necessity for expressing the vol. of gas passing through the sample as the vol. at the mean abs. pressure of the test. The relationships of *P* to refractory type, method of manufacture, firing temp.,

amount and kind of grog and bond, etc. are discussed and illustrated by data.
J. A. S.

Testing of refractory material for industrial firing. A. MÖSER (Tonind.-Ztg., 1934, 58, 288–290; Chem. Zentr., 1934, ii, 308–309).—Two examples of corrosion of high-grade refractory material by coal ash are described. The first was due to the presence of sandy particles and to the low f.p. of the ash, and the second to the ash composition (CaO 30.75, CaSO₄ 46.68, alkali 2.51%). A modified testing method is described.
H. J. E.

Measuring the open and closed pores in granular fireclay. E. TUSCHHOFF, T. WESTBERG, and Y. WAHLBERG (Chem. Fabr., 1935, 8, 67–70).—A modified and accurate H₂O-saturation method of measuring the *d* (bulk and true) and porosity (*P*) (total, apparent, and that due to closed pores) of fireclay grains (*e.g.*, 1–7 mm.) is described. The grains, enclosed in a wire basket and freed from fine material, are (1) saturated with H₂O (by boiling, autoclaving, or vac. methods), (2) weighed suspended in H₂O, (3) treated with EtOH–Et₂O for 45 sec., which removes superficial H₂O without extracting pore-H₂O, (4) weighed in a liquid immiscible with, and of *d* different from that of, H₂O (*e.g.*, CCl₄), (5) dried and weighed in air. The bulk vol., and the wt. when saturated, of the grains (not determinable directly) are given by (2) and (4). *P* and *d* vals. obtained with various raw refractory materials, fired and reburned fireclays, and quartzites burned at cone 18 are given.
A. L. R.

Small cast thorium oxide crucibles. H. K. RICHARDSON (J. Amer. Ceram. Soc., 1935, 18, 65–69).—A mixture of calcined ThO₂ 400, grog 200, Na₃AlF₆ 50, ZrO₂ 50, P₂O₅ 20, and H₂O 300 pts. was milled for 16–18 hr., treated in vac. (to reduce drying shrinkage), cast in plaster moulds, sintered at 1050° in 30 hr., and finally fired in an oxidising atm. at 1885° in a special gas-fired furnace. The material has a high thermal expansion which is very erratic at 700–800° and consequently has not a good resistance to thermal shock. The crucibles are non-porous, and resistant to the action of molten metals and to most chemicals except conc. and fused alkalis.
J. A. S.

Determining SO₄" [in silicates].—See VII. SiO₂ mortars.—See IX. Refractories for steel furnaces—Reverberatories for Cu-refining.—See X.

See also A., Apr., 466, Standardising Lovibond glasses. 467, Sintered glass plates.

PATENTS.

Production of [phosphate] glass which is permeable to ultra-violet light and stable to irradiation. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 424,366, 2.12.33).—A phosphate glass batch containing an NH₄ salt (preferably a phosphate) is melted. A suitable composition is, *e.g.*, K₂CO₃ 13.77, KNO₃ 6.71, CaCO₃ 8.93, BaCO₃ 3.22, MgCO₃ (84.7%) 18.53, B₂O₃ 31.04, Al₂O₃ 28.80, and (NH₄)₂HPO₄ 48.70 pts.
J. A. S.

Glass-to-metal thermal joint. M. E. NORDBERG, Assr. to CORNING GLASS WORKS (U.S.P. 1,964,329, 26.6.34. Appl., 17.11.32).—The total expansions of the

glass (*G*) and metal (*M*) are equal between the static temp. of the joint and the strain point of *G*, though the intermediate vals. may differ; *M* may be Ta and *G* consist of SiO_2 67.2, Na_2O 7.2, B_2O_3 19.5, Sb_2O_3 4.0, Al_2O_3 1.3, and As_2O_3 0.8%. B. M. V.

Construction of kilns. UNIVERSAL GRINDING WHEEL CO., LTD., and J. G. COWAN (B.P. 424,570, 16.8.33).—A down-draught pottery kiln to give a very uniform temp. is arranged so that the flames from each fire-mouth pass into a no. of separate vertical flues formed in the flash wall, each flue having separate control by damper bricks. B. M. V.

Formation of (A) ceramic slabs, (B) cellular ceramic building material. (c) Manufacture of cellular ceramic [ware]. E. R. POWELL (U.S.P. 1,963,029—31, 12.6.34. Appl., [A] 13.3.31, [B] 21.3.32, [C] 29.3.32. Renewed [C] 30.1.34).—(A) Ceramic slabs of considerable size and of porous structure are formed by expansive burning in a reverberatory furnace, being conveyed therethrough by a plate conveyor which is caused to undulate while in the burning zone (*B*). Additional material is also added to the rough upper surface while in *B*, the final slab having a glazed upper surface, which for heat-insulation only is convenient, but for sound absorption should have the pores opened to the atm. by grinding off the glaze. (B) Porous ceramic articles are made without chemical reagents by blowing finely-divided air into a thick slip and fixing the bubbles by addition of dry clay powder, after which complete drying and firing are effected. (c) Two mutually reactive (*e.g.*, acid and carbonate) clay slips are mixed to form a froth, then rapidly dried, moulded, hard dried, and burned. At the end of the drying stage a slip of a different colour may be applied and the mixture moulded and trimmed in such a way as to expose a multi-coloured surface. B. M. V.

Ceramic-coated [ferrous] articles. W. J. SCOTT, ASSR. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,962,751, 12.6.34. Appl., 5.3.32).—An Fe or steel article is barfed all over and enamelled on one face only, the base coat being fired at 860° and the marking coat at 625 – 710° , the temp. being raised gradually during about 4 min. B. M. V.

Manufacture of surfaced refractory articles. C. L. NORTON, ASSR. to BABCOCK & WILCOX CO. (U.S.P. 1,964,743, 3.7.34. Appl., 8.5.30).—A hard refractory body is ground to shape by grains of itself embedded in tough softer bodies, *e.g.*, steel shot, the grains being continually renewed as the process continues. B. M. V.

Abrading and polishing composition. P. A. PATTERSON, ASSR. to McALEER MANUFG. CO. (U.S.P. 1,965,299, 3.7.34. Appl., 27.2.34).—A polish especially suitable for lacquers and enamels comprises a mixture of abrasive particles (*A*) and an emulsion, preferably of the oil-in- H_2O type, of volatile (*V*) and non-volatile (*N*) ingredients in such quantity that cohesion of *A* will cease on evaporation of *V* and *N* will be completely absorbed in *A*. B. M. V.

Manufacture of an article of shellac-bonded abrasive material. D. E. WEBSTER, ASSR. to NORTON

Co. (U.S.P. 1,965,016, 3.7.34. Appl., 24.11.30).—Abrasive grains (*A*) are mixed with shellac (*B*) in limited quantity so that the article (*C*) remains porous. An inert solvent having been applied either to *A* or *B* sufficient to render the mixture slightly plastic when cold, *C* is shaped and compressed without heat and set by heat. B. M. V.

Glassware kiln.—See I. **Insulating materials.**—See XI. **Adhesive.**—See XV.

IX.—BUILDING MATERIALS.

Cement-burning in the blast kiln. E. SCHIRM (Zement, 1934, 23, 317—323; Chem. Zentr., 1934, ii, 1181).—Two stages are necessary, the material being cooled between them: (*a*) drying and deacidification, (*b*) sintering. Good sintering is obtained by adding 50% of already sintered product (*e.g.*, clinker or blast-furnace slag). Al_2O_3 cement may also be sintered in this type of kiln. H. J. E.

Action of water on Portland cement: calcium hydrosilicate. L. CHASSEVENT (Zement, 1934, 23, 237—240; Chem. Zentr., 1934, ii, 112).—Hydrated CaO, SiO_2 (I) in contact with saturated aq. $\text{Ca}(\text{OH})_2$ passes into a material richer in CaO. At the commencement of the reaction of Portland cement with the mixing H_2O , sol. SiO_2 coagulates in the supersaturated CaO solution, forming (I). Hydrolysis of (I) results in the coagulation of more SiO_2 than corresponds with the Ca content of the solution. H. J. E.

Effect of moisture on electrical resistance of embedding cements. R. L. MELTON, K. W. BROWNELL, and G. J. EASTER (J. Amer. Ceram. Soc., 1935, 18, 70—77). Tests were made on an "iron" heater unit having a layer of cement $\frac{1}{8}$ in. thick between the casing (*C*) and the heating element (*E*). The resistance between *E* and *C* was measured with 25-cycle current at temp. up to 800° . The test-units were first subjected to R.H. 65% or 85%. Porous cements absorbed sufficient moisture to lower their insulating val. below the safe limit. Most cements must be "cured" (vitrified) above their working temp. in order to render them sufficiently impervious to moisture. The addition of bentonite, glass cullet, or borax glass to an otherwise good cement had a very adverse effect on its electrical insulation. J. A. S.

Integral use of calcium chloride to supply high early strength [to concrete]. H. F. CLEMMER (Concrete, 1934, 42, No. 12, 10—12, 28—29; Road Abs., 1935, 2, No. 48).— CaCl_2 additions (I) increase the early strength of concrete made with normal Portland cement (II) at temp. $> 21^\circ$. For temp. of 0— 21° (I) should be used with increased (II) or with rapid-hardening cement. For temp. $< 0^\circ$ protection should also be provided. For early strength, concrete should be placed when the temp. is rising. T. W. P.

Composition and stability of 1850-years-old concrete. R. GRÜN (Angew. Chem., 1935, 48, 124—127).—A specimen of Roman concrete having a tensile strength of 110 kg. per sq. cm. is described. The composition of the components is similar to that used today. E. S. H.

Working properties of silica mortars. S. S. COLE (J. Amer. Ceram. Soc., 1935, 18, 61—64).—The following tests are described. (1) Settling. The material (2 mortar : 1 H₂O) is allowed to settle in a 100-ml. cylinder for 24 hr. The “% of settle” (*i.e.*, supernatant liquid) should be $\geq 10\%$. The addition of electrolyte + colloid decreased the settling. (2) Consistency. The Burmister (flow-type) mortar-testing apparatus was used. (3) Rate of H₂O adsorption. The amount of H₂O extracted on a Buchner funnel was measured under standard conditions. This last test was not satisfactory. J. A. S.

Seasoning of pulp wood. R. T. STEEDMAN (Pulp and Paper Canada, 1935, 36, Conv. issue, 75—76).—Four methods of seasoning spruce and balsam fir wood with the object of reducing the moisture content are reported on. In general, the effectiveness of air-seasoning barked logs piled in tiers is indicated. H. A. H.

Influence of wood quality on yield and quality of the sulphite and sulphate cell material. E. HÄGGLUND, O. SANDELIN, C. NYMAN, T. ERIKSSON, and H. VON KOSKULL (Svensk Pappers-Tidn., 1934, 37, 133—139, 164—167, 196—202; Chem. Zentr., 1934, ii, 1228—1229).—Rapidly grown wood has a lower *d* and contains short, broad fibres. Variations of up to 7% occur in the Et₂O extract with wood from different trees and from different parts of the same tree. The lignin content is approx. const. for any one tree, but varies in different trees (25.9—29.4%). The ash was 0.2—0.3, pentosans 6.8—9.0, and the AcOH obtainable with CaO 1.65—2.15% of the wt. of wood. Data are given correlating suitability for paper manufacture with other properties of the wood. H. J. E.

Factors influencing the movement of liquids in wood. S. J. BUCKMAN, H. SCHMITZ, and R. A. GORTNER (J. Physical Chem., 1935, 39, 103—120).—A study of the relationships governing the pressure movement of liquids in wood has been made. The max. and average effective diams. of the pores in the pit membranes vary with the moisture content of the wood, decreasing with increasing moisture content. The influence of pressure on the rate of flow of H₂O is not changed by drying the wood. Drying does not change permeability appreciably. The rate of flow of org. liquids and aq. salt solution does not bear any direct relation to viscosities; other factors also play a part. The decrease in rate of flow with time through balsam-fir heartwood, for C₆H₆, PhBr, and PhNO₂, increases with increasing polarity of the liquid. M. S. B.

Molecular diffusion into wood. L. C. CADY and J. W. WILLIAMS (J. Physical Chem., 1935, 39, 87—102).—The coeffs. of diffusion (*D*) of urea, lactose, and glycerol from aq. solution into transverse sections of samples of different woods have been determined. Three types of *D* have been observed: hindered *D*, in which the radius of the diffusing mol. is an appreciable fraction of the radius of the pore; free *D*, in which effective pores are small enough to prevent mixing of H₂O in the block with the solution, but large enough to allow practically unrestricted *D* of the solute mols.; and stirred *D*, when the pores are sufficiently large to

allow mechanical mixing with the liquid in them as the solution is stirred. Fractional open areas for heartwood sections have been calc. Comparison has been made between the experimentally observed mechanical blocking factors and those calc. by the equations given by previous investigators, and the deviations are discussed. M. S. B.

Thermodynamics of the swelling of wood. A. J. STAMM and W. K. LOUGHBOROUGH (J. Physical Chem., 1935, 39, 121—132).—V.p.-desorption isotherms from room temp. to the b.p. of H₂O have been determined for the system wood—H₂O under conditions which minimise the hysteresis effect. Fibre-saturation (*F*) points decrease linearly with rise in temp. Differential heats of swelling and free energy and entropy changes have been calc. for the whole sorption range and all give smooth curves with zero vals. at the *F* point. Heats of swelling, and free energy and entropy changes for the swelling and dissolution of various substances in H₂O, are compared. M. S. B.

Rate of deterioration in insect-killed spruce on the Gaspé peninsula. C. G. RILEY (Pulp and Paper Canada, 1935, 36, 130—132).—The extent and rate of decomp. of spruce wood killed by bark-beetle attacks has been investigated. (With F. H. YORSTON.) The yield of sulphite pulp from wood showing signs of decay is only slightly (about 1%) below that from normal wood, owing partly to the localised nature of the attack, and partly to the fact that some organisms break down lignin rather than cellulose. The strength is scarcely affected, but the colour is lower. H. A. H.

Determination of lignin in small quantities of wood by means of hydrogen fluoride. W. KLATT (Angew. Chem., 1935, 48, 112—114).—Small amounts (0.5 g.) of wood can be quantitatively examined for lignin (I) by extraction with anhyd. HF, in which the cellulose is sol. (*cf.* B., 1933, 263). In some cases the original structure of the latter can be retained if the pretreatment is with aq. HF, but in others (I) is obtained as a powder. A special Pt filtering crucible is described. The method is applicable to the examination of individual annular rings in woods. C. C.

Magnetism of wood ashes. V. JESSEN and E. WEDEKIND (Forstl. Woch. Silva, 1934, 22, 193—195; Chem. Zentr., 1934, ii, 1227).—Only for beech wood was this property related to the conditions of growth. In using the magnetic method for the quant. characterisation of wood ash, Fe₂O₃ must be reduced to Fe₃O₄ (*cf.* Wedekind, B., 1933, 508). H. J. E.

Bituminous emulsions.—See II. Variability of pulp wood. Adsorption compression of wood.—See V. Determining SO₄²⁻ [in cement].—See VII.

PATENTS.

Treatment of siliceous material and manufacture of cement therefrom. R. C. FOLGER, AssT. to ELECTRIC SMELTING & ALUMINUM Co. (U.S.P. 1,964,685, 26.6.34. Appl., 23.5.32).—Alkali-metal compounds are removed from 2CaO.SiO₂ and zeolites (obtained during the prep. of pure Al₂O₃) by means of aq. CaCl₂, the material being then suitable for Portland cement. B. M. V.

Production of a uniformly coloured cement. A. L. ASHER and W. G. MEYER (U.S.P. 1,963,540, 19.6.34. Appl., 12.2.34).—The clinker is ground to such fineness that it will float in air equally with the pigment.

B. M. V.

Roofing. A. D. MACNUTT, ASSR. to CERTAIN-TEED PRODUCTS CORP. (U.S.P. 1,963,752, 19.6.34. Appl., 28.5.30).—Mineral granules, prior to application to bituminous roofing, are completely coated with a substantially transparent, unvitriifiable film, *e.g.*, a lacquer of natural or synthetic resin, which is also insol. in H₂O or the oily matter.

B. M. V.

Investment [composition]. R. L. COLEMAN (U.S.P. 1,962,764, 12.6.34. Appl., 25.9.33).—A dental mould is formed from tridymite < 50 (75) and a binder, *e.g.*, plaster of Paris, < 20 (25) wt.-%.

B. M. V.

Plastic [artificial stone]. F. D. SNELL, ASSR. to TRAVATEX PRODUCTS CORP. (U.S.P. 1,964,088, 26.6.34. Appl., 15.11.29).—A suitable composition for casting in the form of non-warping slabs comprises a mineral filler (*e.g.*, marble dust) and Mg oxychloride cement (0.52 MgCl₂ : 3 MgO), together with MgSO₄ approx. ≡ any free CaO present in the aggregate. The mixture is allowed to set at warm room temp. while protected from evaporation (*e.g.*, by a humid atm.) and afterwards heated to 50—65°.

B. M. V.

Construction of bituminous macadam roads. R. B. HARRIS, ASSR. to WOOD CHEM. PRODUCTS CO. (U.S.P. 1,964,987, 3.7.34. Appl., 10.2.32).—Between a basic aggregate (*e.g.*, oyster shells) and an asphalt wearing surface is placed an intermediate layer of wood tar (diluted with petroleum fuel oil if desired) and wood-tar oil.

B. M. V.

Treatment of wood for protection from blueing. J. T. OLSSON, ASSR. to STOCKHOLM SUPERFOSFAT FABRIKS AKTIEB. (U.S.P. 1,965,508, 3.7.34. Appl., 9.11.31. Swed., 16.9.31).—The wood is dipped in or sprayed with an aq. solution of borax and chloro-*m*-cresol.

B. M. V.

Ceramic building material.—See VIII.

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

The basic open-hearth process. J. M. FERGUSON (J. West Scot. Iron and Steel Inst., 1934—35, 42, 13—28).—By the addition of small amounts of moist slag to molten slag crystallisation of compounds is facilitated. In this manner 3CaO, Fe₂O₃, formed probably at high temp., a magnetic constituent with a high MnO content, and 3 CaO, SiO₂ have been identified in finishing slags. Crystals of fluorapatite (3CaO, P₂O₅, CaF₂) are also present and their arrangement suggests that this compound is one of the last of the slag components to solidify. Slag samples taken from basic-lined furnaces in the early stages of melting contain CaO, Fe₂O₃, and FeO, but the principal constituent of melting-down slags is 2CaO, SiO₂. At this stage oxidation of metalloids in the steel by the furnace gases is at a max. If the basicity of the slag and the furnace temp. are both low, high gas-oxidation losses occur during the melting-down period.

W. P. R.

Special refractories in the open-hearth [steel] furnace. F. W. MORAWA (Stahl u. Eisen, 1935, 55, 201—206).—Suitable refractories are (1) magnesite (*M*), (2) chromite, (3) mixtures of (1) and (2), and (4) synthetic refractories such as sillimanite, Al₂O₃, SiC. The largest no. of melts per lining is obtained from (2), which has a useful life 5.5 times as long as that of a SiO₂ lining; the cost of this lining is also considerably < that of a SiO₂-brick lining. The origin of the refractory base from which the bricks are made is a factor which determines the suitability of the raw material; Norwegian *M*, *e.g.*, had only 40% of the life of Russian *M*.

W. P. R.

Extraction of vanadium from basic open-hearth slags. M. N. SOBOLIEV and B. M. VUILLEGZHANIN (Redk. Met., 1934, 3, No. 4, 42—47).—Roasting with Na₂CO₃ followed by H₂O-leaching recovered 80—95% of the V. The leaching solution was free from other metals except Cr. Roasting with NaCl or NaHSO₄ and leaching with acid recovered the V, but the solution contained Mn and Fe.

CH. ABS. (e)

Reoxidation of the crude iron [in the blast furnace] and its ultimate reduction. W. MCCONNACHIE (Blast-Furnace Steel Plant, 1934, 22, 567—571).—Analytical data are cited which show that a large amount of the crude Fe is oxidised by the blast and that the resulting oxides are reduced in the space immediately above the slag.

CH. ABS. (e)

Electric melting of cast iron. A. G. ROBIETTE (Metallurgia, 1935, 11, 101—104).—Electric melting permits use of steel scrap not suitable for the cupola, allows small charges to be handled, and secures reproducibility of composition. Duplexing, *i.e.*, cupola melting followed by superheating and reconditioning in an arc furnace, has been employed to produce cast Fe for rapid malleabilisation.

E. H. B.

Influence of melting with ferrous oxide-rich and acid oxide-poor slags on the crystallisation and mechanical properties of grey cast iron. P. BARDENHEUER and A. REINHARDT (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1934, 16, 65—75; Chem. Zentr., 1934, ii, 123—124).—Melts fused with an FeO-rich slag contain more gas, and crystallise in the stable system without supercooling (*S*). With FeO-poor acid slags crystallisation occurs after *S*. Tests of mechanical properties are recorded.

H. J. E.

Principles of desulphurisation of pig iron and steel. P. BARDENHEUER and W. GELLER (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1934, 16, 77—91; Chem. Zentr., 1934, ii, 122; cf. B., 1934, 21).—The reaction between Fe melts containing S, and slags containing FeO, FeO-MnO (I), FeO-CaO, FeO-Al₂O₃, (I)-Al₂O₃, FeO-CaO-SiO₂, and FeO-CaO-Al₂O₃ has been studied. With (I) slags the removal of S depends on the (I) ratio. Addition of Al₂O₃ to the slags hinders S removal. CaO, CaO-SiO₂, and CaO-Al₂O₃ favour desulphurisation.

H. J. E.

Carbon loss and pick-up in the cupola. H. H. LANGEBECK (Met. & Alloys, 1935, 6, 31—34).—The C content of cast Fe is affected by that of the charge, the quality of the coke, the wt. of coke, and the vol. of air. The main factor is the period of contact of molten

Fe with coke and CO. This is high in a cupola with 2 rows of tuyères and low in the Wüst furnace, which has an oil-fired flat hearth with a stack built on to it.

E. H. B.

Influence of carbon content and (A) heat-treatment on the ductility of steel wire, and (B) conditions of patenting on the tenacity of drawn steel wires. A. POMP (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1934, 16, 113—116, 117—127; Chem. Zentr., 1934, ii, 835).—(A) Data are recorded for the changes in ductility in steel wires (0.36—0.77% C) on thermal treatment at 837—1135° and with a Pb bath at 406—542°.

(B) Thermal treatment and changes in mechanical properties are correlated. The tenacity falls with rise in temp. of the Pb bath.

H. J. E.

Surface hardening of steel by the oxy-acetylene flame. E. KALISCH and K. SPÄH (Autog. Metallbearb., 1934, 27, 81—85; Chem. Zentr., 1934, ii, 1011).—The conditions for hardening a steel (C 0.3, Mn 0.6%) have been studied.

H. J. E.

Corrosion of wrought iron and steel. R. MORGAN, P. D. DALSIMER, and N. SMITH (J. Franklin Inst., 1935, 219, 157—165).—Potential-time (P/T) curves have been obtained on the 3 surfaces exposed, by cutting specimens from wrought-Fe (W) and mild-steel (M) tubes. The solution used was 0.1*M*-KCl, and a 0.1*N*-calomel electrode served as a reference. The initial potentials of each surface were different, but approached each other after an interval of 4 hr. The initial separation of the P/T curves for M surfaces was greatly decreased by annealing the specimens, but this treatment did not so affect the P/T curves for the W surfaces. The curves indicate that there is a higher initial corrosion rate for W than for M , and that the disposition of the slag inclusions in W has a definite influence on the progress of corrosion. P/T curves obtained on stainless-steel surfaces indicate that sudden breaks of the protective film followed by immediate self-repair occur continuously in KCl solutions.

W. P. R.

Corrosion of galvanised iron in aerated boiling water and in air-steam mixtures. S. A. POGODIN and M. S. GUSEVA (Soob. Vseso. Inst. Met., 1931, 7, 84—88).—Galvanised Fe is more resistant to corrosion than Pb-coated Fe.

CH. ABS. (e)

Underground corrosion in the south-eastern United States. K. H. LOGAN (J. South-eastern Sect. Amer. Water Works Assoc., 1934, 4, 51—71).—The chief cause of underground corrosion is the unequal distribution of O_2 at and near the pipe surface. Other factors and protective coatings are discussed.

CH. ABS. (e)

Corrosion of iron, copper, and lead in calcium chlorate liquors. S. S. SHRAIBMAN and A. V. BALEEV (Khimstroi, 1934, 6, 460—461).—Corrosion of Fe is > that of Cu and Pb and increases very rapidly with temp. (20—100°). The temp. effect is less marked with Cu and Pb, which form protective films.

CH. ABS. (e)

Corrosion protection under varying conditions. P. LUDWIK and J. KRYSZOF (Mitt. techn. Versuchsam., 1933, 22, 42—49; Chem. Zentr., 1934, ii, 323).—Experiments are described on the effect of repeated

bending (I) on the corrosion of steels and non-ferrous metals by H_2O and sea- H_2O , and on the action of various protective agents. In general, corrosion is increased by (I).

H. J. E.

Determination of slag inclusions in siliceous iron. I. T. LUKASHEVICH-DUVANOVA (Soob. Vseso. Inst. Met., 1931, 7, 105—108).—The inclusions consisted of Al silicate, Al_2O_3 , SiO_2 , and traces of Mn and Fe silicates, Al_2O_3 being the most harmful constituent.

CH. ABS. (e)

Determination of titanium in cast iron, iron, and steel. A. M. DIMOV and O. A. VOLODINA (Zavod. Lab., 1934, 3, 1065—1074).—Cunningham's method (B., 1933, 1060) is preferred to that of Thornton (B., 1914, 615).

R. T.

Determination of titanium in ferrous alloys. J. J. LURIE (Zavod. Lab., 1934, 3, 1127—1128).—5 g. of alloy are dissolved in 100 ml. of boiling 33% HCl or 10% H_2SO_4 , the solution is diluted to 200 ml., 10 ml. of 4% Al alum are added at 90°, aq. NH_3 is added to commencement of pptn. of $Al(OH)_3$, then 1 ml. more of conc. HCl than is required to dissolve the ppt. is added, followed by hot H_2O to 400 ml., and the solution boiled with 10 g. of $Na_2S_2O_3$ for 20 min. and filtered. The residue is ignited, HF and H_2SO_4 are added, and the whole is evaporated to dryness, the residue fused with $K_2S_2O_7$, and Ti determined colorimetrically in the dil. H_2SO_4 extract of the melt.

R. T.

"Vacuum-aluminium" method of determining oxygen in steel. P. S. LEBEDEV (Zavod. Lab., 1934, 3, 1078—1080).—The steel is fused in vac. with Al at 1500°, and the Al_2O_3 content of the melt determined.

R. T.

8-Hydroxyquinoline method of determining molybdenum in steels. Z. S. MUCHINA (Zavod. Lab., 1934, 3, 1075—1077).—1 g. of steel is dissolved in 30 c.c. of 20% H_2SO_4 , HNO_3 is added, the solution conc. to evolution of SO_3 and filtered from the ppt. of SiO_2 , the neutralised filtrate added to 100 c.c. of hot 15% NaOH, and the cooled solution diluted to 500 c.c. and filtered. 250 c.c. of filtrate are made acid with H_2SO_4 , conc. to 100 c.c., made alkaline with aq. NH_3 and then feebly acid with AcOH, and excess of 5% 8-hydroxyquinoline (I) in AcOH added at 80°. The ppt. is collected, ignited, and weighed, or dissolved in aq. H_2SO_4 and (I) determined iodometrically (KBr-KBrO₃ method).

R. T.

Systematic analysis of aluminium oxide in steel. S. L. TZINBERG (Zavod. Lab., 1934, 3, 1129).—The Al-Fe melt is dissolved in 20% HCl, the residue ignited in a Pt crucible, SiO_2 eliminated by heating with HF and H_2SO_4 , the residue again ignited and fused with K_2CO_3 - Na_2CO_3 , the melt extracted with H_2O , the extract filtered, the residue washed with dil. aq. Na_2CO_3 , and the filtrate + washings are made acid with HCl; then 0.5 g. of NH_4 tartrate and aq. NH_3 are added to give an alkaline reaction, the solution is neutralised with AcOH, 1—2 drops of aq. NH_3 are added, and Al is pptd. with 8-hydroxyquinoline.

R. T.

Automatic creep test furnace-guide. P. H. CLARK and E. L. ROBINSON (Met. & Alloys, 1935, 6, 46—49).—12 specimens each consisting of a straight

rod 5 ft. long and $\frac{3}{8}$ in. diam. are passed through a thermostatically controlled furnace and are loaded by single levers. The elongation of the centre 20 in. is measured between gauge rods led out of the furnace, to an accuracy of 0.0001 in. Curves are given for a Ni-Cr-Mo steel tested at 458° in the annealed condition for a period of 10,000 hr. E. H. B.

[Automatic creep test furnace-guide.] F. B. FOLEY (Met. & Alloys, 1935, 6, 50—51; cf. preceding abstract).—Creep curves of 12,000 hr. duration for 2-in. gauge-length specimens show evidence of periodic fluctuations which are attributed to a slow building up of strain and gradual recrystallisation *en masse*, superimposed on the more rapid and local phenomena. In these tests extension is measured to 0.00002 in. by a telescope sighted on Pt wires wrapped around the specimen. The results are at variance with the German view that short-time tests indicate long-time creep performance, persistent creep following an initial creep rate < that which does not produce continuous flow. E. H. B.

Surface - cracking of steel castings during pickling. C. W. BRIGGS and R. A. GEZELIUS (Met. & Alloys, 1935, 6, 39—40).—Cast specimens of a 0.23% C steel annealed for $\frac{1}{2}$ hr. at 900° and pickled in 10% H₂SO₄, alone or with inhibitors, were markedly embrittled and after straining in tension showed surface-cracking. Recovery of tensile strength was almost complete in 2 hr., but the elongation remained low. For intricate castings sandblasting is considered preferable to pickling. E. H. B.

Penetration of brass solder into steel as a result of hydrogen absorption in etching. P. BARDENHEUER and H. PLOUM (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1934, 16, 137—140; Chem. Zentr., 1934, ii, 836).—Samples of steel (0.04—1.05% C) after absorbing H₂ were dipped in molten brass, which penetrated into the intercryst. cracks. This was no longer observed after heating the steel in vac. at 750° for 10 hr. H. J. E.

Basic and acid hearths in reverberatories for copper-refining. E. T. RICHARDS (Chem.-Ztg., 1935, 59, 115—117).—A description of modern German practice in lining reverberatories for Cu-refining is given; linings of tamped quartz sand are preferred to those of magnesite or chromite since they are less sensitive to temp. changes, more easily patched, and more readily worked up for the recovery of their Cu content when worn out. A. R. P.

Intermediate phase in copper-aluminium alloys above the eutectic. G. KURDJUMOV and T. STELLETZKY (Metallwirts., 1934, 13, 304; Chem. Zentr., 1934, ii, 320).—Quenching of alloys with 13.5—15% Al gives a new (γ') intermediate phase, not formed with a lower % Al. It is formed only on rapid cooling, and may be a γ phase supersaturated with Cu. Quenching from the temp. of the β phase gave only γ' ; from the heterogeneous region above 800° γ and γ' were formed, and when the quenching temp. was between the eutectoid line and 670°, γ and β' were produced. H. J. E.

Phosphor-bronze castings—their production. F. HUDSON (Metallurgia, 1935, 11, 95—99).—High-quality

castings are made from charges containing a high proportion of remelted alloy, melted rapidly in an oxidising atm. and cast in sand moulds of high thermal conductivity, preferably containing chill insets. E. H. B.

Die casting in yellow metals. A. H. MUNDEY (Metal Ind., 1935, 46, 59—61).—Two classes of yellow metals usually employed for die casting are Al bronze (I) and high-tensile brass (II). (I) may contain Cu 90%, Al 10% or Cu 88%, Al 9%, and Fe 3%. Its tensile strength is 33—40 tons/sq. in., yield point 10—12 tons/sq. in., elongation 30%, and Brinell hardness no. approx. 100. The dies are heated to 250°, and the cores to a somewhat higher temp. Parts of dies which may suffer erosion are sometimes calorised. Advantages of die castings made from (I) are accuracy, resistance to shock, permanency of dimensions, and high electrical conductivity. (II) is usually based on the Cu 60%, Zn 40% alloy. The Polak process consists in forcing the semi-fluid alloy under pressure into the die. Material for the dies presents the most serious problem, and nearly every heat-resisting steel has been used. W. P. R.

Rapid electrolytic patina on copper. G. L. CRAIG and C. E. IRION (Met. & Alloys, 1935, 6, 35—37).—A malachite coating is formed on a Cu anode in an aq. solution of an alkali carbonate (8% NaHCO₃), using a c.d. of 1—20 amp./sq. dm. The coating may be applied to Cu roofs etc. by means of a cloth-covered roller soaked in the electrolyte. The coating is green and adherent, and changes to brochantite within a year without flaking. E. H. B.

Flash-roasting pyrite with the Nichols-Freeman system [for making sulphur dioxide] in the manufacture of sulphite pulp. C. D. JENTZ, JUN. (Pulp and Paper Canada, 1935, 36, Conv. issue, 61—63, 104).—The process and plant are described. Flash-roasting is an efficient method of oxidation, specially adapted to fine-ground ores such as flotation concentrates. Compared with conventional methods of roasting, the operating temp. is higher and the capacity greater, for furnaces of the same size. Costs for power, maintenance, etc. are given. H. A. H.

Corrosion [in sulphite-pulp mills]. G. A. BAKER (Paper Mill, Mar. 23, 1935, 18, 20, 22).—An alloy (named KA2SMo) containing Cr 18, Ni 8, Mo 3%, with low C content possesses better physical properties and corrosion-resistance than any other alloy in general use. Precautions regarding its application are given. H. A. H.

Zinc metallurgy. I. Reduction of zinc ores by natural gas. H. A. DVERNER. II. Recovery of zinc from ferrite compounds in the electrolytic zinc process. G. L. OLDRIGHT, T. B. BRIGHTON, and C. M. DICE (U.S. Bur. Mines, Rept. Invest., No. 3256, Dec., 1934, 1—24, 25—43).—I. When natural gas (chiefly CH₄) is passed over ZnO at 1000° 68.6% of the Zn is reduced by the reaction: ZnO + CH₄ = Zn_{gas} + CO + 2H₂ (I), 7.8% by ZnO + CO = Zn_{gas} + CO₂ (II), and 23.6% by ZnO + H₂ = Zn_{gas} + H₂O (III); since, however, reversal of (III) is complete and of (II) about 50% complete during condensation of the Zn, about 27% of the Zn distilled will be reoxidised during cooling. By using an excess of CH₄, however, the CO₂ and H₂O

can be converted completely into CO and H₂ in presence of a nickelised Al₂O₃ catalyst and the ultimate reaction is the same as (I). An experimental apparatus comprising a continuous retort (*R*), a cyclone dust collector (*D*), a catalyst tube (*T*), and a vertical condenser (*C*) with inclined baffle plates has been constructed and the most satisfactory operating conditions were established. *R*, *D*, and *T* are constructed of gas-welded Ascalloy and are heated by gas burners at 1000–1050°. The gas supply to *R* is adjusted so that the flue gas from *C* contains about 0.1–1% of CH₄ and < 0.2% of CO₂, to prevent deposition of C in *T*. The catalyst requires periodic regeneration by passing H₂ and CO₂ over it alternately for 30–60 min. To prevent reoxidation of Zn during condensation *C* must be made of a non-porous refractory, e.g., porcelain. The Zn recovered represents > 95% of that in the ore and is nearly as pure as the electrolytic metal. A small pilot plant is illustrated by diagrams and the economics of the process are discussed.

II. When ZnO and Fe₂O₃ are heated for some hr. at > 950° the compound ZnFe₂O₄ (*F*) is formed which is insol. in aq. NH₃ and only sparingly sol. in dil. H₂SO₄. When *F* is heated with H₂SO₄ at 600° all the Zn is converted into ZnSO₄ and the Fe remains insol. as Fe₂O₃ or a basic sulphate; the first stage of the reaction comprises complete sulphation of both metals, so that the heating must be continued until all the Fe₂(SO₄)₃ is decomposed, and therefore an excess of acid should be avoided. Probably the best procedure consists in heating the *F*-acid mixture in thick layers at 200–300° until sulphation is complete, and then roasting the product in thin layers at 600° with continuous rabbling.

A. R. P.

Smelting in the lead blast furnace. Handling zinciferous charges. XI. Preparation of the charge by sintering. XII. Gases within the blast furnace at top and tuyères. XIII. Accretions at various elevations within the blast furnace, and factors governing manner and rate of descent of stock column. XIV. Methods of charging the blast furnace: their effect on furnace operation. XV. Slags from the Traill blast furnaces. G. L. OLDRIGHT and V. MILLER (U.S. Bur. Mines, Repts. Invest., Nos. 3243–6 and 3264, Dec., 1934, 60, 22, 13, 12, 19 pp.).—XI. An account is given of modern practice in sintering Pb-flotation concentrates (I) at the Traill, B.C., smelter, with tabulated data on the composition of the charge, the changes which occur at the various stages on the Dwight-Lloyd grate, the air and fuel consumption, and the SO₂ content of the gases. The charge consists of wet (I) with residues from the H₂SO₄ extraction of the roasted Zn-flotation concentrates, flue dust, and other by-products from smelting and electrolytic operations; an average charge contains H₂O 10, Pb 45, Zn 8.5, S 11.7, SiO₂ 6–7, Fe 12, and CaO 3–4%. In the first roast the max. temp. (*T*) of the charge reaches 1020° and the max. SO₂ content of the gases [SO₂] 3.5%, while the S content (*S*) of the sinter is 6–7%; in the second roast [SO₂] reaches 8%, *T* is 1050°, and *S* 0.6–1.7% as the Pb content rises from 36 to 50%.

XII. The composition of the gases taken from various

parts of the Pb blast furnace (*F*) at the top and tuyère zones at various stages of the smelting operation is tabulated and the results are briefly discussed in relation to the running of *F*.

XIII. During normal operation of *F* the charge moves downwards at an average rate of 1½ in. per min.; arching of the charge is likely to occur when the feed is fine, the tuyère zone is hot, and the slags are rich in Zn. Accretions in *F* are usually high in S and Zn and low in slag-forming materials, whereas accretions in the crucible are generally of an oxide nature with Zn 17–20, Fe 12–13, and SiO₂ 11–13%.

XIV. The distribution of the charge in *F*, using various methods of feeding, is illustrated by diagrams and briefly discussed.

XV. Traill *F* slag contains Fe 28.2–30.6, SiO₂ 18.5–20.6, Zn 15.7–18.5, CaO 7.4–9, and Pb 2.9–5.2, about 50–60% of the Pb being present as metal; when this slag is kept hot in a settler a "mush" consisting of magnetite, Zn spinel, and Zn ferrite settles out, but relatively little Pb can be recovered in this manner. Blast-smelting of the slag with coke, however, results in volatilisation of practically all the Zn and Pb as oxides from which the Zn can be recovered by leaching with H₂SO₄ and the residual PbSO₄ returned to the sintering plant.

A. R. P.

Wet metallurgy. Chlorination of lead ores.

A. FURIA (Chimica e Ind., 1934, 2, No. 2, 17–20; Chem. Zentr., 1934, ii, 1191).—The ores (85% Pb, 2.8 kg. Ag per ton) were heated with NaCl (25% > the theoretical amount), and the residue was treated with dil. HCl and electrolysed, Ag-free Pb being deposited at 0.38–0.5 volt.

H. J. E.

Assay of black sands [for gold etc.]. P. HOPKINS (U.S. Bur. Mines, Rept. Invest. No. 3265, Dec., 1934, 5 pp.).—Black sand concentrates (I) produced in large-scale placer-mining operations contain numerous metallic particles (II) resulting from wear on the machinery; these may contain Fe or steel, Pb, Cu, brass, solder, and bearing metals. In preparing such (I) for assay, stage-grinding is recommended, the (II) being removed at each stage and replaced with an equal wt. of barren quartz. For a pot assay the (I) should be ground as finely as possible, preferably through 200-mesh; the fines are smelted with PbO, flour, and fluxes having a high SiO₂ content, since they are usually high in Fe₂O₃. The (II) contain, generally, particles of Au and Pt embedded in the other metals, removal of which by acid treatment is tedious and unsatisfactory; a better procedure comprises smelting with PbS or FeS₂ in a small pot, allowing the charge to cool, breaking up the pot and its contents, and assaying the product in the usual way.

A. R. P.

Metallographic etching of platinum. A. JEDELE (Metallwirts., 1934, 13, 335–337; Chem. Zentr., 1934, ii, 1194).—Recrystallisation of the polished surface layer on Pt occurs on heating for 10 min. at 1000°. Pt containing 0.1% of P can be etched with aqua regia after this treatment. It is applicable to Pt with 20% of Ir. Beck's method of electrolysing fused NaCl (A., 1934, 1195) at 860° may also depend on a surface recrystallisation.

H. J. E.

Behaviour of sprayed metal coatings towards liquid and gaseous substances. H. REININGER (Metallw.-Ind., 1934, 32, 235—236; Chem. Zentr., 1934, ii, 1012).—When liquids are heated in a vessel coated by spraying, overheating occurs in the micropores of the coating, which may be injured as a result.

H. J. E.

Nature of crystal-lattice distortion and its distribution in drawn and bent rods. F. REGLER (Mitt. techn. Versuchsam., 1933, 22, 49—60; Chem. Zentr., 1934, ii, 321—322).—The interpretation of evidence based on X-ray photographs is discussed. The increase in line breadth always tends to a characteristic max. with progressive deformation at a point where the test-piece breaks.

H. J. E.

Determination of copper in plating baths by the de Haen-Low method. VINCKE (Chem.-Ztg., 1935, 59, 117).—Polemical.

A. R. P.

Electrolytic refining of copper, using complex salts of cuprous chloride. XIV. Electrolyte circulated by special pump. XV. Purity of the cathodic deposits and behaviour of impurities in the anode, using circulated electrolyte. N. KAMEYAMA and S. MAKISHIMA (J. Soc. Chem. Ind., Japan, 1934, 37, 783—785 B; cf. B., 1935, 192).—Electrolysis, out of contact with air, of solutions containing CuCl and NH₄Cl at 50°, circulated on the cascade principle, yields cathode deposits which, except for Ag, are of high purity. The Ag content may reach 0.032%. Au remains in the slime. Most of the Bi, Fe, Ni, Zn, and Pb dissolve, but are not deposited. As and Sb scarcely dissolve unless the solution is oxidised. At the commencement of electrolysis the operating voltage rises, but later falls, reaching a const. val. of 0.3 volt after 1½ days. The effect on electrolysis of the adherent slime films which form on the anodes is discussed.

J. W. C.

Electrolytic preparation and refining of nickel. W. SAVELSBURG (Metall u. Erz, 1934, 31, 222—226; Chem. Zentr., 1934, ii, 1192—1193).—Technical processes are described and discussed.

H. J. E.

Electrodeposits of nickel-iron alloys. E. RAUB and E. WALTER (Z. Elektrochem., 1935, 41, 169—174).—Addition of citric or tartaric acid to baths containing SO₄²⁻ at low *p*_H (3—4) reduces the peeling of the Ni-Fe deposit. Lactic acid produces a poorly adherent, powdery deposit. All the deposits examined were porous and unsuitable as protective coatings.

E. S. H.

Electrodeposition of chromium from aqueous chromic acid solutions. F. J. WEBER (Oberflächen-technik, 1934, 11, 123—127; Chem. Zentr., 1934, ii, 1011—1012).—The effect of H₂SO₄ (I), H₃PO₄ (II), and H₃BO₃ (III) on Cr deposition has been studied. The current yields (*C*) are very low with (II). (II) also lowers *C* in a bath containing (I). Satisfactory deposits are obtained with 10—60% (III) (*C* is > 8.5%). In a (I) bath *C* is raised by (III). Cr deposits are harder when formed at a lower temp. Additions of (NH₄)₂SO₄ produce a harder deposit than does (I). (III) also somewhat hardens the deposit.

H. J. E.

(A) Influence of current density on chromium [plate] hardness. (B) Influence of temperature

on efficiency of chromium-plating. R. J. PIERSOL (Metal Clean. Finish., 1934, 6, 353—356, 453—455, 460).—(A) Data for the interrelation of the c.d., [Fe], [Cr^{III}], and the hardness of the Cr-plate are given. (B) The efficiency (*E*) was higher at high c.d. and at low temp. At a given temp. there was the same % increase in *E* for a doubling of the c.d., whatever the val. of the c.d.

CH. ABS. (e)

Protecting layers produced on magnesium and aluminium by oxidising baths. I. V. KROROV and G. G. IVANOV (Legk. Metal, 1934, 3, No. 4, 36—39).—The properties of the oxide layer formed on Al and Mg by immersion in a molten bath of (A) KNO₃ + (B) NaNO₃ + (C) K₂Cr₂O₇ were studied. The max. resistance to corrosion in aq. NaCl was obtained at 350° with A 42.6, B 54.2, and C 3.2%. CH. ABS. (e)

Bearings.—See I. Enamels for steel. Ba compounds as fluxes. ThO₂ crucibles.—See VIII. Action of nitrocellulose solutions on metals.—See XIII.

See also A., Apr., 439, Systems Cu-Au, Al-Sn-Mn, and Cd-Ag. Binary Al alloys. 440, Cd-Sn, Ti-Hg, Rh-Cu, Pt-Sb, and Pt-Rh alloys. Osmiridium. Heusler alloys. 450, Growth of Ag crystals. 451, Cathodic passivity. 453, Probability of corrosion. 456, Electrolysis of ZnCl₂ solutions. Gd. Electrolysis with scraped electrodes. 457, Haring cell and Ag-plating. 463, Quant. spectrum analysis.

PATENTS.

Direct production of wrought iron. F. JOHANNSEN, Assr. to F. KRUPP GRUSONWERK A.-G. (U.S.P. 1,964,917, 3.7.34. Appl., 4.6.32. Ger., 5.6.31).—Sponge Fe is heated at 900—1400° (e.g., in the upper part of a rotary cylindrical furnace) and further heated to form lumps, the heat being produced partly by the oxidation of Fe with excess of air and partly from electricity or the combustion of fuel. The oxidised Fe forms a very fusible slag which runs away from the Fe metal and flows out with the lumped wrought Fe. In another claim, the sponge Fe is produced in the same furnace from ore and C at 600—900°. (Cf. B., 1934, 1060.) B. M. V.

[Ferrous] alloy. B. S. SUMMERS, Assr. to MICHIGAN STEEL CASTING Co. (U.S.P. 1,964,702, 26.6.34. Appl., 11.7.31).—A heat- and corrosion-resisting alloy comprises Cr 15—30, Pb 0.5—2.0, Cu (optional) 2.5—5.0, and Mo 1.0—3.0%, with Fe the remainder. B. M. V.

Apparatus for handling molten metal. H. M. E. HEINICKE, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,965,340, 3.7.34. Appl., 19.12.30).—The ferrous metal of a die-casting machine is barfed where in contact with Al, Zn, or the like. B. M. V.

Ferrous alloy [malleable cast iron]. V. D. HOMERBERG, Assr. to NITROMAL CORP. (U.S.P. 1,944,178, 23.1.34. Appl., 10.5.29).—Claim is made for malleable cast Fe containing 0.15—5% Al with 0.1—8% of < 1 of the following: B, Cr, Mo, Ni, Ti, W, V, and Zr, and case-hardened in NH₃. The preferred composition is C > 2, Al 1—2, Cr 1.5, Mo 0.4, and Si 0.9—2.83%. A. R. P.

Separation of arsenic and antimony from complex sulphur compounds of copper. H. CMYRAL (B.P. 422,369, 21.2.34. Austr., 21.2.33).—Antimonial or arsenical Cu ores or speisses are briquetted with roasted pyrites or other source of Fe_2O_3 , reducing agents, e.g., coke or coal dust, and fluxes, and the briquettes are smelted in a small shaft furnace, whereby a Cu matte, a CaO-FeO-SiO_2 slag, and a flue dust containing sulphides and oxides of As and Sb are obtained.

A. R. P.

Copper-base alloys. A. H. STEVENS. From AMER. BRASS Co. (B.P. 422,233, 19.10.33).—Strong, workable, and corrosion-resistant Cu alloys contain Cu > 95.5 (96), Si 0.5—3 (3), and Zn 1—2.75 (1)%.

A. R. P.

Hard-soldering mixtures and processes. H. A. P. LITLEDALE (B.P. 421,958, 2.8.34. Addn. to B.P. 415,181; B., 1934, 1108).—The solder composition previously claimed is mixed with aq. NH_3 or a solution of Cu(OH)_2 in aq. NH_3 instead of with H_2O .

A. R. P.

Compound wire. C. DIETZ and J. O. WHITELEY, Assrs. to DENTISTS' SUPPLY Co. of NEW YORK (U.S.P. 1,962,859, 12.6.34. Appl., 21.12.31).—The wire is composed of a base-metal core, a covering of an alloy of Ag and a metal of the Pt group of relatively high m.p., e.g., Pd, and an outer cover of Au.

B. M. V.

Roasting of blende or other sulphides. F. KRUPP GRUSONWERK A.-G. (B.P. 424,376, 14.2.34. Ger., 15.2.33).—A rotary cylindrical kiln is formed with the greater part of its length, from the upper end, as a single passage in which the ore (*O*) is maintained in a thick layer. The lower end is divided into an axial air-supply passage and a no. of satellite passages (*S*) for the final roasting of *O* in thin layers. Fuel burners impinge into *S* at the lower end.

B. M. V.

Production of zinc sheets particularly adapted for use in galvanic cells. P. MITTMANN, Assr. to AMER. LURGI CORP. (U.S.P. 1,947,948, 20.2.34. Appl., 15.4.31. Ger., 19.4.30).—Thin plates of Zn are cast from metal heated just $>$ the m.p., e.g., at 430° , so as to obtain a very irregular crystal structure; the metal is then rolled hot into sheets and finally cold-rolled to the final stage to cause the basal planes of the crystals to lie parallel to the surface of the sheets.

A. R. P.

Recovery of manganese from ore. F. D. DE VANEY and J. B. CLEMMER, Assrs. to RECLAMATION Co. (U.S.P. 1,951,326, 13.3.34. Appl., 31.3.30).—Oxide, carbonate, and silicate Mn ores are separated from gangue by froth flotation, using an alkaline (Na_2CO_3 and/or Na_2SiO_3) circuit, a frother of the type of pine oil, and a collector comprising a fatty acid, e.g., oleic.

A. R. P.

Treatment of metal [magnesium] powder. F. R. KEMMER, Assr. to MAGNESIUM PRODUCTS, INC. (U.S.P. 1,964,853, 3.7.34. Appl., 7.4.33).—Mg powder (obtained by reduction of ore with C) is converted into molten Mg by rubbing in a closed rotary furnace at a temp. between the m.p. and b.p. of Mg in presence, (a) at < 1 atm., of vapours of oil which has previously been mixed with the powder, or (b) of an inert gas at reduced pressure.

B. M. V.

Treatment of light metals. COMP. GÉN. D'ELECTRO-MÉTALL., Assees. of METALLGES. A.-G., and H. LEPP (B.P. 421,904, 15.8.33. Ger., 16.8.32).—Light metals or alloys, e.g., alpac, are degassed by melting under a fluoride and/or chloride flux to which an oxidising agent, e.g., NaClO_3 , has been added; small quantities of reducing agents, e.g., Na, K, Cd, Zn, or S, are introduced into the metal before covering it with the flux.

A. R. P.

Removing hard spots from thermally reduced aluminium-silicon hardeners. METALLGES. A.-G., Assees. of K. SCHMIDT GES.M.B.H. (B.P. 422,688, 4.7.34. Ger., 3.8.33).—Si-Al hardeners produced by electrothermal reduction are treated with steam or other gases or with volatile fluorides or chlorides, whereby the hard spots rise to the surface, and can be removed after allowing the alloy to cool and then remelting it.

A. R. P.

Anode for [interior] electroplating. H. LE LAURIN and A. L. FRY (U.S.P. 1,964,736, 3.7.34. Appl., 16.11.31).—Apparatus for use in plating gun barrels etc. is claimed.

B. M. V.

Sintering and fusing material. Hg boilers. Grading ores etc.—See I. Glass-metal joint. Ceramic-coated articles.—See VIII. [Alloy for] thermionic [grid] device.—See XI. Adhesive.—See XV.

XI.—ELECTROTECHNICS.

Photoelectricity and the chemical industry. J. A. WALTERS (Chem. & Ind., 1935, 258—261).—Characteristics and applications of Se, photoelectric-emission, and rectifier cells for purposes of control and measurement in chemical industry are briefly discussed.

J. S. G. T.

Na_2S . Ammophos.—See VII. Adhesion of enamel.—See VIII. Resistance of embedding cements.—See IX. Melting cast Fe. Patina on Cu. Zn. Chlorinating Pb ores. Determining Cu in plating baths. Refining of Cu. Ni. Ni-Fe electrodeposits. Cr-plating.—See X. Ebonite.—See XIV. Determining [H] in soils.—See XVI. Measuring flour colour.—See XIX.

See also A., Apr., 444, Colloidal Ga. 450, Growth of Ag crystals. 451, Cathodic passivity. 456, Electrolysis of ZnCl_2 solutions. Gd. Electrolysis with scraped electrodes. 457, Haring cell and Ag-plating. 458, Electrolytic development of photographic layers. 460, Prep. of Fe-free Ti solutions. 463, Quant. spectrum analysis of elements. 472, Electrolysis of propionates + nitrates.

PATENTS.

Electrical generator. H. J. MCCREARY, Assr. to R. G. RICHARDSON (U.S.P. 1,964,738, 3.7.34. Appl., 17.10.30).—Hg vapour is passed through a tube (*T*) in which it is ionised by X-rays from an external source. In *T* are placed a negative wire and a surrounding coil (*C*) which is maintained positive by a bias battery. *C* collects the negative charge from the stream of Hg which carries forward the positive charge to a point of

condensation, the condensed Hg forming the other terminal for the external, power-using, circuit.

B. M. V.

Production of electricity by means of a fuel cell. H. H. GREGER (U.S.P. 1,963,550, 19.6.34. Appl., 9.12.32).—Electricity is generated by the combination of CO and/or H₂ and an O₂-containing gas in a cell provided with an electrode for the former composed of Ni, Fe, or C and for the latter of Ni, Ni-Cr steel, or magnetite, the container being of (calorised) Fe. The electrolyte comprises fused carbonates of alkali and alkaline-earth metals, with halides to lower the m.p. to < 700° (< 600° or < 500°).

B. M. V.

Apparatus for producing high ohmic resistances or the like. G. SEIBT (U.S.P. 1,965,059, 3.7.34. Appl., 18.3.31. Ger., 3.4.30).—Rods of ceramic material are assembled between end-supports like a squirrel cage and are rotated at high temp. in a gas rich in C; after deposition of C the cage is removed to a cooler zone before exposure to the atm.

B. M. V.

Production of electrical insulating materials. STRATIT-MAGNESIA A.-G. (B.P. 424,601, 21.2.34. Ger., 21.2.33).—Vitrified materials having a low dielectric loss factor are made from a mixture of 70–90% of soapstone with clay and suitable fluxes, e.g., compounds of Be, Ca, Sr, Ba, etc. Al₂O₃ is excluded and the amount of clay substance is reduced to a min.

J. A. S.

Forming an electrode or a contact surface on an electric resistance of semi-conducting materials. PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 424,930, 19.6.34. Ger., 26.7.33).—A paste of the electrode metal, together with glue, collodion, paraffin, or other org. binder, if desired, is applied to the semi-conductor and sintered.

J. S. G. T.

[Electric] dehydrator having emulsion guiding surface. H. C. EDDY and C. F. KIECH, ASSRS. to PETROLEUM RECTIFYING CO. OF CALIFORNIA (U.S.P. 1,963,325, 19.6.34. Appl., 21.12.31).—In the electric dehydration of oil-H₂O emulsion (*E*) having sufficient conductivity before treatment to act as one electrode, and having *d* > that of the treated oil (*O*), the live electrode is in the form of a vertical sleeve submerged in *O*, and *E* is fed axially in the form of a solid stream upon the pointed end of a vertical rod of insulating material so that it forms an annular stream having an equipotential core. Alternatively, the sleeve electrode may be nearly horizontal and *E* guided by a trough along the axis.

B. M. V.

Manufacture of electrolytic [condenser] cell. A. GEORGIEV, ASSR. to AEROVOX CORP. (U.S.P. 1,963,049, 12.6.34. Appl., 21.9.31).—Both cathode and anode foils are of Al and both are provided with a foundation film of a compound of Al; one set only has a further dielectric film applied by current in one direction only. Alternatively, thick and thin films may be formed by currents in both directions, but of different strengths.

B. M. V.

Thermionic device. J. A. HOLLADAY, ASSR. to KEMET LABS. CO., INC. (U.S.P. 1,963,844, 19.6.34. Appl., 22.1.32).—A grid is formed of Mo 15–40, Mn > 2.5, V 0.3 (approx.), Si > 0.5, C > 0.3, Fe 10–30%, with remainder (> 40%) Ni.

B. M. V.

Electrodes for galvanic cells, particularly large-surface plates for lead electric accumulators. ACCUMULATOREN-FABR. A.-G. (B.P. 424,382, 24.3.34. Ger., 28.3.33).—Forms of grids are described.

B. M. V.

Photo-electric tube. J. H. DE BOER and M. C. TEVES, ASSRS. to RADIO CORP. OF AMERICA (U.S.P. 1,962,895, 12.6.34. Appl., 13.9.29. Holl., 25.9.28).—The cathode comprises a layer of CaF₂ (conveniently deposited on the bulb wall) and a film of adsorbed Cs on it.

B. M. V.

Removal of gaseous impurities from [gas-filled] electric-discharge tubes. L. H. DAWSON (U.S.P. 1,962,138, 12.6.34. Appl., 17.9.31).—In a side tube an electric discharge is passed between electrodes, of Al or other metal unaffected by cathodic disintegration, provided with inserts of misch metal.

B. M. V.

Electrical precipitation [for gases]. W. DEUTSCH, ASSR. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,962,555, 12.6.34. Appl., 8.10.32. Ger., 9.7.31).—Discharge electrodes (*A*), having unusually large curvature but nevertheless high rate of corona discharge, are formed as two parallel rods between which sparks are maintained by an a.c. or d.c. separate from that for the pptn., the latter being unidirectional and maintained between the spark paths and a collecting electrode.

B. M. V.

Purification of air. F. E. HARTMAN, ASSR. to F. H. and W. R. MONTGOMERY (U.S.P. 1,965,187, 3.7.34. Appl., 15.9.30).—The mols. of air are activated, without production of O₃, by ionisation in a corona discharge (*C*) and irradiation with ultra-violet rays (*R*) produced by a gas-filled tube of transmission glass provided with one internal electrode (*I*) and one external electrode (*E*) longitudinally spaced from *I*. *E* produces *C*, and *R* are emitted between *I* and *E*.

B. M. V.

Electrolytic gas-producing device. O. K. ENZOR, ASSR. to H. E. DORSEY (U.S.P. 1,963,959, 26.6.34. Appl., 23.1.33).—All the electrodes are supported on, but insulated from, a metallic floor (*F*) and connected to their leads through it. An all-embracing hood (*T*) makes a detachable liquid-tight joint with *F* and forms the electrolyte tank. Within *T* are smaller hoods (*H*) for collecting the H₂. *H* and *T* are removed together to inspect the electrodes.

B. M. V.

Removing boiler scale. Producing high vacua.—See I. Zn sheets for cells. Interior electroplating.—See X.

XII.—FATS; OILS; WAXES.

Improvement of Ban's method of extraction of crude fat. P. M. IVANOV (J. Appl. Chem. Russ., 1934, 7, 1523–1526).—The seeds are wrapped in filter paper before crushing. The method is economical, convenient, and rapid, but gives results 0.5–0.9% < by the Soxhlet method.

R. T.

Progress in the hardening of fats. W. NORMANN (Chem.-Ztg., 1935, 59, 253–256).—A review.

Influence of carbon monoxide on hydrogenation of fats. S. DANILOV and R. SVIRIDOVSKAYA (Maslo. Zhir. Delo, 1933, No. 6, 5–11).—A high [CO] in H₂ retards hydrogenation, the main product being oleic

acid. CO is decomposed by the Ni catalyst to CO₂ and C. CH. ABS. (e)

Effect of hydrogen impurities on hydrogenation with nickel formate. I. LYUBARSKI (Maslo. Zhir. Delo, 1933, No. 5, 17—19).—The hydrogenation rate with (HCO₂)₂Ni was increased by CO, H₂S, COS, PH₃, CO₂, and CH₄. These impurities retard hydrogenation with a Ni catalyst. CH. ABS. (e)

Examination of Hungarian lard. S. KRON (Z. Unters. Lebensm., 1934, 68, 636—642).—The variations in H₂O content, acidity, Polenske val., and Bömer val. of samples of marked Hungarian lard, taken over a period of 4 years, are discussed. E. C. S.

Ketone formation in fats. III. Behaviour of fat acids at elevated temperatures. K. TÄUFEL, H. THALER, and M. MARTINEZ (Margarine Ind., 1933, 26, 37—39).—Ketone (I) formation occurs on heating fat acids, the amount decreasing with prolonged heating due to a decomp. similar to that of Me nonyl ketone in aq. or paraffin solution. Octoic and lauric acids form (I) more readily than palmitic, stearic, and oleic acids. CH. ABS. (e)

Ketone formation in purified fats. IV. H. SCHMALFUSS, H. WERNER, and A. GEHRKE (Margarine Ind., 1933, 26, 3—4, 87—89).—Acids above C₂ (saturated and unsaturated) become ketonic on exposure to light, atm. O₂ favouring the reaction. Lauric acid became more and not less ketonic on prolonged heating at 110° (cf. preceding abstract). CH. ABS. (e)

Analysis of fat emulsions containing sulphonaphthenic acids. P. E. KONEMOVICH and E. Z. NOVIK-BOM (Izvest. Tzent. Nauch.-Issl. Inst. Kozh. Prom., 1932, No. 6—7, 35).—The sample (26 g.) is mixed with 30 c.c. of N-H₂SO₄ and extracted with Et₂O. The Et₂O extract is evaporated, dried at 100°, and weighed. This gives the total saponifiable fat acids and mineral oil, the ricinoleic and sulphoricinoleic acid content of the mixture being determined from its sap. val. H₂O in the emulsion is determined by the Marcusson method. Sulphonaphthenic acids are determined by difference. CH. ABS. (e)

New method for determination of m.p. [of fats and oils]. H. MIELLER (Z. Unters. Lebensm., 1935, 69, 73—75).—The molten fat or oil is drawn into the bend of a capillary U-tube and cooled in ice for 2 hr. The tube is then placed in a H₂O-bath at an angle of 45° so that one end (suitably bent and lengthened) is in air and the other 2 cm. are under the H₂O surface. The temp. at which slip is first observed and at which 5-mm. movement of the column has taken place are recorded as the limits of m.p. Comparative results with the Grün and Polenske methods, and the m.p. of the body fat of 30 invertebrate animals, are given. E. C. S.

Vitamins of olive oil. J. SAVARE (Bull. Sci. Pharmacol., 1934, 41, 272—280; Chem. Zentr., 1934, ii, 967).—The vitamin-A content of the oil increased with each fraction expressed. Vitamin-B, -C, and -D were absent. A. G. P.

Physical properties of Philippine vegetable oils. F. A. MEDINA and A. CLEMENTE (Univ. Philippines Nat.

Appl. Sci., 1934, Bull. 4, No. 1, 61—91).—Data for the following oils are tabulated: calumpang (I), cashew, coconut, kapok, lumbang, palo-maria de la playa, peanut, pili-nut, tangan-tangan (II), tuba, Castrol XL, and Mobiloil A. All are completely sol. in Et₂O, C₆H₆, benzene, COMe₂, CHCl₃, CCl₄, and CS₂. (II) is completely sol. in 95% EtOH at room temp., due probably to a high content of hydroxylated fatty acids. (II) has the η required of a lubricating oil. CH. ABS. (e)

High-pressure hydrogenation of soya-bean oil. IV. Formation of hydrocarbon. Y. SINOZAKI and H. KUBO (J. Soc. Chem. Ind., Japan, 1935, 38, 21 B; cf. B., 1935, 318).—The ester wax which was formed at 325—350° with the Cu-Cr catalyst was decomposed completely at > 410° with the formation of octadecane, whilst at about 450° a light oil (yield > 70%) of *d* 0.74 was produced. A. B. M.

Calculations in the study of oils and fats, with special reference to fish oils. I. F. CHARNLEY (Canad. Biol. Fisheries, 1934, 8, No. 35, 509—529).—Methods of deducing mixture compositions from observed I vals. and equivs. are described. CH. ABS. (e)

Sizes for rayon.—See VI. Artificial leather.—See XIII. Butter. Determining fat in cheese. Citrus products. Raisin oil by-product.—See XIX.

See also A., Apr., 466, **Standardising Lovibond glasses.** 473, **Prep. of oleyl chloride and α -monoolein.** I vals. of linolenic, linoleic, and stearolic acids. 488, **Twitchell's reagent.** 510, **Pupa oil. Ringed-snake fat.** 523, **Lard fatty acids and esters.** 543—8, **Vitamins.** 551, **Seed oil of *Aegle marmelos*. Hydrocarbons of esparto and candelilla waxes.**

PATENTS.

Powdered soap product and its preparation. W. H. ALTON, Assr. to R. T. VANDERBILT Co., INC. (U.S.P. 1,968,628, 31.7.34. Appl., 7.7.31. Cf. U.S.P. 1,943,253; B., 1934, 931).—Soap (10—70 pts.) is ground with pyrophyllite, talc, mica, or starch (90—30 pts.) so that the dusting material coats the soap particles, of which < 60% should pass 100-mesh. E. L.

Production of powdered soap of low moisture content. B. CLAYTON, W. B. KERRICK, and H. M. STADT, Assrs. to REFINING, INC. (U.S.P. 1,968,526, 31.7.34. Appl., 17.4.33).—Apparatus is described whereby the fat and aq. alkali are saponified during passage through long and narrow heated reaction tubes, such that the frictional resistance enables a const. pressure to be maintained; the soap is discharged into a low-pressure zone in order to evaporate a portion of the H₂O and yield a soap powder. E. L.

Preparation of detergent compound. E. F. DREW (U.S.P. 1,962,299, 12.6.34. Appl., 14.9.28).—Waste liquors from the sulphonation of animal or vegetable fats or oils are treated with an excess (e.g., 3 times that necessary for neutralisation) of Na₂CO₃ or other alkali, and, if desired, with a minor proportion of a sol. oil, to form a detergent liquid, or solid by evaporation. B. M. V.

Heat-treatment of oleaginous materials of vegetable or animal origin. PHYSICAL CHEMISTRY RES.

Co. (B.P. 424,847, 1.9.33. Fr., 9.9.32 and 11.4.33).—Oleaginous materials such as groundnuts in the shell are distilled at 400–500° in a (moist) alkaline medium (*e.g.*, NaOH, Na₂CO₃) in presence of substances such as the Ca or Na salts of fatty acids which increase the yield of combustible oil, and with or without a catalyst such as Fe oxide and/or Fe filings. Steam may be injected during distillation. E. L.

Treatment of fats to produce fatty acids. J. R. MOORE (Assee.) and E. K. WALLACE (U.S.P. 1,967,319, 24.7.34. Appl., 9.11.32).—The fat (*e.g.*, 100 pts.) is dissolved in a H₂O-miscible solvent [*e.g.*, COMe₂ (400 pts.), COMeEt, Cellosolve], a compatible amount of H₂O (*e.g.*, 15 pts.) and mineral acid (H₂SO₄, 2 pts.) as catalyst are added, and the whole is heated at 150–160° under pressure (about 200 lb./sq. in.) in order to effect hydrolysis of the fat (*e.g.*, to the extent of about 75% in 15 min.). On distilling off the solvent, the glycerol liquor separates from the partly hydrolysed fat, which can be subjected to further hydrolysis. E. L.

Refining of vegetable and animal oils and fats. W. GENSECKE, Assr. to AMER. LURGI CORP. (U.S.P. 1,968,252, 31.7.34. Appl., 9.1.33. Ger., 25.11.32).—Pre-refining and deacidification are effected in one operation. Mucins, phosphatides, etc. are pptd. by agitating the crude oil (at about 30°) with an aq. saline electrolyte (*e.g.*, a saturated solution of MgSO₄ or Na₂SO₄) containing mineral acid (H₂SO₄); without separating the ppt., the excess H₂SO₄ and free fatty acids are neutralised with alkali and the purified oil is then settled and separated from the total ppt. obtained from both stages of the treatment. E. L.

Foam prevention.—See I. Gear lubricant.—See II. Alkylsulphonic acids.—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Paints for air-defence apparatus. P. BAUR (Farben-Ztg., 1935, 40, 161–162).—The nature and action of destructive chemical agencies likely to arise from aerial attack etc. are detailed and the need for special paints on defensive (*e.g.*, fire-fighting, anti-poison gas, respiratory) devices is stressed. Paints based on chlorinated rubber—preferably admixed with rubber—are pre-eminently suitable in this connexion. Straight PhOH-CH₂O varnishes are also recommended, but the need for stoving limits their use to small articles.

S. S. W.

Pigment or "adulterated pigment" for oil enamel manufacture. G. ZERR (Farben-Ztg., 1935, 40, 159–160).—The apparent advantages to the paint manufacturer claimed for the practice of buying "pure" pigments to be "let down" in the process of paint manufacture, rather than buying already-extended pigments, are shown to be based on faulty economics and failure to realise the practical difficulties involved.

S. S. W.

Livering of printing inks. H. J. WOLFE (Amer. Ink Maker, 1934, 12, No. 8, 13–14, 23).—The rate of livering (I) was increased by almost any org. or inorg. acid, sulphanic acid being an exception. High-boiling ethers and esters had little effect. (I) was greatly accelerated by traces of H₂O, and was retarded by

Ca(OH)₂, mineral oil, petrolatum, Venice turpentine, and low-acid drying oils. CH. ABS. (e)

Action of nitrocellulose solutions on constructional materials [e.g., metals, rubber]. S. SKLJARENKO and A. PAKSCHVER [with O. GELIKONOVA] (Synth. Appl. Fin., 1935, 5, 264–267, 270).—The ability of nitrocellulose (I) in EtOH-Et₂O or EtOH-COMe₂ to attack corrodible metals is attributed to free acid remaining in the (I), for the solvents are inert and the (I) undergoes no change, and corrosion is inhibited in complete absence of H₂O. Acidified solvent mixtures set up more rapid corrosion than solutions of (I), probably because (I) hinders diffusion of material in solution and forms skins on the metal surface. Ebonite and rubber products are swelled by the solvents.

G. H. C.

Preparation of artificial leather from polymerised oils. A. S. KRYUKOVA (Ovla. Tekh. Kozh. Proi., 1932, No. 10, 29–31).—Vegetable oils were polymerised with rosin, with or without Mn, Co, and Zn linoleates and resinates as catalysts. The product (I) resembled rubber in its plastic properties, but could not be vulcanised. Cardboard impregnated with (I) was H₂O-resistant and elastic. Boiled (I) improved the properties of viscose solution. (I) was used as a binder in preparing a leather substitute. CH. ABS. (e)

Isolation of pure lac resin. L. C. VERMAN and R. BHATTACHARYA (London Shellac Res. Bur., Tech. Paper No. 1, Dec., 1934, 21 pp.).—Pure lac resin is the Et₂O-insol. component (I) of shellac (S); the Et₂O-sol. component (II) and wax are responsible for the low H₂O-resistance, slow thermo-hardening, and other drawbacks of S. Since Et₂O cannot well be used for large-scale extractions, other methods have been investigated. The distribution of total (I) and wax between (a) benzol, toluol, xylol, solvent naphtha, and C₂Cl₄, and (b) the residual resin after 30-min. agitation at the b.p. of each solvent is tabulated. These liquids have selective action on (II) and wax; toluol gave the most consistent results. The use of EtOH solutions of S instead of the solid has the disadvantage that, as EtOH is to some extent miscible with the solvents, the extraction is less efficient. (I) can be recovered from the EtOH solution either by evaporation or pptn. with H₂O, but in both cases repeated treatment is necessary. The wax and (II) were removed together from solid S by distillation in a mol. still and with steam in high vac., but the residual (I) had polymerised during the heating. Electrophoresis of EtOH solutions also failed to separate (I) and (II). The softening point, m.p., acid, I, and sap. vals. of (I) after repeated extractions with Et₂O and toluol are tabulated. S. M.

Resins as colloids. R. HOUWINK (Brit. Plast. Year Book, 1935, 51–60).—Colloidal considerations are applied to the mol. structure of resins. Urea resins (heterogels) are given poly-ring structures—each ring 8-membered, having alternating C and N atoms. Isogels, under-cooled non-hardening [natural (I) and synthetic (II)] and hardening (III) resins, show two changes in physical properties with change of temp., and the range over which this occurs is about 26° for (I) and (II) (?), but much greater for (III). It is stated that (III) possess

network mol. structures, diagrammatically represented, which increase with progressive polymerisation. This suggestion is correlated with elastic recovery under a variety of conditions, as well as with other physical properties. Their moduli of elasticity increase as the "C stage" is approached (figures given for cresol- CH_2O and shellac resins). E. L. H.

Bearings.—See I. TiO_2 .—See VII. **Chlorinated rubber [films].**—See XIV. **Ti salts as pigments.**
Finishing of leather.—See XV.

See also A., Apr., 472, **Addition of carboxylic acids to vinylacetylene.** 485, **Guaicum resin.**

PATENTS.

Paint vehicle for flaked pigments. H. H. HOPKINS and J. RICHARDSON, JUN., Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,936, 24.7.34. Appl., 28.1.31).— $1\frac{1}{2}$ – $2\frac{1}{2}$ lb. of a flaked pigment, e.g., Al, is suspended in 1 gal. of a vehicle, of d approx. 0.90 and η 10–20 poises, comprising 100 pts. by wt. of a polyhydric alcohol-polybasic acid resin, e.g., glycerolphthalic anhydride, in 90.3–107.2 pts. by wt. of volatile solvent, driers being incorporated. S. S. W.

Coating composition. W. E. LAWSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,955, 24.7.34. Appl., 5.9.30).—Mixtures of a cellulose derivative, e.g., the nitrate, a resinous polybasic acid ester of an aryl or alkyl ether of a polyhydric alcohol ($< 3 \text{ OH}$), e.g., monoethylin phthalate, a softener, and a solvent are claimed. S. S. W.

Manufacture of resinous condensation products. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 424,076, 14.10.33).—Colourless, transparent resins are obtained by condensation of poly- $\text{CO}\cdot\text{NH}_2$ - or $\text{CS}\cdot\text{NH}_2$ -derivatives of polyamines with CH_2O or substances yielding it under the conditions of reaction. For manufacture of moulding powders preliminary condensation is carried out at 80–100°; these intermediate products are useful for impregnating textiles for production of non-crease effects. Examples of starting materials are: $(\text{NH}\cdot\text{CO}\cdot\text{NH}_2)_2$, $(\text{CH}_2\cdot\text{NH}\cdot\text{CO}\cdot\text{NH}_2)_2$, $(\text{CH}_2\cdot\text{NH}\cdot\text{CS}\cdot\text{NH}_2)_2$, and $\text{CH}_2[(\text{CH}_2)_3\cdot\text{NH}\cdot\text{CO}\cdot\text{NH}_2]_2$. H. A. P.

[Plastic] butylene derivatives.—See III. **Beater furnish.**—See V. **Polishing composition.** **Shellac-bonded abrasive.**—See VIII. **Adhesive.**—See XV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Manganese salts in plantation rubber. G. A. SACKETT (Ind. Eng. Chem., 1935, 27, 172–176).—Possibility of contamination of rubber with Mn in any form should be carefully avoided. The presence of Mn, e.g., 0.02%, may not impair the appearance of the raw rubber, but it leads, after vulcanisation, to reduced resistance to rupture, extension, and ageing, especially in a "pure rubber" product containing an org. accelerator. An antioxidant such as $\beta\text{-C}_{10}\text{H}_7\text{-NHPh}$ improves the age-resistance, but has no effect on the original tensile strength. In a rubber mixture of "tread quality," Mn does not affect the flexing life, but increases considerably the abrasion loss. D. F. T.

Plastic and elastic phenomena in rubber. A. VAN ROSSEM (India-Rubber J., 1935, 89, 291–294).—A review.

X-Ray analysis of caoutchouc and rubber. L. S. FRUMKIN and I. D. GONTSCHAROV (Zavod. Lab., 1934, 3, 1112–1114).—The application of X-ray analysis to the control of vulcanisation is discussed. R. T.

Hard rubber (ebonite). A. R. KEMP and F. S. MALM (Ind. Eng. Chem., 1935, 27, 141–146).—A résumé is given of the literature on ebonite together with details as to its vulcanisation, compounding, and properties (chemical, mechanical, and electrical). D. F. T.

Chlorinated rubber. M. PIOLUNKOVSKAYA (J. Rubber Ind. U.S.S.R., 1934, 11, 142–149).—A 5% solution of light crêpe in liquid polychlorides of C_6H_6 (I) was chlorinated, and then heated at 80–85° for several hr. to remove Cl_2 and HCl . This solution when applied on a rubber plate gave a thin shiny film the elasticity of which was increased by $(\text{C}_6\text{H}_4\text{Me})_3\text{PO}_4$ (II). Such films containing S and accelerators retained their elasticity after 6 months. A lacquer containing chlorinated rubber, S, (I), tetralin, nigrosine dissolved in $\text{C}_2\text{H}_4\text{Cl}_2$, and (II) gave films which were acid- and alkali-proof and insol. in boiling C_6H_6 and mineral oils. CH. ABS. (e)

Action of nitrocellulose solutions on rubber.—See XIII. **Citrus products.**—See XIX.

PATENTS.

Production of rubber-like dispersion. H. L. LEVIN, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,968,459, 31.7.34. Appl., 27.8.31).—Plasticised rubber in a kneading machine is worked into an aq. paste of an attriting agent (clay, whiting) until the rubber has been dispersed to the desired degree of fineness; the thick mass is then diluted with H_2O containing a peptising material, e.g., soap, or, if the rubber comprises a saponifiable softening agent, containing an alkali. Dispersions so produced show superior stability. D. F. T.

Production of hard rubber dust. F. D. CHITTENDEN, Assr. to REVERE RUBBER Co. (U.S.P. 1,967,809, 24.7.34. Appl., 15.12.31).—An intimate mixture of rubber (I) (e.g., 100 pts.), S (30–100 pts.), and H_2O is heated under pressure ($< 500 \text{ lb./sq. in.}$) at a temp. and for a time sufficient to produce hard rubber (vulcanite); the pressure is then suddenly released. The original mixture of (I) and H_2O may be in the form of an aq. dispersion of the (I). D. F. T.

Heat-insulating material.—See I. **Dyes for rubber.**—See IV.

XV.—LEATHER; GLUE.

Protecting air-dried raw hides against attack by moth and dermestids. L. I. EVREINOVA (Izvest. Tsent. Nauch.-Issl. Inst. Kozh. Prom., 1932, No. 10–11, 39–40).—Moth-infested hides are sprayed with $p\text{-C}_6\text{H}_4\text{Cl}_2$. Hides infested with dermestids are sprayed with a 1:1 mixture of kerosene and turpentine. CH. ABS. (e)

[Treatment of hides with] emulsion mixtures with alkali-petroleum sludge, petroleum sulphonic

acids, etc. A. A. POHELIN and M. M. KHARITONOVA (Izvest. Tzent. Nauch.-Issl. Inst. Kozh. Prom., 1932, No. 5, 28—35).—Hides were fat-liquored with alkali-petroleum sludge (I), petroleum sulphonic acids (II), sulphonated train oil (III), and alkali-petroleum soap (IV), alone, or mixed with spindle oil (V). (I) can substitute animal fats. Emulsions for chrome leather were prepared from (II), (III), (IV), and (V).

CH. ABS. (e)

Effect of pretreatment of raw hides on fixation of tannin. G. A. ARBUZOV (Izvest. Tzent. Nauch.-Issl. Inst. Kozh. Prom., 1932, No. 10—11, 40—56).—Pretreatment of limed hide powder with 0.1*N*-H₂SO₄ and 0.1*N*-NaOH caused a max. swelling at *p*_H 4.2 and a min. at *p*_H 5.75. CaO and 0.1*N*-H₂SO₄ did not affect the amount of tannides fixed in neutral solution. Treatment with 0.1*N*-NaOH, followed by neutralisation, increased the fixation. These results are discussed.

CH. ABS. (e)

Regeneration of moist salt used for pickling [of hides]. S. BELKIN, I. KHOTINSKI, and M. BOYARSKI (Kozh. Obuvn. Prom., 1933, 12, 179—181).—A steam treatment of the saturated solution of the NaCl is described.

CH. ABS. (e)

Tanning materials. P. GILLOT and Y. TUCAKOV (Bull. Sci. Pharmacol., 1934, 41, 257—264; Chem. Zentr., 1934, ii, 890).—Tannins were isolated from various plants and the catechin constituents determined by oxidation. Tanning "reds" are formed, not by oxidation, but by dehydration or condensation of the tannins.

A. G. P.

Preparation of tanning substances under high pressure. P. YAKIMOV and R. TATARSKAYA (Kozh. Obuvn. Prom. S.S.S.R., 1934, 13, 345—349).—Tanning substances were obtained from humic acids from peat by direct oxidation with air at 20 atm. and 120°, or with O₂-enriched air at 10 atm. The peat tanning substances are irreversibly combined with the leather. The optimum *p*_H was > 4.5. The product has a pitch-black colour.

CH. ABS. (e)

Action of micro-organisms on vegetable tanning materials. I. Production of lactic acid from oak-bark extract. I. H. BLANK [with R. PARTRIDGE and L. SCHREIBER] (J. Amer. Leather Chem. Assoc., 1935, 30, 69—90).—The rate of production of lactic acid (*A*) diminishes as the tannin content of the liquors (*L*) is increased. Tail-*L* contain both *A*-forming (I) and *A*-destroying bacilli (II), and consequently the *A*-time curve of *L* inoculated from a tail-*L* exhibits a max. (I) are unaffected but (II) are retarded by absence of atm. O₂, and (I) are stimulated by the addition of glucose to *L*.

D. W.

Qualitative analysis of tanning substances. Z. RUDNITZKI (Ovla. Tekhn. Tozh. Proiz., 1932, No. 8, 34—36).—Characteristic colour reactions are described for oak bark, mimosa, willow, and pine on addition of a small amount of sulphite or bisulphite to the tanning solution, followed by a few drops of aq. K₂Cr₂O₇.

CH. ABS. (e)

Determination of insoluble matter in tanning solutions by the centrifuging method. Z. RUDNITZKI

(Kozh.-Obuvn. Prom. S.S.S.R., 1934, 13, 408).—A modified method of calculating results is described.

CH. ABS. (e)

Comparative method of determination of tannides by azotisation with diazotised amines. I. G. MASLOV and O. I. PAKHOMOVA (Izvest. Tzent. Nauch.-Issl. Inst. Kozh. Prom., 1932, No. 5, 18—25).—To 10 c.c. of the filtered and diluted solution are added 15 c.c. of 30% NaOAc and 30 c.c. of a titrated diazo solution (I). After keeping for 40—45 min., excess (I) is titrated with β-C₁₀H₇-OH solution. Details of the solutions used are recorded.

CH. ABS. (e)

Determination of tannides by azotisation with diazotised amines, and determination of sulphite-cellulose tannides in mixtures with vegetable tannides. N. G. MENDLINA (Izvest. Tzent. Nauch.-Issl. Inst. Kozh. Prom., 1932, No. 8, 41—46; No. 9, 28—43).—The azotisation method is suitable for determining tannides in willow, pine bark, and oak pulp, and for sulphite-cellulose extracts. The individual tanning components in mixtures may also be determined. Details are given.

CH. ABS. (e)

Influence of *p*_H during tanning and of the concentration on the fixation of tannides from sulphite-cellulose extracts. T. I. KOROTEEV (Ovla. Tekh. Kozh. Proiz., 1932, No. 10, 35—41).—The highest fixation of sulphite-cellulose tannides for all concns. occurred at *p*_H 2.

CH. ABS. (e)

Salting-out vat solutions of domestic tannides. O. Y. BORODINA and N. P. TARASENKO (Izvest. Tzent. Nauch.-Issl. Inst. Kozh. Prom., 1932, No. 5, 3—15).—Tannides are classified into 3 fractions by the amount salted-out by varying amounts of NaCl.

CH. ABS. (e)

Interaction of iron and chromium salts with collagen in the combined chromium-iron tanning. A. S. KOSTENKO and S. B. SHIMANOVICH (Tzent. Nauch.-Issl. Inst. Kozh. Prom. Sborn. Rabot., 1934, No. 2, 67—76).—In combined tanning (I) with Fe and Cr salts, the former are adsorbed by and combined with collagen > the latter, due to their greater hydrolysis. In the final tanning of hide powder with Cr the adsorption of Cr is very low if the pretreatment was with Fe salts. The H₂O-stability of products of (I) is low. It is greatly increased by separate treatment.

CH. ABS. (e)

Chemistry of the "first bath" of the two-bath chrome-tanning process. R. F. INNES (J. Soc. Leather Trades' Chem., 1935, 19, 55—72).—The plumping effect of HCl (*A*) on pelt (*P*) is suppressed by the presence of H₂CrO₄ (*C*). The absorption of *C* by *P* ∝ [*C*]. *A* is partly displaced from *P*-*A* by treatment with *C*, but *C* is removed from *P*-*C* only by considerable excess of *A*. The % Cr in *P* is increased by increasing the % *A* in the first bath from 3% to 4.5% per 6% of Na₂Cr₂O₇, but is diminished by also adding 2% of NaCl. *C* absorbed by *P* from aq. *C* is not readily removed by H₂O. *C*-*P* dries out leathery if it contains a min. % of *C* and has been subjected to heavy drumming as in works-scale production, but such conditions have not been simulated in the laboratory.

D. W.

Application of titanium salts as leather pigments. B. I. TZUKERMAN (Ovla. Tekh. Kozh. Proiz.,

1932, No. 8, 28—32).—Ti salts produce with tannides a light brownish-yellow shade of great depth and uniformity. CH. ABS. (e)

Apparatus for volumetric determination of the water intake of leather. A. MIEKELEY and G. SCHUCK (Ledertechn. Rundsch., 1934, 26, 1—6; Chem. Zentr., 1934, ii, 388).—Ratio of vals. obtained for different sides of various sections of leather are examined. The Bergmann-Miekeley method (B., 1932, 1045) is simplified. A. G. P.

Deterioration of vegetable-tanned leather on storage. VI. Effect of methods of finishing and tanning on absorption of sulphur dioxide from the atmosphere. R. F. INNES (J. Soc. Leather Trades' Chem., 1935, 19, 72—78; cf. B., 1934, 160).—The absorption of acid from a polluted atm. by leather (*L*) and consequent deterioration of *L* was prevented by nitrocellulose and shellac finishes, respectively, but not by casein, albumin, or wax finishes. A large amount of acid was absorbed by unfinished Cr-*L* but not by unfinished Al-*L*. The absorbed acid penetrated well below the grain layer. D. W.

Influence of magnesium sulphate on deterioration of vegetable-tanned leather by sulphuric acid. R. C. BOWKER, E. L. WALLACE, and J. R. KANAGY (J. Amer. Leather Chem. Assoc., 1935, 30, 91—104; B., 1932, 400).—Chestnut- and quebracho-tanned leathers (*L*) were, respectively, deteriorated by H₂SO₄ when their *p*_H was > 3, and their *p*_H was increased by the addition of MgSO₄ to them. *L* containing MgSO₄ deteriorated less in 2 years than did comparable *L* containing the same amount of H₂SO₄ and no MgSO₄. D. W.

Preparing velour from rejected pig skins. V. A. GOLDSHTEIN and B. I. TZUKERMAN (Tzent. Nauch. Issl. Inst. Kozh. Prom. Sborn. Rabot, 1934, No. 3, 36—37).—The processes of soaking, treatment with Na₂S and CaO, softeners, bisulphite, and pickling are described. The product is tanned with chrome extract (Cr₂O₃ 1.8, H₂O 80%; basicity 45). The finishing and dyeing are described. CH. ABS. (e)

Hydration of gelatin and collagen. E. Y. VINETZKAJA (Tzent. Nauch. Issl. Inst. Kozh. Prom. Sborn. Rabot, 1934, No. 2, 77—91).—The heat of hydration of collagen is > that of gelatin (I) and the process is not reversible, as it is for (I) CH. ABS. (e)

Dyeing leather. Drum-dyeing.—See VI. Chromal.—See VII.

PATENTS.

Formation of small-particle products from gelatinising substances. V. PANTENBURG, ASSR. to A.-G. F. CHEM. PROD. VORM. H. SCHEIDEMANDEL (U.S.P. 1,965,509, 3.7.34. Appl., 12.5.32. Ger., 27.1.28).—The liquid is placed in spaced drops upon a drying conveyor at temp. > that of gelatinisation but < that of violent evolution of steam, and is cooled quickly when just short of the anhyd. state. B. M. V.

Cementing composition. [Adhesive.] A. G. HOVEY, ASSR. to GEN. ELECTRIC Co. (U.S.P. 1,925,903, 5.9.33. Appl., 3.9.31).—Linseed oil fatty acids 11.82, tung oil 16.35, and rosin 22.53 are heated rapidly in an

Al vessel to 280°, cooled to 260—265°, and treated with *o*-C₆H₄(CO)₂O 32.68, glycerin 16.35, and C₂H₄(OH)₂ 4.22%, the mixture being kept at 200—220° until the resin (*R*) becomes clear and then heated at 250° until a sample solidifies in 40 sec. at 200°. *R* (11) is then dissolved in COMe₂ (11) and the solution mixed with Bu₂ phthalate (5) and a 35% solution (73%) of 0.5-sec. nitrocellulose in a 1:1 mixture of EtOAc and PhMe to form an adhesive for joining Al foil to leather, paper, or Al, or felt to unglazed porcelain. A. R. P.

XVI.—AGRICULTURE.

Soils of the Teindland State Forest. A. MUIR (Forestry, 1934, 8, 25—55).—Three groups of soils are distinguished. Upper horizons are strongly leached and very acid. Acidity decreases with depth. Exchangeable Ca and Mg are comparatively high in A₀ horizons, decreasing to low and approx. const. vals. in lower horizons. CH. ABS. (p)

[Soil] chemistry [report]. F. E. HANCE (Proc. 53rd Ann. Meet. Hawaiian Sugar Planters' Assoc., 1933, 46—63).—"Trace" elements in soils, fertilisers, irrigation H₂O, etc. are determined spectrographically. Soils producing diseased cane contained subnormal amounts of Sr, Cr, and Zn. High soil reserves of Mn and Cr were associated with low incidence of brown-stripe disease. Addition of Cu to soils containing molasses stimulates oxidation processes which subsequently cause dissolution of K from minerals. To minimise leaching of nutrients, fertiliser mixtures are briquetted with plaster of Paris and coated with paraffin. CH. ABS. (p)

Soil crusts in cotton fields. E. S. SUSHKO (Lenin Acad. Agric. Sci. Proc. Leningrad Ged. Sci. Inst. Fert., 1934, No. 34, 17—26).—In soils poor in org. matter surface crusts are formed by cementation with CaCO₃. Surface action of Na salts induces solonetz formation, which also produces crusts. Crusting is prevented by chemical treatments which decrease dispersion, e.g., application of CaSO₄ or org. matter. CH. ABS. (p)

Takuir (takyr): genesis, chemical properties, and method of improving. S. Y. SUSHKO (Lenin Acad. Agric. Sci. Proc. Leningrad Lab. Ged. Sci. Inst. Fert., 1934, No. 34, 37—56).—Takuir (saline soils showing cracked surface) is formed in solontschak-solonetz processes. The Cl' and SO₄' contents increase with depth. In solontschak, with Na salts the solonetzic (I) takuir is formed, but with Mg and Ca salts the (I) properties do not appear and the surface plates become encrusted through cementation with CaCO₃. CH. ABS. (p)

Importance of technique and soil science in German water economy. O. SCHOENEFELDT and F. ALTEN (Angew. Chem., 1935, 48, 101—110).—The influence of cultural practice on the conservation of soil-H₂O is discussed in relation to rainfall. Irrigation is rarely necessary in Germany. A. G. P.

Arsenic toxicity in soils. W. B. ALBERT (Ann. Rept. S. Carolina Agric. Exp. Sta., 1933, 44—45).—Applications of Fe salts reduced As toxicity, but effects were not consistent. As in soil is slowly fixed in insol. forms. Sol. As in soils is not altered by autoclaving or

drying at 105°. The amount of soil As diffusing through collodion sacs was greater at 40—60° than at 27°.

CH. ABS. (p)

Seasonal variation in oxidation-reduction potential of some orchard soils. L. P. BATJER (Proc. Amer. Soc. Hort. Sci., 1933, 30, 98—101).—The oxidation-reduction potential increases as the season advances. Imperfect drainage delays the change.

CH. ABS. (p)

Methods for determining active acidity in soils. I. Theory. B. P. NIKOLSKI. II. Glass electrode. B. P. NIKOLSKI and K. S. EYSTROPEV (Lenin Acad. Sci. Inst. Proc. Leningrad Lab., 1930, No. 12, 51—56, 57—73).—I. Colorimetric methods and the use of the H, Sb, glass, and quinhydrone electrodes are discussed.

II. Glass electrodes give best results. Quinhydrone should be added to the soil sample as a paste and further additions should not affect the reading. The Sb electrode gives poorer results in salt- than in H₂O-extracts.

CH. ABS. (p)

Antimony electrode for determining hydrogen-ion concentration [in soils]. B. P. NIKOLSKI and O. N. GRIGOROV (Lenin Acad. Agric. Sci. Inst. Proc. Leningrad Lab., 1930, No. 12, 41—49).—The Sb electrode compared favourably with the glass electrode, and in peat soils gave better results than the quinhydrone electrode. Vals. for coarse suspensions were high, and centrifuging is suggested. Fresh Fe(OH)₃ sol did not affect results. High dilution (1 in 25 or 50) is preferable for peats.

CH. ABS. (p)

Exchange reactions in carbonate soils salinised with chlorides and sulphates. I. E. TZILIDAS and A. E. IVANOV (Lenin Acad. Agric. Sci. Proc. Leningrad Lab. Ged. Sci. Inst. Fert., 1934, No. 34, 26—36).—Carbonate soils salinised with Na₂SO₄ (I) accumulate gypsum. The potential degree of solonetzisation is directly \propto the amount and solubility of the Ca salts present. Solontschak is more easily converted into solonetz by NaCl (II) than by (I). Addition of CaSO₄ (III) to a (II)-solontschak decreases alkalinity and dispersion $>$ does an equiv. of CaCl₂. In the leaching of (II)-solontschak addition of (III) prevents the formation of solonetz.

CH. ABS. (p)

Base-exchange and related properties of the colloids of soils from the erosion experimental stations. G. S. SLATER and H. G. BYERS (U.S. Dept. Agric. Tech. Bull., 1934, No. 461, 19 pp.).—Removal of SiO₂, Al₂O₃, and Fe₂O₃ from soil colloids by 0.05N-HCl is in proportions very different from those initially present. Extracts of lateritic soils contain practically no Fe. Free sol. SiO₂ probably occurs in surface horizons of grassland soils. A fairly definite relationship exists between the exchangeable base content, the exchange capacity (I), and the SiO₂ : sesquioxide ratio of the complex. The (I) of org. colloids is much $>$ that of mineral colloids. After removal of org. matter the (I) of various horizons of a profile shows great uniformity.

A. G. P.

Base exchange in Iowa soils. P. E. BROWN and R. H. WALKER (Rept. Agric. Res., Iowa Agric. Exp. Sta., 1932, 86—87).—Parker's Ba(OAc)₂-NH₄Cl method

and Schollenberger's NH₄OAc method give comparable results. Ground limestone (100-mesh) produced similar effects to double the amount of quarry-run limestone.

CH. ABS. (p)

Influence of exchangeable magnesium on the dispersion properties of soils. S. Y. SUSHKO and E. S. SUSHKO (Lenin Acad. Agric. Sci. Proc. Leningrad Lab. Ged. Sci. Inst. Fert., 1934, No. 34, 5—13).—The dispersion and swelling of kaolin saturated with Ca, Mg, or Na increased in the order of bases named. The capacity for filtration of the preps. was in the order Ca 100, Mg 70, Na 1.

CH. ABS. (p)

Relation of exchangeable magnesium to the physical properties of soils. A. V. UVAROVA and M. I. KAMLOVA (Lenin Acad. Agric. Sci. Proc. Leningrad Lab. Ged. Sci. Inst. Fert., 1934, No. 34, 13—17).—Results of saturating solonetz soils with Ca, Mg, and Na indicate that Mg in the exchangeable form does not impart solonetz properties to soils.

CH. ABS. (p)

[Agricultural] report of [Sudan] Government chemist, 1933. B. W. WHITEFIELD (Publ. Chem. Sect. Wellcome Trop. Res. Lab., No. 67, 16 pp.).—Rates of formation of NO₂' and NO₃' in soil from (NH₄)₂SO₄ (I) increase with temp in the range 25—40°. Transformation of NO₃' into residual N (II) [total N, less NO₂'-, NO₃'-, and free N and protein-NH₂ (III)] is small at 25°, but takes place almost as rapidly as nitrification at 40°. The proportion of (III) is practically unchanged. Addition of cellulose favours formation of (II). Water-logging of soil inhibited nitrification of (I). Gluten when added to soil behaved partly as (III) and partly as (II). Ammonification of the (III) fraction was rapid (10 days), but NO₃' formation was delayed (3 weeks).

CH. ABS. (p)

Nitrate levels of soil as influenced by different ratios of nitrate and organic materials. E. W. McELWEE (Ann. Rept. Alabama Agric. Exp. Sta., 1932, 26—27).—Depressions of soil NO₃' resulting from application of varying amounts of different plant materials are recorded. The duration of the depression increased with the amount of material applied. The rate and amount of NO₃' accumulation following the period of depression increased with the N content of the org. matter.

CH. ABS. (p)

Fixation of phosphates by soil colloids. G. D. SCARSETH (Ann. Rept. Alabama Agric. Exp. Sta., 1932, 16—18).—The availability of native P in soil colloids (I) was directly \propto the SiO₂ : sesquioxide ratio (II), and was higher in (I) with excess of Ca(OH)₂ than in those unsaturated with Ca. The PO₄'-fixation capacity of (I) was inversely \propto (II). Recovery of added PO₄' was higher in the more acid colloids.

CH. ABS. (p)

Chicago soil - nutrient - temperature tank. G. K. K. LINK (Science, 1935, 81, 204—207). L. S. T.

Determination of the nutrient content [of soils] in field and Mitscherlich pot-culture experiments. F. SCHEFFER (Kühn-Arch., 1933, 38, 141—163; Chem. Zentr., 1934, i, 3788).—Results of Mitscherlich (M) tests for P and K did not agree with manurial trials. Experiments with sand-soil mixtures lead to unduly high vals. The relationship between crop yield and nutrient

supply is expressed more satisfactorily as a hyperbolic curve (Vageler) than as a logarithmic function (*M*). The response of plants to native supplies of P and K differs from that to artificial fertilisers.

A. G. P.

Anhydrous ammonia as a fertiliser. D. D. WAYNICK (Calif. Citrograph, 1934, 19, 295, 310—311).—Leachates from soils treated with aq. NH_3 (I) and aq. $(\text{NH}_4)_2\text{SO}_4$ (II) are compared. Leaching of Ca, Mg, and K was much heavier in the case of (II), and that of PO_4^{3-} in the case of (I). (I) was nitrified more rapidly than (II). Irrigation with H_2O containing NH_3 caused no injury to citrus trees.

CH. ABS. (p)

Thomas slag and progress in calcium phosphate fertilisers. H. LUCKMANN (Chem.-Ztg., 1935, 59, 265—267).—A review.

Influence of manuring on the alkalinity of plant ash. L. TSCHUMI and J. STALÉ (Landw. Jahrb. Schweiz, 1934, 48, 34—48; Chem. Zentr., 1934, ii, 830).—Slow-acting P fertilisers, used in conjunction with K, modified the alkaline-earth content of the ash without change in their relative proportions of base to P. Sol. P fertilisers produced rapid changes in the base : P ratio. The action of K was irregular.

A. G. P.

Relationship between mineral content of soil and of plants grown on it. J. H. MITCHELL and W. T. MATTISON (Ann. Rept. S. Carolina Agric. Exp. Sta., 1933, 51—52).—Data for a no. of crops are given.

CH. ABS. (p)

Effect of soil conditions on growth and composition of certain vegetable crops as influenced by soil reaction. M. M. PARKER, J. B. HESTER, and R. L. CAROLUS (Proc. Amer. Soc. Hort. Sci., 1933, 30, 452—457).—Analyses of cabbage, peas, and lima beans are given for soils of p_{H} 4.4—7.0. At low p_{H} plants tended to accumulate N. Max. Ca contents were found at p_{H} 5.5—6.2 and max. P at 5.9—6.4.

CH. ABS. (p)

Effects of dolomitic limestone on yields and calcium- and magnesium-deficiency symptoms in crops. H. P. COOPER and R. W. WALLACE (Ann. Rept. S. Carolina Agric. Exp. Sta., 1933, 149—152).—Application of limestone to acid soils reduced cotton yields in the first year unless K was added.

CH. ABS. (p)

Nodule numbers on legumes as affected by manuring. J. F. DUGGAR (Ann. Rept. Alabama Agric. Exp. Sta., 1932, 28—29).—Placement of fertiliser in contact with seeds of peanuts reduced nodulation, especially in the early stages of growth. The dry wt. of nuts produced was closely related to the no. of nodules in the later growth period. Superphosphate and S stimulated nodulation in lespedeza, but $\text{Ca}(\text{OH})_2$ and basic slag had no definite effect.

CH. ABS. (p)

Effect of fertiliser treatment on yield, grade, and quality of Irish potatoes. L. M. WARE (Ann. Rept. Alabama Agric. Exp. Sta., 1931, 53).—No marked differences in composition or keeping quality resulted from high or low applications of N, P, or K. A high shrinkage loss is associated with use of P and K, but not with N fertilisers.

CH. ABS. (p)

Effects of nitrate fertilisation on apple fruits. L. VERNER (Proc. Amer. Soc. Hort. Sci., 1933, 30,

32—36).—Treatment with NaNO_3 increased the N content of trees, but did not affect respiration or transpiration rate.

CH. ABS. (p)

Fertiliser trial with Bartlett pears. E. L. PROEBSTING (Proc. Amer. Soc. Hort. Sci., 1933, 30, 55—57).—Leaves of trees receiving N tend to have higher N and lower P contents than those of trees receiving only P or K. The ratio P : N varies considerably, except on trees receiving N.

CH. ABS. (p)

Influence of different fertiliser treatments and seasonal conditions on the characteristics, composition, and properties of strawberries. L. M. WARE (Ann. Rept. Alabama Agric. Exp. Sta., 1932, 27).—Eating and storage qualities of strawberries were not sufficiently affected by fertiliser treatment to influence their market val. Fruit from K-treated plants had increased electrical conductivity, but size and sugar and total solid contents were unaffected. Rainfall affected fruit > did manuring.

CH. ABS. (p)

Reaction of the nutrient medium as affecting growth of strawberry plants. J. H. CLARK (Proc. Amer. Soc. Hort. Sci., 1933, 30, 283—287).—In sand cultures the optimum growth p_{H} for NO_3^- nutrients was 4.6 and for NH_4^+ nutrients 6.4.

CH. ABS. (p)

Effects of special practices influencing nutritional balance on yield, texture, and time of maturity of grapefruit. A. F. KINNISON and A. H. FINCH (Proc. Amer. Soc. Hort. Sci., 1933, 30, 95—97).—Fruit from trees heavily treated with NO_3^- contained more acid and total solids than the controls. The sugar : acid ratio was low.

CH. ABS. (p)

Relation of nitrogen absorption to food storage and growth in pecans. G. H. BLACKMON and A. F. CAMP (Ann. Rept. Florida Agric. Exp. Sta., 1932, 122—124).—In H_2O cultures, pecan seedlings failed to grow when $(\text{NH}_4)_2\text{SO}_4$ was substituted for KNO_3 in the medium. Addition of 0.5 p.p.m. of B caused renewed growth. With 4 p.p.m. symptoms of toxicity developed.

CH. ABS. (p)

Comparative trials of sugar-beet seed. I. Yield of roots, sugar content, and sugar yield. J. PÁZLER [with A. RŮŽIČKA, J. DĚDEK, J. VAŠÁRKO, and F. DOLÁK] (Z. Zuckerind. Czechoslov., 1935, 59, 209—231).—Data for trials in a no. of districts are recorded.

A. G. P.

Leaf diagnosis of tobacco : comparative effects of basic slag, superphosphate, and basic phosphate on the nitrogen-phosphorus-potassium equilibrium. H. LAGATU and L. MAUME (Compt. rend., 1935, 200, 502—504; cf. B., 1934, 595, 1026).—For each pair of leaves there is a distinct grouping of centres of gravity in the N-P-K trilinear diagram. Older leaves are relatively poorer in N and P and richer in K than younger leaves. The three forms of P examined are differentiated principally by their indirect influence on the N assimilation of leaves. Leaf diagnosis shows the mineral nutrition of tobacco and potato to be closely related and quite distinct from that of the vine.

A. G. P.

Eradication of nematodes in greenhouse soils by use of chemicals. L. H. JONES (Ann. Rept. Mass. Agric. Exp. Sta., 1933, 18).—When used with $\text{Ca}(\text{CN})_2$

o- was inferior to *p*-C₆H₄Cl₂ in toxicity and its injurious effects were more persistent. CH. ABS. (p)

Effect of sulphur dioxide fumigation on respiration of Emperor grapes. W. T. PENTZER, C. E. ASBURY, and K. C. HAMNER (Proc. Amer. Soc. Hort. Sci., 1933, 30, 258—250).—Fumigation with SO₂ reduced the respiration of grapes. CH. ABS. (p)

Iron sulphate and other materials for increasing the effectiveness of sulphur insecticides on citrus trees. R. L. MILLER, W. W. YOTHERS, and I. P. BASSETT (Proc. Florida State Hort. Soc., 1933, 52—55).—Addition of 0.5—2.0% of powdered glue or gum tragacanth markedly increased the adherence of S dusts to wet, but not dry, foliage. The efficiency of CaO-S sprays was not improved by additions of the above supplements or of gum acacia, albumin, or casein-CaO. Kaolin caused a slight and FeSO₄ (1 in 50) a marked beneficial effect. CH. ABS. (p)

Melanose and stem-end rots of citrus trees. W. A. KUNTZ and G. D. RUEHLE (Proc. Florida State Hort. Soc., 1933, 87—91).—Bordeaux mixture alone or in combination with 1% oil emulsion gave better control than S or Hg sprays. CH. ABS. (p)

Termites as a pest of citrus trees. W. L. THOMPSON (Proc. Florida State Hort. Soc., 1933, 84—87).—Paris-green, blown into galleries in the trunk, gave good control. Oranges and grapefruit from trees so treated showed reduced acidity. NaF gave promising results. CH. ABS. (p)

Sprays for scale insects and white flies (*Dialeurodes citri*, Ashm.) on citrus trees in Florida. W. W. YOTHERS and R. L. MILLER (Proc. Florida State Hort. Soc., 1933, 48—52).—Addition of 1 lb. of casein-CaO spreader to CaO-S solution (1:25—100) doubled the amount of S adhering to the foliage and quadrupled the toxicity to whitefly larvæ. CH. ABS. (p)

Amount of residual arsenic on leafy vegetable crops sprayed and dusted with arsenical insecticides. J. N. SAMSON (Philippine Agric., 1933, 22, 356—371).—Residue of Pb arsenate on cabbage was greater from dusts than from wet sprays. On other crops the reverse was the case. CH. ABS. (p)

Effect of lead arsenate insecticides on citrus fruits. R. H. MILLER, I. P. BASSETT, and W. W. YOTHERS (Proc. Florida State Hort. Soc., 1933, 57—63).—Compounds of As remained on sprayed trees for > 1 year. As was found in the bark, wood, blossom, and small green fruit of heavily sprayed trees, but only minute amounts occurred in fruit juice. CH. ABS. (p)

Toxicity [to caterpillars] of sodium fluoride and sodium silicofluoride. S. I. KORAB and I. P. SHAPOSHWIK (Nauk. Zapiski Tzuk. Prom., 1933, 10, 93—106).—NaF had a more rapid action than Na₂SiF₆. The toxicity of the solutions decreased after 3—5 days at 15°. CH. ABS. (p)

Reducing locusts and their control at Amatikulu. R. M. BECHARD (Proc. Ann. Congr. S. African Sugar Tech. Assoc., 1934, 42—46).—Spraying sugar cane with solution containing 0.5% of Na₃AsO₃ and 5.0% of molasses gave 100% kill, but caused withering. A prep. containing Ca arsenate, CaO, molasses, and

citronella oil showed high and persistent toxicity without cane injury. CH. ABS. (p)

Ovicidal action of winter washes, 1933. M. D. AUSTIN, S. G. JARY, and H. MARTIN (J. South-East Agric. Coll., Wye, 1934, No. 34, 114—135).—The ovicidal efficiency (I) against *Lygus pabulinus* was unrelated to the characteristics of petroleum oils (III) of paraffinic, asphaltic, naphthenic, or western bases in η ranges of 126—800 min. (Redwood I, at 70° F.) and unsulphonatable residues ranging from 60 to 100 vol.-%. The (I) of tar oil was improved by removal of tar acids and bases, but was < that of (II), probably as a result of differences in the nature of hydrocarbons present. Comparative effects of mixtures of (II) with strained anthracene oils are recorded. CH. ABS. (p)

Ammophos. Phosphorite and org. acids.—See VII. Tobacco.—See XX. Utilising agricultural wastes.—See XXIII.

See also A., Apr., 445, Peptisation analysis of soil colloids. 549, Sugar-cane ripening. Nutrient intake of plants. 552, Influence of H₃BO₃ on plants. Determining sol. ash in plant material. Absorption of Ge by plants. 553, Cu deficiency [of oats]. Action of V and of Cr⁺⁺⁺ and CrO₄[—] on cultivated plants.

PATENTS.

Agriculture. [Retaining moisture in fields.] A. L. CLAPP (U.S.P. 1,962,806, 12.6.34. Appl., 3.3.31).—A web that may be spread on tilth to permit passage of rain downwards, but prevent evaporation upwards, is composed of an aq. suspension of > 2% of fibres, e.g., unhydrated cellulose pulp; leather, and sawdust, with a proportion of asbestos if desired. B. M. V.

Fertiliser. F. W. GENZ, Assr. to VIRGINIA-CAROLINA CHEM. CORP. (U.S.P. 1,944,788, 23.1.34. Appl., 30.11.31).—CaO-impregnated stems of tobacco plants, obtained as a by-product in the manufacture of nicotine, are treated with dil. H₃PO₄ more than sufficient to form Ca(H₂PO₄)₂ and, if desired, with fertiliser salts, and the mixture is stored until at least part of the stems is converted into humus. A. R. P.

Insect repellent. C. R. CLEVELAND, Assr. to STANDARD OIL Co. (U.S.P. 1,963,955, 26.6.34. Appl., 5.1.32).—The repellent comprises aralkyl (CH₂Ph, C₆H₄Et) salicylate preferably in mineral oil solution and containing also pyrethrum extract. B. M. V.

XVII.—SUGARS; STARCHES; GUMS.

Solubility relationships of Trinidad sugar cane juices. L. S. BIRKETT (Internat. Sugar J., 1935, 37, 95—97).—The vals. of the saturation coeff. found for the Trinidad juices studied differ from those found by Thieme in Java. This is to be expected, since the relative proportions of reducing sugars and salts in the total non-sucrose would probably vary from place to place, owing to variations in climatic and soil conditions, and in cane variety, cultural treatment, etc. J. P. O.

Organic coefficient of raw beet sugar. A. BRUNELLI (Ind. Sacc. Ital., 1934, 27, 610—613; Internat. Sugar J., 1934, 37, 114).—The org. coeff. [org. non-sugar (N)/ash ratio] was const. for a given quality of beet juice

and a given method of purification. In two seasons vals. of 1.63 and 1.71 were given, different methods of purification having been used. In the first the ratio of total *N* of the raw sugar to total *N* of the thick-juice was $3.94/8.90 = 0.44$, and in the other $4.43/10.0 = 0.44$. These two ratios being identical, it is concluded that the *N* content of the raw sugar is exactly \propto the *N* content of the thick-juice, irrespective of the method of purification. It is claimed that this ratio affords the best criterion of the efficiency of juice purification.

J. P. O.

[Preparation of] cold water-soluble starch. S. SENGOKU (Rept. Imp. Ind. Res. Inst., Osaka, 1934, 15, No. 4, 13—15).—Attempts to prepare cold H_2O -sol. starch from potato starch are described. CH. ABS. (e)

Sugar beet. [Sugar-cane] soil chemistry. Locust control.—See XVI. $EtCO_2H$ and citric acid fermentation. Sugar in wine.—See XVIII. Fermentable sugars of wheat flour. Carbohydrates in French prunes. Protein from sugar-beet pulps. Honey.—See XIX.

See also A., Apr., 477, Prep. of cryst. *d*-mannose and of cryst. *d*-ribose. 478, Nitration of starch. 549, Sugar-cane ripening. 550, Fermentable sugars of wheat flour. 551, Sugar grass. Analysis of sugar beetroots.

PATENTS.

Mixing apparatus [for molasses]. Foam prevention.—See I. Mg xylonate.—See VII.

XVIII.—FERMENTATION INDUSTRIES.

Following enzyme reactions viscosimetrically. H. LÜERS and A. LÖTHER (Woch. Brau., 1935, 52, 49—51).—By proteolysis (I) of gelatin solutions by enzymes of various types [papayotin, malt extract, *Pinguicula* protease, mould protease such as "Filtragol" (*F*)] it is shown that the rapid fall in η in the early stages is quite out of proportion to the relatively slow increase in free NH_2 -acids, or the decrease in *N* precipitable by tannin. Leucosin or edestin as substrates give similar results, but with relatively smaller decreases in η . Physical and colloid-chemical changes appear important in the early stages of (I). Pectolase activity, e.g., of *F*, can similarly be conveniently followed by measuring the fall in η , whilst in the liquefaction of starch by a bacterial diastase ("Superelastase") some 90% of the fall in η takes place before it is possible to demonstrate the production of maltose. I. A. P.

Anthocyanin discolorations in brewing barleys. K. G. SCHULZ (Woch. Brau., 1935, 52, 33—36, 41—45, 51—54).—Certain continental barleys of the 1934 harvest contained anthocyanins (*A*), both in vegetative organs and in the corns. Some (I) of the corns contained *A* in the husk, others (II) in the aleurone layer, whilst a third group (III) were approx. normal in colour. In a no. of varieties investigated, and in varieties from different districts, the 1000-corn wts. of (II) and (III) were approx. the same, but were regularly $<$ in (I). With (I), individual corns contained more protein than in (III), but the difference disappeared in many cases when protein was expressed as % dry wt. With (II),

there was more protein both on single corns and as %, compared with (III). Formation of *A* in tissues containing chlorophyll appears to be caused by max. assimilating conditions, whilst *A* in the aleurone layer may be due to excessive illumination in the early stages of the plant's growth. Worts prepared from pigmented barleys showed no change in colour, the *A* remaining with the spent grains. No difficulties are anticipated in the use of such barleys in brewing if their other properties are satisfactory. I. A. P.

Drying of hops. HUBER (Z. ges. Brauw., 1934, 57, 45—47; Chem. Zentr., 1934, ii, 1218).—Drying at 60° is not harmful if the H_2O content (I) is $<$ 10%. At 70° (I) must be $<$ 12%, whilst at higher temp. considerable deterioration occurs if (I) falls below 15%. H. N. R.

Modification of malt-protein. P. KOLBACH (Woch. Brau., 1935, 52, 17—21, 28—30, 36—39).—No clear relationship can be recognised between time (*T*) of germination and degree of modification (sol. $N \times 100/\text{malt-N} = M$) of malt-proteins. However, from a crit. review of the literature and from malting experiments it appears that the factors concerned in *M* which are influenced by *T* and by temp. are the amounts of enzyme and decomposable protein present, and the amount of resynthesised protein in the embryo. Understeeping gives at first a more rapid development of *M* than normal steeping, but the latter gives greater *M* after 7 and 10 days. Over-steeping gives the lowest *M* throughout this period. *M* increases with the degree of aëration, whilst in the majority of cases it appears that in barleys of low *N* content the proteins modify more easily than in those with high *N*. Measurement of *M*, however, does not always run parallel to modification as judged by the maltster. I. A. P.

Determination of methyl alcohol in [ethyl] alcohol and [ethyl]-alcoholic beverages. O. ANT-WUORINEN (Z. Unters. Lebensm., 1935, 69, 59—67).— $MeOH$ is converted into CH_2O (I) by oxidation with $KMnO_4$. (I) is determined photometrically by means of Schiff's reaction. Curves and tables are given correlating the % $MeOH$ with the extinction coeff. when a specified procedure is carried out. The % $MeOH$ of 5 types of spirits varied between 0.10 and 0.18%. E. C. S.

Intermediate products of propionic acid fermentation. H. G. WOOD and C. H. WERKMAN (Proc. Soc. Exp. Biol. Med., 1934, 31, 938—940).—Glucose is probably converted into hexose monophosphate, which is subsequently split into two triose mols. Methylglyoxal (I) is formed, part of which is oxidised to $AcOH$ and CO_2 . H_2 arising from this oxidation serves to reduce more (I) to $EtCHO$ and $OH \cdot CHMe \cdot CHO$.

CH. ABS. (p)

Citric acid fermentation on solid materials. F. J. CAHN (Ind. Eng. Chem., 1935, 27, 201—204; cf. B., 1931, 563, 733).—Molasses or aq. sucrose absorbed by cane or beet pulp is fermented by *Aspergillus niger* with the production of 45 or 55%, respectively, of the calc. citric acid (I) in 38—60 hr. Sterilisation of the medium is unnecessary since the (I) formed inhibits the growth of contaminating organisms. E. C. S.

Port wine. J. C. BOTHELO (Ann. Chim. Analyt., 1935, [iii], 17, 49—63).—The method of manufacture of the wine is outlined and the literature relating to its composition reviewed. Analysis of numerous samples of basic wines (red and white) of the Douro district shows that the Blarez ratio (*B*) (reducing sugar per litre/rotation) is ≥ 3.4 , whilst the glucose/fructose ratio (*R*) is ≥ 0.7 , these being the only sugars present. Partly fermented must [geropigas (*G*)] gives similar figures for *B* and *R*, but with unfermented must (mistelles) *B* is > 4 , and *R* may reach 0.9. With genuine Port wines, *B* varies from 2 to 3.6, and *R* from 0.3 to 0.7, but imitation wines and *G* give *B* and *R* $>$ the upper of these limits. Detailed analytical figures are quoted in all cases. The importance of *B* in detecting adulteration is emphasised. I. A. P.

Apple wine. I. G. F. WOLFF (Fruit Products J., 1935, 14, 176—177, 189).—To obtain a product rich in EtOH a suitable blend of apples is necessary. The blend is prepared from sweet, mildly acid, slightly tart, aromatic apples, and crab apples (which have a high tannin content). Suitable varieties of apples are named. A 1:2 blend of sweet with sour apples gives a good beverage; the addition of quince is advantageous. E. B. H.

Residual sugar of wine. C. VON DER HEIDE and J. BURKARD (Z. Unters. Lebensm., 1935, 69, 68—71).—The fermentable residual sugar consists of fructose (*F*), and not invert sugar. For the determination of small quantities of *F* in wine van Creveld's method (A., 1928, 1392) is recommended. For the determination of arabinose, furfuraldehyde is best pptd. as the 2:4-dinitrophenylhydrazone (A., 1932, 763). E. C. S.

**Fermentable sugars of wheat flour. Distinguish-
ing between meat and yeast extracts.**—See XIX.

See also A., Apr., 532, Characterisation of amylases.
Banana-amylase. 534, Liver-esterase.

XIX.—FOODS.

Soft winter wheat studies. III. Effect of some factors influencing viscosity and protein. E. G. BAYFIELD (Cereal Chem., 1935, 12, 1—16; cf. B., 1934, 521).—An attempt was made to differentiate between the quality (*A*) and quantity (*B*) factors present in the protein content (*P*) of flours by means of the η test (cf. B., 1933, 1078). *A* exerted much less influence on η than *B* when only one variety of wheat (*W*) was investigated; when several varieties were compared, decided differences in *A* were obtained. Hence the val. of *P* is reduced when used as a basis for blending *W*. Applications of fertilisers to the soil produced large variations in *A*. *P* decreased with the application of N, K, and P fertilisers, and was lowest with the phosphates. Response to $KBrO_3$ in the baking test (B., 1933, 1078) was correlated with *B* rather than with *A*. E. A. F.

Cause of inferior quality of insect-damaged wheat. S. GÖMÖRY (Mezőg.-Kutat., 1934, 7, 37—47; Chem. Zentr., 1934, ii, 355).—Quality is injured through the introduction of proteolytic enzymes during infestation and subsequent decomp. of gluten (I). Acidity

is also increased. Loss of (I) is minimised by treatment with 0.2% CH_2O . Other aldehydes are without effect. A. G. P.

Nature of pigments of the gasoline extract of wheat. M. C. MARKLEY and C. H. BAILEY (Cereal Chem., 1935, 12, 33—39).—An improved method is described for separating the pigments (*P*) present in the extract, e.g., carotene, xanthophyll, triclin (A., 1931, 1426), and others the exact natures of which are unknown. E. A. F.

Pigments of the dilute alcohol or acetone extract of whole-wheat meal. M. C. MARKLEY and C. H. BAILEY (Cereal Chem., 1935, 12, 40—48).—Extinction coeff.- λ graphs are given for the 50% aq.- CO_2 , 67% aq.-EtOH, and alkaline 67% aq.-EtOH extracts of Mindum durum wheat. Some indication is given of the chemical properties of the pigments present in these extracts. The flavones in the gasoline extracts of wheat are possibly present in the form of fatty acid esters. E. A. F.

Determination of the carotenoid pigment concentration of small samples of whole wheat. M. C. MARKLEY and C. H. BAILEY (Cereal Chem., 1935, 12, 49—53).—Ferrari's technique (B., 1933, 810) was used for 6-g. samples, and a modification of this method for $\frac{1}{2}$ —1-g. samples. The sources of variability in the system were studied and methods of eliminating these indicated. E. A. F.

Fermentable non-reducing sugars of wheat flour. R. GUILLEMET and C. SCHELL (Compt. rend. Soc. Biol., 1934, 116, 1402—1403).—After heating at 120° for 15—20 min. to inactivate amylase, flour contains 0.9—1.5% of fermentable, non-reducing sugars, principally sucrose. CH. ABS. (p)

Detection of wheaten flour in rye flour by the Indian-ink method. E. BERLINER (Z. Unters. Lebensm., 1934, 68, 643—645).—When the flour is mixed with Indian ink in a drop of H_2O , the particles of rye are readily differentiated by the shining mucous appearance of the cell wall, to which particles of C adhere, and by the greater transparency of the protein contents. E. C. S.

[Determining] an index of proteolytic activity by use of the Farinograph. Q. LANDIS (Cereal Chem., 1935, 12, 25—33).—A method is described for determining proteolytic activity (*A*) by means of the Brabender Farinograph, using a dough of uniform consistency as a standard substrate. The development energy (*E*) of the dough is defined as the energy, expressed as degrees Brabender \times time ($^{\circ}B$ -min.), required to develop the standard test-dough to its max. development. The rate of decrease of *E* is roughly \propto the time and to the concn. of the protease. One proteolytic unit has been tentatively defined as the amount of that enzyme which, when present in the standard dough, will produce an initial rate of decrease of *E* of 1000° B.-min. per hr. The *A* of a substance is taken as the no. of enzyme units per g. of material. E. A. F.

Measurement of colour in flour and bread by means of Maxwell discs. II. J. C. BAKER, H. K.

PARKER, and F. B. FREESE (Cereal Chem., 1935, 12, 17—24).—A suitable lamp has been devised to replace daylight as a source of illumination in the new N-A colorimeter (B., 1933, 1078), and variations in light intensity (*I*) have been eliminated by including a rheostat in the lamp circuit and measuring *I* by a Weston Photronic cell connected with a micrometer. Other mechanical changes in design were introduced. Advantages of this new type are: easier prep. of samples and operation, and greater accuracy. The most important factor in the colour of flour (*F*) products is the translucency of the sample; *i.e.*, the colour differences between dry *F*, dough, bread, etc. are largely due to differences in light penetration produced by wetting, heating, texture, and granulation. The effect of grade of *F* on the colour of the compressed bread crumb was determined. E. A. F.

Determination of acidity of flour. J. PANOPOULOS and J. MEGALOOKONOMOY (Praktika, 1933, 8, 327—330; Chem. Zentr., 1934, ii, 1221).—10 g. of flour are shaken for 1 hr. at 20—30° with 100 c.c. of a 7:3 mixture of 96% EtOH and CO₂-free H₂O, filtered, and 50 c.c. of the filtrate titrated (phenolphthalein) with acid. H. J. E.

Degree of acidity [of flour]. A. SCHULERUD (Z. ges. Getr., Mühlen-, u. Bäckereiw., 1934, 21, 29—32, 68—71, 134—136; Chem. Zentr., 1934, ii, 857—858).—Acidity (*A*) is due to fatty acids (I) extractable with Et₂O, to proteins which are pptd. by COMe₂, and to acids sol. in H₂O. The solubility of these acidic substances and their determination are discussed. The amount of (I) in flour increases on storage, but other types of *A* increase only slightly. H. J. E.

Temperature changes in a small laboratory oven when drying flour by the 130° C.-oven method. J. H. LANNING (Cereal Chem., 1935, 12, 69—77).—Thermometers placed in the drying oven (internal measurements 30½ × 33 × 35 cm.) registered different temp. in different parts of the drying chamber (*e.g.*, above or below the shelf). Drying 6—15 flour samples (each 2 g.) at one time, or varying the drying period from 30 to 90 min., affected the results only by about 0.1%. Varying the oven temp. from 130° to 140° greatly affected the results. Specifications for the 130°-oven method should fix the position of the bulb of the thermometer in relation to the samples, the amount of time to be allowed for the oven to recover its original temp. after loading, and the max. and min. no. of samples to be dried at one time. E. A. F.

[Effect of flour on loaf] grain and texture. G. MOEN (Cereal Chem., 1935, 12, 78—83).—Formula and method of baking exert a large influence on the crumb structure obtained. The A.A.C.C. standard method is considerably superior to commercial formulæ. E. A. F.

Variability in experimental baking using hand and machine manipulation. J. G. MALLOCH and J. W. HOPKINS (Cereal Chem., 1935, 12, 57—61).—A machine has been devised for punching and moulding 100 g. of dough, which yields more accurate results than the hand manipulation of doughs, and, with further refinements, it may be possible to reduce the mean

deviations in replicate loaf vol. obtained on the same and on different days to within the required limits.

E. A. F.

Interpretation of standard baking test. R. T. BOHN (Cereal Chem., 1935, 12, 61—68).—The results of a baking test may be expressed in terms of absorption, loaf vol., loaf type and outside appearance, crust colour, grain and texture, crumb colour, reaction to mixing, and reaction to bromate. The significance of each of these factors is indicated. E. A. F.

Bacteriology of milk electro-pasteurised by the Aten method. A. J. L. TERWEN and H. J. QUELLE (Arch. Hyg., 1934, 112, 273—279). NUTR. ABS. (*m*)

Detection of short heating of milk. W. STOLDT (Z. Unters. Lebensm., 1935, 69, 71—73).—Short heating (40 sec. at 71—74°) can be detected by Bengen and Bohm's (B., 1934, 522) or by Weinstein's method (B., 1934, 984). E. C. S.

Rational lactometer. D. W. HORN (Bull. Wagner Free Inst. Sci., 1935, 10, 10 pp.).—A lactometer of the sp.-gr. hydrometer type is illustrated and its method of use described. H. T.

Effect of some southern roughages when fed with basic grain mixture on the fat contents, flavour, texture, and standing-up properties of southern butter. F. H. HERZER (Ann. Rept. Missouri Agric. Exp. Sta., 1932, 23—28).—Cottonseed oil or meal increases the m.p., I val. (I), and *n* of butters, but reduces the Reichert-Meissl val. Roughages do not affect flavour or texture of butter (II). The m.p. gives only a partial indication of the firmness of (II). Change from succulent to dry feeding-stuffs alters const. of (II). Northern samples have higher (I) and lower (I—4°) m.p. than southern samples. CH. ABS. (*p*)

Determination of fat in cheese. J. GROSSFELD and W. HOTH (Z. Unters. Lebensm., 1935, 69, 30—45).—The cheese is digested with conc. HCl or 70% aq. H₂SO₄, and the fat extracted with C₆H₆ and EtOH (5:1). An aliquot part is evaporated to dryness and weighed. The Schmid-Bondzynski method occasionally gives too high results, owing to the extraction of org. acids with the fat. The present method may be used for the determination of fat in egg-yolk or meat, in which case HCl must be used for the digestion. E. C. S.

Origin of acetoin and diacetyl in Magenlab and other cheese cultures. W. RITTER (Landw. Jahrb. Schweiz, 1934, 48, 218—224; Chem. Zentr., 1934, ii, 1047).—Thermophilic streptococci, betacocci, and betabacteria cause the production of acetoin and Ac₂. The last two are effective only in presence of citric acid. The first acts in its absence. *Mycoderma casei* is ineffective. H. J. E.

Effect of pectin on change of state of milk and its main products, particularly on the digestibility of cheese. W. ZIEGELMAYER (Kolloid-Z., 1935, 70, 211—218).—Addition of apple pectin ppts. reversibly a protein from milk, improves the consistency of rindless cheese, and increases the swelling of cheese and its digestibility. E. S. H.

Colloidal aspects of cheese. G. KOESTLER (Landw. Jahrb. Schweiz, 1934, 48, 339—347; Chem. Zentr., 1934, ii, 1047).—A discussion. H. J. E.

Supposed decomposition of lecithin in egg products. W. DIEMAIR, F. MAYR, and K. TÄUFEL (Z. Unters. Lebensm., 1935, 69, 1—9; cf. B., 1931, 413; 1933, 602).—The "decomp." of lecithin (*L*) is due to loss of solubility as a result of the formation of adsorption compounds with proteins or carbohydrates, but not with fats. Addition of H₂O to egg products before extraction, to overcome this effect, gives untrustworthy results, since varying quantities of other P compounds may be extracted. Experiments on the solubility of animal and plant *L* in relation to the determination of *L* in macaroni etc. are recorded.

E. C. S.

Detection of spoiled eggs. J. GROSSFELD and J. PETER (Z. Unters. Lebensm., 1935, 69, 16—29).—Caseous decomp. (*D*) of eggs is detected by increase in the "decomp. quotient" (*Q*), which is 100 × the ratio of P₂O₅ insol. in Pr³OH but sol. in aq. EtOH to that sol. in aq. EtOH. Complete breakdown of lecithin (*L*) to glycerophosphoric acid (*G*) gives *Q* = 100. In fresh or old unspoiled eggs *Q* is < 6. A considerable rise in *Q* may occur (e.g., to 18.5 in the yolk or 69.9 in the whole contents) before *D* is perceptible. *G* breaks down more slowly to H₃PO₄. Milk, wheaten flour, rye flour, oat flakes, and soya-bean meal have apparent *Q* = 71—80, 34.7—40.0, 37.4, 29.5, and 9.0, respectively. The *Q* vals. of macaroni etc. prepared from fresh and spoiled eggs are widely different. The yield of *L* with various solvents is discussed. In baked products colloidal combination of *L* with swollen starch apparently occurs.

E. C. S.

New form of adulteration of eggs? V. FROBOESE (Z. Unters. Lebensm., 1935, 69, 14—15).—The colour of the yolk may be improved by feeding hens with org. dyes, but not by feeding with carotene or lutein.

E. C. S.

Differentiation of egg-yolk and plant lecithin in macaroni etc. H. KLUGE (Z. Unters. Lebensm., 1935, 69, 9—13; cf. Arch. Hyg. 1934, 112, 157).—The ratio of sterol to lecithin (*L*) in egg-yolk is < in plant-*L* preps., enabling plant *L* to be detected in macaroni etc. Confirmatory tests must be applied [I val., refractometer no., lutein test, etc. (cf. B., 1933, 330, 602)].

E. C. S.

Detection of hexamethylenetetramine in fish conserves. B. ROSSMANN (Z. Unters. Lebensm., 1935, 69, 50—58).—CH₂O (*I*), and substances yielding (*I*), may be detected by the official method prescribed for meat products. The method cannot be made quant., since the (*I*) is not completely distilled over. During storage, (*I*) diffuses from the covering liquid into the fish, and is partly fixed, thus hindering detection.

E. C. S.

Methods of estimating the degree of preservation of white fish. G. A. REAY (Chem. & Ind., 1935, 145—148).—The degree of staleness may be judged by (a) bacterial counts, (b) determination of volatile bases, or (c) the odour. Method (c) is, in practice, at least as valuable as method (a) or (b). Commercial standards

for the evaluation of fish (*F*) stored on ice cannot be applied to frozen *F*, or to *F* stored in CO₂, since these, although quite fresh, rapidly acquire defects (e.g., "red along the bone" or imperfect pellicle on smoking), which in the former are taken to indicate staleness.

E. C. S.

Suggested test for distinguishing between meat extract and yeast extract. R. O. BLENCH (Chem. & Ind., 1935, 148).—The sample is digested in a mortar with 70% aq. COMe₂ and the supernatant liquid is filtered. The filtrate is treated with Br-H₂O, avoiding excess. With yeast extracts, after keeping for 5 min., a dark red colour is formed. When shaken with CHCl₃ (*I*) a deep reddish-violet colour separates in the (*I*) layer. The test is negative with meat extract.

E. C. S.

Avocado maturity. A. L. STAHL (Ann. Rept. Florida Agric. Exp. Sta., 1932, 121—122).—The oil content (*I*) of the fruit reaches a max. when the fruit is mature. (*I*) and *d* are closely related. CH. ABS. (p)

Problems in citrus products research. H. W. VON LOESECKE (Proc. Florida State Hort. Soc., 1933, 38—43).—Storage for 9 months at 5° of de-aerated, flash-pasteurised orange juice did not materially alter the flavour or aroma. Storage at 32—38° resulted in an increase in reducing sugars and a slight decrease in *p*H. Darkening of stored orange or grapefruit juice at 32° was greater with bottle caps of Al than with those of Sn. No darkening occurred at 5°. Grapefruit-seed oil (*I*) was rendered palatable by treatment with NaOH and C. Catalytic hydrogenation of (*I*) yielded a solid product, and treatment with S₂Cl₂ produced a rubber substitute.

CH. ABS. (p)

Preservation of citrus juices and pulps. A. F. CAMP (Ann. Rept. Florida Agric. Exp. Sta., 1932, 124—125).—Bitter flavour (*B*) in citrus juices is caused by glucosidal compounds in albedo, pulp, and segment walls of fruit. Removal of all pulp and tissue prevents development of *B* juice during storage. CH. ABS. (p)

Browning of orange juice. Survey of factors involved. M. A. JOSLYN and G. L. MARSH (Ind. Eng. Chem., 1935, 27, 186—189).—Browning (*I*) of orange juice (*II*) is due to secondary changes (probably by condensation with aromatic amines) following oxidation (*III*) with atm. O₂ (*IV*), since the *I* titration of (*II*) rapidly oxidised by (*III*) diminishes without change in colour, subsequent (*I*) being that of (*II*) slowly oxidised. (*III*) is prevented by removal of (*IV*), or by addition of reducing substances, e.g., SO₃^{''} or Sn^{II} salts. The effect of fermentation, EtOH, yeast juice, and acidity on (*I*), and the nature of the brown pigment, are discussed.

E. C. S.

Carbohydrates of dried Californian French prunes (prune d'Agen). E. MRAK, C. SMITH, and V. HENRIQUES (Proc. Amer. Soc. Hort. Sci., 1933, 30, 238—242).—The ratio of glucose to fructose in prunes from cooler areas was < 2 and in those from warmer districts > 2. Contents of sucrose, starch, and hemicelluloses varied considerably. Pentosans, pectins, lignin, and cellulose occurred in considerable quantities.

CH. ABS. (p)

Raisin oil by-product. A. M. PAUL (Food Ind., 1934, 6, 444—445, 466).—Dry grape seed yield 15% of

oil after extraction of glucose. The oil is used in the prep. of raisins, and is suitable as a salad oil. It does not easily become rancid. The press-cake is a valuable cattle feed. CH. ABS. (p)

Influence of treating berries and fruits on the potency of the vitamin-C. I. K. MURRI and A. V. KUDRJAFTZEVA (Bull. Appl. Bot. Genetics, Plant Breeding, U.S.S.R. [Suppl.], 1934, 67, 71—88).—Cranberry juice contained less vitamin-C than did whole fruit. Vacuum-dried fruit had similar potency to juice. Vals. were not affected by pptn. of pectins. In blackcurrants the -C content was unaffected by SO₂ treatment or storage at 10°, but was 25% lower after pasteurising. CH. ABS. (p)

Influence of freezing and preservatives on vitamin-C. I. K. MURRI, N. P. ONOKHOVA, A. V. KUDRJAFTZEVA, and G. K. GUTZEVICH (Bull. Appl. Bot. Genetics, Plant Breeding, U.S.S.R. [Suppl.], 1934, 67, 113—127).—Cranberries stored at 0—8° or picked after snow melts lose vitamin-C. Vals. for potatoes are not affected by freezing (I), but slow thawing causes loss. Storage at 10° after (I) destroys -C. The best preservative is SO₂ followed, in order, by NaOBz and (I). CH. ABS. (p)

Cherry processing. II. F. E. ATKINSON and C. C. STRACHAN (Fruit Products J., 1935, 14, 174—175; cf. B., 1935, 331).—The only permitted colours in Canada for cherry dyeing are Ponceau, Amaranth, and Erythrosin (E). E was used at p_H 4.4. Cherry leaching is carried out at 60° or by boiling the batch for three 10-min. periods. E. B. H.

Arsenic content of honey and bees after dusting with arsenical insecticides. G. LOCKEMANN (Z. Unters. Lebensm., 1935, 69, 80).—The honey contained only 0.1—0.2 p.p.m. of As. Bodies of dead bees immediately after dusting the crops and also 14 days later contained 0.87×10^{-6} g. of As. E. C. S.

Diastase in mixtures of synthetic and natural honey. E. WALTZINGER (Z. Unters. Lebensm., 1935, 69, 77—79; cf. B., 1934, 524).—The absence of diastase from such mixtures is due to failure to neutralise acid used for inversion of sugar. E. C. S.

Protein from sugar-beet pulps. H. COHEN (Trans. Centr. Sci. Res. Inst. Sugar Ind., U.S.S.R., 1933, No. 15, 14—18).—Satisfactory gels could not be obtained from beet-pectins, even with sugar or pectase, over a wide p_H range. Increasing the OMe content of pectin preps. by CH₂N₂ did not increase the gel-forming capacity. CH. ABS. (p)

Bunzell-Becker moisture-determination apparatus [for foods etc.]. H. H. BUNZELL (Cereal Chem., 1935, 12, 54—56).—The apparatus is described and illustrated. An abs. determination of H₂O present in a sample (e.g., of flour, feed, cocoa) is approached irrespective of location and individuality of the operator. E. A. F.

Cellulose of foodstuffs and fodder. I. Crude fibre and cellulose. K. TÄUFEL and H. THALER [with A. BÄURLE] (Z. Unters. Lebensm., 1934, 68, 631—636).—The definition of crude fibre (I) is discussed, and the methods of determining (I), cellulose, and pentosans (II) are reviewed. Comparative determinations are given of

the total (II) of various vegetable foodstuffs, and of the (II) content of the (I) fraction as prepared by the methods of Henneberg and Stohmann and of König. E. C. S.

Odour of black tea. I. Odour of the leaves produced in Formosa during fermentation. R. YAMAMOTO and A. KATO (J. Agric. Chem. Soc. Japan, 1934, 10, 661—667).—Steam-distillation yields an ethereal oil, b.p. 140°. CH. ABS. (p)

Maté. S. KRAUZE (Wiad. Farm., 1934, 61, 471—474, 501—505, 515—517).—Analyses are recorded. A relationship between the caffeine and Mn contents is indicated. The Et₂O extract contains no vanillin. CH. ABS. (p)

Detection of coal-tar dyes in coffee substitutes. G. LODE (Z. Unters. Lebensm., 1935, 69, 88—89).—Fig, malt, and chicory "coffee" contain pigments which resemble coal-tar dyes in their behaviour towards the usual reagents, but differ markedly when treated with mineral acids, alkalis, and aq. SnCl₂-HCl. E. C. S.

Examination of cacao. Chloride, calcium, and magnesium contents of cacao bean. J. GROSSFELD and E. LINDEMANN (Z. Unters. Lebensm., 1935, 69, 45—50).—11 samples of cacao bean, kernel, and paste contained $0.030 \pm 0.007\%$ Cl, 15 samples contained $0.075 \pm 0.018\%$ Ca, 3 samples contained $0.29 \pm 0.01\%$ Mg and $1.05 \pm 0.05\%$ P₂O₅. E. C. S.

Formation of oxalic acid by hydrolysis of constituents of cacao. J. GROSSFELD and E. LINDEMANN (Z. Unters. Lebensm., 1934, 68, 612—631).—By prolonged boiling with dil. HCl of the Ca ppt. from aq. HCl extracts of cacao, the yield of H₂C₂O₄ (I) is increased. This is assumed to be due to the hydrolysis of an unknown precursor (II). The husks and the mucin (III) derived therefrom contain (II), but (II) is not identical with (III). (II) is insol. in H₂O, but is sol. in hot $0.5N\text{-HCl}$. (I) is not formed from (II) by boiling with aq. NaOH. A procedure for the determination of (I) in cacao and preps. therefrom is described. The crude CaC₂O₄ is contaminated with two impurities, one of which is (II). E. C. S.

Determination of quinine in chocolate tablets. A. JUSTIANOS and J. PIERRY (Praktika, 1933, 8, 173—176; Chem. Zentr., 1934, ii, 1171).—An improved Soxhlet extraction method is described. The EtOH solution obtained is titrated with 0.1N-HCl. H. N. R.

Weeping-willow leaves as cattle feed. J. M. MOUBRAY (Rhodesia Agric. J., 1934, 31, 242—243).—Analyses are recorded. The nutrient ratio is 1 : 4—6. CH. ABS. (p)

Determining the water content of green forage. F. S. WILKINS (Rept. Agric. Res. Iowa Agric. Exp. Sta., 1932, 70—71).—Methods of sampling are examined. CH. ABS. (p)

Nutritive value of locusts. E. ADLER (Farming South Afr., 1934, 9, 232).—Meal prepared from red-wing locusts, killed prior to flying, is a satisfactory substitute for oilcake for cattle, but is unsuitable as a fertiliser owing to the high fat content. CH. ABS. (p)

Hungarian lard.—See XII. Food-waste disposal. —See XXIII.

See also A., Apr., 512, Micro-determination of Cu in milk. 523, Lard fatty acids and esters. 529, Substances used in treatment of flour. 532, Tea manufacture. 543—8, Vitamins. 550, Fermentable sugars of wheat flour. 551, Sugar grass. Analysis of forage.

PATENTS.

Leavening ingredient. [Baking powder.] A. H. FISKE, Assr. to RUMFORD CHEM. WORKS (U.S.P. 1,951,328, 13.3.34. Appl., 16.5.31).—Claim is made for a graded mixture of granules of an acid phosphate and NaHCO_3 , both compounds being mixed in a finely-powdered form with gelatin or starch solutions and then dried, powdered, and screened. A. R. P.

Manufacture of milk-containing products. H. E. OTTING, Assr. to M. & R. DIETETIC LABORATORIES, INC. (U.S.P. 1,966,460, 17.7.34. Appl., 28.8.31. Renewed 11.10.33).—Separated cream containing about 40% of butter fat is pasteurised at 88° , cooled to $38\text{--}43^\circ$, inoculated with 0.05—0.2% of powdered steapsin dissolved in H_2O , and kept at $38\text{--}43^\circ$ for about 24 hr. so that at least 5—6% (12—13%) of free fatty acids (calc. as oleic acid) is developed. The cream is then diluted with H_2O , heated at $65\text{--}70^\circ$ to destroy the lipolytic enzyme, cooled to about 50° , and mixed with milk, skim milk, or other milk fluids, after which it may be spray-dried. The resulting powder when added to milk chocolate or other product produces a distinctive butter flavour which does not deteriorate on processing or storage. E. B. H.

Free-flowing powdered milk. H. V. MOSS and T. H. WHEELLOCK, Assrs. to SWANN RESEARCH, INC. (U.S.P. 1,966,513, 17.7.34. Appl., 8.8.32. Renewed 9.5.34).—Up to 6% of $\text{Ca}_3(\text{PO}_4)_2$ (I) is added to the dry, powdered, skimmed milk. Further improvement is obtained by using (I) with a small quantity of CaO and $\text{Al}_2(\text{PO}_4)_3$. E. B. H.

Canning of vegetables. A. H. FISKE, Assr. to RUMFORD CHEM. WORKS (U.S.P. 1,966,927, 17.7.34. Appl., 15.4.31).—Fruits and vegetables of acid nature are preserved without loss of colour if blanched in a suspension of CaCO_3 or $\text{Ca}_3(\text{PO}_4)_2$. The fruit or vegetable is subsequently canned in a dil. saline solution and sterilised as usual. E. B. H.

Hammer mill [for feed].—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Vitamin-D content of ointment bases containing cholesterol. I. Absorption through the intestinal mucosa. II. Absorption through the skin. A. S. VON MALLINKRODT-HAUPT (Z. Vitaminforsch., 1935, 4, 1—15, 16—39).—Adeps lanæ anhydrosus contains provitamin-D, but in smaller amounts than vigantol (I). Leolan has no antirachitic activity. Ointments containing cholesterol after irradiation contain vitamin-D which is absorbed through the skin and induces antirachitic activity. Relatively large administration of such ointments does not lead to symptoms of hypervitaminosis. More (I) is absorbed through the intestinal mucosa than through the skin. Unirradiated ergosterol is also absorbed through the skin. P. W. C.

Analysis of preparations of the type of aromatic tincture of iron and arsenic. M. MELICHAR (Časopis českoslov. Lék., 1933, 13, 321—327; Chem. Zentr., 1934, i, 3894).—EtOH is distilled off and Fe and As are pptd. together as $\text{Fe}(\text{OH})_3$ and $\text{NH}_4\text{MgAsO}_4 \cdot 6\text{H}_2\text{O}$. Sugar is determined polarimetrically in the filtrate. As is separated from Fe by distillation as AsCl_3 and determined with KBrO_3 , Fe being determined iodometrically in the residue. H. J. E.

Bornträger's reaction and its use in identifying drugs containing hydroxymethylanthraquinone and galenicals. A. JERMSTAD (Sci. Pharm., 1934, 5, 29—30; Chem. Zentr., 1934, ii, 811).—Solutions of the preps. in Et_2O or C_6H_6 are treated with aq. NH_3 . Colorations produced in the aq. layer by a no. of preps. are recorded. A. G. P.

Combustibility of tobacco. C. COOLHAAS (Proefstat. Vorstenland. Tabak, Meded. No. 68, 71 pp.; Chem. Zentr., 1934, ii, 1220).—A leaf with poor burning qualities (I) contained more Cl and less K than one with good (I). No effect attributable to the manure used was observed. Conditions of growth are correlated with (I). H. J. E.

Resins in tobacco smoke. A. WENUSCH (Z. Unters. Lebensm., 1935, 69, 81—85).—0.5 g. of essential oil, 2.7 g. of resin, and 4.0 g. of resin acids (in 3 fractions differing in their solubility in Et_2O) were isolated from the main smoke stream during the intermittent smoking of 300 g. of cigarette tobacco. E. C. S.

Determination of essential oil in camomile flowers. F. GSTIRNER (Deuts. Apoth., 1933, 48, 97—98; Chem. Zentr., 1933, ii, 2866—2867).—The D.A.B. VI method (I) gives low results and Bergmann's method (B., 1931, 135) is tedious. The following is more accurate: 5 g. of the comminuted leaves are covered with 500 c.c. of H_2O and 200 c.c. of distillate are collected. A further, separate 200 c.c. are then distilled and both fractions are treated according to (I), the condenser being washed with the first 20 c.c. of C_5H_{12} . E. H. S.

Determination of essential oil in camomile flowers. F. GSTIRNER (Deuts. Apoth., 1933, 48, 322; Chem. Zentr., 1934, i, 3775).—Previous work (cf. preceding abstract) referred to oil from *Matricaria chamomilla*. J. S. A.

Essential oil of Achillea millefolium, Linn. R. L. McMURRAY (Amer. J. Pharm., 1935, 107, 33—34).—Steam-distillation of the plant gave an oil having d_{25}^{25} 0.9066, n_{25}^{25} 1.4703, and α_D^{25} -14.11° . E. H. S.

Tobacco.—See XVI. Determining quinine in chocolate tablets.—See XIX.

See also A., Apr., 471, $\beta\beta'$ -Dibromoisopropyl ethers. 481, Prep. of tetrahydronaphthalene peroxide. 482, Aminoalkylamino-derivatives of carbocyclic compounds. Prep. of dialkylaminoalkyl phenyl- α -naphthylcarbamates. 485, β -Aminoethylapiole. 485, Allylthiol compounds. 486, β -Amino- α -diphenylpropyl alcohol. 496, NMe_4 camphorsulphonate. 499—500, $\text{C}_5\text{H}_5\text{N}$ derivatives. 502, Derivatives of benzimidazole-5-arsinic acid. 504—6 and 551, Alkaloids. 507, Determination of

morphine. 543—8; Vitamins. 551, Presence of 2-acetylpyrrole in valerian.

PATENTS.

Absorbent material. [Antiseptic surgical bandage.] T. D. AINSLIE and J. MCKEOWN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,953,526, 3.4.34. Appl., 7.12.28).—Claim is made for surgical pads or bandages impregnated with the product obtained by evaporating a 1:2—10 mol. mixture of $\text{Na}_2\text{B}_4\text{O}_7$ and H_2O_2 . A. R. P.

Manufacture of therapeutic agents. CHEM. FABR. VON HEYDEN A.-G. (B.P. 424,032, 7.3.34. Ger., 8.3.33).—5-Amino-2-alkoxy-pyridines are acylated, the components being chosen so that either the ether or the acyl group (or both) has (have) $\leq \text{C}_2$; further, a halogenoacyl radical may be introduced and the halogen replaced by NH_2 or an amine. Examples are: 5-propionamido-, m.p. 95—96°, 5-butyramido-, m.p. 91—92°, and 5-diethylaminoacetamido-2-ethoxy-pyridine, b.p. 167—168°/0.08 mm., m.p. 42—43°, and 5-acetamido-2-butoxy-pyridine, m.p. 86°. H. A. P.

Recovery of nicotine from tobacco material. W. W. TRIGGS. From TOBACCO BY-PRODUCTS & CHEM. CORP. (B.P. 423,606, 15.8.33).—The tobacco (I) is wetted with an alkaline solution [or with H_2O in the case of fermented (I)] and vapours (V) are driven off by indirect heat; V are scrubbed with acid, the exothermic heat of neutralisation causing self-concn. of the nicotine salt. Two-stage scrubbing may be effected, the acid in the first being circulated to complete neutrality.

B. M. V.

Fertiliser [from tobacco stems].—See XVI.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Chemistry of [photographic] fixing baths. K. KIESER (Phot. Ind., 1934, 32, 696—698; Chem. Zentr., 1934, ii, 1249).—Pure aq. $\text{Na}_2\text{S}_2\text{O}_3$ has $p_{\text{H}} > 9$. This is depressed to $p_{\text{H}} 5$ by addition of NaHSO_3 or $\text{K}_2\text{S}_2\text{O}_5$, the stability of the bath being thereby raised. Analytical methods applicable to fixing baths are described. A used bath seldom contains $> 1\%$ of the $\text{Na}_2\text{S}_2\text{O}_3$ as sulphate. H. J. E.

Toning with selenosulphate. P. REHLÄNDER (Phot. Ind., 1934, 32, 720—722; Chem. Zentr., 1934, ii, 1249).—The Ag grain becomes covered with a skin of Se sol. The method is the more effective the finer is the grain of the negative. Other methods of Se-toning are less satisfactory. H. J. E.

See also A., Apr., 458, Blackening of plates by ultrasonic waves. Electrolytic development. 463, Quant. spectrum analysis of elements.

PATENTS.

Preparation of light-sensitive layers containing titanium salt of an organic hydroxy-acid. W. KRIEGER, Assr. to KALLE & Co. A.-G. (U.S.P. 1,964,358, 26.6.34. Appl., 11.10.32. Ger., 19.10.31).—Addition of complex salts of Ti with OH-acids, e.g., Na Ti citrate, Na Ti tartrate, K Ti oxalate + Na_2 citrate, to diazotypes permits the production of tones suitable for colour-photography. H. A. P.

Colour photography. E. A. WEAVER, Assr. to TECHNICAL, INC. (U.S.P. 1,951,043, 13.3.34. Appl., 31.1.30).—Two films, one with an emulsion (E) sensitive to green and the other with B sensitive to red light, are joined together, so that the two E surfaces are in contact, with a thin film of H_2O -sol. adhesive, e.g., a 60:40 glycerin- H_2O mixture containing a little glucose. After exposure the films are readily separated for development by simple immersion in H_2O .

A. R. P.

Cyanine [dye] compounds.—See IV.

XXII.—EXPLOSIVES; MATCHES.

Burning of explosives. K. K. ANDREEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 220—227).—Data are recorded for the effect of tube diam. (D), temp., and cu. density on the rate of burning of nitroglycol (I) and cryst. tetryl (II) contained in glass tubes. No detonation was observed. There was a min. D below which burning was not propagated, the exact val. depending on conditions. The vals. for (I) and (II) at 20° were 2 mm. and 8—12 mm., respectively. The flame temp. for (I) was 960—1080°. H. J. E.

See also A., Apr., 460, Explosibility of NH_4NO_3 . 478, Nitration of starch.

PATENT.

Production of smokeless powder. D. R. WIGGAM, Assr. to HERCULES POWDER Co. (U.S.P. 1,965,362, 3.7.34. Appl., 16.9.29).—An explosive having the same bulk as black powder is formed from nitrocellulose moistened to 10—30% H_2O and partly dissolved in a solvent. After graining, it is poured into H_2O containing an oxidising salt at a temp. (77—80°) sufficient to evaporate the solvent very rapidly. B. M. V.

XXIII.—SANITATION; WATER PURIFICATION.

Construction and use of filtration apparatus [for removal of poisonous gases and dust from the atmosphere]. E. BREZINA [with W. SCHMIDT] (Oesterr. Chem.-Ztg., 1935, 38, 31—33).—To ascertain whether the atm. of a workroom where poisonous vapours (C_6H_6 etc.) may be present is satisfactory, atm. currents must be studied, velocities being measured electrically by the change of resistance of a heated wire gauze through the cooling effect of the air current. Concn. of vapour in the air often can be determined with the Zeiss interferometer, which will detect proportions down to 0.1—0.3 mg./litre. Investigations of atm. conditions in processes using PhMe and C_2HCl_3 are described. C. I.

Combined collection and disposal of sewage and food wastes. M. M. COHN (Sewage Works J., 1935, 7, 43—55).—A large proportion of food wastes usually collected and disposed of as garbage could be dealt with in a more economic and sanitary way along with normal sewage solids. A suggestion is made that the waste should be so reduced in size in the home that it could be delivered at the sewage works by the existing H_2O -carriage system, or that it should be collected as at present, sorted, and pulverised, and finally disposed of with the sewage sludge either by digestion or otherwise. C. J.

Incineration of sewage solids. A. E. STILSON (Sewage Works J., 1935, 7, 60—69).—In view of the small amount of fuel required for incineration, provision of mechanical means of dewatering screenings is uneconomic if the plant treats $< 10 \times 10^6$ gals. of sewage daily. In larger plants further drying is required and may be accomplished without nuisance if the temp. is $< 38^\circ$. The dry solids should be fed regularly into a furnace having fuel burners which send a blast of flame against the screenings, and as the materials burn from the top downwards forced draught is unnecessary. In the discussion these conditions are stated to apply only to certain types of furnace. C. J.

[Sewage]-sludge digestion at Meadville, Penn. C. H. YOUNG and R. L. PHILLIPS (Sewage Works J., 1935, 7, 96—103).—Two-stage digestion is practised in this plant with two tanks of 20,000 cu. ft. capacity each, and dealing with domestic sewage sludge from 17,000 people. The gas yield is 1.0 cu. ft. per head, of which 85—92% is produced during the first stage and the composition is CH_4 65—70 and CO_2 30—35%. From the experience obtained, spiral heating coils extending from top to bottom of the tank are advisable; positive means for breaking and withdrawing scum are a necessity. As a large proportion of heat is lost in the sludge and supernatant H_2O withdrawn, the necessity for heat insulation of the tank fabric is doubtful. C. J.

Separate [sewage]-sludge digestion tanks and their operation. W. B. WALRAVEN (Sewage Works J., 1935, 7, 70—81).—At Springfield, Ill., better gasification is obtained when operating at $35\text{--}38^\circ$ instead of $23\text{--}25^\circ$ although the final product drains better after digestion at the lower temp. The circulating H_2O is kept at 68° to prevent caking on the coils, and during winter conditions heat losses accounted for 43.5% of the heat input in tanks having the cone 12 ft. in the natural ground, the walls protected by an embankment, and the top covered by a steel dome. The gas yield was 0.4—0.8 cu. ft. *per cap.*, with a thermal val. of 550—620 B.Th.U. C. J.

Digestion of mixtures of sludge from domestic sewage and packing-house wastes. O. J. KNECHTGES, F. M. DAWSON, and M. S. NICHOLS (Sewage Works J., 1935, 7, 3—16).—Plain domestic sewage sludge (*D*), packing-house sludge (*P*), and various mixtures of the two were submitted to batch digestion at 25° in 5-gal. bottles, some of the digests being seeded with 10% or 66% of ripe sludge and others unseeded. An 8:1 mixture of *P* and *D* seeded with 10% of sludge from a previous similar batch showed the fastest rate of digestion and 25.7 g. of dry solids per litre of liquid sludge were gasified daily, the average gas composition being CH_4 76, CO_2 23, and H_2 1%; there was practically no loss of gaseous N_2 . Fats digest more completely than the bulk of the solids, the loss being 65—77%. No difficulty was found in digesting mixtures of *D* and *P*, the acid phase being absent when *P* is > 50 vol.-%. C. J.

Activated-sludge treatment [of sewage] with extremely low solids. G. M. RIDENOUR (Sewage Works J., 1935, 7, 29—35).—Operating records of a 1,200,000 gals. per day plant show that the ability of the sludge to flocculate and adsorb suspended materials

and to purify the sewage liquor can be maintained when using solids in amounts as low as 150 p.p.m. Whilst the overall purification efficiency is less with low solids, the clarification and reduction in biochemical O_2 demand per unit of solids were maintained. The settlement of the sludge under these conditions shows a flocculation stage which is increasingly prolonged with decreasing amounts of solids preceding the normal settling.

C. J.

Rapid determination of suspended solids in activated sludge by the centrifuge method. L. R. SETTER (Sewage Works J., 1935, 7, 23—28).—When activated sludges of varying gravity-settling characteristics and containing 1000—7000 p.p.m. of suspended solids were centrifuged for 10 min. at 2600 r.p.m. the resultant deposit contained 94—95% of H_2O . A formula is suggested for the calculation of the wt. of suspended solids from the vol. of centrifuged solids, which gives results comparing favourably with the Gooch-filter method and thus affords a rapid method of sufficient accuracy for plant control purposes. C. J.

Biochemical oxygen-demand test, as influenced by the ratio of organic carbon to total nitrogen [in sewage]. J. M. HOLDERBY and W. L. ZEA (Sewage Works J., 1935, 7, 36—42).—Experiments with varying proportions of sterile sewage and lactose diluted with an inoculated H_2O show that the rate of biochemical oxidation of an org. waste is strongly affected by the ratio (*R*) of the org. C to total N contained therein although the ultimate demand is probably the same. When *R* is > 120 there is little relative change in the O_2 demand, but below this val. the rate of absorption increases rapidly and the max. 5-days O_2 demand would probably be obtained when $R = 5.7$. C. J.

Influence of caesium ions on oxygen demand of sewage. J. E. SCHMIDT and J. C. KRANTZ, JUN. (Ind. Eng. Chem., 1935, 27, 171).—The oxidation of sewage is retarded when the [*Cs*] present is 0.001*M*. C. J.

Removal of hydrogen sulphide in sewage by aëration. W. S. MAHLE (Sewage Works J., 1935, 7, 91—95).—In a plant at Fort Worth, Tex., treating sewage and packing-house wastes the H_2S in the Imhoff-tank effluent can be reduced from 7.0 to 1.0 p.p.m. by aëration for $2\frac{1}{2}$ hr. and an expenditure of 0.25 cu. ft. of air per gal. C. J.

Deammoniation of sewage sludges. A. L. GENTER (Ind. Eng. Chem., 1935, 27, 218—220).—Sol. ammoniacal compounds which accumulate in sludge during digestion react chemically with coagulants intended to flocculate the colloids present; hence deammoniation by CH_2O and elutriation result in considerable saving of coagulant. (Cf. B., 1934, 990.) C. J.

Activated [sewage] sludge theory. G. P. EDWARDS (Sewage Works J., 1935, 7, 17—22).—Purification by the activated-sludge process occurs in at least 3 stages—(a) clarification, (b) reactivation, and (c) nitrification. Stage (a) is mainly physico-chemical, though biological action is probably necessary, the present tendency being towards a reduction in the amount of sludge present and increased aëration; stages (b) and (c) are mainly biological, though the essential organisms have not been

identified. Ciliates, said to indicate a good sludge, may be useful in preserving the balance between bacteria and protozoa. C. J.

Aluminium and zinc as water softeners. B. S. SRIKANTAN (Current Sci., 1933, 1, 291).—Al powder removes temporary hardness from H_2O in < 2 hr., CO_2 being evolved and $Al(OH)_3$ and $Mg(OH)_2$ pptd. Permanent hardness due to $MgSO_4$ and $CaSO_4$ is removed by a 1:10 mixture of powdered Al and Zn; H_2 is liberated and all SO_4^{2-} removed. In test-trials, 10 g. of softener reduced the hardness in 2 litres from 50–60° to 1–1.5°. C. J.

Chemical and biological considerations affecting control of swimming baths. J. H. COSTE and E. T. SHELBOURN (Baths and Bath Eng., 1934, 1, 32).—Addition to H_2O of 1 p.p.m. of $CuSO_4$ partly checks algal growth and is more effective in presence of Cl_2 . Successive additions of $CuSO_4$ do not appreciably increase the sol. Cu content, owing to pptn. of basic Cu carbonate and deposition on metal pipes. CH. ABS. (p)

Removal of copper ions from water by sodium aluminate. C. J. BROCKMAN (Ind. Eng. Chem., 1935, 27, 217).—Cu is completely removed from H_2O in phosphate buffer solutions at $pH > 5.3$ by Na aluminate (I) if the ratio (I):Cu is > 6.5 . Coagulation, using (I) with or without alum, has thus a wider range in this respect than has alum treatment alone. (Cf. B., 1934, 990.) C. I.

Chlorine treatment of drinking water of the city of Berne. H. GUBELMANN (Water and Water Eng., 1934, 36, 568–570).—Use of NH_2Cl reduced nos. of bacteria and fauna in H_2O and eliminated chlorophenol taste. CH. ABS. (p)

Physico-chemical investigations of calcium carbonate deposition from water. R. STUMPER (Angew. Chem., 1935, 48, 117–124).—The conditions for pptn. of $CaCO_3$ from H_2O are defined. Pptn. from aq. $Ca(OH)_2$ is determined mainly by the partial pressure of CO_2 and the velocity of formation of the solid phase. Pptn. of $CaCO_3$ from supersaturated solutions takes place after an induction period, (I), which is related to the initial concn., (C), by $C\sqrt{I} = \text{const.}$ I is very sensitive to the presence of impurities; it is diminished by particles of $CaCO_3$, coke, graphite, and charcoal, and increased by the presence of Zn. E. S. H.

Influence of temperature on coagulation [in water purification]. C. J. VELZ (Civil Eng., 1934, 4, 345–349).—Temp. is a dominant factor influencing the required dosage of alum. The effects of high temp. can be eliminated by adjustment of pH to the optimum, e.g., 6.7 at 8–14°, but < 5.8 at 20–25°. CH. ABS. (p)

Oilfield water analysis. IV. Determination of sodium by means of zinc uranyl acetate. W. R. WIGGINS and C. E. WOOD (J. Inst. Petroleum Tech., 1935, 21, 105–119).—The composition of the triple acetate formed by pptg. Na with the acetate was found to be $NaZn(UO_2)_3(OAc)_9 \cdot 6$ or $6\frac{1}{2}H_2O$ (cf. A., 1934, 1085). The pptn. is carried out at 15° and the pptd. Na salt determined after elimination of the Ac radical (with H_2SO_4) by reduction of the U^{VI} in the salt to U^{IV} , then titrating with 0.1N- $KMnO_4$. Optimum

conditions for the reaction are specified. The determination is not appreciably affected by K and only slightly so by Ca and Mg, but NH_4 alone or with Ca or Mg causes a negative error. C. C.

Mathematical treatment of mixing problems. O. WILSKI (Gas-u. Wasserfach, 1935, 78, 207–210).—A discussion relating particularly to H_2O .

Utilisation of agricultural wastes. I. Lignin and microbial decomposition. M. LEVINE, G. H. NELSON, D. Q. ANDERSON, and P. B. JACOBS (Ind. Eng. Chem., 1935, 27, 195–200).—Attempts to develop a sp. anaerobic lignin-digesting flora for the production of fuel gas by fermentation were unsuccessful. Alkali-lignin (L) when added to actively digesting sludge produced practically no gas, and when used in conjunction with fermenting cornstalk flour or packing-house sludge markedly inhibited the fermentation process. This effect is not due to a toxic action of L on the bacteria, but may be due to the production, by chemical combination, of complexes very resistant to microbial decomp. Losses of L attributed previously to fermentation may be due to the method of selection and prep. of the sample for L analysis. C. J.

New methods of water analysis. II. H. F. KUISEL (Helv. Chim. Acta, 1935, 18, 332–343; cf. A., 1935, 462).—The determination of SO_4^{2-} , PO_4^{3-} , and Ca^{2+} is described. F. L. U.

Determination of lead in drinking water. B. WILLBERG (Z. Unters. Lebensm., 1935, 69, 85–87).—The H_2O is conc., Fe and Zn are removed, and Pb is determined colorimetrically as PbS by Winkler's method. E. C. S.

See also A., Apr., 462, H_2O analysis. 525, MeCl poisoning.

PATENTS.

Sewage-treating apparatus. F. S. CURRIE (U.S.P. 1,962,430, 12.6.34. Appl., 21.11.32).—Sludge is permitted to flow from a sedimentation chamber to a digester through non-return rotary valves, several forms of which are described. B. M. V.

Purification of organically polluted water. O. M. URBAIN, Assr. to C. H. LEWIS (U.S.P. 1,967,916, 24.7.34. Appl., 23.8.33).—Yellow P submerged in a polluted liquid acts as a catalyst in promoting the oxidation of dissolved org. matter by diffused air, the period and the vol. of air required depending on the surface exposed. After such treatment for 15 min.—1 hr. the time of stay in an activated-sludge aeration tank may be reduced by 80%. The action is non-biological and is unaffected by otherwise inhibitory wastes. If applied prior to chemical pptn. treatment the CO_2 produced is removed by $Ca(OH)_2$ added as a coagulant. C. J.

Purification of liquids [waste waters]. C. J. SMITH, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,964,487, 26.6.34. Appl., 23.9.29).— H_2O containing (poly)sulphides is treated simultaneously with a gas having a chemical action (e.g., CO_2) and a sweeping inert gas (e.g., flue gases) and finally with an inert gas (e.g., air) alone. B. M. V.

H_2O distillation.—See I. [Sewage] emulsoids.—See III. Purifying air.—See XI.