

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

FEB. 17 and 24, 1933.*



I.—GENERAL; PLANT; MACHINERY.

Weighted % equation aids chemical calculations. H. G. NEVITT (Chem. Met. Eng., 1932, 39, 673—675).—Equations and charts for the mutual conversion of wt.-%, vol.-%, and mol.-% are given. D. K. M.

Modern materials, other than metals and alloys, for construction of chemical engineering equipment. ANON. (Chem. Met. Eng., 1932, 39, 651—658).—The chemical resistance and the physical and mechanical properties of glass-lined and enamelled steel, glass and fused silica, stoneware, wood, cements, coke C, vulcanised and asbestos fibre, rubber, refractories, and plastics are given. D. K. M.

Design of heads for tanks and heat exchangers. C. O. SANDSTROM (Chem. Met. Eng., 1932, 39, 668—672).—The stresses in dished heads are considered and formulæ for the calculation of the thickness are given. D. K. M.

Heat transmission from metal surfaces to boiling liquids. I. Effect of physical properties of boiling liquid on liquid film coefficient. D. S. CRYDER and E. R. GILLILAND (Ind. Eng. Chem., 1932, 24, 1382—1387).—A brass tube was fitted with an electrical heating coil and 5 thermocouples, the coil being so adjusted that the surface temp. was uniform when the tube was immersed in H₂O. The liquid in which the tube was immersed for the tests was contained in an electrically heated boiler and the distillate measured by the use of a bell-jar and condenser. Various liquids were used. In the case of salt solutions local concn. occurred, so the bell-jar was omitted and current input measured instead. Results (which are tabulated) varied greatly with the surface of the tube (grooved or sanded etc.). Equations are derived to correlate the data, but they are not claimed to be applicable to metal surfaces other than those used. C. I.

Physico-chemical factors in high-pressure design. B. F. DODGE (Ind. Eng. Chem., 1932, 24, 1353—1363).—A series of graphs of PV/RT against P_R for a no. of vals. of T_R (ratio of temp. and pressure to crit. temp. and pressures) is given. These give approx. the deviation from Boyle's law under varying conditions irrespective of the nature of the gas. Gas densities are most readily calc. from this compressibility factor. Equations of state such as van der Waals' equation and the many more recent versions of it are all empirical in reality. They may give either P or V explicitly, but V is the more useful quantity for practical purposes. For gas mixtures available data show that neither P nor V is directly additive; in some cases the additive law is nearer the truth for P , in others

for V . A mixture may also be dealt with either by assuming a compressibility factor PV/RT , where V is the molal vol. and varies with the composition of the mixture, or by the use of equations of state. Another series of graphs shows the relation between C_P/C_1 as a function of the pressure ratio to the crit. pressures. At higher temp. the effect of pressure on C_P is negligible. Thermodynamic charts based on sp. heats are rarely available, and few direct measurements of C_P at high pressures have been made. It can, however, be accurately calc. from an equation of state, or sp. heat can be determined from measurement of the Joule-Thomson effect. Equations can be obtained to indicate the effect of pressure on chemical equilibrium in gas mixtures. Isothermal conditions are rare in practice, and to enable the performance of a catalyst converter to be calc. both equilibrium data and thermal data are necessary. C. I.

Theory and practice of testing stills. A. J. V. UNDERWOOD (Inst. Chem. Eng., Dec., 14, 1932. Advance proof, 41 pp.).—Methods for the calculation of the no. of plates theoretically required in a column for the fractionation of liquids of two or more components, with and without the withdrawal of streams from mid-points of the column, are given, together with the position of the feed plate for the most effective utilisation of the column, a method for determining in any operating column whether the feed plate is in the most effective position, and nomographs for the solution of equations relating to fractionation. For binary liquids no serious error is introduced by assuming const. molal reflux when the temp. difference between the top and bottom of the column is small. D. K. M.

Testing of an evaporator. W. E. GIBBS (Inst. Chem. Eng., Dec., 14, 1932. Advance proof, 7 pp.).—The observations and computations necessary are discussed and an example is given, calculations for a triple-effect evaporator dealing with saturated brine being set out in the form of a report. D. K. M.

Design, construction, and costs of arc-welded pebble mills. D. L. PELLETT (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 289—292).—Large-scale mills of this type have been made to withstand severe load conditions with a wide safety margin. The cost of arc-welding is substantially lower than that of other manufacturing methods. H. A. H.

"Molecule mixer" for preparation of colloids and hydrogenation with atomic hydrogen. S. VON BOGDANDY, M. POLANYI, and G. VESZI (Chem. Fabr., 1933, 6, 1—4).—An apparatus is described, in which a stream of gas or vapour may be brought in contact

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

with a rapidly moving, continuous film of liquid. When the process is applied to metal vapours, those of relatively high volatility (Bi, Cd, Zn, Tl, and Pb) give coarsely dispersed systems, whilst those of lower volatility (Cu, Ag, Au, and Sn) give stable colloidal solutions. A red Au sol in olive oil, prepared in this way, contained particles which could not be detected in the ultramicroscope. Preliminary experiments on the action of at. H on olive oil, oleic acid, *m*-cresol, quinoline, PhNO₂, cinnamaldehyde, and Et cinnamate are reported.

E. S. H.

Principles of granulation. T. G. HUNTER (Ind. Chem., 1932, 8, 404—408, 449—451).—A granular material requires less power for its pneumatic transport than a non-granular one. Granulation decreases the rate of absorption of moisture by hygroscopic substances, the rate being smallest when the grains are spheroidal; the rate is further reduced by coating the granules with suitable substances, e.g., NH₄NO₃ with vaseline. Caking is due to changes of atm. humidity, and uniformity of size of granules decreases the tendency to cake. The methods of granulation are: (1) controlled crystallisation, in which the rate of cooling at the temp. near saturation of the liquor is controlled and the liquor agitated; (2) pulverisation, which produces angular granules which may be rounded by churning in a rotating cylinder; (3) extrusion, e.g., forcing of moist material through a sieve, passing a paste of CaCN₂ through rolls, one of which is perforated and through the holes the paste is extruded; (4) the agglomeration of moist powders (100-mesh powder and 5% of H₂O gives best results), with or without the addition of an adhesive, by rotating them in a drum with paddles; after screening, the product may be glazed by drying in a rotary dryer; (5) spraying of molten substance through atomisers, rotary sprayers, or perforated trays and cooling the spray by gases (air), liquids, or metal surfaces cooled by H₂O; the granules may be coated with inert material by dispersing the latter in the liquid cooling medium.

D. K. M.

Device to isolate explosions occurring in chemical plants. T. J. DIXON (J.S.C.I., 1932, 51, 433T).—A box of cast Fe or Pb packed with broken SiO₂ is interposed in a gas pipe-line and has a light Pb cover partly cut through by grooves along 2 diams. An explosion in the line communicating with the upper part of the box ruptures the cover. For protection in either direction the boxes must be used in pairs.

C. I.

Functional testing of chemical plant: some theoretical aspects. A. L. BLOOMFIELD (Inst. Chem. Eng., Dec., 14, 1932. Advance proof, 10 pp.).—The quantities to be observed, e.g., plant dimensions, measurement of flow, etc., and the various forms of flow and balance sheets are discussed.

D. K. M.

Machinery in the chemical works. F. A. M. WÜLFINGHOFF and G. JUNGITZ (Chem. Fabr., 1933, 6, 8—17).—Typical apparatus used in the chemical works is described. The special advantages of Fe, steel, alloy steels, Cu, Ni, Al, Pb, monel metal, wood, and earthenware are discussed.

E. S. H.

Determination and calculation of the viscosity of gas mixtures. H. RICHTER (Gas- u. Wasserfach,

1932, 75, 989). L. ZIPPERER and G. MÜLLER (*Ibid.*, 989—990).—The formula $10^6 \nu_{20} = 0.755 + 13.82/d - 0.775/d^2$ connecting the kinematic viscosity and the density of gases (air = 1) has been deduced from the work of Biel (*ibid.*, 1927, 70, 623) and shown to fit the figures obtained for gas mixtures by Zipperer and Müller (B., 1932, 915) for vals. of *d* between 0.2 and 1.3. If the latter had used gases containing high H₂ concns. or > 21% CH₄, greater disagreement might have resulted when using their formula.

In reply, Zipperer and Müller state that Richter's formula agrees fairly well with experimental facts, but is unsound from a purely physical viewpoint. It shows greater discrepancies than their own formula with mixtures containing heavy hydrocarbons or when *d* is not known with great accuracy.

R. N. B.

Viscosity determination. W. VAN WÜLLEN-SCHOLTEN (Farbe u. Lack, 1932, 607—608).—A fluidometer is described consisting of an improved Ford cup (B., 1933, 1) which is provided with outlet tubes of 3, 4, or 5 mm. diam., according to the η of the oil or paint, and a H₂O-bath.

S. M.

Transparent pressure apparatus. Digester circulation.—See V. **Diatomite insulating product.**—See VIII. **Cast-Fe alloy.**—See X. **Electric heating of plant.**—See XI.

See also A., Jan., 45, **Measuring viscosity.**

PATENTS.

Tunnel kilns. WOODALL-DUCKHAM (1920), LTD., and A. N. TARRANT (B.P. 384,011, 23.9.31).—In a tunnel kiln having a longitudinal flue in the moving floor through which gases from the kiln circulate, the flue is divided up by dampers which are automatically operated so that the circulation of gas can be confined to the desired zone of the kiln.

B. M. V.

Regenerative heating furnace. G. H. ISLEY, Assr. to MORGAN CONSTRUCTION CO. (U.S.P. 1,852,306, 5.4.32. Appl., 19.9.29).—Pairs of stacks, of sets of regenerators, and of furnaces are arranged abreast and a cross-passage is provided at the end of the furnaces to complete a U-shaped arrangement. Fuel is admitted to one (alternately) of the passages between a regenerator and its furnace and also, usually, to the cross-passage, so that both furnaces may be heated to the full heat simultaneously. Air is blown through an ejector device at the base of both stacks, but in the throat of one stack it is turned back by a damper so as to form combustion air.

B. M. V.

Furnace for dewatering and the like. E. J. FOWLER, Assr. to NICHOLS ENG. & RESEARCH CORP. (U.S.P. 1,852,646, 5.4.32. Appl., 8.3.28).—A tower furnace is provided with hearths which are alternately rotating and fixed; they are conical in shape and the material is dragged up the slope by rables which are alternately fixed and rotating, all rotating parts being on the same vertical shaft.

B. M. V.

Connecting one or several soda-melting furnaces to a rotating furnace. B. H. O. DE VERDIER (U.S.P. 1,851,814, 29.3.32. Appl., 10.11.30. Swed., 14.9.29).—A connecting neck between one or two fixed furnaces

and a rotating furnace, as used, *e.g.*, in the cellulose industry, is described. B. M. V.

Furnace. J. L. McFARLAND, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,852,816, 5.4.32. Appl., 7.4.31).—In a furnace having a U-shaped slot in the roof through which the goods are suspended and along which the hangers are caused to travel in mutual heat-exchange relation when in the arms of the U and subjected to heat while passing round the bend, a method of supporting the brickwork at the slot is described.

B. M. V.

Vertical tube-furnace. A. T. CHILDS and J. J. WELDON, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,852,800, 5.4.32. Appl., 8.9.30).—The furnace is adapted to the downward passage of a no. of articles stacked on each other in a long column. They are supported on a swinging bracket outside the furnace at the bottom, and are removed a few at a time by the aid of a lift.

B. M. V.

Heat-treatment [e.g., of malleable iron castings]. R. J. TEETOR (U.S.P. 1,851,738, 29.3.32. Appl., 20.10.30).—At least two furnaces are provided and the articles are heated to and held at the max. temp. by means of combustion gases in contact with them, the air being preheated by heat exchange as described below and also by recuperation with its own exhaust gases. During the next quick-cooling stage the goods are cooled by the forced circulation of inert gases through the furnace and a heat exchanger which transmits the heat to a current of air driven by another fan and utilised for combustion in another furnace, if available, or wasted to atm. During the next very slow-cooling stage heat is allowed to escape by radiation only. The final rapid cooling is effected as in the first stage of cooling.

B. M. V.

Crusher. R. D. NYE, Assr. to SMITH ENG. WORKS (U.S.P. 1,851,109, 29.3.32. Appl., 21.8.29).—In a double jaw-crusher, both swing jaws are directly operated by the same eccentric, their upper ends being formed as half-bearings engaging opposite sides of a single sleeve on the eccentric.

B. M. V.

Dispersion mill. P. M. TRAVIS (U.S.P. 1,851,071, 29.3.32. Appl., 30.6.23).—In a mill of the combined shearing and turbulence type having fluted conical working surfaces, the feed is to the small end of the rotor, and at the large end a centrifugal pump impeller is provided to create a back-pressure retarding the flow of material.

B. M. V.

Grinding muller roller. R. E. RITCHIE, Assr. to CHAMBERS BROS. Co. (U.S.P. 1,852,435, 5.4.32. Appl., 26.7.29).—Edge runners are rotatable on individual axles which are guided by shackles so that they are free to rise, but they are pressed down by hydraulic and/or pneumatic pressure as well as by their own wt.

B. M. V.

Mixing machine. J. F. FIELD (U.S.P. 1,852,712, 5.4.32. Appl., 28.11.30).—In a tower the solid material passes first down an inclined adjustable deflector to regulate the rate of feed, then down a swinging deflector which by the impact of the solids closes switches which start a pump to deliver the liquid constituent. The incorporating chamber is horizontal and may be provided

with helical blades of variable pitch followed by sets of intercalating pins. The outflow is obstructed to regulate the time of incorporation. B. M. V.

Apparatus for mixing, kneading, or disintegrating. H. ROSER, and BAKER PERKINS, LTD. (B.P. 384,408, 30.10.31. Ger., 1.11.30).—An inclined drum is rotated at centrifugal speed and the material is fed thereto by a device such as a worm and removed from the walls by, *e.g.*, a worm of ordinary pitch rotating relatively slowly, a stationary helical blade of long pitch, or wobbling swashplates.

B. M. V.

Kneading and mixing machines. F. AESCHBACH A.-G. (B.P. 384,627, 23.9.32. Switz., 2.8.32).—A rotating bowl is provided with two stirrers rotating about inclined, fixed axes. The stirrers are claimed to run at different speeds, but the paths of their blades are shown intercalating.

B. M. V.

Mixing, kneading, grinding, and sifting machines. L. and J. EIRICH (GEBR. EIRICH) (B.P. 383,588, 5.7.32. Austr., 21.9.31. Addn. to B.P. 377,010; B., 1932, 867).—A carriage and lift is provided for changing the grids in the bottom of the pan of the apparatus described in the prior patent.

B. M. V.

Mixing, kneading, shredding, and like machines. BAKER PERKINS, LTD. (B.P. 383,886, 6.5.32. Ger., 26.5.31).—In a machine of the type in which two rotors run in parallel arcuate troughs, the blade elements of the rotors are helical and extend the full length; their edges and those of the saddle-piece between the troughs may be serrated.

B. M. V.

Apparatus for sifting or grading discrete materials. F. KRUPP GRUSONWERK A.-G., Assces. of H. J. JOHLIGE (B.P. 383,903, 24.5.32. Ger., 19.6.31).—The sifting and conveying bed is formed of discs which are threaded eccentrically on shafts and rotated in unison. In this apparatus the discs on adjacent shafts, instead of alternating singly, are arranged in groups, the width of a group on one shaft being rather < the largest particle to be screened.

B. M. V.

Apparatus for sizing granular materials. M. BOUQUET (B.P. 383,885, 5.5.32. Fr., 3.7.31. Addn. to B.P. 382,875; B., 1933, 3).—Three rolls are assembled with their axes out of line so as to form a pocket for the material.

B. M. V.

Mixing apparatus. J. B. PARNALL and W. W. VEITCH (B.P. 383,419, 17.11.31).—A rotor for causing circulation in a tank is in the form of a disc with central aperture having, on the underside, vanes which are shallower at the periphery than at the centre and, on the upper face, a flange around the aperture. The rotor is driven by a shaft the upper part of which remains in a fixed vertical position, but a universal joint is provided so that the rotor may be swung to one side of the tank. B. M. V.

Mixing apparatus. G. H. HAINES, Assr. to GRAIN MACHINERY Co. (U.S.P. 1,849,187, 15.3.32. Appl., 6.1.31).—The apparatus is suitable for mixing a liquid with a dry substance, *e.g.*, molasses with grain, and comprises a cylindrical vessel tapering at the bottom to a delivery spout. An axial helical elevator is provided which spreads the dry material over an annular

table at the top, during which progress it is sprayed with the liquid. Additional reciprocating agitators are provided on the tapering wall. B. M. V.

Mixing machine. H. L. JOHNSTON, ASSR. to HOBART MANUFG. Co. (U.S.P. 1,849,094, 15.3.32. Appl., 30.11.28).—A multi-speed gear for a mixing paddle is described. B. M. V.

Mixing machine [for cream etc.]. J. W. PUTERBAUGH (U.S.P. 1,851,325, 29.3.32. Appl., 8.4.29).—A whipping device for mixing, aerating, and fluffing up in one operation comprises a pair of cages freely mounted on shafts at right angles to the lower part of a vertical shaft which is rotated. B. M. V.

[Centrifugal] separator [for cream etc.]. P. B. SHEE, ASSR. to SEARS, ROEBUCK & Co. (U.S.P. 1,851,527, 29.3.32. Appl., 5.4.30).—In a separator of the cream type, alined apertures are provided in the cones at an intermediate distance between the main passages past the inner and outer edges of the cones, nearer the former than the latter; the cream rising through these apertures is guided to the main cream outlet by means of grooves formed on the underside of a covering disc or cone. B. M. V.

Settling tanks for thickening turbid liquids. W. LANGEN (B.P. 384,574, 8.6.32).—Rotation of rakes, feed of muddy liquid, and withdrawal of thick sludge are all effected from an island floating in the centre of the tank and restrained by ties from the rim. The bridge for carrying the ducts and power leads is supported at the island end by a hinge and at the outer end on rollers. B. M. V.

Clarification plant. M. PRÜSS (U.S.P. 1,851,684, 29.3.32. Appl., 24.1.29. Ger., 25.1.28).—Sewage or other sludge is raked to a sump (A) by mechanism of known type, the wt. of which may be partly borne by floats, and is removed from A by a pump situated in a stationary watertight chamber below water level in, or just above, A. B. M. V.

Filtering apparatus. G. RAYMOND and R. A. MORGEN (U.S.P. 1,852,371, 5.4.32. Appl., 21.1.29).—A filter-press, arranged above the upper end of a sloping tank the lower end of which forms a reservoir for prefill, is provided with a feeder for filter-aid and pump to effect the filtration. When the press becomes choked the prefill is automatically by-passed back to the reservoir through a sight glass. The pump is then stopped, the press opened, and the cake dropped on to the sloping bed of the tank to drain. To enable the apparatus to be used for dry-cleaner's solvent the whole apparatus is enclosed. B. M. V.

Filtration material. R. CALVERT, ASSR. to CELITE CORP. (U.S.P. 1,851,808, 29.3.32. Appl., 28.10.24. Renewed 19.9.27).—A filter-aid is composed of kieselguhr which has been treated with CaO at a temp. suitable to effect interaction and another solid material having particles smaller than those of the kieselguhr. A 3 : 2 : 1 mixture of kieselguhr, CaO, and old filter cake is mentioned. B. M. V.

Sludge dryer. J. B. BERRIGAN and J. HARRINGTON, ASSRS. to PRESS & DRIER Co. (U.S.P. 1,851,149, 29.3.32. Appl., 9.6.30).—A furnace on rollers and methods of

forming passages³ for the heating gases are described for a dryer as in U.S.P. 1,770,727 (B., 1931, 278).

B. M. V.

Extracting means. C. F. LOESCH, ASSR. to N. V. "OLIEFABRIEK ALKMAAR" (U.S.P. 1,851,856, 29.3.32. Appl., 13.12.28. Ger., 1.4.26).—The extracting is done in an intermediate zone of a vertical tank, the upper part being divided off by a flexible filter diaphragm through which the solution rises and from which mud is shaken at intervals. The lower part is occupied by a still for recovery of solvent. The change-over from circulation of solution to washing with pure solvent is effected automatically by a float which rises at the required sp. gr. Stirrers are provided in the extraction compartment. B. M. V.

Device [digester] for treating materials chemically. J. E. TRAINER and W. A. JONES, ASSRS. to BABCOCK & WILCOX Co. (U.S.P. 1,851,024, 29.3.32. Appl., 5.4.27. Renewed 29.7.30).—In a digester jacketed around the cylindrical wall and at one end only, the pressure of the heating fluid is prevented from straining the connexion of the jacket at the other end by the provision of abutting lugs internally on the jacket and externally on the vessel. B. M. V.

Method of contacting solid and gaseous materials. E. O. BARSTOW and S. B. HEATH, ASSRS. to DOW CHEM. Co. (U.S.P. 1,852,227, 5.4.32. Appl., 13.2.30).—A body of comminuted solid is subjected to contact with a gas introduced at a no. of different levels while simultaneously another fluid is passed through tubes, also well dispersed and conveniently at right angles to the gas inlets, for the purpose of regulating the temp. The process is applicable to the dehydration of MgCl₂ by means of currents of HCl in the presence of Fe at 140—325°. Heat is provided by combustion gases, and their residual heat is transferred to the circulating HCl. The H₂O content of the outgoing gases should be > 17%. B. M. V.

Apparatus for removing dust from gases and/or purifying the same by washing. ATELIERS J. HANREZ SOC. ANON., and A. MODAVE (B.P. 384,535, 20.4.32. Belg., 17.3.32).—Methods of irrigating and of supporting the lower ends of the columns in a Modave washer are described. (Cf. B.P. 380,746; B., 1932, 1062.)

B. M. V.

Apparatus for effecting a partial separation of mixed gases. S. B. DAUGHERTY (U.S.P. 1,851,163, 29.3.32. Appl., 14.4.28).—Water or other solvent is circulated continuously between a higher level and a lower level, the mixed gases are bubbled through at the lower level, and a mixture richer in one constituent is evolved at the higher level. By arranging the absorption zone shorter and wider than the rising limb, the circulation may be effected automatically by the gas-lift. B. M. V.

Treatment of gases under pressure. A. H. TROTTER, ASSR. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,852,763, 5.4.32. Appl., 24.5.29).—In, e.g., the removal of CO₂ from N₂-H₂ mixture under pressure by scrubbing with H₂O, the scrubbing is effected at the bottom of a borehole deep enough for the column of H₂O to provide the pressure. At the surface the H₂O inlet is sufficiently

high above the waste- H_2O outlet to neutralise the loss of head in the underground scrubber. B. M. V.

Method for treating [incorporating two fluid] substances. U. G. TODD, Assr. to PFAUDLER CO. (U.S.P. 1,851,266, 29.3.32. Appl., 6.8.28).—A gas (or lighter liquid) is incorporated into a (heavier) liquid and a portion of each is withdrawn and after cooling, if desired, is circulated back into the other fluid respectively and simultaneously. The process is applicable to the concn. of fruit juices, the vapours from a heated bulk of juice being absorbed in a smaller bulk of conc. juice.

B. M. V.

Refrigerant. C. DANTSIZEN, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,854,984, 19.4.32. Appl., 19.9.30).—A mixture of HCO_2Me with 5–10 wt.-% of anhyd. $MeOH$ or $EtOH$ is claimed. H. R.-D.

Gas- or liquid-storing material. F. G. KEYES, Assr. to FRIGIDAIRE CORP. (U.S.P. 1,854,589, 19.4.32. Appl., 6.9.22. Renewed 26.5.30).—Material for use, e.g., in refrigerating apparatus described in U.S.P. 1,622,521 (B., 1927, 400), is prepared by heating $CaCl_2$ with, e.g., Portland cement or with ZnO , $ZnCl_2$, and Na_2SiO_3 ; the product may be used alone or mixed with activated C. L. A. C.

[Firing arrangement for] coal-dust furnaces. W. BREDSCHNEIDER (B.P. 385,232, 19.7.32).

Filler [chequer]-bricks for regenerators for industrial furnaces. J. DOUGALL & SONS, LTD., and W. B. MITCHELL (B.P. 385,151, 18.3.32).

Foam-like masses.—See V. Preparing flux for porcelain.—See VIII. Cement kilns and coolers. Grinding cement.—See IX. Pptn. apparatus [for gases].—See XI. Milk-treating apparatus.—See XIX.

II.—FUEL; GAS; TAR; MINERAL OILS.

Yorkshire, Nottinghamshire, and Derbyshire coalfield. South Yorkshire area. Silkstone seam. ANON. (Dept. Sci. Ind. Res., Fuel Res. Survey Paper No. 25, 1932, 51 pp.).—Detailed analyses of representative samples of coal taken from 12 points distributed over the area concerned are tabulated. The seam is divided by a dirt band into a lower portion of bright coal, "bottom softs," and an upper portion which is again subdivided into "branch" or "hards" above and "top softs" below. Analyses of these subdivisions as well as of the total seam have been carried out. The moisture content of the whole seam samples was $> 2\%$, the ash content 1.5–5.7% (average about 3%), and the volatile matter 33.5–36.8%. The S and P contents of most of the samples were low. The calorific val. of the seam was high, in some instances exceeding 15,000 B.Th.U. per lb. of air-dried coal. The cokes produced in the Gray-King assay at 600° were highly swollen. The fusion point of the ash was, in general, comparatively high. The suitability of the coal for household use, gas making, etc. is briefly discussed. A. B. M.

Composition of coal. Constitution of the ulmins. F. HEATHCOAT and R. V. WHEELER (J.C.S., 1932, 2839–2847; cf. A., 1925, i, 1389).—The action of $MeMgI$ on a series of coals under comparable conditions affords varying amounts of CH_4 , the vol. obtained depending

on the reactivity index (B., 1931, 466), and is a measure of the reactive H in the coal. Acetylation, followed by hydrolysis of the Ac compounds and determination of the $AcOH$ liberated, shows that the ulmins contain free OH groups, the no. of such groups decreasing with increasing rank of the coal. Contrary to other workers, treatment of a fairly high-rank bituminous coal with ClO_2 affords evidence that the ulmins as a whole are homogeneous. Chlorination-oxidation as above removes the org. S but little of the N. The action of ClO_2 on a series of coals shows (from the C/H ratio before and after chlorination) that lower-rank coals contain more C in reactive groupings than coals of higher rank. Hydrolysis of the Cl compounds with $NaOH$ affords products of uniform C content, but the Cl content of those from higher-rank coals is greater (24.0%) than from those of lower (16.3%) rank. No evidence is obtained of the existence of ulmins of different types.

J. L. D.

Chemistry and technology of solid fuel. D. J. W. KREULEN (Chim. et Ind., 1932, 28, 1011–1017).—No satisfactory method of separating vitrain and durain in coal is known. Lehmann and Stach have correlated the proportions of these components in coal with their properties by microscopical examination of powdered coal disseminated in melted resin. It has been suggested that vitrain is a dispersing medium and that durain is vitrain containing dispersed mineral and vegetable matter. Lieske suggests that fusain is produced from vegetable matter in pockets of fermentation gas. Fischer and Serader's theory of the importance of lignin as the starting point of coal is supported. Lierg's experiments with bitumens, in which condensation products were obtained from solutions which were themselves sol. only in heavier solvents, have been paralleled by the author with humic acids, and inversely coal can be converted into humic acids by controlled oxidation. Low-temp. carbonisation and hydrogenation of coal are referred to, as also are the problems of the combustibility of coke, and the Fischer and Tropsch prep. of hydrocarbons from water-gas by catalysis. C. I.

Characterisation of anthracites and anthracite coals. D. FLORENTIN (Ann. Falsif., 1932, 25, 453–459).—Curves plotted between the vol. of gas evolved per g. and temp. (400–1000°) are a characteristic of a particular type of anthracite or anthracite coal. The initial temp. of gas evolution is about 600° for a good anthracite (d 1.5–1.8), whilst with anthracite coals (d about 1.35) it may be as low as 460°, and at 1000° the vol. obtained from the former is much smaller than that from the latter. A technique is described whereby the "characteristic gas vol." (c.c. per g. at 700°) may be readily determined, and it is suggested that this val. and the d val. should be used in addition to the usual tests in standardising anthracite. A classification of various types on this basis is made.

J. W. B.

Characteristics of lignite dehydrated by steam. A. M. COOLEY, JUN., and I. LAVINE (Fuel, 1932, 11, 428–434; cf. B., 1931, 97; 1932, 758).—Some Dakota lignites when dried by the Fleissner process give a product having good weathering, handling, and burning characteristics; others, however, cannot be successfully

treated by this process. Successful dehydration was always accompanied by a decided absorption of steam by the lignite during the preheat period and by a shrinkage in vol. of approx. 30%.
A. B. M.

Parallel float-and-sink testing [of coal] in carbon tetrachloride and zinc chloride. W. GOOSKOV (Colliery Guard., 1932, 145, 517—518).—Yields of light fractions were larger with $ZnCl_2$ than with CCl_4 ; in most cases S contents were lower in CCl_4 than in $ZnCl_2$ fractions.
CH. ABS.

Artificial material from coal for the manufacture of common objects. F. FISCHER, O. HORN, and H. KÜSTER (Brennstoff-Chem., 1932, 13, 468—472).—Lignite or lignitic brown coal is ground, dried *in vacuo*, and mixed at about 80° with about 12% of cresol, dissolved in a suitable solvent. When the considerable swelling which occurs on mixing has ceased the solvent is removed *in vacuo* and the product is pressed (300 kg./sq. cm.) in moulds, preferably at about 150°. A material ("kolinit") only slightly inferior in strength to bakelite is produced; it can be worked mechanically, e.g., in the lathe, and is suitable for the manufacture of buttons, plates, etc. It is a better electrical insulator than bakelite and is extremely cheap to manufacture.
A. B. M.

Volumetric determination of total sulphur in coal. V. S. KOBZARENKO (Nauk. Zapiski Tzuk. Prom., 1932, 20, 39—42).—The coal is ignited with Eschka's mixture, the aq. extract is boiled with H_2O_2 , and HCl is added until the ppt. almost dissolves. $BaCrO_4$ and NaOAc are added, and after 15 min. the solution is made slightly alkaline and filtered. An aliquot part of the filtrate is then treated with KI and HCl and titrated with $Na_2S_2O_3$.
CH. ABS.

The Kjeldahl process. Comparison between coal and other nitrogenous substances. A. E. BEET (Fuel, 1932, 11, 406—408; cf. B., 1932, 630, 870).—When determining N in bituminous coal by this process it is necessary to continue heating the acid for some time after it has become clear (cf. B., 1932, 630). This precaution is unnecessary with rice flour, wheat flour, bonemeal, etc. Moreover, with these materials, again unlike the results obtained with coal, all the catalysts used were equally effective, reducing the period of digestion from about 200 min. to 33 min. "After-boiling" was necessary to give the total N in the charred residue from the carbonisation of flour at 450°.
A. B. M.

Electrolytic oxidation of coal. C. S. LYNCH and A. R. COLLETT (Fuel, 1932, 11, 408—415).—The pulverised (bituminous) coal was maintained in suspension in the electrolyte in the anode compartment of an electrolytic cell. The max. rate of formation of humic acids was obtained with an electrolyte of 3N-NaOH, a Cu anode, and a c.d. of about 0.3 amp./sq. dm.; a porous diaphragm was necessary, otherwise no oxidation was observed. With a Cu anode oxidation stopped at the humic acid stage; with a Pt anode the humic acids were further oxidised. The max. absorption of O took place initially, although the greatest evolution of CO_2 and formation of humic acids occurred later, suggesting that some pre-oxidation of the humins was necessary

before the humic acids were formed. Potentiometric titration of the humic acids showed that a p_H of 2.0 was the lowest [H] which would ppt. them from solution. The val. of electrolytic oxidation as a tool for the study of the constitution of coal is discussed.
A. B. M.

Regeneration of humic acids from coal by nitric acid oxidation. V. G. LILLY and C. E. GARLAND (Fuel, 1932, 11, 392—400).—The rate of regeneration of humic acids on oxidising coals with HNO_3 (1:1) at 75—80° has been followed by using a slightly modified form of Fuchs' method for the determination of the humic acids produced after suitable periods of oxidation (cf. B., 1928, 145). A no. of bituminous coals and one lignite were oxidised. The larger the particle size of a coal the slower was the initial rate of humic acid regeneration, but the same final val. of humic acid content was eventually reached. In general, other conditions being the same, the higher the rank of the coal the slower was the rate of humic acid regeneration, as was shown by an approx. correlation between the "fixed carbons" of the original coals and their humic acid contents after 36 hrs. oxidation. There was no direct correlation between the evolution of CO_2 and the regeneration of humic acids.
A. B. M.

Melting of coal during the carbonisation process. H. A. J. PIETERS and H. KOOPMANS (Fuel, 1932, 11, 447—451).—Coal, sized to 0.5—1.0 mm., was heated in a stream of CO_2 in an externally-heated, rotating glass tube at const. temp. until tar evolution ceased, i.e., about $\frac{1}{2}$ hr. after attaining the desired temp. The cooled product was embedded in resin, ground and polished, and examined under the microscope. Vitrain particles on heating first melted and were then blown into thin-walled hollow spheres by the gaseous decomp. products; at higher temp. the spheres combined to form thin-walled aggregates and on further raising the temp. the walls of the aggregates developed a fine-porous structure. With a structured coal, e.g., clarain, only the homogeneous part melted, whilst the structured plant remains formed partition walls inside the cenospheres. High-rank coals did not melt but only decomposed, leaving porous coke particles. Oxidation of the vitrain raised its m.p., giving it the character of a coal of higher rank.
A. B. M.

Influence of bitumen on the coking capacity of coal and coal mixtures. K. BUNTE (Z. Österr. Ver. Gas- u. Wasserfach, 1931, 71, 81; Fuel, 1932, 11, 400—405).—Four German coals have been extracted with C_5H_5N and the extracts fractionated by Wheeler's method (B., 1927, 401). The caking powers of the coals were determined by a modified form of Kattwinkel's method (B., 1926, 257, 905); the caking power is given by x^2/y , where x is the amount of sand added (1—5 g. per g. of coal) and y is the amount of loose powder formed. The crushing strengths of the coke buttons obtained by carbonising 7 g. of each coal in a steel cylinder under a load of 300 g. were also determined. The caking power of a blend of the coals was approx. the arithmetic mean of the results for the individual coals. Of the individual fractions the β and γ_{3+4} alone possessed caking power, whereas the γ_1 and γ_2 fractions strengthened these properties without themselves

being capable of being caked, and the α fractions reduced the caking properties. The crushing strength of a coke made from a blend of the coals was not the mean of the results for the individual components; by suitable blending cokes having a greater strength than those obtained from the single coals could be produced. The important factors for the crushing strength of the coke were the β and γ_{3+4} fractions and their wt. ratios; the strength attained a max. with a bitumen content of about 10% and a ratio of β to γ_{3+4} fraction of 1:3.

A. B. M.

Microscopical investigation of coking. E. TERRES and O. REINECKE [with KRÜPE] (*Angew. Chem.*, 1932, 45, 715—719).—Photomicrographs of different types of coal which have been partly carbonised are reproduced. Softened anthracite is relatively very fluid, and as a result the pores formed during the liberation of gas occasion little swelling and collapse rapidly. The fusain present takes but little part in the process of carbonisation, and is relatively heat-stable. H. F. G.

Test of the intermittent vertical chambers at Croydon. Rept. 32 of Joint Res. Comm., Inst. Gas. Eng. and Univ. Leeds. F. J. DENT, W. H. BLACKBURN, N. H. WILLIAMS, E. PARRISH, and A. R. KELLY (*Gas J.*, 1932, 200, Suppl., 16—20).—The plant consisted of one bench of 36 intermittent vertical chambers (Woodall—Duckham) arranged in 6 settings. Before charging the coal (average charge 3.5 tons), the lower 12 in. of the chamber were filled with graded small coke. The average temp. of the bottom combustion flues was 1300° and of the top 875°. The plant was operated on a 12-hr. carbonising period, steam being admitted to the chambers during the last 2 hr. The results of the test of 4 weeks' duration were, per ton of coal carbonised: gas (calorific val. 549 B.Th.U.) 78.62 therms, coke 13.90 cwt., coke for sale (*i.e.*, after deducting coke supplied to producers) 11.29 cwt., tar 13.35 gals., NH_3 recovery equiv. to 28.3 lb., of $(\text{NH}_4)_2\text{SO}_4$, thermal loss of coal gas by leakage from the chambers 1.6 therms. The efficiency of gas production was 63.2% and of carbonisation 85.3%. The effect of radiation on the observed temp. of the waste gas at the inlet and outlet of the waste-heat boiler was determined by comparing the reading of an ordinary thermocouple with that of the "suction" pyrometer. In using this latter instrument, the rate of gas flow over the junction is artificially increased until no further change takes place in the indicated temp. W. H. B.

Operating results with a small horizontal coke oven. OTTO (*Gas- u. Wasserfach*, 1932, 75, 1029—1032).—A step-grate producer which can be fired with brown coal briquettes, coke, or surplus gas, and so take advantage of the varying coke market, is described. Gas analyses and temp. measurements with the two former fuels show that a higher oven temp. can be reached when coke is used, and less combustible matter is left in the clinker. Although 50 wt.-% more briquettes are used for a similar coal throughput, there is an actual saving in cost of 21%. When using briquettes, less H_2O is needed for cooling the grate and temp. control of the setting is easier, but the resulting clinker is unsaleable.

R. N. B.

The back-run process for the manufacture of carburetted water-gas. II. Rept. 31 of Joint Res. Comm., Inst. Gas Eng. and Univ. Leeds. F. J. DENT, W. H. BLACKBURN, N. H. WILLIAMS, E. PARRISH, and A. R. KELLY (*Gas J.*, 1932, 200, Suppl., 6—9; cf. B., 1931, 99).—The effect of superheating part of the steam by passing it through the superheater and carburettor has been investigated in tests using (a) the ordinary "down-run" process, (b) the "back-run" process, on a plant at the Nine Elms works of the Gas Light & Coke Company. The plant had a rated capacity for 500 B.Th.U. gas of 1,750,000 cu. ft. per day and was equipped with a self-clinkering grate and both an annular and a waste-heat boiler. The experimental methods employed are described and the results, including chemical and heat balances, are given in detail. The amount of downward steam which could be used in the down-run tests was restricted by the necessity of maintaining a temp. at the top of the carburettor sufficiently high to ignite the blow gases; in the back-run tests, however, the amount of downward steam could be increased until the upper limit of temp. for the safe working of the mechanical grate was reached. The proportion of steam which could be passed downwards through the generator was found to determine very largely the ability to maintain a proper distribution of temp. in the fuel bed; the back-run process is thus at an advantage in this respect. The introduction of back-run steaming can be used to obtain a reduction of the coke consumption or an increase in the vol. of gas made per day, or both, as a result of (a) the heat returned to the generator by the back-run steam, (b) the improved temp. distribution in the fuel bed. Some of the reduction in coke consumption is obtained at the expense of a reduction in the amount of steam raised.

W. H. B.

Experiments on gasification of Donetz anthracites in the Thiessen gas producer. N. V. SCHISHAKOV (*Izvest. Teplotekh. Inst.*, 1932, 391—409).—Anthracite containing >15% of ash causes clinkering, and H_2O -jacketing the zone of combustion is then necessary.

CH. ABS.

Gases met with underground. J. S. HALDANE (*Gas J.*, 1932, 200, Suppl., 9—10).—Choke or black-damp results from removal of O_2 from air by substances present in soil and rock, and its partial replacement by CO_2 . Deficiency of O_2 rather than excess of CO_2 causes danger. A fall in barometric pressure often causes large vols. of gas to issue into underground spaces. The combustible gases found adsorbed in coal are liberated with explosive violence if coal has been disintegrated by earth movements. It is considered that CH_4 and H_2 formed by anaërobic fermentation may have been the cause of the Holborn explosion in 1928. In oxygenated soils, gases resulting from anaërobic fermentation or leaks in gas mains are readily consumed by micro-organisms.

E. S.

Gas and water from gushers in Kara-Chukhur. I. TOLBIN and A. ARAKELYAN (*Azerbaid. Neft. Choz.* 1932, No. 1, 52—59).—The gas contained CO_2 0.3—4.6% hydrocarbons 72.5—98.4, N_2 0—22.1%. H_2O from wells contained Cl 4.393—8.928, CO_2 0.002—0.341,

SO₃ trace—0.0448, CaO 0.1666—0.786, MgO 0.1619—0.7956 g. per litre. CH. ABS.

Preparation of pure methane from natural gas. H. H. STORCH and P. L. GOLDEN (J. Amer. Chem. Soc., 1932, 54, 4662—4663).—The removal on a large scale of higher hydrocarbons and all but 0.05% of the C₂H₆ from natural gas by means of active charcoal is described.

J. G. A. G.

Removing gasoline from gas. S. ISAEV, A. G. EGOROV, and A. GRIGORIEV (Groz. Neft., 1932, 2, No. 3—4, 49—53).—Grozni natural gas contains 1 kg. of gasoline per cu. m. Gases recovered in the New Grozni district contained, after recompressing, CH₄ 29.7—30, C₂H₆ 10.3—11.8, C₃H₈ 28.4—29.1, C₄H₁₀ 23.7—22.6, C₅H₁₂ and higher homologues 7.9—6.5%. The gasoline contains C₂H₆ 0.4—4.3, C₃H₈ 3.7—17.1, C₄H₁₀ 20.1—44.0, C₅H₁₂ 25.3—29, residue 10.4—49.5%. CH. ABS.

The Sigma B.Th.U. Recorder. 30th Report of Joint Res. Comm. Inst. Gas Eng. and Univ. Leeds. J. W. WOOD, F. J. DENT, W. H. BLACKBURN, N. H. WILLIAMS, E. PARRISH, A. R. KELLY, and J. W. G. DAVEY (Gas J., 1932, 200, Suppl., 15—16).—Gas is burned under controlled conditions and a portion of the heat developed acts on a concentric tubular body. The differential expansion produced is recorded on a moving chart by a pen mechanism. The recorder is robust, requires no water supply or drain, has an indefinitely long life, and requires little attention to keep in working order. It is suitable for use in small gas undertakings where a more elaborate recorder would be too costly as compared with the output of gas. The record is automatically corrected within limits for changes in *d* of the gas and in atm. temp. and pressure. It must be checked and set at regular intervals against a non-recording calorimeter, and should be cleaned every 14—28 days. It may be expected to indicate the gross calorific val. of town's gas within ±2% or, with daily checking, ±1%. 80% of a sudden change in calorific val. is registered in 5 min., but 45 min. is necessary to attain equilibrium. G. M.

Slide nomograms applied to gas-works routine calculations. T. H. BLAKELEY (Gas J., 1932, 200, 860—861).—A combined slide rule—nomogram is useful for solving expressions containing > 3 variables. The construction and use of such an instrument for the determination of the calorific val. of a gas with a Boys calorimeter, and also of a slide rule for reading off log. gas-vol. factors, are described. If temp. rise, vol. of H₂O collected, barometric pressure, log. gas-vol. factor, and temp. of meter, effluent gas, and air are known, the calorific val. can be calc. to ±1 B.Th.U.

R. N. B.

2nd Rept. of the [Gas-]Liquor Effluents and Ammonia Sub-Committee [of the Institution of Gas Engineers]. A. KEY, W. ETHERIDGE, and A. H. EASTWOOD (Gas J., 1932, 200, Suppl., 11—13; cf. B., 1932, 53).—(a) The activities of the Committee since 1926 are summarised. (b) A method has been worked out for the determination by means of active charcoal of the benzol present in liquor after washing for recovery of PhOH. (c) The initial efficiency of tolyl

phosphate as solvent for PhOH is much greater than that of benzol, its total capacity being 8 times that of benzol, whilst 30 times the quantity of higher tar acids is removed. The phenols recovered are of a better quality, but the solvent deteriorates with use. (d) Tar oils are superior to benzol in their solvent power for phenols and higher tar acids, due to the presence of basic materials. (e) The presence of ammoniacal liquor in sewage in quantities equiv. to the normal average production by gasworks has no detrimental effect on the processes of biological oxidation, but an additional burden is thrown on the bacteria beds. (f) Oxidase-containing bacteria are responsible for the destruction of phenols in the liquor. Spent liquor is less toxic to most types of sewage bacteria under aerobic than under anaerobic conditions. Ammoniacal liquor is more toxic to all types of sewage bacteria than is spent liquor. E. S.

Thermal and electrical theories of ignition. J. D. MORGAN (Fuel, 1932, 11, 452—456).—The present position of the two theories is discussed. The results of Finch and Thompson (A., 1932, 25), some of which were anticipated by the author ("Principles of Spark Ignition," 1922), can probably all be explained on the thermal theory when complete data relating to the character of the spark are available. Experiments on the ignition of a mixture of coal gas and air by means of an electrically heated Pt wire have shown that combustion can occur without the occurrence of any detectable ionisation, and that the ionisation associated with inflammatory combustion occurs only after the appearance of flame, and is therefore a consequence and not a cause of combustion. There is no justification for an electrical theory of ignition. A. B. M.

Hot-water separation of bitumen from Alberta bituminous sand. K. A. CLARK and D. S. PASTERNAK (Ind. Eng. Chem., 1932, 24, 1410—1416).—Laboratory tests show that such sand, if acid, must be made nearly neutral or alkaline with Na₂CO₃ to give satisfactory hot-H₂O separation of bitumen. Ca(OH)₂ or Mg(OH)₂, formed from their oxides, or Ca and Mg salts in the presence of NaOH, adversely affect the separation of bitumen. Bentonite and clay (> 1%) have a similar effect. CaCO₃, and FeSO₄ and Na₂SO₄ in small amount, are not very injurious. Washing with cold H₂O to remove clay and some sol. salts is recommended, followed by neutralisation with Na₂CO₃, before hot-H₂O separation. T. H. B.

Mineral oil asphalts. H. PÖLL (Petroleum, 1932, 28, No. 36, Asphalt u. Strassenbau, 2—7).—The methods available for the separation of asphalts into distinct, chemically unchanged fractions are critically reviewed and experimentally compared. An efficient method is described, in which the asphalt is exhaustively extracted with cold light petroleum and the solution shaken with fuller's earth, which is then separated. Evaporation of the light petroleum solution gives a mineral oil fraction. The fuller's earth is extracted with cold CHCl₃ to give a solution of mineral oil resins ("Erdölharze"). The asphaltenes remaining after extracting the original asphalt with light petroleum are dissolved in CHCl₃ and the mixture is shaken with fuller's earth. The separated

fuller's earth is extracted with C_5H_5N or CS_2 to give a solution of asphalt resins ("Asphalthärze"). Hard asphalts ("Hartasphalte") are extracted from the residual fuller's earth by C_5H_5N - CS_2 mixtures (1:1) and subsequent evaporation of the extract. It is suggested that mineral oils and asphalts may be separated by this method into the fractions stated, together with a carbene fraction ("Karbene": insol. in CCl_4 , sol. in CS_2) and an insol. "carboid" fraction. H. E. B.

Stabilisation of aqueous dispersions of asphalt. A. W. HIXSON and J. M. FAIN (Ind. Eng. Chem., 1932, 24, 1336—1343).—For the optimum dispersion of Mexican asphalt in alkali tannate solutions, a fixed ratio exists, over a definite range of concn., between tannin and alkali concns. A soap-emulsified asphalt containing both K tannate and K caseinate gives practically no deposit on screening on the addition of $FeSO_4$, whereas with K tannate alone or K caseinate alone such a deposit is produced. A theory advanced to explain this action is based on the stabilisation of asphalt emulsions with a finely-divided solid emulsifier. E. S.

Design and testing of asphalt paving mixtures. N. H. TAYLOR (J.S.C.I., 1932, 51, 415—433 T).—Recent work has shown that the % voids in a mixture of sand and filler for asphalt paving is of great importance and that best results are obtained by addition of just enough bitumen to fill the voids. The % voids can be determined by compression methods either dry or with addition of castor oil. Such a test gives an approx. result, and trials with increasing proportions of bitumen then give the relation of bitumen addition to % voids, which in practice can scarcely be reduced below 2%. Grading of sand is important only through its relation to % voids; the limits can be made elastic, but even so the mixing of 2 or 3 different sands is usually necessary. A settling test for the fineness of the filler particles (of which 50% should be below 25μ) is described, and results showing the effect of various fillers in raising the m.p. of bitumen are tabulated. Limestone and cement as fillers are much more resistant to H_2O than is granite dust or clay, the latter forming emulsions with H_2O in the continuous phase. A failure of asphalt paving in Singapore is attributed by the author to the use of granite dust as filler, especially above concrete. Briquettes made of asphalt mixtures were tested in an extrusion machine, the load necessary for movement to commence being recorded as a measure of stability, and also in an impact testing machine. Results supported the author's views as to % voids. Increase of moulding pressure increases stability. A machine for stability tests of mixtures containing stone is described, and a suggested specification for asphalt mixture suitable for Singapore is given. In view of the difficulty of meeting this in all respects, the use of asphalt concrete in preference to sheet asphalt is suggested. C. I.

Hydrogenation of constituents of tar oils (1) in presence of sodium hydride as catalyst, (2) under high pressure and at high temperature. II. G. HUGEL and J. FRIESS (Ann. Off. Nat. Combust. liq., 1932, 7, 59—96; Chem. Zentr., 1932, ii, 1865).—Crude $C_{10}H_8$ and anthracene can be hydrogenated in presence

of NaH. Hydrogenation of ship's tar (fixed C 24, solid bitumen 57, oily bitumen 19%) at 480° and 100 atm. original H_2 pressure, in absence of NaH, affords a 60% fraction of b.p. 50— 400° . In presence of NaH hydrogenation can be effected at 265— 300° , giving 50—60% of b.p. 50— 400° . A. A. E.

Colloid-chemical processes in the breaking of bituminous emulsions. H. THRON (Asphalt u. Teer, 1932, 32, 493—495; Chem. Zentr., 1932, ii, 1729).

German crude [petroleum] oils. A. W. SCHMIDT and W. MÜLLER (Petroleum, 1932, 28, No. 39, 1—6).—Oil samples from four different districts were fractionally distilled and the yields and properties of the fractions were compared. The German petroleum was predominantly paraffinic in nature and contained a moderate % of unsaturated substances with small amounts only of aromatic and hydroaromatic compounds. H. E. B.

Cracking of Czechoslovakian crude oils. E. F. NELSON and G. EGLOFF (Petroleum, 1932, 28, No. 36, 1—3).—The development of cracking plant, the production of cracked products, and the characteristics of the crude oils and products are reviewed. H. E. B.

Rotatory power of Autun shale oil. A. BOULZAGUER and J. FRIESS (Ann. Office Nat. Combust. liq., 1932, 7, 55—58; Chem. Zentr., 1932, ii, 1106).—The cracking temp. at which the optical activity is lost has been determined. Less highly refined oil has a greater optical activity than oil treated with H_2SO_4 . The origin of shale oil and petroleum is discussed on the basis of the presence of cholesterol and phytosterol. A. A. E.

Fatty acid content of petroleum. I. I. LAPKIN (Bull. inst. res. biol. Perm, 1931, 8, 51—53).—Hydrocarbons resulting from the reduction of naphthenic acids from Grozni gas oil contain paraffins, indicating that fatty acids are present in petroleum. CH. ABS.

Cracking at low super-atmospheric pressure. M. D. TILITSCHÉEV and G. N. SELEDZHIEV (Neft. Choz., 1932, 23, 47—56).—Grozni paraffin distillate cracked to 52% b.p. $< 200^\circ$, 72% $< 300^\circ$, and 80% $< 350^\circ$. Cracking by the non-residuum method at 5 atm. afforded b.p. $< 300^\circ$: Surakhani fuel oil 73, Grozni mixed-base fuel oil 64, Grozni mixed-base bottoms 59, cracked residue from Grozni mixed-base fuel oil 49%. To produce a fraction of b.p. $> 300^\circ$ the pressure in the reaction chamber may be 6 atm. CH. ABS.

Stability of cracked [oil] distillates. N. ZHERDEV (Azerbaij. Neft. Choz., 1932, No. 7, 72—79).—Rectification of the lighter gasoline fractions is sufficient to stabilise the v.p. of the gasoline. CH. ABS.

Acid sludge. N. I. CHERNOZHUKOV and V. K. ZUKOV (Izvest. Teplotekh. Inst., 1932, 609—612).—Characteristics of stored acid sludges are recorded. A mixture of acid sludge and fuel oil (1:2) could be used as a fuel provided the temp. was kept at 70— 80° and the mixture was kept agitated. CH. ABS.

Thermal decomposition of benzine and petroleum with especial reference to the formation of acetylene. F. FISCHER and H. PICHLER (Brennstoff-Chem., 1932, 13, 441—445).—The yields of gaseous

products (principally C_2H_4 , CH_4 , H_2 , and C_2H_6) obtained by passing the vapour of a benzine (b.p. 80–140°) through a heated tube were 36% at 700°, 75% at 800°, and 79% at 900°; the yields of C_2H_2 were very small. Larger yields of C_2H_2 were obtained by the subsequent thermal decomp., under reduced pressure, e.g., 0.1 atm., and at higher temp., of the gas produced, or by the direct thermal decomp. of the benzine under reduced pressure; in the latter experiments deposition of C was avoided by diluting the benzine with H_2 . By these means, at 1200°, 50% of the benzine was converted into C_2H_2 . The yields of C_2H_2 were lower and those of C_2H_4 higher when a petroleum oil (b.p. 180–250°) was subjected to thermal decomp. under similar conditions. A. B. M.

Refining Grozni mixed-base fuel oil. M. A. BESTUZHEV (Rep. Lubr. Oil Comm., U.S.S.R., 1932, 2, 45–54).—Ceresins, if present with paraffins, affect crystal form, which is a criterion of filterability. Paraffin obtained from cracked distillate (non-residuum cracking) forms large crystals. Ceresins are less volatile than paraffin waxes and are easily decomposed at high temp. Ceresin can be separated from paraffin by means of efficient bubble towers. CH. ABS.

Refining processes for producing motor benzol from crude benzol. R. WELLER and E. SCHRAMM (Brennstoff-Chem., 1932, 13, 445–447).—Crude benzols can be satisfactorily refined with H_2SO_4 of approx. 80% concn.; the optimum concn. varies with the type of benzol and is determined by a preliminary test. Neither the Ufer nor the Belani process leads to lower washing losses or to improved quality in the refined product. The Instill process can be used with normal benzols, but is unsatisfactory with those having a higher content of reactive unsaturated hydrocarbons. Benzols can be refined satisfactorily by hydrogenation. A. B. M.

Modern methods of recovery and purification of motor spirit. A. THAU (Gas- u. Wasserfach, 1932, 75, 853–859).—The wash-oil and active-C processes are described, the cost of the former being 1.54 times that of the latter, from which a lower-b.p. spirit is obtained owing to a higher saturation val. 3–4 kg. of steam and 0.007 kg. of C are used in the recovery of 1 kg. of benzol. The respective recovery vals. are 90% and 95%. The Instill process of purification uses a solid absorbent of $Fe_2(SO_4)_3$ and fuller's earth instead of the usual H_2SO_4 . The respective yields of pure motor spirit from raw benzol are 84% and 75%, the latter being low owing to destruction of the unsaturateds. The Instill process removes a higher % of both free and active S. The SiO_2 gel process is also described. Benzol may be freed from active S by the Feld method, using Cu cement powder. The val. of the Cu used per ton is 6d., the S concn. being lowered from 16 to 2 g. per 10^5 cu. m. R. N. B.

Present technical position of the benzene synthesis. F. FISCHER, O. ROELEN, and W. FEISST (Brennstoff-Chem., 1932, 13, 461–468).—Recent developments in the production of a suitable initial gas mixture (cf. B., 1933, 49), in the method of gas purification (cf. B., 1931, 1033), and in the prep. of the catalyst (cf. B., 1931, 748; 1932, 376) are outlined.

The difficulty of temp. control in large-scale apparatus has been overcome by the design of a narrow, rectangular unit contact apparatus, 20 mm. by 120 cm. in cross-section and 5 m. long, which is packed with the catalyst ($Ni-Mn-Al_2O_3$) and maintained at the reaction temp. (190–210°) by the circulation of hot oil around it; the temp. control was made automatic without difficulty and the apparatus then required little supervision. The yield, 70 g. of liquid product per cu. m. of gas (CO 24%, H_2 48%), was equal to that obtained in the laboratory-scale apparatus. After about 1000 hrs. operation the catalyst required regenerating by extraction of the deposited paraffin wax with light petroleum. By using a battery of such units the throughput of the plant could be increased to any desired val. A. B. M.

Aniline solubility of gasoline as index of anti-knock value. C. T. NUNN (Refiner Nat. Gas Mfr., 1932, 11, 434).—Correlation between NH_2Ph cloud point (I) and actual anti-knock val. is accurate and reproducible. The relation between (I) and d corresponds with that between b.p. and d . CH. ABS.

Inhibitors in cracked gasoline. I. Relation of structure to inhibiting effectiveness. G. EGLOFF, J. C. MORRELL, C. D. LOWRY, JUN., and C. G. DRYER (Ind. Eng. Chem., 1932, 24, 1375–1382).—There is an induction period in the oxidation of gasoline, and accelerated tests in a steel bomb show that when minute quantities (0.01%) of certain substances are added this period is lengthened. Storage tests show the same substances to inhibit gum formation for periods up to 6 months. Increase in concn. up to 0.05% of pyrocatechol increases the induction period proportionally. Some inhibitors reduce gum in the Cu-dish test. Phenols and aromatic amines are pronounced inhibitors, but a single OH or NH_2 group has little action. Most inhibitors contain one of the following groupings: >1 OH or NH_2 group, an aromatic OH and NH_2 group, a single aromatic OH or NH_2 group with one or more alkyl groups, an aromatic secondary NH group. Modifying groups in phenols and amines are more effective in the *ortho*- and *para*- than in the *meta*-position. Ethers, NO_2 -, halogeno-, and S compounds are effective only when they contain an aromatic NH_2 or OH group. The hydrocarbons examined and $PbEt_4$ are ineffective. $Fe(CO)_5$ increases the rate of deterioration. G. M.

Motor fuels. W. GIESSMANN (Petroleum, 1932, 28, No. 49, 1–10).—The b.p. curve, calorific val., and knock rating are discussed in relation to the evaluation of petrols. The C.F.R. engine for the determination of the knock rating (C_8H_{18} no.) is described (cf. J. Soc. Automotive Eng., 1931, 28, 637). Recent developments in the methods of evaluating oil fuels for Diesel engines are discussed (cf. B., 1931, 1034; 1932, 327; and Pope and Murdock, J. Soc. Automotive Eng., 1932, 30, 136). Petrol engines and Diesel engines respectively demand fuels of opposite ignition properties. A. B. M.

Diesel fuel. M. D. TILITSCHÉEV and A. I. DOLADUGIN (Neft. Choz., 1932, 23, 27–29).—Paraffin-base fuel is best. Standards are recommended. CH. ABS.

Oil fuel in the brick industry. I. LUBBOCK (Trans. Ceram. Soc., 1932, 31, 431–452).—The advantages of

oil fuel are summarised, and its successful application in the firing of brick, terra-cotta, and tiles, and in brick and sand dryers, are described with illustrations.

A. L. R.

Bright stocks from Grozni mixed-base crude oil. A. N. SACHANOV, L. G. ZHERDEVA, and G. B. POLYANSKAYA (Rep. Lubr. Oil Comm., U.S.S.R., 1932, 2, 37—44).—Owing to viscosity of the acid sludge, bright stock could not be prepared from mixed-base heavy bottom oils. Prep. of bright stock from a fuel oil from the same stock is described. CH. ABS.

Manufacture of bright [oil] stocks. N. NYURENBERG (Groz. Neft., 1932, 2, No. 1—2, 77—78).—The speed of cooling of the oil should be governed by the properties of the stock. The rate of stirring affects the pour point of the oil. Rapid cooling and slow stirring are equiv. to rapid stirring and slow cooling. CH. ABS.

Accidental ignition of petrol vapour by electric sparks. A. KLING and A. SOULIER (Compt. rend., 1932, 195, 1024—1027).—A mixture of C_3H_8 , C_4H_{10} , or C_5H_{12} with the amount of O_2 required for complete combustion is ignitable by the spark of a Wimshurst machine with plates 25 cm. in diam., but is not fired if the condensers are absent; similar results are observed with filter-paper saturated with petrol, Et_2O , or C_6H_6 placed between the balls. It is concluded that there is no risk of ignition from any spark produced when silk etc. is being dry-cleaned or by the friction of an insulated body, e.g., a belt. C. A. S.

Extinction of burning liquids. C. MATIGNON (Chim. et Ind., 1932, 28, 1018—1023).—Experiments with the foam type of extinguisher on tanks of burning petrol are described. The limiting factor to success is the temp. of the burning surface at which the foam is to be developed, and tests might just as well be made with kerosene as petrol, the temp. probably being no less. It is noted that an incandescent vessel wall breaks up the foam. At least 50 cm. of clear space should be left in any vessel of burning liquid to allow for foam development. C. I.

Determination of gaseous hydrocarbons by a condensation method. E. DITTRICH (Gas- u. Wasserfach, 1932, 75, 849—853).—The gas freed from CO_2 , C_2H_2 , and H_2O is passed into an evacuated system containing a U-tube in liquid air. The permanent gases and part of the CH_4 which do not condense are collected in a gasholder. The rest of the CH_4 is removed from the condensed liquids by a Töpler pump and transferred to the gasholder, the mixed sample being analysed in the usual way. The condensate is connected to three U-tubes cooled to -90° , -120° , and -185° , and after removal of the liquid air distils in three fractions: (a) C_2H_4 + part of the C_3H_6 , (b) the remainder of the C_3H_6 + C_4H_{10} , (c) C_5H_{12} and above. All except fraction (c) can be pumped off and measured; fraction (c) is removed in a stream of air and analysed by combustion. The olefines distil with the corresponding paraffins and are measured by adsorption in H_2SO_4 of various concns. R. N. B.

Industrial applications of the ultra-violet radiation test. III. Lubricating oils and greases. J. MUIR (Ind. Chem., 1932, 8, 437—438; cf. B., 1932,

1073).—Oils and greases may be examined as a film between a non-fluorescent slide and cover glass, as a spot absorbed by non-fluorescent filter-paper, or dissolved in a non-fluorescent solvent. The physical consts. cannot be deduced from fluorescent colours, but the latter may indicate whether the substance is of mineral or fatty origin or a mixture. A new instrument called the callophane is a convenient source of ultra-violet rays, but it cannot entirely replace a quartz-Hg-vapour lamp. D. K. M.

Synthetic lubricating oils. J. WOODHUYSEN (Petroleum, 1932, 28, No. 49, Motorenbetrieb, 2—3).—Lubricating oils and fats have been prepared from plant products by a secret process. They are colourless, homogeneous, neutral, and contain no tar, petroleum, or paraffin wax; they do not attack rubber, and are immiscible with oil and benzine, but are sol. in steam. Tests have shown them to have low coeffs. of friction, great stability, and to be resistant to very high pressures. They have a wide possible field of application and the costs of production are low. A. B. M.

Relationship between mole fractions and absolute viscosities of blended lubricating oils. E. R. EPPERSON and H. L. DUNLAP (Ind. Eng. Chem., 1932, 24, 1369—1370).—Mean mol. wts. of 10 samples of lubricating oils were determined by the cryoscopic method using C_6H_6 , $PhNO_2$, and $C_2H_5Br_2$ as solvents, the last-named proving the best. Determined vals. for mixtures of these components agreed within 1.5% with the calc. vals. The ebullioscopic method was unsatisfactory. Kendall and Monroe's formula connecting viscosity with the mol. composition of a mixture was tested for 34 binary blends of lubricating oils. The max. deviation was 3% for a blend of a light and a heavy oil. G. M.

Gravity index for lubricating oils. W. B. McCLUER and M. R. FENSKE (Ind. Eng. Chem., 1932, 24, 1371—1374).—Oils may be classified by their viscosity indices (cf. B., 1929, 1039), obtained from viscosity determinations at $100^\circ F.$ and $210^\circ F.$, but data on sp. gr. and viscosity at $100^\circ F.$ are more readily obtained, and can be used to calculate a viscosity-gravity const., which for mineral lubricating oils is shown to correspond with a definite viscosity index. Hence, gravity indices can be obtained in close numerical agreement with viscosity indices. For light oil fractions the gravity index can be determined more precisely than the viscosity index. Oils from polymerised olefines do not conform to this viscosity index/viscosity-gravity const. relationship. T. H. B.

Autoxidation of paraffin oil. G. ARDITTI (Compt. rend., 1932, 195, 136—137; cf. B., 1931, 661; 1932, 7).—Using the method described previously, $PhOH$ strongly and NH_2Ph and hexadecene moderately retard, and anthraquinone accelerates, the reaction. Finely-divided Cu and Ni act similarly to, but more vigorously than, the same metals as wire, but NiO accelerates more vigorously than CuO, whilst Fe_2O_3 retards the reaction. $H_2O >$ doubles the induction period. C. A. S.

Thermal decomposition of paraffin wax in the presence and in the absence of hydrogen at high pressure. H. I. WATERMAN, A. J. TULLENERS, and

J. DOOREN (Proc. K. Akad. Wetensch. Amsterdam, 1932, 35, 1063—1067).—Physical data are given for the products of the fractional distillation of cracked and of berginised paraffin wax; these indicate that high-pressure H_2 diminishes ring formation. A. G.

Comparison of the viscosity of glycerol and glycol with that of mineral oils. TYPKE (Allgem. Oel- u. Fett-Ztg., 1932, 29, 677—678).—The η of glycerol and glycol (flash points 160° and 90° , respectively) can be matched by a light machine oil and spindle oil respectively, which have similar setting points. E. L.

I in oil-well water.—See VII. **Hot-patching of gas retorts.**—See VIII. **Bone-black.**—See XVII.

See also A., Jan., 23, **Emulsion persistence.** 25, **CH_4 - CO_2 and CO - H_2 equilibria.** 37, **Active charcoal.** 43, **Determining $Fe(CO)_5$ in gases.** 46, **Geochemistry of oil formation.** 85, **Lubricating oils, coal-tar constituents, and cancer.**

PATENTS.

[Steel for apparatus used in] cracking hydrocarbons. VEREIN. STAHLWERKE A.-G. (B.P. 384,016, 29.9.31. Ger., 23.10.30. Addn. to B.P. 382,355; B., 1932, 52).—Addition of 0.2—2.5% Cu to the Al-Cr steels claimed previously increases their resistance to the action of S in the oil. A. R. P.

Cracking of hydrocarbons. E. C. HERTHEL and H. L. PELZER, Assrs. to GRAY PROCESSES CORP. (U.S.P. 1,853,614, 12.4.32. Appl., 14.9.28).—Raw cracked products from a group of vapour-phase cracking systems are scrubbed for removal of tar and during normal operation are subjected to a common refining operation by passage through an absorptive catalyst prior to a common condensing operation. During the initial and final period of each vapour-phase cracking operation the new products are condensed without the refining operation, the condensate being kept entirely separate from the refined one. H. S. G.

Treating [cracking of liquid] hydrocarbons. H. T. DARLINGTON, Assr. to M. B. SCHUSTER (U.S.P. 1,853,552, 12.4.32. Appl., 24.11.26).—A cold solution of a salt normally solid in hot oil is sprayed into oil maintained under cracking conditions in such manner that the solvent is evaporated before the solution reaches a wall of the container and the solute is left as discrete solid particles to afford nuclei for the deposition of C. H. S. G.

Treatment of cracked hydrocarbon vapours. C. B. WATSON, Assr. to PURE OIL Co. (U.S.P. 1,853,755, 12.4.32. Appl., 1.7.29).—Cracked hydrocarbon vapours admixed with steam are passed, without reheating, through a treating zone containing finely-divided, solid, absorptive catalyst, from which the undesirable higher-boiling compounds are removed as condensate while the partly treated vapours and steam are separately removed and condensed. The oil is vaporised and passed through a second body of catalyst, the undesired compounds being removed as condensate separate from the finally treated vapours. H. S. G.

Treatment of hydrocarbon oils. C. R. WAGNER, Assr. to PURE OIL Co. (U.S.P. 1,853,753, 12.4.32. Appl., 11.6.28).—In the first pass of a multiple-pass cracking

zone, hydrocarbon vapours are made to travel in a relatively thin annular body and are heated from the interior and exterior substantially instantaneously to a raised cracking temp. H. S. G.

Treatment of hydrocarbon oils. J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,854,417, 19.4.32. Appl., 6.2.31).—The products of hydrocarbon oil cracking are treated under pressure with a cold-saturated solution of SO_2 in H_2SO_4 ($>95\%$) at -6.6° to -26.1° . H. S. G.

Refining of hydrocarbons. T. T. GRAY, Assr. to GRAY PROCESSES CORP. (U.S.P. 1,853,972, 12.4.32. Appl., 9.8.26).—Cracked hydrocarbon vapours are passed under pressure through a body of solid treating material, from which the polymerides formed are withdrawn as a condensate, and are then passed in indirect heat-exchange relation with the body of treating material prior to subsequent condensation. H. S. G.

Petroleum refining. E. A. DICKINSON, Assr. to GRAY PROCESSES CORP. (U.S.P. 1,853,671, 12.4.32. Appl., 15.8.28. Renewed 4.2.31).—The initial exothermic reaction in the refining of vapour-phase cracked products with solid absorptive polymerising material is controlled by admitting liquid hydrocarbons with the vapours to be treated. H. S. G.

Purifying petroleum oils. B. L. SOUTHER and J. W. GREENE, Assrs. to GULF REFINING Co. (U.S.P. 1,854,866, 19.4.32. Appl., 7.4.28).—The oil is treated with H_2SO_4 containing mixed (lower) alkyl hydrogen sulphates resulting from the reaction of still gases and H_2SO_4 . H. S. G.

Purification of liquids [alcohols from petroleum products]. H. N. LYONS, Assr. to DOHERTY RESEARCH Co. (U.S.P. 1,854,801, 19.4.32. Appl., 20.3.24).— H_2O -sol. alcohols, e.g., Pr^iOH , obtained from petroleum hydrocarbons, are diluted with sufficient H_2O to ppt. hydrocarbon impurities and are then distilled to obtain first the lighter impurities and subsequently a pure alcohol fraction. H. S. G.

Inhibition of gum formation in low-boiling hydrocarbon oils. STANDARD OIL DEVELOPMENT Co., Asses. of C. WINNING, L. E. SARGENT, and J. F. DUDLEY (B.P. 383,511, 11.3.32. U.S., 24.4.31).—A mixture of a colourless inhibitor and an inhibitor which is a dye is used, the amount of the latter being insufficient alone to prevent gum formation. Examples are: indophenol from nitrosodimethylaniline and α - $C_{10}H_7$ -OH, with $NHPhMe$; indophenol from nitrosophenol and $NHPh_2$, with tricresol. C. H.

Lubricant [for gasoline pumps etc.]. C. P. TEEPLE, Assr. to CRANE PACKING Co. (U.S.P. 1,854,237, 19.4.32. Appl., 29.10.30).—A lubricant which is substantially insol. in gasoline (etc.) or H_2O comprises a mixture of blown castor oil 25—80, glycerin 10—65, carnauba (or montan etc.) wax 1—25, graphite 1—40%. E. L.

Process and apparatus for compressing coal. C. STILL (B.P. 385,038, 22.9.31. Ger., 23.9.30).

Construction of coke-oven doors. H. SIMON, LTD., SIMON-CARVES, LTD., and C. LEDGER (B.P. 385,090, 30.11.31).

Cracking of hydrocarbons. E. W. ISOM, Assr. to SINCLAIR REFINING Co. (U.S.P. 1,856,640, 3.5.32. Appl., 12.4.29).

Cracking of hydrocarbons. N. E. LOOMIS, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,857,759, 10.5.32. Appl., 3.3.27).

Converting hydrocarbons. G. EGLOFF and W. R. HOWARD, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,857,445, 10.5.32. Appl., 1.9.22. Renewed 27.6.27).

Hydrocarbon oil conversion. J. DELATTRE-SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,857,406, 10.5.32. Appl., 3.6.29).

Liquid [hydrocarbon] heating and vaporising. J. S. HARRISON, Assr. to STANDARD OIL Co. (U.S.P. 1,856,074, 3.5.32. Appl., 22.3.28).

Apparatus for treating hydrocarbons and the like. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,857,532, 10.5.32. Appl., 16.10.20. Renewed 13.8.30).

Treating [heavy] hydrocarbons. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,857,533, 10.5.32. Appl., 3.3.27).

Rectifying petroleum oils. P. C. KEITH, JUN., Assr. to M. W. KELLOGG Co. (U.S.P. 1,856,283, 3.5.32. Appl., 10.7.28).

[Hydrocarbon] oil distillation. F. DENIG, Assr. to KOPPERS Co. (U.S.P. 1,856,471, 3.5.32. Appl., 3.3.31).

Treating hydrocarbons [by distillation]. L. B. CHERRY, Assr. to C & C DEVELOPING Co. (U.S.P. 1,856,828, 3.5.32. Appl., 11.3.22).

Distilling petroleum residuum. H. V. ATWELL, Assr. to STANDARD OIL Co. (U.S.P. 1,856,801, 3.5.32. Appl., 15.3.24).

Road-making materials.—See IX. Resin from coal tar etc.—See XIII.

III.—ORGANIC INTERMEDIATES.

Conditions for formation of phenylhydrazine hydrochloride. P. N. RABINOVITSCH (Chem.-pharm. Ind., Russia, 1932, No. 1, 25—27; Chem. Zentr., 1932, ii, 1613).—Technical NH_2Ph (10 mols.) dissolved in 30% HCl (21 mols.) is cooled to -20° and treated with a solution of technical NaNO_2 (10 mols.) at -12° ; the diazo solution is added to a solution of Na_2SO_3 (12 mols., from 39% NaHSO_3 and 30% NaOH) at $5-6^\circ$, kept at $80-85^\circ$ for 1 hr., then treated with NaHSO_3 (10 mols.) and heated for 6—10 hr. 30% HCl (13 mols.) is then added (at $85-90^\circ$) and the solution is decolorised with C. After cooling to $6-10^\circ$ the $\text{NHPh}\cdot\text{NH}_2\cdot\text{HCl}$ is collected and washed with 12% HCl and EtOH. A. A. E.

Chlorinated naphthalenes—their value in electrical industries. ANON. (Chem. Trade J., 1932, 91, 443—444).—The m.p. and b.p. of chloronaphthalenes increase with the no. of Cl atoms in the mol., and the m.-p. range of the commercial products is $60-125^\circ$. Their acid val. is of the order 0.005% (as HCl) and this increases only very slightly during processing and use. They are hard, impervious to moisture, and do

not burn. Their sp. inductive capacity varies with the Cl content, but on the average is twice that of paraffin waxes. Their use instead of paraffin and beeswax in the electrical industry is indicated. D. K. M.

Hydrogenation with at. H.—See I. CH_4 from natural gas. Viscosity of glycerol and glycol.—See II. Furfuraldehyde from wood.—See V. [Products from] HCN.—See VII. Anthracene drugs.—See XX. *p*-Hydroxyphenylglycine.—See XXI.

See also A., Jan., 23. Emulsion persistence. $\text{Me}_2\text{O}-\text{MeOH}-\text{H}_2\text{O}$ equilibrium. 47, Prep. of $\text{C}_2\text{H}_2\text{Cl}_4$ and C_2HCl_3 . 49, Prep. of α -bromo-*n*-butyric acid. 53, Synthesis of glyceraldehyde and glycerol. 55, Synthesis of β -ethoxyamines. Prep. of diethylisopropylamine. 57, Sulphonation of aromatic amines. 59, Purification of aromatic amines. Azo derivatives of $\text{CH}(\text{NO}_2)_3$. Intermediates for azo dyes. 61, Prep. of Ph_2S . 74, Pyridine boron trifluoride. Prep. of 2-phenylquinoline. 75, Quinazolines.

PATENTS.

Dehydration of aqueous acetic acid. KODAK, LTD., Asses. of W. W. HARTMAN (B.P. 383,148, 16.3.32. U.S., 20.3.31).—Propylene dichloride, b.p. 96.8° , is used as entraining liquid. The azeotropic mixture, b.p. 77.5° , contains 88% $\text{C}_3\text{H}_6\text{Cl}_2$ and is free from AcOH. Suitable apparatus is described. C. H.

Manufacture of aliphatic [acetic] anhydrides. H. DREYFUS (B.P. 381,963 and Addn. B.P. 382,673, 15.7.31).—(A) Cu or Cr acetate, or other aliphatic acid salt of a metal of low basicity, is heated with or without addition of corresponding sulphates or chlorides, preferably at $250-320^\circ/10-15$ mm. (B) Acetates of metals of high basicity are heated with normal salts of strong mineral acids, e.g., $\text{Mn}(\text{OAc})_2$ with MnCl_2 at $280-300^\circ/10-20$ mm. C. H.

Manufacture of acetic anhydride. COURTAULDS, LTD., and J. BROWN (B.P. 383,727, 24.10.31).—AcOH vapour is passed through molten metal (Pb, Zn, or alloy), e.g., at about 500° , on which is floated a catalyst (TiO_2 or Al_2O_3). The conversion is 5—10%. C. H.

Separation of acetic anhydride from admixture with acetic acid and water. A. H. STEVENS. From E. BERL (B.P. 382,503, 15.2.32. Addn. to B.P. 379,042; B., 1932, 1071).—In the process of the prior patent the salts are added in finely-divided form. C. H.

Production of aldehydes. H. T. BÖHME A.-G. (B.P. 382, 929, 17.3.32. Ger., 15.7.31. Cf. B.P. 381,476; B., 1933, 11).—A Ca salt of an aliphatic acid above C_1 (e.g., Ca laurate or stearate) is heated with $(\text{HCO}_2)_2\text{Ca}$ and a solvent (tetrahydronaphthalene, $\text{C}_{12}\text{H}_{26}$, BuOH) in an autoclave, e.g., at $150-400^\circ$. C. H.

Manufacture of xanthates. L. J. CHRISTMANN and D. W. JAYNE, JUN., Assrs. to AMER. CYANAMID Co. (U.S.P. 1,852,110, 5.4.32. Appl., 15.5.30).—Cryst. xanthates containing 2 mols. of H_2O are obtained directly by dropping CS_2 (1 mol.) into a solution of NaOH (1 mol.) in H_2O (1 mol.) and the appropriate alcohol (1 mol.). A. R. P.

Manufacture of wetting, cleansing, dispersing, and like agents. J. Y. JOHNSON. From I. G. FARBENIND.

A.-G. (B.P. 382,718, 28.9.31).—A carboxylic amide having an aliphatic or alicyclic residue above C_5 (preferably above C_{10}) and carrying a reactive mineral acid residue, *e.g.*, Cl or Br, preferably α to the CO group, is heated with a neutral sulphite (Na_2SO_3), *e.g.*, in H_2O at 80–150°. Solubilising agents (MeOH, EtOH, $COMe_2$, dioxan) and emulsifying agents (Turkey-red oil, high-mol. sulphonic acids) may be present. Suitable amides are chloroacetic octadecylamide or do- and tetra-decylamides α -bromolauric ethylanilide, and α -bromopalmitamide.

C. H.

Separation in the anhydrous state of fatty acids contained in dilute aqueous solutions. USINES DE MELLE, formerly SOC. ANON. DES DISTILLERIES DES DEUX SÈVRES (B.P. 383,049, 3.11.31. Belg., 3.11.30. Addn. to B.P. 273,744; B., 1929, 47).—In the process of the prior patent, the ester solvent is replaced by an aliphatic ketone sparingly sol. in H_2O and boiling below 119°, with or without addition of hydrocarbon to reduce the H_2O -solubility of the ketone. Examples are $COMeEt$ with C_6H_6 , light acetone oils, $COEt_2$.

C. H.

Manufacture of pyridine derivatives. E. KOENIGS and H. GREINER (B.P. 382,327, 27.7.31. Addn. to B.P. 346,246 and 379,316; B., 1931, 711; 1932, 1114).—4-Pyridylpyridinium dichloride is prepared by treating C_5H_5N with $SOBr_2$, S halides, or nascent $SOCl_2$ or $SOBr_2$ (*i.e.*, SO_2 and PCl_5 or PBr_5), and the product is converted by means of alkalis, amines, H_2O , alcohols, or phenols into 4-substituted pyridines. 4-Amino- (m.p. 156°) and 4-hydroxy- (m.p. 148°, b.p. 175–180°/1 mm.) -pyridines are described.

C. H.

Manufacture of 3:5-di-iodo-2- and -4-hydroxypyridinemonocarboxylic acids. SCHERING-KAHLBAUM A.-G. (B.P. 382,609, 16.9.32. Ger., 22.9.31. Addn. to B.P. 369,528; B., 1932, 671).—2- or 4-Hydroxypyridines carrying CO_2H *meta* to the OH are iodinated in alkaline solution; the boiling solution is repeatedly rendered alternately acid and alkaline, and the acid finally pptd. 3:5-Di-iodo-4-hydroxypyridine-2-carboxylic acid, decomp. 250°, and the 3:5:2:4-isomeride, decomp. 272°, are described.

C. H.

Manufacture of sulphonic acids of piperidine or of an alkyl homologue of piperidine. I. G. FARBENIND. A.-G. (B.P. 382,922, 20.6.32. Ger., 20.6.31).—The corresponding pyridinesulphonic acids are reduced with H_2 in presence of solvent (H_2O) and a hydrogenation catalyst (Ni, Pt).

C. H.

Production of 8-[hydr]oxy-derivatives of quinoline. H. E. G. ROWLEY. From J. D. REDEL—E. DE HAËN A.-G. (B.P. 383,920, 6.7.32).—An 8-halogenoquinoline-5-sulphonic acid is heated with alkali, *e.g.*, with 80% aq. NaOH at 200–205° or with 30% aq. NaOH under pressure at 150–160°, and the resulting 8-hydroxy-5-sulphonic acid is hydrolysed, preferably with H_2O at 180°, to give 8-hydroxyquinoline, m.p. 75°.

C. H.

Manufacture of hydroxybenzo- [naphtha]-quinolinecarboxylic acids. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 382,450, 3.12.31).—Naphthaquinolines carrying OH in 1 of the 2 positions remote from the quinoline nucleus are treated in alkali with

CO_2 under pressure. *o*-Hydroxycarboxylic acids are thus prepared from 8- and 9-hydroxy- β -naphthaquinolines, m.p. 243° and 276°, respectively [acids, m.p. 315° (decomp.) and 340–342°, respectively], and 8- and 9-hydroxy- α -naphthaquinolines, m.p. 268° (decomp.) and 188° (decomp.), respectively (acids, m.p. 330° and 295°, respectively).

C. H.

Manufacture of styrene and homologues thereof. I. G. FARBENIND. A.-G. (B.P. 382,816, 18.1.32. Ger., 17.1.31).—An α -chloroethylbenzene is heated with acids less volatile than HCl, *e.g.*, HBO_3 , CH_2Cl-CO_2H , BzOH, palmitic acid, the styrene being preferably distilled off as formed. A polymerisation retarder (quinol, anthraquinone, $C_{10}H_7 \cdot NO_2$) may be added.

C. H.

Manufacture of sulphurised derivatives of phenols. CHEM. FABR. VORM. SANDOZ (B.P. 382,333, 31.7.31. Ger., 2.8.30. Addn. to B.P. 365,534; B., 1932, 496).—In the process of the prior patent the phenols are replaced by their condensation products with aldehydes or S halides. Examples are: commercial xylenols condensed with CH_2O in presence of HCl, and the product heated with NaOH, S, and $SnCl_2$ at 110–120°; product from PhOH and SCl_2 heated with NaOH and $SnCl_2$ or Sn at 137–140°; cresol and MeCHO heated with NaOH, S, and $Cr(OH)_3$ at 130°.

C. H.

Manufacture of aldehyde-phenol condensation products and application thereof as moth-proofing or like agents. I. G. FARBENIND. A.-G. (B.P. 383,493, 20.2.32. Ger., 7.3.31).—2:4:6-Trihalogenophenols are condensed with aldehydes, especially aromatic aldehydes, to give di- and tri-arylmethanes or hydrols. 2:4:6-Trichlorophenol, *e.g.*, is condensed with benzaldehyde-*o*- or -*p*-sulphonic acid, *m*-nitrobenzaldehyde, or CH_2O (product, m.p. 211°).

C. H.

Purification of trinitrotoluene. IMPERIAL CHEM. INDUSTRIES, LTD., and G. P. DAVIES (B.P. 382,322, 27.7.31).—The β - and γ -isomerides are removed by treating crude neutral $C_6H_2Me(NO_2)_3$ in molten state, preferably at 80–83°, with alkali sulphite (Na_2SO_3) solution adjusted to initial p_H 7.0–8.3 by addition of weakly acid substances, *e.g.*, $NaOAc + AcOH$, $NaH_2PO_4 + Na_2HPO_4$, or HBO_3 (with $Na_2B_4O_7$, if necessary).

C. H.

Manufacture of aromatic [hydr]oxy-compounds and aromatic [hydr]oxy-carboxylic acids. W. W. GROVES. From CHEM. FABR. VON HEYDEN A.-G. (B.P. 382,969, 13.8.31).—Aryl halides are heated with aq. Na_2CO_3 or $NaHCO_3$ under pressure, *e.g.*, at 290–330°, with or without addition of CO_2 and/or a Cu catalyst; the carbonate may be formed *in situ*. The phenols and hydroxy-acids produced are separated. The products from PhCl, 1- $C_{10}H_7Br$ (mixed acids, m.p. 188–192°), and 2- $C_{10}H_7Cl$ (mixed acids, m.p. 195–200°) are examples.

C. H.

Manufacture of arylamino-2-hydroxynaphthalenecarboxylic [naphthoic] acids. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 382,449, 2.12.31).—A 5-, 6-, or 7-arylamino- β -naphthol is heated in alkaline solution with CO_2 under pressure, *e.g.*, at 230–250°/50 atm. The following 2-hydroxy-3(?)-naphthoic acids are

described: 7-anilino-, m.p. 250°; 7-*p*-chloroanilino-, m.p. 255°; 7-*p*-anisidino-, m.p. 240°; 7-*p*-toluidino-, m.p. 245° (decomp.); 7- α -naphthylamino-, m.p. 272°; 6-anilino-, m.p. 222°; 6-*p*-toluidino-, m.p. 235° (decomp.); 5-anilino-, m.p. 214—215°. C. H.

Manufacture of anthraquinone derivatives. A. G. BLOXAM. From Soc. CHEM. IND. IN BASLE (B.P. 381,942, 6.7.31).—The halogen in a 3-halogeno-1-acylaminoanthraquinone is exchanged for \cdot NHR, \cdot OR, or \cdot SR, condensation with 1:3-diaminoanthraquinone being excluded. Examples are intermediates and vat dyes from 3-bromo-1-benzamidoanthraquinone and PhOH (green), *p*-C₆H₄Me \cdot NH₂ (red), α -aminoanthraquinone (red), 1-amino-5-benzamidoanthraquinone (brown-red, orange when purified in H₂SO₄), *p*-toluenesulphonamide (m.p. 345°; hydrolysed, m.p. 298—299°), *o*-thiolbenzoic acid, thioxanthone from 4-chloro-2-thiolbenzoic acid and 1-chloro-4-aminoanthraquinone (grey). C. H.

Manufacture of a 1-hydroxyanthracenecarboxylic acid. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 382,456, 8.12.31).— α -Anthrol is heated in alkaline solution with CO₂ under pressure, e.g., at 210—220°/90 atm. The carboxylic acid has m.p. 200°. C. H.

Manufacture of sulphamic acids of 2-aminoanthrahydroquinonedisulphuric acid esters. DURAND & HUGUENIN A.-G. (B.P. 382,367, 4.9.31. Ger., 5.9.30).—A 2-aminoanthraquinone (e.g., 2-amino- or 2:6-diamino-anthraquinone) is treated with the usual agents for the production of the leuco-disulphuric ester, whereby the β -NH₂ is simultaneously converted into NH \cdot SO₃H. C. H.

Refrigerant.—See I. Alcohols from petroleum.—See II. Extraction of pure substances [carbazole].—See VII. Rosin decomposition product [as wetting agent].—See XIII. Acetono-butylic fermentation.—See XVIII. Gluconic acid ester.—See XX.

IV.—DYESTUFFS.

Dyes in photography.—See XXI.

See also A., Jan. 23, High-mol. azo dyes as colloids. 24, Pptn. of dyes by electrolytes. 44, Optical-electric colorimeter. 52, Synthesis of perhydro-norbixin. 59, 60, Nitro-dyes. *peri*-Bisazo dyes. 62, Patent-blue dyes. 72, *p*-Dimethylaminobenzylidene derivatives of ketones. Dye of *Robinia pseudacacia*. 73, Ethers of leucothioindigotin. 75, Bz derivatives of indigotin. Cyanine dyes. 76, S dyes. 84, Pigments of raw silk. 103, Colouring matter of acacia wood.

PATENTS.

Manufacture of [thio]indigoid vat dyes. I. G. FARBENIND. A.-G. (B.P. 383,543, 18.4.32. Ger., 16.4.31).—1:2- or 2:1-Naphthisatin chloride (etc.) is condensed with a 6-alkoxythioindoxyl, or 1:2- or 2:1-naphthindoxyl with a 6-alkoxyisatin chloride (etc.). The 6-OMe and 6-OEt compounds give olive-green vat dyes. C. H.

Manufacture of vat dyes [of the anthraquinone series]. A. G. BLOXAM. From Soc. CHEM. IND. IN

BASLE (B.P. 381,920, 7.7.31).—A 1:3-dihalogeno-anthraquinone is condensed with 2 mols. of a vattable amine, or 1:3-diaminoanthraquinone with corresponding halogen compounds, ∇ 1 mol. of α - or β -amino- (or -halogeno-)anthraquinone being used. Examples are condensations with 2 mols. of 1-amino-5-benzamidoanthraquinone (red-brown), aminodibenzanthrone (dark green), or 3-bromo-1-benzamidoanthraquinone (red-brown); or with 1 mol. of α -aminoanthraquinone and 1 mol. of 1-amino-5-benzamido- (brown) or 1:5-diamino- (red)-anthraquinone; or with 1 mol. each of 1:4- and 1:5-aminobenzamidoanthraquinone (violet-brown). C. H.

Manufacture of a sulphuric acid ester suitable for use in dyeing and printing textile fibres. DURAND & HUGUENIN A.-G. (B.P. 383,741, 13.11.31. Ger., 14.11.30).—1:2:2':1'-Dianthraquinoneazine is converted by C₅H₅N, SO₃ and Cu in C₅H₅N into the dianthrahydroquinoneazine tetrasulphuric ester obtained previously by oxidation of 2-aminoanthrahydroquinone disulphuric ester. C. H.

Manufacture of dyes of the dibenzanthrone series containing chlorine, and their application in dyeing. Soc. CHEM. IND. IN BASLE (B.P. 382,411, 16.10.31. Switz., 18.10.30).—An amino- or hydroxydibenzanthrone is treated with CH₂O in ClSO₃H. The dihydroxydibenzanthrone of B.P. 14,498 of 1912 (B., 1913, 593) gives a blue vat dye, aminodibenzanthrone a red-brown. C. H.

Manufacture of azo dyes [acid dyes, pigments, and ice colours]. Soc. CHEM. IND. IN BASLE (B.P. 381,767, 1.12.31. Switz., 1.12.30).—A diazo or tetrazo compound is coupled in substance or on the fibre with an arylamide made from an aromatic mono- or di-amine (particularly of the benzidine series) and an *ortho*-coupling hydroxybenzoic acid (or 1 mol. of such acid and 1 mol. of another acid). The shades are brown to yellow. Examples include: *p*-nitroaniline-*o*-sulphonic acid \rightarrow *p*-cresotic anilide; 4-chloro-2-aminodiphenyl ether \rightarrow *p*-cresotic or 2:4-dihydroxybenzoic dianisidide; 2:5-dichloroaniline \rightarrow *p*-cresotic *p*-phenylenediamide or dehydrothiitoluidide. C. H.

Manufacture of [green] azo dyes insoluble in water on the fibre [ice colours]. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 381,580, 24.6.31).—A blue aminoanthraquinone (free from other substituents attackable by HNO₂) is diazotised and coupled on the fibre with an arylamide of acetoacetic acid or of a 1-carboxyphenyl-3-methyl-5-pyrazolone or with a carbamide derived from a pyrazolone, both components being free from solubilising groups. Examples are: 1-amino-4-cyclohexyl- (or *n*-propyl-, *n*-butyl-, methyl-, or phenyl-)aminoanthraquinone \rightarrow bisacetoacetyltolidine; 1-amino-4-anilinoanthraquinone \rightarrow 2-*p*-acetoacetamidophenylbenzimidazole; 1:4:5:8-tetra-aminoanthraquinone (1 NH₂ diazotised) \rightarrow 5-chloro-*o*-toluidide of 1-*m*-carboxyphenyl-3-methyl-5-pyrazolone, or bisacetoacetyltolidine, or phosgenated 1-*p*-aminophenyl-3-methyl-5-pyrazolone. C. H.

Anthraquinone derivatives.—See III. Light-sensitive emulsions.—See XXI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Sulphur and nitrogen of wool. E. WINTON and R. EDGAR (Iowa State Coll. J. Sci., 1932, 6, 395—405).—S is not uniformly distributed throughout the length of the fibre. The samples contained S 2.62—3.78 and N 15.81—16.35%. If the N or S content is used as a basis for the proximate analysis of mixed fabrics, blank determinations on the wool are necessary. CH. ABS.

Transparent pressure apparatus for cellulose investigations. S. HILPERT and H. HOFMEIER (Chem. Fabr., 1933, 6, 5).—The apparatus is described.

E. S. H.

Cellulose from cotton hulls. N. CHETVERIKOV (Masloboino Zhir.-Delo, 1932, 2, 34—39).—Cotton hulls contain 20—30% of fibre. Boiling for 5 hr. with 6—7% NaOH affords cellulose (96.6% purity). CH. ABS.

Fixation of water by cellulose. G. CHAMPETIER (Compt. rend., 1932, 195, 280—282).—Cellulose is impregnated with a solution of $\text{Na}_2\text{S}_2\text{O}_3$ and progressively dried, the amount of the salt present being determined. Ordinary cotton combines with 0.5 mol. and mercerised cotton with 1.0 mol. H_2O per $\text{C}_6\text{H}_{10}\text{O}_5$ group. Similar results are obtained by immersion in $\text{C}_5\text{H}_5\text{N}$ solutions.

P. G. M.

Digester circulation methods. G. L. M. HELLSTROM (Pulp & Paper Canada, 1932, 33, 491—493).—The Morterud, Schaufelberger, and Hellstrom circulating systems are described. The last is similar to the much earlier Morterud system in that liquor is withdrawn from the lower part of the digester and reintroduced at the top, but differs in not attempting to prevent chips from circulating likewise, since all screens and perforated pipes are dispensed with. The system is therefore much simpler.

H. A. H.

Formation of furfuraldehyde during sulphite digestion [of wood]. G. SPIELMEYER (Papier-Fabr., 1932, 30, 662).—Formation of furfuraldehyde increases in rate with the duration of digestion and as the SO_2 content decreases. 5—20% solutions of NH_2Ph in a 1:1 mixture of EtOH and AcOH are used as reagents for measurement of furfuraldehyde in liquor. $\text{Ca}(\text{HSO}_3)_2$ hinders formation of furfuraldehyde.

T. T. P.

Characterisation of [paper] pulps and stuffs. P. K. BAIRD and R. H. DOUGHTY (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 280—284).—A preliminary survey of factors affecting the quality of pulps is made, and a tentative scheme for characterising and specifying all the possible variables, both chemical and physical, is outlined.

H. A. H.

Routine control testing [of wood pulp]. F. W. BRADSHAW (Pulp and Paper Canada, 1932, 33, 481—484, 518).—A modification of the British standard method of making sheets for pulp evaluation is suggested, in order that the method may be available for routine control. The usual method of drying the sheets is speeded up by placing the stack in a current of hot air (40°) in a specially designed draught box (described). Curves are given to show the rate of drying. Results are within about 2% of those obtained by the standard method.

H. A. H.

Design and care of pulp strength testing equipment. P. BORONOW (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 277—279).—The Valley Iron Works, Wis., apparatus and method of pulp evaluation are described.

H. A. H.

Evaluation of cellulose sulphite lye. A. EDWARDS and P. F. F. CLEPHANE (Trans. Ceram. Soc., 1932, 31, 417—421).—Cellulose sulphite lye (used in the prep. of SiO_2 bricks and cements) in aq. solution was evaluated by (1) dilution until a stable froth ceased to form on shaking, (2) measurement of the surface tension of the solution; the results of these methods agreed. Surface adsorption of lye by SiO_2 (the amount was roughly proportional to the surface area) occurred in mixtures of lye solution and ground quartz; a chemical method of determining the total lye present in such mixtures is described, in which the org. principle of the lye reduces Fehling's solution. Surface tension measurements indicated that the most economical solution contained 0.5% of lye; the amount to be added to compensate for adsorption could be calc. from the grading analysis of the aggregate.

A. L. R.

Satin white.—See XIII. Saccharification of cellulose.—See XVII.

See also A., Jan., 21, Films, threads, and colloid science. 22, Prep. of proteo-cellulose membranes. 25, Alkali cellulose. 55, Differentiation of hemi-celluloses. 84, Pigments of raw silk.

PATENTS.

Preparation and preservation of [bagasse] fibre. T. B. MUNROE and E. C. LATHROP, Assrs. to CELOTEX Co. (U.S.P. 1,854,557, 19.4.32. Appl., 29.11.29).—The pith is removed from the bagasse remaining after extraction of the sugar, and the residue is made into bales which are stacked under cover. The heat generated during the initial period of storage, owing to the alcoholic fermentation of the residual sugar, is sufficient ultimately to stop further fermentation and bacterial action, so that no degradation of the cellulose fibres occurs.

B. P. R.

Production of pure cellulose from cellulosic raw materials. R. DOSNE, Assr. to CANADIAN INTERNAT. PAPER Co. (U.S.P. 1,854,331, 19.4.32. Appl., 26.8.29. Can., 12.4.29).—Wood pulp in the form of sheets is mercerised with conc. aq. NaOH, the excess liquor squeezed off, the product treated with an aq. solution containing 3—5% SO_2 , washed with H_2O , or again treated with NaOH and washed. Rayon threads produced from such material are whiter and stronger than those from ordinary pulp.

B. P. R.

Washing or other liquid treatment of cellulose acetate or other derivatives of cellulose. BRIT. CELANESE, LTD. (B.P. 385,103, 9.12.31. U.S., 9.12.30).—The cellulose derivative in powdery or flaky form is passed through a series of cells where it is agitated and treated with a countercurrent of H_2O or other liquid, the material being drained before passing from one cell to the next.

F. R. E.

Removing malodorous gases formed in the sulphate- and soda-pulp manufacture. B. N.

SEGERFELT (U.S.P. 1,854,428, 19.4.32. Appl., 13.2.30. Swed., 22.1.29).—The gases are withdrawn, cooled to their dew point by saturating them with H_2O , and their velocity is reduced to a min. Alkali and other dust collects in the H_2O from the cooling spray and is removed in the condensate; the gases are then treated in a filter with hydrocarbons, *e.g.*, terpenes or camphors, that oxidise or absorb the remaining malodorous constituents. B. P. R.

Production of artificial silk. H. W. K. JENNINGS. From GLANZSTOFF-COURTAULDS GES.M.B.H. (B.P. 384,826, 12.1.32).—Viscose in the form of spools or cakes is desulphurised with a solution containing Na_2S or a mixture of Na_2S and $NaOH$, the total alkali content of which, calc. as $NaOH$, is $> 0.15\%$. F. R. E.

Manufacture of artificial silk [of high tensile strength and high extensibility]. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 385,005, 25.6.31).—Viscose is spun into a bath containing a high proportion of H_2SO_4 such as is known to produce a thread of tensile strength > 2 g. per denier. The thread is first stretched, then washed free from acid with H_2O (hot or cold) after relieving the tension to allow contraction to a determined const. extent, and finally wound without further stretching. F. R. E.

Increasing the elasticity and strength of artificial [viscose] silk and the like. W. WURTZ (B.P. 385,126, 25.1.32. Addn. to B.P. 379,604; B., 1932, 979).—Salts, *e.g.*, sulphates of Na, Zn, Cr, and Mg, or $NaOAc$ are added to the second spinning bath only, with a further addition of org. substances, *e.g.*, keratin, glucose, to the second pptg. bath. H. R.-D.

Manufacture of foam-like masses [from viscose]. R. O. HERZOG and H. HOFFMANN (B.P. 384,668, 4.6.31. Ger., 4.6.30).—Viscose solution containing $< 6\%$ of $NaOH$ (*e.g.*, 3.7% of $NaOH$ and 7–7.5% of cellulose) and ripened to $< 5^\circ$ (Hottenroth) is diluted, *e.g.*, with an equal vol. of H_2O , mixed with a foaming agent, *e.g.*, 0.5% of oleic acid, and worked into a foam. This is run into moulds and allowed to coagulate spontaneously, coagulation being accelerated, if desired, by heat or the addition of salts, *e.g.*, $NaCl$, to the foam. After washing and drying, a light (apparent d 0.02–0.1), porous, elastic product is obtained particularly suitable for use as a heat-insulating material. Fillers, softeners, colouring agents, or fire- or H_2O -proofing agents may be incorporated. D. J. N.

Manufacture of superior quality artificial silk in high yield by the wet-spinning process. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 385,160, 24.3.32. Ger., 24.3.31).—The filaments are spun on large, permeable or perforated, friction-driven bobbins or rollers of diam. > 200 mm. (preferably > 250 mm.) in one or more yarn laps having dry wt. < 300 g. (preferably > 500 g.). After washing and after-treatment on the rollers, the yarn is respooled, with twist if desired, on to bobbins taking at least 300 g. and preferably 500 g. (dry wt.), and is subsequently divided up into shorter lengths (skeins, bobbin windings, etc.) which are separated according to their position on the original bobbin, those from the upper and lower layers being inferior to the rest. F. R. E.

[Wet] treatment of artificial silk spinning cakes. GLANZSTOFF-COURTAULDS GES.M.B.H. (B.P. 384,706, 10.8.31. Addn. to B.P. 344,279; B., 1931, 437).—A sleeve of thin permeable material, *e.g.*, cambric, is placed on each carrier before mounting the cakes. On passage of the treatment liquid, the sleeve clings to the inner thread layers of the cake, where it is allowed to remain during the drying and winding-off. F. R. E.

Manufacture of artificial textile materials, artificial straw, tubes, strips, etc. LONZA ELEKTRIZITÄTWERKE U. CHEM. FABR. A.-G. (B.P. 384,793, 7.12.31. Switz., 9.12.30).—Highly conc., dough-like solutions or masses flowing only with difficulty or not at all at room temp., which contain at least 30% of cellulose esters and/or ethers and, if desired, softening agents, together with fillers, dyes, pigments, materials producing a matte or air-silk-like appearance, etc., are extruded under heat and pressure (300 atm.) through annular orifices into an evaporative atm. At the same time one or more textile threads, metal wires, or other thread-like inlays, together with air or another gas, are conveyed through bores within the annular orifices, each inlay being either coated with plastic material, *e.g.*, cellulose acetate containing softening agents, or treated with a substance, *e.g.*, triacetin, having a solvent action on the covering material in order to produce intimate contact between the inlay and the covering material. After partial drying the resultant articles may be passed between rollers to produce any desired effect. F. R. E.

Apparatus for treating artificial [rayon] threads, filaments, and the like. W. H. FURNESS (B.P. 385,477, 7.3.32. U.S., 20.6.31).

Manufacture and [cross-]winding of artificial yarns or threads. BRIT. CELANESE, LTD., W. I. TAYLOR, and E. KINSELLA (B.P. 384,997, 12.6., 15.7., and 27.11.31).

Soda-melting furnaces.—See I. Transparent films.—See XVII. Lubricated belt.—See XIV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Solvents in cleaning acetate rayon. E. SCHUELKE (Rayon, 1932, 13, No. 6, 12–13).— C_2HCl_3 is preferred to CCl_4 . Boiling C_2HCl_3 (15 min.) does not injure fabrics, but some dyes are not fast to this treatment.

CH. ABS.

Sizing of acetate rayon. G. FARKAS (Russa, 1932, 7, 45–51, 171–179, 313–319).—Strength, elongation at rupture, elasticity, residual elongation, rigidity, slipping properties, amount of size fixed on the fibre, and penetration of the size were determined for Rhodiaseta rayon sized by various methods, and the results were compared with those for unsized fibre. The change in strength on sizing varied from -9.3% (linseed oil after 7 days) to 16.5% (diastase-treated starch). Sizing usually increases elasticity (max. for gelatin and boiled linseed oil). The best results from the point of view of weaving are obtained by sizing with a finely-divided emulsion of boiled linseed oil and NH_4 alginate in presence of a suitable emulsifying agent. Desizing is facilitated by adding “pellastol EN” or triethanolamine to the soap solution. CH. ABS.

Fireproofing of fabrics. F. I. SADOV and P. V. STERLOV (Za Rekonstr. Textil. Prom., 1932, 11, 39—51).—The best procedures were: (1) impregnation with Na silicate and fixation with NH_4Cl , $(\text{NH}_4)_2\text{SO}_4$, or NH_4 phosphate; (2) impregnation with Na_2SnO_3 and fixation with NH_4Cl or $(\text{NH}_4)_2\text{SO}_4$; (3) impregnation with alum and fixation with NH_4 phosphate. Resistance to fire is increased 3—4 times. All the agents are easily removed by soaking in H_2O for 24 hr. Addition to the impregnating bath of casein, dextrin, starch, gelatin, algin, cellulose acetate, Ph_3PO_4 , or asbestos was unsuccessful. Preliminary results with metallisation of fabrics by electrolysis of ZnSO_4 and CuSO_4 solutions are promising.
CH. ABS.

Ignition of petrol vapour.—See II. **Applications of H_2O_2 .**—See VII. **Dyeing of hide powder.**—See XV.

See also A., Jan., 24, **Pptn. of dyes by electrolytes.** 62, **Alkali-fastness of Patent-blue dyes.**

PATENTS.

Laundry souring composition and method. R. A. PHAIR, Assr. to H. KOHNSTAMM & Co., Inc. (U.S.P. 1,849,535, 15.3.32. Appl., 19.4.29).—After the usual scouring, white fabrics are soured with Na_2SiF_6 containing 1% of a H_2O -sol. rosaniline-blue, which serves as an indicator and a blueing agent.
A. J. H.

Production of fast colour reserves under aniline black. DURAND & HUGUENIN A.-G. (B.P. 382,466, 28.12.31. Ger., 27.12.30).—The white material is printed with a vat dye leuco-sulphuric ester and a reserve for aniline black, steamed if necessary, padded for the black, dried, steamed to develop the black, passed through an acid dichromate bath, and finally oxidised in air.
C. H.

Manufacture of azo dyes on the fibre [ice colours]. SOC. CHEM. IND. IN BASLE (B.P. 383,064, 14.11.31. Switz., 15.11.30).—Scarlet to blue-red dyeings are obtained by coupling on the fibre a 2:3-hydroxynaphthoic arylamide, containing in 2- and/or 4-positions alkyl or alkoxy, with a diazotised 2-aminodiphenyl ether, $\text{NH}_2\cdot\text{ArO}\cdot\text{Ar}'$, in which Ar' carries halogen, alkyl, and/or alkoxy substituents, and Ar may be further substituted. Examples are: 4:4'- or 4:2'-dichloro-, 4-chloro-4'-methoxy-, 4-chloro-4'-methyl-, or 4-chloro-4'-ethoxy-2-aminodiphenyl ether \rightarrow *o*-anisidine, 4-chloro-*o*-anisidine, 2:5-dimethoxyanilide, *o*- or *p*-toluidide. [Stat. ref.]
C. H.

Treatment of [real] silk and materials made therefrom [to prevent "laddering"]. D. S. MUNN (B.P. 383,276, 1.5.31).—The threads are impregnated with rubber latex (which may contain vulcanising agents) and dried at $\gtr 80^\circ$. [Stat. ref.]
A. J. H.

Obtaining parti-colour effects ["spotting"] on textile threads, and on fabrics woven therefrom. J. BRANDWOOD (B.P. 385,011, 5.8.31).

Filtering [dry cleaners' solvent].—See I. **Wetting and mothproofing agents.** Sulphonic acids of piperidine etc.—See III. **Ester for dyeing etc.** **Dyeing with dibenzanthrone dyes.**—See IV. **Bleaching agent.**—See XIX.

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

Sulphuric acid plant. I. Burner gas. II. Chamber design and methods of intensification. B. WAESER (Chem. Fabr., 1932, 5, 445—446, 469—471, 474; cf. B., 1932, 769).—I. Recent mechanical pyrites burners show an increase in the no. of hearths, in one case to 12. For blende the Spirlet furnace is becoming widely used. Furnaces of the Dwight-Lloyd type will probably become usual in connexion with contact plants, and rotary burners for the larger chamber plants. The lower limit of economy of the latter is 20 tons of pyrites per day. The combination of mechanical furnaces and the Dwight-Lloyd furnace for blende is advantageous.

II. Types of instrument for continuous temp. etc. recording and also for automatic control of burner gas concn. are mentioned. Special types of chambers are described. The "Schmiedel box" is considered suitable only as an auxiliary, and it is not good as a substitute for a Guy-Lussac tower. The same criticism is made of other similar types of apparatus, the difficulty being the rate of oxidation of NO . The Lutjens and Ludewig troughs (of sheet Pb with a cooling arrangement and the sides protected with acid-resisting brick) are considered promising when interposed between chambers. They have no moving parts. Methods of concn. to *d* 1.84 by burner heat are referred to.
C. I.

Stocktaking on a chamber sulphuric acid plant. W. H. IBBOTSON (Ind. Chem., 1932, 8, 439—441).—Directions are given.
D. K. M.

Hydrochloric acid and magnesium oxide from magnesium chloride. D. V. VASILKOV (Kali, Russia, 1932, 4, 13—17).—Spraying aq. MgCl_2 into furnace gas at 200° , 500° , and 710° gave, respectively, 29, 63—68, and 88—91% hydrolysis. $\text{MgCl}_2\cdot 6\text{H}_2\text{O}$, dehydrated by gradual heating from 120° to 165° , underwent 99% hydrolysis when treated with H_2O vapour at 450° .

CH. ABS.

Absorption of hydrochloric acid by solutions of magnesium chloride. A. P. OBUKHOV and M. N. MIKHAILOV (Kali, Russia, 1932, 3, 20—23).—The system $\text{MgCl}_2\text{—H}_2\text{O—HCl}$ was studied at $10\text{—}100^\circ$. The solubility of HCl in aq. MgCl_2 decreases sharply with rise in temp. Instant absorption of HCl is accompanied by pptn. of $\text{MgCl}_2\cdot\text{H}_2\text{O}$. Addition of MgCl_2 to dil. HCl solutions increases the HCl in the gas phase.

CH. ABS.

Making strong phosphoric acid at Trail, B.C. W. C. WEBER (Chem. Met. Eng., 1932, 39, 659—662).—A description of plant and full working details for the manufacture of conc. (30—32%) H_3PO_4 by the action of H_2SO_4 and H_3PO_4 wash solution on ground and dried phosphate rock are given. The extraction and washing efficiencies are 95—96% and 97—98%, respectively. Careful control of the temp. and excess of H_2SO_4 are necessary to obtain easily filterable CaSO_4 .
D. K. M.

Hydrocyanic acid. G. H. BUCHANAN (Chim. et Ind., 1932, 28, 1024—1031).—Liquid HCN is produced in 3 factories in the United States as a 96—98% solution in H_2O . It has *d* 0.7 and b.p. 25.6° . Its comparatively

low v.p. at temp. above the b.p. permits its transport in light containers by road. By rail steel cylinders are used with special protection for the valves. The liquid has f.p. -13.4° and is inflammable. The explosion limits for the vapours are 5.6% and 12.8%. The limiting concn. which can be breathed in safety is 240 p.p.m., and for permanent safety 25 p.p.m. is a suitable figure. The poison is not cumulative. The liquid is decomposed rapidly by addition of alkali and decomp. is also promoted by O_2 and H_2O . This reaction has been the cause of explosions of cylinders. The makers recommend that all containers should be emptied within 90 days of filling. An alternative method of distribution is with the liquid absorbed in discs of wood pulp. Amongst chemical uses are the synthesis of nitriles and thence acids by the interaction of HCN and aldehydes or ketones. Thus with MeCHO lactonitrile is produced, and thence Et lactate. With CO_2 , $CHMe_2 \cdot CO_2H$ (a solid, m.p. 80°) or its esters are obtained, and these are produced commercially. Another synthesis employs aromatic amines which interact with CNCl to produce substituted guanidines, used as vulcanisation accelerators. Experiments on hydrogenation are described. C. I.

The Deuton acid-cock. K. DEHNE (Chem. Fabr., 1933, 6, 6—8).—The advantages are pointed out.

E. S. H.

Theory and practice of ammonia oxidation. R. PODHORSKY (Arh. Hemiju, 1932, 6, 187—213).—A review.

Official test for carbonate in sodium and potassium bicarbonates. C. MORTON (Pharm. J., 1933, 130, 3).—A sample of pharmaceutical $NaHCO_3$ or $KHCO_3$ (1 g.) is dissolved in CO_2 -free H_2O in a Nessler glass, 10 c.c. of approx. 0.01% phenolphthalein solution are added, and the whole is diluted to 100 c.c. The colour is compared with that given by 5—10 c.c. of 0.1N-NaOH with 0.3 c.c. of the same phenolphthalein solution diluted to 100 c.c. in another Nessler glass. A deeper colour in the former indicates that the permitted limit (p_H 8.6) is exceeded. This limit corresponds to about 2% carbonate. J. W. S.

Manufacture and applications of hydrogen peroxide. M. MAKOW (Chim. et Ind., 1932, 28, 507—523, 783—792).—The BaO_2 and Na_2O_2 processes of manufacture of H_2O_2 have been superseded by electrolytic methods. The first such proceeds by electrolysis of H_2SO_4 , which yields at the anode $H_2S_2O_8$ and also H_2SO_5 , which latter acid is decomposed by O_2 or H_2O_2 . The production of H_2SO_5 is, therefore, a measure of the O_2 loss. A Pt anode and high c.d. are necessary. A diaphragm may be used and the temp. should be 5—8°. The yield under good conditions should be 60%. Later processes employ, instead of H_2SO_4 , K_2SO_4 and $(NH_4)_2SO_4$. In the H_2SO_4 process the electrolyte is evaporated under 10—20 mm. pressure and the vapours are fractionally condensed. Pure reagents and careful control are necessary. In the second process $(NH_4)_2SO_4$ is electrolysed and $KHSO_4$ added, whereby $K_2S_2O_8$ is pptd. This is distilled *in vacuo* with H_2SO_4 and H_2O_2 is condensed. The yield is better than in the first process and control is easier. The direct $(NH_4)_2SO_4$

process is a simplification. In this case, superheated steam must be used for decomp. in the still. Large plants are now working the first and third processes in France. Al and Mg do not catalyse decomp. and H_2O_2 is now transported in Al tank-wagons. A list of indicators suitable for p_H determination in presence of H_2O_2 is given. The bleaching of wool, silk, cotton, oils, etc. with H_2O_2 is described. C. I.

New industrial synthesis of sodium cyanide. D. HATT (Chem. et Ind., 1932, 28, 777—782).—The process which is now being tested on a semi-works' scale at Thann depends on the exothermic reaction $CaCN_2 + 2CaC_2 + Na_2CO_3 = 2NaCN + 3CaO + 4C$, carried on at 450—500°. Yields of >80% were obtained in the laboratory, and similar good results given with other reducing agents such as Zn, provided that the heat liberated was equal. The heated mixture does not fuse or sinter, but cakes slightly; the product is not hygroscopic. Pure NaCN is obtained by extraction with liquid NH_3 at room temp. and pressures of 5—8 kg. If H_2O or steam is then introduced, the heat produced by the CaO present suffices to distil off the NH_3 , mixed, however, with a little C_2H_2 . The cyanide produced in this way hydrolyses quantitatively at atm. pressure, yielding formate. The economic prospects of the process are at present doubtful. C. I.

Analysis of alkali bromides. L. W. WINKLER (Pharm. Zentr., 1933, 74, 3—5; cf. B., 1924, 253).—An aq. solution of the bromide is strongly acidified with H_2SO_4 and titrated boiling with 0.1N- $KMnO_4$. The presence of a trace of Cl' is advantageous. If BrO_3' is also present a portion must be treated with KI and titrated with $Na_2S_2O_3$, and the titre obtained from the first measurement modified accordingly. J. W. S.

Gypsum. C. L. HADDON (Chem. & Ind., 1933, 24—27).—A review.

Vacuum evaporation of magnesium chloride solutions. Y. VILNYANSKI, Z. BANNIUK, and N. HAIDUKOV (Kali, Russia, 1932, 3, 15—19).—The v.p. curves of $MgCl_2$ solutions (10—90 g. in 100 c.c. H_2O) at 10—180° were plotted. The separation of the system $MgCl_2$ -KCl-NaCl- H_2O is discussed. Vac. evaporation is more economical than open-pan evaporation. The product is $MgCl_2 \cdot 6H_2O + MgCl_2 \cdot 4H_2O$ containing 55% $MgCl_2$. CH. ABS.

Preparation of ferrous sulphide from ferric oxide and sulphur dioxide. G. A. SHAKHOV, S. S. MARGOLINA and G. I. GLADKOV (Tzvet. Met., 1931, 866—871).— Fe_2O_3 is reduced by C or CO in presence of SO_2 ; FeS for use in Cu smelters may thus be prepared commercially. CH. ABS.

Testing of potassium ferro- and ferri-cyanide for chloride and bromide. G. BÜMMING (Pharm. Ztg., 1932, 77, 1311—1312).—In the method given in the D. Ap. V. 5 to the D.A.B. VI, the amount of 50% ($H_2SO_4 + HNO_3$) for dissolving $Ag_4Fe(CN)_6$ and $Ag_3Fe(CN)_6$ is insufficient. In addition, the presence of HNO_3 decreases the solubility of the Ag salts, and hence omission of this acid is recommended.

F. O. H.

Alkaline separation of iodine. O. Y. MAGIDSON (Bull. Nauch. Issledov. Khim. Farm. Inst., 1930, 4—6, 19—21, 34—37; 1931, 65—71).—Separation of I from Baku bore-hole water and other solutions containing various salts can be effected with O_3 (up to 91%), $KMnO_4$ (88.5%), or ClO^- (74.3%). CH. ABS.

Chlorine method of separating iodine. S. V. GORBACHEV and I. A. KASATKINA (Bull. Nauch. Issledov. Khim. Farm. Inst., 1930, 21).—88—90% recovery of I from bore-hole H_2O was attained. CH. ABS.

Iodine and bromine in oil-well waters of the Grozni district. I. MAXIMOVICH (Grozni. Neft., 1932, 2, No. 1—2, 79—82).— H_2O from Old Grozni contained $\succ 143$ mg. Br and 80 mg. I per litre; that from New Grozni wells contained $\succ 53$ mg. I per litre. CH. ABS.

Granulation. Testing an evaporator [for brine].—See I. **Report on ammonia [liquor].**—See II. **[Acid-resistant] cast-Fe alloy and steel.**—See X. **Satin white.**—See XIII.

See also A., Jan., 7, **Sensitised phosphors.** 34, **Electrolytic oxidation of $Na_2S_2O_3$, and prep. of complex Ag salts.** 36, **Liquefaction of He. Prep. of liquid $H_2 + Ne$. Synthesis of NH_3 .** 37, **Na kaolinates. Prep. of pure Yb oxide.** 38, **White lead.** 40, **Ir(OH) $_4$.** 41, **Determination of halogens, and of SiO_2 and Al_2O_3 in alkali fluorides etc.**

PATENTS.

Extraction and manufacture of potassium sulphate from calcium-containing sulphates. K. BÜCHNER, Assr. to PREUSSISCHE BERGWERKS- U. HÜTTEN-A.-G. (U.S.P. 1,854,687, 19.4.32. Appl., 9.8.30. Ger., 15.3.29).—Solutions of, e.g., polyhalite are treated with $Mg(OH)_2$ or $MgCO_3$ in the presence of CO_2 to ppt. $CaCO_3$ and K_2SO_4 is recovered from the liquor. L. A. C.

Manufacture of anhydrous borax (sodium tetraborate). F. B. DEHN, From AMER. POTASH & CHEM. CORP. (B.P. 385,217, 14.6.32).—Hydrated $Na_2B_4O_7$, with the addition, if desired, of an oxidising agent (0.01—0.1% of $NaNO_3$), is heated until a fluid mass containing only a trace of H_2O is obtained (i.e., to about 780°) and the product is run into moulds in which the anhyd. salt crystallises as a friable mass. Suitable apparatus is described. L. A. C.

Production of soluble phosphate from phosphate rock. A. H. STEVENS, From PHOSPHATE ACIDULATING CORP. (B.P. 385,071, 7.11.31).—A 1:1:33 mixture of H_2SO_4 , d 1.635, and ground phosphate rock passes through a kneader provided with rotating paddles some of which are positioned at a reverse angle to retard or reverse the movement of the material; a stream of air is drawn through the apparatus to remove evolved gases, and, when the mass has almost solidified, it falls into a curing den. L. A. C.

Manufacture of calcium chloride. S. B. HEATH, Assr. to DOW CHEM. Co. (U.S.P. 1,852,303, 5.4.32. Appl., 6.11.28).—A 71—75% solution of $CaCl_2$ at 178° is passed over rollers to obtain flakes of $CaCl_2 \cdot 2H_2O$ and these are cooled in a countercurrent of air, whereby they lose a further 1.5—2% H_2O . A. R. P.

Preparation of a mixed calcium chloride-calcium chlorate product. S. B. HEATH, Assr. to DOW CHEM. Co. (U.S.P. 1,854,405, 19.4.32. Appl., 7.3.30).—A 1:1 mol. mixture of $CaCl_2 \cdot 2H_2O$ and $Ca(ClO_3)_2$ is obtained by the concn. at $>60^\circ$ of a solution containing the salts in the correct proportion; solutions containing excess $CaCl_2$ are first concn. at 80—100° to crystallise the excess. Alternatively, a solution of the two salts is run into a solution of equilibrium concn. boiling $>60^\circ$ so that a mixture crystallises in the same proportion as in the added solution. L. A. C.

Extraction of substances in purified condition. J. N. ELGERSMA (B.P. 382,372, 10.9.31. Holl., 11.9.30).—The crude substance is extracted with a mixture of a low-boiling solvent and a suitable higher-boiling non-solvent; the purified product is pptd. on removal of the solvent. Examples are: $NaNO_3$ extracted from caliche with liquid NH_3 and MeOH at 4 atm.; alkali cyanides from cyanamide-alkali melts with liquid NH_3 and EtOH; S from spent oxide with CS_2 and EtOH; carbazole from admixture with anthracene with SO_2 and $COMe_2$. C. H.

Production of cyanides. E. J. PRANKE (U.S.P. 1,852,856, 5.4.32. Appl., 25.8.30).—Into a fused bath of $Na_2Ca(CN)_4$ at 1400° is introduced in small quantities at a time (a) a mixture of $CaCN_2$ (2 mols.), C (4 atoms), and Na_2CO_3 (1 mol.), or (b) CaC_2 and a rapid current of N_2 . In either case the sudden heating results in the instantaneous formation of more $Na_2Ca(CN)_4$. A. R. P.

Recovery of zinc compounds from ammoniacal solutions. D. L. OGDEN, Assr. to AMER. METAL Co., LTD. (U.S.P. 1,854,664, 19.4.32. Appl., 27.7.28).—A solution containing, e.g., 80 g. each of NH_3 , Zn, and CO_2 per litre is heated in thin layers by a countercurrent of steam, preferably in a scrubbing tower provided with constant-level trays; granular $5ZnCO_3 \cdot 2ZnO$ is pptd. L. A. C.

Production of beryllium fluoride. I. G. FARBENIND. A.-G. (B.P. 385,235, 26.7.32. Ger., 13.8.31).— NH_4HF_2 vapour is passed over finely-divided beryl at 350—600° until the Si has all been expelled as SiF_4 , and the residue ($BeF_2 + AlF_3 + Fe_2O_3$) is treated with H_2O to extract the BeF_2 , which is worked up to form Be compounds as desired. The waste gases are treated with excess NH_3 to ppt. $SiF_4 \cdot 2NH_3$ which, after removal, e.g., by electrical dust filters, is worked up to NH_4HF_2 . L. A. C.

Production of alumina, soda, and hydrochloric acid. L. R. KEOGH, Assr. to SODA ALUMINA CHEM. Co. (U.S.P. 1,854,409, 19.4.32. Appl., 10.6.27. Can., 30.9.26).—Briquettes prepared from clay which has been calcined at 700° are treated in a tower with a downflow of H_2O and an upflow of hot gases containing oxides of N and S; after removal, the briquettes are extracted with dil. H_2SO_4 to yield conc. $Al_2(SO_4)_3$ solution, which is run on to a hot hearth for dehydration and partial dissociation of the salt, the escaping steam and SO_3 passing to the tower. The residual $Al_2O_3 \cdot SO_3$, mixed with C and NaCl, is heated at 300° in the presence of steam to yield HCl and later at 900° with superheated steam to yield $NaAlO_2$ and H_2S ; the latter is burned

to yield SO_2 and H_2SO_4 , and the NaAlO_2 , after purification, is treated with CO_2 to ppt. $\text{Al}(\text{OH})_3$ and yield Na_2CO_3 solution. L. A. C.

Production of double salts [manganous ammonium sulphate]. H. VON BRAMER, Assr. to EASTMAN KODAK Co. (U.S.P. 1,852,687, 5.4.32. Appl., 7.4.31).—A solution containing MnSO_4 and $(\text{NH}_4)_2\text{SO}_4$ in the mol. ratio of 2—7:1 is boiled down until crystals of anhyd. $7\text{MnSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4$ separate from the boiling liquor. A. R. P.

Preparation of arsenic trichloride. G. E. MILLER and S. C. WITHERSPOON (U.S.P. 1,852,183, 5.4.32. Appl., 25.9.28).— Cl_2 is passed into a boiling suspension of As_2O_3 and S in AsCl_3 . A. R. P.

Production of antimonates of the alkali and alkaline-earth metals. I. G. FARBENIND. A.-G. (B.P. 385,218, 15.6.32. Ger., 3.7.31).— Sb_2O_3 is heated below its fusion point with NaClO_3 and an alkali or alkaline-earth oxide, hydroxide, or carbonate; the product is lixiviated and the residue (NaSbO_3) dried. L. A. C.

Production of uniform [vanadium] catalytic mixtures [for oxidation of sulphur dioxide]. H. N. HOLMES (U.S.P. 1,852,207, 5.4.32. Appl., 7.1.30).—Aq. KVO_3 is mixed with aq. FeCl_3 , the mixture agitated until the ppt. first formed is peptised, then poured into aq. Na_2SiO_3 until all the Fe and V are pptd., and the ppt. is collected, dried slowly to 30—50% H_2O , crushed to small granules, and again dried in air at 200—400° for several hr. Aq. CuSO_4 may partly replace the FeCl_3 . A. R. P.

Soda-melting furnaces. Filtration material. Treatment of gases.—See I. Xanthates.—See III. Fertilisers.—See XVI. Bi Na gluconate.—See XX.

VIII.—GLASS; CERAMICS.

Diminution of content of iron in glasses decolorised by selenium. E. DAMOUR and A. NADEL (Compt. rend., 1932, 195, 152—155).—To glass made from $100\text{SiO}_2 + 40\text{Na}_2\text{CO}_3 + 16\text{CaCO}_3 + 3\text{NaNO}_3 + 0.5\text{Fe}_2\text{O}_3$ (all materials pure) was added (a) nil, (b) 1NaCl , (c) $1\text{NaCl} + 0.01\text{ZnSeO}_3$. (b) contained very little less Fe_2O_3 than (a), but (c) approx. 30% less. It is concluded that the Se catalyses production of FeCl_3 , which volatilises, but that, the reaction being an equilibrium one, complete elimination of Fe is impossible. Addition of NaCl aids the decolorising effect of Se when both it and Fe are present in small quantities, but has no effect alone or on the decolorising power of Se when present in larger amount. C. A. S.

Decrease in the transparency of old window glasses for ultra-violet rays. H. VALENTIN (Pharm. Zentr., 1933, 74, 5—8).—Of a no. of samples of window glasses tested, all showed a greater absorption of ultra-violet radiation after 3 years' illumination, whilst only one specimen showed any transparency for wavelengths below 3000 Å. after this period. J. W. S.

X-Ray study of porcelains and their relation to mullite. A. J. BRADLEY and A. L. ROUSSIN (Trans. Ceram Soc., 1932, 31, 422—429).—An X-ray examination (powder method) was made of raw materials of the

porcelain industry, commercial porcelains, sillimanite-mullite materials, and of the effect of heat on sillimanite. The occurrence of the so-called kaolinite in 3 forms (true kaolinite, dickite, and nacrite) was confirmed. Porcelains consist essentially of a distinctive fibrous material, previously unidentified, similar to, but distinct from sillimanite and mullite (suggested name, "porzite"). The crystal structure of sillimanite from N. America and from Assam was the same; natural and artificial mullites had the same structure, which was distinct from that of sillimanite. A mineral from the Isle of Mull ("pink mullite") resembled porzite more closely than did either sillimanite or mullite from other sources. Natural sillimanite was partly converted into porzite on heating; addition of ball-clay facilitated the conversion, which was complete in sillimanite + 25% ball-clay. A. L. R.

Rept. 23 of the Refractory Materials Joint Sub-Comm. Hot-patching of gas retorts. I. Preliminary experiments on the application of certain cements. F. H. CLEWS, H. BOOTH, and A. T. GREEN. **Permeability of refractory materials to gases. IV. Experiments at temperatures up to 850°. Significance of permeability to gases in relation to the use of refractory materials in gas retorts. Permeability of the diatomite insulating product in relation to its industrial application.** F. H. CLEWS and A. T. GREEN. **Action of carbon monoxide on refractory materials. III. Experiments (a) with laboratory prepared specimens, (b) on the influence of reheating disintegrable products.** W. HUGILL, H. ELLERTON and A. T. GREEN (Gas J., 1932, 200, Suppl., 21—24; cf. B., 1932, 64).—The principles governing hot-patching of gas retorts are considered, and laboratory tests are described of the effect of additions, to cements applied wet to hot surfaces, of small amounts of matter in promoting "stickability" and of limited amounts of fluxes in developing cohesion of cement and brickwork. Some improvements were obtained, but no cement mixture generally capable of successful application in paste form to hot retort surfaces could be recommended. The cement-gun was superior to the paddle method of application in promoting union of cement and brickwork, but covered a limited area in one operation. The application of various finely-divided dry cements by means of (1) compressed air, (2) a blowpipe flame, was studied; the latter method gave encouraging results.

The permeability to N_2 of 13 representative refractory materials was measured at 500—850°; it decreased with rise in temp. in a manner almost independent of the nature of the material and of its abs. permeability, falling, at 500°, to approx. 0.5 of its val. at room temp., and to 0.4 at 850°. Vals. for SiO_2 materials were slightly less. The increase in gaseous viscosity with rise in temp. accounted almost quantitatively for the permeability decrease. Theoretical vals. at 1000—1350° are given.

The use is discussed of permeability measurements to control the production of homogeneous or special products, and, in conjunction with porosity determinations, to form a quant. assessment of the texture of refractory materials. Permeability is considered in

relation to the usage of gas retorts from which leakage at high temp. (other than that through faulty joints or cracks) appears to be very slight, although greater from SiO_2 than from fireclay retorts. The possible effects are discussed of the introduction of corrosive materials into the pores of the structure by penetration of gases. The low permeability of heat-insulating products (generally diatomite) is noted. Further work on the disintegration of refractory materials by CO (cf. *loc. cit.*) showed that the "Fe spots," around which most disintegration occurred, contained free Fe oxide; those containing Fe in combination (*e.g.*, as silicate) were relatively innocuous. The resistance of a material to disintegration was increased by raising the temp. and prolonging the time of firing. A. L. R.

Oil fuel in brick industry.—See II. **Cellulose sulphite lye.**—See V. **"Deuton" acid-cock.**—See VII. **Cast-Fe alloy as constructional material.**—See X.

See also A., Jan., 24, **Flocculation of colloidal clay.** 28, **System $\text{K}_2\text{SiO}_3\text{--Na}_2\text{SiO}_3\text{--SiO}_2$.** 37, **Na kaolinites.** 46, **Japanese acid clay.**

PATENTS

Glass-melting furnace. J. L. DRAKE, Assr. to LIBBEY-OWENS-FORD GLASS CO. (U.S.P. 1,854,505, 19.4.32. Appl., 2.3.27).—The tank furnace is provided, on each side, with a series of passages (incorporating the gas ports) leading into a longitudinal regenerator chamber, the exit (or inlet) to which is a reduced opening at the bottom of one end. This arrangement gives uniform heating of the chequer-work. J. A. S.

Pot furnaces for glass smelting. J. SCHÜFFLER (B.P. 384,074, 27.11.31).—A setting is described in which the flames are tangential to the glass pot and the exhaust passages in the base are provided with dampers to regulate the heat, and with embedded metal pipes to recuperate the air. B. M. V.

[**Frosting of**] **electric lamp bulbs.** K. FUWA and Y. SHIRAIHI, Assrs. to GEN. ELECTRIC CO. (U.S.P. 1,854,988, 19.4.32. Appl., 27.12.28. Jap., 14.7.28).—Powdered glass is attached to the inner surface with a low-m.p. substance which is transparent when fused, such as Pb borate, borosilicate, or phosphate, or Na phosphate. J. A. S.

Production of [variegated] enamel ware. O. HOMMEL (B.P. 385,221, 20.6.32. U.S., 20.6.31).—Materials differing from the enamel in *d*, m.p., fluidity, and colour (*e.g.*, borates or silicates of Pb, Bi, Li, Na, metal oxides, etc.) are applied to the surface with the enamel before firing. The patterns obtained can be influenced by the particle sizes and the inclination of the surface during firing. J. A. S.

Preparation of felspathic flux for porcelain. C. H. PEDDRICK, JUN., and P. W. LEWIS, Assrs. to UNITED FELDSPAR CORP. (U.S.P. 1,855,115, 19.4.32. Appl., 28.11.25. Renewed 22.12.31).—An apparatus for the mixing of minerals of different composition to give a mixture of the desired composition is claimed. J. A. S.

Tunnel kilns.—See I.

IX.—BUILDING MATERIALS.

Composition of the liquid phase in Portland cement standard mixture. H. HEIN (Tonind.-Ztg., 1932, 56, 632—634; Chem. Zentr., 1932, ii, 1220).—The alkalis in the clinker form with $\text{Ca}(\text{OH})_2$ alkali hydroxides, which attain equilibrium with CaSO_4 with partial formation of K_2SO_4 and $\text{Ca}(\text{OH})_2$. The setting reactions consist in interaction of these solutions with the clinker constituents. The setting time is reduced by alkali hydroxide. A. A. E.

Graphic method for determining the constituents of Portland cement from the chemical analysis. O. F. HONUS (Cement, 1932, 5, 356—360).—An equilateral triangle, ABC , of 10 cm. side is constructed with the side AC continued to Y . Along ACY with A as zero 5.6, 11.2, and 16.8 cm. are marked, representing the wt. of 1, 2, and 3 mols. of CaO . Nos. representing 0.1 of the mol. wt. of all constituents are also marked on ACY . MgO is plotted along CA with C as zero, and Al_2O_3 along AB . Fe_2O_3 is marked along BA , SiO_2 along CB , and SO_3 along BC . Then the three apices represent the following % vals.: $A = 0 \text{ CaO} = 100 \text{ MgO} = 100 \text{ Fe}_2\text{O}_3 = 0 \text{ Al}_2\text{O}_3$; $B = 0 \text{ Fe}_2\text{O}_3 = 100 \text{ SiO}_2 = 100 \text{ Al}_2\text{O}_3 = 0 \text{ SO}_3$; $C = 0 \text{ SiO}_2 = 100 \text{ CaO} = 100 \text{ SO}_3 = 0 \text{ MgO}$. The mol. ratios may then be represented by lines joining the respective mol. wts. of any two oxides. C. A. K.

Ageing of cement under the influence of the atmosphere. V. M. ANŽLOVAR (Cement, 1932, 5, 361—364).—With increasing time of storage all the cements tested lost more and more of their initial strengths, both tensile and crushing; the high-strength cements therefore lost increasingly their characteristic property of rapid hardening as the period of storage increases. No change occurred when cement was sealed in metal drums. C. A. K.

Physical changes in cement mortar caused by carbon dioxide. C. R. PLATZMANN (Zement, 1932, 21, 381—382; Chem. Zentr., 1932, ii, 1220).—Shrinkage is caused by gel degradation as well as by formation of CaCO_3 . A. A. E.

Change of sulphates in cement clinker during heating. K. AKIYAMA (Bull. Waseda Appl. Chem. Soc., 1932, 17, 8—16).—Much SO_4 caused a fall in the softening point of the clinker and disturbed the combination of CaO and clay. When finished in an oxidising flame, clinker contained no SO_4 , which was highest in the dust, and particularly in the smallest particles. CH. ABS.

Fireproofing wood. G. M. HUNT, T. R. TRUAX, and C. A. HARRISON (Proc. Amer. Wood Preservers' Assoc., 1931, 104—129).— $(\text{NH}_4)_2\text{HPO}_4$ is most effective; $\text{NH}_4\text{H}_2\text{PO}_4$ is nearly as effective. CH. ABS.

Asphalt paving mixtures.—See II. **Cellulose sulphite lye.**—See V. **Cements for gas retorts.**—See VIII. **Paint for plaster.**—See XIII.

See also A., Jan., 37, **Hardening of Portland cement. Synthesis of Ca silicates.**

PATENTS.

Rotary [cement] kilns and coolers. J. S. FASTING (B.P. 385,153, 21.3.32. Fr., 11.4.31).—The calcining

and precalcining zones of a rotary kiln contain heat-transmitting bodies of Cr-Fe alloys, containing, if desired, Ni (up to 20%) and $\geq 1\%$ of Mo, Al, W, etc. The preferred design is such that the bodies are not only transverse to the kiln, but also aid in stirring the kiln charge. C. A. K.

Wet grinding of raw cement material. M. VOGEL-JØRGENSEN (B.P. 384,736, 8.10.31).—In at least one of the grinding stages, preferably the final one, a centrifugal separator is arranged in the circuit. C. A. K.

Cementitious material of high-alumina type. N. V. S. KNIBBS (B.P. 385,032, 14.9.31).—A mixture of CaO and bauxite or other aluminous material is subjected to steam under pressure or heated at 300–900° while in the presence of CO₂ which combines with free or lightly combined CaO. C. A. K.

Magnesia cement compositions. L. C. STEWART, Assr. to DOW CHEM. Co. (U.S.P. 1,853,521—2, 12.4.32. Appl., [A] 4.9.28, [B] 22.10.29).—(A) A plastic cement consists of a mixture of MgO, MgSO₄, and H₂O together with a small quantity of a sol. citrate, phosphate, or tartrate, separately or together. (B) The addition agent specifically claimed is Na₂HPO₄·12H₂O (1–3%). C. A. K.

Manufacture of concrete and cement mortar. R. CROSS, Assr. to SILICA PRODUCTS Co. (U.S.P. 1,854,180, 19.4.32. Appl., 2.7.28).—A mixture of Portland cement, an inorg. thickening agent, *e.g.*, bentonite, H₂SO₄, and H₂O is stirred for 0.5–7 hr. and then incorporated with the aggregate. C. A. K.

Treatment of moulded articles made from cement, concrete, artificial stone, etc. J. MADEN (B.P. 385,044, 29.9.31).—A mould containing a hollow casting, *e.g.*, moulded tubular pole, is placed in a trough containing H₂O to a level lower than the hollow interior of the article. The trough is covered loosely and steam is admitted for approx. 3 hr. before the mould is removed. C. A. K.

Treatment of [newly] plastered surfaces. N. W. SMITH and G. WADE (B.P. 385,127, 27.1.32).—The surface is treated with an alkaline-earth (*e.g.*, Ca or Mg) bicarbonate solution before it is papered or coloured, to prevent discoloration. H. R.-D.

Treatment of road-making materials. G. RODEWALD, Assr. to AMBER SIZE & CHEM. Co., LTD. (U.S.P. 1,854,348, 19.4.32. Appl., 12.3.30. Ger., 18.3.29).—Materials are treated with solutions containing C₅H₅N or like bases and subsequently are impregnated with bitumen emulsions. C. A. K.

Production of cast bodies from masses consisting of [moist] cement or concrete. E. HEINLEIN (B.P. 385,154, 22.3.32. Ger., 25.3.31)

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

Crucible induction furnaces and their metallurgy. M. H. KRAEMER (Z. Metallk., 1932, 24, 281–284).—The use of high-frequency induction furnaces for melting and refining metals is discussed. The chief advantages of this type of furnace are that the heat is generated

entirely in the metal and that very efficient mixing is obtained by the stirring action of the current. This stirring action also serves to refine the metal rapidly as all parts are continuously brought to the surface where the impurities are oxidised; care must be taken, however, to avoid over-oxidation as this fault is difficult to rectify. Refining slags under ordinary conditions are heated only by conduction from the metal bath, and hence the slag layer should be thin; thicker slag layers may be heated by embedding a graphite ring above the metal surface at the top of the crucible, whereby the graphite is heated by induction and so keeps the slag from freezing. In starting a melt with scrap metal, a small quantity should be melted first and the remainder added slowly to the molten metal; attempts to melt a charge packed to fill the crucible result in only the bottom being melted and the upper layers welding together to form a bridge which cannot be pushed into the molten metal without danger of breaking the crucible. Control of the stirring action may be obtained by raising or lowering the crucible or heating coil, or by winding the coil in two halves, the current in one half flowing in the opposite direction to that in the other. A. R. P.

Heat-treating furnace atmospheres. S. TOUR (Metals & Alloys, 1932, 3, 270–272).—Steel is treated in a quiescent atm. of burnt fuel gas-air mixtures in an electric furnace. For any furnace charge and temp. there is a "neutral atm."; higher O₂ content results in excessive scaling, whilst higher CO content effects decarburisation. Approx. analyses of neutral atm. are: for tool steel (C or Cr-V) at 1500° F. 4% O₂, at 1600° F. 2.5% O₂; stainless steel at 1800° F. 8–10% O₂; high-speed steel (18% W, 4% Cr, 1% V type) at 1600° F. 2–3% O₂, at 2360° F. 5% CO, at 2400° F. 10% CO. E. H. B.

Low-carbon cast irons. G. DELBART and E. LECŒUVRE (Compt. rend., 1932, 195, 386–388).—Nine cast irons containing C 1.72–2.50, Si 2.26–3.78, Mn 1.43–3.75, P 0.072–0.280, S 0.026–0.075, and (two only) Cr 0.32–0.48, were examined and their chief mechanical properties determined, as also were the Ac and Ar points, effects of tempering, reheating, etc. C. A. S.

Martensite hardening and annealing of cast iron. L. GUILLET, J. GALIBOURG, and M. BALLAY (Rev. Mét., 1931, 28, 582–597; Chem. Zentr., 1932, ii, 761).—The hardening and annealing of cast Fe, alloyed or not with Ni and Cr, is discussed. A. A. E.

Action of molybdenum on mechanical properties of grey cast irons. J. COURNOT and J. CHALLANSONNET (Compt. rend., 1932, 195, 139–142; cf. B., 1932, 801).—Addition of increasing amounts ($\geq 3\%$) of Mo to (1) a ferritic cast Fe with a little pearlite (C 3.6, Si 2.3%) and (2) a pearlitic cast Fe (C 3.25, Si 1.4) causes a steady increase in hardness and resistance to bending, shear, and compression, these qualities showing for 2.9% Mo in (1) and 2.1% in (2) increases, respectively, of, in (1), 120, 106, 85, and 101%, and in (2) of 36, 60, 71, and 36%. 2.8% Mo in (2) gives a metal so hard (380 Brinell) that it cannot be machined. C. A. S.

Austenitic cast-iron [alloy] as constructional material. R. MÜLLER and R. HANEL (Chem. Fabr., 1932, 5, 493—497, 504—505).—A new cast-Fe alloy, "Niresist," contains Ni 12—15, Cu 5—7, Cr 1.5—4.0, Mn 1.0—1.5, C 2.7—3.1, and Si 1.2—2.0%. It is prepared by alloying cast Fe with monel metal and ferrochrome. It is non-magnetic, has Brinell hardness about 200, and tensile strength 14—24%. Details of its resistance to corrosion by H_2SO_4 , acid salt solutions, and weak acids are given. In most cases it is about equal in this respect to phosphor-bronze, but it is desirable to vary the Ni and Cr content according to the use intended. It is much more resistant to erosion than ordinary cast Fe. Whilst cast Fe is "burnt" by atm. O_2 at about 700°, niresist can be used without injury up to 950° whatever the composition of the gas with which it is in contact, especially if the Cr content is high. The thermal expansion at 315° is $18-20 \times 10^{-6}$, about the same as that of Al, and the metal is thus suitable for the construction of the cylinders of Diesel engines etc. The alloy is prepared by melting the components in the cupola, in crucibles, or in the electric furnace, and casting is performed as usual. The austenitic structure is illustrated by photomicrographs. C. I.

Corrosion-resistant steels. I. Alloys for use in contact with sulphuric acid. II. Intercrystalline corrosion in chromium-nickel austenitic steels; its effect, cause, and cure. J. L. MILLER (Iron and Steel Inst., Carnegie Schol. Mem., 1932, 21, 111—127, 128—151).—I. Alloy steels containing Cu, Si, Mo, and Ni show most resistance to corrosion by H_2SO_4 . A steel of given alloy content is increasingly corrosion-resistant as the no. of alloying components is increased. Cr reduces the resistance when < 15% is present, but at > 15% Cr the resistance increases, provided that the Ni content is at least equal to that of Cr. Si is most effective at 3% within the range 2—5%. Resistance increases with the Cu content up to 12.5%. Two corrosion-resistant alloy steels are recommended: (a) Ni 30, Cu 3, Si 3%, (b) Ni 30, Cu 10, Si 3; (a) is readily forged, whilst (b) cannot be forged, but has considerable strength and shock-resistance at room temp.

II. The max. amount of C which may be retained in solid solution after heating within the carbide pptn. range is approx. 0.02%. Excess of C is pptd. probably as a carbide and migrates rapidly to the grain boundaries. The min. quenching temp. required to prevent carbide pptn. rises as the C content is increased; the temp. of max. pptn. is that of max. susceptibility to corrosion. Magnetic tests with 18-8 alloys indicate a relation between the amount of α -Fe present and the susceptibility to corrosion only when the time of heating within the pptn. range is short. Prolonged heating at temp. above 650° decreases the amount of α -Fe present after pptn. The intercryst. corrosion caused by carbide pptn. may be eliminated by heating the stainless alloy at approx. 800° for 2 weeks. After this treatment no loss of physical properties or corrosion-resistance occurs when the alloy is subsequently heated at any temp. below 800°. A theory of carbide pptn. is developed, according to which a compound of C rich in Fe is formed at the grain boundaries. The carbide is transformed very slowly into Cr carbide by diffusion. Resistance to

corrosion is established when the Cr content of the compound is sufficiently high. E. S. H.

Influence of non-metallic inclusions on corrosion of steels. C. E. HOMER (Iron and Steel Inst., Carnegie Schol. Mem., 1932, 21, 35—37).—The corrosion of steel specimens immersed in H_2O , aq. NaCl containing Na_2CO_3 , or aq. Na_2SO_4 always begins at inclusions of sulphides or embedded scale; silicate and Al_2O_3 inclusions do not appear to have any effect. Only a fraction of the total sulphide inclusions act in this way. The active centres develop rapidly and concentric rings of rust are frequently produced around them in the early stages. In aq. NaCl corrosion is independent of the inclusions, but addition of Na_2CO_3 serves to localise the attack. With horizontally immersed specimens, local attack is not readily attained on the upper surface, but is easily produced on the lower surface. E. S. H.

Determination of the life of lanoline rust-preventing coatings on steel. C. JAKEMAN (Engineering, 1932, 134, 750—751).—Tests on coated small articles and machines when exposed to the corrosive atm. of an NH_4NO_3 storage shed and also to ordinary storage showed better results than were expected even with "high-acid" lanoline. Parts coated with the recommended mixtures [lanoline (< 2% acid) thinned with either white spirit or naphtha] may be assumed to be protected for at least 3 years. C. A. K.

Effect of heat-treatment on yield point of mild steel. M. KURODA (Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1932, 20, 29—38).—When mild steel is quenched the yield point and Lüders lines become faint, reappearing when the metal is tempered. Quenched steel showed a special semi-granular form of boundary cementite and all the heat-treated specimens possessed an α -Fe structure. From this it is concluded that the yield point is not the special characteristic of the body-centred lattice, but is a property of the soft steel itself, probably due to the existence of the boundary structure. C. A. K.

Influence of recrystallisation on mild steel rolled below its critical range. J. VIETÓRISZ (Iron and Steel Inst., Carnegie Schol. Mem., 1932, 21, 153—191).—Hardness-annealing temp. curves of the compressed material show a max., a min., and a further rise to a second (lower) max. Recrystallisation can be detected by microscopical examination at places deformed to a somewhat higher degree than corresponds with the maxima of the hardness curves; the maxima are regarded as starting points of recrystallisation. Velocity of grain growth in mild steel is greatest at 650—700°. The influence of annealing on specimens rolled to the same degree below the crit. temp. is greater as the amount of work-hardening increases. These changes are correlated with changes in microstructure. Tensile strength and traction hardness decrease more quickly with rising annealing temp. than the yield point. An increase of malleability with rising temp. occurs both in and across the direction of rolling. To produce mild steel of equal quality in every direction, it is better to roll it "hot" at a temp. suitably low but still above the crit. range, than to deform it "cold" below

the crit. range, and follow by a suitable annealing procedure.

E. S. H.

Steels for case-hardening. F. W. ROWE (*Metalurgia*, 1932, 7, 53—54).—Steels containing (a) Ni 3—3.5, Cr 0.5—1, Mo 0.2%, and (b) Ni 4, Cr 1%, are replacing gradually 0.5% Ni case-hardening steel, which has a somewhat low core strength in heavy sections. The former possess very high core strengths, which property allows quite light casings (0.035—0.05 in.) to be made without pitting or collapse occurring. Allowance must be made for the tendency of Ni—Cr steels to over-carburise.

C. A. K.

Nitrogen-hardening of steels. I. Nitriding properties of Nitralloy steels, with special reference to the effect of the constituent elements. B. JONES

and H. E. MORGAN (*Iron and Steel Inst., Carnegie Schol. Mem.*, 1932, 21, 39—86).—Al is preferred to Ni or ferrous materials for the essential parts of a nitriding container since it does not dissociate the NH_3 . Steels being nitrided act as catalysts for the decomp. and do not harden efficiently if pre-dissociation occurs. Surface- and depth-hardness for steels containing the constituent elements present in Nitralloy steel, singly and in combination, have been determined. Cr gives a comparatively great depth of hardening, but Al steels show a steep gradient. The effect of heat-treatment is described. N contents of the nitrided steels have been determined from the surface to the core. The thin layer at the surface is mainly Fe_2N , which is comparatively soft, the max. hardness in all steels being found just beneath this layer. Greater penetration of N is observed in Armco iron and mild steels than in alloy steels; in the former, the nitride separates as a distinct phase. It is considered that hardness is due to the presence of finely-dispersed particles of a complex nitride, consisting mainly of Fe_2N with nitrides of Al and Cr, crit. amounts of which cause a distortion of the cryst. lattice of Fe.

E. S. H.

Properties of some copper-bearing steels. I. Copper-bearing steels of present industrial interest. K. G. LEWIS (*Iron & Steel Inst., Carnegie Schol. Mem.*, 1932, 21, 87—110).—The addition of Cu lowers the crit. points in steel to a degree which depends on the amount of other elements present, particularly Mn. The results emphasise the increased hardening effect on quenching due to the presence of Cu.

E. S. H.

Density of ferrosilicons. C. BEDEL (*Compt. rend.*, 1932, 195, 329—330).—The densities of 12 Si—Fe alloys have been determined. Plotted against composition, a slight peak occurs for SiFe, and, save in the immediate neighbourhood of that composition, the densities are always < those corresponding to linear variation with composition (cf. A., 1911, ii, 879).

C. A. S.

Determination of barium in ferriferous minerals.

E. CHAUVENET and AVRARD (*Compt. rend.*, 1932, 195, 331—332; cf. A., 1932, 588).—The previous method is simplified by heating the mineral in CCl_4 vapour at 900—930°, when all substances present save free SiO_2 are converted into chlorides, those of Fe, Al, P, and Si (from silicates) being completely, of Ca and Mn partly, and of Ba not at all, volatilised. Mn and total Si are deter-

mined in a separate sample after alkaline fusion; Fe may be determined from the volatile chlorides, or in a third sample.

C. A. S.

Deoxidation of red brass by phosphorus. E. R. THEWS (*Metallbörse*, 1932, 22, 1037—1038; *Chem. Zentr.*, 1932, ii, 1959).—A discussion.

A. A. E.

Effect of phosphorus on copper-tin bronzes.

G. KREBS (*Z. ges. Giessereipraxis*, 1932, 53, 281—282; *Chem. Zentr.*, 1932, ii, 1959).—The hardness is max. at 72% Cu; at 33% Cu the hardness is that of pure Cu. Deoxidation and disappearance of the oxide layer are effected by addition of P, 0.2% remaining in the bronze. The favourable effect of P on the structure, physical properties, and resistance to sea-water corrosion is described.

A. A. E.

Refining of nickel. E. T. RICHARDS (*Metallbörse*, 1932, 22, 673—674; *Chem. Zentr.*, 1932, ii, 764).—The effect of S on the brittleness of crude Ni has been investigated. In contrast to S, the O content is not injurious. Oxidation is accomplished by atm. O_2 and addition of NiO, and when sufficient has taken place the metal bath is covered with a Ca silicate slag. Deoxidation is brought about by Mg, Mn, and C. The Mn and C are ineffective in removing S, but the addition of 0.15% Mg completes deoxidation and removes S.

L. S. T.

Preparation of nickel-manganese brass. A. LE THOMAS (*Rev. Nickel*, 1932, 3, 65—70; *Chem. Zentr.*, 1932, ii, 1231).—An alloy of Cu 16.7, Zn 30, Ni 33, and Mn 20% is alloyed with a 60:40 brass. The advantages of special brasses are discussed.

A. A. E.

Mechanism of precipitation-hardening in hardenable silicon-nickel alloys. O. DAHL (*Z. Metallk.*, 1932, 24, 277—281).—Ni alloys with 5—9% Si harden on annealing at $> 450^\circ$ after quenching in H_2O from 950° and to a slightly smaller extent after slow cooling, showing that the pptn. of the new constituent must be a very slow process; the max. hardening effect is obtained with 5.5—7% Si. With a const. annealing time of 1 hr. the electrical resistance begins to increase at an annealing temp. of 300° , reaches a max. at $450\text{—}500^\circ$, falls sharply to a min. at 650° , and then increases again slowly to its original val. at 850° ; on the other hand, the hardness does not begin to rise until about 450° and reaches a max. at 650° , after which it falls rapidly. With slowly cooled alloys annealing has only a relatively small effect on the resistance, although the max. hardness obtainable is practically the same as that produced in quenched alloys. With the 6.6% Si alloy the hardness increases from 160 to 280 in 100 hr. at 450° , to 360 in 55 hr. at 525° , and to 380 in 16 hr. at 625° ; the resistance rises to a max. at 450° in 16 hr. and at 525° in 30 min., but above 600° falls uniformly. When the alloys are aged at a relatively low temp. for a long time and then annealed at a higher temp. for a short time the hardness attained in the first anneal falls at the beginning of the second anneal before starting to rise again. The behaviour of these alloys thus resembles that of duralumin except that the changes are much slower and therefore more readily studied. Several theories to account for the observed facts are discussed, but none is entirely satisfactory.

A. R. P.

Corrosion research on light materials. F. HORN (Soc. Chem. Ind., Chem. Eng. Group, Jan., 1933, 11 pp.).—Accelerated tests for the corrosion of light alloys in dil. HCl, NaCl solutions, etc. are outlined, but there appears little correlation of such results with those of service. The most important factors affecting corrosion are the composition and the degree of purity of the metal or alloy. Straight alloys of Al with Cu, Ni, and Mg are no longer used for high-duty work, and no binary alloys, e.g., with 12% Si, or 2% Mn, give the high mechanical properties demanded. Duralumin (Cu 4, Mg 0.5, Mn 0.5%) still possesses the highest combination of strength and resistance to corrosion. Success has been achieved by coating Al alloys with certain other metals, but this method has failed with Mg alloys, for the protection of which a film formed by immersing the alloy in a solution of a mixture of $K_2Cr_2O_7$, potash alum, and NaOH gives the best results. C. A. K.

Prevention of corrosion of aluminium alloys by metallic coatings applied by Schoop's spray process. G. AKIMOV and W. KROENIG (Korrosion u. Metallschutz, 1932, 8, 115—119; Chem. Zentr., 1932, ii, 1505).—A coating of Cd 83, Zn 17%, or alloys of Zn, Al, and Cd, can be used to protect duralumin and cast Al alloys against sea-water. A. A. E.

"Widia" metal in the service of the chemist. C. AGTE (Chem. Fabr., 1933, 6, 5—6).—A lecture. E. S. H.

Determination of aluminium oxide in aluminium alloys. W. EHRENBURG (Z. anal. Chem., 1932, 91, 1—5).—All metals more electronegative than Cu are removed by conc. aq. $CuCl_2$, the pptd. Cu forming aq. Cu_2Cl_2 . The residue of Al_2O_3 and SiO_2 is washed with hot H_2O and hot HNO_3 (1:5) and SiO_2 is removed by addition of conc. HF followed by conc. HNO_3 and heating on the sand-bath, leaving Al_2O_3 . The results are consistently higher than those obtained by heating the alloy in a stream of Cl_2 , probably due to the presence of > 1 form of Al_2O_3 not all equally stable to Cl_2 . The dissolution of the alloy by aq. $CuCl_2$ is very rapid and may be usefully employed in other connexions. M. S. B.

Palladium in the noble metal industry. E. R. THEWS and R. W. HARBISON (Deut. Goldschmiede-Ztg., 1932, 35, 232; Chem. Zentr., 1932, ii, 1682).—The use of Pd in alloys, and the properties of some alloys, are described. A. A. E.

Sintered tungsten carbide Brinell balls. H. STYRI (Metals & Alloys, 1932, 3, 273—274).—Hardness tests have been made on hardened and tempered samples of Cr steel and on Ta carbide by means of the Vickers diamond indenter, the Rockwell machine, and the Brinell machine, in which both Hultgren's (work-hardened steel) balls and Carballoy (WC) balls have been employed. The vals. given by the Carballoy balls are systematically higher than those for the steel balls and appear more reliable, especially > 650 Brinell, the ball suffering less permanent deformation in 11 impressions than the Hultgren ball does after 1 impression. E. H. B.

Wire-drawing process. III. **Lubrication.** E. L. FRANCIS (Iron and Steel Inst., Carnegie Schol.

Mem., 1932, 21, 1—34).—Determinations of the friction coeff. of bronze balls in contact with a cast-Fe surface, under different conditions of lubrication, give results for the order of merit of the lubricants, which agree with those determined under actual wire-drawing conditions. The experiments show that in these cases lubrication is of the boundary type, being confined to a film 10^{-5} in. thick. A good lubricant must be capable of mol. orientation and adsorption at the metal surfaces. This condition is realised with animal and vegetable oils, containing free fatty acids, but not with mineral oils. Viscosity, pressure, and speed have no influence under these conditions. The behaviour of a soap depends on its physical and chemical properties; it should contain $< 80\%$ of fatty acids and as little impurity as possible. The majority of lubricants serve best at high temp. At 100—120°, many oils are as efficient as the best soap, whilst aq. lubricants, used on clean wire, are nearly as efficient when used at the b.p. In an appendix, F. C. THOMPSON, with the author, refers to the possible causes and treatment of wire-drawers' dermatitis. E. S. H.

Testing [of thin metal sheets] by Siebel and Pomp's deep-drawing-widening test. H. FOURNIER (Compt. rend., 1932, 195, 142—144).—This method (cf. Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1929, 11, 18, 287; 1930, 12, 9, 115) is discussed, and close connexion shown to exist between its indications and the elongation-stress curve. It is more sensitive than the methods of Persoz or of Erichsen, especially for metal showing greater ductility, but is of less general application. C. A. S.

Relation between the results of the deep-drawing-widening and tensile tests [of metals and alloys]. H. FOURNIER (Compt. rend., 1932, 195, 327—329; cf. preceding abstract).—The results of the deep-drawing-widening tests of (a) Siebel and Pomp, (b) Persoz, and (c) Erichsen have been compared with those of the tensile test for two steels, brass, Al, duralumin, and Mg. The relation between the results of the tensile test and of (a) given by its authors is found to vary with the state of the metal; that for (b) and (c) is reasonably independent thereof. Test (a) is suitable for examining the more, (b) and (c) the less, ductile metals, or the results of different treatments of the same metal. C. A. S.

Influence of elongation by successive tractions, followed by ageing, on the elastic limit, and Young's modulus of soft steel. J. GALIBOURG (Compt. rend., 1932, 195, 1022—1024; cf. B., 1932, 643).—Cold-worked steel or Ni does not obey Hooke's law until it has been aged at room or a moderate (e.g., 165—170°) temp. Successive repetitions of the process have the same result. Thus the modulus of the annealed metal (19,250 kg. per sq. mm.) is $>$ that (17,930) of the metal thus treated, if calc. on the original cross-section, but $<$ the same (20,320) calc. on the cross-section before the last traction. Ni behaves similarly. C. A. S.

Effect of active carbons on the flotation of minerals. R. BRAUNSTEIN (Kohle u. Erz, 1932, 29, 189—195; Chem. Zentr., 1932, ii, 1500).—Small quantities of active C or fuller's earth ppt. a floating ore

or inhibit its flotation. For complete pptn., *e.g.*, of galena, the necessary quantity of C falls with its activity. The effect is presumably due to adsorption of the flotation agent, and it is measured by the relative adsorption of the agent by the mineral and the C.

A. A. E.

Differential flotation of minerals. E. ALAKOZOFF (Chim. et Ind., 1932, 28, 768—776).—A plant handled 4 types of minerals containing Pb, Zn, and in one case Cu, obtaining as principal products Pb concentrate, Zn concentrate, and a Cu-Pb-Zn mixture. A small-scale flotation plant was installed for research purposes, and results with it are given in detail. No successful method of concentrating Zn when in the form of calamine could be found. Other trials showed that Hg in cinnabar and Au in pyrites and quartz could readily be conc. Amongst the reagents employed were NaCN, ZnSO₄, CuSO₄, creosote, *o*-toluidine, cresols, Na₂S. Fineness of grinding and H₂O content were also dealt with quantitatively. Zn concentrates with a considerable S content showed a tendency to heat in storage.

C. I.

Physico-chemical cleaning of metals [prior to electrodeposition]. E. JIMENO and I. GRIFOLI (Anal. Fís. Quím., 1932, 30, 794—806).—In the process of pickling Fe in H₂SO₄ at room temp. the acid is used up mainly in dissolving oxide, although at higher temp. this is no longer the case. Very dil. acid dissolves but little oxide, but the process under such conditions is tedious. The usual electrolytic methods are not economical. In the method recommended, the specimen is immersed in dil. (5—15%) H₂SO₄ containing an inhibitor such as C₅H₅N for a short time, and is then submitted to electrolysis in conc. H₂SO₄, when a perfectly clean surface is obtained within 2—3 min.; the inhibitor reduces the quantity of acid used by 30—50%. Up to 20% of FeSO₄ and 0.057 g. per litre, of As₂O₃ in the bath are without influence.

H. F. G.

Deposition of copper on aluminium. H. GINSBERG (Aluminium, 1932, 14, 4—5; Chem. Zentr., 1932, ii, 764).—The metal is cleaned with 10% NaOH saturated with NaCl, washed, dipped in 2% HCl, coated anodically (20—25 amp. per sq. dm. at 50—60 volts with electrode separation 6 cm. for 10 sec.—2 min. in 10% aq. H₂C₂O₄ or CH₂Cl·CO₂H), washed, treated with Na₂CO₃ and NaHCO₃ (23 and 45 g. per litre) at 90—95° during 10—20 sec., and then coated with Cu from a neutral CuSO₄ or KCN-Cu bath.

A. A. E.

Electrodeposition of nickel and chromium. J. W. CUTHBERTSON (Metallurgia, 1932, 7, 57—58).—Generally speaking, the more simple is the bath the more satisfactory will it be. In operating a plating bath, the prime factor is [H⁺] control. A suitable solution contains NiSO₄ 3 lb., NiCl₂ 1 oz., H₃BO₃ 2 oz., citric acid 0.5 oz., H₂O 1 gal., and is worked at 32° with a c.d. of 25 amp./sq. ft. Org. addition agents are of little use in Ni-plating and only complicate control. Any advantage gained by the use of hot plating solutions appears to be due to secondary actions, but aëration and agitation are essential if high c.d. are employed. A prior plating of the base metal with Cu is not necessary, but careful cleaning and prep. of the surface to be plated are essential.

C. A. K.

Electrothermic separation of lead and zinc. B. BOGITCH (Compt. rend., 1932, 195, 127—129).—The ore, *e.g.*, marmatite, after roasting for a period depending on its content of Cu and Fe, is heated in a chromite-lined furnace (300 kw.) provided with hot and cold condensation chambers. Crude Pb with most of the Ag is found on the floor of the furnace; above it is a matte containing most of the Cu and Ni; in the condensation chambers are the Zn and some PbS in fine powder, the amount of PbS increasing with the amount of S in the ore. All these products are in a condition suitable for further treatment on ordinary lines. The slag retains a little Pb and Zn. Assays of the products are given. Of the Pb and Zn 70 and 0%, respectively, occur in the crude Pb, 26 and 83% in the Zn-PbS powder, 2.4 and 9 in the matte, and 1.6 and 8.0 in the slag. C. A. S.

Prép. of [metals as] colloids.—See I. Fireproofing of fabrics.—See VI.

See also A., Jan., 18, System Li-Cd. Cu and Au alloys. Au-Bi, Fe-Co, Mn-Cu-Al, Li-Sn, Pd-Ni, Pt-Co, Fe-Ni-W. 29, Cyanide solution [for Au]. Cd-Au. 33, Determination etc. of corrosion. 34, Electrolysis of Ni salt. 39, Anti-corrosive solutions. 44, Measuring spectral lines [of alloys].

PATENTS.

Treatment of sulphurous iron ores [pyrites]. B. F. HALVORSEN (B.P. 384,464, 21.1.32).—FeS₂ is heated with a small quantity of O₂ to bring about the reaction 3FeS₂ + 2O₂ = Fe₃O₄ + 3S₂, and the hot Fe₃O₄ is immediately treated with H₂ to obtain Fe sponge and H₂O. The H₂ and O₂ are obtained in correct proportions for these reactions by electrolysis of H₂O.

A. R. P.

Manufacture of cores of compressed magnetisable powder [iron alloys]. SIEMENS & HALSKE A.-G. (B.P. 384,235, 11.7.32. Ger., 13.7.31).—The powder is mixed with 0.25—1.5% of water-glass and an equal amount of sugar and the mixture is moistened, dried, and pressed into cores.

A. R. P.

Refining of copper. J. E. HARRIS and J. H. WHITE, ASSS. to BELL TELEPHONE LABS., INC. (U.S.P. 1,852,162, 5.4.32. Appl., 8.3.29).—Molten Cu held in a crucible or ladle lined with pure Al₂O₃ is deoxidised with CaB₆ to obtain metal with a high electrical conductivity.

A. R. P.

Manufacture of tinfoil. S. E. DIESCHER, ASSR. to S. DIESCHER & SONS (U.S.P. 1,810,699, 16.6.31. Appl., 5.12.25).—The apparatus comprises a bath of molten Sn divided into two compartments by an Fe partition which dips just below the surface of the molten Sn. The front compartment is provided with rolls for passing the sheet Fe through the bath, and the back compartment with a series of superimposed rolls for removing surplus Sn from the sheets. The surface of the bath where the sheets enter it is kept clean and free from SnO₂ and particles of Sn-Fe alloy by the action of a large roll partly immersed below the surface of the molten metal; this roll collects the dross and transports it into a part of the bath from which it is removed as it accumulates.

A. R. P.

Production of alloys of beryllium with heavy metals. I. G. FARBENIND. A.-G. (B.P. 384,243, 25.7.32.

Ger., 5.9.31).—A mixture of BeO or BeF₂ with the oxide of the desired metal (e.g., Fe₂O₃ or magnetite) is reduced by the thermit reaction, using a 60—40 : 40—60 Mg—Ca alloy with or without a small proportion of Al.

A. R. P.

Production of a welding material suitable for use as welding wire. W. ALBERTS (B.P. 384,187, 19.5.32. Addn. to B.P. 343,414; B., 1931, 497).—The slag specified in the prior patent is highly basic, e.g., it contains 48% CaO, 10% MgO, 11% FeO, 17% MnO, and 11% SiO₂.

A. R. P.

Cleaning and polishing preparation for silver, gold, and the like. A. ROSENBERG (B.P. 384,040, 23.10.31).—A dry powder comprising a mixture of china clay 47, CaCO₃ 47, (NH₄)₂SO₄ 5, and finely-divided Mg 1% is claimed.

A. R. P.

Test rods, more particularly for blast furnaces. W. W. TRIGGS. From FREYN ENG. Co. (B.P. 385,195, 11.5.32).

Ore-dressing jigs. H. H. SMITH. From GEN. MINING & FINANCE CORP., LTD. (B.P. 385,204, 23.5.32. S. Afr., 27.7.31).

Heat-treatment [furnaces].—See I. Steel for oil-cracking apparatus.—See II. Heat-treatment furnace. Electroplating machine.—See XI.

XI.—ELECTROTECHNICS.

Inductive electric heating in chemical plants. R. D. CENTER (Chem. & Met. Eng., 1932, 39, 617—618).—The primary coil carrying a.c. is wound around the outside of the vessel, which must be of Fe or steel, the walls of which become a combined core and 1-turn secondary coil; the induced currents heat the vessel. Three applications are given.

D. K. M.

Response to sudden illumination of a gas-filled photo-electric cell. P. FOURMARIER (Compt. rend., 1932, 195, 378—380).—The lag in attaining a steady state on illuminating a photoelectric cell with K or Cs cathode, filled with Ne, A, or He, has been examined by means of a rotating slit, whereby full illumination was established in 10 microsec. In general, there is an instantaneous response attributed to ionisation by the primary electrons, followed by a slower rise (cause of the lag) due to ionisation by either the positive ions of the mols. of the gas, or by secondary electrons of the cathode. The lag in an A-filled cell is of longer duration.

C. A. S.

Artificial material from coal. Oxidation of coal.—See II. Uses of chlorinated naphthalenes.—See III. Fireproofing of fabrics.—See VI. H₂O₂.—See VII. Induction furnaces. Cleaning of metals. Cu on Al. Cr- and Ni-plate. Pb—Zn separation.—See X. Food investigation with ultra-violet light.—See XIX.

—See also A., Jan., 34, Electrolytic oxidation, and prep. of complex Ag salts. Electrolysis of Ni salt. 44, Optical-electric colorimeter.

PATENTS

Electric [heat-treatment] furnace. A. J. HANSON, ASSR. to AMER. ELECTRIC FURNACE Co. (U.S.P. 1,854,374, 19.4.32. Appl., 11.4.30).—Metal articles to

be treated are contained in a perforated container adapted to rotate continuously in the same direction in a current of heated air which is recirculated through the container.

J. S. G. T.

Electric lamp and the illuminating body used therein. K. AGTE, ASSR. to GEN. ELECTRIC Co. (U.S.P. 1,854,970, 19.4.32. Appl., 13.5.31. Ger., 20.5.30).—A coating of Ta carbide is formed on a refractory core, e.g., of W, coated Re, or a Re alloy.

J. S. G. T.

Electrode for accumulators. M. SCHNEIDER (B.P. 384,995, 1.6.31).—An electrode comprising U-shaped vertical undulations formed in material composed of Pb—Sb alloy and surrounded by an integral plane frame of the same material is claimed.

J. S. G. T.

Carbon-coating of [plate] electrodes. E. D. DE BROSCHE (U.S.P. 1,854,926, 19.4.32. Appl., 6.6.30).—The clean metal plate is heated, e.g., in C₂H₂, until C is deposited, and the tube exhausted while the plate is hot.

J. S. G. T.

[Electrolyte for Leclanché] primary cell. B. K. BROWN (U.S.P. 1,854,176, 19.4.32. Appl., 16.7.28).—A solution containing TiCl₄ is used.

J. S. G. T.

Cells for the electrolytic treatment of fluids. A. E. KATZ (B.P. 384,734, 6.10.31).—The cathode has a smooth metallic surface and one of the conical or frusto-conical electrodes, *A*, is formed with an axial passage through which liquid is passed between the electrodes; the other, *B*, surrounding *A*, has inwardly directed passages communicating with an axial passage extending only through the outer part of *B*. Treated fluid passes to a filter for removing occluded gases.

J. S. G. T.

Electroplating machine. H. J. RICHARDS and W. E. HINTON, ASSRS. to LASALCO, INC. (U.S.P. 1,854,763, 19.4.32. Appl., 15.5.30).—A revolvable tumbling barrel (*A*) operatively supported in the electrolyte container (*B*) is adapted to be raised out of *B*, and means are provided for automatically switching the current on or off according as *A* is in or out of *B*.

J. S. G. T.

Collecting electrode for electrical precipitation apparatus. J. R. GIES, ASSR. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,854,650, 19.4.32. Appl., 15.5.30. Ger., 24.5.29).—Longitudinally reinforced strips are supported loosely and independently in a supporting frame.

J. S. G. T.

[High]-resistance material. T. C. BROWNE and C. J. KAYKO, ASSRS. to T. C. BROWNE (U.S.P. 1,854,923, 19.4.32. Appl., 26.4.26).—A plastic mixture containing Mo sulphide, cement, Na silicate, and, if desired, graphite is dried and baked at 800°.

J. S. G. T.

[Temperature regulator for hot-cathode] vapour electric-discharge devices. BRIT. THOMSON-HOUSTON Co., LTD., ASSEES. of P. M. CURRIER (B.P. 385,223, 23.6.32. U.S., 24.6.31).

Vertical tube furnace.—See I. Frosted lamp bulbs.—See VIII. Magnetisable cores.—See X.

XII.—FATS; OILS; WAXES.

Fats. A BÖMER (Chem. Weekblad, 1932, 29, 643—645).—A brief survey of research progress during the last 30—40 years.

H. F. G.

Solubility of fats in ethylene glycol monoethyl ether, either alone or mixed with vaseline oil.—E. JAFFE (*Annali Chim. Appl.*, 1932, 22, 667—673).—This ether may be used for the determination of the crit. solution temp. of certain fats, but, as a result of its high solvent power, the separation occurs at such a low temp. that the fat partly solidifies. A mixture of this solvent, vaseline oil, and fat is homogeneous when hot and begins to separate at a definite "temp. of desolubilisation," which may be used to detect adulteration of (1) cow's butter or cacao butter with coconut oil, (2) castor oil with other vegetable oils, and (3) linseed oil with fish oil. T. H. P.

Detection of diacetyl in fats improved by butter aromas. VIZERN and GUILLOT (*Ann. Falsif.*, 1932, 25, 459—462).— Ac_2 (<0.02 g. per kg.) is readily detected in butter and fats by rapidly distilling 50 g. of the sample with 20 c.c. of 95% EtOH , treating the distillate (20 c.c.) with 1 c.c. of 10% $\text{NH}_2\text{OH}\cdot\text{HCl}$ solution, and 1.7 c.c. of $N\text{-NaOH}$, shaking for 1 min., and then adding 1 c.c. of a 1% NiSO_4 solution and 0.6 c.c. of $N\text{-AcOH}$ dropwise with shaking. Removal of EtOH (the presence of which vitiates the test) on the H_2O -bath gives the characteristic Ni dimethylglyoxime. The presence of small amounts of H_2O -sol. fatty acids does not interfere. J. W. B.

Determination of fat in butter. A. CASOLARI (*Annali Chim. Appl.*, 1932, 22, 706—712).—50 g. of the butter are heated, in a special tared tube closed at one end with a rubber stopper and having a small orifice at the other, with 5—10 c.c. of about 30% MeOH or EtOH in a bath at 70—75°, and then centrifuged and cooled. When the fat has solidified, the H_2O - EtOH layer and the protein coagulum are removed and the residue is washed with cold H_2O and dried with absorbent paper, the tube being then reweighed. The % of fat found is increased by 0.3. The results obtained with normal butters are as exact as those found by extraction with Et_2O . The Gerber acido-butyrometer method gives high results at 65°, but more exact ones at a lower temp. T. H. P.

Acid and iodine values of the oil from soft winter wheat. C. B. GUSTAFSON (*Cereal Chem.*, 1932, 9, 595—600).—The Hanus I val. of extracts in light petroleum of 92 pure varieties or mill samples of American wheats showed little variation with place of origin, mean vals. being 115.2 (1929), 116.9 (1930), and 117.0 (1931); acid val. (means, 11.0, 12.8, and 9.9, respectively) showed rather greater variations, Michigan wheats giving the lowest val. The I val. decreased by 2—8 units, and the acid vals. increased (from 2- to 6-fold) on storage of the ground wheat for 10 weeks, but the former gives no reliable indication of susceptibility to development of rancidity. J. G.

Utilisation of seeds of *Agriophyllum arenarium*. N. MILASHEVSKI (*Masloboino-Zhir. Delo*, 1931, No. 11, 21—22).—The seeds contain H_2O 10.6, fat 8.1, protein 23.86, carbohydrate 46.51, crude fibre 7.48, ash 4.05%. The oil had d 0.9272, acid val. 2.68, sap. val. 196.1, I val. 136.5, viscosity 7.45 at 20°, congealing point -14°. The oil cake (H_2O 20, fat 1.65, protein

24.15, carbohydrate 41.71, crude fibre 7.59, ash 4.9%) is a satisfactory cattle feed. CH. ABS.

Changes in oil-bearing seeds stored under various conditions. M. ZABOLOTSKI and A. BARUKOV (*Masloboino-Zhir. Delo*, 1932, 2, 16—22).—Soya bean, linseed, hemp seed, and sunflower seed with chaff contained more H_2O than the seeds without chaff. The oil content increased and the ash decreased slightly with length of storage; protein and cellulose underwent no uniform change. The acid val. increased in seeds stored under high humidity. Soya bean absorbed H_2O more rapidly and retained it longer than the other seeds. CH. ABS.

Hydrogenated oils in the margarine industry. A. SCHROEDER (*Allgem. Oel- u. Fett-Ztg.*, 1932, 29, 653—654).—Deposits from chilled sunflower oil contain P compounds (phosphatides?); segregation of such constituents in cold weather might account for variations in the H_2O -retaining power of the hardened fats. E. L.

Rapid determination of the acid value of olive oil. B. BALDI (*Boll. Chim. farm.*, 1932, 71, 807).—10 c.c. of the oil are titrated with a solution of NaOH (14.84 g. per litre) of which 1 c.c. is equiv. to 1% of oleic acid. H. F. G.

Analysis of oils. Determination of the hexabromide index. M. LOMBARD (*Ann. Falsif.*, 1932, 25, 462—468).—Consistent vals. for the hexabromide index (wt. of acid hexabromides insol. in Et_2O from 100 g. of oil) are obtained by the technique described, the essential factor being the dropwise addition, with const. agitation, of Br in dil. Et_2O solution to the acids (from hydrolysis) also in Et_2O at 0°. Lower temp. are unnecessary, and the yield is almost unaffected by the vol. of Et_2O used to wash the pptd. hexabromide or by the temp. of filtration. Addition of AcOH gives unreliable results since crystallisation of the hexabromide is retarded. Contrary to earlier statements (B., 1913, 242), the ppt. should be dried at 105—110°, at which temp. it is quite stable. J. W. B.

Middle soap. R. H. FERGUSON and A. S. RICHARDSON (*Ind. Eng. Chem.*, 1932, 24, 1329—1336).—The existence of anisotropic "middle soap" (cf. B., 1927, 18) as an individual phase in commercial soap systems has been confirmed, and equilibria involving middle soap have been investigated in the systems soap (coconut, tallow, or mixed)- NaCl - H_2O at 100°. The separated phases have been analysed, so that it has been possible to indicate the direction of the tie-lines in the phase diagrams. In concn. ranges where middle soap occurs, such commercial soaps behave essentially as single soaps and exemplify the types of equilibria found with Na or K soaps of pure fatty acids. Middle soap becomes more prominent as the proportion of coconut soap, in tallow-coconut soaps, increases, and, in general, the real soap and electrolyte contents of the neat soap also increase; the shift is not quite regular, but, as a rule, the behaviour of mixed soaps can be predicted from the known effect of electrolyte on soaps from single stocks. Middle soap is distinguished by its very high viscosity and tough and stringy consistency when chilled. E. L.

Karlsbad powder ["Carlonit" bleaching earth] in the oil and fat industry. E. BELANI (Allgem. Oel-u. Fett-Ztg., 1932, 29, 654, 656—657).—This naturally-active, neutralising earth is a cheap and excellent bleaching agent for fatty oils. E. L.

Hydrogenation with at. H.—See I. Fatty acids in petroleum. Lubricating oils.—See II. Applications of H_2O_2 .—See VII. Lubrication and wire-drawing. Lanoline rust-preventing coatings.—See X. Fat in goat skins. Sulphonated castor oils.—See XV. Beef fat and CO_2 .—See XIX.

See also A., Jan., 19, Systems K stearate (palmitate)-EtOH- H_2O . 24, Soaps and org. solvents. 50, Illipé butter. 71, Sesquiterpene ketones [in turmeric oil]. Wood oil of *Eremophila Mitchellii*. 85, Lubricating oils and cancer. 99, Halibut-liver oil. Butter-fat vitamins.

PATENTS.

Rendering method [for fats etc.]. G. MCGILTON, ASSR. to INDUSTRIAL PATENTS CORP. (U.S.P. 1,854,270, 19.4.32. Appl., 6.11.30).—The material is first heated up with live steam and, after removal of the accumulated H_2O , treated with steam under pressure in order to break down the cellular structure etc., and finally melted out in steam-jacketed open or vac. pans; the rendered mass is pressed as usual to remove the fat. E. L.

Soap. D. L. MCCARTHY (U.S.P. 1,854,268, 19.4.32. Appl., 5.2.30).—A vegetable oil (2 pts.) is saponified with Na_3PO_4 (9—10 pts.) and H_2O (2 pts.); glycerin is not removed. E. L.

Detergent composition. E. S. STODDARD, ASSR. to CONOVER Co. (U.S.P. 1,854,235, 19.4.32. Appl., 18.1.30).—The composition (for use in dish-washing machines etc.) comprises a soap core, surrounded or coated by Na_3PO_4 , which can be conveniently separated by, and contained in, H_2O -sol. gelatin capsules, so that the Na_3PO_4 shall dissolve (and effect some cleansing) before the soap. E. L.

Preparation of esters of high viscosity from castor oil. C. R. DEL-TURCO (B.P. 385,021, 27.8.31).—Castor oil is partly hydrolysed and the product (acid val. 80—120) is washed to remove glycerol and heated in vac. to about 250° , with or without a catalyst, thereby effecting esterification of the hydroxy-glycerides with the free hydroxy-acids; raw castor oil is added, if required, in order to reduce the acid val. of the product to < 6 . The product is of high d and η , and miscible with mineral oils. E. L.

Production of sulpho-acids. CHEM. U. SEIFENFABR. R. BAUMHEIER A.-G. (B.P. 384,701, 6.8.31. Ger., 6.8.30).—Oils or fatty acids are sulphonated in the presence of mono- or tri-acetin or other esters of polyhydric alcohols with fatty acids containing fewer C atoms in the mol. (in any case $\geq C_{12}$) than the acids to be sulphonated. E. L.

Apparatus for manufacture of neutral products from oils and fats. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 384,715, 31.8.31).—Apparatus for a continuous process is described, whereby the fatty

acids removed from a crude oil by steam-distillation in vac. (cf. B.P. 213,267; B., 1925, 619) are esterified with deficiency of glycerol, and the esterification product, containing, e.g., 5% of free fatty acid, is supplied continuously to the crude oil entering the deacidifying still. The deacidified oil can be modified by adding $PrCO_2H$ etc. to the distilled fatty acids. E. L.

Lubricant.—See II. Separation of aq. fatty acids. Wetting etc. agents.—See III. Insecticides etc.—See XVI. Bleaching of flour etc.—See XIX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Variations of optical rotation of turpentine of *Pinus pinaster*. A. OUDIN (Compt. rend., 1932, 195, 185—186).—The optical rotation of turpentine obtained from *P. pinaster* varies from tree to tree, but remains fairly const. for a given tree over long periods. H. D.

Standardisation of paints and paint materials. F. MARGIVAL (Peint., Pig., Ver., 1932, 9, 211—215).—The advantages of using standard specifications when dealing with ready-mixed paints, paint ingredients, etc. are pointed out. A scheme involving the use of triangular co-ordinates is outlined. S. S. W.

Paint for priming plaster surfaces. P. H. WALKER and E. F. HICKSON (U.S. Bur. Stand., Misc. Publ., 1932, No. 137, 13 pp.).—Forty priming paints were tested on plaster and concrete in humidity cabinets, and on wet sand etc., for colour failure and blistering, and on blotting paper, newspaper, etc. for penetration and prevention of "spotting" of subsequent coats. The compositions and general properties of the primers and results of the above tests are tabulated and discussed. The desirable characteristics of a good plaster primer are deduced, and a specification is suggested, comprising chiefly physical tests and comparisons with a primer that can readily be mixed from standard materials. S. S. W.

Water-resistant coatings. A. V. BLOM (Farben-Ztg., 1932, 38, 349—351).—Various types of finishes were exposed in different localities, on metal and wood with and without primers, to the action of H_2O alone, H_2O alternated with sunlight, and running H_2O alternated with sunlight. The general scheme of investigation is outlined and a few sp. points are illustrated, e.g., advantages of oleo-bituminous paints over a straight bitumen, need for a penetrative primer on wood, to anchor subsequent coats and prevent blistering, and the variations in elastic properties of nitrocellulose coatings. As a result of the tests, it is stressed that H_2O -resistance is a relative conception and that the behaviour of a material is not defined until conditions of application and exposure, undercoat systems, etc. are known. S. S. W.

Zinc white and its fineness. A. MANN (Farbe u. Lack, 1932, 641—642).—Photomicrographs are given to show the distribution of ZnO in oil and varnish. The fine-grained structure causes diffuse light reflexion which increases the whiteness and hiding power. The commercial grades of ZnO and their uses are reviewed. S. M.

Satin white. J. B. MEYER (Farben-Ztg., 1932, 38, 379—380).—Present information on the constitution,

prep., practical use (in conjunction with casein), and evaluation of satin whites (Ca sulphoaluminates), as used in the paper industry, is summarised. S. S. W.

Staining power of Prussian-blue. G. ZERR (Farbe u. Lack, 1932, 640).—Usual methods of determination give discordant results. Accuracy is ensured by shaking ZnO or lithopone with a solution in $H_2C_2O_4$ of a weighed quantity of the Prussian-blue until the latter is completely absorbed by the substrate; the uniform product is filtered, dried, powdered, and worked up with a measured amount of oil. S. M.

Sediments in ink and in writing. C. A. MITCHELL and T. J. WARD (Analyst, 1932, 57, 760—770).—The ratio of Fe to tannin should be about 5 : 100; if there is much deviation from this proportion pptn. may occur, excess of Fe giving rise to a bluish-green deposit and of tannin to large, black, irregular clots. Photomicrographs (24) illustrate different types of deposit found in writings in books and documents, caused by inks, mould hyphae, pounces, blotting-paper, etc. It is important to note microscopical appearances in examinations for legal purposes. T. McL.

"Bleeding" of pigments in oil films. W. LUDWIG (Farbe u. Lack, 1932, 616—617, 628).—Bleeding is dependent on solvent action between the colouring matter and the oil and is increased by (a) free fatty acids in the oil, (b) the use of basic pigments, (c) most solvents and thinners, and (d) non-adsorbent surfaces, e.g., glass. It can be reduced by using tung oil instead of linseed oil. The testing of pigments for bleeding is described and common dyes are classified according to their bleeding tendency. Conc'n. of the pigment at the surface of a film is promoted by rapidly evaporating solvents and may produce a streaky effect, which can, however, be reduced by addition of substrates possessing high absorption for the pigment, e.g., talcum, China clay, mixtures of barytes with ZnO, chalk, or infusorial earth. Bleeding can be prevented in special cases by applying films of gelatin, spirit or cellulose lacquers between the priming and surface coats. S. M.

Solubility of rosin in benzene. F. SANDER (Farbe u. Lack, 1932, 643—644).—A French rosin gave 6—8% and an American rosin 65—70% of residue insol. in benzene of high b.p. Previous work on the action of benzene and light petroleum on rosin and on the composition of the residue is reviewed. Rosin is completely sol. in C_6H_6 .

SCHIEBER observes that differences in solubility may be due to colloidal changes in the rosin or to its autoxidation. Thickening of rosin solutions can be hindered by addition of 15—20% of solvent naphtha or 0.25% of an antioxidant. S. M.

Synthetic resins from glycerol and polybasic acids. E. SCHLENKER (Allgem. Oel- u. Fett-Ztg., 1932, 29, 658—663).—The structure of these resins as long chains of glycerol mols., linked primarily at the α -positions through the CO_2H groups of alternating phthalic acid residues, is suggested; the remaining free β -OH groups may, perhaps, be esterified in later stages of resinification. The inherent difference between the α - and β -positions of the glycerol mol. may account

for the peculiar properties of these resins in comparison with the glycol-phthalic acid condensates. E. L.

Linoleum adhesives and their drawbacks. F. KIRCHDORFER (Farbe u. Lack, 1932, 647—648).—Details are given for the prep. of aq. and H_2O -free adhesives for linoleum on various materials. Reference is made to the bad effects of moist and porous surfaces. S. M.

See also A., Jan., 38, Ultramarine. 38, White lead. 44, Surface microscopy [of paint films].

PATENTS.

Production and recovery of dispersed substances [e.g., white lead]. L. D. JONES, ASSR. to SHARPLES SPECIALTY CO. (U.S.P. 1,854,744, 19.4.32. Appl., 27.11.25).—The fineness and other physical properties of pptd. compounds are controlled by the use of protective agents under suitable conditions. White lead is made by mixing solutions of Na_2CO_3 and $Pb(NO_3)_2$ in the presence of gelatin and centrifuging. S. M.

Preparation of rosin decomposition product. C. O. HENKE, ASSR. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,853,353, 12.4.32. Appl., 26.2.30).—Material containing abietic acid, e.g., wood rosin (grade FF), is refluxed at 350—375° in a still, preferably of cast Fe (Fe having a catalytic effect), until practically all the acid is decomposed, when the refluxed mass is distilled below 450°, giving an abietene-like hydrocarbon which, on sulphonation and neutralisation with an alkali-metal base, yields H_2O -sol. sulphonation products of high wetting power. S. S. W.

Resin [from coal-tar or coal-gas condensates]. A. O. JAEGER and J. A. BERTSCH, ASSRS. to SELDEN CO. (U.S.P. 1,853,565, 12.4.32. Appl., 12.4.26. Renewed 19.2.32).—A crude aromatic hydrocarbon fraction, e.g., crude solvent naphtha, after removal of phenols etc., washing with conc. H_2SO_4 , and removal of impurities so reacted, is treated with just sufficient active halogen, e.g., Cl_2 , to react with acyclic, alicyclic, and heterocyclic impurities, preferably in the presence of a halogen carrier, e.g., Br, Fe filings. The coumarone and indene compounds present are then polymerised, and any admixed aromatic hydrocarbons are removed by controlled distillation. Light-coloured resins are obtained. (Cf. U.S.P. 1,741,305; B., 1930, 940.) S. S. W.

Manufacture of [resinous] condensation products. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 382,301, 22.7.31).—An aromatic hydroxycarboxylic acid or a derivative, e.g., an ether, is condensed with at least 4 mols. of an alkyl-substituted aralkyl halide or a hydrogenated *ar*-halogenoalkylated $C_{10}H_8$, e.g., in presence of $ZnCl_2$, $AlCl_3$, $FeCl_3$, Zn, Sn, Al, or Fe, and/or surface catalysts. Examples include products from: dimethylbenzyl chloride or bromide and salicylic, *p*-hydroxybenzoic, *p*-cresotic, 2 : 3-hydroxynaphthoic, *o*-phenoxy-, *o*-acetoxy-, or *o*-methoxy-benzoic acid. The resins are sol. in drying oils, turpentine, and C_6H_6 . C. H.

Production of [resinous] condensation products [of the formaldehyde-urea type]. W. KRAUS (B.P. 383,025, 19.10.31. Austr., 27.10.30).— $CO(NH_2)_2$, $CS(NH_2)_2$, urethane, and aq. CH_2O are boiled in presence

of acid catalysts. Initial condensation products of the 3 basic ingredients with CH_2O may replace the bases themselves. Rapid-hardening, H_2O -stable resins are obtained. C. H.

Resinous condensation product. K. H. HOOVER, ASST. to ASSOC. OF AMER. SOAP & GLYCERINE PRODUCERS, INC. (U.S.P. 1,853,049, 12.4.32. Appl., 12.5.30).—Esterifiable ethers of glycerol and cyclic compounds, *e.g.*, phenyl or tetrahydrofurfuryl ether of glycerol, are heated with polybasic carboxylic acid compounds, *e.g.*, phthalic anhydride, until the acid val. is > 10 . The resinous condensation products so obtained are sol. in lacquer solvent mixtures, miscible with nitrocellulose, and suitable for use in adhesives and films. S. S. W.

Manufacture of resinous compositions. BRIT. THOMSON-HOUSTON CO., LTD., ASSEES. OF R. H. KIENLE (B.P. 384,342, 9.6.31. U.S., 10.6.30).—A drying oil, *e.g.*, linseed oil, is heated for a few hr. at 200 – 220° in an autoclave with polyhydric alcohol-polybasic acid resin (modified or unmodified) until a heat-hardening complex is formed. This is converted into an air-drying complex by adding 5–10% of a polyhydric alcohol having > 2 OH groups per mol., *e.g.*, glycerol, and continuing the heating in the open at 240 – 260° until a small drop gels rapidly on a 200° hot-plate. The product is dissolved, while still hot, in a suitable solvent, *e.g.*, PhMe-naphtha, to give an air-drying varnish. S. S. W.

Manufacture of thermoplastic polymerisation products from indene or styrene, vinyl acetate, and like monovinyl compounds. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 381,693, 15.9.31).—Autopolymerisation is avoided by maintaining the temp. at $> 30^\circ$ and $<$ the b.p. of the initial material by "concn. cooling," *e.g.*, by evaporation of initial material, or of liquids (H_2O , alcohols) in cooling devices, under suitable pressure or vac. Styrene, *e.g.*, descends a cylinder past "concn.-cooling" coils at 95° to the bottom, where the product is softened by means of a heating coil at 180 – 220° and may be removed by a warm conveyor and ejected on to a belt conveyor. C. H.

Mouldable compositions. H. WADE. From BAKELITE CORP. (B.P. 384,728, 21.9.31).—An aq. emulsion of PhOH- CH_2O or other artificial resin not of "alkyd" type is made in a colloid mill with addition of a stabiliser and NH_3 or $(\text{CH}_2)_6\text{N}_4$ and then pptd. on the fibre or filler with alum or other precipitant, H_2O being removed subsequently. S. M.

Moulding compositions. BRIT. THOMSON-HOUSTON CO., LTD., ASSEES. OF W. R. STEELE (B.P. 385,062, 27.10.31. U.S., 27.10.30).—The proportion of synthetic resin can be reduced to 8% if 10% of "palm fibre" is used in conjunction with the usual fillers. S. M.

Transparent films for use, for example, as the surface layers of pictorial sound records. GRAMOPHONE CO., LTD., S. WHYTE, and W. E. LORD (B.P. 384,694, 17.7.31).—By incorporating up to 30% of diatomaceous earth of particle size < 0.01 mm. with synthetic resin or cellulose ester or ether films, improved resistance to the cutting action of the needle is obtained

without materially affecting the transparency of the film. The diatomaceous earth should be of good colour and as free from impurities as possible. D. J. N.

Production of colour pictures [on glass]. M. KING (B.P. 384,245, 28.7.32. Irish F.S., 30.10.31).

Moulding of [hollow] plastic materials. C. BEAUMONT (B.P. 385,073, 10.11.31).

Ice colours. Azo pigments.—See IV. **Chewing-gum base.**—See XIX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Vulcanisation of rubber in concentrated solution in presence of ultra-accelerators. A. BOURBON (Rev. gén. Caoutchouc, 1932, 9, No. 81, 9–13; Chem. Zentr., 1932, ii, 786).—The speed of vulcanisation depends on the accelerator and the solvent. For accelerators, the speed diminishes in the order Zn isopropylxanthate, piperidine piperidylthiocarbamate, Zn diethylthiocarbamate; for solvents it diminishes in the order $\text{C}_2\text{H}_2\text{Cl}_2$, CHCl_3 , PhMe, C_2HCl_3 , CCl_4 , benzene (70 – 140°), corresponding with ϵ . For a particular solvent, starting in the solid condition, it first rises and then reaches a max. and falls. A. A. E.

Action of accelerators [of vulcanisation of rubber]. H. J. GRÜNDEL (Gummi-Ztg., 1933, 47, 359–360).—When maintained at a temp., *e.g.*, 100° , which would lead to distinct "after-vulcanisation" in a vulcanised unaccelerated mixture of rubber and S (93 : 7), a similar mixture free from pre-vulcanisation gives no physical sign of vulcanisation, although a very considerable proportion of S may enter into combination. Similarly, a vulcanised mixture of rubber (92), S (7), and *p*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$ (1 pt.) shows physical signs of "after-vulcanisation" at 55° , whereas the tensile characteristics of an unvulcanised mixture give no evidence of vulcanisation below 98° . With rise of temp. from the lowest possible for vulcanisation, the coeff. of vulcanisation necessary for attainment of optimum tensile qualities first increases to a max. and then falls to the val. observed for ordinary vulcanising temp. D. F. T.

[Products from] HCN.—See VII.

See also A., Jan., 21, **Surface tension of caoutchouc solutions.**

PATENTS

Production of synthetic rubber polymerides. R. H. GERKE, ASST. to NAUGATUCK CHEM. CO. (U.S.P. 1,854,186, 19.4.32. Appl., 24.9.28).—A 1 : 3-diene, such as erythrene, is polymerised in the presence of an inorg. peroxide, *e.g.*, BaO_2 , and an org. acid anhydride, *e.g.*, Bz_2O or Ac_2O , in a sealed tube if necessary. D. F. T.

Production of compositions containing rubber or the like. DUNLOP RUBBER CO., LTD., and F. W. WARREN (B.P. 384,792, 7.12.31).—A vulcanisable composition capable of being spread easily and smoothly is produced by mixing comminuted rubber or the like with a rubber solvent, the latter preferably containing dissolved rubber, and mechanically working the viscous mixture in the presence of a lubricant such as NH_4 oleate. D. F. T.

Lubricated belt [containing rubber]. A. L. FREDLANDER, Ass't. to DAYTON RUBBER MANUF'G. CO. (U.S.P. 1,854,252, 19.4.32. Appl., 5.8.29).—Rubber or rubber-fabric belts are rendered noiseless by applying after vulcanisation stearic acid or Zn stearate and then heating for about 1 min., *e.g.*, at approx. 280–300°, to cause penetration of the powder. The treatment may be repeated several times. D. F. T.

Chewing-gum base.—See XIX.

XV.—LEATHER; GLUE.

Acid flocculation of vegetable tannin extracts. O. GERNGROSS and H. HERFELD (Collegium, 1932, 679–709).—The p_H val. at which vegetable tan liquors of analytical concn. were flocculated was characteristic for each tanning material and independent of the mineral acid (HCl, H₂SO₄) used. Mimosa, myrobalans, algarobilla, divi divi, valonia, and sumac were non-flocculable by solutions of p_H 1–7, but sumac, myrobalans, and mimosa were rendered turbid at $p_H < 1$. The ppts. obtained by small increases in the acidity were less easily peptised in H₂O than those obtained by large increases; hence it follows that the tannin particles are not coagulated but are hydrolysed by large decreases in p_H . Hydrolysis was confirmed by tannin analyses. Vegetable tannins can be divided into “condensed” and “hydrolysable” according as they are pptd. or hydrolysed on diminishing the p_H val. of their solutions. Insol. matter in tannin extracts should be determined at p_H 4.5–5.0 after a min. settling period of 24 hr. The degree of dispersion of the particles diminished as the concn. of the tannin solution was increased and the amount of ppt. obtained by reducing the p_H val. of such solutions was increased. Less ppt. was produced by additions of org. acids than of inorg. acids at the same low p_H vals. The p_H of flocculation was increased by ageing the tannin solutions before the addition of the acid. Clarified and sulphited extracts were less liable to acid flocculation than the untreated extracts. Sulphite-cellulose extract was stable to acid flocculation, and the sensitiveness of tannin extracts to acid treatment was reduced by admixture with sulphite-cellulose extract. D. W.

Absorption of oxygen by [vegetable] tanning materials. IV. E. W. MERRY (J. Soc. Leather Trades' Chem., 1932, 16, 529–546; cf. B., 1933, 33).—The rate of absorption of O₂ was proportional to the concn. of the solution of the tanning material up to d 1.190, was decreased by decreases in their p_H val. and vice versa, and was greatly increased by the growth of moulds on them or by additions of relatively large amounts of H₂O₂. The rate of O₂ absorption was increased by adding chestnut extract to a sumac or valonia infusion, but was diminished by adding it to a mimosa extract or by blending valonia infusion with myrobalans or mimosa infusions, respectively. The O₂ absorption of gambier or myrobalans infusion was unaffected by addition of chestnut extract. The dark colour in oxidised tan liquors was removed by substances, *e.g.*, pelt, which removed the tannin. A slightly greyer-coloured leather of good quality was produced with such oxidised tan liquors. D. W.

Utility of the quinhydrone electrode in determinations of the hydrogen-ion concentration in vegetable tannin extracts. O. GERNGROSS and H. HERFELD (Collegium, 1932, 947–949).—Different results are given by the quinhydrone and H electrodes only with tan liquors of $d > 1.0065$, and not with solutions of analytical concn. The readings with the quinhydrone electrode are const. in 5–15 min. A small electrode vessel (3–4 c.c. capacity) and excess of quinhydrone should be used. D. W.

Detection of sulphite-cellulose waste liquor [in vegetable tanning extracts] by the [Procter-Hirst] aniline-hydrochloric acid, cinchonine, and fluorescence tests. (A) Report of Committee for qualitative tannin analysis. (B) Effect of pre-treatment of the sulphite-cellulose waste liquor. O. GERNGROSS and H. HERFELD (Collegium, 1932, 710–723, 723–725; cf. B., 1932, 1064).—(A) Humic acids were distinguished from sulphite-cellulose wastes in tannin extracts by using the Gerngross-Herfeld modified Procter-Hirst reaction (B., 1932, 809), but the sensitivity of the reaction was thereby reduced to 4–5% of sulphite-cellulose waste liquor. The error with sulphited extracts was eliminated by a modification of the cinchonine reaction and its sensitivity was thereby reduced to 6–7% of sulphite-cellulose waste. The fluorescence test failed owing to errors caused by decayed wood, the “violethin” in pine bark, and strong sulphiting. (B) The qual. tests are very little affected by the methods of boiling or purification used in the manufacture of the sulphite-cellulose waste. D. W.

Chrome tanning. XIV. **Determination of degree of olation in basic chromium chloride and sulphate solutions.** XV. **Effect of concentration, basicity, temperature, and salt additions on the degree of olation.** E. STIASNY and G. KÖNIGFELD (Collegium, 1932, 897–902, 902–916; cf. B., 1932, 905).—XIV. The degree of olation is calc. from the formula $V = 100(a - b - c)/(a - b)$, where a = c.c. 0.1N-Na₂S₂O₃ required in determining Cr in 50 c.c. of the liquor diluted to contain about 0.1% Cr, b = c.c. of 0.1N-NaOH required by the same amount of liquor in the basicity determination, and c = c.c. of 0.1N-HCl required by the same amount of liquor in the determination of non-olated OH groups. The last-named are determined by adding an excess of 0.1N-HCl to 50 c.c. of the diluted liquor and immediately titrating the excess HCl to p_H 2.8 with 0.1N-NaOH, using K salt of *p*-sulphobenzeneazobenzylaniline (cf. B., 1931, 359). For CrCl₃ liquors the formula is $V = 100(b - c)/(25 - c)$, where b = c.c. 0.1N-NaOH required in the titration of a mixture of 50 c.c. of the solution and 25 c.c. 0.1N-HCl to p_H 2.8, and c = c.c. of 0.1N-NaOH required by the mixture of 50 c.c. of chrome liquor and 25 c.c. 0.1N-HCl after refluxing for 1 hr.

XV. The olation was increased as the concn. of the Cr liquor was increased, the liquor aged, and the temp. raised. All basic Cr liquors are olated immediately they are rendered basic, olation increasing until it attains an asymptotic limit, which depends on the concn., basicity, and temp. of the Cr liquor. Freshly

prepared Cr liquors and liquors which have not been much aged are in a state of change, whilst aged liquors change very little and are more suitable for tanning. $\text{Cr}_2(\text{SO}_4)_3$ liquors are more quickly and more completely olated than CrCl_3 liquors of similar basicities and concn. Cr liquors which have been olated at higher temp. are gradually de-olated on being allowed to remain at a lower temp. and gradually attain the same degree of olation as aged liquors which have not been heated. Olation is hindered by CO_2 , but the CO_2 gradually escapes on ageing and the difference is removed from Cr liquors rendered basic with NaOH and Na_2CO_3 , respectively. Olation is unaffected by additions of NaCl , but increased by Na_2SO_4 . D. W.

Acidity of vegetable-tanned leathers. II. W. R. ATKIN and F. C. THOMPSON (*J. Soc. Leather Trades' Chem.*, 1932, 16, 591—608; cf. B., 1929, 865).—By the use of KCl solutions in extracting the leather samples, the internal and external p_{H} vals. are equalised, the conductance of the solutions is improved, diffusion potentials are diminished, and the p_{H} val. is practically unaffected. Kubelka and Ziegler's criticisms (B., 1931, 1064) are answered. When known amounts of acid are added to leather, one portion of the acid is neutralised by salts of weak acids in the leather and another portion by free NH_2 groups. Weak acids are buffered when present in a chestnut-tanned hide powder. An Innes "difference figure" > 0.7 can be obtained for leathers containing only weak acids since at high dilution the latter become highly ionised and simulate strong acids. The min. (2.5) as a limiting val. for sound leathers is justified. Bennett's suggestion (B., 1931, 408) is considered not very helpful and a formula is given for calculating the acid figure from the experimental points. D. W.

Determination of buffer salts and acidity in water extracts of vegetable-tanned leathers. C. W. DAVIES and R. F. INNES (*J. Soc. Leather Trades' Chem.*, 1932, 16, 546—557).—The amount of buffer salt in a leather and the type of acid present can be determined by obtaining the conductivity curves of aq. extracts of leathers. Typical curves have been derived for HCl , H_2SO_4 , AcOH , lactic acid, $\text{HCl} + \text{AcOH}$, aq. extracts of a Nigerian leather, a sumac-tanned leather rich in buffer salts, a gambier-tanned leather containing little buffer salt, leathers tanned with oak bark, myrobalans, chestnut, mimosa bark, and quebracho, respectively, and free from buffer salt, and a new bookbinding leather marked "Floquet." The conductimetric curves of sumac- and mimosa-tanned leathers, respectively containing 1% of added H_2SO_4 , are discussed. It is shown that the added acid is neutralised in the sumac tannage but not in the mimosa tannage. From these curves it is deduced that the acid in a chestnut-tanned leather is much stronger than AcOH , and thereby the exceptional acidity of such leathers is explained. The combined acid is stronger than the free acid in a sumac-tanned leather. The conductimetric method can be applied to determine the presence of free mineral acid in a leather and to show if a leather has been treated with an amount of mineral acid insufficient to neutralise the buffer salts therein. D. W.

Nature of the water-soluble [matter] in leather tanned with wattle bark. III. R. O. PAGE and H. C. HOLLAND (*J. Amer. Leather Chem. Assoc.*, 1932, 27, 432—453; cf. B., 1932, 652).—Combined tannin was increased to a max. of 120 pts. per 100 pts. of hide substance by storing the leather for 15—20 years, but the combined H_2O -sol. matter reached a max. very quickly. Combined tannin was increased and combined H_2O -sol. matter decreased as the temp. was raised from 15° to 40° . The combined H_2O -sol. matter was increased by pretreatment of the pelt with acids, alkalis, NaCl , or CaCl_2 , and decreased by pretreatment with cationic chrome-tanning liquors, the effect being proportional to the Cr absorbed. The combined tannin was increased by prolonged pretreatment only with acids, alkalis, etc. and by pretreatment with cationic chrome-tanning liquors. The increase in combined H_2O -sol. matter was caused by pretreatment of the pelt only if the pelt was plumped (cf. B., 1929, 66). D. W.

The fat-liquoring process. II. Behaviour of sulphonated castor oils in chrome leather fat-liquoring. F. STATHER and R. LAUFFMANN (*Collegium*, 1932, 672—679; cf. B., 1932, 811).—The total amount of fat absorbed in the fat-liquoring of chromed hide powder with different sulphonated castor oils was independent of the degree of sulphonation and dilution of the oils, respectively, but the amounts of combined oil and of EtOH extract in the leather were increased as the degree of sulphonation of the oil was increased. The amount of combined oil was increased as the "ageing" period was prolonged or the temp. of the "ageing" process was raised. The total fat absorbed by the chromed powder was increased slightly at first and then diminished by increasing the degree of neutralisation of the powder. This effect was more pronounced with oils of higher degrees of sulphonation. D. W.

The fat-liquoring process. III. Fat-liquoring chrome[-tanned] leather with mixtures of sulphonated castor oil and unsulphonated oils. F. STATHER and R. LAUFFMANN (*Collegium*, 1932, 940—946; cf. preceding abstract).—The amount of fat absorbed by chromed hide powder is unaffected by variations in the proportions of the ingredients in mixtures of sulphonated castor oil (I) and unsulphonated oils or by the degree of sulphonation of (I), except for a slight diminution with mixtures containing a relatively small % of (I). D. W.

Preparation of casein substrates [for analysis of bating materials]. K. H. GÖLLER (*Collegium*, 1932, 950—953).—180 g. of "Hammarst" casein are stirred into 1965 c.c. of H_2O at 80° until a colloidal solution is obtained, set aside for 15 min., filtered through glass wool into a 2-litre graduated flask, made up to 2080 g. with H_2O , 10 c.c. of PhMe are added, and the whole is kept for 2 days before use. Its p_{H} val. should be 6.3—6.4 and for titration 2.7—2.8 c.c. of 0.2N-KOH should be required for 10 c.c. with phenolphthalein as indicator, or 1.1—1.2 c.c. of N-HCl with Me-red. D. W.

The bating problem [and evaluation of bating materials for skins]. R. QUARCK (*J. Amer. Leather*

Chem. Assoc., 1932, 27, 532—541).—The bating action of enzymes is not merely a function of time, mass, and temp. With greasy skins these factors are all sometimes low, as if the removal of the fat were the deciding factor. Damage was caused by low-temp. bating in one case, whereas it was obviated by the use of a higher temp. Some proteolytic bacteria in H_2O are activated by certain bating preps. and not by others. The bating action is affected by the hardness of the H_2O , the pre-treatment of the pelts, the neutral salts present in the bating liquor and those which may be formed in the pelt. A neutral salt is necessary to free the enzyme adsorbed by the wood-flour in artificial bating materials. Well-defined chemical compounds can be formed by neutral salts and NH_2 -acids or polypeptides. The physical effects in bating are also discussed. D. W.

Fat in goatskins. S. L. FOSTER (J. Amer. Leather Chem. Assoc., 1932, 27, 527—532).—Raw Patna goatskins contained 2.5% of fat, of which 90% was removed in the wet work and 300% added in the later stages of manufacture. Fat spews in Patna goat leathers are not caused by the incomplete removal of the natural grease. D. W.

"Red heat" [in salted raw hides]—its cause and prevention. M. E. ROBERTSON (J. Soc. Leather Trades' Chem., 1932, 16, 564—568).—Raw hides salted with NaCl of marine origin develop red stains due to chromogenic halophilic bacteria occurring in the NaCl. No "red heat" was observed on hides treated with pure or sterilised NaCl. The trouble can be prevented by mixing such marine NaCl with 0.5—1.0 wt.-% of NaF or Na_2SiF_6 . D. W.

Effect of p_H value on the combining capacity of hide powder for acid and basic dyes. C. C. HSIAO and E. O. WILSON (J. Amer. Leather Chem. Assoc., 1932, 27, 500—527).—In the combination of a basic dye (methylene-blue) with hide powders at different p_H vals., maxima were reached at p_H 7.6 and 9.4; with an acid dye (metanil-yellow) a max. was observed at p_H 1.75, and with further increase of p_H the amount of dyestuff fixed diminished considerably. At the optimum p_H vals. the same no. of equivs. of basic and acid dyes were fixed by the hide powder. The amount of combined dyestuff was only slightly increased by increasing the concn. or raising the temp. of the dye solutions, respectively. More uniform coloration was obtained by adding Na_2SO_4 to the solutions, but the amount of combined dye was thereby diminished. The effect is interpreted by applying Donnan's membrane-potential theory. D. W.

Technique of fur preparation. W. E. POPKIN (J. Amer. Leather Chem. Assoc., 1932, 27, 541—549).—A lecture. D. W.

Phosphatides in leather manufacture. B. REWALD (Collegium, 1932, 929—931).—Phosphatides can be used as emulsifiers of fats and the emulsion employed for fat-liquoring leather. They are more firmly retained than sulphonated oils by leather; soya beans provide a cheap source of supply. D. W.

Resilience and elasticity of leather. F. ENGLISH (Collegium, 1932, 917—928).—The grain layer is the

hardest and the flesh layer the softest, but in some leathers the middle and flesh layers are the hardest. Raw seal hide and seal leather should be used as standards. The resilience is increased by drying, diminished by placing the leather in damp sawdust or a damp atm., and by continuous mechanical softening, at first greatly and then more gradually increased, until finally a limiting val. is reached. The resiliences of leathers are comparable only if they are of the same thickness. D. W.

Comminution of leather for analysis. F. STATHER (Ledertech. Rundsch., 1932, 24, 63—64; Chem. Zentr., 1932, ii, 1734—1735).—An apparatus is described. A. A. E.

See also A., Jan., 20, Sorption of tannic acid by proteins.

PATENTS.

Manufacture of leather and products used in connexion therewith. C. G. SHAW and J. HOFFMAN (B.P. 384,663—4, [A, B] 28.5.31. [B] Can., 15.11.30).—(A) Sole leather is partly dried, one or more coats of a waterproof composition comprising a cellulose derivative, a drying or semi-drying oil, and suitable solvents and pigments are applied, and the leather is subsequently subjected to mechanical treatment to open the hair holes. (B) The leather is first treated on the grain side with a slightly alkaline solution, subsequently with a dil. acid solution, and finally with an oil emulsion before proceeding with the coating described in (A); the coated leather is then given a coating of wax emulsion, dried, rolled, and brushed. D. W.

Imitation leather. F. B. DEHN. FROM DECORATIVE DEVELOPMENT, INC. (B.P. 384,846, 18.2.32).—The markings on natural skins, e.g., reptile leathers, are photolithographically reproduced on largerskins, e.g., goatskins, sheepskins, or on a prepared surface on such skins, and the printed skins are subsequently embossed to simulate the scale-like surface of the natural skins. D. W.

Manufacture of vegetable glue. I. F. LAUCKS and G. DAVIDSON, Assrs. to I. F. LAUCKS, INC. (U.S.P. 1,854,700 and 1,854,702, 19.4.32. Appl., [A] 31.8.28, [B] 4.10.28).—The adhesives comprise, e.g., (A) 30 pts. of soya-bean flour, 1 pt. of alum, and an alkaline medium, e.g., NaOH and CaO, (B) 30 pts. of wheat flour, 5—10 pts. of Portland cement, and an alkaline medium. L. A. C.

XVI.—AGRICULTURE.

Report on [soil] chemistry. F. E. HANCE and others (Proc. Ann. Mtg. Hawaiian Sugar Planters' Assoc., 1932, 51, 619—642).—Irrigation waters: K_2O and P_2O_5 contents are recorded. Effect of drying on the available P_2O_5 content of soils: In soil exposed under glass to direct sunlight the available P_2O_5 increased at first slowly and then rapidly, falling sharply after 3—6 months. Available K_2O , SiO_2 , and CaO were approx. unchanged. Effect of fertilisation on soil reaction: NH_4 salts increased acidity; Portland cement, CaO, molasses, and press cake increased alkalinity; NO_3 and bone meal had a variable effect; raw rock phosphate and treble, reverted, and super-phosphates and K_2O had no significant effect. A slow return to normal vals. was indicated after several months; the change was

accelerated by the presence of growing cane. Changes in availability of plant nutrients in fertilised soil: When PO_4''' was supplied to plots of growing cane there was a marked decrease in the soil-available P_2O_5 after 2.5 months, but no decrease occurred on plots receiving no phosphate, or on plots receiving P_2O_5 but kept free from vegetation. Corresponding effects were observed with K_2O . Portland cement increases the available P_2O_5 in the soil. CH. ABS.

Effect of a soil mulch on soil temperature. E. S. WEST (J. Counc. Sci. Ind. Res., Australia, 1932, 5, 236—246).—Seasonal and daily variations in temp. are reduced by mulching. Summer temp. to depths of 60 cm. averaged 2° lower in mulched than in uncultivated soil. A. G. P.

Changes in the microflora of soil. H. J. CONN (New York State Agric. Exp. Sta. Tech. Bull., 1932, No. 204, 21 pp.).—Microscopical technique is described. In an acid soil of high colloidal content, the natural flora of fungi and *Actinomyces* is changed to one in which bacteria predominate, more quickly by an increased moisture content than by addition of CaCO_3 . A. G. P.

Laws of soil colloidal behaviour. X. Exchange neutrality and combining capacity. S. MATTSO and J. B. HESTER (Soil Sci., 1932, 34, 459—483; cf. B., 1932, 1045).—Completely electro-dialysed soils are treated with neutral salt solutions containing varying amounts of the free acid or base. The p_H of the clear liquid is practically that of exchange neutrality (*i.e.*, the point at which soil absorbs equal nos. of anions and cations of the salt). Curves expressing the relationship between p_H and the equiv. of free acid or base added ("neutralisation curves") are utilised in conjunction with the corresponding curve for the salt solution itself for determining the saturation capacity and the degree of saturation at a definite p_H , and also the colloid content of the soil. Examination of a soil profile by this method reveals the extent of the hydrolysis of the absorbing complex brought about by the podsolisation process. Neutralisation curves of the isoelectric ppts. of Fe and Al phosphates, silicates, and humates, and of protein- and albumin-humates are recorded and discussed. A. G. P.

p_H of soils of northern Africa and of French West Africa. J. F. DE FERRIÈRE (Ann. Agron., 1932, 2, 674—682).—Data indicate a zonal distribution of soils having characteristic p_H ranges corresponding with definite climatic conditions, especially rainfall, and interspersed with intrazonal areas influenced by local conditions. A. G. P.

Statistical examination of the p_H and assimilable potassium in some African soils. J. F. DE FERRIÈRE and E. NATTIER (Ann. Agron., 1932, 2, 683—689).—High proportions of assimilable K (Schloessing method) are associated with soils of $p_H > 7.0$. Vals. decline with p_H . A. G. P.

Effect of various factors on the p_H of peats. M. M. McCool (Contr. Boyce Thompson Inst., 1932, 4, 497—511).—Recorded p_H vals. of certain peats were markedly affected by the ratio of peat to H_2O used, and by previous air- or oven-drying. The sol. salt content

of peats was increased by drying, but no correlation between changes in p_H and in sol. contents was observed. Leaching with H_2O increased, and treatment with neutral salt solutions decreased, the p_H of very acid peats. Superphosphate affected p_H only when very heavy applications were made. Treatment with S lowered the p_H and the increased acidity thus produced was very difficult to remove by leaching with H_2O . A. G. P.

Oxidation-reduction potentials and hydrogen-ion concentration of a soil. L. G. WILLIS (J. Agric. Res., 1932, 45, 571—575).—Liming an acid humus soil reduced its oxidation-reduction potential to an extent which varied inversely as the p_H produced. A similar relationship existed in the displaced soil solution when titrated with very dil. acid. A. G. P.

Determination of the lime requirement of acid soils. H. DAMMERMANN (Arch. Pflanzenbau, 1932, 9, 389—426).—Comparison is made of a no. of standard methods. Determinations of the exchange acidity by Daikuhara's method and of hydrolytic acidity by Kappen's method yield sufficient information for practical purposes. For highmoor soils neither method is very satisfactory and the electrometric titration method of Jensen is recommended. A. G. P.

Determination of the potash and phosphate requirements of soils. E. BECKER (Z. Pflanz. Düng., 1932, 11B, 552—575).—The larger proportion of available P commonly associated with neutral or alkaline soils is recorded more definitely by the Sigmund (HNO_3 extraction) method than by those of Lemmermann (citric acid extraction) or of Neubauer. The last-named method shows unduly high vals. for heavy, acid, difficultly-working soils as a result of the improved physical condition produced by the admixture of sand in the test. For soils containing $> 5\%$ CaCO_3 recorded vals. for assimilable P are not always in agreement with those of field trials. The Lemmermann method gives high vals. for very acid soils [p_H (KCl) < 5], but is applicable to all other soils containing $< 5\%$ CaCO_3 . The field response to P manuring shown by P-rich soils containing much CaCO_3 is attributable to the less easy intake of native PO_4''' under these conditions and the consequent utilisation by crops of a large proportion of fertiliser P. Vals. for available K_2O obtained by Sigmund's method are generally higher than those by the seedling method (average ratio 148 : 100). A. G. P.

Determination of small quantities of potassium in soil solutions. M. VON WRANGEL and H. BEUTELSPACHER (Z. anal. Chem., 1932, 90, 401—417).—20 c.c. of solution containing 0.2—2.4 mg. K_2O are treated with excess of $\text{Na}_3\text{Co}(\text{NO}_2)_6$ and the ppt. is separated and washed centrifugally. After dissolving in 0.1N-NaOH, the NO_2' is determined colorimetrically with indole in presence of H_2SO_4 . The ppt. was found to have the const. composition $\text{K}_2\text{NaCo}(\text{NO}_2)_6$. The method is suitable for routine analyses. Details are given. F. L. U.

Comparison of potash determinations in soils by the seedling and the *Aspergillus* methods. K. IHLE and W. STOLLENWERK (Landw. Jahrb., 1932, 76, 291—

296).—A general parallelism is recorded between the results of the two methods both in acid and alkaline soils. Soils having < 10 mg. K_2O (Neubauer) are not clearly differentiated by the *Aspergillus* method. The results of the latter distinguish between soils deficient in and those adequately supplied with K, but further detail cannot be claimed. A. G. P.

Rate of absorption of potassium by plants and its possible effect on the amount of potassium in soils from applications of potassium fertilisers. R. P. BARTHOLOMEW and G. JANSSEN (Arkansas Agric. Exp. Sta. Bull., 1931, No. 265, 70 pp.).—Plants take up large amounts of K at all stages of growth at a rapid rate. Absorption is as rapid in darkness as in daylight. Plants were readily adaptable to rapid changes in the K concn. of the medium. In soils, the fixation of K in a non-replaceable form was much more rapid in cropped than in uncropped soils. Soil-K which has been transformed from a replaceable into a non-replaceable condition may revert rapidly to a replaceable form. A direct relationship exists between the [K] in displaced soil solutions and the amount of replaceable K in the soil. Plants have a max. capacity for K absorption which may be maintained throughout growth if adequate supplies are available. Residual effects of added K fertilisers are unlikely to appear. There is a min. to which plants can reduce the replaceable K in soil. Rapid intake of K during the early growth stages of plants may be sufficient so to deplete K supplies in soil that internal translocation of K is necessary to maintain later growth. A. G. P.

Potash fertilisers and hops. SEEGER (Ernähr. Pflanze, 1932, 28, 339—340).—Hops grown with insufficient K were badly formed and of inferior colour. A. G. P.

Use of nitrate of soda on certain Indiana soils. F. MOSER (Soil Sci., 1932, 34, 445—457).—Trials with maize, wheat, and timothy are recorded. Late applications on maize were the most effective, but in no case were crop increases great. Small early dressings (50 lb. per acre) in the rows produced a temporary stimulation, but plants suffered from N deficiency later and yields declined. The protein content of all crops was slightly increased by late applications of $NaNO_3$ and by heavy applications at any time. A. G. P.

Manurial experiments with silicophosphate. H. NIKLAS, W. SCHROPP, and A. HOCK (Arch. Pflanzenbau, 1932, 9, 470—495).—Comparative cropping trials with basic slag, superphosphate, and silicophosphate (superphosphate in the manufacture of which 3—5% of kieselguhr is added) on a no. of soils are recorded. The effect of the added colloid in increasing the efficiency of superphosphate in certain cases is discussed. A. G. P.

Silage investigations at Bangalore. III. Effect of stage of maturity on the ensilage of Jowar. T. S. KRISHNAN (Agric. & Live Stock India, 1932, 2, 507—514; cf. B., 1930, 1000).—Best silage was produced by material in the prime stage (*i.e.*, grain just hardening). In the advanced (straw) stage it is preferable to make ensilage than to feed the straw direct. Immature material produced an unsuitable sour silage, in the

making of which there was a heavy loss of protein and mineral matter. Excessive amounts of volatile bases and org. acids (including $PrCO_2H$) were formed. A. G. P.

Influence of time on the physiological activity of rye seed and its significance in the seedling method. A. KUKE (Z. Pflanz. Düng., 1932, 27A, 64—68).—A reply to Neubauer (B., 1932, 855). A. G. P.

Physiology of nitrifying organisms in natural soils. I. Influence of nitrogenous organic materials on nitrification. H. ENGEL (Z. Pflanz. Düng., 1932, 27A, 1—21).—Nitrification of urea in a light, poorly-buffered soil was more rapid than that of $(NH_4)_2SO_4$. This is ascribed to the favourable alkalinity caused by the NH_3 produced from urea. Nitrite accumulation from urea was considerable, but from $(NH_4)_2SO_4$ was insignificant. During the nitrification of $(NH_4)_2SO_4$ there was a progressive increase in soil acidity. With urea, soil pH increases in the early stages corresponding with the formation of $(NH_4)_2CO_3$. The next phase, *viz.*, nitrification of half the total N and formation of NH_4NO_3 , coincides with a fall in pH to approx. the initial val. The final and complete nitrification of NH_4NO_3 involves a further decrease in pH and a corresponding decline in the rate of nitrification. Similar stages occur in the nitrification of peptone and blood meal, relative rates of nitrification being in the order urea $>$ peptone $>$ blood $>$ $(NH_4)_2SO_4$. Org. materials have no direct stimulatory action on the nitrifying organisms. A. G. P.

Influence of a wheat crop on accumulation of soil nitrate. F. PENMAN and P. M. ROUNTREE (J. Dept. Agric. Victoria, 1932, 30, 496—504).—Growth of wheat reduced the capability of soil to accumulate nitrate, irrespective of that removed in the crop. The activity of *Azotobacter* decreased soon after the crop was established. No evidence was obtained that cropping intensified any microbiological processes involving the assimilation or reduction of nitrates. A. G. P.

Stimulus of seed grain. V. CASABURI (L'Ind. Chimica, 1932, 7, 1630—1633).—Treatment of seed wheat with "Uni-dea," a compound derived from methylenedinitrothiolsulphonic acids and containing Hg, Fe, and Cu in "complex" combination, results in increases in crop, hectolitre wt., 100-corn wt., protein content, and resistance to rust. T. H. P.

Influence of manuring on the yield and botanical composition of a natural meadow. H. RAUM (Z. Pflanz. Düng., 1932, 11B, 537—552).—Five years' general observations are recorded. A. G. P.

Effect of various iodine treatments on the yield, composition, and digestibility of meadow grass. K. NEHRING, W. ZIELSTORFF, and W. SCHMIDT (Landw. Jahrb., 1932, 76, 505—523).—Manuring with KI did not affect yields. Spraying with KI solution depressed the yield in some cases. The I content of the hay was considerably increased in all cases, especially where spraying was adopted, when 20% of the added I appeared in the crop. In KI-sprayed grass approx. 50% of the I content existed in a H_2O -sol. form, but where KI was applied to the soil the I content was almost entirely insol. Increased I content of hay is associated with a

higher protein content and with greater retention by animals in feeding trials. The latter was still more marked where KI was added directly to the hay ration. The resorption of I by sheep was in the order: untreated hay + KI > hay from grass sprayed with KI > hay from KI-manured soil. A. G. P.

Effect of nutrition on root growth. F. BORNE-MANN (Ernähr. Pflanze, 1932, 28, 337—338).—Ostermann's remarks (B., 1932, 318) are criticised. Root size is determined not alone by soil-nutrient supplies, but by the ratio of these to CO₂ assimilation by leaves. A. G. P.

Localisation of nitrate in sugar-beet culture. G. M. CHECCUCCI (Ind. sacc. Ital., 1932, 25, 100—101; Chem. Zentr., 1932, ii, 1382).—The favourable action of NO₃' is most marked when the nitrate is in direct contact with the seed. A. A. E.

Effect of an iodide fertiliser on the iodine content of a food plant. A. B. BEAUMONT and G. M. KARNS (Science, 1932, 76, 567).—White egg-turnips grown on soil treated with KI showed much higher I contents in roots and tops than those grown on soil treated with KCl. L. S. T.

Presence and distribution of sulphofying bacteria in mineral and peat soils. J. K. WILSON and H. W. HIGBEE (J. Amer. Soc. Agron., 1932, 24, 806—821).—The organisms occurred in all soil types examined. No relationship was observed between the no. of sulphofying bacteria present and the pH or the Ca, Mg, S, N, or P contents of the soils. Air-drying reduces the no. of organisms in the soil, but does not destroy all of them. In air-dry peats higher Ca contents are associated with larger nos. of sulphofying bacteria. In field soils higher nos. were observed in autumn than in spring. A. G. P.

Effects of ammonium sulphate and other forms of nitrogen on the botanical composition of closely cut turf. G. E. BLACKMAN (Ann. Appl. Biol., 1932, 19, 443—461; cf. B., 1932, 697).—Reduction in the proportion of weeds (plants other than *Gramineæ*) resulting from periodic applications of (NH₄)₂SO₄ to closely cut turf is due to the toxicity of the NH₄ ion and is not produced by other N fertilisers. A. G. P.

Calcium- and hydrogen-ion concentrations in the growth and inoculation of soya beans. W. A. ALBRECHT (J. Amer. Soc. Agron., 1932, 24, 793—806; cf. B., 1929, 992).—Failure of soya beans on acid soils is related more closely to Ca⁺⁺ deficiency than to high [H⁺]. A min. supply of Ca⁺⁺ is necessary for growth and still further amounts are necessary before inoculation can take place. The efficiency of Ca compounds in this respect is probably dependent on the [Ca⁺⁺] to which they give rise, and in materials examined was in the order CaCl₂ = CaCO₃ > Ca(OAc)₂ > adsorbed Ca. A. G. P.

Soil contamination of pasture samples. Detection and approximate estimation, with special reference to the effect on the iron content of pastures. H. O. ASKEW (New Zealand J. Sci. Tech., 1932, 4, 92—100).—The SiO₂ of plant tissues is almost completely sol., but that of soil largely insol., in 2% NaOH solution. The material is ashed, treated with

HCl, evaporated to dryness, and heated. The residue is extracted with 2N-HCl, filtered, and the insol. portion extracted with 2% NaOH solution. The portion insol. in NaOH is assumed to be derived from soil, and the extent of the contamination may be calc. from vals. obtained by direct extraction of soil. The method, used in conjunction with Fe determinations in bush sickness investigations, indicated considerable contamination with soil Fe even in hand-picked samples. The method also permits the qual. examination of the contents of sheep paunches for ingested soil. A. G. P.

Three-year study of the chemical composition of grass from plots fertilised and grazed intensively. J. G. ARCHIBALD, P. R. NELSON, and E. BENNETT (J. Agric. Res., 1932, 45, 627—640).—The pasture was treated with a complete fertiliser in spring and successive dressings of N fertilisers during the summer. The intensive system resulted in a much greater dry-matter production per acre. The % dry matter in the fresh grass declined, but there was a marked increase in the N content of the dry matter and smaller increases in all other constituents except crude fibre, which declined. The Ca content was not greatly affected. Seasonal variations in yield and composition are recorded. Close correlation is shown between rainfall and the production or recovery of grass constituents, notably of the N, P, and Et₂O extract. A. G. P.

Nitrogen supply for young apple trees growing in leguminous and non-leguminous sod. A. J. HEINICKE (Proc. Amer. Soc. Hort. Sci., 1931, 28, 526—531).—Lucerne alone does not supply as much N as the trees can obtain in cultivated soil. CH. ABS.

Fertilisation of apple orchards. III. Comparison of sodium nitrate and ammonium sulphate. H. E. KNOWLTON and M. B. HOFFMAN (West Virginia Agric. Exp. Sta. Bull., 1932, No. 252, 12 pp.).—N fertilisers applied 10—15 days prior to blooming were more effective than when used at the blooming stage. The relative efficiencies of NaNO₃ and (NH₄)₂SO₄ varied with soil type. (NH₄)₂SO₄ tended to increase acidity in orchard soils. A. G. P.

Autumnal migration of nitrogen and carbohydrates in the apple tree with special reference to leaves. A. E. MURNEK and J. C. LOGAN (Missouri Agric. Exp. Sta. Res. Bull., 1932, No. 171, 30 pp.).—The N content of leaves decreased steadily from the period of active growth until defoliation. The autumnal translocation of N from leaves to twigs and later to main stems persists into the yellow leaf stage, and premature defoliation (by frost and wind) may involve considerable N losses from the tree. Carbohydrate movements are largely controlled by day-to-day weather variations. A. G. P.

Citrus Preservation Committee—Progress Report (Oct., 1932). ANON. (J. Counc. Sci. Ind. Res., Australia, 1932, 5, 201—204).—Washing with 5% borax solution or 2.5—5% Na₂CO₃ had little action in prolonging the storage life of Navel oranges, but borax reduced the incidence of stem-end rot (*Alternaria*) in Valencia oranges. Coating with paraffin wax after washing did not improve the storage quality of Navels, but reduced skin browning and stem-end rot in Valencias. Best

conditions for storage and transport are described. A storage temp. of $3\cdot5^{\circ}$ is recommended. A. G. P.

Sulphuring of apricots. J. E. THOMAS (J. Council. Sci. Ind. Res., Australia, 1932, 5, 228—235).—The amount of SO_2 absorbed by apricots is directly related to the time of exposure, but the amount retained is largely influenced by the nature of the drying process. Shade-drying produces much higher losses of SO_2 than sun-drying. Spraying with H_2O or 2·5% NaCl solution prior to sulphuring has little effect on SO_2 absorption or on the final colour of the fruit. Storage losses of SO_2 are considerable. Treatment of oversulphured fruit with H_2O_2 or NaOCl leads to appreciable colour spoilage during storage and transit. A. G. P.

Indigofera endecaphylla as a conservator of the fertility of tea soils at Peradeniya. A. W. R. JOACHIM (Trop. Agric., 1932, 79, 161—165).—Growth of this cover crop prevented losses of soil by erosion and increased the N and org. matter contents of the soil. A. G. P.

Wetting, spreading, and emulsifying agents for use with spray fluids. IV. Miscible oils. R. M. WOODMAN (J.S.C.I., 1933, 52, 4—6 T).—The standardisation of the toxic oil in spray emulsions is discussed. Fusel oil may replace phenols as an aid to dissolution in the prep. of a miscible oil. The miscible oil-forming tendency of various mixtures of fusel oil and soft soap has been measured and the character of the emulsions from these miscible oils studied. The effect of incorporating resin oil or H_2O has also been investigated.

Evaluation of stomach poisons for grasshopper baits. C. H. RICHARDSON and L. E. HAAS (J. Econ. Entom., 1932, 25, 1078—1088).—A method is described for determining the median lethal dose of poisons. Vals. obtained included: As_2O_3 0·36; Na arsenites, Paris Green, and Na_2SiF_6 , 0·16; acid Pb arsenate $> 3\cdot0$; rotenone $> 2\cdot0$ mg. per g. body-wt. A. G. P.

Pyrethrum in the control of *Mineola scitulella*, Hulst. R. W. HAEGELE (J. Econ. Entom., 1932, 25, 1073—1077).—Among various spray combinations examined, best results were obtained with a kerosene extract of pyrethrum in a kerosene-soap emulsion. A. G. P.

Determination of effective strains of *Rhizobium trifolii*, Dangeard, the root-nodule bacteria of clover, under bacteriologically controlled conditions. D. L. KEENEY (Soil Sci., 1932, 34, 417—443).—Technique is described. Considerable and persistent differences are recorded in the efficiency of different strains both in the total N per clover plant and in % N in the tissues. A. G. P.

Papaya tree.—See XVIII. **Cleaning and packing apples.**—See XIX.

See also A., Jan., 46, **Crimean etc. soils. Forest humus. 96, N fixation by *Azotobacter*. 101, Life of plants in closed atm. Plant nutrition. 102, K requirement of tobacco crop. Action of NaNO_3 on young apple trees.**

PATENTS.

Fertiliser manufacture. C. L. BURDICK, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,854,291,

194.32. Appl., 24.1.30).—Phosphate rock is decomposed with HNO_3 (3—6 mols. per mol. of P_2O_5 + that equiv. to non-phosphatic constituents), and the product is treated with the gases evolved during the acid treatment and with sufficient NH_3 to neutralise free acid and convert at least part of the H_2O -sol. Ca phosphate into citrate-sol. phosphate. L. A. C.

Insecticide and fungicide. E. V. HAYES-GRATZE (B.P. 384,996, 9.6.31).—A neutral sulphonated (castor) oil, which has been electrically ionised by electrolysis and/or high-frequency discharge, with or without small additions ($> 30\%$ in all) of CCl_4 and/or NaOCl, NaOH, camphor, quassia, etc., is diluted for use with 10—40 vols. of H_2O . E. L.

Moth-proofing etc. agents.—See III.

XVII.—SUGARS; STARCHES; GUMS.

Drying of beets after centrifuging of raw beet cossettes and fabrication of sugar from the juice. A. A. SHUMILOV and P. K. GROSHEV (Zhur. Sakh. Prom., 1931, 5, 473—479).—The raw beet cossettes are steamed at about 90° and the steamed cossettes are centrifuged. CH. ABS.

Purification of beet juice with a small amount of lime by the U.S.R.I. method. I. B. MINTZ, B. E. KRASILSCHIKOV, I. E. GLUKHOVSKI, and V. V. UDOVICHENKO (Nauk. Zapiski Tzuk. Prom., 1932, No. 16—17, 13—32).—The juice is sulphited to p_{H} 4—5 until coagulation starts, and then treated with 0·1—0·2% CaO and heated at 80 — 85° ; 0·8—1·0% CaO is then added and the juice carbonated to an alkalinity of 0·06—0·08. The carbonated juice is then heated at 95 — 100° and filtered. Gaseous SO_2 is replaced by anhyd. liquid SO_2 . The colour, yield, and loss were the same as in the usual process. CH. ABS.

Sugar lost in the molasses as criterion of the quality of the juice. J. DĚDEK, E. GRUT, and V. S. PEDERSEN (Z. Zuckerind. Czechoslov., 1932, 57, 105—110, 113—116).—Laboratory experiments are described, according to which 22 thick-juices were crystallised and worked up to molasses. It was impossible from the composition of the thick-juices to deduce correctly the composition of the molasses resulting from them. Thus thick-juices which differed in purity by only 0·1% gave molasses having quotients differing by 3%. Even the ash content of the thick-juices permits an approximation only being made of the loss of sugar in the molasses. J. P. O.

[Sugar] defecation with a small amount of lime by the Friedrich U.S.R.I. method. I. B. MINTZ (Nauk. Zapiski Tzuk. Prom., 1932, No. 16—17, 161—165).—Use of 0·25—0·5% CaO at $> 100^{\circ}$ is inefficient; filtration is difficult, the colour is dark, and the boiling of a massecurite is complicated. Preferably the diffusion juice is treated with 0·2—0·3% CaO and 0·1—0·05% Na_2CO_3 , heated at 110° , and filtered under low pressure. The filtrate is treated with 0·3—0·5% CaO and the juice carbonated to an alkalinity of 0·06—0·08; the juice is then filtered and sulphited to low alkalinity. The juice, but not the crystals, is darker than when 2% CaO is used; the yield of sugar is slightly lower, and the purity of the final molasses is higher. CH. ABS.

Bone-black regeneration. I. F. ZELIKMAN and K. K. LYUBITZKI (Nauk Zapiski Tzúk. Prom., 1932, No. 16—17, 67—122).—Continuous washing with H_2O is better than periodical boiling. $NaOH$ removes more org. matter, but decreases the decolorising power. HCl (0.5—1.0% of wt. of C) increases the decolorising power by 20%. Acidification (HCl) followed by thermal regeneration (300—400°) is recommended. CH. ABS.

Cause of the dampening of sugar in storage. R. SVÁTEK (Z. Zuckerind. Czechoslov., 1932, 57, 101—103).—Although direct-consumption sugar may be sent to the store in a perfectly dry state, it may become damp in summer-time. This is due to the gradual displacement of the cooler air of the store by the warmer air from outside, the hygroscopicity of which is higher. H_2O vapour is condensed, and forms syrup by dissolving the dust on the surface of the crystals, thus initiating the first step in the deterioration of the sugar. Caking is also thus explained. To prevent such occurrences, the warehouse must be suitably heated. J. P. O.

Formic acid in sugar products. F. W. ZERBAN (J. Assoc. Off. Agric. Chem., 1932, 15, 354—360).—The official method for determination of HCO_2H in food products (Methods of Analysis, A.O.A.C., 1930, 346) is applicable to sugar products. SO_2 does not interfere. Some HCO_2H is probably formed in steam-distilling the acid solutions of certain sugar products, but no other method is available. Vals. (% HCO_2H varying from nil for glucose and fructose to 0.791 for filtered refinery syrup) obtained in the case of 41 products are tabulated. HCO_2H is formed by the action of $Ca(OH)_2$ or other alkalis on reducing sugars at high temp. Certain activated carbons, e.g., bone-black and Suchar, appear to catalyse the formation of HCO_2H by heat from sugar. This activity is accentuated by alkalis. W. J. B.

Properties of Fehling's solution. G. BRUHNS (Centr. Zuckerind., 1932, 40, 631—632, 666—667).—Among the several inconveniences of Fehling's (Soxhlet's) solution in the determination of invert sugar one of the most serious is the fact that when the reduced Cu is titrated with CNS' and KI the results are untrustworthy unless the reaction mixture is cooled down to 20° at least, which is not generally practicable in the tropics. Muller's solution keeps better than Fehling's. J. P. O.

Caramel colour. J. B. SHUMAKER and J. H. BUCHANAN (Iowa State Coll. J. Sci., 1932, 6, 367—379).—Caramels were prepared by heating sucrose at 190°, 200°, or 210°. Three periods of foaming occurred, corresponding with the loss of 1, 2, or 3 H_2O and formation of $C_{12}H_{20}O_{10}$, $C_{24}H_{36}O_{18}$, and $C_{30}H_{50}O_{25}$. Higher colour vals. are produced by more complete dehydration and formation of larger mols. The higher caramels are negative colloids. These colloids are stable in citric acid of p_H 1.5, cold H_2SO_4 of p_H 1.5, or hot or cold H_3PO_4 of p_H 2 or 3, but are pptd. by hot H_2SO_4 of p_H 1.5. CH. ABS.

Calculation of the yields and losses in mixed beet-sugar factory operation. A. DOLINEK (Z. Zuckerind. Czechoslov., 1932, 57, 110—112, 116—120).—For mixed operation, where, e.g., the last run-offs of the refinery are

mixed with the thick-juices of the raw sugar factory, a scheme of calculating the yields and losses is proposed in which certain of the unknown and undeterminable losses in the raw sugar factory are assumed. Sources of such losses are summarised, and a method of correcting for the polarisation of the juice destroyed by CaO is given. That a rendement of 88% should be assumed for raw sugar is fundamentally incorrect, and it is recommended that calculations should be based on a val. of 90%. J. P. O.

Iodometric determination of invert sugar in first raw sugars. R. OFNER and I. GRAČKO (Z. Zuckerind. Czechoslov., 1932, 57, 125—126).—In Ofner's iodometric process (B., 1932, 279), the clarification treatment with $Pb(OAc)_2$ can be dispensed with by working as follows: 10 g. of the sample with 50 c.c. of H_2O and 50 c.c. of the Cu solution are treated with 5 c.c. of the standard I solution to be used in the later titration, following which the procedure is as already described. J. P. O.

Effect of certain colloids on the saccharification of cellulose. N. VITA and E. SALMOIRAGHI (Annali Chim. Appl., 1932, 22, 683—686).—Presence of colloidal S or C increases the yield of glucose obtained by treating cellulose with H_2SO_4 under pressure, and also retards further change of the glucose. T. H. P.

Increased structure in starch grains which checks swelling and is destroyed on making into a paste. J. R. KATZ and E. A. HANSON (Rec. trav. chim., 1932, 51, 1207—1210; cf. B., 1930, 1043).—Further evidence is brought forward to support the view that the swelling of starch granules is checked by a structure development, this latter being destroyed when the starch is converted into a paste, either by heating or by the action of salt solutions. J. W. S.

Sugar-beet culture.—See XVI.

See also A., Jan., 37, Active charcoal. 93, Prep. of starch substrate in amylase viscosimetry.

PATENTS.

Preventing the formation of lumps or clods when dissolving starch which swells in cold state. J. W. HAAKE, Assr. to HENKEL & Co. G.M.B.H. (U.S.P. 1,855,048, 19.4.32. Appl., 28.5.30. Ger., 31.5.29).—Cakes of cold- H_2O -swelling starch are subdivided into pieces of uniform shape and size, e.g., by passage through cutting rollers. L. A. C.

Bagasse fibre.—See V. Acetono-butylic fermentation.—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Bromatological chemistry [analysis] of beer. J. B. DE MELLO and M. TAVEIRA (Rev. Soc. Brasil. Chim., 1932, 3, 55—89, 160).—Methods (suitable for standard routine use) for the full analysis of beers (including detection of preservatives, colouring matters, etc.) are detailed, the interpretation of the results being discussed in relation to the requirements of the Regulations of the National Department of Public Health. The composition of some national beers is tabulated. E. L.

Pectin from dried grape marc. A. MEHLITZ (Kon-serven-Ind., 1932, 19, 320—321, 325—327; Chem.

Zentr., 1932, ii, 1385).—From the material containing 0.5—1.5% of pectin (as Ca pectate) only an impure pectin powder containing 14% of ash and 31.3% of Ca pectate could be obtained by triple extraction and pptn. with EtOH. Fermentation may have diminished its gelatinising power. A. A. E.

Behaviour of the acid concentration of wines and grape must in regard to technical operations. I. Clarification and decolorisation. P. CRISCI and L. MICHELINI (Annali Chim. Appl., 1932, 22, 663—666).—Decolorisation of wine and must with HCl-washed animal charcoal and their clarification by gelatin depend largely on the p_H ; faulty action is due mostly to excessive acidity. T. H. P.

Determination of tannin in wines. ASTRUC and CASTEL (Ann. Falsif., 1932, 25, 477—480).—Determination of the tannin is effected by a method depending on its reducing properties. The val. (A mg. Cu per litre) of the reducing power of 20 c.c. of the sample (fermented or diluted until it contains < 3 g. of sugar per litre) is first determined (Bertrand's method). The wine (100 c.c.) is then boiled to expel aldehydes, defecated by oxidation with $KMnO_4$ and addition of Pb subacetate, and the reducing power (B) of 22 c.c. of the filtrate (made up to 100 c.c.) determined. Finally the reducing power (C) of a 2% tannin solution is determined under identical conditions. The tannin content of the wine is given by $(A-B)/C$ g. per litre. Examples are given. J. W. B.

Production of papain from the fruit of the papaya tree (*Carica papaya*). ANON. (Agric. and Live Stock, India, 1932, 2, 471—489).—Cultivation for the production of consumable fruit and for the manufacture of papain is discussed and methods of latex drying are described. Details of production costs are tabulated. A. G. P.

Apple juice. Sauerkraut.—See XIX.

PATENTS

Preparing hop-flavoured malt extract in powdered form. C. J. KOCH (U.S.P. 1,852,418, 5.4.32. Appl., 16.2.28).—Malt extract is boiled with successive batches of hops. The spent hops are filtered off, and the liquid is cooled to 65° and spray-dried. C. R.

Acetono-butylic fermentation process. A. FERNBACH, Assr. to UNION SOLVENTS CORP. (U.S.P. 1,854,895, 19.4.32. Appl., 17.7.30. Fr., 23.7.29).—Molasses is heated with yeast at 50—55° until the sucrose in the molasses is inverted and the protein in the yeast hydrolysed. The liquid is then boiled, the caramelised substances are filtered off through C, and a culture of bacteria is added to produce the acetono-butylic fermentation. C. R.

Chocolate syrup.—See XIX.

XIX.—FOODS.

Proteins of wheat bran. G. L. TELLER and W. K. TELLER (Cereal Chem., 1932, 9, 560—572).—Methods of separation and properties of albumins, globulins, prolamines, glutelins, proteins insol. in cold 0.2% NaOH, and of non-protein N compounds present in 12 different pure brans are described, the respective mean vals.

being 0.53, 0.38, 0.33, 0.62, 0.53, and 0.25% (H_2O -free basis). Examination of the non-protein N compounds indicates that $\geq 25\%$ are present as NH_2 compounds of the asparagine type. The factor 5.7 for the conversion of N into crude protein is confirmed for bran and wheat. J. G.

Soluble protein in flours of various qualities. L. SZEGFY (Mezőg. Kutat., 1932, 5, 172—180; Chem. Zentr., 1932, ii, 1541).—The weaker is a flour (as determined by means of the Hankoczy farinograph) the higher is the amount of protein sol. in a 10% suspension at room temp. in 24 hr. A. A. E.

Farinograph [method] for predicting the most suitable types of American export wheats and flours for mixing with European soft wheats and flours. C. W. BRABENDER (Cereal Chem., 1932, 9, 617—627).—The use of farinographs to determine consistency, developing time, elasticity, permanence of elasticity, fermentation tolerance, and gluten stability of doughs is illustrated. J. G.

Quality of grain used in preparation of edible pastes. P. BARBADE (Ann. Falsif., 1932, 25, 468—476).—A method is described whereby the mechanical and swelling properties of Italian paste can be determined, the results giving reliable information regarding the properties of the macaroni produced from it. J. W. B.

Comparative composition of brown and polished rice, and losses in material due to polishing. J. A. LECLERC (Cereal Chem., 1932, 9, 600—602).—Mean dry-basis analyses for Japanese rice (unpolished and polished), and for unpolished so-called "glutenous" rice are, respectively: fat 2.45, 0.37, 2.89; crude fibre 0.88, 0.16, 1.12; ash 1.22, 0.36, 1.36; protein 8.67, 8.15, 8.63; carbohydrates 86.70, 90.79, 86.00%; weight/1000 kernels 20.11, 18.24, 26.5. J. G.

Relationship between viscosity, total protein content, ash content, and baking strength of experimentally and commercially milled flours from Western Canadian hard red spring wheat. C. E. RICH (Cereal Chem., 1932, 9, 535—559).—Determinations of η , using the torsional viscosimeter for suspensions of flour in dil. lactic acid, are a measure of the hydration capacities of the proteins, and therefore of baking strength, and are of equal val. in this respect to total protein determinations, the relation to the latter being linear between 9 and 16% of protein. Hydration capacity, which is lower for damaged wheats, varies seasonally but shows only slight variations for wheat proteins of one commercial grade, variety, or crop year, although the val. is lower for Garnet than for Marquis wheat of the same grade. The ash content, which is a log. function of η , also influences estimations of gluten quality deduced from the slope of the line obtained when log. concn. and log η are plotted; it is inaccurate to eliminate the ash by leaching with H_2O , and the latter method cannot therefore give reliable results. Statistical elimination of the ash content confirms that inherent hydration capacity is const. for all samples of one variety, grade, and crop year. J. G.

Relation of baking volume to size and form of the batch. J. STRUBE and G. LUSTER (Z. ges.

Getreide-Mühlenw., 1932, 19, 115—120; Chem. Zentr., 1932, ii, 1248).

Variation in weight of a given volume of different flours. III. Causes for variation, milling, blending, handling, and time of storage. E. GREWE (Cereal Chem., 1932, 9, 628—636; cf. B., 1932, 1052).—Abnormal baking results may arise from changes in particle size of flours, and therefore in the wt. of a given vol. taken. Wt. per given vol. is a useful measure of uniformity of flours and increases with decrease in H₂O content (e.g. resulting from changes in R.H.) and in air temp.; blends follow the law of averages. The effect of granulation size may be followed by sieve prep. and by using graded flours. J. G.

Effect of metal in mixing bread doughs. E. N. FRANK (Cereal Chem., 1932, 9, 636—637).—Doughs prepared in a bronze mechanical mixer gave loaf vols. up to 40 c.c. lower than those obtained by hand-mixing, the actual decrease increasing with the period of contact between metal and dough. J. G.

Factors which affect gas production during dough fermentation. W. L. HEALD (Cereal Chem., 1932, 9, 603—616).—A modification of the Kent-Jones apparatus is described in which the NaCl solution is substituted by a 0.5-in. layer of kerosene on H₂O. Gas production is increased by increase in yeast content, sugar, and diastatic malts (when the flour is low in diastase), yeast foods, and by rise in temp. (up to 35°). It is decreased by NaCl, excess of yeast food, and temp. > 40°, and is unaffected by sugar and diastatic malts (if the diastatic power of the flour is high), high-speed mixing, and absorption by H₂O. J. G.

Automatic method for measuring gas production and expansion in doughs. M. C. MARKLEY and C. H. BAILEY (Cereal Chem., 1932, 9, 591—594).—Bailey and Johnson's method (B., 1925, 111) is made automatic by conducting the displaced air into a bell-jar of H₂O containing a floating buoy to which is attached a siphon tube. Entry of air lowers the H₂O-level and the siphon then discharges H₂O until hydraulic balance is restored, there being therefore no substantial change in gas pressure in the system. The H₂O discharged is collected in a vessel containing a float and stylus, and its amount is recorded on a kymograph chart. Typical curves are given. J. G.

Effect of dairy manufacturing processes on the nutrient value of milk. I. Apparent digestibility of fresh whole milk and of evaporated milk. W. B. NEVENS and D. D. SHAW (J. Nutrition, 1932, 5, 485—494).—In feeding experiments with rats, the protein of whole fresh milk (I) was of higher digestibility than that of commercial or laboratory evaporated milk (II). No appreciable differences in the digestibility coeffs. of the fat or total solids of (I) and (II) were apparent. No sugar occurred in the faeces of rats receiving (I) or (II). Superior growth produced by (II) cannot be ascribed to differences in digestibility. A. G. P.

Creaming of milk. I—IV. E. MERTENS (Milch. Forsch., 1932, 14, 1—42).—Adverse effects on the formation of a cream layer in milk are obtained if the milk be (a) cooled to 3° and held for at least 4 hr., (b) frozen,

or (c) submitted to the action of pumps etc. In all cases the creaming effect may be restored by heating at 50° for 5 min. Creaming properties showed an optimum on heating to 60—61°. If the cream be removed from milk, homogenised, and remixed with the separated milk, a considerable improvement in creaming is obtained. Two milks showing poor creaming properties were found to have a skim milk—butter interfacial tension > normal. Foaming properties ran parallel with creaming efficiency. Other factors improving creaming were greater viscosity at the skim milk—butter fat interface (cf. B., 1930, 380), and the addition of small quantities of substances such as lacto-globulin and colostrum. E. B. H.

Souring of milk. W. GRIMMER and A. SCHRADER (Milch. Forsch., 1932, 14, 117—135).—An equation is developed for the relationship between p_H and titratable acidity of the milk, based on dissociation equations for the sol. constituents present. This equation cannot be completely solved owing to incomplete knowledge of the form of the sol. substances and also the different types of acid development. An approx. logarithmic relationship between change in p_H and acidity gives results very close to the empirical figures. Changes in conductivity with reference to acidity are also considered. E. B. H.

Micro-methods in milk analysis. I. Micro-determination of calcium and magnesium. M. MIETHKE and H. LEVECKE. **II. Total nitrogen, casein, and albumin.** M. MIETHKE and H. FINZENHAGEN. **III. Total phosphorus and different phosphate fractions.** K. LANG and M. MIETHKE. (Milch. Forsch., 1932, 13, 535—541; 14, 187—194, 195—199; cf. A., 1932, 1276).—A scheme of analysis is outlined. E. B. H.

Preservation of milk for examination. M. RÜDIGER and K. KONG (Milch. Forsch., 1932, 14, 164—168).—Inorg. and org. preservatives have been considered for use in delayed investigations of such properties of milk as acidity, alizarol test, conductivity, microscopical characteristics, etc. HgCl₂, H₃BO₃, (CH₂O)₂, CHCl₃, PhMe, PhOH in EtOH, NaOBz, and mustard oil have been found suitable in sp. cases. (Cf. B., 1931, 1071; 1932, 1052.) E. B. H.

Isotonic watering of milk with saccharine solutions. A. CASOLARI (Annali Chim. Appl., 1932, 22, 753—762).—Addition of a saccharine substance such as glucose or sucrose to milk to mask watering may be detected by (1) addition of molybdic acid, which gives a blue coloration with such milk, (2) a fermentation test with milk dialysate, previously evaporated to its original vol., or (3) heating the evaporated dialysate with Barfoed's solution, which is reduced by glucose but not by lactose. T. H. P.

Detection of blood in milk by means of benzidine. A. KÜSTER (Milch. Zentr., 1932, 61, 333—335).—The application of the benzidine reaction is described. F. O. H.

Influence of certain lactic acid streptococci on chemical changes in Cheddar cheese during ripening. C. D. KELLY (New York State Agri. Exp. Sta. Tech. Bull., 1932, No. 200, 28 pp.).—Protein hydrolysis

proceeded at a steady rate during ripening, whether or not starters were used. H₂O-sol. products increased in proportion throughout the period under examination. NH₂-acids and products sol. in CCl₃·CO₂H and in phosphotungstic acid changed but little during the first 10—13 days of ripening, but subsequently increased steadily. During the initial period lactic acid is decomposed rapidly. A. G. P.

Lactic acid streptococci associated with the early stages of Cheddar cheese ripening. C. D. KELLY (New York State Agric. Exp. Sta. Tech. Bull., 1932, No. 201, 26 pp.).—The production of lactic acid is the principal function of cheese "starters." Flavour and aroma are not directly influenced by the starter used. A. G. P.

Blue mould in relation to cleaning and packing of apples. K. F. BAKER and F. D. HEALD (Phytopath., 1932, 22, 879—898).—The toxic action of dil. HCl and of Na₂CO₃—Na₂B₄O₇ mixtures used in removing As residues from apples is examined. Period of contact and temp. are important factors. The toxicity of alkaline washes is attributable to their Na₂CO₃ content. Borax, at the concn. used, has little action. The use of NaOCl for spraying packing-house equipment is recommended. A. G. P.

Commercial processing of apple juice. D. C. CARPENTER and W. F. WALSH (New York State Agric. Exp. Sta. Tech. Bull., 1932, No. 202, 28 pp.).—Suspended matter in the fresh press juice is variable in chemical composition. Clarification may be effected by heating at 82° for 20 min., cooling, and filtering. Clarification with gelatin-tannin, clarase, and pectinol is described. Pasteurisation of juice at 76·6° for 20 min. yields a sterile product in which no "scorching" is apparent. A. G. P.

Citrus fruit juice. J. F. COOPER (Canning Age, 1932, 13, 468—490).—The bitter taste developing in stored citrus juice is due to the presence of glucosides (naringin in grape-fruit, hesperidin in orange), the contents of which decrease with maturity of the fruit. Changes in colour in these juices are due to the presence of peel oil, a certain amount of which, however, causes the solid particles to remain in suspension. E. B. H.

Sterilisation of fruit juices by filtration. I. D. C. CARPENTER, C. S. PEDERSON, and W. F. WALSH (Ind. Eng. Chem., 1932, 24, 1218—1223).—The application and efficiency of Seitz germ-proofing filters on a semi-commercial scale are described. The efficiency depends on the *p*_H of the syrup, currant and grape juices at *p*_H 2·9—3·2 giving a sterile filtrate at 20 lb. per sq. in., whereas cider at *p*_H 3·5 can be filtered only at the rate of 10 lb. per sq. in. Data are given to show that 94% of the filtrate passes through pores 40 μ or larger in diam., yet the diam. of the organisms is 0·45—4·0 μ, supporting the view of Bechhold that the action of bacterial filters is not that of a sieve. The rate of filtration through Seitz discs is slightly slower than that desirable in commercial practice. E. B. H.

Aroma-producing substances of cocoa. H. FINCKE (Kazett., 1932, 21, 381—383; Chem. Zentr., 1932, ii, 1983).—Ac₂ is unimportant. Three groups are

differentiated: (1) readily volatile and partly undesirable, (2) fat-sol., difficultly volatile, and of great aromatic strength, (3) tannin-like compounds. A. A. E.

Physiological studies of potatoes in storage. R. C. WRIGHT (J. Agric. Res., 1932, 45, 543—555).—In potatoes stored at 0° the sugar content increased during a period of 3—4 months, when an approx. const. val. was attained. At temp. up to 4·5° changes were similar but smaller as the temp. of storage was raised. With still higher temp. (up to 21°) there was a decline in sugar content which increased with the temp. Above 4·5° respiration rates increased with temp. and, in general, decreased as the period of storage was prolonged. No relationships existed between the CO₂ content of the intercellular atm. of the tubers and storage temp. The effects of raising the temp. of tubers after preliminary freezing (—5·5°) and after prolonged storage at 0° are recorded. A. G. P.

Relation between temperature and rate of fermentation of commercial sauerkraut. C. S. PEDERSON (New York State Agric. Exp. Sta. Bull., 1932, No. 614, 23 pp.).—The rate of fermentation varied with the temp. of the vat and also with atm. temp. at the time of cutting the cabbage. No prediction of the time necessary for complete fermentation can be made. A. G. P.

Quality of commercial sauerkraut. C. S. PEDERSON and C. D. KELLY (New York State Agric. Exp. Sta. Bull., 1932, No. 613, 14 pp.).—Comparative analyses of a large no. of samples are recorded. The best (firm) texture occurred in samples having 2·0—2·5% NaCl. Unsatisfactory samples showed abnormality in one or more of the analytical vals. volatile acid, total acid, EtOH or NaCl content. A min. of 1·20% of lactic acid is suggested as indicative of complete fermentation. A. G. P.

Szechuen Yin-Er [white fungus]. T. HU (Science, China, 1932, 16, 437—443).—The food contains 71·2% of carbohydrate which consists largely of a substance resembling gum acacia. CH. ABS.

Chemical changes in the fat of frozen and chilled meat. IV. Protective influence of carbon dioxide on the fat of beef stored at 0°. C. H. LEA (J.S.C.I., 1933, 52, 9—12 T).—CO₂ has a marked effect in retarding the onset of taint in beef fat at 0°. In a saturated atm. the time required for the production of a perceptible "off" flavour was approx. doubled in the presence of 10% CO₂. At lower humidities the protection afforded by the gas was somewhat increased, but gas storage was less effective in delaying the appearance of taint when commenced 5 or 6 days after slaughter. To protect the fat comparatively little advantage results from increasing the CO₂ concn. beyond 15 or 20%. These (or higher) concns. of the gas appear to have no harmful effect on the flavour of the fat, nor on its resistance to oxidation during a storage period of 50 days.

Effect of carbon dioxide on colour changes or bloom of lean meat. J. BROOKS (J.S.C.I., 1933, 52, 17—19 T).—The rate of oxidation of hæmoglobin to methæmoglobin in beef muscle stored in air at 0° is not altered to a significant extent by the addition of CO₂ in

concs. < 20%. The factors concerned in the colour changes of lean chilled meat during storage are discussed.

Effect of carbon dioxide on bacterial growth with special reference to preservation of fish. II. Gas storage of fresh fish. F. P. COYNE (J.S.C.I., 1933, 52, 19—24t; cf. B., 1932, 749).—CO₂ has a marked preservative action on fresh fish. At 0° the storage period can be at least doubled by 50% CO₂, due to inhibition of bacterial growth. The practical application of these findings is discussed.

Colorimetric determination of traces of lead in foodstuffs. A. MACHEBEUF, H. CHEFTEL, and J. BLASS (Compt. rend., 1932, 195, 146—147).—Sufficient of the substance (a few g.) to contain 0.15—0.25 mg. Pb is heated with 1 c.c. each of HNO₃ and H₂SO₄, 3 c.c. of H₂O are added, and the whole is heated to fuming. The product is washed out, 0.2 g. of CaSO₄ and 10 c.c. of EtOH acidified with H₂SO₄ are added, and the whole is centrifuged; this is repeated 4 times, and then once with pure EtOH at 70°. The PbSO₄ is then dissolved out with NH₄OAc, the solution conc., gelatin added, and Pb determined colorimetrically by H₂S. Bi and Hg do not interfere; > 0.1 mg. of Ag should be present. 0.2 mg. of Pb can thus be determined accurately to about 0.1 mg. C. A. S.

Detection of [food] preservatives. T. VON FELLEBERG and S. KRAUZE (Mitt. Lebensm. Hyg., 1932, 23, 111—137; Chem. Zentr., 1932, ii, 1092).—Directions for the detection and determination of H₃BO₃, HF, SO₂, KNO₃, CH₂O, hexamethylenetetramine, HCO₂H, BzOH, and cinnamic, salicylic, chlorobenzoic, and *p*-hydroxybenzoic acids and esters are given. A. A. E.

Food investigation with the aid of ultra-violet light. J. HEESTERMAN and J. E. H. VAN WAEGENINGH (Chem. Weekblad, 1932, 29, 650—659).—A general account of fluorescence methods, with special reference to the detection of artificial colouring matter, and the examination of eggs, fish oils, fats, etc. H. F. G.

Metallic selenium as a catalyst in Kjeldahl digestions. H. C. MESSMAN (Cereal Chem., 1932, 9, 357).—The addition of 20 c.c. of H₂SO₄ and 8 g. of a flux consisting of Na₂SO₄ (90 pts.), HgSO₄ (7), CuSO₄ (1½), and powdered Se (1½ pts. by wt.) per g. of cereal enables a digestion to be made in 15—20 min. (Cf. B., 1932, 621.) E. B. H.

The Kjeldahl process [for flour, etc.].—See II. Solubility of fats. Ac₂ in fats. Fat in butter. Wheat oil. Seeds of *Agriophyllum arenarium* [as cattle feed]. Margarine industry.—See XII. Digestibility of grass. Citrus preservation. Tea soils.—See XVI. Pectin from grape marc. Papaya fruit.—See XVIII.

See also A., Jan., 23, Emulsion persistence. 50, Illipé butter. 89, Bran and linseed cake as feed. 98—100. Vitamins (various).

PATENTS.

Bleaching methods [for flour etc.] and agent. P. E. ROLLHAUS and W. B. STODDARD, Assr. to PILOT LABORATORY, INC. (U.S.P. 1,854,764, 19.4.32. Appl., 12.11.28. Cf. B., 1930, 657).—Chlorinated fatty acid

peroxides (e.g., coconut oil fatty acids, chlorinated with PCl₃ and treated with alkaline H₂O₂) are used for bleaching flour and other foodstuffs. (Cf. B.P. 334,531; B., 1930, 1106.) E. L.

Food products. C. N. FREY, E. B. BROWN, and C. CRAIG, Assrs. to STANDARD BRANDS, INC. (U.S.P. 1,854,929—30, 19.4.32. Appl., 28.11.28).—Protein (compressed yeast, casein, gluten, or soya bean, 4 lb.) and H₂O (4 lb.) are autoclaved at 15—20 lb. pressure for 4 hr. with (A) 3.5 c.c. of HCl (*d* 1.19), 2.5 c.c. of H₃PO₄ (85%), and 10.0 c.c. of lactic, glutamic, or citric acid, or (B) 35 c.c. of HCl and 23 c.c. of lactic acid. The extract of the hydrolysed mass is separated from the residue, neutralised with NaOH, and evaporated to a paste; flavouring substances may be added. The mild hydrolysis prevents discoloration, the production of bitter flavours, and, to a large extent, the destruction of vitamin-B. Use of the product in bread and cracker manufacture improves the food val. and crust coloration. E. B. H.

Preparation of powder for making custards, puddings, creams, sauces, ice-creams, and like boiled products. W. FUCHS (B.P. 385,200, 18.5.32. Ger., 20.7.31).—Cornflower is replaced by a cereal flour to which 1% of a protective colloid, e.g., casein, is added to prevent paste formation on addition of cold milk. The powder gives a uniform jelly with high nutritive val. E. B. H.

Milk-treating apparatus. C. MORTENSEN (U.S.P. 1,854,619, 19.4.32. Appl., 28.8.30).—A heat-exchange apparatus is described, whereby milk is conducted spirally, adjacent to spirals containing the heating or cooling liquid moving in the opposite direction. E. B. H.

Sterilisation and preservation of eggs. J. FOUSEK (U.S.P. 1,852,606, 5.4.32. Appl., 15.5.28).—By the addition to liquid eggs of sugars or polyhydric alcohols in proportions by wt. varying from 3:2 to 2:3, the membrane portion is caused to separate, and the coagulating temp. of the egg-albumin is raised from 60° to 77°. It is, therefore, possible to sterilise by heat and store in hermetically sealed containers. E. B. H.

Preservation of fruit. C. A. NIETO (B.P. 385,050, 6.10.31).—Citrus fruit etc. is coated with Portland, Roman, or CaO cement and then packed in a granular substance before being cold-stored. H. R.-D.

Treatment of [dried] fruit. J. B. SEGUR and K. H. HOOVER, Assrs. to ASSOC. OF AMER. SOAP & GLYCERINE PRODUCERS, INC. (U.S.P. 1,853,151, 12.4.32. Appl., 12.5.30).—Treatment of, e.g., prunes with 0.25—1.5% of glycerin or a glycol ether by spraying or by immersion in a 25% aq. solution gives improved appearance and marketability. E. B. H.

[Preparation of] dates. J. B. SEGUR and K. HOOVER, Assrs. to ASSOC. OF AMER. SOAP & GLYCERINE PRODUCERS, INC. (U.S.P. 1,853,152, 12.4.32. Appl., 12.5.30).—The dates are dipped in or sprayed with a solution of a hygroscopic polyhydric alcohol, e.g., glycerin. E. B. H.

Manufacture of chocolate syrup. M. WALLERSTEIN, Assr. to WALLERSTEIN Co. INC. (U.S.P. 1,854,353—

5, 19.4.32. Appl., [A] 27.3.28, [B] 27.12.28, [C] 28.3.31.—A stable, non-thickening syrup is prepared by treatment of a gelatinised paste of cocoa and H_2O with (A) an enzyme, diastase, or pancreatin, under suitable conditions of pH and temp. before or after addition of sugar; or (B) an enzymic prep., e.g. "Rapidase," a product containing an amylolytic enzyme produced by *B. mesentericus* or *B. subtilis*; or (C) amylolytic and proteolytic enzymes, e.g., diastatic malt and papain, to modify the starchy and protein constituents, whereby the latter become sol. and more digestible, and aid the digestion of milk. E. B. H.

Production of beverage syrup tea. P. D. POTTER and R. T. METZGER, Assrs. to SPRAGUE, WARNER & CO. (U.S.P. 1,854,062, 12.4.32. Appl., 21.4.30).—A 1:15 tea infusion is clarified by heating for 2 hr. at 115° and subsequent addition of 0.5% citric acid after cooling to 10° . Before filtering, 0.01% of an essential oil is added if desired. 50% of sugar is added to the clear liquid and the syrup sterilised at 82° . Dilution of the syrup gives a clear beverage. E. B. H.

Production of tea entirely or almost entirely free from theine. T. GRETHE (B.P. 384,197, 27.5.32. Ger., 3.6.31).—Tea leaves are moistened with H_2O and the theine is extracted with a suitable solvent (e.g., CH_2Cl_2) which is finally removed by means of a current of warm air so that the tea is not heated above 65° , to preserve the flavour. E. B. H.

Chewing-gum base. L. W. GELLER, Assr. to AMER. CHICLE Co. (U.S.P. 1,855,016, 19.4.32. Appl., 2.10.28).—A mixture of "hard" and "soft" chloroparaffin resins, prepared by catalytically chlorinating a CCl_4 solution of paraffin, and depolymerised crêpe rubber, the resin being in excess of the rubber, is claimed. H. R.-D.

Preservation of green [cattle] fodder. A. I. VIRTANEN, and VOINVIENTI-OSUUSLIKE VALIO R.L. (B.P. 385,212, 8.6.32. Finl., 2.5.32).—Chlorides of S acids, e.g., SO_2Cl_2 , are mixed with H_2O to give on hydrolysis an acid of 2N-concn., 12–16 litres of this solution being added to 200 kg. of fodder as described in B.P. 370,685 (B., 1932, 622). E. B. H.

Cream separator. Mixing machine for cream etc. Incorporating fluid substances.—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Alkali-acidimetric method of determining potassium guaiacolsulphonate in "thiocol" syrups. G. N. THOMIS (J. Pharm. Chim., 1932, [viii], 16, 516–525).—The K and K_2 salts of guaiacolsulphonic acid ("thiocol") in syrups are best determined by titration of the free phenolic OH with 0.1N-NaOH (Poirrier-blue), followed by titration of the free NaOH in the resulting solution with 0.1N-HCl, using alizarin-yellow R. R. S. C.

Determination of mercury in grey mercury ointment. F. VIEBÖCK (Pharm. Presse, 1932, 37, Wiss.-prakt., 47; Chem. Zentr., 1932, ii, 1210).—The ointment (1 g.) is gently heated with conc. HNO_3 (5 c.c.) until the Hg is dissolved; the solution is then shaken with 20 c.c. of H_2O to dissolve the N oxides. It is then

treated with 0.1N- $KMnO_4$ until the colour is only slowly discharged, heated at 60° , treated with a crystal of $Fe(NO_3)_3$, and titrated with 0.1N- NH_4CNS , the end-point being reached in the cold after a sharp change has been observed. A. A. E.

Examination of [medicinal] tablets [Nos. 17–21 of the Dutch Pharmacopœia]. H. J. VAN GIFFEN (Pharm. Weekblad, 1932, 69, 1444–1451).—Dialacetic tablets are examined as follows: diallylbarbituric acid is determined by titration with NaOH; acetamidophenyl allyl ether is extracted from the alkaline solution with Et_2O and identified by m.p. (94°) and a series of colour reactions after treatment with HCl and HNO_3 . Phenylethylbarbituric acid is determined in luminal tablets either titrimetrically, gravimetrically by extraction with Et_2O , or by Kjeldahl. In borovertine tablets ($CH_2)_6N_4$ borate is determined as N_2 , titrimetrically as borate, or gravimetrically after extraction with $EtOH$. In bulbocapnine tablets, PO_4''' is determined titrimetrically with NaOH, and the alkaloid with H_2SO_4 after extraction with $CHCl_3$. A no. of colour reactions for bulbocapnine are described. S. C.

Microchemistry of "fantan" (phenylcinchonylurethane). G. DENIGÈS (Bull. Soc. Pharm. Bordeaux, 1931, 69, 236–239; Chem. Zentr., 1932, ii, 1663).—With $COMe_2$ and AcOH, with 2 pts. of $CHCl_3$ to assist evaporation and dissolution, typical crystals (micro-reactions as for atophan) are obtained. A. A. E.

Behaviour of ethyl nitrite in copaiba emulsions. W. G. CROCKETT, W. M. FRAYSER, and G. V. THOMPSON (J. Amer. Pharm. Assoc., 1932, 21, 1153–1157).—Determination of $EtNO_2$ in copaiba (but not poppyseed, cottonseed, or olive oil) emulsions by the $KI-H_2SO_4$ method in the nitrometer is erratic and depends partly on the concn. of the reagents. R. S. C.

Chondrus bleached with sulphur dioxide. C. H. LAWALL and J. W. E. HARRISON (J. Amer. Pharm. Assoc., 1932, 21, 1146–1153).—Sun- (but not SO_2 -) bleached *Chondrus* is free from S. R. S. C.

Pyrethrum. S. G. JARY (J. S.E. Agric. Coll., Wye, 1932, 30, 183–185).—Combed flowers contained 1.70% of total pyrethrins and 0.57% of pyrethrin-I. Hand-picked flowers contained slightly less. CH. ABS.

Standardised ergot preparations. H. BREDDIN (Pharm. Ztg., 1932, 77, 1348–1349).—Suggestions are made for the prep. of standard fluid extract. E. H. S.

Detection of phosphoric esters (particularly tolyl phosphate) in apiol. L. ROSENTHALER (Pharm. Acta Helv., 1932, 7, 87–88; Chem. Zentr., 1932, ii, 1210).—The contents of a capsule are evaporated on a H_2O -bath with saturated $EtOH-KOH$ (2 g.) and ashed; the residue is taken up in saturated NH_4Cl and filtered. 1 drop of 10% $MgSO_4$ is added to 1 drop of the solution, $MgNH_4PO_4$ being pptd. For the detection of $C_6H_4Me \cdot OH$ part of the residue after removal of $EtOH$ is dissolved in H_2O and the solution is treated with sulphanilic acid, $NaNO_2$, and alkali, $C_6H_4Me \cdot OH$ producing a yellow or orange coloration. A. A. E.

Morrhual. G. KIRKHGOF and I. G. ZILBERG (Bull. Nauch. Issledov. Khim. Farm. Inst., 1930, 6–7).—The solid fatty acids of morrhual had I val. 130–140

(66—68 after pressing through clay). The Ca salt was only partly sol. in C_6H_6 . The liquid acids had I val. 200, and the Ca salt was sol. in C_6H_6 and Et_2O .

CH. ABS.

Anthracene drugs. J. H. GARDNER (Washington Univ. Stud. Sci. Tech., 1932, [ii], No. 6, 41—55).—A review of syntheses and structural views. CH. ABS.

Analysis of morphine hydrochloride of the Pharmacopœia. E. Y. STUBER and B. A. KLYACHKINA (Bull. Nauch. Issledov. Khim. Farm. Inst., 1930, 37—40).—Morphine is not extracted with Et_2O when $NaOH \leq 15\%$ is employed. Using 30% $NaOH$, and mixtures of hydrochlorides with morphine hydrochloride, Et_2O extracts codeine 98, narcotine 95, papaverine 92, thebaine 97%; C_6H_6 extracts codeine 93, papaverine 98%, and $CHCl_3$ extracts codeine 97, narcotine 97, papaverine 98.5, thebaine 95.5%. CH. ABS.

New alkaloids from Russian flora. A. P. ORÉKHOV (Bull. Nauch. Issledov. Khim. Farm. Inst., 1930, 3—4).—*Anabasis aphylla* affords lupinine and anabasin, $C_{10}H_{14}N_2$, isomeric with nicotine and affording nicotinic acid on oxidation. *Peganum harmala* and *Banisteria Caapi* contain harmine and harmaline. Alkaloids are present also in *Leontice ewersmannii*, *Saussurea frolowii*, *Alchagi camelorum*, and *Sophora pachycarpa*. CH. ABS.

Irrigation of tobacco. S. V. TIMOSHENKO (Bull. All-Union Inst. Tobacco Ind., Russia, 1932, No. 83, 1—25).—The protein and ash contents decrease with increase in the H_2O supply, whilst the nicotine content (calc. on dry matter) increases. The carbohydrate: protein ratio is directly related to the intensity of irrigation. CH. ABS.

Essential oils from grass. S. SPIRIDONOVA (Bull. Nauch. Issledov. Khim. Farm. Inst., 1930, 8—9).—*Artemisia caspia*, var. *citriodora*, Kazakevich, gave 0.4% of an oil having d_{20}^{20} 0.9062, $[\alpha]_D^{20}$ -10.50° , n_D^{20} 1.4740, acid val. 5.27, esterification val. 47.23; free alcohol ($C_{10}H_{18}O$) 44.5, aldehydes and ketones 42.62, aldehydes 34, phenols 2%. 34% of citral was present; α -pinene, camphene, borneol, *l*-camphor, and probably cadinene were also present. *Artemisia maritima*, var. Kazakevich, gave 0.59% of an oil which, after separation of *l*-camphor (36%), had d_{20}^{20} 0.9381, $[\alpha]_D^{20}$ $+33.20^\circ$, n_D^{20} 1.4692, acid val. 2.80, esterification val. 36.74; esters ($C_{10}H_{17} \cdot CO_2Me$) 12.8, free alcohol ($C_{10}H_{18}O$) 33.9, aldehydes and ketones 61.51, 44.80, aldehydes 5%. α -Pinene, camphene, and borneol were probably present. CH. ABS.

Testing $K_4Fe(CN)_6$ and $K_3Fe(CN)_6$.—See VII.

See also A., Jan., 47, Avertin. 64, Prep. of stereoisomeric methoxyphenylacetic acids. 68, Synthesis of 2:3-dimethoxyfluorene. 74, Mol. compound of veramon. 75, Derivatives of diethylbarbituric acid. 76, Oxidation product of nicotine. 77, Alkaloids of *Picalima Klaineana*. Quinine hydrobromide cryst. with $CHCl_3$. 78, Lupin alkaloids. 79, Aminomethylene derivatives containing As and Sb from hydroxymethylene compounds. Hydroxyphenylboric acids. 80 and 81, Micro-detection of alkaloids. 82, Prep. of hæmolytic and pptg. sera. 85, Lubricating oils, coal-tar

constituents, and cancer. 90, Therapeutical adsorbing and neutralising substances. 91, Nicotine in tobacco smoke. Absorption of nicotine from cigarette smoke. 97, Determination of hormones. 98, New cryst. sex hormone. 98—100, Vitamins (various). 99, Prep. of conc. antineuritic vitamin. 102, K requirement of tobacco crop. 105, Alkaloids of *Atropa belladonna*, fumaraceous plants, *Bryonia dioica*.

PATENTS.

Production of aluminium derivatives of acetylsalicylic acid. "CHINOIN" FABR. CHEM.-PHARM. PRODUKTE A.-G., and E. WOLF (B.P. 383,112, 20.1.32. Hung., 15.4.31).—A sol. (Na) acetylsalicylate and a sol. Al salt ($AlCl_3$) react, e.g., in EtOH, to give $[C_6H_4(OAc) \cdot CO_2]_2AlOH$, which is H_2O -insol. and nearly tasteless. C. H.

Manufacture of a phosphoric acid ester of gluconic acid. SCHERING-KAHLBAUM A.-G. (B.P. 382,262, 19.8.32. Ger., 26.8.31).—Gluconic acid is phosphated; e.g., Ca gluconate is heated with Et phosphate, P_2O_5 , or $POCl_3$, or gluconic acid with $EtPO_3$. C. H.

Production of [colloidal solutions of] bismuth sodium gluconate. H. N. SKERRETT, From DRUG PRODUCTS Co., INC. (B.P. 381,863, 14.4.32).— $Bi(OH)_3$, pptd. from a solution of Bi subnitrate in dil. HNO_3 , is treated with gluconic acid and aq. $NaOH$ to give a colloidal solution of $NaBiO_2 \cdot 2.5NaC_6H_{11}O_7$ with pH 8.5. This may be evaporated. C. H.

Manufacture of complex metallic organic compounds. CHEM. FABR. VORM. SANDOZ (B.P. 382,759, 10.11.31. Ger., 10.11.30).—Fe, Ni, Co, Sb, or V salts of glucosamic acid are prepared; they may be combined with inorg. or org. bases. Compounds described include: G_2Ni , $[G_2Ni]Na$, GFe , G_2SbOH , $G_2Sb(OH)_2$, where $G = C_6H_{12}O_4N$; quinine, emetine, Ca, Mg, NH_4Et_2 , NH_2Ph , C_5H_5N , and piperazine salts are described. The products are sol., of low toxicity, and suitable for injection. C. H.

Demethylation of alkaloids [harmine and harmaline] containing methoxy-groups. BOOTS PURE DRUG Co., LTD., F. L. PYMAN, and H. H. L. LEVENE (B.P. 382,124, 19.12.31).—Harmine and harmaline are heated with 45—70% and 40—55% H_2SO_4 , respectively, below 156° . C. H.

Treating tobacco leaf. CASSA AUTONOMA MONOPOLURILOR REGATULUI ROMANIEI, Assecs. of S. Z. RAPEANU (B.P. 384,892, 25.4.32. Rumania, 4.2.32).—The leaf in bale is treated for 15—30 min. with air at about 30° having a R.H. 85—90%. L. A. C.

Parathyroid extraction. L. BERMAN (U.S.P. 1,854,502, 19.4.32. Appl., 10.12.25).—Parathyroid glands are extracted with 85% aq. EtOH containing 5% of H_2SO_4 and the extract is purified, neutralised, and freed from EtOH. E. H. S.

Producing a remedy for preventing or cutting short post-operative pneumonia and catarrhal affections of the bronchial passages. A. CZECH and W. HAAS (B.P. 385,148, 14.3.32. Austr., 12.3.31).—One or more alkyl benzoates together with NH_3 , Et_2O ,

ethereal oils such as turpentine, templin, and eucalyptus oils are added to an EtOH solution of camphor, camphoric acid, and BzOH. E. H. S.

Concentration of sexual hormones in body fluids. SCHERING-KAHLBAUM A.-G. (B.P. 385,041, 28.9.31. Ger., 27.10.30).—Body fluids, *e.g.*, urine, with or without acidification, are saturated with salts and the hormone is recovered from the upper of the two layers thus formed by known methods. E. H. S.

Sulphonic acids of piperidine. Aldehyde-phenol condensation products.—See III. Theine from tea.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Uses of dyes in photography. O. BLOCH (Phot. J., 1933, 57, 2—9).—A review is given of optical sensitisation, the uses of filters, and the theory of desensitisation. There appears to be a relationship between grain size and the degree of desensitisation obtainable by a given treatment. J. L.

Syntheses of [photographic] developers. I. *p*-Hydroxyphenylglycine. I. V. KULIKOV and L. A. ZEPALOVA-MICHAILOVA (J. Gen. Chem. Russ., 1932, 2, 730—735).—The optimum conditions for the production of this compound (45% yield) from *p*-C₆H₄(NH₂)·OH and CH₂Cl·CO₂Na (I) (A., 1884, 1144) are a 10% excess of (I) in aq. solution at 85—90°. Small amounts of a more sol. by-product, m.p. 188°, which is also a developer, are produced. G. A. R. K.

Reproducing screen plates. D. A. SPENCER (Phot. J., 1933, 57, 19—22).—The difficulties encountered in making copies (transparencies or prints on paper) of mosaic screen colour photographs are described. J. L.

Some [photographic] intensification tests. D. CHARLES (Brit. J. Phot., 1933, 80, 3—4).—HgI₂ intensifier, with or without further darkening in Na₂S, is the most effective. The next best method is bleaching with K₂Cr₂O₇ and redeveloping with pyro-metol, which does not increase the graininess as much as do other intensifiers. J. L.

Photographic methods for measuring velocities of explosion waves and shock waves. W. PAYMAN and D. W. WOODHEAD (Fuel, 1932, 11, 435—440).—The various arrangements of lenses and moving or stationary mirrors and films which have been used in the study of explosion waves and shock waves travelling in tubes or expanding freely are discussed. A. B. M.

Explosion of electric detonators.—See XXII.

See also A., Jan., 35, Weigert effect with dyes. **Activation of nuclei. Desensitising with sensitisers. Lattice disturbances. Hypersensitisation.** 44. **Measuring spectral lines [of alloys].**

PATENTS.

Manufacture of light-sensitive layers. KALLE & Co. A.-G. (B.P. 382,483, 18.1.32. Ger., 16.1.31).—The paper etc, is coated with a solution of a diazo compound (preferably stabilised) and a diazosulphonate,

Ar·N₂·SO₃Na. A mixture of 4-ethylaminonaphthalene-1-diazonium Cd chloride and Na naphthalene-β-diazosulphonate gives on exposure a brown positive, fixed by washing. Other combinations are: the diazo salt from 2-amino-5-diethylaminophenol and the diazosulphonate from 4-benzamido-2:5-diethoxyaniline (brown positive); the diazo salt from 4-chloro-*o*-anisidine and the diazosulphonate from 2-amino-5-diethylaminophenol (yellow-brown negative). C. H.

[Manufacture of] light-sensitive silver halide emulsions. I. G. FARBENIND. A.-G. (B.P. 383,486, 8.2.32. Ger., 7.2.31).—Emulsions sensitive to green, yellow, and light red are obtained by incorporation of a polymethine dye containing 2 substituted benzselazole residues. Such dyes are made, *e.g.*, from CH(OEt)₃ and 5-ethoxy-, 5-methyl-, 5- or 6-acetamido-, or 7-methoxy-2-methylbenzselazole. C. H.

Photographic dichromate colloid processes. F. DE LESSEPS (B.P. 384,770, 17.11.31. Fr., 6.2.31).—By preparing films with mixtures of (A) K₂Cr₂O₇ and (B) Na₂Cr₂O₇ in the proportions of (1) 4A : 1B, (2) 2A : 2B, and (3) 1A : 4B, in g. per litre of H₂O, contrasty, medium, and soft positives are obtained, respectively. Improved development is obtained by immersing the exposed film in cold H₂O for 1 min. and then in H₂O at 45° for about ½ hr. The warm H₂O may contain 1 g. of (NH₄)₂CO₃ or K₂CO₃ per litre. The exposed surface may then be coloured by immersion first in aq. FeCl₃ (5 g. per litre) and then in aq. pyrogallol (10 g. per litre). J. L.

Production of lenticular screen films for colour photography. C. ROEHRICH (B.P. 385,431, 1.1.32. Ger., 22.4.31).

Envelope for light-sensitive photographic flat film. I. G. FARBENIND. A.-G. (B.P. 385,497, 7.4.32. Ger., 8.4.31).

XXII.—EXPLOSIVES; MATCHES.

Influence of temperature of the [explosive] powder on variation of *fp*.*dt* for different densities of loading. H. MURAOUR and G. AUNIS (Compt. rend., 1932, 194, 1927—1929; cf. B., 1932, 289).—Using a powder without solvent, containing 9% of centralite in threads 5.2 mm. in diam., the differences in *fp*.*dt* for powders initially at 18° and 97° show a decrease as Δ increases. This is due to the shorter duration of combustion at the higher temp.; the difference becomes const. for equal periods of combustion. C. A. S.

Velocity of combustion of colloidal [explosive] powders at low temperature. H. MURAOUR and G. AUNIS (Compt. rend., 1932, 195, 319—321; cf. B., 1932, 289).—Of the three methods for calculating the variation of the vivacity (1/*fp*.*dt*) with the initial temp. of the powder, viz., that (a) log *fp*.*dt*, (b) 1/*fp*.*dt*, (c) *fp*.*dt*, is a linear function of the initial temp., experiments with the powder previously used at 20° and -80° are in favour of (c). C. A. S.

Rapid determination of moisture in smokeless powder. T. SMISNIEWICZ and W. WYKOWSKI (Chim. et Ind., 1932, 28, 1289—1296).—The method is based on the known relationship between air saturation and humidity of the powder. For each type of powder

curves are plotted correlating air humidity and % volatile matter in the powder, as determined by heating it at 60° for 4 hr. A hair hygrometer, corrected by means of a standard wet-and-dry-bulb instrument, is inserted in the powder in a case, which is then hermetically sealed. A reading is taken after 1 hr., and % moisture is found from the curve for the particular type of powder in question. In 15 tests the method gave results differing by 0.01—0.35% from those obtained in the drying test. It is satisfactory for practical control, and must be regarded as an auxiliary to, and not a substitute for, the standard one. W. J. W.

Propagation tests and the photography of the disturbance sent out by the explosion of commercial electric detonators. D. B. GAWTHROP (J. Franklin Inst., 1932, 214, 647—664).—Schlieren photographs were taken of various types of detonators: (a) immediately after explosion, (b) from the same position, but when the shock wave had passed the centre of the field of view, and (c) at the same time as in (b), but farther away. Fragments of the shell were thus shown in advance of the shock wave and the gaseous products. Usually two shock waves were visible, one sent out directly, and the other possibly the same wave reflected from the back of the detonator. Results are shown for 80:20 fulminate-chlorate, tetryl-Pb azide, picric acid-fulminate, and Pb styphnate detonators, as well as a composite photograph with 3 different positions of the camera of shots with a picric acid-fulminate detonator. Detonators with a tetryl or picric acid charge, primed with fulminate or Pb azide, transfer detonation over the greatest distances. The particles are more finely divided and have a velocity of 1200 m./sec. as compared with 970 m./sec. for other types. The velocity of the shock wave, determined by the wave-speed camera, varied from 455 to 530 m./sec. for 11 types, the average being 497 m./sec. and the average deviation from the mean 3.36%. The average velocity of the particles was 460—1950 m./sec. The velocity of the gaseous products diminished rapidly, and was < 100 m./sec. at 15 cm. from the point of explosion. With Pb styphnate detonators in Al shells the flame of the Al was sent out in advance of the shock wave at an average velocity of 4550 m./sec., followed by particles at 1590 m./sec. and the shock wave at 510 m./sec. for the first 30 cm. Flame was observed in the gaseous products. Records of the velocities of shock waves transmitted through cellophane tubes from shielded detonators showed double the val. obtained when the waves expanded freely in air, *i.e.*, 1045 m./sec. with a mean deviation of 2.16%, and the velocity of the particles was about 195 m./sec. higher. The ability of the disturbance from a shielded detonator to transfer detonation to an explosive charge was tested by wrapping it and the explosive, with an air gap between, in a paper tube. With 40% straight dynamite, the distances obtained with different detonators varied from 50 to 400 cm.; the latter figure exceeds that obtained by substituting an explosive charge for the shielded detonator. With permitted explosives the distances varied from 0 to 100 cm. When the base of the detonator shell was removed to eliminate the effect of flying particles, the distance was reduced from

125 to 20 cm. with fulminate-chlorate detonators, and from 400 to 30 cm. with tetryl-Pb azide detonators.

W. J. W.

Measurements on explosion waves etc.—See XXI.

PATENTS.

Nitrocellulose propellant powder. R. G. WOODBRIDGE, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,854,776, 19.4.32. Appl., 13.2.31).—Nitrocellulose (N 12.85—13.50%; preferably 13.05—13.25%) is incorporated with a H₂O-insol., non-hygroscopic, aromatic NO₂-compound having a solvent action on the nitrocellulose, *e.g.*, C₆H₃Me(NO₂)₂, and a flash-eliminating compound having these same properties, as well as low volatility, when colloidized with nitrocellulose, *e.g.*, Et₂ or Bu₂ phthalate, or CO(NPhMe)₂, or CO(NPhEt)₂. The amount of the flash-eliminating compound is < that of the aromatic NO₂-compound, a suitable composition for the powder being 5 and 10%, respectively, of these constituents with 85% of nitrocellulose. At 70% R.H. and 30° the hygroscopicity is < 1%.

W. J. W.

Manufacture of cast explosive charges having a basis of ammonium nitrate. DYNAMIT-A.-G., FORM. A. NOBEL & Co. (B.P. 384,966, 7.9.32. Ger., 29.9.31).—NH₄NO₃ is melted with a nitrate of a mono- or poly-amine of the aliphatic series. A mixture of NH₄NO₃ (55%) and ethylenediamine dinitrate (45%) melts at 105°; of NH₄NO₃ (60%) and methylamine nitrate (40%) at 58°; and of NH₄NO₃ (55%), ethylenediamine dinitrate (40%), and methylamine nitrate (5%) at 93°.

W. J. W.

Pure C₆H₂Me(NO₂)₃.—See III.

XXIII.—SANITATION; WATER PURIFICATION.

Imhoff tank effluent aerated to reduce load on filters. W. R. DRURY (Eng. News-Rec., 1932, 109, 752).—Aeration of Imhoff tank effluent at Flint, Mich., for ½ hr. utilises 0.12 cu. ft. of free air per gal. of sewage treated and reduces the 5-day biochemical O₂ demand by 15—20% with consequent reduction in the area of filters required. The aeration tank described is totally enclosed and the used air is withdrawn by fans and evacuated upwards through the filter media, thus aerating the filter and destroying any foul odours.

C. J.

Report on gas-liquor effluents. Water from gushers.—See II.

See also A., Jan., 41, **Determining F' in natural water.**

PATENTS.

[Refuse] incinerator. S. H. THOMPSON, Assr. to MORSE BOULGER DESTROYER Co. (U.S.P. 1,851,336, 29.3.32. Appl., 12.12.27).—An inclined arch or shelf slopes forwardly to a firegrate; reasonably dry material is charged direct on to the latter and wet material to the former, where it is dried by the gases passing over it. Secondary combustion takes place in a chamber under the arch.

B. M. V.

Respiratory filters. E. THALER, and CLORA-FABRIKATE CLOETTA & Co., M.B.H. (B.P. 385,500, 11.4.32).

Clarification plant.—See I.