# BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JAN. 18 and 25, 1935.\*

# I.-GENERAL; PLANT; MACHINERY.

Solution of problems in heat conduction by the method of wave-trains. J. ROBERTSON (Phil. Mag., 1934, [vii], 18, 1009–1022; cf. B., 1933, 447).— Mathematical. M. S. B.

Liquids for heat transport in chemical engineering. J. SPANGLER (Chem. Fabr., 1934, 7, 421-429).... A review of current technical practice in the use of high-pressure  $H_2O$  and org. liquids, especially eutectics of low  $\eta$ , as heat-transport media. J. S. A.

Modern ball and pebble [mill] technique. P. O. ABBÉ (Drugs, Oils, and Paints, 1934, 49, 411—413).— Polemical against Kendall (B., 1934, 911). D. R. D.

Apparatus for measuring the viscosity of sludges and the deformability of plastic masses. K. ENDELL and H. FENDIUS (Chem. Fabr., 1934, 7, 401–403). —The instruments are described. E. S. H.

Air classification in pulverising. H. HARDINGE (Ind. Eng. Chem., 1934, 26, 1139—1142).—If the product of a mill working in closed circuit with an air classifier is passed to the latter by a controllable air current the characteristics of the final product can be controlled as desired. The continuous removal of a proportion of oversize particles which are afterwards returned prevents overgrinding. Further control is obtainable by varying the size of the balls. Examples include the grinding of fireclay, cement, pyrites, etc., special requirements being met in each case. C. I.

Apparatus for measuring the vapour pressure of benzines [and other volatile liquids]. R. SAL-MONI (Giorn. Chim. Ind. Appl., 1934, 16, 483–485).— A known vol. of air is saturated with the vapour of the liquid and the increase in vol. measured, the total pressure being kept const. at P. If the vol. changes from  $V_1$  to  $V_2$ , the v.p. of the liquid =  $P(1 - V_1/V_2)$ . Data obtained for a no. of liquids are in most cases within 2 mm. of the accepted val. The method is particularly useful for liquid mixtures such as benzine, since degassing by evacuation, which is liable to change the composition of the liquid, is avoided. D. R. D.

Refining paper stock.—See V. Grinding of cement clinker.—See IX. H<sub>2</sub>O purification.—See XVIII.

See also A., Dec., 1303, Diffusion of vapours through gas films. 1326, Torsion viscosimeter. Ultrafiltration.

# PATENTS.

Gas-fired furnaces. S. STANWORTH, J. H. CLEGG, and J. STANWORTH (B.P. 417,320, 28.2.33).—A crucible furnace for melting or heating metals etc. has a central heating chamber (C) communicating with an air-induction pipe at the outer end of which is a gas burner. The hot combustion gases enter C tangentially. The waste gases pass through an annular passage surrounding C and thereby heat the incoming air which enters through a second, outer, annular passage. The waste gases pass also through an external recuperator wherein the ingoing air is preheated. A. B. M.

Rotary drum furnace. METALLGES. A.-G. (B.P. 419,019, 6.3.34. Ger., 24.3.33).—A rotary cylindrical furnace has no ceramic lining, but an inner shell (I) of heat-resisting metal is spaced from the outer shell, the annular space being filled with insulating, heating, or cooling medium and subdivided by partitions. (I) may be formed in such a way as to accelerate, agitate, and/or retard the charge on rotation. B. M. V.

Rotary drum dryer. H. E. NEUBAUER, Assr. to BUFFALO FOUNDRY & MACHINE CO. (U.S.P. 1,957,146, 1.5.34. Appl., 1.11.30).—In a drum dryer the discharge knife is mounted on eccentric bushes which are rotated to effect adjustment, and the discharge for condensate comprises an arm and scoop within and rotating with the drum. B. M. V.

Drying and heating materials. K. MIDDELBOE (B.P. 417,534, 8.4.33).—Material in the form of slurry, e.g., cement raw materials, is dried by being fed on to a rotating bed of loose carrier bodies (B) through which a current of hot gas is passed, preferably in a downward direction. B are agitated as the slurry is fed on to them in order to distribute the material over their surfaces, but they are maintained at rest, relatively to one another, during the drying operation, at the end of which they are again agitated to remove the dry and hot material and cause it to pass down through the perforated support under the bed of B, to a hopper and thence to the kiln. A. B. M.

Pottery and other kilns or ovens. INTERNAT. FURNACE EQUIPMENT Co., LTD., and L. BAILLY (B.P. 418,751, 6.5.33).—The combustion chambers surrounding the ware chamber (W) are themselves surrounded by flues through which a circulation of air is maintained to W. B. M. V.

Heat-transfer tube. F. X. GOVERS, ASST. to INDIAN REFINING CO. (U.S.P. 1,958,364, 8.5.34. Appl., 26.8.31).— A ductile tube is embedded in a mass of cast Fe of pointed oval streamline form, arranged with the blunt end upstream, and surrounded by fins of like form.

B. M. V.

A17,320, 28.2.33).—A crucible Refrigerating system. P. F. SCHLINGMAN, Assr. to Gen. ELECTRIC Co. (U.S.P. 1,958,249, 8.5.34. Appl.,
\* The remainder of this set of Abstracts will appear in next week's issue.

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20.5.33).—The medium in an evaporative system comprises trifluoroacetone. B. M. V.

Feeding of water to boilers. R. M. OSTERMANN and S. A. SHERIDAN, Assrs. to SUPERHEATER Co. (U.S.P. 1,957,553, 8.5.34. Appl., 17.12.31).—Tannin or other suitable colloid is added to feed-H<sub>2</sub>O containing CaCO<sub>3</sub> and the mixture passed through a closed heater (H), the flow being interrupted at intervals to allow the temp. of H to rise sufficiently to cause loosening of any CaO incrustation in it, and the boiler temp. being kept sufficiently high. B. M. V.

[Gyratory] crushers. G. H. N. COLES, and E. ALLEN & Co., LTD. (B.P. 418,986, 5.4.33).—A horizontal groove is formed in the lower part of one or both of the crushing elements in which partly crushed material may dwell and be further crushed, the device being especially effective in breaking flaky pieces into cubes. B. M. V.

Crusher. H. H. RUMPEL, Assr. to SMITH ENG. WORKS (U.S.P. 1,957,228, 1.5.34. Appl., 27.4.29). In a gyratory cone crusher the main vertical shaft rotates without eccentricity between sets of main bearings, but an upward extension is conically eccentric and carries the crushing cone freely on other bearings. Means for adjustment of the mantle are described.

B. M. V.

Grinding, crushing, pulverising, and mixing mills. W. HAWES (B.P. 418,978, 3.4.33).—Details of construction of a mill of the multi-stage conical type are claimed. B. M. V.

Disc mills. N. K. NIELSEN (B.P. 418,826, 1.5.33).— In a disc grinder having the lower disc rotated by a shaft coming up from below, the upper (non-rotating) disc is supported on a gimbal device of less diam. than the stone or other grinding medium. B. M. V.

[Disc] grinding mill. M. A. MADSEN (B.P. 418,960, 23.4.34).—In a disc grinder having the lower disc rotated by a shaft (S) coming up from below, the upper (non-rotating) disc (U) is supported on a gimbal device recessed into the back of U and forming a bearing for an upward extension of S. B. M. V.

Apparatus for disintegrating and dispersing. T. ROBINSON, ASST. to LANCASTER PROCESSES, INC. (U.S.P. 1,958,020, 8.5.34. Appl., 30.10.31).—For the formation of pulp and/or emulsions the materials are fed to the axis of, and finished fluid is withdrawn from, the periphery of a vortical chamber (C) containing a bulk of liquid under treatment which is withdrawn from the bottom of C, passed through disintegrating devices (D), and returned to C tangentially. D comprise alternate helical runners and stationary radial blades in one or more conduits, combined shearing and longitudinal motion being effected. B. M. V.

Air separators for use in conjunction with pulverisers. BRT. "REMA" MANUFG. Co., LTD. (B.P. 419,367, 11.5.33).—An air separator suitable for placing above a pulveriser (or fan) from which the air-borne material issues in a whirling manner comprises a hollow conical annulus in which adjustable vanes are placed to vary the whirling, and hence the amount of material drawn out of the vortex, through the apex of the outer cone, by the air. B. M. V. Production of reduced particle size from spraysolidified powder-like or granular materials. E. F. VAN SUCHTELEN (B.P. 417,449, 4.3.33).—The molten material, *e.g.*, soap,  $Na_2CO_3$ ,10H<sub>2</sub>O, is sprayed into a current of cold air and the material is further subdivided by abrasive action against the walls (and/or the fan) of a pneumatic conveyor. A. B. M.

**Example 7** Centrifugal separators. A. M. HOOD (B.P. 419,187, 16.2.34).—The material is subjected to a preliminary separation in the lower part (I) of the bowl, thence the lighter liquid with any entrained heavy material passes through ports into the main part (II) of the bowl at a radius such that it is forced to enter at the central eyes of, and flow through, the driving cones which are provided in (II) only. An adjustable obstruction is placed in the path of the heavier liquid flowing from (I) to (II). B. M. V.

Centrifugal treatment of liquids. J. STONE & Co., LTD., and A. W. EMPSON (B.P. 418,568, 26.4.33).— A centrifugal separator embodying driving cones (C) is provided with flow-resistance means to equalise the flow between each pair of C, comprising, preferably, a perforated cylinder at the inner edges of the cones with suitably graduated perforations. A method of supplying (heavy) flushing liquid down the axis with the feed mixture, but in separate strata, is described.

B. M. V.

Centrifugal machine. L. J. BARRETT (Assee.) and G. E. GARNO (U.S.P. 1,958,123, 8.5.34. Appl., 4.8.30).—Interlocks between the motor control and cover of the casing are described. B. M. V.

Rotary filters. R. BENNET and T. STEVENSON (B.P. 419,229, 5.7.33).—A no. of small filter drums (D)are arranged around the periphery of a cylindrical framework (F). Each D is a separate filtering unit with its own rotating, scraping, and vac.-breaking devices worked from F. D can be rotated or scraped at any portion of the periphery of F, but this is normally done immediately prior to its immersion in the liquor tank. Any suitable cake-washing device or liquor-agitating arrangement can be fitted. A. WE.

Devices for filtering liquids. M. HANSLIN and C. KYBURZ (B.P. 419,259, 8.5.34. Fr., 8.5.33).—The unit (U) comprises a no. of hollow strainers (S) embedded in a filtering medium (presumably granular). S are parallel to one another and may be alternately connected to the inlet and delivery pipes of U. Any no. of U may be interconnected for either series or parallel working. A. WE.

Filters. JENAER GLASWERK SCHOTT & GEN. (B.P. 419,257, 30.4.34. Ger., 10.5.33).—Particles of glass, quartz, or ceramic material fritted together constitute the filtering septum; the cross-section of the plate is plano-convex, and the plane side is uppermost. It is claimed that greater resistance to pressure is obtained and that the underside is more uniformly wetted, thus ensuring a more rapid filtration. A. WE.

Apparatus for filtering liquids, particularly lubricating oil. T. G. FERGUSON and B. H. HOVEY (B.P. 419,007, 27.6.33).—A tank is divided into 4 compartments, no. 4 being underneath 2 and 3; no. 1

is provided with heaters and acts as a settler, 2 acts as settler and is also provided with bucket filters, and 3 and 4 are for storage of the clean oil. B. M. V.

Filter. E. H. MORGAN (U.S.P. 1,958,279, 8.5.34. Appl., 25.9.29).—Sewage sludge (S) or the like is fed between two belts (B) of porous material which during a straight run are compressed between upper rollers and a lower plate providing increased pressure at the edges of B to prevent escape of S. B. M. V.

**Pumps for filter-presses and the like.** H. H. DAVIS, and S. H. JOHNSON & Co., LTD. (B.P. 417,344, 5.5.33).—The pump described in B.P. 398,684 (B., 1933, 992) is provided with a modified valve mechanism and with an arrangement of ports whereby the main and auxiliary pistons are cushioned by air or steam at both ends of their strokes. A. B. M.

Clarification apparatus. G. RAYMOND, R. A. MORGEN, and F. FAIR (U.S.P. 1,956,833, 1.5.34. Appl., 11.7.31).—An apparatus for cleaning dry-cleaners' solvent (etc.) comprises a trap for buttons or the like, a compartment for admixture of cleaning chemical, and a treatment compartment including a filter. B. M. V.

**Recovering solvent from sludge.** D. I. ASH-WORTH, ASST. to DE LAVAL SEPARATOR CO. (U.S.P. 1,957,750, 8.5.34. Appl., 11.7.31).—Sludge formed by alkaline treatment of used dry-cleaners' solvent is, after the initial separation from clean solvent (S), diluted with  $H_2O$  to  $\gg$  double vol. and then heated to and held at just < the b.p., a de-emulsification and further gravity separation of S taking place. B. M. V.

[Pulp] density controlling apparatus. H. S. COE (U.S.P. 1,957,941, 8.5.34. Appl., 16.11.32).—A diaphragm pump drawing thickened pulp (P) is of excess capacity, *i.e.*, if left to itself it would in time draw thin pulp. Its capacity is reduced by admission of air (A)at a point between the valves, A being controlled by a float floating on the top of a column (C) of H<sub>2</sub>O or other liquid of less d than P. C has both ends open and is submerged to a definite depth in a continuously renewed sample of P. B. M. V.

**Dissolving and extracting devices.** A. ROULLAND (B.P. 417,302, 15.2.34. Ger., 15.2.33).—Fruit, vegetable, and other pulp is extracted in an apparatus comprising a series of perforated drums (D) which rotate about a horizontal axis in a trough divided into compartments (one for each drum) by vertical partitions extending nearly to the axis of D. Within D are radial, perforated partitions adapted to scoop up the pulp, drain it, and feed it through an axial sleeve into the next drum. The extracting liquid passes from compartment to compartment countercurrent to the direction of movement of the pulp. A. B. M<sup>•</sup>

Apparatus for continuous extraction of material. L. MELLERSH-JACKSON. From F. KRUPP GRUSONWERK A.-G. (B.P. 418,725, 6.3.34).—An apparatus in which the liquid is propelled down an annular and up an axial space by means of helical blades and the solvent caused to flow countercurrent is described. B. M. V.

Countercurrent leaching process. A. SCHAUS, Assr. to DORR Co., INC. (U.S.P. 1,957,182, 1.5.34. Appl., 11.11.30. Fr., 13.11.29).—In a continuous sedimentation system it is found that the area of tank (T) (per ton of solids treated) necessary to give clear settling decreases with increase of pulp ratio (r) of the pulp fed to any T up to a crit. point (p), with a marked drop at that point. In nearly every case p would be too great a dilution to use in an ordinary thickener system when the liquor is valuable in itself or by reason of evaporation being necessary; a staircase of thickeners is therefore arranged so that an adjustable part of the clear overflow from any T may be pumped into the feed of the same T. B. M. V.

Dialysing apparatus of the filter-press type. A. J. S. HOOTON, H. H. DAVIS, and S. H. JOHNSON & CO., LTD. (B.P. 418,959 and 419,032, 13.4.33).—(A) Each septum is sandwiched between two perforated, unsmooth rubber sheets, and they in turn are clamped between metal or other rigid frames provided with lattice work to support the sheets. (B) The ported lugs of the frames are not connected directly to each other, but detachable (rubber) tubes are employed so that any frame containing recovered crystalloid may be by-passed without stopping the dialysis in the others. B. M. V.

**Pasteurising of liquids.** BERGEDORFER EISENWERK A.-G. ASTRA-WERKE (B.P. 417,495, 10.1.34. Ger., 10.1. and 1.2.33).—Liquids containing gases are pasteurised in a continuous-flow apparatus provided with automatic pressure regulators which maintain pressures in the heating elements  $\prec$  the saturation pressure of the gas  $\equiv$  the temp. in the element. A. B. M.

Maintaining a high and dense suspension of crystals and like granular solids in a liquid. AKTIESELSKAPET KRYSTAL (B.P. 418,349, 26.3.34. Norw.; 3.4.33).—A no. of methods of injecting a fluid (F) into a comparatively dense mass of growing or dissolving crystals in such a way as to give it a complete overturning motion are described. F may be either a gas or the supernatant liquid; some forms of the injecting devices are suitable for rectangular tanks. B. M. V.

Liquid-testing methods and apparatus. V. A. SCHOENBERG (B.P. 419,339, 13.1.34. U.S., 24.7.33).— A method of obtaining a pool of oil of definite depth (prior to optical examination) comprises forming a hole in an opaque plate (I) the thickness of which is = the required depth of pool, placing (I) upon a horizontal transparent plate, filling the pool, and striking-off with a straight edge. B. M. V.

Separation of gas mixtures into constituents. LINDE AIR PRODUCTS Co., Assees. of W. W. FRASER (B.P. 418,673, 24.4.33. U.S., 10.9.32).—After compression in several stages with intercooling, the gas mixture (e.g., air) is divided into portions (I) and (II), (I) being expanded in an engine and passed to a highpressure rectifier ( $R_1$ ), and (II) being cooled by excess cold from  $R_1$ , expanded without external work, and passed also to  $R_1$  at a point near the entry of (I). The mixture is then subjected to as many stages of rectification at decreasing pressures as are necessary to obtain the desired purity of products. B. M. V.

Valves for high-temp. work. Catalysts.—See X. Pptn. apparatus for gases.—See XI.

## II.—FUEL; GAS; TAR; MINERAL OILS.

Indian bituminous coals. H. HOFFMANN and R. K. D. Rov (Brennstoff-Chem., 1934, 15, 428–430; cf. B., 1934, 388).—A series of Indian coking (A) and gas (B) coals had ash contents of 10.72-17.75%, and volatile matter contents (ash-free, dry basis) of 27-28%for A and 39-44% for B. The decomp. points (P) (Fischer et al., B., 1925, 233) of A were 256–325° and of B 226–300°. In general, P rose with increasing S content of the coal. A. B. M.

Properties of coking coals. A. SHIMOMURA (J. Fuel Soc. Japan, 1934, 13, 94-97; cf. B., 1932, 374).-Measurements of the expansion (E), driving pressure (P), and evolution of volatile matter on heating Japanese coals (I) and commercial blends (II) were made to assess their suitability for coke-making. (I) and (II) are classified, and compared with European coals (III), according to their E on heating, and  $\eta$  when molten. Most of (I), and all (II), showed little or no P, and so were unsuitable for the production of hard, dense coke of minute cell structure. For bituminous (I), high in volatile matter, the softening and initial points of  $E, \eta$  of the fused coal, and the temp. of evolution of volatile matter were too low, and the magnitude of E too great. The properties of blends of highly swelling, strongly caking coals (IV) of low m.p. and  $\eta$  with each of the following were determined: (a) anthracite, (b) coking coal, (c) highly volatile, highly oxygenated coal, (d) oxidised coal, semi-cokes prepared at (e) 450° and (f) 500°, (g) coke breeze, and (h) quartz sand. Reduction in swelling and increase in initial points of softening and E were greatest with (e), and least with (h); although (IV) had exhibited some P, blends containing 30% of each of the above materials showed practically none. In those blends yielding a better-quality coke, the temp. of max. evolution of volatile matter tended to be higher. It is considered that, by suitable blending, coals having proper coking properties may be obtained from the bituminous (I), which are, per se, unsuitable for modern coking practice. It is suggested that ideal coking coals should have ash as low as possible, volatile matter (dry basis) 20-30%, (dry, ashless basis) PhOH extract 15-35%, C 85-89, H 4.5-5.5, O 5-8%, temp. of initial and final  $E \ll 430^{\circ}$  and  $470^{\circ}$ , magnitude of E from > 50 to < 200%, P (Nedelmann's apparatus) about 0.1 kg. per sq. cm.; temp. range of max. evolution of volatile matter 460-500°. A. L. R.

Spontaneous oxidation of coal and other organic substances. J. S. HALDANE and R. H. MAKGILI (J.S.C.I., 1934, 53, 359–367 T).—The results of studies on the gaseous exchange in the oxidation of coal, hay, grass, sawdust, tobacco, peat, and linseed oil are summarised. In general two distinct types of oxidation occur, one of which is independent of life, and may lead to spontaneous combustion, whilst the other is dependent on life, and cannot raise the temp. above about 70°. The first type is characterised by the fact that when the temp. is kept const. the rate of oxidation steadily diminishes as time elapses, although it increases very markedly as the temp. rises. It is also accompanied by the production of a small but very distinct amount of CO; usually, also, the vol. of O<sub>2</sub> consumed

is much > the vol. of CO<sub>2</sub> produced. The second type occurs only in presence of moisture, after the addition of which the oxidation, even at const. temp., increases with time, and may increase enormously until the limiting temp. is reached. The vol. of CO<sub>2</sub> produced is approx. = that of the  $O_2$  consumed, and there is no formation of CO. It is thus fairly easy to distinguish the two forms of oxidation. Coal is peculiar owing to the fact that when it is wetted not only does the CO which has been formed disappear rapidly, but the vol. of  $CO_2$  formed in proportion to  $O_2$  consumed is much increased; the rate of consumption of  $O_2$  is also itself much increased. "Black damp" is the residual gas from a spontaneous oxidation process. When this is formed from air-dry coal, CO is always present in it, but when the coal is wet, as in old workings etc., no trace of CO is present, whilst a much larger proportion of  $CO_2$ , in proportion to  $O_2$  consumed, is formed than with air-dry coal. CO added to a flask containing wet coal disappears, and a good deal of CO<sub>2</sub> continues to be formed after all the O<sub>2</sub> has disappeared. These changes are not due to micro-organisms, since they still occur in presence of strong antiseptics. The results of experiments are described illustrating these points in connexion with the spontaneous oxidation of the substances mentioned, and illustrating also the presence, in certain cases, of substances which either, by acting as antiseptics, inhibit oxidation due to life, or else inhibit the form of oxidation which is not due to life.

Determination of humic acids in peat. E. V. RAKOVSKI and T. M. POLYAKOV (Khim. Tverd. Topl., 1933, 4, 129—136).—10 g. of peat are shaken with aq. Ca(OAc)<sub>2</sub> and the AcOH formed is determined by titration [to give free humic acid (I)]. The decrease in Ca is also determined. Ca salts of (I) are determined by shaking with aq. NaOAc and determining the Ca which goes into solution. CH. ABS. (e)

Recent experiences in the working of Upper Silesian steelworks' gas producers. G. DRATH and F. WESEMANN (Arch. Eisenhüttenw., 1934-5, 8, 151-157).-Tests on rotating-hearth gas producers of the Mindoga-Chapman and Hilger types show that the throughput is dependent solely on the capacity of the valve, and only in rare cases have the coking power of the fuel and its ash content any appreciable influence. The quality of the gas and its tar and H<sub>2</sub>O content are determined to a great extent by the amount of steam admitted, which must be very carefully regulated by practical tests. The temp. and quality of the gas can be regulated by adjusting the height of charge which is shaken by the rotation of the hearth, and by the method of admitting the steam. Continuous charging of coal tends to produce dusting, but contamination of the gas can be prevented by the provision of a suitable dusthood. A. R. P.

Output of rotating-hearth gas producers in the gasification of coke. F. W. HERBORDT (Stahl u. Eisen, 1934, 54, 999—1000).—The effect of ash content and size of the coke on the output of gas producers is illustrated graphically and with reference to examples from practice. A. R. P.

#### British Chemical Abstracts-B.

CL. II.-FUEL; GAS; TAR; MINERAL OILS.

MINERAL OILS.

Naphthalene-free gas? L. PIATTI (Gas-u. Wasserfach, 1934, 77, 811—812).—The importance of preventing  $C_{10}H_8$  (I) stoppages is discussed. Gas initially free from (I) may become saturated from old deposits in the mains, and trouble may be caused by later deposition of (I) in a hard form or by clouds of dry rust. The injection of tetralin is recommended. E. H. M. B.

Toxicity of illuminating gas and the problem of rendering it innocuous. I. GIORDANO (Giorn. Chim. Ind. Appl., 1934, 16, 486—493).—Work on the toxicity of the constituents of coal gas is reviewed and it is concluded that CO is the only toxic gas present in appreciable quantity.  $H_2$ ,  $CH_4$ ,  $C_2H_4$ ,  $C_2H_2$ , and their homologues are not toxic. The quant. aspect of CO poisoning is considered in detail. The methods of removing CO are reviewed, but none of them is considered of industrial applicability. D. R. D.

Determination of flame velocities of mixtures of inflammable gases. F. SCHUSTER (Gas-u. Wasserfach, 1934, 77, 805-807).—An inflammable gas has a max. flame velocity (V) when mixed with the optimum quantity of air. Vals. of V for mixtures of H<sub>2</sub>, CO, and CH<sub>4</sub> are plotted on a triangular diagram. The effect of diluting with N<sub>2</sub> and CO<sub>2</sub> is determined by means of a nomogram. A graph is given connecting the Ott no. with the calorific val., d, and V. E. H. M. B.

Heavy-oil tar emulsions in the water-gas process. J. J. MORGAN and C. F. STOLZENBACH (Amer. Gas Assoc. Month., 1934, 16, 245—248, 277—280).—The emulsions consist of  $H_2O$  droplets suspended in the tar and surrounded by an outer coating of "free C" particles (I). When (I) are removed with a tar solvent the  $H_2O$ particles do not coalesce. They are surrounded by a stabilising layer [other than (I)] consisting of asphaltenes (II). The (II) and (I) content of the tars formed from a west Texas heavy oil increased with the gasification temp. in the range 480—930°. CH. Abs. (e)

Syukeev bituminous mineral. B. L. MOLDAVSKI and S. E. ARKINA (Khim. Tverd. Topl., 1932, 3, 367– 373).—Analytical data are recorded. CH. Abs. (e)

Organic mass of oil shale. G. L. STADNIKOV (Khim. Tverd. Topl., 1934, 5, 7–16).—The origin and development of the shale are discussed on the basis of analytical data and derived products. CH. ABS. (e)

Thermal decomposition of shale. V. TZUIBASOV and V. EFREMOV (Khim. Tverd. Topl., 1933, 4, 278–287). —The org. mass (kerogen) is transformed into pyrobitumen (optimum temp. 360°), which forms tar, coke, and gas during the subsequent cracking. CH. Abs. (e)

Acidic fractions of the tars from Petrograd shales. D. N. ANDREEVSKI and A. F. CHEGIS (Khim. Tverd. Topl., 1933, 4, 469–480).—Analytical data are recorded. CH. ABS. (e)

Destructive hydrogenation under pressure of Kashpira shales. V. P. TZUIBASOV and V. P. EFREMOV (Goryu. Slantz., 1934, 4, No. 2, 56—60).—Introduction of H<sub>2</sub> during the thermal treatment  $(320-360^{\circ})$  removes S as H<sub>2</sub>S, the shale yielding 20% of tar containing 1.54%S. The usual distillation from a Fischer retort yields only 10—11% of tar (6.5% S). CH. ABS. (e) Coal bitumen. D. J. W. KREULEN (Chem. Weekblad, 1934, 31, 630—633).—Flocculation by  $Et_2O$ of the tetralin extract (275°, 6—7 atm., 6 hr.) of a coal (ash 4.5, volatile matter 31.9%) and extraction of the product (I) by various solvents for periods up to 16 days yields a series of fractions of which the coke- and humic acid-forming properties have been examined. The results show the micelles of (I) to contain a humic nucleus and adsorbed bituminous compounds; the latter cannot be removed even by prolonged extraction, and their properties mask those of the nucleus. The bitumen which remains in the  $Et_2O$  solution cannot be oxidised to humic acids, whereas this is possible with the flocculated material. H. F. G.

Chemical composition, properties, and methods of treatment of primary tar from Tcheliabinsk lignites. Berginisation of the tar. A. V. Lozovor and M. K. DJAKOVA (Compt. rend. Acad. Sci., U.R.S.S., 1934, 3, 624-625).—Catalytic (MoS<sub>3</sub>) hydrogenation of the tar distillate at  $300-400^{\circ}/200-250$  atm. and then at  $430-460^{\circ}$  for 1-2 hr. gives a motor fuel, b.p.  $< 230^{\circ}$ , and a C<sub>6</sub>H<sub>6</sub>-petroleum fraction, b.p.  $< 280^{\circ}$ . In absence of catalyst the product contains phenols, S, and unsaturated compounds, and the usual byproducts are formed in larger amounts. J. L. D.

Gasoline method of separating solid bitumens from primary tars. V. E. RAKOVSKI and S. I. RUIBIN (Khim. Tverd. Topl., 1934, 5, 131–136).— Low-temp. tar was diluted with naphtha (b.p. 70–100°), asphaltenes, paraffin, and solid substances being separated. CH. ABS. (e)

Destructive hydrogenation of Kashpira tar. S.S. NAMETKIN, F. I. SANIN, and E. F. RUDAKOVA (Khim. Tverd. Topl., 1933, 4, 332—354).—With no catalyst, compounds with large amounts of S were obtained which were no longer found when  $MoS_2$ ,  $Al_2O_3$ -NiO, or limonite was used as a catalyst; 0.5% of  $MoS_2$  was sufficient for hydrogenation. It was not poisoned by S compounds. CH. ABS. (e)

(A) Composition of gasoline from sapropelite tar. N. M. KARAVAEV, I. B. RAPOPORT, and A. N. BASHKIROV. (B) Changes of properties of sapropelite gasoline on keeping. N. M. KARAVAEV and K. S. KURUINDIN. (c) Gasolines obtained in the destructive hydrogenation of sapromyxite tar. I. B. RAPOPORT and N. V. MILOVIDOVA (Khim. Tverd. Topl., 1931, 2, No. 9, 46-54; 1933, 4, 315-323; 1934, 5, 175-183).-(A) Data are recorded. The products included  $C_6H_6$ , PhMe, *p*-xylene, *cyclohexane*, methyland dimethyl-*cyclohexane*, and  $C_nH_{2n+2}$  (n = 5-8).

(B) Oxidation of unsaturated hydrocarbons with probable formation of per-acids was observed.

(c) A no. of aromatic and unsaturated compounds were identified. CH. ABS. (e)

Refining of light products from the low-temperature carbonisation of coal. N. I. TSCHERNOSHUKOV, L. S. DIUBAKOVA, and G. V. MEDVEDEV (Khim. Tverd. Topl., 1934, 5, 149—161).—Gasoline distillates from sapropelite and humic tars are refined by the usual methods. Special refining is needed with a S content > 0.2%. Kerosene fractions from humic tars suffer large losses during  $H_2SO_4$  treatment. Better results are obtained if they are treated after oxidation under pressure. CH. ABS. (e)

Refining of gasolines of primary tars with zinc chloride and ferrous chloride. I. K. S. KURUINDIN and I. I. IVANOV. II. Analysis of fractions of gasoline from Cheremkhov tar. K. S. KURUINDIN and A. I. SHUMILOV (Khim. Tverd. Topl., 1934, 4, 578–585; 5, 74–82).—I. Refining in the liquid phase is described. Losses on treatment with ZnCl<sub>2</sub> were 3.5% for the liquidand 1.5-2% for the vapour-phase treatment. The catalyst rapidly loses its activity.

II. Data are recorded.

Сн. Авз. (е)

Destructive hydrogenation of Kashpira tar, S. S. NAMETKIN, F. I. SANIN, and E. F. RUDAKOVA (Khim. Tverd. Topl., 1933, 4, 598-605).—Hydrogenation of the heavy oils gave 39% of gasoline (b.p.  $< 200^{\circ}$ ). Other data are recorded. 8% of MoS<sub>2</sub> catalyst was used. CH. ABS. (e)

Hydrogenation of oxygen-containing compounds. II. Reduction of phenols in the primary tar of Cheremkhov coals. B. L. MOLDAVSKI and S. E. LIVSCHITZ (Khim. Tverd. Topl., 1934, 5, 91-96; cf. B., 1934, 53).—Tricresols were reduced with a cresol fraction (b.p. 210°) with MoS<sub>2</sub> as catalyst and under various pressures. The fraction of b.p. 90-125<sub>o</sub> obtained in the reduction of the hydrocarbons contained 94% of PhMe. The higher phenols yielded a stable gasoline. CH. ABS. (e)

Lubricating qualities and cementing power of tars and their influence on the design of tar-sand carpets. H. KOHLER (Monograph, Berlin, 1934, 50 pp. ; Road Abs., 1934, No. 544).-The binder (I) in sand carpets permits the consolidation of the aggregate into the closest possible packing, followed by cementing together of the particles to prevent them springing back, but these are varied by the lubricating quality (II) and cementing power of (I). For tars at const. temp. (II) falls with rise in drop point (III). Increase of film thickness is associated with a decrease to a min., followed by an increase, in (II). At a given temp. and at min. (II) the film thickness for different tars  $\propto$  (III). Tar-sand mixtures have a max. stability with min. (II). For tar binders the surface area of the aggregate, the affinity between the tar and the mineral matter, and the (III) of the tar determine the amount of (I) required. Apparatus for determining (II) is described. T. W. P.

Synthetic hydrocarbons from water-gas. N. A. KLIUKVIN and Y. N. VOLNOV (Khim. Tverd. Topl., 1933, 4, 355—362).—Ni-Th, Ni-Th-Hg, and Ni-Mg catalysts gave an optimum yield of gasoline (30—40% on the converted CO, raised to 98—100% on recycling). A product rich in unsaturated compounds could be obtained. CH. ABS. (e)

Analysis of hydrocarbon gases. A. I. DINTZES (Khim. Tverd. Topl., 1933, 4, 381–382).—A modification of Podbielniak's method for small amounts of saturated hydrocarbons is described. CH. ABS. (e)

Determination of the gasoline content of gases. H. TROPSCH and W. J. MATTOX (Ind. Eng. Chem. [Anal.], 1934, 6, 405-408).—The gases are condensed in liquid N<sub>2</sub> (-195°) and CH<sub>4</sub> is removed under reduced pressure. The condensate is then distilled and the gasoline (I), viz., all hydrocarbons above C<sub>4</sub>, condensed at -105°. (I) is subsequently vaporised, its v.p. (II) measured, and the sample finally weighed (III) after condensation again at -195°. The mol. wt. and d of (I) are determined from (II) and (III). A nomograph is given for reducing gas vols. to n.t.p. S. C.

Cracking with aluminium chloride. A. F. DOBRI-ANSKI and N. I. ZELENIN (Khim. Tverd. Topl., 1933, 4, 606-618).—A kerosene distillate (I) freed from lowboiling fractions on heating with 15% of AlCl<sub>3</sub> gave  $46 \cdot 6\%$  of a gasoline ( $d \cdot 745$ ). The yield may be raised by prolonging the distillation. The use of other related materials in place of (I) is described. CH. ABS. (e)

Destructive hydrogenation [of fuel oil] in presence of catalysts. I, II. I. S. DINER and M. S. NEMTZOV (Khim. Tverd. Topl., 1932, 3, 837—857; 4, 136—151).— I. The effect of conditions on the hydrogenation of a Grozny mixed-base fuel oil at 430—450°, using a NiO catalyst, was studied.

II. Increase in the amount of Ni catalyst up to 20% acts favourably. Coke formation ceases with 5-8% of catalyst. Increase in the H<sub>2</sub> partial pressure favours the formation of aromatic compounds. The unsaturated compounds are the coke-forming agents. CH. ABS. (e)

Gum in fuels for spark-ignition engines. L. VON SZESZICH (Brennstoff-Chem., 1934, 15, 421—425).—A survey of the literature. A. B. M.

Indiana oxidation test for motor oils. T. H. ROGERS and B. H. SHOEMAKER (Ind. Eng. Chem. [Anal.], 1934, 6, 419—420).—Apparatus and procedure for testing the rate of sludge formation and increase of  $\eta$  in oils are described. E. S. H.

Determination of sulphur [in fuel oils] by the lamp method. N. A. ORLOV and A. S. BROUN (Khim. Tverd. Topl., 1933, 4, 380–381).—The SO<sub>2</sub> formed is oxidised by an HCl solution of  $K_2Cr_2O_7$ . With > 2% S, gasoline should be used as a diluent. CH. ABS. (e)

Evaporation-rate method applied to petroleum thinners. D. D. RUBEK and G. W. DAHL (Ind. Eng. Chem. [Anal.], 1934, 6, 421-422).—Technique for determining and representing graphically the volatility of complex solvents is described. E. S. H.

Requirements of lubricants for various industrial purposes. A. J. GENTIL (Chem. Weekblad, 1934, 31, 605—607).—The essential requirements of lubricating oils and greases are noted and methods of examination briefly described. H. F. G.

Evaluating the viscosity-temperature characteristics of [lubricating] oils. W. B. McCLUER and M. R. FENSKE (Ind. Eng. Chem. [Anal.], 1934, 6, 389– 392).—The $\eta$  vals. at different temp. are compared with those of a reference oil. From the equations developed a nomograph is constructed for determining the  $\eta$ -temp. characteristic. E. S. H.

Extraction of montan wax from Ukrainian brown coals of the Alexandriiski district. P. Y. SAMOILOVICH (Khim. Tverd. Topl., 1931, 2, No. 9, 62-72).—The wax is extracted from the coals with

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 $C_6H_6$ -EtOH and separated from the acids with Et<sub>2</sub>O (yield 6–19%; m.p. 86°; C 78.0, H 10.6, N 0, ash 0.68%; calorific val. 9315 g.-cal.; acid val. 23; sap. val. 78; esterification val. 55). CH. Abs. (e)

Measuring v.p. of benzine.—See I. MeOH and EtOH syntheses. Separating phenols from tar.— See III. CO.—See VII. Anticorrosive properties of oils.—See X. Furnace for distillations.—See XI.

See also A., Dec., 1328, Lignites of the Moscow Basin. 1359, Formation of naphthenic acids from petroleum.

# PATENTS.

Coking oven. DR. C. OTTO & Co. G.M.B.H. (B.P. 417,362, 18.1.34. Ger., 20.1. and 6.5.33).—An oven for coking briquettes comprises alternate vertical chambers (A) and rows of horizontal heating flues (B). The combustible gas formed during the coking process passes from A, through vertical ducts (C) at one end or both ends of A, to B, means being provided for separately regulating the flow from C to individual B.

A. B. M.

Apparatus for coking powdered coal and like hydrocarbonaceous fuel. F. L. DORNBROOK and M. K. DREWRY (B.P. 417,555, 19.1.34).-The pulverised coal is passed through an oxidising chamber wherein it is agitated in contact with flue gases containing 10% of O2 and at about 300°, and thence through a carbonising chamber (C) containing a series of flat, rectangular heating elements traversed by flue gases at 550-800°. The pre-oxidation prevents caking of the coal during carbonisation. The volatile products of carbonisation are recovered. The powdered coke is transferred directly to the combustion chamber of a boiler and utilised for the production of steam. The flue gases used for pre-oxidation and for heating C are withdrawn from suitable points of the combustion chamber. Suitable apparatus is described. A. B. M.

Production of compositions of fuel oil and powdered coal. RADIOCHEM. FORSCHUNGSINST. G.M.B.H. (B.P. 417,352, 12.8.33. Ger., 12.8.32. Cf. B.P. 406,067; B., 1934, 441).—Mineral or tar oil is mixed with a gelatiniser, e.g., 2-3% of paraffin wax or ozokerite, with a small proportion, e.g., 0.1-1%, of wool pitch, wool fat, and/or vaseline, and with the desired proportion, e.g., an equal wt., of finely-powdered coal. The wool pitch etc. prevents the setting of the composition in cold weather. A. B. M.

Burning of low-grade fuels, especially refuse. METALLCES. A.-G. (B.P. 418,726, 6.3.34. Ger., 20.5. and 1.8.33).—The raw material, e.g., refuse (R), is pushed by a pusher-plate (P) up to an already started fire upon a rectangular hearth, preferably a blast grate. The addition of each increment of charge is effected by two strokes of P, viz., (1) to clear a space on the grate, (2) to fill up the space with R as uncompacted as possible. During stroke (1) a mass of clinker of much smaller vol. is pushed off through a door (D) opposite the charging door, D being normally closed and provided with a cutting edge. If any predrying is desired it is accomplished by products of combustion passing through a thin vertical layer of R, the foul moist gases being afterwards mixed with air and passed through the main fire. B. M.  $\nabla$ .

Removal of weak gaseous acids from gases. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 417,379, 27.2.33).—CO<sub>2</sub>, H<sub>2</sub>S, and HCN are removed, together with readily volatile liquids, from industrial gases, e.g., coke-oven gas, by scrubbing the crude gas with a solution, colloidal solution, emulsion, or suspension in high-boiling org. solvents of difficultly volatile, strong org. bases, e.g., NHBu<sub>2</sub>, butanolamine, etc., or salts thereof with weak acids. The absorbed substances are recovered by heating the saturated washing medium, which is then recirculated. A. B. M.

Conducting high-temperature hydrogenation processes. R. P. RUSSELL, ASST. to STANDARD-I. G. Co. (U.S.P. 1,949,631, 6.3.34. Appl., 26.7.30).—In hydrogenation processes for the production of motor fuel at  $> 483^{\circ}$  and > 100 atm., a reaction chamber resistant to oxidation is used. This is constructed of an Fe alloy containing (approx.) Cr 27, Ni 22, Si  $\ge 2$ , and C < 0.5%. C. C.

Carrying out catalytic reactions [hydrogenation of carbonaceous materials]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 417,527, 8.4.33. Addn. to B.P. 402,938; B., 1934, 263).—In carrying out the process of the prior patent, a catalyst carrier is used consisting of, or containing, activated C. Before use, and before or after impregnation with the catalyst, the carrier is subjected to the action of steam or  $CO_2$  at  $> 500^{\circ} (> 1100^{\circ})$  and, if desired, under pressure.

A. B. M.

Production of low-boiling from higher-boiling hydrocarbons by the action of hydrogen at elevated temperatures. R. P. RUSSELL, ASST. to STANDARD-I. G. Co. (U.S.P. 1,949,632, 6.3.34. Appl., 24.3.30).— Heavy petroleum oils, e.g., reduced crudes or residues, are hydrogenated in continuous liquid phase in presence of a catalyst resistant to S (e.g., oxides and sulphides of metals of group VI) at  $455-466^{\circ}$  and > 20 atm. The liquid and vapour are removed from the reactor and cooled under pressure without distillation until only naphtha remains vaporised. Vapour and condensate are separated. C. C.

Refining of cracked hydrocarbon oils. J. C. MORRELL, ASST. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,949,756, 6.3.34. Appl., 3.12.27).—Cracked hydrocarbon distillates are treated with plumbite solution followed, in some cases, by the addition of a sol. polysulphide, *e.g.*, of the alkali or alkaline-earth metals. The reaction products are removed by an adsorbent, *e.g.*, fuller's earth. C. C.

Treatment of hydrocarbon oils. C. D. LOWRY, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,949,749, 6.3.34. Appl., 2.5.31).—Hydrocarbon oils, *e.g.*, cracked distillates, are refined by treatment in the vapour phase with greensand preferably in presence of HCl or steam and HCl. C. C.

Vapour-phase treatment of [cracked petroleum] oils. W. S. BAYLIS, Assr. to PATCO, INC. (U.S.P. 1,949,673, 6.3.34. Appl., 2.5.27).—Motor fuels which are stable as regards colour and gum formation are

produced by refining petroleum distillates, e.g., cracked distillates, in the vapour phase by injecting the vapour with finely-divided, solid, polymerising, adsorptive material (I) (e.g., acid-treated clay which may contain 5% of  $H_2SO_4$ ) into a treating zone. Part of the spent (I) separates directly; the remainder is electrically pptd. C. C.

Refining of sour hydrocarbon oil. L. M. HEN-DERSON, ASST. to ATLANTIC REFINING CO. (U,S.P. 1,940,861, 26.12.33. Appl., 9.1.31).—The oil is treated with Na<sub>2</sub>PbO<sub>2</sub>, whereby oil-sol. Pb compounds are formed, the aq. layer is removed, and the Pb separated as PbCl<sub>2</sub> by agitating the oil with 10—20% aq. CuCl<sub>2</sub>. A. R. P.

Recovering organic compounds from the waste products of the sulphuric acid refining of mineral oil or wax. V. MEHNER and S. F. ROSTLER (B.P. 419,372, 11.5.33).—Acid sludges from the refining of petroleum products are neutralised with metals or their oxides, hydroxides, or suitable salts and the mixture is distilled *in vacuo*, with or without steam, or extracted by org. solvents. The product is an oily or paraffin-like material practically free from S. C. C.

Treating wash-oil. I. H. JONES, ASST. to KOPPERS Co. of DELAWARE (U.S.P. 1,949,746, 6.3.34. Appl., 7.2.30).—Used debenzolised wash-oil is reclaimed by treatment below 70° with 2—10 vol.-% of  $H_2SO_4$ ( $d1 \cdot 71 - 1 \cdot 84$ ), preceded, if necessary, by dehydration with  $0 \cdot 5\%$  of this acid and followed by washings with  $H_2O$  and alkali. C. C.

Cracking of hydrocarbons. (A) W. S. GULLETTE, (B, C) E. W. ISOM, and (B) E. C. HERTHEL, ASSTS. to SINCLAIR REFINING CO. (U.S.P. 1,959,669 and 1,960,908 -9, [A] 22.5.34, [B, C] 29.5.34. Appl., [A] 16.12.29, [B] 12.6.29, [C] 14.4.31).

Cracking of hydrocarbon oils. H. C. WEBER and W. H. MCADAMS, ASSIS. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,960,608, 29.5.34. Appl., 26.6.30).

Cracking of hydrocarbons. H. L. PELZER, Assr. to SINCLAIR REFINING Co. (U.S.P. 1,949,655-6, 6.3.34. Appl., [A], 13.6.27, [B] 18.7.33).

Conversion of hydrocarbon oils. (A) R. C. COOK, (B) L. C. HUFF, and (c) J. D. SEGUY, ASSTS. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,956,856, 1,957,780, and 1,960,598, [A] 1.5.34, [B] 8.5.34, [C] 29.5.34. Appl., [A] 19.8.29, [B] 24.3.30, [C] 29.8.32. Renewed [A] 7.6.33). J. F. DONNELLY, ASST. to DONNELLY PROCESS CORP. (U.S.P. 1,957,945-6, 8.5.34. Appl., 24.4.26).

Treatment of hydrocarbon oils. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,958,267, 8.5.34. Appl., 15.6.20). W. M. STRATFORD, Assr. to TEXAS Co. (U.S.P. 1,958,959, 15.5.34. Appl., 28.11.28).

Apparatus for treatment of heavy oils and other similar products with a view to their conversion into lighter products. A. JOSEPH, Assr. to HOUDRY PROCESS CORP. (U.S.P. 1,957,652, 8.5.34. Appl., 27.12.30. Fr., 1.12.30).

Filtering lubricating oil. Testing liquids.—See I. Wetting preps.—See III. Corrosion inhibitors.— See X.

## III.—ORGANIC INTERMEDIATES.

Ethyl alcohol synthesis. I. N. A. KLIUKVIN, Y. N. VOLNOV, and M. N. KARPINSKI (Khim. Tverd. Topl., 1932, 3, 829—837).—A max. (39%) yield of EtOH was attained at  $320-330^{\circ}/120$  atm. with a ZnO : CoO (3 : 1) catalyst. Alcohols up to  $C_5H_{11}$  OH were formed simultaneously. The gas used contained CO  $33 \cdot 4$ ,  $H_2$  66  $\cdot 2$ , and CO<sub>2</sub> 0.4%. CH. ABS. (e)

Preparation of furfuraldehyde. A. E. ARBUZOV and B. P. LUGOVKIN (J. Appl. Chem. Russ., 1934, 7, 550—557).—The yields of furfuraldehyde (I) obtained by heating straw with aq.  $H_3PO_4$  under atm. pressure are < those given by aq. HCl or  $H_2SO_4$ ; at 160°/8— 10 atm. the yield of (I) is almost theoretical (9·3% from straw containing 9% of  $H_2O$ ), using 0·5—2%  $H_3PO_4$ . The straw remaining after distillation of (I) is not carbonised, and is suitable for various technical purposes (paper, plastic masses, cattle-feed, etc.). The aq.  $H_3PO_4$  remaining after distillation of (I) can be used repeatedly. R. T.

Separation of mixtures of phenols and phenolcontaining fractions of tars. V. I. ZABAVIN (Khim. Tverd. Topl., 1933, 4, 480–491).—Aryl carbonates were formed by treating phenols with twice the calc. amount of Ca(OH)<sub>2</sub> and passing a stream of COCl<sub>2</sub> until the solution became clear. A fractional decomp. of the resulting mixture was obtained with 25% aq. NH<sub>3</sub>, the separation of the individual phenols depending on [aq. NH<sub>3</sub>] and on the duration of contact.

Сн. Авз. (е)

Preparation of 2-nitro-*p*-cresol from *p*-toluidine. J. B. ASCHKINAZI (J. Appl. Chem. Russ., 1934, 7, 373– 376).—The highest yields (71%) of 2-nitro-*p*-cresol (I) are obtained by heating aq. p-C<sub>6</sub>H<sub>4</sub>Me·N<sub>2</sub>·NO<sub>3</sub> (II) for 5—6 hr. at 50—60°, and isolating (I) by steam-distillation. The yield and purity of (I) are lowered by adding Cu(NO<sub>3</sub>)<sub>2</sub>, Na<sub>2</sub>SO<sub>4</sub>, or C<sub>6</sub>H<sub>6</sub>, by increasing the dilution of (II), and at decomp. temp.  $> 60^\circ$ . R. T.

Reducing tar phenols.—See II. Bestan AS as tanning material.—See XV.

See also A., Dec., 1333, Prep. of citroanilide. 1336, Synthesis of  $COMe_2$ , and its determination. 1341, Prep. of amino-nitriles. 1342, Synthesis of styrene. Prep. of  $NH_2Ph$  and  $p-NO_2 \cdot C_6H_4 \cdot NH_2$ . 1354, Vanillin synthesis. 1357, Prep. of hexachloro-1:4-naphthaquinone. 1359, Formation of naphthenic acids from petroleum. 1368, Quinoline. 1375, Distillation with Hg vapour. Determining  $CH_2O$  by  $NH_2Ph$ . Analysis of mixtures of  $COMe_2$ , MeCHO, and AcOH. 1405, Citric, and gluconic, fermentation.

#### PATENTS.

Manufacture of vinyl esters. CARBIDE & CARBON CHEMICALS CORP., Assees. of G. A. PERKINS (B.P. 418,943, 18.12.33. U.S., 25.1.33).—MeCHO or paraldehyde is heated with an aliphatic carboxylic acid anhydride (Ac<sub>2</sub>O) and a non-volatile "inorg." acid catalyst (0.25-2%) of  $H_2SO_4$ ,  $H_3PO_4$ , or  $p-C_6H_4Me\cdotSO_3H$ ), and the vinyl ester is distilled as formed. Apparatus is claimed. H. A. P.

Britteh Chemical Abaimada Br

Manufacture of primary diterpene alcohols. Soc. CHEM. IND. IN BASLE (B.P. 418,723, 27.2.34. Switz., 3.3.33).-Dihydro-B-ionone is condensed with NaNH, and C<sub>2</sub>H<sub>2</sub> in Et<sub>2</sub>O to give the acetylene carbinol (I), b.p. 135°/10 mm., which is reduced (Na-moist Et<sub>2</sub>O or  $Ni-H_2$ ) to the olefine alcohol (II); this is chlorinated and isomerised to (III) by PCl<sub>5</sub> in light petroleum at  $< 0^{\circ}$ . (III) is then condensed with CH<sub>2</sub>Ac·CO<sub>2</sub>Et, and the product, b.p. 165°/0.4 mm., hydrolysed [Ba(OH)<sub>2</sub> in aq. EtOH] to the ketone (IV), b.p. 130-132°/0.2 mm. This is then converted as before into the acetylenic, b.p. 125°/0.1 mm., and olefinic carbinol, b.p. 124-126°/0.2 mm., which, finally, is isomerised to the alcohol (V), b.p. 136-138°/0.1 mm., by boiling with Ac<sub>2</sub>O and hydrolysing the acetate formed (KOH-EtOH). A similar series of reactions may be carried out with dihydro-aionone. Thus,  $C_{11}H_{19}$ ·COMe  $\rightarrow$  (I) ·CMe(OH)·C:CH (II)  $\cdot \text{CMe}(\text{OH}) \cdot \text{CH}^{\circ}.\text{CH}_{2} \rightarrow (\text{III}) \cdot \text{CMe}^{\circ}.\text{CH}^{\circ}.\text{CH}_{2}.\text{CH}_{2} \rightarrow (\text{IV}) \cdot \text{CMe}^{\circ}.\text{CH} \cdot \text{CH}_{2} \cdot \text{CH}_{2} \cdot \text{COMe}$  $\rightarrow$ 

 $\rightarrow$  (V) ·CMe:CH·[CH<sub>2</sub>]<sub>2</sub>·CMe:CH·CH<sub>2</sub>·OH. H. A.P.

Manufacture and application of products useful as assistants in textile and leather industries. A. G. BLOXAM. From Soc. CHEM. IND. IN BASLE (B.P. 419,010, 27.4.33. Cf. B.P. 403,977; B., 1934, 233).—Cyclic amidines derived from an unsulphonated o- or periarylenediamine and an aliphatic carboxylic acid having  $\ll C_4$ , or a cycloaliphatic acid are alkylated or aralkylated. Further alkylation to the quaternary salt may be carried out. Examples are: Me (II), Et (III), CH<sub>2</sub>Ph (IV), and Bu derivatives of µ-heptadecylbenziminazole (I) (from technical stearic acid); (I) +  $(CH_2)_2O$  (2 pts.) at 200°; (I) +  $CH_2Cl \cdot CH(OH) \cdot CH_2 \cdot OH$ ; o- $NH_2 \cdot C_6H_4 \cdot NHMe +$ stearic acid ; o-NHMe  $C_6 \tilde{H}_4 \cdot NO_2 + \text{coconut}$  oil (Ni-H<sub>2</sub>) at 200-220° (1-5 atm.); N-benzyl-µ-heptadecylbenziminazole + (CH<sub>2</sub>)<sub>2</sub>O; and quaternary salts from (II) and (III) and MeCl or EtCl, from (IV) or the corresponding oleic acid derivative (V) and CH<sub>2</sub>PhCl, and from (V) and epichlorohydrin. H. A. P.

Wetting etc. agents.—See VI. Supported catalysts.—See X.

#### IV.—DYESTUFFS.

See A., Dec., 1344, Colour of thiol and methylthiol azo dyes of  $\alpha$ - and  $\beta$ -C<sub>10</sub>H<sub>7</sub>·OH. Influence of chromophore position in bisazo dyes. 1361, Furan dyes. 1370, Synthesis of polymethine [cyanine] dyes.

#### PATENT.

[Manufacture of dyes for] colouring organic masses capable of being moulded. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 418,667, 20.3.33).— Rubber and synthetic plastic and thermo-hardening resins are coloured before vulcanisation or moulding with H<sub>2</sub>O-insol. azo dyes free from SO<sub>3</sub>H and CO<sub>2</sub>H and of the type R·X·R', where R and R' are cyclic coupling components at least one of which is coupled with a diazo compound, and X is a bivalent atom or group, or a diaminoaryl residue. Examples are:  $2[o-NH_2\cdot C_6H_4\cdot OMe$  (I), NH<sub>2</sub>Ph, or  $o-NH_2\cdot C_6H_4CI] \implies$ carbonylbis-3'-amino-1-phenyl - 3-methyl-5-pyrazolone (II) (golden-yellow); o-dianisidine (III)  $\implies$  4'-isomeride of (II) (red); 2 (I)  $\implies$  bis-2: 3-hydroxynaphtho-1: 5naphthylenediamide (IV) (bordeaux); 3:3'-dichlorobenzidine  $\implies$  (IV) (blue); (III)  $\implies$  bis-2:3-hydroxynaphthoyl derivatives of 4:4'-diaminodiphenyl-urea, -amine, sulphide, or -methane (blue), or 4:4'- $CO(C_6H_4:NH_2)_2$ ; 4':4''-diamino-1:1-diphenylcyclohexane (V)  $\implies$  bis-2:3-hydroxynaphthoyl derivatives of p-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub>; 4:4'-diaminodiphenyl sulphide, sulphone, -thiourea, and -propane ( $\beta\beta$ ) (red), (mono-) p-aminophenylsulphon-p-phenylenediamide, and (III) (bluish-red), and 6-amino-2:4-dihydroxy-1-methylquinoline (yellow-red); and 3':3''-(OMe)<sub>2</sub>-derivative of (V)  $\implies$  bis-2:3-hydroxynaphthobenzidide (violet-red). H. A. P.

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

Absorbency of cotton wool. R. M. SAVAGE (J.S.C.I., 1934, 53, 379—382 T).—Analytical data on the greasy fraction of cotton wool are given and absorbency is attributed to (1) orientation of the fatty acid coating of the fibres with  $CO_2H$  groups outwards, (2) swelling of the fibres by absorption of  $H_2O$  vapour, and consequent rupture of the coating. Good samples are wetted on account of (1). Certain samples can exist in two reversible modifications, as theory requires.

Production of celluloses of different viscosities. Activated bleaching. A. ZAKOSHCHIKOV, D. TUMARKIN, and T. MESHNIKOVA (Iskusst. Volok., 1934, 5, No. 4, 22–28).—The regulated reduction of  $\eta$  of linters cellulose by bleaching with NH<sub>3</sub> as an activator for the decomp. of Ca(OCl)<sub>2</sub> (I) has been studied. The optimum effect was obtained on introducing the alkali-steeped linters into a bleaching mixture containing active Cl and NH<sub>3</sub> (10:1). By bleaching for 1 hr. at  $13-15^{\circ} \eta$  was reduced with 0.2% active Cl to 175 or, with NH<sub>3</sub>, to 43; other data are recorded. The activation is connected with  $\rm NH_2Cl$  formation. The high decomp. velocity of (I) renders the industrial use of the process difficult. A uniform bleaching may, however, be obtained by mixing steeped linters with dil. aq. NH3, pressing the material out, and introducing it into the bleaching liquor. A cellulose of consistently even  $\eta$  (8-10) was thus obtained. Сн. Abs. (e)

Nitration of cellulose. II. Nitration with nitric acid in presence of nitrates. S. ROGOVIN and P. PAZADNIA (Iskusst. Volok., 1934, 5, No. 3, 9–12; cf. B., 1934, 1053).—Addition of 15% NaNO<sub>3</sub> to 89-95%HNO<sub>3</sub> increases the degree of nitration (I) of cellulose by 0.6-0.7% N. Similar additions of KNO<sub>3</sub> and, especially, NH<sub>4</sub>NO<sub>3</sub> decrease (I), due to formation of complexes of the type RNO<sub>3</sub>, HNO<sub>3</sub>. CH. ABS. (e)

The ethers of cellulose. D. TRAILL (J.S.C.I., 1934, 53, 347-352 T).—A lecture describing the prep. and properties of the Me, Et, CH<sub>2</sub>Ph, and glycol ethers.

Papermaking trials with coniferous woods from Southern Rhodesia. ANON. (Bull. Imp. Inst., 1934, 32, 343—348).—*Pinus insignis* (I), *P. patula* (II), and *Cup*ressus lusitanica (III) were investigated. After mild digestion with NaOH they all furnished strong, longfibred pulps with a low alkali consumption. (I), whether grown in New Zealand or Rhodesia, is of similar composition, and together with (II) should be suitable for making groundwood. (III), owing to the presence of many resinous knots and to its rather dark colour, would be less suitable. All three were resistant to bleaching, but could be used for the production of kraft wrapping papers. D. A. C.

Refining of paper stock. C. R. CRAWFORD (Paper Trade J., 1934, 99; T.A.P.P.I. Sect., 249–252).—The main differences between beating and refining are indicated. A new type of combined beater-refiner is described, in which the pulp circulates around a specially designed high-capacity tub, through the refiner, and back to the tub, so giving the fibres time to absorb  $H_2O$ between each passage through the beating knives, as in an ordinary beater, but with a much more intensive beating treatment by reason of the refiner action. Very rapid beating is claimed, with low power consumption. H. A. H.

Influence of acid concentration and temperature on penetration etc. in the early stages of pulping. M. F. MARTUINOV (Trans. Centr. Sci. Res. Inst. Paper Ind., 1933, No. 2, 54—66).—Increase in acidity from 3 to 6% SO<sub>2</sub> results in better saturation of wood chips and activation of the chemical process of pulping. The effects are greater if the temp. during the penetration period is raised from 105° to 120° than if the acidity is increased. The time of cooking can be decreased without increasing the screenings. CH. ABS. (e)

Influence of aluminium sulphate on retention of kaolin by paper. Y. G. KHINCHIN (Trans. Centr. Sci. Res. Inst. Paper Ind., 1933, No. 1, 10–17).—Increased retention of kaolin by paper on addition of  $Al_2(SO_4)_3$  is due to a colloidal process, favouring retention of kaolin particles. The increased retention also depends on the order of addition, hardness of  $H_2O$ ,  $p_{\rm H}$ , and the absorptive capacity of the fibrous material . CH. ABS. (e)

Chemical control in paper manufacture. J. E. MINOR (Paper Trade J., 1934, 99; T.A.P.P.I. Sect., 245-248).-The significance of a no. of chemical tests in the control of papermaking operations is discussed, particularly as they affect strength and permanence. Low  $\alpha$ -cellulose content indicates a weakened paper, but not necessarily an impermanent one, whilst a high retention of  $\alpha$ -cellulose after artificial ageing tests is but very slight evidence in favour of permanence. The use of ZnS pigments as fillers increases the Cu no.; this increase, however, does not indicate degradation. When beating is carried out in hard H<sub>2</sub>O, at no stage does the  $p_{\rm H}$  of the process liquid give any indication of the  $p_{\rm H}$  of the resulting paper. The  $p_{\rm H}$  of paper is not an infallible criterion of its permanence, much depending on the H.A.H. origin of the acidity.

Furfuraldehyde.—See III. Rubber threads.—See XIV. Determining tannides [and sulphite cellulose]. —See XV. Light-sensitive paper.—See XXI.

See also A., Dec., 1339, Nitrating cellulose. Fractionating cellulose acetate. Prep. of cellulose stearates.

#### PATENTS.

Manufacture of bands, threads, and the like from animal fibres. N. V. KONINKLIJKE PHARMA-CEUTISCHE FABRIEKEN VOORHEEN BROCADES-STHEEMAN & PHARMACIA (B.P. 419,180, 23.1.34. Holl., 11.2.33).---- Collagenous or elastin-containing animal fibres are loosened, but not completely separated, in a suitable solution (dil. acid) and pressed into bands or sheets,  $\measuredangle$  2 of which are then superimposed, the bands with fibres at an angle in different layers and the sheets partly overlapping, and again pressed together ; after dividing into strips, the materials are worked up into threads in the usual manner. F. R. E.

Production of washable textile fabrics permeable by air and moisture. B. LIEBOWITZ (B.P. 419,208, 5.4.33. U.S., 5.4.32).—Two or more layers of fabric (I) having between them a network of threads of a cellulose derivative (II), *e.g.*, acetate, are treated with a solvent for (II) and subjected to pressure and heat, whereby (I) are stuck together to form a semi-stiff material.

F. R. E.

Production or treatment of cellulose derivatives. C. F. BOEHRINGER & SOEHNE G.M.B.H. (B.P. 419,190, 23.2.34. Ger., 25.2.33 and 7.2.34).—Org. derivatives of cellulose in the solid, strongly swollen, and, particularly, fibrous state are separated from the liquids immiscible with  $H_2O$ , which are used in their prep. or after-treatment, by displacing them, *e.g.*, in a diffuser, by means of another miscible liquid which may subsequently be removed by evaporation, washing with  $H_2O$ , or distillation in steam. F. R. E.

Clarification of viscose. Soc. ALFA-LAVAL (B.P. 419,350, 28.5.34. Fr., 27.5.33)—Viscose is rapidly heated to a temp. below its point of instantaneous coagulation and is then centrifuged while in the more fluid condition. After regulated cooling to obtain the desired ripening at the end of the operation, it is atomised in a closed space *in vacuo* to remove occluded gases.

F. R. E. **Paper-making** New JERSEY ZINC Co., Assees. of (A, B) H. M. CYR and (B) O. KRESS (B.P. 419,582 and 419,790, 23.3.34. U.S., 17.4.33).—(A) The pulp is sized in the beater and 1—10% of ZnS pigment is subsequently added just prior to discharging the pulp, the  $p_{\rm H}$  being maintained at  $\ll 4.5$ . To prevent Custaining, the  $p_{\rm H}$  during sheet formation must be  $\ll 5$ . (B) ZnS pigment is added to the white-H<sub>2</sub>O, maintaining the  $p_{\rm H}$  at  $\ll 4.5$ . It thus acts as a bactericide.

D. A. C.

Appliance for after-treatment of fibrous materials, in particular artificial silk wound on perforated bobbins by a suction or pressure treatment. E. BERL (B.P. 419,075, 12.5.33).

Bleaching fibrous cellulose.—See VI.

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

Dyeing of staple fibre and staple fibre-cotton mixture yarns with vat dyes in circulating machines. K. LINSENMEIER (Textilber., 1934, 15, 516—517).—Well-penetrated and uniform dyeings are obtained by using only those vat dyes which require a low temp. and [NaOH] so that excessive swelling (with consequent compression) of the yarn is avoided. In the early stages of dyeing, the dye-liquor circulation through the yarn should be reversed every 11—2 min. Dyeing recipes are given. A. J. H. Absorption of direct dyes of cellulose. S. M. NEALE (Silk & Rayon, 1934, 8, 452–453, 470).—The rate and extent of absorption are discussed in relation to the even dyeing of unequal qualities of viscose rayon. "Heavy-dyeing" qualities of rayon absorb dyes more rapidly, but not in greater ultimate amount, than does "light-dyeing" rayon, so that equal depths of shade are obtained on these types of rayon if the dyeing is sufficiently prolonged. A. J. H.

"Safe" colours for cotton and viscose. ANON. (Silk & Rayon, 1934, 8, 273—275).—Researches on the mechanism of fading by light are reviewed. A. J. H.

Damage to cotton fabrics caused by treatment with magnesium sulphate. J. P. PEPER (Chem. Weekblad, 1934, 31, 603-605).—The  $MgSO_4$  treatment is detrimental when the temp. exceeds about 140°; the loss of strength may amount to 80% if 190° is employed. H. F. G.

Bleaching cellulose.-See V.

#### PATENTS.

Cleaning fluid [for fabrics]. A. MOHN, Assr. to RHODES-PERRY-MARTIN, INC. (U.S.P. 1,940,688, 26.12.33. Appl., 26.9.29).—Claim is made for a mixture of  $C_2H_4Cl_2$ (I) and CCl<sub>4</sub> in inverse proportion to their latent heats of evaporation, *i.e.*, a mixture containing  $37 \cdot 5 - 40 \cdot 5$ vol.-% of (I). A. R. P.

Manufacture and use [in mercerising lye] of wetting preparations. IMPERIAL CHEM. INDUSTRIES, LTD., C. DUNBAR, and S. H. OAKESHOTT (B.P. 419,154, 5.5.33. Cf. B.P. 385,977; B., 1933, 225).—Mixtures of phenolic fractions of low-temp. coal tar, vertical-retort tar, or producer-gas tar, of b.p. 200—300° (230°), with  $\geq 10\%$  (2%) of pine oil or terpineol, and, if desired, oleic or similar acids, are claimed. H. A. P.

Wetting, penetrating, dispersing, foaming, and cleansing agents used in the textile industry. CHEM. FABR. STOCKHAUSEN & Co. (B.P. 419,308, 9.5.33. Ger., 9. and 10.5.32).—The addition of the products of B.P. 418,139 (B., 1935, 13) to textile baths, *e.g.*, for fulling, scouring, sizing, dressing, bleaching, or dyeing, and to printing pastes, is claimed. H. A. P.

Bleaching of fibrous cellulose. A. H. STEVENS. From INTERNAT. PAPER Co. (B.P. 419,543, 12.6.33).— Chemically-treated pulp, e.g., straw, bagasse, esparto, and particularly kraft pulp, containing 2—85% of H<sub>2</sub>O, is treated with salts of the alkali or alkaline-earth metals or with NH<sub>3</sub> gas. It is then subjected to a vac. of about 15 in., bleached with Cl<sub>2</sub> gas at  $\leq 1$  atm., and washed. It may then be treated with OCl' or dried to its original H<sub>2</sub>O content and again subjected to a vac. and similarly treated with SO<sub>2</sub> gas (or O<sub>3</sub>, O<sub>2</sub>, CO, etc.). Plant suitable for continuous or batch operation is described.

D. A. C.

Production of dyes on the fibre. E. I. DU PONT DE NEMOURS & Co. (B.P. 418,827, 1.5.33. U.S., 30.4.32). —The fibre (a cellulose ester or ether) is padded with an aminophenyl-carboxyl- or -sulphon-amide, which is then diazotised and coupled with a component other than a 2:3-hydroxynaphthoic arylamide. Examples are  $4:1:2-\text{NH}_2\text{-}C_6\text{H}_3\text{Me}\cdot\text{SO}_2\cdot\text{NMe}_2 \rightarrow m\text{-}C_6\text{H}_4(\text{OH})_2$  (yellow),  $\beta$ -C<sub>10</sub>H<sub>7</sub>·OH (yellow-orange), and 2:3-OH·C<sub>10</sub>H<sub>6</sub>·CO<sub>2</sub>H (scarlet). H. A. P.

Dyeing of acetylcellulose and mixed materials containing it. J. R. GEIGY A.-G. (B.P. 419,048, 21.7.33. Addn. to B.P. 414,770; B., 1934, 925).— Dyeing is carried out in an acid bath with  $H_2O$  of any degree of hardness by  $H_2O$ -insol. dyes dispersed by means of salts of the amides  $R \cdot CO \cdot NH \cdot C_2 H_4 \cdot SO_3 H$ , where R is >  $C_7$ . H. A. P.

Reincorporation into fibres of textile materials of substances lost during processes of production. A. PRESCHER (B.P. 418,935, 4.10.33. Ger., 4.10.32).— The fibre is subjected to a vac. sufficient to remove  $H_2O$ and air from its capillaries and treated with an aq. emulsion of (wool) fat and other substances to be added. The emulsifying agents are salts of the H sulphates of *n*-aliphatic alcohols having  $\ll C_{12}$  or of acids of the type  $R \cdot X \cdot R' \cdot SO_3H$ , R being an alkyl radical of  $\ll C_{11}$ , R' a hydrocarbon radical, and X one of the groups  $\cdot CH_2 \cdot O^*$ ,  $\cdot CO_2^*$ ,  $\cdot CO \cdot NH^*$ , or  $\cdot CO \cdot NR'^*$ . H. A. P.

Clarification apparatus. Recovering [drycleaners'] solvent.—See I. Assistants.—See III. Colouring mouldable masses.—See IV.

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

Pressure synthesis a possibility for sulphuric acid manufacture. E. BERL (Chem. Met. Eng., 1934, 41, 571-575).-According to the Lunge-Berl theory the essential intermediate products in the Pb-chamber process of  $H_2SO_4$  manufacture are  $H_2SO_4$ ·NO (I) and  $SO_5NH$  (II). (I) decomposes very readily into  $H_2SO_4$ and NO. Experiments in thick-walled capillaries have shown that increase of pressure reverses this decomp. and at 280 atm. pressure of NO 77% of the H2SO4 is converted into (I). Under plant conditions (I) is converted rapidly into (II):  $2H_2SO_4\cdot NO + NO_2 =$  $2SO_5NH + H_2O + NO$ , and (II) is the pivot of the whole reaction. This theory is supported by the fact that the formation of H<sub>2</sub>SO<sub>4</sub> is most rapid at concns. of 60—65%  $H_2SO_4$  and is made slower by excess  $H_2O$ . HNO<sub>3</sub>, as such, is not a catalyst. The effect of increase of pressure will be to eliminate the (comparatively) slow reaction  $2NO + O_2 = 2NO_2$  and permit work through compounds (I) and (II) instead of gaseous NO. Smallscale tests between pressures of 1 atm. and 13.5 atm. show that the production of H<sub>2</sub>SO<sub>4</sub> increases approx. with the square of the pressure. By extrapolation a production of 10 tons per day of 80% H<sub>2</sub>SO<sub>4</sub> per cu. m. should be obtained at 25 atm. Such an apparatus would require only a very small Gay-Lussac tower, but the reaction heat to be removed would be  $5 \times 10^6$  kg.-cal. Saving in compression costs might justify the use of O<sub>2</sub> instead of air, especially in connexion with a synthetic NH<sub>3</sub> plant employing electrolytic H<sub>2</sub>. C. I.

Determination of sulphuric acid in tower (sulphurous) acid. S. I. BOGDANOV and F. KHVUTER (Trans. All-Union Sci. Res. Inst. Paper Cellulose Ind., 1933, No. 2, 84–90).—The benzidine method gave good results with SO<sub>3</sub> contents common in tower H<sub>2</sub>SO<sub>3</sub>. CH. ABS. (e)

Electrotitrometer for control of sulphuric acid concentration in factory practice. A. L. KISELEV (Zavod. Lab., 1934, 3, 860—862).—Apparatus is described. R. T.

Changes undergone by sodium bicarbonate. V. LUCAS (Bol. assoc. brasil. pharm., 1932, 13, 257—259; Chem. Zentr., 1933, i, 3909).—The initial alkalinity of NaHCO<sub>3</sub> to phenolphthalein remains const. over long periods, suggesting that the trace of  $Na_2CO_3$  in commercial NaHCO<sub>3</sub> is introduced during manufacture and not by spontaneous decomp. under the influence of air and moisture. CH. ABS. (e)

Simplified method of analysis of limestone N. V. UDOVENKO (Zavod. Lab., 1934, 3, 907).—Two 0.5-g. portions of limestone are dissolved in 20 c.c. of conc. HNO<sub>3</sub> and 10 c.c. of saturated aq. KNO<sub>3</sub>, and the solutions are boiled for 5 min. To one solution 60 c.c. of hot  $H_2O$  are added, and the ppt. of SiO<sub>2</sub> is collected, washed, ignited, and weighed. The filtrate + washings are made alkaline with aq. NH<sub>3</sub> and boiled, and the ppt. of Al(OH)<sub>3</sub> + Fe(OH)<sub>3</sub> is collected, washed, ignited, and weighed. Ca is determined in the second solution by pptn. as oxalate. The analysis occupies 1.3 hr. R. T.

Distribution of bromine in the decomposition products of Solikamsk carnallites. A. F. SAGAI-DACHNUI, and S. S. SINANI (Trans. State Inst. Appl. Chem. U.S.S.R., 1933, No. 18, 37–43).—Inconclusive results are recorded for the products of the cold decomp. of carnallite containing 0.174% Br. CH. ABS. (e)

Modern methods of acid decomposition of phosphorites. A. LIKIERNIK (Przemysł Chem., 1934, 18, 146—151).—A review of literature. R. T.

Determination of phosphoric acid and of total sesquioxides in flotational phosphorites. L. V. VLADIMIROV (Zavod. Lab., 1934, 3, 800–801).—Al<sub>2</sub>O<sub>3</sub> + Fe<sub>2</sub>O<sub>3</sub> in phosphorites should be determined after fusion with Na<sub>2</sub>CO<sub>3</sub>; SiO<sub>2</sub> should be eliminated before determining P<sub>2</sub>O<sub>5</sub> by Böttger's or Woy's methods. The following procedure is proposed : the sample is dissolved in aqua regia, the filtrate conc. to 10 ml., 15 ml. of 50% aq. NH<sub>4</sub> citrate, 15 ml. of saturated aq. NH<sub>4</sub>Cl, and 20 ml. of 25% aq. NH<sub>3</sub> are added, the solution is filtered after 15 min., and PO<sub>4</sub><sup>'''</sup> in the filtrate + washings is pptd. by 25 ml. of magnesia mixture. R. T.

Determination of assimilable phosphoric acid in superphosphates prepared from flotational apatite. G. S. BLJACHER and M. L. TSCHEPELEVETZKI (Zavod. Lab., 1934, 3, 898–900).—The assimilable  $P_2O_5$  content (I) is 0.5% > the H<sub>2</sub>O-sol.  $P_2O_5$  (II). R. T.

Determination of nitrogen in Ammophos. A. SOKOLOV (Zavod. Lab., 1934, 3, 802–803).—Ammophos contains 0.5—1.5% of H<sub>2</sub>O-insol. P<sub>2</sub>O<sub>5</sub>, present as complex salts of NH<sub>4</sub> phosphate, ferrites, and aluminate. Total N should be determined in the HCl extracts prepared for P<sub>2</sub>O<sub>5</sub> determination. R. T.

Simplified variant of Penfield's method for determination of fluorine in phosphorites and apatites. S. N. ROZANOV (Zavod. Lab., 1934, 3, 791-795).—Dry air is aspirated for 2.5 hr. through a suspension of 0.5-0.7 g. of dry powdered mineral, 2 g. of SiO<sub>2</sub> powder, 3 g. of quartz sand, and 2-3 g. of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> in 50 c.c. of conc. H<sub>2</sub>SO<sub>4</sub> at 160-170°, the issuing gases, containing SiF<sub>4</sub>, are passed through U-tubes containing saturated 50% alcoholic KCl, and the HCl liberated is titrated with 0.1N-KOH (1 c.c.  $\equiv 5.7$  mg, F). R. T.

Determination of fluorine in the gases and solutions obtained in the superphosphate industry. E. N. ISAKOV (Zavod. Lab., 1934, 3, 896–898).—Schucht and Möller's and Sahlbom and Hinrichsen's methods (A., 1906, ii, 901, 798) are recommended for factory practice. R. T.

Rapid determination of silica in water-glass. S. S. KOROL and V. M. KALUSHSKAJA (Zavod. Lab., 1934, 3, 908).—50 ml. of 1% aq. water-glass (I) in a paraffined flask are made neutral with 0.5N-HCl, 20 g. of KCl, 3 g. of NaF, and 40 ml. of 0.5N-HCl added, 100 ml. of EtOH added 20 min. later, and excess of HCl is titrated after 10 min. with 0.5N-NaOH (phenolred); SiO<sub>2</sub>%  $\equiv 0.75a/b$ , where *a* is the difference between the no. of ml. of NaOH used above and in a blank test, and *b* is the wt. of (I) taken. R. T.

Determination of copper in copper sulphate. V. P. ZEMLJANITZIN (Zavod. Lab., 1934, 3, 909–910).— Fe<sup>II</sup> is determined in 10 c.c. of solution by 0.1N-KMnO<sub>4</sub> (I) titration. 5 c.c. of conc. HCl are added to a second 10-c.c. portion, which is titrated at the b.p. with SnCl<sub>2</sub>, and 10 c.c. of 5% HgCl<sub>2</sub> are added to the cold solution to remove excess of SnCl<sub>2</sub>. (I) is added to 30 c.c. of Reinhardt–Zimmermann solution in 500 c.c. of H<sub>2</sub>O, to a rose colour, the solution added, and titrated with (I). The no. of c.c. of (I) used less that required for titrating Fe<sup>II</sup> gives the Cu content. R. T.

Decolorising power of aluminium hydroxide. V. FABBRINI (Ind. Sacc. Ital., 1934, 27, 324—327).— Al hydroxide has both a clarifying and a decolorising power, the latter being intermediate between those exerted by Antichromos and Carboraffin. It is best applied in conjunction with C, using approx. equal quantities of each. Advantages are : lower cost than activated C, better and clearer filtration, and its filtration without the necessity of pre-coating the cloths with kieselguhr. J. P. O.

Determination of small quantities of vanadium in uranium preparations. N. I. TSCHERVJAKOV and E. A. OSTROUMOV (Zavod. Lab., 1934, 3, 803—805).—  $0\cdot 2$ — $0\cdot 5$  g. of impure UO<sub>2</sub>Cl<sub>2</sub> or UO<sub>2</sub>(NO<sub>3</sub>)<sub>2</sub> is dissolved in the min. vol. of H<sub>2</sub>O, 5—6 drops of 50% HCl and  $0\cdot 5$  c.c. of H<sub>3</sub>PO<sub>4</sub> are added, and four times the vol. of EtOH, followed by 4 c.c. of glycerin. The solution is mixed and 1 c.c. of  $0\cdot 5\%$  p-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NMe<sub>2</sub>,H<sub>2</sub>SO<sub>4</sub> is added, and the coloration obtained is compared with that given by a known solution of vanadate in pure aq. UO<sub>2</sub>Cl<sub>2</sub>. R. T.

Detection and determination of small concentrations of carbon monoxide. J. SCHMIDT (Brennstoff-Chem., 1934, 15, 425–428).—Methods available for concns. of 1.0-0.1% or less of CO in air, H<sub>2</sub>, or other gases are summarised. A. B. M.

"Mono" gas analyser for oxygen determination. A. L. KISELEV (Zavod. Lab., 1934, 3, 943-944).

Britch Chemwood Abstracts B.

-The  $O_2$  content of air is determined from the diminution in vol. after combustion with  $H_2$  in a special apparatus. R. T.

S cements.—See IX. Determining traces of Cr in  $TiO_2$ .—See XIII.

See also A., Dec., 1305, Prep. of colloidal solutions and hydrosols. 1315, Electrolysis of salt solutions. Formation of N oxides in the electric discharge. 1317, Prep. of phosphorescent ZnS. 1319, Prep. of F. 1320, Prep. of HReO<sub>4</sub>, and of stable FeCl<sub>2</sub>. 1321, Determining [H<sup>-</sup>]. 1326, Purifying inert gas by mischmetal. 1330, Rapid catalytic prep. of NaNH<sub>2</sub> in liquid NH<sub>3</sub>. 1341, Alkali cyanide and ferrocyanide from CaCN<sub>2</sub>. 1400, Prep. of rare-earth Ca gluconates. 1421, Prep. of humates.

#### PATENTS.

Manufacture of phosphoric acid. G. F. MOORE, Assr. to U.S. PHOSPHORIC PRODUCTS CORP. (U.S.P. 1,940,689, 26.12.33. Appl., 6.4.32).—In the continuous countercurrent process of leaching phosphate rock (I) with  $H_2SO_4$ , a const. rate of settling of the  $CaSO_4,2H_2O$ is obtained by grinding (I) wet in a ball mill until all but  $3\frac{1}{2}$ —4 vol.-% passes 60-mesh. A. R. P.

Synthetic production of ammonia. A. E. HECKER, Assr. to MATHIESON ALKALI WORKS, INC. (U.S. P.1,940,860, 26.12.33. Appl., 13.1.28).—The gases (I) used for making up the reaction mixture are mixed with the  $NH_3$ -containing gases from the catalytic chamber to produce  $(NH_4)_2CO_3$  directly, and thus avoid the necessity of removing CO<sub>2</sub> from (I) before the mixture is passed over the catalyst. A. R. P.

Manufacture of calcium cyanamide. K. HIBI (U.S.P. 1,941,172, 26.12.33. Appl., 21.9.31).—Fused CaC<sub>2</sub> is granulated with jets of N<sub>2</sub> to produce C-shaped pellets the outside of which have conductive layers of C, and these are passed downwards through an electric furnace with graphite electrodes in such a way that they act as resistors while a current of N<sub>2</sub> is passed in the same direction to produce CaCN<sub>2</sub> in the hot zone.

A. R. P

Crystallisation of aluminium nitrate obtained in the treatment of leucite and similar silicates. A. C. BLANC (U.S.P. 1,940,842, 26.12.33. Appl., 17.12.30. It., 24.12.29).—The Al(NO<sub>3</sub>)<sub>3</sub> (I) solution is evaporated until the  $H_2O$  is a little  $\leq$  that required for the (I) crystals; on adding conc. HNO<sub>3</sub> the greater part of the salt crystallises. A. R. P.

Granular materials.—See I. Weak acids from gases.—See II.

# VIII.—GLASS; CERAMICS.

Determination of iron and titanium in window glass. GANTOIS, LEJEUNE, NOËL, and SCOHY (Bull. Soc. chim. Belg., 1934, 43, 545—557).—Existing procedures have been compared. For Fe colorimetric methods (e.g., with KCNS) are preferred. Ti is best determined colorimetrically with  $H_2O_2$ , but gravimetric methods are satisfactory when carefully controlled. E. S. H.

Determination of viscosity of molten glass and proof of H. Le Chatelier's formula. I. Fallingsphere method. B. DERJAGUIN and M. VOLAROVITSCH (J. Chim. phys., 1934, 31, 471–488).—Viscosity coeffs. of several varieties of glass have been measured at temp. between 870° and 1400°. The results conform closely to Le Chatelier's formula log log  $(\eta/\eta_0) = A - Bt$ , in which  $\eta_0$ , A, and B vary with the nature of the glass. F. L. U.

Quartz, felspar, and clay as materials in chemical industry. W. MIEHR (Chem.-Fabr., 1934, 7, 397—401).— A lecture. E. S. H.

Composition and properties of clay. P. VAN CAMPEN (Chem. Weekblad, 1934, **31**, 618–624).—A survey is given from the mechanical, chemical, colloidchemical, and petrographic aspects. H. F. G.

Determination of specific heat of refractory materials at high temperatures. N. LOZINSKI and S. GERMAN (Zavod. Lab., 1934, 3, 831—838).—Apparatus and methods are described. R. T.

## Pulverising [fireclay].—See I.

See also A., Dec., 1307, Systems  $PbO-SiO_2$  and  $SiO_2-Al_2O_3$ . 1326, Al-Mg mirrors.

#### PATENTS.

Manufacture of silicon carbide refractories and products thereof. CARBORUNDUM Co., LTD. (B.P. 419,214, 8.5.33. U.S., 30.6.32).—SiC is mixed with  $\geq 25\%$  of Al<sub>2</sub>O<sub>3</sub>, MgO, CaO, spinels, etc. and fired in an inert atm. (CO, N<sub>2</sub>, He, etc.) to incipient fusion of the bond ( $\leq 95\%$  of the fusion temp.). The heating should be rapid enough to prevent recrystallisation of the SiC. The product is very refractory and impermeable. J. A. S.

Pottery kilns.—See I.

# IX.—BUILDING MATERIALS.

The burning process in Portland cement manufacture. W. WATSON and Q. L. CRADDOCK (Cement, 1934, 7, 343-341).—A review of the literature.

T. W. P.

Grinding of cement clinker. R. ZOLLINGER (Cement, 1934, 7, 342—344).—For each cement quality is improved by fine grinding up to a limiting val., after which a reduction in quality occurs. Best results are obtained by grinding to a graded product. Types of mills are discussed and an analysis of results from a compound mill is given. T. W. P.

Admixtures improve properties of sulphur cements. W. W. DUECKER (Chem. Met. Eng., 1934, 41, 583-586).—A 2:3 S-sand cement is the strongest. It is, however, difficult to work and up to 54% of S is more usual. Addition of  $\geq 4\%$  of C black improves strength and workability. S cements are adversely affected by repeated temp. changes; this can be minimised by addition of  $\geq 6\%$  of "Thiokol" (an olefine polysulphide). These cements are resistant to H<sub>2</sub>SO<sub>4</sub> and to HCl except in presence of Fe. They also resist 40% HNO<sub>3</sub>, but are attacked by alkali hydroxides and oils. The max. temp. allowable is 94°. C. I.

Causes of adhesion [between stone and acid oils]. W. RIEDEL (Asphalt u. Teer, 1934, 34, 429–432, 487–490; Road Abs., 1934, No. 546).—With stone and acid oils, the acid content is reduced and the adsorption

of the oil takes place independently of the hydrophilic or hydrophobic nature of the stone. T. W. P.

Adhesion of bituminous binders to various stones. K. MOLL (Teer u. Bitumen, 1934, 32, 231– 234; Road Abs., 1934, No. 545).—Lack of adhesion may be due to the aggregate being wetted by  $H_2O$  more readily than by the binder. A test for adhesion is described in which tarred chippings are treated with  $H_2O$  at 60°. T. W. P.

Chemical studies of wood preservation. III. Analysis of preserved timber. R. E. WATERMAN, F. C. KOCH, and W. McMAHON. IV. Small-sapling method of evaluating wood preservatives. R. E. WATERMAN and R. R. WILLIAMS (Ind. Eng. Chem. [Anal.], 1934, 6, 409–413, 413–418; cf. B., 1934, 1013).—III. Methods of analysis of timber, creosoted or treated with inorg. salts, are described. The recovery of creosote from old timber, and methods for the analysis and toximetry of creosote, are outlined.

IV. The effect of weathering is accelerated by using for test-pieces small pine saplings treated with preservative and set in the ground. E. S. H.

Pulverising [cement].—See I. Spontaneous oxidation. Tar-sand carpets.—See II. Wall cloth for interior decoration.—See V.

# See also A., Dec., 1301, Meta-alite.

## PATENTS.

**Production of cement.** E. J. WECHTER, Assr. to LOUISVILLE CEMENT Co. (U.S.P. 1,957,415, 1.5.34. Appl., 12.5.32).—To approx. 8 pts. of natural or other cement 1 pt. of CaO and 1% of a fatty acid are added, then H<sub>2</sub>O sufficient to hydrate the CaO but not the silicates. The whole is agitated, the heat of slaking causing good distribution of the Ca esters. B. M. V.

Calcium sulphate plasters. S. BARRATT (B.P. 419,081, 15.5.33).—CaHPO<sub>4</sub> (1-5%) or other polybasic acid salt is ground with plaster of Paris to be used as a wall plaster. Pigment failures due to the association of alkali and H<sub>2</sub>O in the CaO undercoat are thereby prevented. T. W. P.

Drying and heating [cement slurry].—See I. Plastic-elastic compositions.—See XIII.

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

Temperature losses in pig iron between blast furnace and converter. A. GRAFF (Arch. Eisenhüttenw., 1934-5, 8, 135-145).—Tabulated data of the heat losses in transferring pig Fe from the blast furnace to the ladle, then to the mixer, and finally to the converter are given, and various means of reducing these losses to a min. are discussed. A. R. P.

[Slag-]granulation process of the Bochum Verein, with particular reference to the utilisation of the water medicinally. J. STOECKER (Stahl u. Eisen; 1934, 54, 1129—1132).—The plant used for granulating Fe blast-furnace slag at these works is described, provision is made for removing the  $H_2S$  evolved by hydrolysis of the MnS and CuS. About 12—15 cu. m. of  $H_2O$  and 1 lb. of CaO per ton of slag are required and the warm  $H_2O$  from the sump, which contains 0.06 g. of  $H_2S$  per litre, is utilised for warm S baths for the workmen and townspeople. A. R. P.

Difficulties of measuring the temperature of molten steel. R. S. WHIPPLE (Engineering, 1934, 138, 541—542).—The light from molten steel is frequently polarised and serious errors arise if a polarising type of optical pyrometer is used. For a disappearing-filament type of pyrometer suitable neutral screens are essential if temp.  $> 1500^{\circ}$  are to be measured. Curves are given showing response of the eye to (a) light from a body at 1800° after passing through a neutral and a red screen (R), and (b) light from a filament at 1450° after passing through R only. A SiC-C thermocouple has been successfully used for measurements up to the temp. of molten steel. W. P. R.

Internal stress [in steel produced] by precipitation-hardening. H. BÜHLER and W. TONN (Stahl u. Eisen, 1934, 54, 1108—1110).—The distribution of internal stress in pptn.-hardened steel with (a) C 0.2—0.4, Cr 0.46—0.56, and Cu 0.7—0.8%, or (b) C 0.03 and W 6—18% is shown in graphs. In both cases tensile stresses develop in the outer layers and compression stresses in the core of cylindrical test-pieces. In (a) the magnitude of the stresses is the same as that developed by normalising treatment, but the stresses are of opposite sign. A. R. P.

Influence of the degree of drawing and tempering on the internal stress in steel wires. H. BÜHLER and W. PÜNGEL (Arch. Eisenhüttenw., 1934-5, 8, 165—168).—With ordinary degrees of reduction (R)compression stresses are produced in the core and tensile stresses in the outer layers of drawn steel wire and these stresses (S) increase with R > 20% to a max. at a val. of R which depends on the nature of the steel and on drawing conditions; with higher R the vals. of S decrease and eventually with very high R the distribution of Sbecomes reversed. Prior annealing or patenting has no effect on S produced by drawing. No definite relation between the rate of removal of S on tempering and the R could be established; a larger amount of Sis retained after the usual tempering when S are initially high than when they are low. At 250° at least 5 min. is required to produce a noticeable reduction in S; after  $1\frac{1}{2}$  min. at 350° S are reduced by 55% and after 5 sec. at 450° by 77%. Only 5 sec. are required for the complete removal of S at 550°. A. R. P.

Influence of the conditions of manufacture on the properties, especially the deep-drawing capacity, of steel sheet. H. KAYSELER, H. LASSEK, W. PÜNGEL, and E. H. SCHULZ (Stahl u. Eisen, 1934, 54, 993—999).—Tests have been made on steel sheets which, after normalising at 800°, have been rolled to various degrees of reduction (R), then annealed at (a) 650—750° for 3 hr. or (b) 950° for 5 min., rolled to (a) 1—7 or (b) 12% reduction, and finally annealed at 200—550° for 1—5 hr. After treatment (b) irrespective of the R the tensile strength (S), hardness (H), yield point (Y), and Y/S ratio are higher than after treatment (a), but the elongation (E) and the regularity of the reduction in area in deep-drawing are n. t so good. The bending properties of the sheets are somewhat worse after (b) than after (a). Final cold-rolling up to 10% has no effect on the properties of (b) sheets, but the (a) sheets have the best deep-drawing properties when R = 35%, in which case they are as good as those of the (b) sheets. The final low-temp. anneal improves most of the mechanical properties, especially after treatment (a). A. R. P.

Influence of heat-treatment on magnetic saturation of plain steels. H. ESSER and G. OSTERMANN (Arch. Eisenhüttenw., 1934—5, 8, 173—176).—The magnetic saturation of electrolytic Fe is 22,580 and that of cementite 13,220 gauss. The residual austenite (A) in H<sub>2</sub>O-quenched steel containing > 1% C increases with rise of quenching temp. (T) to a max. at a temp. which is higher the higher is the C content; with steel containing 0.8—1% C, however, A decreases with rise in T almost linearly, and with hypoeutectoidal steels A is const. whatever the val. of T. Oil-quenched steels have a lower content of A than have H<sub>2</sub>Oquenched steels with the same T. With very high T A begins to decrease owing to the effect of heat stresses. A. R. P.

Change in magnetic saturation on tempering quenched plain steels. H. ESSER and G. MOMM (Arch. Eisenhüttenw., 1934-5, 8, 177-180).-The magnetic saturation of quenched hypoeutectoidal steels decreases with rise in tempering temp. (T), but there is a sharp peak (I) in the curve at 250°, the beginning of the inflexion in the curve corresponding with the complete decomp. of residual austenite. (I) is more marked and occurs at higher T with increasing C content in hypereutectoidal steels. The curves give no indication of the martensite transformation at 100-150°. From a series of tests on steels with 0.4-1.7% C and on a 2% C-2% Mn steel it is concluded that, on the assumption that the magnetic transformation point of cementite depends on the grain size and occurs only at  $> 250^\circ$ , austenite decomp. begins at 130° and proceeds at a rate which increases rapidly with T.

A. R. P. Shape of sample for testing the toughness of metals by the dynamic test. L. A. GLIKMAN and S. P. GONTSCHAROV (Zavod. Lab., 1934, 3, 844–848).— The brittleness of steel cylinders varies according to whether the walls are smooth or incised (screws).

R. T.

Testing of steels for embrittlement after prolonged heating and strain. L. A. GLIKMAN and S. P. GONTSCHAROV (Zavod. Lab., 1934, 3, 849-851).— Apparatus and technique are described. R. T.

Metallographic examination of hard alloys. N. M. ZARUBIN (Zavod. Lab., 1934, 3, 919–926).—The technique of preparing polished and etched hard-steel surfaces is described, and photomicrographs of such surfaces are given. R. T.

Determination of the m.p. of some chromiumiron resistance alloys. F. HOFFMANN and A. SCHULZE (Physikal. Z., 1934, 35, 881-884).—Cr-Fe alloys are more suitable than Cr-Ni for heating resistances owing to their higher m.p. The m.p. of four Cr-Fe alloys (e.g., megapyr<sup>(1)</sup>) an alloy of Fe 65, Cr 30, and Al 5%; cf. B., 1933, 1012) was about 1500°. A form of vac. oven suitable for determining the m.p. is described. A. J. M.

Corrosion of steels in a wet medium. A. PORTE-VIN and E. HERZOG (Compt. rend., 1934, 199, 789—791). —Tests are recorded on corrosion by 3% aq. NaCl, sea-H<sub>2</sub>O, by aq. H<sub>2</sub>SO<sub>4</sub> at 20—40°, and by spray. Addition of 0.4% of Cu to an unquenched Martin steel reduced corrosion due to intermittent immersion in 30%H<sub>2</sub>SO<sub>4</sub> at 18° to one tenth. 3% of Cr halved the corrosion by sea-H<sub>2</sub>O. H. J. E.

Rapid determination of anticorrosive action of oils. P. I. KARASIK and T. A. MASTERKOV (Zavod. Lab., 1934, 3, 838—843).—Appearance of rust on polished steel surfaces coated with various vaselines and oils is noted after keeping in atm. of different R.H., and in presence of  $HNO_3$  vapours. The time varies from 23 to 180 days in absence, and from 1 to 30 days in presence, of  $HNO_3$ . R.T.

**Rapid determination of aluminium in iron ores.** R. N. GOLOVATI and SIDOROV (Zavod. Lab., 1934, **3**, 949). —1 g. of ore is dissolved in conc. HCl, the solution evaporated with 10 c.c. of 50% H<sub>2</sub>SO<sub>4</sub> to copious evolution of SO<sub>3</sub>, 10 c.c. of conc. HCl are added, the solution is filtered from SiO<sub>2</sub>, and the filtrate + washings are diluted to 250 c.c. Aq. NH<sub>3</sub> is added (until feebly acid) to 100 c.c. of solution, Fe<sup>III</sup> is reduced to Fe<sup>II</sup> by adding saturated aq. NaHSO<sub>3</sub> (I) at 80—90°, and Al pptd. by 2 c.c. of NHPh·NH<sub>2</sub> (II), the ppt. collected, washed with a solution of 4 c.c. of (II) in 100 c.c. of (I), diluted to 2 litres, ignited, and weighed as Al<sub>2</sub>O<sub>3</sub>.

Determination of chromium in tungsten steels. N. J. CHLOPIN (Zavod. Lab., 1934, 3, 787-790).— High results are obtained in the determination of Cr by the  $KMnO_4$  method in presence of W, which does not, however, interfere with the  $Ag_2S_2O_8$  method. The former method gives trustworthy results when W is first removed by pptn. together with  $MnO_2$ . R. T.

Potentiometric determination of chromium, vanadium, and molybdenum present together. A. M. ZANKO and M. J. SCHLJAKMAN (Zavod. Lab., 1934, 3, 777-784).-2 g. of steel are dissolved in 75 c.c. of 10%  $H_2SO_4$ , 7 g. of  $(NH_4)_2S_2O_8$  (I) and  $H_2O$  to 150 c.c. are added, excess of (I) is removed by boiling, the solution is made neutral, poured into boiling 25% aq. NaOH, diluted to 500 c.c., and filtered. 100 c.c. of filtrate are conc. to 50 c.c., 1.5 c.c. of 0.1N-KMnO<sub>4</sub> and 15 c.c. of 25% H<sub>2</sub>SO<sub>4</sub> are added, and the solution is electro-titrated at 95-100° in a  $CO_2$  atm. with 0.1N-Cr sulphate (II). The first break in the curve is due to reduction of KMnO4; the second represents reduction of Cr<sup>VI</sup> to Cr<sup>III</sup>, and of V<sup>V</sup> to V<sup>IV</sup>. The titrated solution is cooled to 70°, a slight excess of  $\rm KMnO_4$  is added to oxidise V<sup>IV</sup> to V<sup>V</sup>, and the titration with (II) is repeated, after which 70 c.c. of conc. HCl and excess of KCl are added and the titration is continued to the final break ( $\equiv$  reduction of V<sup>IV</sup> to V<sup>III</sup>, and of Mo<sup>VI</sup> to Mo<sup>III</sup>). % Cr is given by 4.33(b-c), % V by 6.375c, and % Mo by 8(d-c), where b is the no. of c.c. of (II) delivered from the first break to the second, and c and d are the no. of c.c. of (II) used in the second and third titrations, respectively. R. T.

Volumetric determination of chromium, manganese, and vanadium in steel, using diphenylamine as indicator. Z. S. MUCHINA and N. V. ZOLOTAREVA (Zavod. Lab., 1934, 3, 881-884).-1-2 g. of steel are dissolved in 20-25 c.c. of 20% H2SO4, 2 c.c. of conc. HNO<sub>3</sub> are added, and the solution is boiled to elimination of N oxides, when 10 c.c. of 85% H<sub>3</sub>PO<sub>4</sub>, H<sub>2</sub>O to approx. 200 c.c., 3-5 c.c. of 0.1N-AgNO<sub>3</sub>, and 2 g. of  $K_2S_2O_8$  are added, the solution is boiled for a further 25 min. and, after cooling, titrated with 0.1N- $FeSO_4$  (NHPh<sub>2</sub> indicator) (Mn + Cr + V). A further 2 g. of  $K_2S_2O_8$  are added to the titrated solution, which is then boiled 15 min., 15–20 c.c. of 50% HCl are added, and the whole is again boiled for 10 min., cooled, and titrated as before (Cr + V). 0.1N-KMnO<sub>4</sub> is added to the solution, excess of  $KMnO_4$  removed by 0.5N-NaNO<sub>2</sub>, 3 g. of urea are added to remove excess of NaNO<sub>2</sub>, and 15 min. later the solution is titrated with 0.02N-FeSO4 (V). Salts of Fe, Cu, Zn, Co, Ni, Ti, and Mo do not interfere. R. T.

Rapid electrometric determination of manganese in tungsten steel. N. J. CHLOPIN (Zavod. Lab., 1934, 3, 884-889).—Smith's AgNO<sub>3</sub>-(NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub> method of determining Mn gives trustworthy results when the solutions are electro-titrated (Pt-W or Ptgraphite electrodes). Cr, Ni, and W do not interfere.

R. T.

Application of perchloric acid to analysis of special steels. Z. S. MUCHINA and N. V. ZOLOTAREVA (Zavod. Lab., 1934, 3, 784-786).-30% HClO<sub>4</sub> can be substituted for  $(NH_4)_2S_2O_8$  in the analysis of steels for Cr, V, Si, and Ni. **R. T**.

Rapid spectroscopic determination of the alloying constituents in special steels, O. SCHLIESSMANN (Arch. Eisenhüttenw., 1934-5, 8, 159-164).-The detection and determination of Al, Co, W, Nb, Cr, V, Mo, Ti, Ni, Mn, Cu, and Si in steels by the arc method is described in detail. Suitable lines and line-pairs are tabulated. A. R. P.

Sources of error in determination of phosphorus in iron and steel. A. MILOVIDOVA and A. GLAZUNOVA (Zavod. Lab., 1934, 3, 866-867).-The val. of the factor for calculating the P content (I) (modified Woy's method) rises with the (I) up to 0.125%, thereafter remaining const. R. T.

Determination of soluble and insoluble nitrogen in ferrochromium and in corrosion- and heatresisting steels. C. M. JOHNSON (Iron Age, 1934, 134, No. 4, 10-15).-Sol. N is determined by dissolving the steel in dil. HCl or H2SO4 at 100°, making alkaline, and distilling off NH<sub>3</sub>. Insol. N (as nitrides) is filtered from the dil. acid solution, digested with hot 60% HClO4 and conc. H<sub>2</sub>SO<sub>4</sub>, and determined (as before) as NH<sub>3</sub>.

Сн. Авз. (е)

Determination of small quantities of aluminium in special iron-containing copper-zinc alloys. M. I. SCHUBIN (Zavod. Lab., 1934, 3, 889-893).—The alloy, containing Cu, Mn, Fe, Sn, Zn, and Al, is dissolved in HNO<sub>3</sub>, the filtrate from the pptd. SnO<sub>2</sub> is electrolytically freed of Cu, sufficient aq. NH3 is added to ppt. only Fe(OH)<sub>3</sub> and Al(OH)<sub>3</sub>, the ppt. washed with 2% aq. (NH4)2SO4, dissolved in dil. H2SO4, tartaric acid and aq.  $\rm NH_3$  are added, and Fe and traces of Zn and Mn pptd. by  $\rm Na_2SO_3$ . The filtrate is boiled to eliminate excess of  $\rm NH_3$ ,  $(\rm NH_4)_3PO_4$  added, and the ppt. of  $\rm AlPO_4$  collected, washed with 1.5% aq.  $\rm NH_4OAc$ , ignited, and weighed. The error is  $\pm 0.02\%$ . R. T.

Determination of tellurium in tellurium-lead and tellurium antimonial lead. W. J. BROWN (Ind. Eng. Chem. [Anal.], 1934, 6, 428-429).-Lenher's method (Trans. Amer. Inst. Min. Met. Eng., 1923, 69, 1051) is applicable if Bi and Cu are first removed. A method for recovering a small amount of Te, which is pptd. with the Cu and Bi residue, is described.

E. S. H.

Determination of antimony in solder. C. L. BARBER (Ind. Eng. Chem. [Anal.], 1934, 6, 443-445).-The presence of 0.01% Sb in solder can be recognised by the behaviour of the alloy in boiling HCl. Sb is determined by treating the solder with boiling H<sub>2</sub>SO<sub>4</sub>, cooling, adding H<sub>2</sub>O and HCl, boiling to expel As, filtering off  $PbSO_4$ , and titrating the Sb with 0.05N-KMnO4. E. S. H.

Determination of small quantities of antimony in white metals. Volumetric method. C. W. ANDERSON (Ind. Eng. Chem. [Anal.], 1934, 6, 456-457). -Solder is dissolved in conc. HCl containing Br, the solution evaporated, and Na<sub>2</sub>SO<sub>3</sub> added; dil. HCl is added and the solution boiled during passage of an air current. Sb is determined by titration with 0.0125N-The presence of Cu interferes, but the method KBrO<sub>3</sub>. is applicable, with modification, in presence of Fe.

E. S. H.

Ceric sulphate for determining tin in bearing metals. L. G. BASSETT and L. F. STUMPF (Ind. Eng. Chem. [Anal.], 1934, 6, 477).-The solution containing Sn' is titrated with 0.1N-Ce(SO<sub>4</sub>)<sub>2</sub>, using starch-KI solution as indicator. E. S. H.

Effect of impurities on the surface tension of type-metal alloys. H. V. WHITE (Bull. Virginia Polytech. Inst. Eng. Exp. Sta., 1934, No. 17, 51 pp.).-Oxidation increases the surface tension (T). A slight increase in T is caused by As, Bi, Cd, Mg, K, or Fe under oxidising conditions. Zn causes a large increase and Na a marked decrease. Сн. Авз. (е)

Physics of gold [dis]solution. H. A. WHITE (J. Chem. Met. Soc. S. Afr., 1934, 35, 1-11).-Mathematical. The rate of dissolution of Au in aq. KCN is analysed with reference to the [CN'], the rate of diffusion of  $O_2$ , the size of the Au particle, the d and  $\gamma$  of the pulp, the O2 consumption of impurities, and the rate of settling of the pulp constituents. A. R. P.

Theory of the amalgamation process. I. N. PLAKSIN (Sovet. Zolotoprom., 1933, No. 9-10, 20-25). -The solubility of Au in Hg is only 0.15-0.20%, and does not control the extraction of Au with Hg. Hg enters the Au particles, forming a solid solution (16% Hg) which is wetted by Hg and separates as a slime. Pure Hg is less effective than that contaminated with Au or Ag. Cu is reduced from its salts by Fe and then enters the Hg. Fe amalgamates with Hg only when its surface is oxide-free. Cu and Fe interfere with Au extraction. Сн. Авз. (е)

Testing the wearing qualities of babbitt metal. N. M. ORLOV (Zavod. Lab., 1934, 3, 851-856).—Known methods are described. Abrasion of bearing metals diminishes with increasing smoothness of surface.

R. T.

Metallography of tantalum. N. M. ZARUBIN and M. V. SITIN (Zavod. Lab., 1934, 3, 821–830).—Photomicrographs of Ta surfaces etched with various reagents are given. R. T.

Effect of heat-treatment on corrosion of magnesium-zinc and -aluminium alloys. T. MURAKAMI and S. MORIOKA (Kinz. no Kenk., 1934, 11, 99—116).— In Mg-Al alloys the corrodibility decreases, and in Mg-Zn alloys increases, with the increasing amount of the separated second phase, due to tempering. Alloys with pearlite structure are most resistant to corrosion. In general, Mg-Zn and Mg-Al alloys are most resistant to corrosion in the "as-cast" state. CH. ABS. (e)

Occurrence of CuAl<sub>2</sub> in duralumin. (A) G. L. CLARK and H. A. SMITH (Physical Rev., 1933, [ii], 43, 305). (B) L. W. KEMPF (*Ibid.*, 942—943).—(A) Large amounts of CuAl<sub>2</sub> have been found in the hub section of an aeroplane propeller. The pptn. of this compound is due, apparently, to a combination of lattice strain, fatigue, and high-frequency vibration with particular types of heat-treatment and a time factor.

(B) The above results are discussed. L. S. T.

Rapid analysis of aluminium alloys. I. J. KLINOV and T. I. ARNOLD (Zavod. Lab., 1934, 3, 894-895).-1 g. of alloy is boiled with 20% KOH, when Al, Zn, and Si pass into solution, and Fe and Cu remain undissolved. The solution is filtered, the residue washed with 2% KOH and then with H<sub>2</sub>O, and dissolved in warm 75% HNO<sub>3</sub>. The filtrate + washings are made up to a known vol.,  $\frac{3}{4}$  of which is taken for electrolytic Zn determination (2 amp./3.5 volts for 35 min.). 5 c.c. of 50% H<sub>2</sub>SO<sub>4</sub>, 20 c.c. of 10% aq. (NH<sub>4</sub>)<sub>2</sub>MoO<sub>4</sub>, and  $H_2O$  are added to the remaining  $\frac{1}{4}$  of the filtrate, and the yellow coloration is compared with that given by a standard solution (0.02% Si). The HNO3 solution of Fe and Cu is made neutral with aq. NH<sub>3</sub>, a 20% excess of which is then added to ppt. Fe(OH)<sub>3</sub>, which is collected, washed with 12.5% aq.  $\mathrm{NH_3}$ , the filtrate + washings are made up to 250 c.c., and the blue coloration is compared with that given by a standard solution (0.66% Cu). The Fe(OH)<sub>3</sub> is dissolved in the least vol. of 50% HCl, 1.5 c.c. of 30% aq. sulphosalicylic acid are added, with aq. NH3 to change of colour from violet to yellow, when H<sub>2</sub>O is added to 1 litre and the coloration compared with that given by a standard solution (0.175% Fe). The complete analysis occupies 1.5-2 hr. R. T.

Spectrometric analysis of light alloys. I. KLIACHKO (Legk. Metal., 1934, 3, No. 1, 29–36).—The method of determining Mg (0.3-8.0%), Mn (0.3-8.0%), and Si (0.3-0.8%) in duralumin is described. The accuracy is  $\pm 0.05\%$ . CH. Abs. (e)

Apparatus for producing uniform scratches on metal surfaces. R. B. MEARS and E. D. WARD (J.S.C.I., 1934, 53, 382–383 T).—The details of construction of a simple machine for making reproducible scratches on a bare or painted metal surface are given. Microscopical examination reveals that scratches produced by this machine are straight and uniform for nett wts. on the needle of  $\lt$  200 g.

Radiotechnic method of studying fatigue of metals. S. I. SCHAPOSCHNIKOV (Zavod. Lab., 1934, 3, 927—935).—Apparatus is described. R. T.

Theory of electrolysis of cryolite-alumina melts. P. P. FEDOTEEV (Legk. Metal., 1932, No. 4, 15–16; Chem. Zentr., 1933, i, 3611).—Free AlF<sub>3</sub> (I) is formed at the anode and Na<sub>3</sub>AlO<sub>3</sub> at the cathode. Excess of (I) is advantageous. CH. ABS. (e)

Electrolytic refining of aluminium in the system AlCl<sub>3</sub>-NaCl. V. A. PLOTNIKOV, N. S. FORTUNATOV, and N. M. SIUSSKIN (Legk. Metal., 1932, No. 7–8, 24–27; Chem. Zentr., 1933, i, 3623).—The process has been investigated at a bath temp. > the m.p. of Al, with alloys of Al and Cu, Si, Mn, and Zn in such proportions that the alloys were molten at  $< 800^{\circ}$ . The cathode c.d. must be < 200 amp. per sq. dm. at 2.4 volts.

Сн. Авз. (е)

Recent developments in electroplating. A. POLLACK (Chem.-Ztg., 1934, 58, 997—1001).—A review.

Control of quality of galvanostegic zinc plating. J. L. VERTZMAN (Zavod. Lab., 1934, 3, 944—946).—A drop of 9N-H<sub>2</sub>SO<sub>4</sub> is placed on the Zn surface, washed off after 30 sec., the plate dried, and the process repeated until the underlying metal becomes visible; the thickness in mm. of the Zn coating = the no. of drops × 0.004—0.006. R. T.

Aluminium plating of alloys in a molten  $AlCl_{3}$ -NaCl mixture. V. A. PLOTNIKOV, N. GRATZIANSKI, and S. DEMSCHENKO (Legk. Metal., 1933, 2, No. 2—3, 27—32; Chem. Zentr., 1933, ii, 1423).—Satisfactory deposits of Al plated on Cu and Fe alloys were obtained. The anode of cast Al served at the same time as a container for the bath. Optimum results were obtained with  $3AlCl_{3}$ -2NaCl at 200—250° at a cathode c.d. of 1 amp. per sq. dm. Corrosion of the Al surface by HCl must be prevented. The Al plate contains Fe 0.04, Si 0.02, and Na 0.01%. The formation of an Al-Cu alloy at the boundary surface was detected metallographically. CH. ABS. (e)

Pulverising [pyrites etc.].—See I. Working of steelworks' gas producers.—See II. Submergedresistor furnace.—See XI.

See also A., Dec., 1299, Temper colours of Fe. Properties of metals. 1301, Au-Mn phase diagram. Crystal structure of Th-Bi solutions. Al-Si. Cu-rich Cu-Mn-Sn alloys. 1310, Ga. 1315, Production of metals of the Ce group. 1318, Purifying Hg. Reducing  $Al_2O_3$  by C. 1319, Analysis of Mn ores. 1320, Action of reducing agents on KReO<sub>4</sub>. 1322, Analysis of Pb glances, and Silesian Pb sulphides. 1324, Precipitant for Co and Pd [in steels]. Spark spectrum of high-% Mo-Fe alloy. 1326, Evaporation of Al. Al-Mg mirrors.

#### PATENTS.

Metal [cast iron] for casting purposes. A. J. STOKES, J. W. HOWLETT, and M. V. ROBERTS (B.P. 415,876, 8.7.33).—An air-hardening cast-Fe alloy machinable in the unannealed state contains Mo 0·3—2·5 (1), Cr 0·3—0·75 (0·45), C 3, Si 2, Mn 1, S 0·05, and P 0·5%. A. R. P.

Production of steel having a lesser tendency to blue-fracture and brittleness due to ageing. H. MEYER (U.S.P. 1,941,101, 26.12.33. Appl., 20.11.30. Ger., 21.12.29).—Mild steel is heavily forged at 900— 800° and working is continued until the temp. falls to 700° without an intermediate anneal so as to produce a pronounced crystallographic directional effect in the steel and to impart sufficient toughness to overcome the brittleness produced by ageing. A. R. P.

Production of [ferro-]alloys poor in oxygen. Soc. D'ELECTRO-CHIM., D'ELECTROMÉTALL., ET DES ACIÉRIES ELECTR. D'UGINE (B.P. 416,228, 18.12.33. Fr., 19.12.32).—The molten alloy, e.g., ferro-chromium or -manganese, is intimately mixed with a very fluid, molten, acid slag having a high solvent power for the oxides present, e.g., SiO<sub>2</sub> 40, TiO<sub>2</sub> 35, Al<sub>2</sub>O<sub>3</sub> 20, and Ca 0.5%. A. R. P.

Steel alloys [for valves for high-temperature work]. W. W. TRIGGS. From DEUTS. EDELSTAHLWERKE A.-G. (B.P. 416,214, 22.11.33).—The steel contains C 0·3--0·5, Cr 1·5-2·5, Co 0·5-3, and Si 2-4%. A. R. P.

(A) Alloy steel. (B) Improving the workability of high-chrome steels. H. A. DE FRIES, ASST. to LUDLUM STEEL CO. (U.S.P. 1,941,202—3, 26.12.33. Appl., 29.3.29). —(A) The steel contains Cr 1—30, Cu 0.2—1.2, and S 0.1—0.5%. (B) The Cu and S are added as Cu matte (1—3%). The alloy with C 0.05—0.12, Mn 0.3—0.5, Si 0.3—0.7, Cr 15—16, Cu 0.5—0.75, and S 0.25—0.35% has a high resistance to corrosion and also forging, machining, and grinding properties superior to those of ordinary Cr steel. A. R. P.

Hardening of steels. R. WEBER & Co., ZWEIGNIEDER-LASSUNG DER L. SOEST & Co., M.B.H. ZU DÜSSELDORF-REISHOLZ (B.P. 415,846, 13.4.33. Ger., 14.4.32).—Salt baths for hardening steel comprise mixtures of alkali and alkaline-earth halides stable at 1000°,  $\geq 10\%$  of MgO, and  $\geq 12\%$  of borax (I), e.g., BaCl<sub>2</sub> 71, NaCl 20, (I) 8, MgO 1% or CaCl<sub>2</sub> 85, MgO 7.5, and NaF 7.5%. A. R. P.

Treatment of alloys [brass]. E. E. FISHER and M. A. BAERNSTEIN, ASSTS. to NAT. PIGMENTS & CHEM. Co. (U.S.P. 1,940,678, 26.12.33. Appl., 4.6.31).—The use of fluxes containing Na<sub>2</sub>O, BaO, and Al<sub>2</sub>O<sub>3</sub> is claimed in melting and refining brass. The BaO and Al<sub>2</sub>O<sub>3</sub> are preferably added as  $Ba_3Al_2O_6$ . A. R. P.

Sintering of ores and apparatus therefor. T. H. BENNETT, ASST. to MATTHIESSEN & HEGELER ZINC CO. (U.S.P. 1,940,935, 26.12.33. Appl., 3.6.31).—The ore, e.g., ZnS, is fed on to the periphery of a rotating table provided with rotating dished buckets to remove the upper layers of roasted material before they again pass under the charging hopper. A. R. P.

[Roasting] treatment of [zinc sulphide] ores. W. T. ISBELL and G. F. WEATON, ASSTS. to ST. JOSEPH LEAD CO. (U.S.P. 1,940,912, 26.12.33. Appl., 13.8.31).— The ore is roasted at 800° and the dust and fume are passed in turn through dry settlers, to recover the coarser particles which are returned to the roaster, then through  $H_2O$  sprays, and a wet electrostatic separator to obtain a product with a high Pb and Cd content.

A. R. P.

High-resistance alloys primarily for use in thermionic valve and like cathode cores. MARCONI'S WIRELESS TELEGRAPH CO., LTD., Assees. of S. UMBREIT (B.P. 416,186, 1.9.33. U.S., 1.9.32).—Claim is made for alloys of Ni + Co  $\leq 95$ , Si 1—3, and Ti  $\geq 1\%$ , the Co being 10—45% of the Ni. An addition of 5—10% Mo may also be made to this alloy. A. R. P.

Manufacture of supported [e.g., gauze] catalysts. O. G. BENNETT and J. C. W. FRAZER, Assrs. to CATALYST RESEARCH CORP. (U.S.P. 1,940,934, 26.12.33. Appl., 16.3.31).—Cu, Ni, or other catalytically active metal, preferably as gauze, is amalgamated on the surface by electrolysis or by simple immersion in aq. HgCl<sub>2</sub>, and, after washing and drying, the Hg is removed by distillation in vac. at low temp. to leave a surface of high activity. A Ni gauze so treated promotes the hydrogenation of  $C_2H_4$  to  $C_2H_6$ . A. R. P.

**Refining of molten zinciferous lead.** METALLGES. A.-G., Assees. of BLEI- U. SILBERHÜTTE BRAUBACH G.M.B.H. (B.P. 416,285, 26.3.34. Ger., 2.5.33).—The Pb is circulated through a reaction vessel in which it is treated with  $Cl_2$  to convert the Zn into Zn $Cl_2$ , and then enters a separating vessel from which pure Zn $Cl_2$  is withdrawn and from which the Pb is siphoned back to the main vol. of molten Pb through a seal. A. R. P.

[Acid-]pickling compounds. [Corrosion inhibitors for metals.] BARRETT CO., Assees. of P. J. COLE (B.P. 418,919, 2.6.33. U.S., 2.6.32).—Corrosion inhibitors suitable for descaling in 2—15% (5%) HCl or  $H_2SO_4$  at 50—95° are obtained by condensation of heterocyclic N bases ( $C_5H_5N$ , quinoline, acridine, crude coal-tar bases) with an ester of an org. sulphuric acid or an org. halide containing an aryl group ( $p-C_6H_4Me\cdotSO_3Me$ , CH<sub>2</sub>PhCl). H. A. P.

Cleaning of precious metals, especially silver. C. MANN (U.S.P. 1,941,040, 26.12.33. Appl., 17.12.29). —The articles, contained in a Zn basket, are immersed in 0.5% aq. NaHCO<sub>3</sub> containing activated C in suspension. A. R. P.

Beryllium-aluminium alloys. J. K. SMITH, Assr. to BERYLLIUM CORP. (U.S.P. 1,941,230—1, 26.12.33. Appl., 22.12.31. Renewed [B] 1.9.33).—Claim is made for alloys of Al 55—70 (60) and Be 25—40 ( $38 \cdot 2$ )% with 0.5—2.5% each of Mn (0.5), Mo (0.5%), and (A) Zr (0.4%) or (B) V. A. R. P.

Magnesium alloy. A. LUSCHENOWSKY (U.S.P. 1,941,039, 26.12.33. Appl., 14.12.31. Ger., 17.12.30). —The alloy contains Zn 0.5—15, Mn 0.01—3, Fe 0.01—1.5, and Ag 0.005—1.5%. A. R. P.

Aluminium-silicon alloy with 0.001-0.1% of phosphorus. R. STERNER-RAINER, Assr. to AMER. LURGI CORP. (U.S.P. 1,940,922, 26.12-33. Appl., 2.8.33. Ger., 8.8.32).—Claim is made for Al alloys with 5-40% Si which have been refined and degassed by passing PCl<sub>5</sub> through the melt just prior to casting. A. R. P. Gas-fired and rotary drum furnaces.—See I. Electron-emitter [alloy].—See XI.

## XI.—ELECTROTECHNICS.

Auto-transformer electric furnace unit for distillations on a laboratory scale. J. K. MARAIS and A. J. PETRICK (J. Chem. Met. Soc. S. Afr., 1934, 35, 12—15).—The heating furnace consists of two cylindrical vessels mounted concentrically, the inner (I) serving as the container for the retort and carrying the heating unit (U) and the outer serving to support U and its lagging. U consists of a 2-amp. capacity nichrome wire wound around (I) and insulated therefrom by mica. The transformer is wound and tapped to give 50 temp. stages in the interval 62—277 volts; its method of construction and use are shown in diagrams. The application of the apparatus to the distillation of the products of coal hydrogenation is described. A. R. P.

Arrangement for the automatic, continuous change of temperature of the electric furnace. O. WERNER (Chem. Fabr., 1934, 7, 405–406).—An electric circuit for this purpose is described. E. S. H.

Inductive electric heating in chemical production. R. D. CENTER (Chem. Met. Eng., 1934, 41, 579-582).—A vessel (V) to be heated by induction heaters must be of steel, Fe, or Ni as V forms the core of a magnet. It is wound with asbestos-insulated Cu or Al wire, and with this construction the max. temp. possible is 800°, at which hysteresis and eddy currents cease. The impossibility of overheating and the absence of all fire risk are advantageous in many cases. C. I.

Development of the submerged resistor induction furnace. G. H. CLAMER (Met. & Alloys, 1934, 5, 242—250).—A history of the Ajax–Wyatt electric furnace, tracing its development from the Hering submerged-electrode furnace, E. H. B.

 $[H_2SO_4]$  control.—See VII. Magnetic saturation of plain steels. Resistance alloys. Determining Cr, V, and Mo present together. Determining Mn in W steel, and A1 in Cu–Zn alloys. Fatigue of metals. Electrolysis of cryolite–Al<sub>2</sub>O<sub>3</sub> melts. Electroplating. Zn-plating control. Refining and plating A1.—See X. Determining PO<sub>4</sub><sup>'''</sup> availability in soils.—See XVI.

See also A., Dec., 1299, Resistance of Mg and its alloys. 1305, Prep. of colloidal solutions and hydrosols. 1310, Ga. 1315, Electrolysis of salt solutions. Production of metals of the Ce group. Formation of N oxides in the electric discharge. 1318, Purifying Hg. Reducing Al<sub>2</sub>O<sub>3</sub> by C. 1320, Electrochemistry of Re. 1321, Determining [H']. 1324, "VIKP" thermoelectric relay. 1325, Dialysis chamber. 1326, Torsion viscosimeter.

#### PATENTS.

Electrodes for alkaline accumulators. ALKLUM STORAGE BATTERIES, LTD., and B. M. BERG (B.P. 419,183, 30.1.34).—Thin, flat, perforated, metallic strips, preferably formed with burred edges, are interposed between, and make contact with, flat layers of active material. J. S. G. T. [Electrolyte for] electric batteries. Soc. ANON. LE CARBONE (B.P. 419,485, 28.11.33. Fr., 5.12.32).—  $H_2O$  is added to a dry mixture of an alkali, *e.g.*, NaOH or KOH, with a fixing agent, *e.g.*, flour or starch, which is gelatinised by hot  $H_2O$ . If desired, paraffin wax and NaCl may be added. J. S. G. T.

Electron emitter. J. A. BECKER, Assr. to BELL TELEPHONE LABS., INC. (U.S.P. 1,957,486, 8.5.34. 12.9.27).—The core is of Os alloyed with Ba and/or Sr; other Pt metals may also be present. The alloy, formed by melting in vac., is drawn into wire and the filament placed in the final bulb and heated in vac. to form a film of Ba or Sr on the surface by diffusion.

B. M. V. **Purification of electric insulating liquids.** MINISTER OF COMMUNICATIONS OF IMPERIAL JAPANESE GOVERNMENT (B.P. 419,292, 3.5.33. Jap., 25.5.32).— Moisture and fine particles are removed from the liquid by passing it through fibrous or porous dielectric materials subjected to a unidirectional electrostatic field. J. S. G. T.

Electrostatic precipitating plant [for gases]. STURTEVANT ENG. CO., LTD., and H. W. WAGNER (B.P. 419,610, 19.5.33).—Electrode-carrying insulators are separated from the electrode chamber (C) by an insulating liquid seal (S), and a tubular electrode feeding member (forming an inlet for a cleaning gas, to prevent deposition of particles on S) is arranged in C.

J. S. G. T.

**Electrical precipitation apparatus [for gases].** J. R. GIES, ASST. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,956,591, 1.5.34. Appl., 23.1.32. Ger., 28.1.31.) —The collecting electrodes are formed of planar plates in parallel zigzags and are provided with hooks or projections inside the angles, the lines of the angles being transverse to the flow of gas. B. M. V.

Apparatus for electrical precipitation of suspended particles from gaseous fluids. LODGE-COTTRELL, LTD. From SIEMENS-LURGI-COTTRELL-ELEKTROFILTER GES.M.B.H. F. FORSCHUNG U. PATENT-VERWERTUNG (B.P. 419,647, 14.4.34).—A chamber, open to the pptn. chamber and mounted above the housing for the high-tension members, is separated from the latter by a gas seal comprising a labyrinth or trap arrangement through which the insulated electrode support passes. J. S. G. T.

Apparatus for electrical precipitation of suspended particles from gases. G. H. HORNE and M. A. LISSMAN, ASSTS. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,957,458, 8.5.34. Appl., 11.4.32. Renewed 1.8.33).—The discharge electrodes are divided into 2 groups (I, II) of wire or rod-like members assembled alternately in lines between earthed electrodes which are of sheet form. (I) are of bare metal and subjected to a high unidirectional voltage (V); (II) are of metal covered with insulation and are subjected to a pressure  $V \pm v$ , v being unrectified and considerably  $\leq V$ .

B. M. V.

Electrochemical recording. E. GLAS (B.P. 418,683 4.5.33. Austr., 4.5.32).—The use of a recording paper and an anode so combined as to given an insol. coordinated metal compound of mol. wt.  $\lt$  100 and green to

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violet in shade is claimed. E.g., the paper is impregnated with thio-oxamide,  $SH \cdot C(:NH) \cdot C(:NH) \cdot SH$ , in EtOH and NaOAc, and a Cu (+ 0.05% Si) anode is used. H. A. P.

[Rubber-covered] electric accumulator plates. J. Lucas, LTD., and J. MERRICK (B.P. 419,142, 7 4.33).

Treating cracked petroleum.—See II. CaCN<sub>2</sub>. —See VII. Treating Zn ores. Alloys for valves etc.—See X.

# XII.—FATS; OILS; WAXES.

Properties of the fats of invertebrate animals. H. MIELLER (Fettchem. Umschau, 1934, 41, 221–224).— The usual characteristics of the  $\text{Et}_2\text{O}$ -extracted fats (mostly liquid) from 30 species of invertebrata, including crabs, worms, insects (larvæ etc.), snails, mussels, and plankton, are detailed and discussed. E. L.

Antioxidants and autoxidation of fats. II. H. S. OLCOTT (J. Amer. Chem. Soc., 1934, 56, 2492—2493).— The following substances inhibit (activity decreases in the order quoted) autoxidation of lard at 75° (cf. Mattill, B., 1931, 550): 1:2:3- and 1:2:4-C<sub>6</sub>H<sub>3</sub>(OH)<sub>3</sub>, o- and p-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub>,  $\alpha$ -C<sub>10</sub>H<sub>7</sub>·OH, 1:2:3:4-C<sub>6</sub>H<sub>2</sub>(OH)<sub>4</sub>, 1:8-C<sub>10</sub>H<sub>6</sub>(OH)<sub>2</sub>,  $\beta$ -naphthaquinone, toluquinol, p-OH·C<sub>6</sub>H<sub>4</sub>·OMe, 1:3-C<sub>10</sub>H<sub>6</sub>(OH)<sub>2</sub>, benzoquinone, toluquinone, thymoquinol. The following are inactive: p-C<sub>6</sub>H<sub>4</sub>(OAc)<sub>2</sub>, p-C<sub>6</sub>H<sub>4</sub>(OBz)<sub>2</sub>, p-OH·C<sub>6</sub>H<sub>4</sub>·OBz, quinol di-p-nitrobenzoate, p-C<sub>6</sub>H<sub>4</sub>(OMe)<sub>2</sub>, 1:2:4-C<sub>6</sub>H<sub>3</sub>(OAc)<sub>3</sub>, 1:2:3:4-C<sub>6</sub>H<sub>2</sub>(OAc)<sub>4</sub>, C<sub>6</sub>(OH)<sub>6</sub>, dipyrogallol tricarbonate, 1:4-C<sub>10</sub>H<sub>6</sub>(OH)<sub>2</sub>, anthraquinol, 1:5-dihydroxyanthraquinol, 2:4:6-tribromoresorcinol, saligenin, cyclohexane-1:4-diol, thymoquinone, triquinoyl (C<sub>6</sub>O<sub>6</sub>;8H<sub>2</sub>O), cyclohexanol, and tannic, tartaric, citric, and maleic acids. Xanthophyll, carotene, lycopene, and BzO<sub>2</sub>H accelerate autoxidation of mixtures of lard and cod-liver oil.

#### H. B.

Possibility of using acid wort as a nutrient medium for detection of yeasts and mould fungi in margarine. H. DEGER (Margarine Ind., 1933, 26, 139-142).—" Soapiness " in margarine is produced by a non-fermenting mould on a red torula yeast, and "perfume rancidness " by a mould. Wort containing lactic or tartaric acid serves for the examination of the organisms ( $p_{\rm H}$  3·3-3·6). CH. Abs. (p)

Metallic soaps. F. J. LICATA (Amer. Paint J. Convention Daily, 1934, 18, No. 53E, 11—12).—Al stearate forms gels with hydrocarbons, fatty acids, and glycerides, but not with other esters, alcohols, or ketones. Ca and Zn stearates form soft, creamy pastes instead of gels. The addition of these compounds to pigments greatly facilitates grinding. D. R. D.

Detection of fish oils. E. J. BETTER and J. SZIMKIN (Fettchem. Umschau, 1934, 41, 225).—The following modification of the Tortelli–Jaffé test (T) gives positive results with fish oils which fail to respond to the original T and will reveal 5—10% of fish oils in mixtures : 3 c.c. (0.75 c.c. with very dark oils) of oil are dissolved in 3 c.c. of glacial AcOH and 4 c.c. (or more if required to produce a clear solution) of CHCl<sub>3</sub>; 20 drops of a 10% solution (I) of Br in CHCl<sub>3</sub> are added, followed immediately by 10 drops of Hanus I solution (II). In presence of fish oils the solution develops a green colour. It may be necessary with some oils to add a further 20 drops of (I)' and in the case of mixtures to follow this with 10 drops of (II) and (after 5 min.) a further 20 drops of (I) in order to obtain the coloration. The presence of 7–10% of  $H_2O$  in the oil does not impair the sensitivity of the test as in the case of T. E. L.

Apparatus and method for the colorimetry of fats and oils. C. STIEPEL (Allgem. Oel- u. Fett-Ztg., 1934, 31, 443—445).—The use of solutions of I,  $K_2Cr_2O_7$  of various conces. as colour standards is discussed and a convenient simple apparatus described. E. L.

Application of the thiocyanogen value to the determination by Kaufmann's method of the oleic and linoleic acid contents of Indian oils and fats which contain no linolenic acid. II. N. N. GODBOLE and SADGOPAL (Allgem. Oel-u. Fett-Ztg., 1934, 31, 435— 438; cf. B., 1934, 1019).—The I and SCN vals. have been determined and the content of saturated, oleic, and linoleic acids calc. therefrom for 14 Indian oils and fats (including chaulmoogra and margosa oils, mahua fat, tallows, etc.) which give zero hexabromide vals. The method is suitable for the examination of butters, but castor oil is anomalous in that the SCN val. (87·7) appears to be slightly higher than the I val. (85·8). E. L.

Spontaneous oxidation. Lubricants.—See II. S cements.—See IX. Anticorrosive properties of oils.—See X. Determining moisture [in soap etc.]. —See XX.

See also A., Dec., 1330, Non-saponifiable matter of shea-nut fat. 1381, Fatty acids in animal oils. Millipede oil. 1413—7, Vitamins in oils. 1421, Coffee-bean oil. Kaoliang oils. Sicilian sumachseed oil. Oils from leguminous pulses.

#### PATENTS.

[Dry-]rendering of fatty materials. W. LAABS, Assr. to PACKERS EQUIPMENT DEVELOPMENT Co. (U.S.P. 1,950,360, 6.3.34. Appl., 29.8.21).—The bones, offal, etc. are digested at, e.g., 110—155° in a jacketed closed vessel under steam pressure (maintained at, e.g., 80 lb./ sq. in. by venting excess  $H_2O$  if necessary) derived solely from the natural  $H_2O$  content of the material; the product is then dried by reducing the pressure, before separating the rendered grease from the gluey and solid residues. E. L.

Distillation and purification of [higher] fatty acids. S. GORANFLO, ASST. to WILSON & Co. (U.S.P. 1,951,241, 13.3.34. Appl., 12.12.32).—Continuousworking plant is described whereby the crude acids are rapidly heated to about 240—270°, and discharged on to one of the upper plates of a bubble tower through which they fall countercurrent to superheated steam under vac. The fatty acid vapours are condensed at a temp. above the b.p. of  $H_2O$  under the vac. employed. E. L.

Spray-solidified materials.—See I. Assistants for textile etc. industry.—See III and VI.

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

Steam-distilled products as related to protective coatings. J. L. BOYER (Official Digest, 1934, No. 139, 279—283).—The "steam and solvent" method for extraction of turpentine, dipentene, pine oil, and rosin from tree stumps is described. The liquids are obtained by steam-distillation, followed by fractionation and chemical refining. The rosin is extracted by means of petroleum naphtha (b.p. 100—150°) and the solution decolorised by washing with immiscible solvents or filtering through fuller's earth. D. R. D.

Determination of hiding power of paints. A. E. JACOBSEN and C. E. REYNOLDS (Ind. Eng. Chem. [Anal.], 1934, 6, 393—395).—A known amount of paint is brushed over a contrast background consisting of black and grey. The end-point is reached when the obliteration of the contrast is complete. E. S. H.

Dry colours. R. R. LANGDON (Decorators' & Painters' Mag., 1934, 34, 276-277).—A list of common pigments, with notes on their chemical composition, manufacture, uses, and methods of testing their quality. D. R. D.

Determination of traces of chromium in titanium oxide pigments. J. OURISSON (Bull. Soc. Ind. Mulhouse, 1934, 100, 565—575).—Ti is removed as  $K_2 TiF_6$ by adding KF to the HF solution of the pigment, filtering, and concentrating and crystallising from the mother-liquor. K is then pptd. with  $H_2SiF_6$ , excess of which is evaporated off. Traces of Ti are removed from the residue by fusion with  $NH_4HF_2$ , and, after treatment with  $H_2SO_4$ , evaporation to dryness, and calcination, the Cr present is converted into chromate by alkali fusion and finally determined colorimetrically with diphenylcarbazide. The method is sensitive to  $1 \times 10^{-6}$  g. of Cr, the amount usually present in commercial samples being 0.2— $5 \times 10^{-6}$  g. of Cr per g. of TiO<sub>2</sub>.

Apparatus for measuring adhesion of dried films. R. P. COURTNEY and H. F. WAKEFIELD (Ind. Eng. Chem. [Anal.], 1934, 6, 470—473).—The varnish film, sprayed on metal foil, is attached by cement to a steel panel. The load required to peel the metal foil from the varnish surface is recorded continuously by a balance. E. S. H.

Nature and constitution of shellac. IX. Determination of solubility in organic liquids. W. H. GARDNER and H. J. HARRIS (Ind. Eng. Chem. [Anal.], 1934, 6, 400-402; cf. B., 1934, 804).—Misleading results can be obtained for the solubility of a resin in an org. solvent (I) due to dispersion of insol. matter in the solution and occlusion of sol. matter by the swollen, undissolved gel (II). Accurate results are obtained by using a large vol. of (I) and repeatedly drying, grinding, and re-extracting (II). The insol. resin content (III) of shellac varies very considerably and there is a direct relationship between (III) and the bleaching qualities.

Newer types of phenolic resins in oil varnishes. G. DRING (Chem. & Ind., 1934, 1013—1020).—A résumé is given of the development of PhOH- $CH_2O$  resins from spirit-sol. types, through early resin-modified types partly sol. in oils, to current 100% oil-sol. types. Oil varnishes made from the last-named have unusual resistance to various agents, but are prone to yellowing on exposure and skinning in cans. The properties of

S. C.

such varnishes, showing increasing amounts of oil-sol, phenolic resin, are tabulated and graphed. Attention is drawn to the special manufacturing procedure necessary when using these resins, and this is illustrated by a study of the gelation time of tung oil mixed with these and normal varnish resins in varying proportions. Changes of  $\eta$  of tung oil varnish batches with time of heating are also plotted. Mention is made of new types of 100% oil-sol. PhOH-CH<sub>2</sub>O resins (now under preliminary development) that show practically no colour change on exposure. S. S. W.

Soluble phenolic resins. C. T. O'CONNOR (Amer. Paint J. Convention Daily, 1934, 18, No. 53E, 10—11).— Varnishes containing the initial condensation products of phenols (I) and CH<sub>2</sub>O (II) (heat-hardening phenolic resins) are liable to give trouble, since, on heating, further condensation occurs, as a result of which the resin becomes less sol. and may be partly pptd. With resins obtained by the more complete condensation of (I) and (II) this cannot occur. D. R. D.

Manufacture of odourless bakelite products. H. I. WATERMAN, W. J. C. DE KOK, and A. R. VELDMAN (Chem. Weekblad, 1934, **31**, 608-610).—The crude material (100 g.) is added to 2 litres of a solution containing 2 g. of NH<sub>2</sub>Ph diazotised with NaNO<sub>2</sub>, and the mixture is neutralised and stirred for 15 min. The product is removed by centrifuging, washed, and dried at 40-45°; the yield is 96%. If a colourless product is required the resultant dye should be H<sub>2</sub>O-sol., *e.g.*, the diazo compound should contain a SO<sub>3</sub>H group. H. F. G.

Measuring deformability of plastic masses.— See I. Furfuraldehyde.—See III. Metallic soaps.— See XII. Tobacco resins.—See XX.

See also A., Dec., 1359, Resins of mastic and Manila elemi. 1421, Resin from Achras zapota.

# PATENTS.

Production of plastic-elastic compositions. S. PEREZ. From O. BLUMBERG (B.P. 419,496, 2.2.34).— Compositions resistant to acids and alkalis and suitable for insulating and cementing purposes in the building and other industries are obtained by kneading together, at  $\leq 140^{\circ}$ , solid polymerides (100 pts.) of indene and/or coumarone with  $\leq 15$  pts. of vulcanised rubber (crumb). The vulcanised rubber may be replaced in part by unvulcanised or chlorinated rubber. Solvents may be present during the operation. D. F. T.

Production of sheet material from [urea-formaldehyde] artificial plastic masses. (Mrs.) T. MÜLLER (B.P. 419,306, 9.5.33).—Castings of urea-CH<sub>2</sub>O products (I) are made in closed non-metallic (glass, plywood, acid igneous rock) moulds and evenly dried (methods described) with air of gradually decreasing R.H. Before drying is complete (I) may be immersed in H<sub>2</sub>O at 50—80° and pressed. For the condensation a non-acid solution is preferred, but an acid is added immediately before casting. The stability is increased by incorporating an alkyd resin. S. M.

Preparation of derivative of cellulose [moulding] composition. G. SCHNEIDER, Assr. to CELANESE CORP. OF AMERICA (U.S.P. 1,949,434, 6.3.34. Appl., 13.4.32).

(A, B) Preparation of resinous [moulding] compositions [from saccharides]. A. S. FORD, Assr. to INDUSTRIAL SUGAR PRODUCTS CORP. (U.S.P. 1,949,831-2, 6.3.34. Appl., 10.6.31).—(A) A clear glassy resin is formed by condensing a mono- or di-saccharide, e.g., cane sugar, with  $CH_2O$  or other aldehyde in presence of  $H_2O$  and heating the product with small increments of urea.  $(CH_2)_6N_4$  may be added as a hardening agent. (B)  $o-C_6H_4(CO)_2O$  is used instead of urea; a stoving varnish resin is formed. S. M.

Manufacture of resinous products [from proteins]. E. I. DU PONT DE NEMOURS & Co. (B.P. 419,293, 3.5.33. U.S., 3.5.32).—Casein or other protein (1 pt.) is heated with glycerol or other polyhydric alcohol (2 pts.) at 140° for 30—45 min.; NaOH, CaO, etc. may be added as catalyst and the product modified by incorporating an alkyd or natural resin. S. M.

Colouring mouldable masses.-See IV.

## XIV.—INDIA-RUBBER, GUTTA-PERCHA.

Plastic and elastic properties of rubber. A. VAN ROSSEM (Chem. Weekblad, 1934, 31, 589—590).— The significance of plasticity and elasticity measurements is indicated. H. F. G.

Manufacture of rubber, suitable for the production of films and threads, from plastic materials. H. I. WATERMAN, C. G. H. MAX, and J. J. LEENDERTSE (Chem. Weekblad, 1934, 31, 614-615).-The HCl additive product (I) is prepared, in 100% yield, by treating a 2% C6H6 solution of rubber with HCl at 16.5-19°; after 16 hr. the product is separated by pptn. with EtOH. Glossy, transparent films may be prepared by spreading a CHCl<sub>a</sub> solution of (I) on a glass plate and allowing it to evaporate at 45-50°. The films adhere to metals and may be dyed; they may be combined with plasticisers, which reduce the strength but increase the extensibility. Threads may be prepared by dry spinning from a 7% CHCl<sub>3</sub> solution of (I). The material is not readily combustible, and is but little acted on by HCl (conc. and 2N), KOH (20% and 2N), soap solutions, or 4N-H<sub>2</sub>SO<sub>4</sub>. Decomp. is effected by treatment with conc. H<sub>2</sub>SO<sub>4</sub> or HNO<sub>3</sub>, or by prolonged heating at 55-60°. H. F. G.

Influence of the gaseous medium on hot vulcanisation. B. V. BIZOV and M. K. POPOVA (J. Gen. Chem. Russ., 1934, 4, 889—892).—The ratio combined S/free S in rubber vulcanised at 135—138° in various gases increases in the order :  $SO_2 < H_2O < H_2 < air < EtOH$  $< N_2 < CO_2 < CO_2 + H_2O < CH_2O < H_2 + H_2O <$ vac.  $< NH_3 < NH_3 + H_2O < H_2S < H_2S + H_2O$ ; imbibition of  $C_5H_{11}$ ·OAc by the product varies in the reverse order. The free S content and the content of CHCl<sub>3</sub>-sol. substances fall by 50% when the pressure falls from 760 to 75 mm. during vulcanisation in air. R. T.

#### PATENTS.

Manufacture of solid chlorinated rubber products. J. P. BAXTER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 419,728, 10.5.33).—Solutions of chlorinated rubber are freed from solvent by heating under pressure, preferably > 1 atm., and then suddenly reducing the pressure so that a substantial proportion of the solvent is "flashed off," *e.g.*, by injecting them into a chamber at > the condensation temp. (*T*) of the solvent and at a pressure substantially < that of the solution. The remainder of the solvent is evaporated by simultaneously supplying heat from an auxiliary fluid at > T, *e.g.*, H<sub>2</sub>O or inert gas. D. F. T.

Vulcanisation of rubber. DUNLOP RUBBER Co., LTD., B. W. D. LACEY, and L. PALMER (B.P. 419,555, 8.8.33).—Hollow rubber articles, *e.g.*, tyres, are vulcanised on a fluid-distensible core or "bag," *e.g.*, of rubber, the inner surface of which has an exposed adherent lining of liquid-absorbent textile material, such as asbestos fabric or comminuted asbestos or cotton; the useful life of the core is thereby prolonged.

Colouring mouldable masses. See IV. Plasticelastic compositions.—See XIII.

# XV.—LEATHER; GLUE.

Influence of  $p_{\rm H}$  of the solution on the firmness of unhaired hides, G. KATROVSKI (Kozh.-Obuvn. Prom. U.S.S.R., 1932, 93—95).—The action of low [H<sup>-</sup>] and [OH'] is irreversible, and the hydrolysis caused by them weakens the hide. Greatest strength and least stretching occurred at  $p_{\rm H}$  7. CH. ABS. (e)

Chemical-technological characteristics of the tanning material "Bestan AS." Y. P. BERKMAN, V. BABUN, and D. TOLKACHEV (Kozh.-Obuvn. Prom. U.S.S.R., 1934, 13, 270—275).—"Bestan AS" is prepared by sulphonation of low-grade anthracene and 10% crude  $C_{10}H_8$  with 90—98%  $H_2SO_4$  at 120°. The product is condensed with 3% of CH<sub>2</sub>O, partly neutralised with Na<sub>2</sub>CO<sub>3</sub>, and finally treated with conc. Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. Analysis gave C 35·3, H 2·2, N 0·7, S 17·0, O 28·5, Na 13·8, and Cr 2·5%. The Cr compounds of the aromatic and heterocyclic sulphonic acids are the active tanning ingredients. CH. ABS. (e)

Synthetic tanning materials for youfte leather. M. Kotov (Kozh.-Obvun. Prom. U.S.S.R., 1934, 13, 280-283; cf. preceding abstract).—Tanning with "Bestan AS" is discussed. The  $p_{\rm H}$  of the hide should be 4-5 to give a max. adsorption of Cr. By increasing the adsorption of sulphonic acids that of Cr is lowered. CH. ABS. (e)

Application of synthetic tanning materials for preparing hard and soft leather goods. A. GOLDEN-BERG (Kozh.-Obuvn. Prom. U.S.S.R., 1934, 13, 278— 280; cf. preceding abstract).—" Bestan AK" gave good results with hard leather when used with vegetable tans. Methods are described and discussed.

Сн. Авз. (е)

D. F. T.

Lee's volumetric method of tannin determination. I. BER (Kozh.-Obuvn. Prom. U.S.S.R., 1932, 297-298).-1.5 g. of powdered hide and 25 c.c. of the tanning solution suffice for the test. The method is superior to that of Löwenthal. CH. ABS. (e)

Volumetric determination of tannides with chromic acid. Z. RUDNITZKI (Kozh.-Obuvn. Prom. U.S.S.R., 1934, 13, 197—199).—The tannides are oxidised by heating with excess of a standard solution of  $K_2Cr_2O_7 + H_2SO_4$ , the excess  $K_2Cr_2O_7$  being determined volumetrically. The method can also be applied in determining synthetic tans or sulphite cellulose.

CH. Abs. (e) Toxic gases in sub-soil.—See XVI. Bone glue as source of N for yeasts.—See XVIII.

See also A., Dec., 1318, Reactions of Al and Cr salt solutions on gelatin and hide substance. 1362, Hemlock tannin.

#### PATENT.

Assistants for leather industry.-See III.

# XVI.—AGRICULTURE.

Improvement of the Agro Pontino. I. Types of soil and their possibilities. G. TOMMASI (Ann. R. Staz. Chim. Agrar. Sperim., 1934, 14, No. 309, 28 pp.).— A lecture. R. N. C.

Toxic gases in the subsoil of Lima. F. CARRANZA (Bol. Soc. Quím. Peru, 1934, 1, No. 1, 36—39).—The fatal collapse of two workmen while cleaning a well 120 ft. deep appears to have been due to poisoning by toxic gases resulting from the decomp. of waste liquors filtering into the subsoil from the adjacent tanneries.

E. L.

Recent research on soil chemistry in the U.S.S.R. I. N. ANTIPOV-KARATAIEV (Pedology, 1934, 29, 167–179). A summary of published and unpublished work.

A. M.

Comparison between the pipette and hydrometer methods for mechanical analysis of soil. G. J. BOUVOUCOS (Soil Sci., 1934, 38, 335-345).—The "coarse clay" (I) fraction (0.005 mm.) is shown by the hydrometer method in 1 hr. and the "fine clay" (II) (0.002 mm.) in 2 hr. Agreement between the two methods for (I) is good, but that for (II) is probably influenced by differences in dispersion. A. G. P.

Methods of chemical analysis of soils. N. I. SOKOLOV (Pedology, 1934, 29, 362-372).—Defects in current methods are discussed. A. M.

Physical and chemical characteristics of soils from the erosion experiment stations. II. H. E. MIDDLETON, C. S. SLATER, and H. G. BYERS (U.S. Dept. Agric. Tech. Bull., 1934, No. 430, 62 pp.; cf. A., 1932, 1108).—Relationships between certain physical propperties of soils and the nature and composition of the clay complex are examined in three principal profiles. Data are given whereby the nature of the eroded material and of the original soil are compared. A. G. P.

Oxidation-reduction potential  $(r_{\rm H})$  of soils. G. TOMMASI and L. MARIMPIETRI (Ann. R. Staz. Chim. Agrar. Sperim., 1934, 14, No. 290, 19 pp.).—Welldrained and aërated normal soils (I) have  $r_{\rm H}$  26—28, whilst poorly-productive acid soils (II) have  $r_{\rm H}$  approx. 23. The  $r_{\rm H}$  decreases steadily as depth below the surface increases, the decrease for (II) being > for (I). Prolonged submersion diminishes  $r_{\rm H}$ , the fall being heavier for soils rich in colloids and org. matter, and being accompanied in all cases by an increase in NH<sub>3</sub> and disappearance of NO<sub>3</sub>'. Addition of CaO'to (II) increases  $r_{\rm H}$  to the normal val. for (I). Addition of NO<sub>3</sub>' causes an increase of  $r_{\rm H}$  in all cases. R. N. C.

Dispersing action of sodium ions on soils. L. POZDENA (Z. Pflanz. Düng., 1934, A, 36, 99—104).—  $Li_2CO_3$  and LiCl produce greater dispersion than  $Na_2CO_3$ and NaCl, respectively. No relationship is apparent between the relative effects of the corresponding salts. A. G. P.

Adsorption of anions by soils. N. P. REMEZOV and M. M. VLASOV (Pedology, 1934, 29, 202–215).— Cl' and SO<sub>4</sub>" are not absorbed by podsol or chernozem, whilst Cl' is strongly adsorbed by krasnozem.  $PO_4^{""}$ is absorbed by all soils, natural or saturated with Na or H. A. M.

Exchange of cations in soils. B. P. NIKOLSKI (Pedology, 1934, 29, 180—189).—Adsorbed H may form undissociated weak acids with the adsorption complex and so render the determination of adsorption capacity (I) conditional on the  $p_{\rm H}$  of the leaching solution. (I) is defined as the no. of milliequiv. of Ba" that the soil can adsorb from a buffered 0.1N solution of Ba" at  $p_{\rm H}$  6.5. A. M.

Heat of wetting of soils. I. Effect of neutral salts. II. Effect of soil saturation with different cations. G. K. DAVUDOV (Trans. Centr. Sci. Res. Inst. Sugar Ind., U.S.S.R., 1932, No. 8, 24–32).— Heat of dissolution of soil salts is negligible in comparison with the heat of wetting (I). Vals. of (I) for soils saturated with bases were in the order Ca > H > Na, whereas the total surface of the soils varied in the reverse order. CH. ABS. (p)

Effect of salts on the physico-chemical properties of alkali soils. V. V. OKHOTIN and O. F. SMIRNOVA (Pedology, 1934, 29, 237—262).—Saturation of chernozem and Viatka clay with Na to 17% of their adsorption capacity increased their adhesion, plasticity, and swelling, whilst resistance to compression remained unchanged. Further increase of Na had no marked effect. Introduction of Ca gradually until all Na is replaced is the best method of improving alkali soils. A. M.

Changes in solonetz soils under irrigation. L. P. Rozov (Pedology, 1934, 29, 216-236).—The movement of salts in soil monoliths was studied. A. M.

Chemical amelioration of solonetz. N. V. ORLOV-SKY (Pedology, 1934, **29**, 340–361).—The application of 5 tons of  $CaSO_4$  to solonetzous, light-chestnut soil under irrigation brings about an increase in wheat crop of nearly  $2\frac{1}{2}$  cwt. per acre in  $2-2\frac{1}{2}$  years. With  $(NH_4)_2SO_4$ the amount of  $CaSO_4$  may be decreased. A. M.

Determination of the [base-]absorbing capacity of soil. I. V. VARFOLOMEEN (Trans. Centr. Sci. Res. Inst. Sugar Ind. U.S.S.R., 1932, No. 8, 43—49).—The dry soil (5—10 g.) is shaken with N-BaCl<sub>2</sub> for 1 hr. The liquid is filtered, with min. transference of soil to paper. The latter is subsequently dried and returned to the

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remaining soil. 500 c.c. of  $0.05N-H_2SO_4$  are then added and, after shaking for 5 min., the excess is titrated with NaOH. CH. Abs. (p)

Determination of adsorbed calcium in carbonate soils. P. A. KURCHATOV, M. F. SKOKOV, and J. F. PIL (Pedology, 1934, 29, 273—285).—Schmuck's method is recommended. A. M.

Behaviour of salts in soil and in subsoil water in relation to irrigation. S. Y. SUSHKO (Proc. Leningrad Dept. Gedroiz Inst. Fert. Lenin Acad. Agric. Sci., 1933, No. 20, 3-67).—Salinity in surface soils is largely caused by improper irrigation. CH. Abs. (p)

Clearing of forests. D. FEHÉR (Silva, 1932, 20, 233-236; Bied. Zentr., 1934, A, 4, 499).—In cleared areas all soil vals. except total,  $NO_{3^-}$ , and  $NH_{3^-}N$  were > those in the covered forest. A. G. P.

Characteristics of the organic matter of soils of the U.S.S.R. III. Phases of the organic nitrogen of soils. N. P. REMEZOV and K. V. VERIGINA (Z. Pflanz. Düng., 1934, A, 36, 37—52; cf. A., 1933, 929).—The  $H_2O$ -sol. fraction of the org. N of soils increases with the total org. N and with the proportion of univalent ions in the total exchangeable cations present. It is the most easily mineralised of the N fractions. Differentiation between hydrolysable N and non-hydrolysable N (I) is best made by autoclaving with 5% HCl at 200°. Variations in mono- and di-NH<sub>2</sub>-acid N and amides are characteristic of the nature of the soil. No relationship exists between soil type and (I). The nature of the protein matter of soil influences the exchangeable base capacity. A. G. P.

Phosphoric acid problem of tropical and subtropical agriculture with special consideration of the Brazilian situation. W. KINTZEL (Phosphorsäure, 1934, 4, 418—428).—Central American soils are low in Ca and  $PO_4^{\prime\prime\prime}$  and high in Al and Fe.  $Ca(H_2PO_4)_2$  or CaHPO<sub>4</sub> may be fixed by Al or Fe or leached during heavy rains. Physiologically alkaline fertilisers are necessary. CH. ABS. (p)

Determination of phosphate availability in calcareous soils by electrodialysis. W. T. McGeorge (Soil Sci., 1934, 38, 347–353).—The amount of  $PO_4^{\prime\prime\prime}$ extracted from calcareous soils by electrodialysis (I) is closely related to the root-assimilable  $PO_4^{\prime\prime\prime}$  (Neubauer). Vals. obtained by (I) (mg. of  $PO_4^{\prime\prime\prime}$  per 10 g. of soil) are unaffected by the size of the sample used, but vary with the current strength. A. G. P.

Microfertilisation method for determining [soil] requirements of phosphoric acid and potassium. F. SEKERA and K. SCHOBER (Phosphorsäure, 1934, 4, 321-351).—Soil is treated with nutrient solutions containing K and/or P. Black filter-paper inoculated with *A. niger* is placed on the top of the soils, which are incubated for 30 hr. or maintained at room temp. for 3 days. Differences in the white growth on the paper are observed. CH. ABS. (p)

Phosphate fixation in Hawaiian soils. A. AVRES (Hawaiian Planters' Rec., 1934, 38, 131-145).—In some cases the calc. amount of  $H_3PO_4$  required fully to saturate the phosphate-fixing property of the soil is enormous. The amount of  $PO_4'''$  which must be

added to a particular soil to maintain a conen. of this nutrient sufficient to meet the needs of a cane crop appears to be settled only by an examination of each particular soil. In some cases the subsoil may have a greater fixing power than the top soil. J. P. O.

Phosphates in beet agriculture. O. ENGELS (Zuckerrübenbau, 1934, 16, 100).—Cell juices of beet grown with a full supply of  $PO_4^{\prime\prime\prime}$  contain more alkali phosphates than do the cell juices of beets grown in soils deficient in  $PO_4^{\prime\prime\prime}$  and consequently after defecation in the factory contain a higher degree of "natural alkalinity." This results in better clarification and easier filtration of the press-cake. Such beets are firmer, and are more easily sliced, giving cossettes of better quality. J. P. O.

Influence of soil reaction and phosphoric acid on growth of vines. K. MÖHRINGER (Z. Pflanz. Düng., 1934, A, 36, 85–98).—On acid soils basic slag and Rhenania phosphate produced better growth and root formation in vines than did superphosphate, although neither fertiliser appreciably altered the soil reaction.

A. G. P. Availability [in soil] of iron and aluminium phosphates and their complex salts. A. I. ACHROMEIKO (Phosphorsäure, 1934, 4, 429–440).—In the manufacture of Ammophos from phosphorites rich in sesquioxides complex salts, e.g.,  $NH_4H_2Fe(PO_4)_2$ and  $NH_4H_2Al(PO_4)_2$ , are formed. Approx. 50% of the N of these preps. in insol. in  $H_2O$  and 25–50% of the total P is citrate-insol. In podsols added Fe and Al phosphates become more sol. after 45 days. In chernozems the citrate-sol. P of FePO<sub>4</sub> becomes = that of  $NH_4H_2PO_4$  after approx. 2 months. CH. ABS. (p)

Ability of potassium oxalate to decompose phosphates [in soil]. E. BLANCK and W. HEUKESHOVEN (J. Landw., 1934, 82, 177–183).—Application of  $K_2C_2O_4$  (I) to soils increased the utilisation of soil- $PO_4^{\prime\prime\prime}$ by crops. The effect is diminished by simultaneous additions of CaCO<sub>3</sub>, especially where superphosphate (II) is used. The action of (I) on the efficiency of basic slag, Rhenania phosphate, and phosphate rock is smaller and less definite than on (II). A. G. P.

Reaction of soils and crop production. V. MORANI (Ann. R. Staz. Chim. Agrar. Sperim., 1934, 14, No. 312, 12 pp.).—The optimum  $p_{\rm H}$  ranges for the cultivation of a variety of crops are given. R. N. C.

Effects of the previous crop [on yields]. L. FORSBERG (Landtmannen, 1932, 15, 445—446; Bied. Zentr., 1934, A, 4, 493).—Experimental data show considerable variations in crop yields due to the influence of the previous crop. A. G. P.

Importance of the potassium-nitrogen ratio in soils for assimilation, transpiration, and chlorophyll content of young cereal plants. G. GASSNER and G. GOEZE (Z. Pflanz. Düng., 1934, A, 36, 61-85).— The K and N contents of soils had a uniform and reciprocal action on assimilation (I), transpiration (II), and chlorophyll content (III) of wheat and rye. With moderate N supplies max. (I) occurred with small amounts of K, but with excessive N max. (I) is associated with large supplies of K. K deficiency with excessive N reduced (I), but with simultaneous N deficiency caused little injury. Increasing amounts of N tended to raise (I), (II), and (III) if K is adequate, but in K deficiency lowered (I) and (II) and raised (III). A. G. P.

Potassium nutrition of wheat. L. MARIMPIETRI (Ann. R. Staz. Chim. Agrar. Sperim., 1934, 14, No. 313, 19 pp.).—Growth of wheat supplied with  $K_2SO_4$  is more rapid, and the dry wt. and shoot/root wt. ratio of the plants are also increased. The wt. of the spike and the development of the plant tissues are progressively greater. The  $K_2O$  of the plant dried at 100—105° is high during the first 3 months of growth, but falls rapidly when sprouting, whilst that of the whole plant rises rapidly to a max. at the appearance of the spikes and afterwards falls; at harvesting the tissue- $K_2O$  of plants grown both with and without  $K_2SO_4$  are approx. equal. Total and phytin  $P_2O_5$  and total wheat-protein are higher with  $K_2SO_4$ . R. N. C.

Potassium manuring and the quality of wheat. J. LEMMERZAHL (Z. Pflanz. Düng., 1934, **B**, 13, 452– 464).—Manuring with K tended in most cases to increase the protein content of grain and (to a smaller extent) the wt. per 1000 grains. Baking properties improved.

A. G. P.

Water and sand cultures [of plants] with manganese. K. SCHARRER and W. SCHROPP (Z. Pflanz. Düng., 1934, A, 36, 1—15).—Small increases in the growth of wheat, rye, oats, barley, maize (I), and peas resulted from addition of Mn to sand culture media. In sub-lethal ranges the Mn-growth curves showed 2 maxima. Replacement of Fe in media by Mn decreased shoot growth in (I) but increased the root wts. (up to 50% replacement). With complete replacement growth ceased. A. G. P.

Significance of soil type and its mechanical composition for the sensitiveness of plants to chlorine. A. SOKOLOV (Pedology, 1934, **29**, 326–339). —Flax, hemp, buckwheat, and potatoes are almost insensitive to Cl (in  $NH_4Cl$ ) on chernozems or heavy soils, but are very sensitive on podsols and light soils. Liming is not always useful since many plants are sensitive to excess of CaO. A. M.

Fixation by plants of radium in soils. A. LEPAPE and R. TRANNOY (Compt. rend., 1934, 199, 803—805).— Plants assimilate Ra in amounts increasing with the Ra content of the soil. The ratio Ra in plant ash : Ra in soil declines as the latter val. increases. In the organs of maize plants the Ra contents decreased in the order leaves, stems, seed. A. G. P.

Rôle of silicon in plant nutrition. A. SREENIVASAN (Current Sci., 1934, 3, 193-197).—A review.

Relationship between nutrient supply and chemical composition of the cacao tree. J. A. McDONALD (3rd Ann. Rept. [1933], Imp. Coll. Trop. Agric. Trinidad, 1934, 50–62).—Application of P to a P-deficient soil increased the K : N ratio in cacao leaves to an extent > that caused by use of K fertilisers alone. Trees having high N : K ratio in leaves are particularly susceptible to attack by thrips. CH. ABS. (p)

Changes in chemical composition of potato tubers during storage, with special reference to manuring, variety, and temperature. H. ERTEL (Diss., Berlin, 1932; Bied. Zentr., 1934, A, 4, 488).— Changes due to drying-out and to respiration occur at different times in different varieties. Manurial treatment influences the length of the resting period, during which no changes occur, max. periods following complete manuring. The commencement of chemical alteration is marked most clearly by changes in the N content. The protein content of tubers shows wide varietal differences, max. vals. being obtained in N deficiency. No relationship was apparent between the composition and yield of potatoes. A. G. P.

Growth of sugar beet in late summer. L. FORS-BERG (Landtmannen, 1932, 15, 662—663; Bied. Zentr., 1934, A, 4, 503).—The final yield of beet may be calc. from the wt. of roots on Aug. 10 (southern Sweden). Subsequent increases in wt. of roots and tops and in % sugar are determined. A. G. P.

Growth analysis of the cotton plant under irrigation in the Sudan. I. Effects of different combinations of nitrogen applications and water supply. F. CROWTHER (Ann. Bot., 1934, 48, 877— 913).—Effects of  $H_2O$  and N supplies on morphological development and physiological activities are recorded. At the period of rapid development of bolls, N intake practically ceases, probably because of the carbohydrate deficiency in roots following rapid accumulation in bolls. A. G. P.

Stall manure. W. SAUERLANDT (Z. Pflanz. Düng., 1934, B, 13, 433–452).—Analyses of numerous samples from various sources are recorded. A. G. P.

Changes in the  $p_{\rm H}$  of soils by repeated manuring with nitrogen fertilisers. O. DE VRIES and J. W. C. VISSER (Z. Pflanz. Düng., 1934, A, 36, 52–60).—Effects of NaNO<sub>3</sub>, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, NH<sub>4</sub>NO<sub>3</sub>, Ca(NO<sub>3</sub>)<sub>2</sub>, and urea are recorded. A. G. P.

Pastures. III. Fertilisation of permanent pastures for steer grazing. E. W. CRAMPTON and L. C. RAYMOND (Macdonald Coll. McGill Univ. Tech. Bull., 1934, No. 13, 31 pp.).—The capacity of a plot (I), fertilised in the first year with CaO, N, P, and K, in the 2nd and 4th years with N only, and in the 3rd year with N, P, and K, was double that of an unfertilised plot (II). In the last two years the average beef gains per acre were 341 and 150 lb. on (I) and (II), respectively. NUTR. ABS. (m)

Mechanism of disease-resistance in plants. W. BROWN (Trans. Brit. Mycol. Soc., 1934, 19, 11-33). —A review of the physical and chemical means by which plant tissues can resist fungal attack, and fungi can penetrate cell walls. E. B. H.

Weed control in cereals on highmoor soils. F. BRÜNE and C. HUSEMANN (Mitt. Ver. Förd. Moorkult., 1932, 50, 31–36, 60–71; Bied. Zentr., 1934, A, 4, 498).—Trials with various preps. are recorded. Use of kainit dust (200 kg.) with CaCN<sub>2</sub> (50 kg.) per hectare gave good results. A. G. P.

Effects of weed control and of the preceding crop on the quality of grain. N. A. WOGAU (Social. sern. chos., 1932, 1, 47-49; Bied. Zentr., 1934, A, 4, 493).—Weed control influences the yield and protein

content (I) of grain and lowers its quality. The (I) of crops following flax, sunflower, root crops, or maize is > those following rye, summer wheat, or millet. A. G. P.

Soil treatment in the control of certain soilborne diseases of potatoes. D. J. MacLEOD and J. L. HOWATT (Amer. Potato J., 1934, 11, 60-61).--Common scab and black scurf were controlled by applications of HgCl or HgCl<sub>2</sub> mixed with bentonite (1:4)in the rows. Hg compounds applied at the rate of 30-45 lb. per acre did not affect growth of cereals, clover, or timothy, or the activity of N-fixing organisms. Cu<sub>2</sub>O gave promising results against club root in turnip, and borax (10 lb. per acre) in the row controlled brown rot. CH. ABS. (p)

Chocolate spot of beans. W. H. Hogg (9th Ann. Rept. Seale Hayne Agric. Coll., 1933, 40, 21–22).— Disease is associated with low (< 0.01%) K<sub>2</sub>O content in soil. CH. ABS. (p)

Fungicides and insecticides and foodstuffs treated therewith. H. M. QUANJER (Chem. Weekblad, 1934, 31, 685-686).—A review, the harmlessness of using poisonous chemicals on plants being stressed. S. C.

Effects of sprays on apple quality. J. F. HOCKEY (39th Ann. Rept. Pomol. and Fruit Growing Soc., Quebec, 1932, 49—55).—Use of Bordeaux mixture (I) in "pre-pink" stages and of CaO–S–FeSO<sub>4</sub> combinations (II) as "pink" and calyx sprays resulted in lower sugar content of fruit and retarded colouring as compared with those receiving (I) alone. Fungicidal action of (II) was > that of wettable S. CaO–S (III) with  $Al_2(SO_4)_3$  applied at the rate of 9 lb. per 100 gals. did not impair colour or sugar content. The CaO–S–Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> combination used as second pre-blossom spray prevented russetting by (I) and leaf injury by (III), but corroded pump valves. CH. ABS. (p)

Lead arsenate [insecticide] substitutes. P. GAR-MAN (Conn. Pomol. Soc. Proc. 43rd Ann. Meet., 1933, 70-80).-Russetting (I) of apples by Ca arsenate (II) was reduced and its insecticidal efficiency increased by addition of CaO (6 lb. per 100 gals.). (I) was increased by addition of CaO-S. Addition of  $Al_2(SO_4)_3$  decreased foliage injury by (II). Synthetic cryolite sprays gave promising results and when used with CaO and flotation S caused no injury. BaSiF<sub>6</sub> and Mn arsenate showed low efficiency; Mg and Zn arsenates severely injured foliage. Peach curculio was best controlled by BaSiF<sub>6</sub> or by Pb arsenate (III), with ZnSO<sub>4</sub> to prevent leaf injury. Basic (III) was less effective than standard (III), but caused no injury. K<sub>2</sub>SiF<sub>6</sub> and Mg arsenate caused fruit drop and defoliation. Zn arsenate injured leaves and bark. CH. ABS. (p)

Important factors involved in spray residue removal. W. A. RUTH (Trans. III. State Hort. Soc., 1933, 67, 257—268).—Effects of type of machine, concn. of acid used, temp., and use of wetting agents on removal of As and Pb are recorded. CH. Abs. (p)

[Spray] residue removal, 1933. D. F. FISHER (Trans. Ill. State Hort. Soc., 1933, 67, 292–302, and Proc. 36th Ann. Meet. Maryland State Hort. Soc., 1934, 27–37).—Pb and F residues are best removed by solutions containing HCl 1.5, NaCl 2.0, and light mineral oil 1% at  $37.7^{\circ}$ . When cryolite-oil sprays were used throughout the season residues of F were not satisfactorily removed by any process. Residues from Ca and Mn arsenates were effectively treated by all processes except those using Na silicates.

Сн. Авз. (р)

Injurious effects of Bordeaux mixture on pecan trees. J. B. DEMAREE and J. R. LARGE, JUN. (Proc. 28th Ann. Conv. South-east Pecan Growers Assoc., 1934, 20–29).—Nature of the injury is examined. Sprays containing Cu phosphate 2,  $Ca(OH)_2$  4, and bentonite 2 lb. in 50 gals. give no injury, but are less effective in controlling scab. CH. ABS. (p)

Control of pecan rosette with zinc sulphate. J. B. DEMAREE, E. D. FOWLER, and H. L. CRANE (Proc. 28th Ann. Conv. South-east Pecan Growers Assoc., 1934, 29—37).—Beneficial effects of  $ZnSO_4$  (I) were less marked when (I) was added to Bordeaux mixture (II). Toxicity of (II) to fungi was not reduced by additions of (I). Treatment of soil with (I) was less satisfactory than application as spray or by injection into trunks. Addition to soil of FeSO<sub>4</sub>, MnSO<sub>4</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, CuSO<sub>4</sub>, or borax did not affect the incidence of rosette. CH. ABS. (p)

Control of pecan black aphid under orchard conditions. G. F. MOZNETTE (Proc. 28th Ann. Conv. South-east. Pecan Growers Assoc., 1934, 55-61).----By addition of nicotine to customary Bordeaux spray and, if necessary, following this by summer oil-nicotine, aphid is controlled and premature defoliation prevented. CH. ABS. (p)

[Control of] finger and toe [disease]. W. H. Hogg (9th Ann. Rept. Seale Hayne Agric. Coll. Pamph., 1933, 40, 33—41).—To prevent the disease, soil should contain  $\lt 0.03\%$  each of available  $P_2O_5$  and  $K_2O$ . A  $P_2O_5$ :  $K_2O$  ratio of 1:1 is preferable in the more fertile soils. Control was obtained by adjusting soil  $p_{\rm H}$  to 8.0 by means of CaO. CaCO<sub>3</sub> was not satisfactory. Ca(ClO<sub>3</sub>)<sub>2</sub> used as a weed killer did not affect soil reaction or control the disease. CH. ABS. (p)

Determination of naphthalene in poultry-lice powders. D. S. BINNINGTON and W. F. GEDDES (Ind. Eng. Chem. [Anal.], 1934, 6, 461-463).—The  $C_{10}H_8$ is separated by steam-distillation in presence of EtOH and dil.  $H_2SO_4$ , and converted into the picrate (I), which is determined by treatment with an excess of NaOH and back-titration with 0·1*N*-acid (phenolphthalein). The solubility of (I) at 25° is 0·259% in  $H_2O$  and 0·009% in 0·2% picric acid solution. The latter is used for washing (I) on the filter. S. C.

# Determining N in Ammophos.-See VII.

See also A., Dec., 1418, Influence of dyes and hormones on plant growth. Root development of lucerne. 1421, Prep. of humates. 1422, Effect of K on growth of sugar cane.

# PATENT.

Preparation of horticultural pyrethrum dust. A. E. BADERTSCHER, ASST. to MCCORMICK & Co., INC. (U.S.P. 1,940,899, 26.12.33. Appl., 21.1.32).—The plants are sprayed with a solution of pyrethrum in CCl<sub>a</sub>

or light petroleum containing talc in suspension, whereby they become covered with a fine insecticidal dust. A. R. P.

# XVII.—SUGARS; STARCHES; GUMS.

Manufacturing qualities of POJ 2878 [sugar cane]. H. F. HADFIELD (Hawaiian Planters' Rec., 1934, 38, 126–130).—Juice from the POJ 2878 cane when limed to  $p_{\rm H}$  8.0 in the ordinary way took about  $2\frac{1}{2}$  hr. to settle. Addition of  $\rm H_3PO_4$  to the limed juice was beneficial, but gave a large vol. of settlings. When this juice is mixed with that from other canes (e.g., Yellow Caledonia and POJ 36) in the proportion of 25–30% the clarification is just as good as that of the latter two alone, but the presses do not function so well and polarisation is usually higher. J. P. O.

Possibility of the presence of heavy water in the [beet] sugar industry. A. MIRČEV (Z. Zuckerind. Czechoslov., 1934, 59, 93—95).— $H_2O$  obtained from beet juices and beet molasses was purified and submitted to various physical tests. In no case did the vals. obtained for the *d*, b.p., f.p., *n*, etc. differ from the established vals. for ordinary  $H_2O$ . J. P. O.

Equipment for pre-defecation of raw [sugar] juice with milk-of-lime. J. HERNYCH (Z. Zuckerind. Czechoslov., 1934, 59, 22—24).—An arrangement is described for the conversion of an existing discontinuous liming apparatus into a continuously working plant for the above process. J. P. O.

Coagulation of beet juices. Acid range. I. The optimum coagulation. II. Peptisation of the coagulate. J. VAŠÁTKO (Z. Zuckerind. Czechoslov., 1934, 59, 65—72, 73—77, 99—104).—I. Diffusion juice (I) was found to have an optimum coagulation much lower than expressed juice (II) for the same beet. The optimum  $p_{\rm H}$  is not a fixed val., but varies according to the nature of the juice from root to root, being for (II) in most cases about  $p_{\rm H} 3 \cdot 2$ . (I) had an optimum val. yet further on the acid side.

II. The influence of the natural acidity of expressed beet juice on heating was studied. With the juices of some varieties after reaching the optimum coagulation the coagulate remains unaltered, even after further heating, whereas with other juices peptisation (P) of the coagulate sets in. The increase of [H'] occurring on heating the acid juice is not sufficiently great to alter the result to any extent. When P occurs at the natural acidity it can also be brought about in the same juice by acidification at a lower  $p_{\rm H}$ , and conversely. In juices from decomposed beets pronounced P occurs under these conditions. J. P. O.

Divided measuring tank for diffusion juice. E. PŠENIČKA (Z. Zuckerind. Czechoslov., 1934, 59, 20-22).—The tank, consisting of a cylindrical vessel divided into halves, is recommended for diffusion juice in conjunction with automatic liming apparatus.

J. P. O.

Factory experiments on filtration kieselguhr for the sugar industry. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1934, 59, 17–20).—Factory experiments have confirmed the results obtained in the laboratory (cf. B., 1934, 693). The most striking result was that quite satisfactory results can be obtained in the filtration of syrups and remelts with smaller amounts than are generally recommended, viz., about 0.01 wt.-% of the liquor. J. P. O.

Practical exhaustibility of Java molasses. C. SIJLMANS (Arch. Suikerind. Nederl.-Indië, 1934, II, No. 6, 167-209).-The following are the principal results of a statistical study of the figures for 90 factory molasses in Java factories. The so-called optimum ash concn., *i.e.*, that which can be regarded as reasonable under normal factory conditions, can be calc. with accuracy from the formula 1.6665a + 0.9946b - 3.392, in which a is the sulphated ash % true non-sugar, and b the temp. (° C.) when centrifuging. This val. states the quantity of ash % H<sub>2</sub>O which a molasses in equilibrium should have for its satisfactory exhaustion at the temp. at which it is centrifuged. The practical exhaustibility can be calc. from  $x_1 = 50.0723 + 0.30615x_2$ - $0.09789x_3$ , in which  $x_1$  is sucrose % true non-sugars,  $x_2$  is ash % glucose-free org. non-sugars, and  $x_3$  is the invert sugar on the same basis. J. P. O.

Amino-acids in beet molasses and the velocity of crystallisation. E. AFFERNI (Ind. Sacc. Ital., 1934, 27, 319—323).—Comparative figures obtained (for % sucrose crystallised) for the inhibitory effects of different NH<sub>2</sub>-compounds were : aspartic acid (I) 30, glycine 38, asparagine 45, leucine 52, betaine 73, and NMe<sub>3</sub> chloride 85%. (I) appears to be the principal inhibitant in beet syrups. J. P. O.

Sugar boiling. Its effect on quality of raw sugar. H. H. Bass (Int. Sugar J., 1934, 36, 439-441). --Conglomerate grain appears to form mostly in the early stages of a boil, especially at high purities. Uneven grain is due principally to the undue lengthening of the waiting method for the required no. of grain to appear, and the appearance of fresh grain during the strike. Details are given for the formation of crops and of grain, and the completion of boiling. Molasses inclusion in the grain is aggravated by poor clarification, and has a distinctly bad effect on the filterability of the sugar. It may occur at the beginning or end of the strike, and, next to a good clarification, the best defence is a good circulation in the pan and uniform boiling conditions. J. P. O.

Velocity of crystallisation of sucrose. K. I. SMOLENSKI and A. ZELEZNY (Gaz. Cukr., 1934, 74, 303). —Using a method consisting in the addition of a certain amount of fine crystals to a supersaturated solution and the refractometric determination of the decreasing concn. of the mother-liquor without removing the crystals, the velocity of crystallisation may be calc. by  $V = SN^2t/N_0$ , where V is the speed of crystallisation, S the crystal surface,  $N^2t$  the saturation no. at a given moment, and  $N_0$  the original saturation no. A table is given showing the time required to ppt. 75% of the crystallisable sugar with different saturation nos. and at different purities. J. P. O.

Lead volume error in the polarisation of raw sugars. F. W. ZERBAN (Facts about Sugar, 1934, 29, 277-278).—Clarification with aq. Pb subacetate was compared with Horne's dry Pb clarification, the second method giving the lower vals. The vol. error should be corr. by using Horne's method. CH. Abs. (e)

Determination of sucrose in beet (using the Sachs-le Docte method). F. R. BACHLER (Facts about Sugar, 934, 29, 191-194).—From data found from beets polarising  $14 \cdot 3-24 \cdot 7\%$  sugar, the marc per normal wt. occupied an average vol. of  $2 \cdot 31$  c.c. ( $2 \cdot 763$  g.). On the average the beets contained  $10 \cdot 63\%$  of "marc hydrate" and  $89 \cdot 37\%$  of juice of  $26 \cdot 8^{\circ}$  Brix and  $81 \cdot 67$  purity. This juice occupies a vol. of  $21 \cdot 89$  c.c., which in turn, in the Sachs-le Docte method, calls for an addition of  $179 \cdot 1$  c.c. of "Pb acetate water." J. P. O.

Determination of invert sugar. S. STARE (Z. Zuckerind. Czechoslov., 1934, 59, 95-96).-Heating is carried out for 6 min. from the moment of immersion in the boiling-H<sub>2</sub>O bath, the amount of H<sub>2</sub>O in which is such that ebullition is interrupted for  $\gg 1$  min. A Cu reagent of the following composition is recommended : equal vols. of solution A (175 g. of CuSO<sub>4</sub> per litre) and B (450 g. of Rochelle salt, 100 g. of  $Na_2CO_3$ , and 20 g. of NaOH per litre) are mixed before use. Using this reagent, 10 g. of sucrose (I) reduced  $2 \cdot 07 - 2 \cdot 16$  mg. of Cu; and 10 g. of (I) and 1 mg. of invert sugar 4.75— 4.88 mg. of Cu. This method is claimed to be somewhat more sensitive than the Ofner or the Kraisy method. The Cu<sub>2</sub>O formed, being in a colloidal condition, had to be separated by means of the Zsigmondy ultra-filter or a filter of Jena glass No. 3G4, "Hyflo" or other purified diatomaceous filter-aid being used also. J. P. O.

Decolorising power of Al hydroxide.—See VII. Sugar beet.—See XVI. Enquiries from Inst. f. Gärungsgewerbe.—See XVIII. Starch equiv. of beet.—See XIX.

See also A., Dec., 1337, Prep. of arabinose from gum acacia. 1384, Determining lactose in milk. 1420, Starch determination. Glucosides. 1422, Effect of K on growth of sugar cane.

#### PATENT.

Moulding compositions from saccharides.—See XIII.

## XVIII.—FERMENTATION INDUSTRIES.

Use of bone glue as source of nitrogen for yeasts. W. SCHERMAN (Bull. Assoc. Chim. Sucr., 1934, 51, 504—510).—70% of the N of commercial bone glue (G) is rendered assimilable for yeasts (Y) by hydrolysis with  $H_2SO_4$ . 7% saving is effected in the cost of production of Y by substituting hydrolysed G for the usual sources of N. E. C. S.

Water purification in the modern brewery and distillery. F. J. LAMMERS (Ind. Eng. Chem., 1934, 26, 1133—1138).—The desired characteristics of mashing liquor, plant-washing  $H_2O$ , boiler-feed  $H_2O$ , and cooling  $H_2O$  are discussed, with a review of the modern methods available for their prep. in the brewery and distillery. Distillery blending- $H_2O$  is also dealt with. I. A. P.

Influence of grinding of malt on quality of beer. R. HOFFMANN (Woch. Brau., 1934, 51, 356—357).— Uniformity of grind is essential, and under-modified and steely-tipped corns need special care. The grind should be as fine as possible, consistent with good filtration, thus giving a more rapid mash and effecting a saving of time in heating, leading to a brighter wort and a superior beer. Separation of grist and husk is desirable; boiling with husk gives a dark colour and unpleasant taste to the beer. I. A. P.

Enzymes in brewing. M. A. POZEN (Ind. Eng. Chem., 1934, 26, 1127—1133).—A review of the processes of malting and brewing (United States), especially with reference to the rôle of enzymes (I), showing that the character and quality of the resulting beer depend on the specially regulated activity of numerous (I). I. A. P.

Degree of purification of [brewery] transport casks. I. JANENSCH (Woch. Brau., 1934, 51, 372—375). —The idea that newly pitched casks are necessarily sterile is erroneous. To carry out biological tests, sterile linen rag was moistened with sterile H<sub>2</sub>O, rubbed over the surface to be investigated, and transferred to a sterile container, cultures of any organisms present being then prepared. Of the casks investigated, the rinsings of which contained a high proportion of dangerous organisms,  $\frac{1}{3}$  had been freshly pitched. The smoked and sulphurised casks examined were sterile. I. A. P.

Susceptibility of beer to cold. P. PETIT (Brass. Malt., 1933-4, 24, 161; Woch. Brau., 1934, 51, 381-382).-The head separated from beer precooled to 4°, allowed to remain at approx. 22° for 15 min., and treated with, e.g., a little  $C_5 \hat{H}_{11}$  OH gave a fluid with a much higher optical index (I) than the original beer. (I) then fell gradually, due to the re-dissolution of the foamcolloids (II), and the rapidity of this fall differed for different beers. However, (II) are pptd. by liberated CO, during pouring, whilst cold-turbidity is dependent on temp. alone. Storage of beer at a high temp. favours the diffusion of protein from yeast, and also increases the separation of colloids which takes place on cooling, whilst the diffused substances assist in the foam formation. The foam of a dil. yeast autolysate resembles that of beer, but differs markedly from that of a wort saturated with CO<sub>2</sub>. I. A. P.

Honey wine. F. FILIPELLO and G. L. MARSH (Fruit Products J., 1934, 14, 40-41, 61).—The effects of addition of nutritive salts, of the varieties of honey and of yeast, and of methods of clarification are examined. Satisfactory honey brandy can be obtained. E. B. H.

Clarification and stabilisation of wines by freezing. M. A. JOSLYN and G. L. MARSH (Fruit Products J., 1934, 14, 44).—Wine frozen to the consistency of a H<sub>2</sub>O-ice and then defrosted is satisfactorily cleared. E. B. H.

Determination of artificial colour in whisky. G. E. MALLORY and P. VALAER (Ind. Eng. Chem. [Anal.], 1934, 6, 474—475).—A test, using  $Zn(OAc)_2$ , for distinguishing between caramel and the colour extracted from uncharred white-oak chips is described. The latter colour also gives an intense blue-black colour on addition of FeNH<sub>4</sub>(SO<sub>4</sub>)<sub>2</sub> and NaOAc. E. S. H.

Enquiries from practice [of the Institut für Gärungsgewerbe (A.T.L.), Berlin]. C. LUCKOW (Pharm. Zentr., 1934, 75, 733—737).—*Raspberry syrup* from raw juice and syrup. In Germany the use of sugar syrup for making fruit syrups would be illegal; solid

sugar must be used by law. Turbidity of Kümmel [liqueur]. Turbidity is due to the separation of terpenes and is removed by dilution with  $H_2O$ , followed by filtration with MgO and redistillation to the desired EtOH content. Prep. of sugar solutions. A solution containing 1 kg. of sugar (I) per litre is made by dissolving 100 kg. of refined (I) in 42 litres of  $H_2O$  and boiling for 10 min. with the addition of 75 g. of tartaric or citric acid. Stop-cocks. Tin cocks fitted into corks or cork rings are the best type for spirit containers. Rubbercovered cocks should not be used. Expansion of spirits. For practical purposes rectified spirit expands 0.1%in vol. per °C. rise in temp. Acid and ester determination in rum. These vals. are determined by the usual titrimetric methods (to phenolphthalein). S. C.

See also A., Dec., 1402, Starch-liquefying enzyme in rice. Prep. of highly active yeast invertase. Determining the activity of commercial invertase. 1403, Nephelometric determination of pepsin. Micro-detection of proteases and amylases. 1404, Prep. of stable urease powder, and of a new type of compound from yeast. 1405, Citric, and gluconic, fermentation.

#### PATENT.

Stable malt and malt product [diastatic flour]. K. F. SCHREIER (U.S.P. 1,950,418, 13.3.34. Appl., 25.2.32).-Graded cereal grain is steeped at 15.5-21°. the steep-H<sub>2</sub>O being renewed if sourness develops, and is then malted (drum system) with the temp. maintained at 23.9-27.8° and with loss of moisture avoided. Malting is continued until the diastase produced is sufficient to give 15-40° Lintner in the flour, up to which point there is no appreciable development of proteolytic enzymes. The grain is dried at  $> 54 \cdot 4^{\circ}$ , and is allowed to cool when it has < 7% of moisture, and may then be ground immediately. The flour produced may be bleached, is classified as "live," and has the odour and flavour of nuts; it absorbs the max. of H<sub>2</sub>O, and the dough does not liquefy. The flour may be mixed with other flours in suitable proportions, yielding a light loaf, or with milk powders, or the malted grain may be shredded or crushed for breakfast foods.

# XIX.—FOODS.

I. A. P.

Fibre content of British-milled wheatfeed : determination of fibre. E. A. FISHER and R. H. CARTER (J.S.C.I., 1934, 53, 313-317 T).-Earlier figures for fibre contents of the various grades of wheatfeed [bran (B), middlings (M), etc.] are in some cases much too high, due mainly to changes within the milling industry; thus, B now represents about 40% (cf. 25% pre-war) of the total wheatfeed manufactured, and its fibre content has fallen by 2%, whilst straightrun M now represents some 75% of the total M manufactured (45%) of total wheatfeed including B). The average fibre contents (as determined by the official method of the Fertiliser and Feeding Stuffs Regulations, 1927) are B 9.0%, straight-run M 5.0%. The average figures are closely similar whether based on no. of samples tested or on an output basis. It follows that the average figures given are representative of the whole output of British-milled wheatfeed. Comparatively slight departures from the instructions laid down in the official method result in considerable variations in apparent fibre content. With strict adherence to the instructions the range of error is 0.6% when means of duplicate determinations are considered. Results from 25 different laboratories showed variations up to 1.2%, and in a few cases much greater. E. A. F.

Rational pasteurisation of milk. C. GORINI (Lait, 1934, 14, 924—934).—A rapid destruction, and not necessarily the destruction of a large no. of organisms, should be the aim of a perfect pasteurisation. Lactic acid cocci should remain after pasteurisation to inhibit the subsequent growth of sporing organisms. E. B. H.

Chemical control of low-temperature pasteurisation [of milk]. J. PIEN and J. BAISSE (Lait, 1934, 14, 934—942).—A modified Schern-Gorli test is described in which indigo is used in place of red corpuscles. This modification detects milk heated at 60—67° for 30 min. E. B. H.

Pasteurisation of milk for manufacture of cheese. J. PIEN (Bull. Assoc. Chim. Sucr., 1934, 51, 497-503).—Obligatory pasteurisation in the cheese industry is impracticable, since the manufacture of certain cheeses is practically impossible if pasteurised milk is used. E. C. S.

Cryoscopy of milk. J. J. RYAN and G. T. PYNE (Sci. Proc. Roy. Dublin Soc., 1934, 21, 113—122).— A const. is developed and applied to milks to which known amounts of  $H_2O$  are added; this takes into account the chief osmotic constituents of milk and permits the determination of the degree of dilution of a sample. A good agreement is obtained with the results of f.-p. determinations. P. G. M.

Field tests for chlorine in milk for the detection of mastitis. C. E. HAYDEN (Rept. [1931—1932], New York State Vet. Coll. Cornell Univ., 1933, 55— 58).—A colour reaction with  $FeNH_4(SO_4)_2$  containing Ag and KCNS, and also two forms of the  $K_2CrO_4$ -AgNO<sub>3</sub> test, are described. CH. ABS. (p)

Calcium-phosphorus equilibrium in cheese. G. GUITTONNEAU and R. CHEVALIER (Compt. rend., 1934, 199, 801-803).—The Ca : P ratio of serum from pressed cheeses ranged from 1.35 to 1.50 and that of soft cheeses from 0.5 to 0.6. A. G. P.

Cold storage of poultry. I. Gas storage of chickens. E. C. SMITH. II. Chemical changes in the fat of gas-stored chickens. C. H. LEA (J.S.C.I., 1934, 53, 345—347 T, 347—349 T).—I. Chickens (I) were stored undrawn or roped for 14 weeks in 95—98% CO<sub>2</sub> at 0° to  $-1^{\circ}$ . After 8 weeks they had seriously deteriorated owing to autodigestion of the belly-wall and distension of the crop and vent. Rancidification of the fat was noticeable to the palate after 12 weeks. (I) stored in air at the same temp. were unsaleable after 6 weeks owing to growth of moulds.

II. Data are given for the oxidation and hydrolysis of the skin fat of (I) stored for 14 weeks in 95-98% $CO_2$  at 0° to  $-1^\circ$ . E. C. S.

Cacao-shell vitamin content. ANON. (Vet. Rec., 1934, 14, 1103).—Cacao shell contains 28 vitamin

units, due to exposure of the beans to the tropical sun for drying. The shell contains 2% of theobromine, which makes it unsuitable for use in excess as cattle food; the best results are obtained with 2—3 lb. per animal per day. R. N. C.

Are sprayed grapes poisonous? S. V. VENKA-TARAYAN (J. Mysore Agric. Exp. Union, 1933, 14, 22-24).—No danger follows spraying with Cu preps.

Сн. Abs. (*p*)

Preservation of orange juice by canning. M. A. JOSLYN and G. L. MARSH (Fruit Products J., 1934, 14, 45—49, 56—57).—Juice pasteurised at  $87 \cdot 5^{\circ}$  for 2 min. or at  $85^{\circ}$  for 8 min., de-aërated, and canned (in citrus enamel cans) is stable for about 12 months. Ultraviolet light introduces off-flavours. Relative merits of varieties of oranges are considered. E. B. H.

Cold withering [of tea]. A. H. HALL and T. G. DICKSON (Tea Quarterly, 1934, 7, 118–128).—A wither of about 65% at  $1-2^{\circ}$  was obtained in 24 hr., using air cooled by refrigerator coils and dried by CaCl<sub>2</sub>. Rolling was also performed at a low temp. An increase in the val. of the tea was obtained. E. B. H.

Determination of carotene as a means of estimating the vitamin-A value of forage. H. R. GUILBERT (Ind. Eng. Chem. [Anal.], 1934, 6, 452-454).--A sample of the forage (1-5 g.) is boiled under reflux for 30 min. with 20 c.c. of saturated KOH in EtOH and the cooled mixture extracted with 200-250 c.c. of  $Et_2O$  in two or three portions. The extract is then washed free from chlorophyllins, flavones, and alkali with H<sub>2</sub>O and evaporated. Carotene (I) is separated from xanthophyll (II) by dissolving the residue in light petroleum and removing (II) by repeated extraction with 85% and finally with 90% MeOH. The petroleum solution of (I) is then made up to 50 c.c. and matched against a standard solution containing 3.06 g. of Naphthol Yellow and 0.45 g. of Orange G in  $2 \times 10^5$  pts. of  $H_2O \equiv 2.7$  mg. of (I) per litre]. The method gives results identical with those obtained by Schertz's COMe<sub>2</sub>-Et<sub>2</sub>O extraction method and is more easily carried out. Comparative results by the two methods and the SbCl<sub>a</sub>-blue method on lucerne-leaf meal are tabulated. S. C.

Replacement of oil-cake protein by ammonium bicarbonate in cow's rations. P. EHRENBERG, B. MÜLLER, F. DIETRICHS, and K. HÖTZEL (Bied. Zentr. [Tierernähr.], 1934, B, 6, 425—440).—Partial replacement of protein by NH<sub>4</sub>HCO<sub>3</sub> is possible over considerable periods without appreciable decline in milk yield.

A. G. P.

Nitrogen balance of growing pigs fed with dried yeast, soya-bean, and groundnut cake. J. SCHMIDT, M. F. VON SCHLEINITZ, and E. LAGNEAU (Bied. Zentr. [Tierernähr.], 1934, B, 6, 281–291).—N retention was in the order yeast > soya bean > groundnut. The fattening period required increased with the different feeds in the order named. A. G. P.

Influence of herring meals of high and low salt and high and low fat contents on weight increases and on carcase quality [of pigs]. A. BÖMER, W. BÜNGER, W. HELMS, W. KLEBERGER, P. MALKOMESIUS, D. MEYER, and M. POPP (Landw. Versuchs-Stat., 1934, 120, 225—359; cf. B., 1933, 844; 1934, 731).—Meals rich in NaCl (9—12%) had no ill effects on the health or carcase quality (I) of pigs receiving up to 300 g. daily. Live-wt. increases produced by high-fat meals (to 22%) were > those by low-fat grades. (I) was not adversely affected. The vitamin-A and -D contents of all herring meals were high. A. G. P.

Starch equivalent of beet. G. FINGERLING (Landw. Versuchs-Stat., 1934, 121, 1—141).—The digestibility (D) of the N constituents of beet (I) was higher for pigs than for oxen. In other respects D vals. for the two animals were similar, that for the N-free extract being notably high. Apart from sugar constituents digestion of (I) is bacterial rather than enzymic. The starch equiv. for oxen was  $51 \cdot 2$  and for pigs  $37 \cdot 9$ . Incomplete utilisation of the nutrients of (I) is ascribed to the high content of amides and org. acids. A. G. P.

Spontaneous oxidation.—See II. Furfuraldehyde. —See III. Margarine. SCN vals. of oils and fats.— See XII. Fungicides (etc.) and foodstuffs. Storage of potatoes.—See XVI. Determining moisture in foodstuffs.—See XX.

See also A., Dec., 1299, Odour of metals. 1384, Constituents of milk. Determining lactose in milk. 1384 and 1413-7, Vitamins.

# PATENTS.

Pasteurising and deodorising lacteal liquids. MURRAY DEODORISERS, LTD., Assees. of H. L. MURRAY (B.P. 418,591, 24.4.33. New Zealand, 20.7.32, 23.1. and 24.4.33).—Cream (e.g.) is continuously pasteurised by spraying into steam (or diffusing steam into it) while under a comparatively low vac  $(V_1)$ , and is deodorised under a higher vac.  $(V_2)$  under the pull of a single vac. pump. An automatic valve to hold the ratio  $V_1: V_2$ const. is described. B. M. V.

**Preservation of eggs.** S. FOWLER and P. J. BENFIELD (B.P. 419,668, 10.5.33).—The eggs are treated with a neutral or alkaline emulsion of wool fat (especially Yorkshire brown grease) to which may be made additions of other oils or fats, benzoates or other preservatives, or emulsifying agents as  $(NH_d)$  linoleate. E. B. H.

Pasteurising liquids. Extracting devices [for pulp].—See I. Diastatic flour.—See XVIII.

# XX.-MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of moisture in pharmaceutical products and foodstuffs. II. Applications. J. LEX-MARIE (J. Pharm. Chim., 1934, 20, [viii], 443-461; cf. B., 1935, 45).—Determinations in many pharmaceutical products, soap, oils, extracts, foodstuffs, etc. by heating at 100°, drying over  $H_2SO_4$ , and by distilling with xylol are given. The xylene method is the best. E. H. S.

Preparation and properties of menthyl valerate. B. BOBRANSKI (J. Pharm. Chim., 1934, [viii], 20, 437—442).—Methods of prep. are reviewed and results of esterification using gaseous HCl given; 67.3—84% of the acid is esterified according to the excess employed. E. H. S.

Rapid identification of the constituents of officinal quinine hydrochloride. G. DENIGÈS (Bull. Trav.

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Soc. Pharm. Bordeaux, 71, 254—255; Chem. Zentr., 1934, ii, 1343).—A colour reaction for quinine hydrochloride is described. H. N. R.

Iodometric determination of morphine. LAUR-ENCE and LABARRE (J. Pharm. Chim., 1934, [viii], 20, 353-358).—0.5 g. of opium (or an appropriate amount of tincture) and 2 g. of Ca(OH)<sub>2</sub> are ground with 10 c.c. of H<sub>2</sub>O, filtered, and the filtrate (I) is made up to 50 c.c. 10 c.c. of (I) are neutralised with 3—5 drops of AcOH (too great an excess is detrimental) and 2.5 g. of KI and 10 c.c. of 0.1N-I are added. Cryst. morphine tri-iodide is filtered, washed, and the excess I determined in the filtrate by titration with 0.04N-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. The method gives results agreeing with the B.P. method and is much quicker. S. C.

Deterioration and stabilisation of aconite preparations. I. W. B. BAKER (J. Amer. Pharm. Assoc., 1934, 23, 974—979).—Crude aconite (I) deteriorates rapidly, especially when powdered. Tincture of (I) U.S.P. X may be stabilised by adjusting to  $p_{\rm H} 2 \cdot 3 - 3 \cdot 0$  with HCl. A. E. O.

Chemical constants of tobacco resins. M. P. PIATNITZKI (Vses. Inst. Tabachn. Prom. Krasn., 1933, No. 104, 123—125).—Acid, sap., and  $\text{Et}_2\text{O}$  vals., and I vals. (I) are recorded. (I) are usually higher in lowgrade tobaccos. In the volatile fractions of the resins (I) are higher in the better qualities. CH. ABS. (p)

Determination of total resins in tobacco by the "dry residue" method. M. P. PIATNITZKI and S. KASHIRIN (Vses. Inst. Tabachn. Prom. Krasn., 1933, No. 104, 117—122).—The loss of wt. of the sample after extraction with  $C_6H_6$  is taken as resin content (I). Quality of tobacco is unrelated to (I). CH. ABS. (p)

Spontaneous oxidation [of tobacco].—See II. Medicinal H<sub>2</sub>O from slags.—See X.

See also A., Dec., 1318, HgO, Hg(CN)<sub>2</sub>. Donovan's solution. 1320, Prep. of stable FeCl<sub>2</sub> solutions. 1335, Prep. of mixture of aldehydes and acids (C<sub>8-10</sub>). 1348, Prep. of anæsthesine. 1368, Antimalarials from quinoline derivatives. 1369, Prep. of anti-pyrine. 1386, Prep. and standardisation of pollen extracts. 1400, Prep. of rare-earth Ca gluconates. 1384 and 1413-7, Vitamins. 1412, Prep. of female sex hormones, and of theelin. Cryst. progestin. Corpus luteum hormones.

#### PATENTS.

Variable-resistant chemicals and bandage embodying same. W. F. WILHELM, Assr. to M. FIELD & Co. (U.S.P. 1,950,957, 13.3.34. Appl., 30.1.33).— Particles of a chemically active material, e.g., chloramine-T, are coated with varying thicknesses of a protective substance, e.g., Na stearate, which prevents decomp. of the medicament, but is slowly removed during application. E. H. S.

Parasiticide. J. M. SCHAFFER and F. W. TILLEY (U.S.P. 1,950,818, 13.3.34. Appl., 9.9.29).—A solution of o-phenylphenol in aq. coconut oil soap is claimed.

E. H. S.

Diterpene alcohols.-See III.

# XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Influence of composition of light-sensitive paper on quality of printing. A. Y. GONCHAROV (Bumazhn. Prom., 13, No. 5, 36—44).—Premature reduction of Fe<sup>III</sup> salts in some grades of cyanotype paper is due to org. combined SO<sub>2</sub> or to lignin in the paper. Retarded speed of reduction in such papers is due to emulsion composition and the high acidity of paper from unbleached pulp (I). Discoloration is eliminated by substituting 50-70% of bleached pulp for (I). CH. ABS. (e)

See also A., Dec., 1316, Gradation of photographic layers. Colour-sensitising. 1324, Grating microspectrograph. Densitometry and photographic printing.

#### PATENT.

Sensitisation of photographic emulsions. I. G. FARBENIND. A.-G. (B.P. 418,745, 26.4.33. Ger., 26.4.32). -The use of carbocyanines, derived from benz-oxazoles, -thiazoles, or -selenazoles, indolenines, or quinolines in which in  $\ll 1$  benzene nucleus both positions p- to the junction of the heterocyclic ring are substituted, is claimed. Examples, made by standard methods, are salts of: 4:5:4':5'-tetramethoxy- (sensitisation max.  $\lambda$  625 mµ), -tetraethoxy- ( $\lambda$  600 mµ), -bismethylenedioxy- $(\lambda 640 \text{ m}\mu), 4:5:7:4':5'-pentamethyl- (\lambda 600 \text{ m}\mu),$ 4:5:7-trimethyl ( $\lambda$  600 m $\mu$ ), 5:5'-dimethoxy-4:4'dimethylthiol- ( $\lambda$  640 m $\mu$ ), and 5:5'-bisdiethylamino-4:7:4'-trimethyl derivatives of 1:1'-diethylbenzthiocarbocyanine; 4:5:4':5'-tetramethoxy- ( $\lambda$  600 mµ) and -tetramethyl-1:7:1'-triethylbenzthiocarbocyanine; 4:5:4':5'-tetramethoxy- ( $\lambda$  650 mµ), -tetraethoxy-( $\lambda$  650 mµ), and -bisethylenedioxy- ( $\lambda$  605 mµ) -1:1'diethyl-, 4:5:4':5'-tetraethoxy-7-methyl-1:1'-diethyl- $(\lambda 605 \text{ m}\mu)$ , and 4:5:4':5'-bisethylenedioxy-  $(\lambda 620 \text{ m}\mu)$ and -tetramethoxy- (\lambda 620 m\mu) -1:7:1'-triethylbenzselenocarbocyanine; 6:6'-dichloro-1:3:3:5-1': 3': 3': 5'- octamethylindocarbocyanine ( $\lambda$  590 m $\mu$ ); 1:7-diethylbenzseleno-4':5'-dimethyl- ( $\lambda$  650 mµ), and 5'-ethoxy-4'-methyl (λ 655 mµ) -benzthiocarbocyanine, and 5-methoxy-1:7-diethylbenzseleno-4:5'-dimethylbenzthiocarbocyanine ( $\lambda$  665 mµ). H. A. P.

# XXII.—EXPLOSIVES; MATCHES.

See also A., Dec., 1312, Velocity of decomp. of nitric esters. 1313, Luminosity accompanying detonation.

# XXIII.—SANITATION; WATER PURIFICATION.

Trickling-filter fly (Psychoda alternata). Its habits and control. G. M. FAIR (Sewage Works J., 1934, 6, 966—979).—Complete flooding of filters is recommended as a means of control as the larvæ are destroyed by 24-hr. submergence and the surface film of the medium is unharmed. C. J.

Vacuum filtration of elutriated [sewage] sludge. C. E. KEEFER and H. KRATZ, JUN. (Sewage Works J., 1934, 6, 845—896).—The removal of the sol. N compounds from digested sludge, by washing, reduces the amount of coagulant required; the vol. of wash- $H_2O$ is small and as the biochemical  $O_2$  demand is < that of sewage, it presents no difficulty in treatment. Elutriation of sludges improves the results obtained on vac. filters with all coagulants tried, but  $\text{FeCl}_3$  and  $\text{FeSO}_4-\text{Cl}_2$ are best. Owing to the small amount of  $\text{NH}_3$  in fresh raw sludge the effects of washing are not marked, and it is advisable to mix fresh and digested sludges before treatment and so save coagulant. C. J.

Present status of chemicals in sewage treatment. J. H. BRENDLEN (Sewage Works J., 1934, 6, 920—927).—Suspended and colloidal matter are removed by the same fundamental process in both chemical and biological treatment plants. The advantages of the former are closer control, increased flexibility, removal of odours, and the production of a sludge which is amenable to final disposal. A reduction of 60-75%is claimed in the biochemical  $O_2$  demand and suspended matter and this may be increased by 15% by rapid filtration. The chemicals required are tending to become cheaper and may be used to supplement existing overloaded biological plants. C. J.

[Sewage-sludge] digestor overflow liquor-its character and effect on plant operation. A. J. FISCHER (Sewage Works J., 1934, 6, 956-965).-The proportion of solid matter carried by the overflow liquor (I) depends on the  $H_2O$  content and type of the raw sludge, the extent of the agitation produced mechanically and by the evolution of the gas, and the stage to which the digestion process is carried. Two-stage operation produces an improved (I) as most of the gas is evolved in the first stage, short-circuiting is reduced, and the final product is more completely digested. The best method of disposal is by admixture with the raw sewage when the total solids are < 0.3%, Cl<sub>2</sub> being added if (I) causes undesirable septic action in the settling unit. When the total solids are > 0.5% treatment on sand beds is recommended. C. J.

Effect of aëration on rate of oxidation of activated [sewage-]sludge mixtures. H. HEUKELEKIAN (Sewage Works J., 1934, 6, 897-907).-Under laboratory conditions, the reduction in the total suspended solids by the continued aëration of sewage and activated sludge (A) in various proportions is generally low, and there may be an initial increase due to the coagulation of sewage colloids. There is also an initial decrease in the % of ash in the suspended matter due to the low ash content of the sewage solids, but as aëration proceeds the proportion of ash increases again. Up to a point the reduction in the biochemical  $O_2$  demand (B)increases in proportion to the amount of A present for short aëration periods, but with higher proportions of A and longer aëration periods the % reduction decreases. The ratio of B to suspended sewage solids is approx. 1.0 and that of A = 0.22 - 0.30, the various mixtures having intermediate vals. which approach that of A as the concn. of suspended solids increases and the aëration proceeds. C. J.

Rapid methods for [sewage] sludge solids determination. J. I. SMITH (Sewage Works J., 1934, 6, 908—919).—In the preferred method the solids retained by vac. filtration on paper in a perforated Al dish are dried at 120° for 10 min. and weighed. The determination requires 30 min. and is not affected by the changes in the characteristics of the sludge (such as occur after heavy rain) which are a disadvantage of the more rapid volumetric centrifuge (I) and sp.-gr. methods (II). Method (I) is a useful rough control test but is less accurate than (II). C. J.

Slime growths in sewers. F. E. DE MARTINI (Sewage Works J., 1934, 6, 950—955).—The appearance and habits of the common sewer fungi *Sphærotilus*, *Cladothrix*, *Leptomitus*, and *Beggiatoa* are described. S. *natans* or "sewage fungus" is also frequently found in streams receiving sewage effluents. It grows best in soft  $H_2O$  containing some  $O_2$  and carbonaceous wastes, *e.g.*, from breweries, sugar factories, canneries, and paper mills. Growths in sewers are unlikely when the sewage is septic, acid, or strongly alkaline, and if present may be reduced by treatment with  $Cl_2$  and  $CuSO_4$ . C. J.

Hygienic investigation of swimming-bath water. J. IDZERDA (Chem. Weekblad, 1934, 31, 681-682).-The chief points in the examination of swimming-bath H<sub>2</sub>O (I) are clearness (II) and disinfectant properties (III). (II) is determined by the turbidity (IV) and transparency. The max. (IV) allowable is 1 unit (representing the turbidity of a suspension containing 1 mg. of SiO<sub>2</sub> per litre). Each swimmer causes a (IV) equiv. to 1500 mg. of  $SiO_2$  and necessitates the use of 1.5— 2 cu. m. of clean H<sub>2</sub>O if the max. is not to be exceeded. (I) should be transparent through  $\lt$  25 m. (III) is measured by the time required to kill 1000 B. coli per c.c. of (I) alone or contaminated with fæces. Cl<sub>2</sub> as gas or as HOCl is very satisfactory for cont nuous purification, but is very sensitive towards impurities of all kinds. NH<sub>2</sub>Cl (V) is less rapid in its action, but being insensitive to impurities is considered the most satisfactory disinfectant. Cl2-CuSO4 is no quicker than (V) and Cl2-CaCO2 has the advantage for use in indoor baths of being odourless. The electro-katadyne (AgNO<sub>3</sub>) system is also mentioned. S. C.

Detecting CO and determining  $O_2$  [in air].—See VII.  $H_2O$  purification in breweries etc.—See XVIII.

See also A., Dec., 1317, Prep. of  $H_2O$  of min. conductivity. 1407, Occurrence of *B. aërogenes* in sewage.

# PATENTS.

Sewage-grit treatment. G. G. HYDE, Assr. to DORR Co., INC. (U.S.P. 1,957,168, 1.5.34. Appl., 6.2.31).— A Dorr rake classifier for removing grit [without settled org. matter (O)] from sewage is provided with a partition (P) parallel to the sloping deck and just clear of the rake frame in its upper or return position, whereby the washing of the grit is effected in a closed, inclined column and O is washed over the top edge of P to rejoin the main effluent. B. M. V.

Clarification of water and the like containing solid particles. C. GREAVES (B.P. 419,071, 6.5.33).— The contents of a conical settling tank are maintained in circular motion by means of the influent which is delivered near the surface and tangentially to the periphery. The solids are thus thrown centrifugally towards the outside wall and settle, and the clear liquor is decanted at a central bell-mouth outlet. C. J.

Filter [for sewage sludge].—See I. Burning refuse.—See II.