

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

NOV. 9 and 16, 1934.*

I.—GENERAL; PLANT; MACHINERY.

Use of mixtures of rich and poor gases for heating large furnaces [in the steel industry]. E. DAMOUR (Rev. Mét., 1934, 31, 266—269).—Examples are given of the beneficial effects of mixing coke-oven gas with blast-furnace or producer gas for firing open-hearth and other furnaces. A. R. P.

Rate of heat transfer from a steam coil to water. F. H. RHODES (Ind. Eng. Chem., 1934, 26, 944—946).—Small-scale trials showed that the rate of heat transfer from steam condensing in a coil to H₂O is 285 B.Th.U./sq. ft./hr./°F. temp. difference with stirring, and 152—172 B.Th.U. without stirring. In the first case the transfer increases slowly with rise in steam temp., and in the latter case more rapidly. Corrections were made for heat produced by stirring and lost by radiation. C. I.

Solar heat for evaporation of solutions of hygroscopic substances under Central Asiatic conditions. C. B. MEDINSKI (J. Chem. Ind. Russ., 1934, 10, No. 6, 59—61).—Natural salines and aq. MgCl₂, CaCl₂, NaCl, and H₃PO₄ can be evaporated to dryness by exposure to the sun during all seasons of the year at Tashkent. R. T.

Textile fibres in thermal insulation. H. BOXSER (Amer. Dyestuff Rep., 1934, 23, 442—444).—The thermal conductivities of animal (*A*), vegetable (*V*), and mineral fibres (*M*) are compared. In general, *A* are better insulators than *V*, an important exception being kapok. Raw wool is a poorer insulator than degreased wool. Insulating materials consisting of textile fibres are very durable, particularly cattle hair. Textile fibres are superior to *M* (e.g., asbestos) because of their greater springiness. Tables of the thermal conductivities of various products are given. A. J. H.

Modern two-roll mill. ANON. (Verfkroniek, 1934, 7, 252).—A paint mill of this type is described and illustrated. D. R. D.

Fine structure of powders in bulk with special reference to pulverised coal. R. MELDAU and E. STACH (J. Inst. Fuel, 1934, 7, 336—354).—The geometrical theory of the modes of packing of spherical particles is discussed. The packing of pulverised coal and bakelite dust has been studied experimentally by fixing the powder in its original configuration and examining sections thereof under the microscope, the fixing being effected by filling in the interspaces with molten Brazil wax (preferably dyed black with "Olesol") at 190° and then allowing this to set. A feature of loose powders is the marked amount of "bridging" or "arching" that occurs. On shaking down heaps of powder

there occur simultaneously (*a*) a breakdown of the bridges or arches, (*b*) movement of the particles towards the closest conjunction by mutual sliding and rotation, and (*c*) filling up of gaps between larger particles by smaller ones. The process of conjunction of the particles appears to be facilitated by the presence of suitable nuclei, e.g., large particles or more densely packed groups of particles, irregularities in the walls of the container, etc., which grow by close aggregation of the neighbouring particles. The flow structure in powders has been studied by using powdered bakelite arranged in layers of differently coloured particles, and fixing the powder after allowing a little to flow through an aperture or past an obstacle; the results are illustrated by photomicrographs. Some practical consequences of the observations are discussed. A. B. M.

Modern methods of purifying boiler feed-water. K. HOFER (Stahl u. Eisen, 1934, 54, 701—708, 729—731).—An account is given of purification by means of Na₃PO₄ and colloidal solutions, the effects of various softening agents on corrosion in the boiler, methods of producing protective films, methods of removing dissolved gases, methods of removing colloidal material which causes foaming, the effect of constructional details on the boiling of the H₂O, methods of avoiding caustic embrittlement, and methods of preventing scale formation in the condensers. A. R. P.

Kilns.—See VIII. **Beet diffusion. Clarification of sugar juice.**—See XVII. **Filtering materials for beer.**—See XVIII.

PATENTS.

Annealing and other heat-treatment furnaces. BIRMINGHAM ELECTRIC FURNACES, LTD., and A. G. LOBLEY (B.P. 415,423, 22.12.32).—Two lines of goods are caused to travel in opposite directions on live rollers. The internal atm. is drawn by a no. of fans downwards through the rollers carrying the ingoing goods and delivered upwards through the outgoing goods at an adjacent point for each fan. B. M. V.

[Boiler] furnaces. A. W. BENNIS (B.P. 416,146, 10.6.33).—A fire-grate composed of a no. of parallel troughs primarily designed for forced draught is provided with means for rapidly changing over to natural or induced draught. B. M. V.

Catalytic heater. F. A. HOWARD, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,948,298, 20.2.34. Appl., 3.10.31).—A catalytic heater comprises a closed vessel containing liquid fuel at const. level, a perforated shelf supporting the catalyst, a wick and mass of fibrous material, air inlet and gas outlet, and a coil for the liquid to be heated. B. M. V.

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

Catalytic apparatus. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,945,812, 6.2.34. Appl., 1.7.31).—In order that a bath-cooled catalyser may be operated with a temp. gradient, the vertical catalyst tubes are surrounded by the bath, which is of higher b.p. than the highest temp. desired, and vertical tubes conveying gaseous cooling medium (*M*) are placed in the bath so that the lower part may be cooler than the upper. *M* may be the ingoing gases to be treated. B. M. V.

Propagation of reactions. S. T. WILES, Assr. to BUFFALO ELECTRIC FURNACE CORP. (U.S.P. 1,946,252, 6.2.34. Appl., 30.11.31).—An apparatus serving simultaneously as electrode, furnace, reaction chamber, and means for admission of materials (*M*) and withdrawal of products comprises an elongated arc-electrode (*A*) which is also a conductor of heat and bored for the passage of *M*, the feeding movements of *A* and *M* being co-ordinated with the intensity of the arc. The furnace walls should also be of carbonaceous conducting material. A pair of such electrodes may be employed. B. M. V.

(A) **Apparatus for drying and heating slurry-like materials.** (B) **Rotary kiln plants.** J. S. FASTING (B.P. 416,082—3, 9.3.33).—Accessories to rotary kilns are described. (A) A pre-dryer comprises a no. of hanging bodies (*H*), comprising pieces of sheet Fe, chains, or the like, which are moved through the waste gases by a rotating spider or travelling conveyor, the slurry being spread on *H* at one part of the travel and jarred off at another point, the pasty or dry slurry passing into the kiln (*K*). (B) The clinker is cooled on a gas-permeable support within a fixed hood surrounding the lower end of *K*. The support itself may be moving or stationary; in the latter case the material is caused to travel by means of blades attached to the outside of *K*. B. M. V.

Apparatus for drying materials, particularly tea and other vegetable products. J. BRYDEN (B.P. 416,216, 27.11.33. Ceylon, 8.12.32).—A chain conveyor is described for conveying trays of tea through a dryer. B. M. V.

Dryer. F. L. FURBUSH, Assr. to C. G. SARGENTS' SONS CORP. (U.S.P. 1,947,338, 13.2.34. Appl., 11.5.31).—A dryer for unspun wool, cotton, or the like comprises a casing and conveyor (*A*), the circulation of air being upwards through the earlier part of *A* to a fan and heater, and downwards through a perforated diaphragm and the later part of *A*. B. M. V.

Drying oven. C. C. WILCOX, Assr. to STUDEBAKER CORP. (U.S.P. 1,946,923, 13.2.34. Appl., 27.10.30).—To eliminate fire hazard due to lacquer dust drying on a steam-pipe when the ventilating current is accidentally stopped, steam from the heaters or other non-supporter of combustion used as heat-transfer agent is automatically admitted to the oven. B. M. V.

Conditioning of spray-dried products. W. S. BOWEN (U.S.P. 1,946,566, 13.2.34. Appl., 18.3.31).—While upon the floor of the spraying chamber the dried powder is subjected to currents of conditioning gas admitted through a hollow agitator, e.g., chilled air for sugar or highly heated air for removing the H₂O of crystallisation from other substances. B. M. V.

Coil-tube heat-exchange apparatus for fluids. L. MELLERSH-JACKSON. From L'AIR LIQUIDE, SOC. ANON. POUR L'ETUDE ET L'EXPLOIT. DES PROC. G. CLAUDE (B.P. 416,096, 13.3.33).—In an exchanger comprising a no. of tubes for the inner fluid helically wound in an annular space containing the outer fluid, the coils are in layers alternately of opposite hand, reckoning in a radial direction. B. M. V.

Insulation or non-conducting coverings for heat and sound. CAPE ASBESTOS Co., LTD., and K. L. DE BOER (B.P. 415,769, 1.3.33).—Insulating slabs, sheets, half-round shells, etc. are formed of comminuted or fibrous insulating material, of rigid or semi-rigid consistency or made so by enclosure in a textile bag, and are finally completely covered with a metallic (e.g., Al) sheath the joints of which are sealed and secured by an adhesive which is resistant to the temp. attained in use. Metal foil may also be embodied in the interior. B. M. V.

Machine for grinding or pulverising and mixing moulding sand and other materials. J. E. GENNELLE (B.P. 416,180, 25.8.33. Fr., 1.9.32).—In a mill of the edge-runner type, between the grinding zone and the usual upstanding rim is placed a perforated circular wall (*A*) the apertures of which are smaller on the inside so as to perform a certain amount of disintegration by cutting as well as acting as screens. Scrapers are provided to guide the material under the millers, one of which is in substitution for part of *A* and returns screened material. B. M. V.

Pulverising machine. E. E. ELZEMEYER and H. C. GRIESEDIECK, Assrs. to AMER. PULVERISER Co. (U.S.P. 1,947,700, 20.2.34. Appl., 10.11.30).—Means of adjusting the concaves in a hammer pulveriser are described. B. M. V.

Separation of materials of different specific gravities. GEN. ELECTRIC Co., LTD. From T. CHANCE (B.P. 415,881, 26.7.33).—In the apparatus described in U.S.P. 1,937,190 (B., 1934, 704), the rotation of the sand pulp may be produced (or assisted) by injecting the pressure fluid tangentially. B. M. V.

Apparatus for separating granular material. A. A. HIRST (B.P. 415,509, 30.3.33).—A pneumatic or hydraulic jig is provided with longitudinal, laterally spaced bars upon the bed screens, the cross-section of the bars tapering upwards so that the action of the reciprocating fluid is stronger in the lower part of the bed than in the middle and upper parts. B. M. V.

Mixing of concrete and other granular materials. N. HARRISON (B.P. 415,379—81, [A—C] 21.1.33).—(A) A mixer comprising a rotary pan (*P*) is provided with two sets of bladed stirrers (*S*) rotating in opposite directions on shafts which are both eccentric to *P*. Kneading rollers are also provided, mounted either on some of the arms of *S*, or on fixed arms, so that they trail in *P*. (B) *P* is provided with a central discharge door (*D*) operated similarly to a cone clutch; after opening downwards, *D* is slid horizontally to leave the discharge aperture completely unobstructed. (C) A deflecting blade is automatically lowered into *P* to scrape the mixed material to the aperture. B. M. V.

Mixing apparatus. A. G. REED, Assr. to TRANSIT MIXERS, INC. (U.S.P. 1,945,868, 6.2.34. Appl., 6.2.32).—The charging boot of a concrete mixer (*M*) extends right into *M* when in the mixing position and is automatically withdrawn when *M* is tilted to discharge. B. M. V.

(A) **Mixing apparatus.** (B) **Production of [bloomed slag] constructional material.** R. C. NEWHOUSE (U.S.P. 1,947,487—8, 20.2.34. Appl., [A] 15.7.32, [B] 21.5.32).—To form a light aggregate for concrete, molten slag (*e.g.*) is introduced tangentially near the top of a rotating funnel, and powdered limestone or $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is distributed on the inside of the vortex.

B. M. V.

Mixing apparatus. J. E. JEWETT, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,947,851, 20.2.34. Appl., 31.1.30).—A mixer for two fluids (the term includes comminuted solids) comprises a vessel (*A*) from which one fluid, or the partly mixed fluids, is (are) withdrawn by an impeller device and returned through a Venturi throat delivering downwards, to which throat the other liquid is drawn in together with air or other gas to promote agitation by effervescence in *A*.

B. M. V.

Bowl separator. C. E. GISH (U.S.P. 1,947,844, 20.2.34. Appl., 23.3.31).—A centrifuge for use in, *e.g.*, the panning of Au comprises a bowl (*A*) provided with an intumed detachable rim (*B*) at its upper end or mouth and with detachable riffles (*C*) on its interior surface. The ore pulp is fed through a sleeve surrounding the shaft, while *B* and *C* are pressed down to make close contact with *A*; after sufficient concentrate has collected, *B* and *C* are lifted as a unit and the concentrate is discharged centrifugally.

B. M. V.

Precoating in filtration. E. STARITZKY, Assr. to DORR CO., INC. (U.S.P. 1,946,039, 6.2.34. Appl., 21.5.31).—In the filtration of by-products of maize-starch manufacture, claim is made for the principle of allowing coarser particles to reach the filter first. A rotary, internal drum filter is described.

B. M. V.

Revivifying filter clay. N. E. LEMMON and A. B. BROWN, Assrs. to STANDARD OIL CO. (U.S.P. 1,946,748, 13.2.34. Appl., 13.6.32).—The clay, after use in filtering oil, is treated with (1) an org. solvent to remove oil and (2) anhyd. inert gas (*e.g.*, refinery gas or products of combustion) to remove (1), and is then ignited or treated with a revivifying solvent.

B. M. V.

Sludge remover. D. W. TOWNSEND and J. BROWER, Assrs. to CHAIN BELT CO. (U.S.P. 1,947,429, 13.2.34. Appl., 4.12.29).—Settled sludge is collected at intervals, without previous raking towards the centre of the thickener, by rotating arms with suction nozzles well distributed over the floor.

B. M. V.

Resolution of loose emulsions. H. F. FISHER, Assr. to PETROLEUM RECTIFYING CO. OF CALIFORNIA (U.S.P. 1,947,704, 20.2.34. Appl., 24.5.30).—For agglomerating the flocs, a loose emulsion of, *e.g.*, oil and H_2O is withdrawn from the middle layer in a settling vessel, already containing upper and lower separated layers, and is pumped back against a negligible back-pressure into the H_2O layer, separation then taking place by gravity. The feed material may be pretreated between live and earthed electrodes.

B. M. V.

Vacuum pan control. W. L. SMITH (U.S.P. 1,948,052, 20.2.34. Appl., 15.9.32).—Electric-resistance thermometers are placed in the liquid being evaporated and in H_2O contained in a small adjacent evaporator, both being subjected to the same vac. and heated to boiling. The temp. difference may be indicated and/or caused to control a steam valve or the like. B. M. V.

Fractionating system. W. H. BAHLKE and E. W. THIELE, Assrs. to STANDARD OIL CO. (U.S.P. 1,947,577, 20.2.34. Appl., 21.5.31).—In a bubbling tower of the frothing type, the froth is permitted to overflow into compartments (at each stage) separated off from the main upflow of vapour; through these the down-flowing liquid passes and collects the liquid formed by the breaking of the froth.

B. M. V.

[**Fractionating**] **contact apparatus.** G. B. COUBROUGH, Assr. to LUMMUS CO. (U.S.P. 1,945,600, 6.2.34. Appl., 16.11.29. Renewed 12.7.33).—In a tower, each tray comprises a perforated shower plate and a superposed collecting plate and is provided with an individual pump for return of most of the liquid one stage up, the remainder passing down. The vapours are caused to pass transversely through the showers, and a method of causing all perforations to drip equally is claimed.

B. M. V.

Apparatus for utilising the waste heat of condensates. I. G. FARBEIND. A.-G. (B.P. 416,227, 14.12.33. Ger., 15.12.32).—The pressure of a condensate is not relieved until after passage through a heat exchanger (*A*) in which its heat is recovered; the automatic valve is operated by a float on the inlet side of *A*, whilst the actual valve is in the outlet pipe from *A*.

B. M. V.

Apparatus for forming crystals. L. PRIME (B.P. 415,899, 11.10.33. Belg., 12.10.32).—An apparatus (*C*) for making crystals by the saturation of a liquid with a gas [*e.g.*, $(\text{NH}_4)_2\text{SO}_4$] is described. The gas is led into *C* through a no. of injectors (*I*), each fed by a separate pipe. *I* are disposed helically in the body of *C*, the outlet from each one going partly to the next and partly to cause rotation of the liquid. It is claimed that *I* promote hydraulic classification of the crystals.

A. WE.

Purification of liquefied gases. LINDE AIR PRODUCTS CO., Asses. of W. F. MOELLER (B.P. 416,051, 3.3.33. U.S., 23.4.32. Addn. to B.P. 411,248; B., 1934, 659).—The gases, purified as described in the prior patent, are recondensed by heat exchange with a refrigerant, which may be drawn from the production cycle.

B. M. V.

Gas and fluid separator. H. A. WARD (U.S.P. 1,947,366, 13.2.34. Appl., 3.10.31).—A float-operated steam trap is described.

B. M. V.

Refrigeration and separation of gaseous products. L. S. GREGORY (U.S.P. 1,946,580, 13.2.34. Appl., 4.9.31).—A system is described in which the high-pressure gas is expanded through an engine which assists the plant, and the expanded gas is used in cooling the condensers.

B. M. V.

Refrigeration process and adsorbents therefor. G. C. CONNOLLY and (A) E. B. MILLER, (A) Assr. to C. F. HOCKLEY, Receiver for SILICA GEL CORP. (U.S.P.

1,947,381, 13.2.34. Appl., 6.12.30).—The refrigerant (*A*) is NH_3 or an amine in substantial absence of permanent gases and is adsorbed on a gel of SiO_2 or $\text{SiO}_2\text{-Al}_2\text{O}_3$ impregnated with a substance (*e.g.*, CaCl_2 , LiCl , or SrCl_2) capable of forming compounds with *A*. B. M. V.

Apparatus for recovery by adsorption of vapours or liquids or for separation of gases. E. R. SUTCLIFFE (B.P. 415,801, 6.2.32 and 2.6.33).—In an apparatus comprising an annular permeable casing containing adsorption filter medium (*A*) (or a group thereof), the ingoing gases are caused to gyrate in order to spread them evenly over the outer parts of *A*; any condensed vapour draining out of *A* is collected in a H_2O -seal, and that seal is blown by the regenerating hot gas (steam) which is passed through *A* in the reverse direction. B. M. V.

Gas analysis. J. D. MORGAN, ASSR. to DOHERTY RESEARCH Co. (U.S.P. 1,947,303, 13.2.34. Appl., 14.3.32).—Combustion gases (*e.g.*) are cooled to a definite temp. and caused to flow at a definite rate around a porous pot (*A*), the pressure within which is measured at the end of an automatically determined period; *A* is then automatically purged and a new cycle started. B. M. V.

Device for measuring the ratio of the ingredients in a mixture of gases or liquids. E. SCHWEITZER, ASSR. to I. G. FARBENIND. A.-G. (U.S.P. 1,947,923, 20.2.34. Appl., 29.4.32. Ger., 8.5.31).—The apparatus comprises a horizontal (transparent) tube (*T*) formed with a series of linearly spaced, small perforations (*P*) and surrounded by a collecting jacket. An easy- but closely-fitting ball is placed in the tube and the two fluids are admitted at opposite ends of *T* and leave by *P*, so that the position of the ball will be a measure of the relative flow of the fluids. B. M. V.

Apparatus for refining [vapours]. P. S. NISSON, ASSR. to GRAY PROCESSES CORP. (U.S.P. 1,948,126, 20.2.34. Appl., 21.1.29).—In the refining of, *e.g.*, petroleum vapours by polymerisation of the impurities in a solid adsorbent (*A*) into compounds of higher b.p. which are condensed, *A* is supported on a series of perforated diaphragms below each of which is another diaphragm acting as liquid-vapour separator, the former being drawn off at each stage. B. M. V.

Chemical container. [Vehicle for transport of solid carbon dioxide.] E. A. HULTS, ASSR. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,945,689, 6.2.34. Appl., 5.1.32).—The blocks of, *e.g.*, CO_2 are placed in narrow rows across the car, each row being separated by substantially gastight walls. B. M. V.

Hydraulic fluid. A. G. WEBER and R. B. SCHNEIDER, ASSRS. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,945,543, 6.2.34. Appl., 29.3.32).—Liquid oxygenated by-products (*A*), mainly alcohols of high mol. wt. from the synthesis of MeOH by hydrogenation, are mixed with an oil (*B*) of low m.p. and stable at high temp. A no. of mixtures of *A* of various b.-p. range and *B* of various compositions are claimed. B. M. V.

Manufacture of diaphragms for use in physical or like apparatus. C. CHILOWSKY and P. BRETON (U.S.P. 1,945,933, 6.2.34. Appl., 20.12.29. Fr.,

28.12.28).—A permeable backing member is stretched and held above the surface of a liquid (the simplest form of truly horizontal surface) at a definite distance < the desired thickness of the diaphragm. A solution of cellulose acetate is then poured on and allowed to set, the backing remaining embedded. B. M. V.

Composite bearing. P. C. HAAS (U.S.P. 1,946,790, 13.2.34. Appl., 18.1.32).—Woven cellulosic webbing is impregnated with < its own wt. of a fusible resin which is not rendered infusible by heat, *e.g.*, coumarone. It is desired that the fibres become exposed and wetted with the lubricant, *e.g.*, H_2O . B. M. V.

Drying finely-divided materials.—See II. **Treating [flaky] cellulosic materials.**—See V. **Thermostat.**—See X. **Removing particles from gases.**—See XI. **Concentrating fruit juices.**—See XIX.

II.—FUEL; GAS; TAR; MINERAL OILS.

Lancashire coalfield. Analysis of commercial grades of coal. I. ANON. (Dept. Sci. Ind. Res., Fuel Res., Survey Paper No. 33, 1934, 90 pp.).—Proximate analyses, calorific vals., S content, P content of the ash in grades used for coking purposes, caking indices, and the results of laboratory assays at 600° are recorded for a wide range of seams mostly from the Middle Coal Measures. The method of prep. of the coal, and its uses, as far as could be ascertained, are also given. A. B. M.

Bright and dull coals. H. BRÜCKNER and W. LUDEWIG (Brennstoff-Chem., 1934, 15, 301—305).—The coking properties of two non-caking and three caking coals, and of their bright and dull constituents, have been studied. The results of petrographic analyses of all the samples (*cf.* Stach, B., 1931, 617) are also given. The dull coals gave higher volatile matter contents by the crucible coking test than the corresponding bright coals. The yields of coke obtained from mixtures of the two constituents of a coal were somewhat lower than those calc. from the simple mixture law in the case of the non-caking coals, but considerably higher in the case of the caking coals; these deviations are attributed to a mutual interaction of the bitumens which modifies their behaviour on thermal decomp. The plastic curves obtained by Foxwell's method showed no pressure-resistance with the non-caking coals, or with their bright or dull constituents, and only the bright portion of the coking coals exhibited plastic properties. A. B. M.

Soluble constituents of bituminous coal. K. PETERS and W. CREMER (Angew. Chem., 1934, 47, 576—578).—The amount of sol. material obtained by extracting coal with C_6H_6 , CO_2 , etc. increases with increasing fineness of subdivision of the coal in such a manner as to confirm the assumption that the solvent penetrates only a surface layer of the coal of 0.5μ thickness. The coal must therefore be ground to μ fineness before all the sol. material can be extracted (*cf.* B., 1932, 1063; 1933, 578). The amount of extract obtained from brown coals, however, is almost independent of particle size. Grinding for 16 hr. *in vacuo* suffices to reduce a bituminous coal to μ size, although this may not be apparent under microscopical examination,

owing to "balling" together of the particles; this balling together, however, does not affect the subsequent extraction. Extraction with C_6H_6 proceeds initially at a rapid rate, after which the yield of extract becomes a linear function of log time; the fraction of the extract sol. in C_6H_{12} is removed completely in the initial period. The successive extracts vary from easily sol. oils to difficultly sol. shellac-like bitumens; the small differences in their elementary composition indicate that the components of bituminous coal differ more in their state of polymerisation than in their composition.

A. B. M.

Calculation of the ultimate analysis of coal from the proximate analysis. F. SCHUSTER (Brennstoff-Chem., 1934, 15, 309—311).—Korn's formulæ (Power, 1934, 78, 249) have been modified by using a slightly different form of the relation between C content and fixed C, by using Vondráček's or Schuster's form of the calorific vol. formula, and by assuming a N content of 1.5% for German coals and 2.0% for English coals. When applied to a series of 10 coals both the original and the modified formulæ gave results of sufficient accuracy for technical heat calculations.

A. B. M.

Chemical and microscopical detection of lignite dust in coal dust. F. ROLL and E. STACH (Giesserei, 1933, 20, 563—565; Chem. Zentr., 1934, i, 1424).—The dust is added to a molten resin, and a section of the solidified product is polished. The section is covered with oil and examined microscopically, when the lignite particles appear light on a dark background.

Production and temperature of stationary coal dust and coal dust-gas explosions. E. A. FUHRMANN and H. KÖTTGEN (Z. physikal. Chem., 1934, 169, 388—415).—An apparatus for burning a coal dust-air mixture as a steady flame at a jet has been used to study dust explosions on a laboratory scale. Whilst the explosiveness of a coal dust tends to run parallel with the gas content of the coal, it also depends on the nature of the chemical binding of the gas in the coal initially; coals with a high yield of gas may, on explosion, form at first products hindering explosion. The graph of flame temp., T , against distance from the jet, l , exhibits a max. followed, for the outer end of the flame, by a falling portion exhibiting more or less well-defined steps, which are taken to correspond with exothermic reactions. With increasing fineness of the dust the $T-l$ curve changes continuously into that corresponding with a gas-explosion flame, the max. becoming higher. The above form of $T-l$ curve, which seems to be a special characteristic of explosion flames, is also observed in the flame of a CH_4 -coal dust mixture. In this flame the paths of the incandescent dust particles can be directly observed, and an inner cone, outer cone, and intermediate zone distinguished. Reaction schemes for the various zones are suggested and used to account for the form of $T-l$ curve. The max. and mean T are max. for a flame with 8.3% CH_4 .

R. C.

"Thermax" process of low-temperature carbonisation. G. KROUPA (Petroleum, 1934, 30, No. 34, 1—2).—An externally-heated, vertical, cylindrical retort (R) is provided with a rotating, inner, concentric cylinder having a spiral screw on its outer surface, so that coal

which is fed in at the top of R is conveyed at a controllable rate down the annular space between the two cylinders. A slow rate of rotation is used, whereby the semi-coke is maintained in compact form and little dust is produced. The inner cylinder is perforated, the volatile products of carbonisation being withdrawn through the perforations into the cylinder and thence to an offtake. R is heated by circulating hot combustion gases around it; the fuel consumption for heating is small. The preferred temp. of carbonisation is 500—550°. A balance sheet shows the process to be economically sound.

A. B. M.

Effect of coking time on the properties of the coke and its suitability for foundry use. E. HOMBERG (Arch. Eisenhüttenw., 1934—5, 8, 49—56).—Coke suitable for use in cupolas and blast furnaces must be strong and hard, yet not brittle; this type of coke is fine-grained, and the pores are small and can readily be obtained in wide coke ovens by prolonging the coking time and reducing the max. coking temp. Although coke produced in this way undergoes crystal growth and further graphitisation in the Fe-melting furnace, it is relatively free from fissures into which the molten Fe and slag can penetrate, and therefore it does not crumble as the burden passes down the furnace; in addition it has a higher reactivity due to its regular fine-grained structure, and therefore accelerates the melting process.

A. R. P.

Dependence of the properties of coke on the conditions of its production. V. W. J. MÜLLER and E. JANDL (Brennstoff-Chem., 1934, 15, 305—309; cf. B., 1934, 130).—The adsorption isotherms and the rate of adsorption of CO_2 by the "model" cokes described previously (*loc. cit.*) have been determined, using a modified form of Agde's apparatus (A., 1927, 642). The amount adsorbed at 20° under a final pressure of 600 mm. Hg varied from nil with the coke carbonised for 8 hr. at 1100° to 130—145 c.c. for some of the 700° cokes; the corresponding vals. for two industrial coke-oven cokes, for a gas coke, and for a wood charcoal were nil, 11.8, 33.2, and 42.6 c.c. respectively. The adsorption isotherms were logarithmic curves. The rate of adsorption decreased with rising temp. of carbonisation, and with increasing time or increasing rate of carbonisation of the coke. No quant. correlation of the adsorptive properties of the cokes with their reactivities was possible, although, in general, a coke of high adsorptive power also exhibited a high reactivity.

A. B. M.

Bagasse carbon. J. F. WILLIAMS (Trop. Agric. [Trinidad], 1934, 11, 107—110).—Decolorising C is prepared by the low-temp. destructive distillation of bagasse followed by heating the ground residue to red heat in closed vessels for 2 successive periods of 6 hr.

A. G. P.

Combustion rate of carbon. Combustion at a surface overlaid with stagnant gas. H. DAVIS and H. C. HOTTEL (Ind. Eng. Chem., 1934, 26, 889—892).—Under the conditions cited previously (B., 1934, 786) the theory that the combustion rate (R) of C is controlled by diffusion has been confirmed by further work in which discs of various types of C were burned in the bottom of a straight-sided cup. The effect of cup

depth, gas velocity, and temp. on the rate of reaction were studied. For a given cup depth, *i.e.*, distance of diffusion of O_2 to the C surface, *R* differed for different types of C. As graphitisation increased, *R* decreased owing, it is suggested, to a lower $CO : CO_2$ ratio being set up at the C surface. Visual and photographic observations showed the presence of CO in the corona surrounding a burning sphere of C. C. C.

Removal of inert material from bone char. J. M. D. BROWN and W. A. BEMIS (Ind. Eng. Chem., 1934, 26, 918—920).—A machine is described by which the active particles of bone char are separated from inert material by a powerful current of air blown through a perforated vibrating table fitted with small baffles. The lighter particles are raised over the baffles, while heavy inert particles are discarded. The machine can be adjusted for varying *d* and degree of activity. Figures for colour and ash-adsorption vals. are given. E. B. H.

Lignite as a source of town's gas. A. SANDER (Chem. Fabr., 1934, 7, 331—336).—A review of published work on various large-scale trials in Germany. Lignite requires a lower temp. for carbonisation than coal or, alternatively, a shorter coking time. On the other hand, in almost all processes it requires preliminary briquetting and special provision must be made for cracking tar vapour. The crude gas usually contains about 20% of CO_2 , and this must be reduced to 5% by washing. Continuous vertical retorts and intermittent chamber ovens have been used, the latter with the greater success. Heavy steaming is practised and the cracking of tar vapour is effected by passage over red-hot coke, which, however, also causes decomp. of higher hydrocarbons. The gas produced has usually a calorific val. of about 4000 kg.-cal./cu. m. A specially designed retort works on the countercurrent principle, the gases being led back and through the retort against the charge. The temp. of several zones is controlled separately. Other proposals include use of O_2 instead of air, and carbonisation under pressure (10—20 atm.). C. I.

Simple method of technical gas analysis. H. SCHWIEDESEN and G. BARTH (Arch. Eisenhüttenw., 1934—5, 8, 15—20).—In the usual method of analysis of flue gases free from hydrocarbons high vals. for CO are frequently obtained owing to incomplete absorption of O_2 by the pyrogallol and subsequent absorption in the aq. Cu_2Cl_2 . To avoid this error it is recommended to mix a known vol. of air with the gas, remove the CO_2 with aq. KOH, pass the mixture over a glowing Pt spiral to burn the CO, again remove the CO_2 with aq. KOH, add a known vol. of H_2 , and again pass the gas over the spiral. The method can also be used for combustible gas containing hydrocarbons provided that the calorific val. and moisture content are determined and a standard curve is constructed. Apparatus for making the analysis is described and expressions are given for calculating the results. A. R. P.

Examination of asphalt found in excavations at Mohenjo-Daro (Indus Valley). F. J. NELLESTEYN (Chem. Weekblad, 1934, 31, 543—546).—A bituminous waterproofing material from these excavations (*ca.*

3000 B.C.) consisted of an artificial mixture of asphaltic bitumen of Mesopotamian origin, clay, and gypsum and contained org. matter 28.3% (29.3% sol. in CS_2 , 85.5% sol. in C_5H_5N , S content of the combined extracts 7.1%) and inorg. matter 71.7% (SiO_2 + insol. 55.1, Fe_2O_3 + Al_2O_3 11.2, $CaSO_4$ 13.7, $CaCO_3$ 8.9, CaO 4.8, $MgCO_3$ 4.2%, V and Ni traces). S. C.

Determination of coke in acid tars. E. L. LEDERER (Petroleum, 1934, 30, No. 34, 3).—In determining the coke content by subtracting the ash from the CS_2 -insol. material large errors may arise, unless suitable correction is made, due to the different form in which the material represented by the ash may exist in the original acid tar; *e.g.*, $FeSO_4 \cdot 7H_2O$ in the tar would appear as Fe_2O_3 in the ash. A. B. M.

Viscosity measurement with the road-tar consistometer. W. EYMANN (Teer u. Bitumen, 1933, 31, 325—326; Chem. Zentr., 1933, ii, 3794).—Irregularities in the measurements are eliminated by preheating the tar to 50°. H. J. E.

Use of gum inhibitors in the refining of motor fuels. W. H. HOFFERT and G. CLAXTON (Proc. World Petroleum Congr., 1933, 2, 69—76).—The application of inhibitors to motor fuels, with particular reference to motor benzol, is described and the advantages of such treatment over the usual acid-washing process are summarised. E. S.

Mechanism of gum formation in cracked gasoline. Formation of peroxide, aldehyde, and acid in storage. C. G. DRYER, C. D. LOWRY, JUN., J. C. MORRELL, and G. EGLOFF (Ind. Eng. Chem., 1934, 26, 885—888).—Peroxides (I) were determined by the thiocyanate method of Yule and Wilson (B., 1932, 7), aldehydes (II) by comparing the colour imparted to a special Schiff's reagent with that of standard aldehyde solutions, and acids (III) by titrating the aq. extract of the gasoline (B., 1930, 894). (I), (II), (III), and gum (IV) were determined at intervals on five cracked gasolines and on samples of one gasoline containing inhibitors, stored for a year. (I) were the first deterioration product to appear, followed by (II) and (III), (III) forming at a much slower rate. It is concluded that the formation of (IV) is closely linked to the concn. of (I) and that (II) and (III) are merely secondary products formed from (I). Inhibitors only retard the deterioration, the reactions which occur being the same as in uninhibited gasolines. C. C.

Motor benzol. W. H. COLEMAN (Proc. World Petroleum Congr., 1933, 2, 753—756).—The production, characteristics, and uses of this fuel are reviewed. E. S.

Paraffin hydrocarbons in commercial benzene. G. GOETSCH (Verfkroniek, 1933, 6, No. 12, 14—19; Chem. Zentr., 1934, i, 1265).—5 c.c. of the sample are mixed with 25 c.c. of 95% EtOH in a special shaking flask, and the paraffin content is determined by addition of H_2O from a burette until the liquid is permanently turbid. H. J. E.

Formation of gas hydrates in natural-gas transmission lines. E. G. HAMMERSCHMIDT (Ind. Eng. Chem., 1934, 26, 851—855).—“Freezing” in natural-gas

systems may be due to the formation of gas hydrates (I). A study of (I) showed that this formation depended primarily on the temp., pressure, and composition of the gas-H₂O mixture. High velocity of the gas stream, pressure pulsations, and inoculation with a crystal of (I) all tended to promote the reaction. The m.p. depends on the pressure and varies between 1.1° at 110 lb. per sq. in. and 15.5° at 800 lb. per sq. in. The v.p. of (I) is < that of liquid H₂O at the same temp., hence the dew point of the gas is depressed in presence of (I). The fugacity of (I) was calc. Analysis showed that C₃H₈ and *iso*-C₄H₁₀ were conc. in (I). Hydrates were prepared from pure paraffin hydrocarbons up to C₃H₈ and *iso*-C₄H₁₀ and their m.p. determined. *n*-C₄H₁₀ and higher hydrocarbons did not form (I) under the conditions existing in a pipe-line. Deductions are made as to the complexity of the various gas-hydrate mols.

C. C.

Knock of fuels and its prevention. IV. Alcohol as an anti-knock material. E. ENDO (J. Fuel Soc. Japan, 1934, 13, 79; cf. B., 1934, 487).—A motor fuel of suitable anti-knock val. and vaporisation properties for aviation purposes is obtained by adding 15–20% of EtOH to gasoline. The EtOH should be of 98% purity; the stability of the mixture is improved by adding 2–5% of Et₂O. In respect of anti-knock val. 15% of EtOH is equiv. to 30% of benzol when the fuels are examined in the Armstrong engine. The power output and fuel consumption of the EtOH-gasoline mixture are nearly the same as those of the same gasoline blended with benzol or containing PbEt₄. The EtOH-gasoline mixtures are suitable for aero-engines of compression ratios 6.0–6.5:1; with those of higher ratios (7.0–7.5:1) a mixture containing EtOH 15–20, motor benzol 40, and gasoline 45–40% is recommended.

A. B. M.

Ignition quality of fuels for compression-ignition engines, and proposals for its determination. R. STANSFIELD (Proc. World Petroleum Congr., 1933, 2, 256–261).—The development of tests for the ignition quality (*I*) is outlined. Tests were made on a modified L.W.-type Gardner single-cylinder engine using a wide range of fuels, and also cetene-1-C₁₀H₇Me blends and blends of sub-standard fuels. The delay angle between the moment of lift of the spray valve and the beginning of rapid pressure rise in the cylinder was taken as a measure of *I*. It is concluded that the types of fuel at present on the market are relatively unaffected by engine conditions. No important relative alteration in *I* was observed. Fuels doped with EtNO₃ show very marked changes in *I* with alteration of engine conditions. Starting tests gave results in good agreement with the running tests, and, because of their simplicity, it is suggested that they should, at present, be adopted as a means of rating. A temp.-sensitive fuel can be detected by making this test at two widely different engine temp.

E. S.

Volumetric determination of the combustible constituents H—O/8 and C in solid and liquid combustibles. HELLMANN (Feuerungstechn., 1933, 21, 136–138; Chem. Zentr., 1933, ii, 3943).—Two types of apparatus are described for the combustion of a fuel

in O₂ and the determination of CO₂ and H₂O in the gaseous product.

H. J. E.

Acids of montan wax. D. HOLDE and W. BLEYBERG (Brennstoff-Chem., 1934, 15, 311–312).—Tropsch and Stadler's results (cf. B., 1934, 741) cannot be accepted as refuting those of the authors, partly because a different initial material was used. That the acid which was isolated from montan wax was actually C₂₈H₅₆O₂ has been established by determining the m.p. of mixtures of the acid with the corresponding synthetic acid and its neighbouring homologues.

A. B. M.

Phase equilibria in hydrocarbon systems. IV. Solubility of propane in two different oils. B. H. SAGE, W. N. LACEY, and J. G. SCHAAFSMA (Ind. Eng. Chem., 1934, 26, 874–877; cf. B., 1934, 707).—The solubilities of C₃H₈ gas (I) in each of two oils and the resultant changes in properties have been examined at temp. from 21.1° to 93.3°, and pressures up to 70% of the v.p. of (I) at each temp. The oils used were a crystal oil (II) and a blend from Santa Fé crude, the latter sample having an appreciable v.p. The solubility of (I) increases rapidly as its partial pressure approaches that of pure C₃H₈. The apparent *d* of the absorbed (I) is > that of pure liquid C₃H₈. The molal composition of saturated solutions of (I) at the same temp. and partial pressure is practically the same for each oil. Total pressures and viscosities of the solutions have also been examined. (I) dissolved in (II) appears to obey the ideal solution laws. At the lower temp. the heat of dissolution (III) of (I) in (II) is comparable with the heat of condensation (IV), but as the crit. temp. of (I) is approached (III) is > (IV).

C. C.

Emulsions of triethanolamine with kerosene and mineral lubricating oils. J. RISI and H. BERNARD (Canad. J. Res., 1934, 11, 247–248).—Details are given of the prep. of such emulsions in a stable form. Their physical properties, flash point, stability, and corrosive properties are described, whilst the coeff. of friction for those of the second type is compared with that of a mineral lubricating oil.

H. N. R.

Phenol as a selective solvent in the refining of lubricating oils. R. K. STRATFORD, H. H. MOOR, and O. S. POKORNY (Proc. World Petroleum Congr., 1933, 2, 362–369).—By the use of anhyd. PhOH as a selective solvent it is possible to produce, economically, high-grade lubricating oils from comparatively low-grade flash oil distillates. Pronounced improvements are produced in viscosity index, C residue, Slight oxidation, and S content. The plant of the Imperial Oil Refineries at Sarnia, Canada, is described and results and average normal operating costs when treating Colombian distillates are given. PhOH treating expenses are low and definite savings are shown in cost of finishing as compared with the acid and clay method of treatment.

E. S.

Heating large furnaces. Structure of powders in bulk.—See I. Reduction of CO₂ by C.—See VII. Oiling earth roads.—See IX. H₂O-seal gasometers. Plastics from coal.—See XIII. Tar distillates as insecticides.—See XVI. Determining phenols in H₂O etc. Disposal of refinery waste H₂O. Determining C₁₀H₈ in insecticides.—See XXIII.

PATENTS.

Treatment of carbonaceous materials with reducing gases. H. DREYFUS (B.P. 414,445, 24.2.33).

—Solid carbonaceous material, *e.g.*, bituminous coal, is impregnated with 10–20% of an oxy-acid of P, or a salt thereof, *e.g.*, $(\text{NH}_4)_2\text{HPO}_4$, and is then subjected to the action of H_2 or other reducing gas at an elevated temp. (450°) under atm. pressure. The coal is converted largely into liquid and gaseous products, which, if desired, may be cracked, preferably in the vapour phase, under conditions favouring the production of the lower olefines. The solid residue is washed with H_2O or aq. NH_3 to recover the oxy-acid for use again.

A. B. M.

Manufacture of fuel briquettes from carbonaceous material. A. A. ROBERTS (B.P. 414,361—9

and 414,672, [A—H] 26.10.32, [I, J] 29.10.32).—(A) Powdered coal, coke, etc. is mixed with $\gt 5\%$ of hydraulic cement, which is then distributed throughout the granules of the mass of coal by mixing-in an approx. equal wt. of H_2O , and the mixture is briquetted under pressure. An aq. emulsion (*E*) of bitumen may be added with the H_2O , the amount of H_2O then used, including that in *E*, being $1\frac{1}{2}$ times the wt. of cement and bitumen. A combustion-promoting agent, *e.g.*, H_3BO_3 , and an alkali chloride (NaCl) may be dissolved in *E*, if desired. (B) Briquettes in which a bituminous or other org. binder is used are baked after being moulded and the volatile products evolved are condensed on fresh quantities of the powdered material to be briquetted. (C) Coal etc. is mixed with $\gt 3\%$ of hydraulic cement and $\gt 7\%$ of naturally occurring bitumen, in the form of an emulsion, and is briquetted. The cement may be ground-in with a proportion or with the whole of the coal in its reduction to the desired granular size. (D) Processes described under (A) and (C) may be combined. (E) The proportions of cement and of the H_3BO_3 added to the briquettes are adjusted in accordance with the amount and composition of the ash of the coal in such a manner as to prevent any slagging during combustion and to compensate for the retarding effect of the added cement on the combustion. (F) The rate of combustion of briquettes made from powdered coal or coke etc. is controlled by adding an amount of an inert binder in excess of that necessary for the bond and maintaining the temp. of combustion at least at its previous val. by adding a B compound as a combustion accelerator. (G) In making briquettes from coal which is liable to swell during combustion the proportion of volatile matter in the coal is reduced prior to briquetting, *e.g.*, by preheating or by admixture with a low-volatile coal, and $\gt 1\%$ of H_3BO_3 is added. In addition higher moulding pressures may be employed. (H) The B compound used, preferably H_3BO_3 or a sol. borate, is added in amount just short of that sufficient to cause slagging of the ash. (I) When hydraulic cement is used as a binder the briquettes are moulded within the setting time of the cement in contact with the H_2O . (J) The briquettes are rendered suitable for combustion under forced instead of natural draught by employing moulding pressures $\gt 4000$ lb./sq. in., or $\gt 2500$ lb./sq. in. when the pressure is applied for $\gt \frac{1}{4}$ sec. It may be advantageous to increase slightly the proportions

of cement, bitumen, and combustion-promoting agent used, and to use pressures $\gt 5000$ lb./sq. in. [Stat. ref. to (J).]

A. B. M.

Aqueous dispersions of carbon black. DEWEY &

ALMY, LTD. (B.P. 414,932, 7.11.33. U.S., 28.11.32).—C black is dispersed in H_2O containing 2–8% (calc. on the wt. of C) of a sol. salt of a compound obtained by condensing an aromatic sulphonic acid ($2\text{-C}_{10}\text{H}_7\text{-SO}_3\text{H}$) with CH_2O .

A. B. M.

Oxidisation-resisting carbon article. H. V.

JOHNSON, Assr. to NAT. CARBON CO., INC. (U.S.P. 1,948,382, 20.2.34. Appl., 2.9.31).—A body predominantly of C is provided with a coating 0.01–0.05 in. thick of SiC or SiOC and glazed with NaF or CaF_2 , containing also the oxide(s) of ≤ 1 of the following: B, Si, Al, P, Mg, Ca.

B. M. V.

Removal of carbon deposits [from the cylinders of internal-combustion engines]. W. G. LOVELL and

T. A. BOYD, Assrs. to GEN. MOTORS RESEARCH CORP. (U.S.P. 1,936,681—2, 28.11.33. Appl., [A] 28.8.29, [B] 10.12.30).—The cylinders are washed with a mixture containing (A) a terpene hydrocarbon, or (B) a derivative of furfuryl alcohol, preferably at 65° . Preferred compositions are: (A) carvene 40, C_6H_6 30, and EtOH 30%, (B) Me furoate 50, C_6H_6 25, EtOH 25%.

A. R. P.

Apparatus for removing oil from thermatomic carbon [or drying finely-divided material]. C.

MILLER, Assr. to THERMATOMIC CARBON CO. (U.S.P. 1,947,789, 20.2.34. Appl., 3.11.30).—A rotary cylinder for drying is superposed over one for cooling, the drying being effected by hot inert gases and the cooling by a jacket.

B. M. V.

Retorts for low-temperature distillation of coal or the like. A. GUAGNINO (B.P. 414,972, 6.2.34. Fr.,

21.2.33).—The retort (*R*) comprises a fixed, vertical, tapered outer member (*O*), with its narrower end uppermost, and a co-axial inner member (*I*), tapered in the opposite direction and movable vertically. *R* is heated externally. *I* is slightly raised before charging; when the coal has been charged into the annular space between *O* and *I*, *I* is forced down, thereby compressing the charge. When carbonisation is complete the coke is released by raising *I* and is discharged through the door at the bottom of *R*.

A. B. M.

Low-temperature distillation of coal. A. V.

ABBOTT (U.S.P. 1,943,291, 16.1.34. Appl., 4.2.31).—Coal is passed through three retorts, preferably of the horizontal, rotary type (cf. U.S.P. 1,708,740; B., 1929, 505), which are connected in series and are heated at successively higher temp., *e.g.*, $300\text{--}600^\circ$, $650\text{--}750^\circ$, and $800\text{--}900^\circ$, respectively. The coke is passed through a cooling zone as it is conveyed from one retort to another. The gaseous and liquid by-products are withdrawn separately from each retort. The hot coke is quenched with H_2O before it is discharged from the third retort, the gases thereby produced being withdrawn with the gaseous by-products.

A. B. M.

Coking of bituminous material. E. O. RHODES, Assr. to AMER. TAR PRODUCTS CO. (U.S.P. 1,942,978, 9.1.34. Appl., 9.2.29).—Tar, pitch, or similar material is carbonised in coke-oven chambers (*C*) by spraying the

liquefied material into *C* together with superheated steam or other inert gas. A. B. M.

Apparatus for coking of bituminous liquids and the like. L. C. KARRICK (U.S.P. 1,942,650, 9.1.34. Appl., 11.4.30).—Pitch, bitumen, etc. is carbonised in thin layers by means of radiant heat, *e.g.*, by passing flexible metal supports, *e.g.*, chains (*C*), through a reservoir of the material and then vertically up or down through an externally-heated retort (*R*). The layer of coke produced is flaked off *C* by passing them around sheaves of small radius, and is withdrawn from *R*.

A. B. M.

(A) Combined [gas] generator and purifier. (B) **Apparatus for purifying gas.** W. J. HUFF, L. LOGAN, and O. W. LUSBY, (B) Assrs. to W. J. HUFF (U.S.P. 1,947,778—9, 20.2.34. Appl., [A] 25.4.30, [B] 17.7.31).—(A) S is eliminated from hot combustible gas, manufactured by a cyclic process, by metals and oxides of groups V, VI, or VII in promoter contact with Cu, Ag, Fe, Ni, Co, Pb, Sn, Sb, or their oxides, the reagent being adjacent the carburetting and heat-transfer surfaces of the plant. Air for revivification is admitted during the heating periods of the generator. (B) This air is automatically regulated by the O₂ content of gases passing out. An intermediate spray-cooler may be inserted. (Cf. B.P. 305,026; B., 1930, 1012.) B. M. V.

Gas purification. (A) C. DAVIES, JUN., (B) F. W. SPERR, JUN., Assrs. to KOPPERS CO. OF DELAWARE (U.S.P. 1,942,050 and 1,942,072, 2.1.34. Appl., [A] 7.5.31, [B] 3.9.28).—(A) The gas is washed first with an aq. suspension of S to remove HCN and then with aq. FeSO₄ (waste pickling liquor), which removes H₂S and part or all of the NH₃. The pptd. FeS is treated with an acid or acid compound to liberate H₂S, which is converted, in known manner, into free S for the production of the aq. suspension used in the first stage, and (NH₄)₂SO₄ is recovered from the solution. (B) Coke-oven gas etc. is purified, cooled, treated with a dehydrating agent, *e.g.*, aq. CaCl₂, and then oil-scrubbed to remove C₁₀H₈. The sprays used for oil-scrubbing are designed to leave a small amount of oil fog in the gas.

A. B. M.

Distillation of tar. (A) J. M. WEISS, (B) S. P. MILLER, Assrs. to BARRETT Co. (U.S.P. 1,942,195 and 1,942,371, 2.1.34. Appl., [A] 30.9.26, [B] 23.3.28. Renewed [A] 8.11.30).—(A) Tar is distilled in a stream of coke-oven or similar fuel gas, which is withdrawn from the main stream of gas leaving the coke-oven plant and is returned thereto after condensation of the tar distillates. The gas so returned carries with it a proportion of uncondensed light oil vapours; these may be left in the gas to enrich it, or the combined gas streams may be passed to an absorption system for light oil recovery. (B) Hot coal-distillation gases, *e.g.*, gases taken directly from the collector main of a coke-oven battery, are passed up through a supply of the tar and the resulting gases and vapours are cooled to condense oils therefrom. The distillation may be controlled to leave either a light or a heavy pitch in the still.

A. B. M.

(A) Distillation of tar and recovery of oils with apparatus therefor. (B) **Coal and tar distillation.**

S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,942,374—5, 2.1.34. Appl., [A] 31.8.29, [B] 11.12.29).—(A) Tar is distilled to pitch of high m.p. by being brought into intimate contact with hot coal-distillation gases, and the gases and vapours formed are partly cooled by mixing with a regulated quantity of oil and then further cooled to condense the remaining oils therein. The process is so regulated that the high-boiling greasy and resinous constituents are separated in the first stage of condensation. (B) The tar from a coke-oven battery is distilled by being brought into intimate contact with part of the hot distillation gases. The pitch so formed is coked in some of the ovens of the battery. A. B. M.

(A) Distillation of tar etc. (B) **Operation of the by-product recovery system of a coal-distillation plant.** (c) **Recovery of tar acids.** S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,944,129—31, 16.1.34. Appl., [A] 30.8.29, [B] 25.9.29, [C] 19.4.30).—(A) The volatile products from a coal-carbonisation plant are condensed in stages. The first stage, which is effected in the collector main, gives a heavy tar suitable, either alone or blended with water-gas tar etc., for road-construction purposes; the blending may be effected in the main, the water-gas tar then serving also as the flushing and cooling agent. The gases and vapours leave the main at a higher temp. than usual. The second cooling stage, effected in the condensers, gives a tarry oil which is subsequently distilled to pitch. The distillate, either alone or blended with undistilled tarry oil, is suitable for creosoting purposes. Apparatus is described. (B) The pitch from the tarry oil is blended while still hot with the heavy tar to produce fuel. (c) The distillate from the tarry oil, which is relatively high in tar acid content, is treated for the recovery thereof. A. B. M.

Distillation of tar or pitch. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,947,485, 20.2.34. Appl., 9.8.29).—Tar is distilled by spray-contact with hot gases from the carbonisation of coal in two counter-current stages, the residue from the hottest still being substantially only tar coke. B. M. V.

Asphalt from blown petroleum residuums. C. P. McNEIL, Assr. to STANDARD OIL Co. (U.S.P. 1,942,656, 9.1.34. Appl., 9.12.29).—The apparatus comprises a pipe still (*S*), flash tower (*T*), and reaction chamber (*C*), etc. The hot residuum leaving *T* is intimately mixed with air and passed through *C*. The reaction temp. is controlled by passing a regulated amount of the feed stock through cooling tubes in *C*, which thus acts also as a preheater for the material fed to *S*. A. B. M.

Preparation of creosoting compositions. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,942,373, 2.1.34. Appl., 30.8.29).—Tar is sprayed into the hot coal-distillation gases from a coke-oven or retort plant, which are thereby enriched and at the same time partly cleaned, the process being so regulated that the tarry oil produced on subsequently cooling the vapours contains > 2% of free C and is suitable for use as a creosoting composition. A. B. M.

Removal of phenols from ammonia liquors. H. B. COBB, Assr. to SEMET-SOLVAY Co. (U.S.P. 1,943,653,

16.1.34. Appl., 26.1.28).—The liquor is passed through scrubbing towers (*T*) countercurrent to a suitable extracting medium, preferably the crude light oil recovered from the coal-carbonisation plant itself, the phenolated light oil being then extracted with aq. NaOH and recirculated. The liquor is sprayed on to the surface of the light oil in *T* so that it passes down through the oil in a finely-dispersed form. A. B. M.

Production of liquid hydrocarbons for use as motor spirit. M. P. APPLEBEY, C. COCKRAM, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 415,792, 3.3.33).— C_2H_4 at 40 atm. and room temp. is condensed by heating at 400° with a mixture of liquid hydrocarbons rich in naphthenes (produced in the liquid-phase hydrogenation of coal) in presence of a heavy-metal oxide, e.g., Mo oxide. The product has a naphthene content < that of the original liquid and is suitable for use as a motor spirit. D. K. M.

Production of motor spirit. G. F. HORSLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 415,793, 3.3.33).—Motor spirit rich in paraffins (I) and/or naphthenes (II) is brought into contact with V oxide in the vapour phase at 300–500°, whereby much of the (I) and (II) is converted into unsaturated and/or aromatic hydrocarbons with practically no loss of wt. or calorific val. D. K. M.

Stabilisation of anti-knock compounds in motor fuels. I. G. FARBENIND. A.-G. (B.P. 414,581, 15.1.34. Ger., 14.6.33).—Decomp. of $PbEt_4$ present in the fuels is prevented by the addition of a small amount, e.g., 0.01–0.05%, of NaF, KF, or NH_4F . A. B. M.

Lubricating oil. (A) A. HENRIKSEN and B. H. LINCOLN, (B–D) B. H. LINCOLN and A. HENRIKSEN, ASSRS. to CONTINENTAL OIL Co. (U.S.P. 1,939,979 and 1,939,993–5, 19.12.33, Appl., [A] 26.1.33, [B] 14.7.32, [C, D] 25.7.32).—A lubricating oil of high "film strength" is obtained by adding to a hydrocarbon lubricating oil a small proportion, e.g., 1%, of (A) a product made by condensing, e.g., in presence of anhyd. $AlCl_3$, $(C_6H_5)_2O$ with a halogenated org. acid, e.g., dichlorostearic acid, (B) a condensation product of a halogenated fat, ester, or glyceride, etc. with an aromatic hydrocarbon, (C) a condensation product obtained by treating a chlorinated fatty acid and/or ester etc. with an alkaline condensing agent, e.g., NaOEt, or (D) a halogenated wax–halogenated org. acid condensation product. A. B. M.

Lubricating oils. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 415,065, 12.12.32 and 17.2.33).—The addition of a resin (0.2%), prepared by condensing soft paraffin wax or its chlorinated derivative with $C_{10}H_8$ in presence of an anhyd. chloride, e.g., $AlCl_3$, and a halide of a metal of group I or II, e.g., NaCl, at 20–200°, using middle oil with boiling range 180–300° as a diluent, to a lubricating oil improves its setting point and imparts a fluorescence. (Cf. B.P. 349,071 and 409,696; B., 1931, 832; 1934, 664.) D. K. M.

Treatment of hydrocarbon oils. L. C. HUFF, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,948,713–4, 27.2.34. Appl., [A] 10.11.30, [B] 15.11.30).

Treating hydrocarbon oils. H. P. PARRIGIN and R. P. CURRIE, ASSRS. to TEXAS Co. (U.S.P. 1,948,003, 20.2.34. Appl., 2.8.29).

Treatment of hydrocarbon vapours. W. F. SIMS and V. U. CLOER, ASSRS. to PANHANDLE REFINING Co. (U.S.P. 1,948,890, 27.2.34. Appl., 16.2.28).

Treatment of vapour-gas mixtures. R. PYZEL, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,948,595, 27.2.34. Appl., 30.3.33).

Oil emulsion treating apparatus. J. B. TURNER (U.S.P. 1,948,481, 20.2.34. Appl., 13.5.33).

Processing of hydrocarbon oils. J. C. BLACK (U.S.P. 1,945,508, 6.2.34. Appl., 21.1.30).

Oil refining. J. S. WALLIS, ASSR. to FOSTER WHEELER CORP. (U.S.P. 1,945,581, 6.2.34. Appl., 12.7.30).

Revivifying filter clay. Resolving emulsions. Fractionation. Refining vapours.—See I. sec.-Alcohols—See III. Asphalt pavement.—See IX. Corrosion-resisting coatings.—See XIII. Gas-meter leathers.—See XV. Wax-emulsion coating for fruits etc.—See XIX.

III.—ORGANIC INTERMEDIATES.

Manufacture of concentrated acetic acid. M. KLAR (Chem.-Ztg., 1934, 58, 777–780).—A review of modern methods.

Silver consumption in the activation of acetic acid. STEINMETZ (Deuts. Essigind., 1933, 37, 314–316; Chem. Zentr., 1933, ii, 3926).—The process follows Faraday's law of electrolysis. For normal operation a val. of 0.1 mg./litre/%/hr. is sufficient. For new plant the val. is 30% higher. H. J. E.

Determination of citric acid as pentabromoacetone and its application to wine. O. REICHARD (Z. Unters. Lebensm., 1934, 68, 138–172; cf. B., 1926, 687).—Quant. yields of pentabromoacetone are obtained by the Stahre method when the ratio of the amounts of citric acid (I), Br, and KBr is 1 : 2 : 3. The optimum temp. is 5°. Malic, lactic, tartaric, and acetic acids and glycerol do not interfere, but more KBr is required. If > 0.5% of sugar is present it must be removed or the (I) separated as the Br salt before bromination. Details for the determination of (I) in wine are given. E. B. H.

Nitrification [and NO_2' determination].—See XVI. Determining aldehyde [in spirits]. EtOH purification.—See XVIII. Colorimetric determinations with the Zeiss step-photometer.—See XIX. Determining phenols in H_2O etc. Determining $C_{10}H_8$ in insecticides.—See XXIII.

PATENTS.

Separation of olefines [ethylene from propylene]. BRIT. CELANESE, LTD., and W. H. GROOMBRIDGE (B.P. 415,766, 1.3.33).—The mixed gases are passed through 70–90% aq. H_2SO_4 at 15–25°/10–30 atm., H_2O being added as absorption proceeds in order to maintain a const. concn. of the acid phase. C_3H_6 only is absorbed. H. A. P.

Hydration of olefines. DISTILLERS Co., LTD., W. P. JOSHUA, H. M. STANLEY, and J. B. DYMCK (B.P. 415,426–7, [A, B] 24.1.33).—(A) C_2H_4 and (B) higher

olefines (C_3H_6 and C_4H_8) are hydrated to the corresponding alcohols by passage with steam over phosphates of Ca, Ba, Sr, or Mg (or mixtures) intermediate in composition between ortho- and meta- [+ (B) B phosphate] at 100–350° (> 150°)/ > 250 atm. H. A. P.

Separation of diacetylene from gases containing acetylene. RUHRCHEMIE A.-G. (B.P. 415,377, 17.1.33. Ger., 5.2.32).—The gases are treated with ketones ($COMe_2$) and mixtures with similar solvent properties in amounts insufficient to dissolve all the C_2H_2 (in counter-current) at –30° to 0°. The C_4H_4 is dissolved preferentially. H. A. P.

Simultaneous and continuous dehydration and rectification of raw ethyl [propyl, or butyl] alcohol. O. VON KEUSSLER and D. PETERS (U.S.P. 1,935,529, 14.11.33. Appl., 13.1.30. Ger., 19.1.29).—Raw 90–96% alcohol is distilled with C_6H_6 in a dehydrating column the distillate from which is separated into two layers, one containing practically all the C_6H_6 , which is used over again, and the other consisting of impure aq. alcohol. The latter is passed to a rectifying column, from which low- and high-boiling impurities are collected separately, whilst the rectified spirit is returned to the first column for dehydration. The dehydrated alcohol is freed from remaining traces of C_6H_6 in a further column and is finally distilled from its high-boiling impurities. J. H. L.

Separation of sec.-alcohols from acid liquors. B. T. BROOKS, Assr. to STANDARD ALCOHOL Co. (U.S.P. 1,944,400, 23.1.34. Appl., 3.5.32).—The product from interaction of crude C_3 – C_6 olefines (e.g., from cracked petroleum) with aq. H_2SO_4 is allowed to stratify, and the upper (polymeric) hydrocarbon layer separated and distilled (in steam) until all sec.-alcohol (I) dissolved in it has passed over. Separation of (I) from the acid liquors is carried out separately in the usual way. H. A. P.

Manufacture of oxalic acid and esters thereof. E. I. DU PONT DE NEMOURS & Co. (B.P. 415,472, 27.2.33. U.S., 27.2.32).—A suspension of an alkali oxalate ($Na_2C_2O_4$) in a lower aliphatic alcohol (MeOH) is treated with an inorg. acid. H. A. P.

[Production and] purification of succinic acid. J. A. BERTSCH and A. H. KRAUSE, Assrs. to MONSANTO CHEM. Co. (U.S.P. 1,945,175, 30.1.34. Appl., 2.5.30).—Maleic acid is reduced electrolytically until approx. 97% is converted into succinic acid, which is purified by oxidation with alkaline $KMnO_4$, followed by addition of a decolorising agent (C) and filtering. H. A. P.

Separation of organic dibasic acids. H. W. WITZEL, Assr. to SELDEN Co. (U.S.P. 1,945,246, 30.1.34. Appl., 26.9.30).—Acids of approx. equal solubility in H_2O are separated by partial neutralisation of their aq. solution with an alkali and crystallisation of a H salt. Thus, e.g., maleic (I) and phthalic acids from air-oxidation of C_6H_6 are separated by crystallisation of Na H maleate (II), and (I) and tartaric acid (oxidation of furfuraldehyde) as K H tartrate, followed by (II). H. A. P.

Production of maleic or phthalic anhydride. A. L. MOND. From NAT. ANILINE & CHEM. Co., INC. (B.P. 415,748, 27.1.33).—The gaseous products of oxid-

ation of C_6H_6 or $C_{10}H_8$ are scrubbed with a H_2O -immiscible org. solvent ($1-C_{10}H_7Cl$, solvent naphtha) at < the b.p. of H_2O at the pressure used (45–60°), and the maleic or phthalic anhydride is recovered by cooling the solution formed. H. A. P.

Continuous production of esters. T. S. CARSWELL, E. T. STEHLBY, and N. J. G. ALOZERIJ, Assrs. to MONSANTO CHEM. Co. (U.S.P. 1,945,177, 30.1.34. Appl., 17.9.28).—A mixture of an acid (I) non-volatile at < 120°, an alcohol (II) of b.p. < 100°, and H_2O is continuously steam-distilled; the ester, (II), and H_2O in the evolved vapours are separated by fractional condensation, (II) is returned to the process together with fresh (I) and (II) equiv. to the ester removed, and the H_2O is used to generate steam for the distillation. Apparatus is claimed. H. A. P.

Polymerisation of esters of ethylenedicarboxylic acids. H. B. DYKSTRA, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,945,307, 30.1.34. Appl., 3.6.30).— Me_2 and Et_2 fumarates are polymerised by light or BzO_2H to colourless resins sol. in alcohols, esters, and aromatic hydrocarbons; the maleates give liquid polymerides. Interpolymerides of the above with other polymerisable substances (vinyl esters, $CH_2:CHPh$) are claimed. H. A. P.

Preparation of [wax-like] esters. G. DE W. GRAVES, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,944,887, 30.1.34. Appl., 3.7.31).—The prep. of esters of *n*-aliphatic alcohols and acids containing C_{12-18} and C_{6-13} , respectively, is claimed. The products are used as substitutes for natural waxes. Dodecyl hexoate, b.p. 205–210°/28 mm., and laurate, m.p. 21°, octadecyl, m.p. 37°, and octadecenyl laurate, and tetradecyl hexoate are described. H. A. P.

Production of acetone from ethyl alcohol. G. BLOOMFIELD, L. C. SWALLEN, and F. M. CRAWFORD, Assrs. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,945,131, 30.1.34. Appl., 9.1.30).—EtOH is passed over catalysts consisting of oxides of groups I and II (Cr, Mn, Cu, Fe) and an alkaline-earth oxide at 250–650°/ < 1 atm. (400–500°/10–250 mm. partial pressure of EtOH). H. A. P.

Catalytic oxidation of [cyclic] ketones [to dicarboxylic acids]. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 415,172, 17.3.33).—The ketone (cyclohexanone etc.) is oxidised with O_2 (at > 5 atm.) or air (> 20 atm.) at 50–120° (75–105°) in the liquid phase in presence of multivalent metals or their salts [$Mn(OAc)_2$, $Fe(OAc)_2$] and an org. acid (AcOH). H. A. P.

Urea manufacture. H. C. HETHERINGTON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,937,116, 28.11.33. Appl., 2.1.31).—The reaction mixture of urea (I), H_2O , and $NH_2CO_2NH_4$ (II) is fed at 150°/100 atm. to a still maintained at 130° and a lower pressure, whereby the unconverted (II) distils off and is collected in a solution of (I) and NH_3 . A. R. P.

Manufacture of cyclic α -cyanoketimides and cyclic α -cyanoketones. SCHERING-KAHLBAUM A.-G. (B.P. 415,259, 4.8.33. Ger., 15.8.32).— $\alpha\omega$ -Polymethylene dicyanides are cyclised by alkali or alkaline-earth metal or Al derivatives (I) of sec.-bases into monomeric

or dimeric α -cyanoketimides, which are readily hydrolysed to the corresponding α -cyanoketones. Examples of (I) are $\text{NEt}_2\text{-MgBr}$ (from MgEtBr and NHEt_2 in Et_2O), $\text{Li dicyclohexylamide}$, LiNEt_2 (II), NaNPhMe (III), and LiNPhMe . From $\text{CN}\cdot[\text{CH}_2]_5\cdot\text{CN}$ and (II) or (III) in Et_2O α -cyanocycloheptanone is obtained in a yield of 70–80% of theory. The prep. of 2-cyanocyclopentadecanoneimide, m.p. 135°, and 2:10-dicyanocyclohexadecane-1:9-dione is described. H. A. P.

Manufacture of textile adjuvants [sulphonated sulphones]. SOC. CHEM. IND. IN BASLE (B.P. 415,877, 15.7.33. Switz., 15.7.32).—Aryl or aralkyl alkyl sulphones containing an aliphatic radical of $\leq C_8$, or their substitution products, prepared by interaction of the salt of an arylsulphonic acid with an aliphatic halide, are converted into sulphonic acids or sulphuric esters. Examples are the condensation of dodecyl ("loryl") chloride and $\text{Et } \alpha$ -bromolaurate with $p\text{-C}_6\text{H}_4\text{Me}\cdot\text{SO}_2\text{Na}$ at 150–160° and sulphonation of the products with 24% oleum, and 60% oleum + ClSO_3H , respectively. The products are used as detergents, wetting and dispersing agents. H. A. P.

Manufacture of high-molecular sulphones. W. J. TENNANT. FROM HENKEL & Co. (B.P. 415,527, 21.4.33).—Inorg. oxy-acid esters (or their salts) of aliphatic or cycloaliphatic alcohols are condensed with sulphonic acids or their salts, ≤ 1 of the components being aliphatic and containing $\leq 8\text{C}$. Examples are dodecyl p -tolyl sulphone, m.p. 65°, from $p\text{-C}_6\text{H}_4\text{Me}\cdot\text{SO}_2\text{Na}$ and Na dodecyl sulphate in H_2O at 175–185°, didodecyl sulphone, m.p. 95°, and a mixture of sulphones from $1\text{-C}_{10}\text{H}_7\cdot\text{SO}_2\text{Na}$ and Na sulphates of mixed C_8 , C_{10} , C_{12} , and C_{14} alcohols. H. A. P.

Preparation of dihydrorotenone. H. L. J. HALLER and P. S. SCHAFFER, Ded. to U.S.A. (U.S.P. 1,945,312, 30.1.34. Appl., 10.4.33).—Rotenone or an extract of *Derris* root is hydrogenated (Ni-H_2 in C_6H_6 , COMe_2 , EtOAc , or BuOAc , at 35–40°). (Cf. A., 1933, 1216.) H. A. P.

Manufacture of acid amide[alkylene oxide] derivatives. I. G. FARBENIND. A.-G. (B.P. 415,718, 28.2.33. Ger., 29.2.32).—Carboxyl- or sulphon-amides having ≤ 1 replaceable H and a radical of $\leq C_8$, and free from hydroxyalkyl groups, are condensed with ≥ 3 mols. of an alkylene oxide [$(\text{CH}_2)_2\text{O}$] in presence of an alkaline catalyst. Examples of starting materials are the mixed amides from partly hydrogenated train oil + NH_3 (cf. B.P. 384,665; B., 1933, 182) and dibutyl-naphthalenesulphonamide. The products are used as dispersing, emulsifying, and wetting agents and as textile assistants generally. H. A. P.

Oxidation of mononuclear aromatic hydrocarbons. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,945,354, 30.1.34. Appl., 8.2.30).—In the catalytic oxidation of mononuclear hydrocarbons and phenols ($\text{C}_6\text{H}_6 \rightarrow$ maleic acid) the substance and an excess of O_2 (air) are passed through a series of converters (at 390–450°) and the product is condensed out after each converter stage. Alkali-promoted (V_2O_5) catalysts are especially suitable. H. A. P.

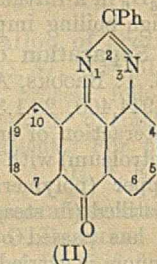
Manufacture of condensation products from phloroglucinol and aromatic amines. I. G. FARB-

ENIND. A.-G. (B.P. 415,945, 22.1.34. Ger., 20.1.33).—Formation of triarylamino-benzenes is avoided by carrying out the condensation in presence of H_2O and (in the case of negatively-substituted amines) inorg. acid. Yields of 60–99% of diarylamino-phenols are claimed. 3:5-Bis- m -, m.p. 183°, and p -nitro-, m.p. 205°, p -chloro-, m.p. 112°, $4'$ -chloro-3'-nitro-, m.p. 210°, and $6'$ -chloro-3'-nitro-phenylaminophenol, m.p. 236°; 3:5-bis- $4'$ -, m.p. 229°, and $5'$ -nitro- o -anisyl-, $4'$ -, m.p. 220°, and $5'$ -nitro- o -tolyl-, m.p. 280°, and $4'$ -aminoquinolyl-aminophenol, m.p. 175–180° (decomp.); 5-2':5'-dichloro-, m.p. 205°, and 5-1':3':5'-trichloro-phenyl-, m.p. 170°, and 5-4'-nitro- o -tolyl-amino-1:3-dihydroxybenzene, m.p. 241°, are described. H. A. P.

Separation of borneol from pine oil. I. W. HUMPHREY, Assr. to HERCULES POWDER Co. (U.S.P. 1,945,501, 30.1.34. Appl., 11.3.30).—Pine oil is heated with (0.02%) HI (at 190–225°) and the product fractionated. The terpineol is thus dehydrated to hydrocarbons of b.p. 174–178° and the residue, b.p. $> 198^\circ$, comprises borneol and other primary alcohols which may be separated by distillation and crystallisation. H. A. P.

Manufacture of nitrogenous condensation products of anthraquinone series [anthrapyrimidines].

J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 415,069, 13.1.33. Cf. B.P. 412,005; B., 1934, 752).—HCN or nitriles are condensed with 1-aminoanthraquinone (I) and derivatives in presence of a H halide (HCl) at 100–200° (140–180°). Examples are: 2-phenyl-1':9'-anthrapyrimidine (II) [from (I) and PhCN], its 6-, 7-, and 10-NHBz derivatives, 6- and 7-benzamido- and 4-chloro-2-methyl-1':9'-anthrapyrimidine and -1':9'-anthrapyrimidine, and (from 1:4-diaminoanthraquinone and HCN) 4-amino-1':9'-anthrapyrimidine and 1':9':4':10'-anthradipyrimidine. H. A. P.



Purification of 2-phenylquinoline-4-carboxylic acid and its salts. W. H. GLAHN and J. EHRLICH, Assrs. to VERONA CHEM. Co. (U.S.P. 1,945,270, 30.1.34. Appl., 14.8.31).—A colourless product is obtained by heating the crude alkali salts of the acid with aq. alkali hypochlorites (NaOCl) and filtering from the insol. coloured by-products formed. H. A. P.

Manufacture of alkoxy-derivatives of phosphorous acid [thiophosphoryl] chlorides. E. CLEMMENSEN, Assr. to MONSANTO CHEM. Co. (U.S.P. 1,945,183, 30.1.34. Appl., 24.12.31).— PSCl_3 is condensed with < 3 mols. of MeOH , EtOH , PrOH , or BuOH under reduced pressure. The prep. of methoxythiophosphoryl dichloride is described. Corresponding derivatives from POCl_3 are described but not claimed. H. A. P.

Treatment [neutralisation] of chemical compounds [silicon esters]. P. L. SALZBERG, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,944,274, 23.1.34. Appl., 25.5.32).—Free H halide is removed from esters of inorg. acids [$\text{Si}(\text{OEt})_4$] by treatment with an alkylene oxide [$(\text{CH}_2)_2\text{O}$]. H. A. P.

Manufacture of halogenated arylamines. IMPERIAL CHEM. INDUSTRIES, LTD. From E. I. DU PONT DE NEMOURS & Co. (B.P. 414,667, 19.2.33).—See U.S.P. 1,930,751—4; B., 1934, 874.

Manufacture of [halogeno- and nitro- α -] naphthoyl[-o-]benzoic acid derivatives. E. I. DU PONT DE NEMOURS & Co. (B.P. 416,502, 16.3.33. U.S., 16.3.32).—See U.S.P. 1,917,285—6; B., 1934, 394.

Hydraulic fluid.—See I. Phenols from NH_3 liquors.—See II. Azo intermediates.—See IV. HCO_2K .—See VII. Catalyst for converting alcohols into aldehydes.—See X. Bu^nOH and Pr^nOH by fermentation.—See XVIII.

IV.—DYESTUFFS.

PATENTS.

Manufacture of [insoluble] azo dyes and intermediate products therefor. I. G. FARBENIND. A.-G. (B.P. 414,684, 8.2.33. Ger., 8.2.32).—Pyrazolones, obtained by reducing diazotised aminoarylthiazoles (e.g., dehydrothiolumidine) to hydrazines and condensing with acetoacetic ester (etc.), are coupled in substance or on the fibre with diazo or tetrazo compounds, both components being free from solubilising groups. Examples of diazo components are: *o*-nitroaniline (yellow), 2-aminoanthraquinone (orange), aminoazotoluene (yellow-brown), 4-benzamido-2:5-dimethoxyaniline (red). C. H.

Manufacture of *o*-[hydr]oxyazo dyes. I. G. FARBENIND. A.-G. (B.P. 415,925, 6.12.33. Ger., 7.12.32).—Orange chromable dyes (single-bath process) of good fastness to light, milling, and washing are obtained by coupling a diazotised, negatively substituted *o*-aminophenol free from SO_3H or CO_2H [1:6:2:4 and 1:5:2:4-OH· $\text{C}_6\text{H}_2\text{Cl}(\text{NH}_2)_2\text{NO}_2$, 1:3:4:6:2-OH· $\text{C}_6\text{HCl}_3\text{NH}_2$, and 1:4:6:2-OH· $\text{C}_6\text{H}_2\text{Cl}_2\text{NH}_2$] with a monosulphonated 1- α - or - β -naphthyl-3-methyl-5-pyrazolone. H. A. P.

Manufacture of [direct] dyes of the anthraquinone series. I. G. FARBENIND. A.-G. (B.P. 414,664, 7.2.33. Ger., 8.2.32).—A 4-halogeno-1-aminoanthraquinone-2-sulphonic acid is condensed with $\text{R}\cdot\text{CO}\cdot\text{NH}\cdot\text{C}_6\text{H}_4\cdot\text{NH}_2$, where $\text{R} = \text{Ar}\cdot\text{CH}\cdot\text{CH}\cdot$ or $\text{Ar}\cdot\text{CH}\cdot\text{CH}\cdot\text{CH}\cdot\text{CH}\cdot$ to give blue-green or green direct dyes for cotton. C. H.

Production of pyranthrone dyes. W. M. MURCH, ASSR. to NAT. ANILINE & CHEM. Co. (U.S.P. 1,945,405, 30.1.34. Appl., 24.4.31).—Pyranthrone is treated with SO_2Cl_2 and a little I in PhNO_2 at 60—210° (90—150°), the product cooled to < 100° (80°) and filtered from insol. Cl-compounds, and the PhNO_2 removed from the filtrate (steam-distillation). A brown vat dye is obtained. H. A. P.

Preparation of sulphur dyes. H. A. LUBS and G. C. STROUSE, ASSRS. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,944,250, 23.1.34. Appl., 5.9.30).—The thionation of indophenols, hydroxyarylamines, or hydroxyaminophenazines is carried out with Na polysulphides in (mono-)ethers of $\text{C}_2\text{H}_4(\text{OH})_2$ or $\text{O}(\text{C}_2\text{H}_4\text{OH})_2$, e.g., $\text{HO}\cdot\text{C}_2\text{H}_4\cdot\text{OEt}$, $\text{HO}\cdot\text{C}_2\text{H}_4\cdot\text{OBu}$, and $\text{HO}\cdot\text{C}_2\text{H}_4\cdot\text{O}\cdot\text{C}_2\text{H}_4\cdot\text{OEt}$, at the b.p. H. A. P.

Compositions for dyeing etc.—See VI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Value of viscosity and copper number for judging the attack of cellulose. A. C. W. C. BOR (Chem. Weekblad, 1934, 31, 514—521).—Contrary to the views of Clibbens and Ridge (B., 1929, 239) experiments on the tendering of cotton by H_2SO_4 , neutral (p_{H} 7.1) and alkaline (p_{H} 9.5, 10.5, 11.2) NaOCl show that variable results can be obtained between the loss in strength and the fluidity and the Cu no., respectively. An alkaline boil with 2% Na_2CO_3 solution does not improve the agreement between the results. In the case of NaOCl -tendered cotton, a fairly definite relationship holds between tendering and loss of fluidity, but this does not hold with acid-tendered cotton even after an alkaline treatment. S. C.

Pulps for use in rayon. I. Beech. M. SHIKATA and I. TSUCHIYAMA (Artif. Silk Staple Fibre J. Japan, 1933, 1, 3—4).—Wood of *Fagus japonica*, Max., contains ash 0.58, $\text{EtOH}\cdot\text{C}_6\text{H}_6$ extract 3.80, α -cellulose 45.85, β -cellulose 4.62, γ -cellulose 7.67, lignin 18.52, pentosan 21.25, mannan 0, galactan 0.23, and pectin 3.25%. The pulp contained ash 0.86—1.89, α -cellulose 70.1—90.80%. CH. ABS.

Alkaline bleach demand test for [unbleached] sulphite [pulp]. H. JOHN and F. W. POPPE (Paper Trade J., 1934, 99; T.A.P.P.I. Sect., 88—89).—The method, which involves treatment with dil. $\text{Ca}(\text{OCl})_2$ saturated with $\text{Ca}(\text{OH})_2$, is described. The "bleach demand" is reported as g. of Cl consumed per 100 g. of oven-dried bleached pulp. It is claimed that good reproducibility is possible, and that the index of pulp quality so obtained may readily be converted into terms of bleach consumption in the mill. Modifications for mill control work are given. H. A. H.

Determination of ripeness and the ultra-filtration of viscose. H. FINK, R. STAHN, and A. MATTHES (Angew. Chem., 1934, 47, 602—607).—The chemical ripeness (degree of esterification) of viscose is determined by pptn. with $\text{CH}_2\text{Cl}\cdot\text{CO}\cdot\text{NEt}_2$, thus: $\text{Cell}\cdot\text{O}\cdot\text{CS}_2\text{Na} \rightarrow \text{Cell}\cdot\text{O}\cdot\text{CS}_2\cdot\text{CH}_2\cdot\text{CO}\cdot\text{NEt}_2$, and determination of N (Kjeldahl) in the washed but undried ppt. The results are expressed as the no. of $\text{O}\cdot\text{CS}_2$ groups per 100 $\text{C}_6\text{H}_{10}\text{O}_5$; the highest val. found was 171. Results are reproducible. Fractions of different chain-length (viscosity) can be obtained from viscose by pptn. with $(\text{NH}_4)_2\text{SO}_4$ (I), and the γ vals. increase slightly as the chain-length diminishes. Viscosities with the same mean γ val. and mean chain-length may behave quite differently towards pptn. by (I). Ripeness may also be measured by ultra-filtering the viscose and determining S in the filtrate; the two methods agree. This method permits measurement of NaOH absorbed. The initial NaOH val. is about 20, and increases during ripening, being α 100— γ owing to liberation of OH groups. It increases slightly with increasing free NaOH. A. G.

Rayon identification [methods]. RAYON SUB-COMMEE. OF AMER. ASSOC. OF TEXTILE CHEMISTS & COLORISTS (Amer. Dyestuff Rep., 1934, 23, 457—462).—Microscopical and chemical tests are described, and rayon-animal fibre mixtures are included. Photomicrographs of transverse and cross-sections of several types of rayon fibres are given. A. J. H.

Hydrogen-ion concentration [p_H] of [aqueous] paper extracts. ANON. (Paper Trade J., 1934, 99; T.A.P.P.I. Sect., 100—101).—A tentative standard method is described. Either the colorimetric (A) or the electrometric method may be used. Certain precautions for A are given; it is especially necessary, owing to the weak buffer action of most paper extracts, that the approx. p_H should be determined with an indicator solution adjusted at the mid-point of its range, followed by a further determination with indicator adjusted at the approx. p_H .

H. A. H.

Determination of gelatin in paper. V. GRUENMAN (Papier, 1933, 36, 729—737, 821—827; Chem. Zentr., 1933, ii, 3934).—Methods are discussed. As a qual. test the biuret reaction, controlled, in detecting small quantities, by the evolution of NH_3 on heating with $NaOH-CaO$, is recommended.

H. J. E.

Textile fibres in thermal insulation.—See I. Plastic sheet materials.—See XIII.

PATENTS.

Manufacture of resilient cellulosic textile fibres. F. R. REDMAN, Assr. to RESILIENT RAYONS, INC. (U.S.P. 1,945,449, 30.1.34. Appl., 2.5.33).—Cotton or artificial silk made by any process in staple or yarn form is rapidly immersed in a solution of albumin or gelatin at 27—55°, pressed so as to contain 50—200% of H_2O , and immersed in a hardening agent (e.g., aq. CH_2O or a Cr salt) at 21—38° for $\frac{1}{2}$ —30 min. The material is then dried at $\geq 55^\circ$ and at the same time gently beaten to crack the gelatin surface film.

D. A. C.

Refined cellulose fibre. G. A. RICHTER, Assr. to BROWN CO. (U.S.P. 1,945,202, 30.1.34. Appl., 17.9.31).—Raw or pretreated fibres of hemp, jute, China grass, manila, etc. are treated under slow agitation in 4—10% aq. $NaOH$ at $\geq 70^\circ$ for 1—6 hr. The fibre is washed and may be bleached. A high strength and absorbency are claimed.

D. A. C.

Treatment of [pulp-]digester liquors. A. D. MERRILL (U.S.P. 1,945,504, 30.1.34. Appl., 15.7.32).—The cooking liquor (L) is withdrawn through a perforated, annular strainer pipe (P) and circulated to the blow-off elbow at the bottom of the digester (D). The P , which is bored only in the upper half of its circumference, is also used to withdraw side relief liquor. L is circulated at the min. rate to reduce scale formation. From 1—2 hr. before the end of the cook circulation of L is stopped and steam directly admitted into D , while L is sprayed in near the top of D to facilitate liberation of SO_2 .

D. A. C.

Manufacture of carbohydrate (A) derivatives, (B) compounds. H. DREYFUS (B.P. 415,052 and 415,383 [A] 14.2.33, [B] 16.2.33).—(A) Cellulose (I) or a derivative yielding it under the conditions of reaction (ester or ether) is condensed with an unsaturated hydrocarbon (olefine or cyclohexene) in presence of a catalyst (a strong acid) at $> 100^\circ / > 50$ atm. The product may be subsequently esterified or etherified. Thus, e.g., cotton is treated with H_2SO_4 in Pr^2_2O , the Pr^2_2O is distilled off, and the residue heated with cyclohexene (3—4 pts.) at 150—200° or *iso*- C_4H_8 at 170—190°/150—200 atm. The products may be acetylated, benzylated, or ethylated.

(B) Hydroxyalkyl ethers of (I) containing ≤ 1 hydroxy-alkyl group per glucose unit are prepared by action of alkylene oxides [$(CH_2)_2O$] at > 5 atm. in presence of insufficient alkali for complete formation of alkali-cellulose (< 10 wt.-%), an org. base, or a weak acid. The products may be esterified (acetylated) and are then suitable as film- or fibre-producing materials. H. A. P.

Manufacture of derivatives of cellulose. H. DREYFUS (B.P. 415,382, 16.2.33).—Hydroxyalkyl ethers of cellulose containing ≤ 1 hydroxyalkyl group per $C_6H_{10}O_5$ mol. are made by treating cellulose at $\leq 120^\circ$ under pressure (10 atm.) with gaseous alkylene oxides, e.g., C_2-C_4 oxides, in absence or presence of ≥ 10 wt.-% (on the cellulose) of caustic alkali or other basic substances (amines) or of weak acids (SO_2 , bisulphites). After washing with a non-solvent (H_2O , dil. acid, $EtOH$, or Et_2O) and drying, the product may, if desired, be esterified.

F. R. E.

Esterification of cellulose and cellulosic material. R. E. FOTHERGILL and F. C. HAHN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,945,310, 30.1.34. Appl., 25.5.32).—Cellulosic material, e.g., cellulose, or its ethers or esters containing ≤ 1 esterifiable OH group, is treated with an org. acid anhydride and an org. acid in presence of anhyd. HF (\leq , and preferably 4—6 times, the wt. of cellulose).

F. R. E.

Treatment of cellulose nitrates. DU PONT VISCOLOID Co., and R. K. ESKEW (B.P. 415,408, 22.2.33).—To purify, bleach, clarify, and reduce the η of cellulose nitrates, undissolved nitrocellulose ($N < 12.5\%$) is heated at $> 100^\circ/1$ atm. in an aq. medium containing a sol. chloride ($NaCl$, $MgCl_2$), in presence of an oxidant (HNO_3), a non-oxidising acid (H_2SO_4), and, if desired, a penetrant (triacetin).

F. R. E.

Treatment of cellulose derivative materials with liquids. BRIT. CELANESE, LTD., J. E. JONES, and D. R. JOHNSTON (B.P. 415,447, 24.1.33).—The materials in flaky or granular form are raked through a horizontal passage countercurrent to a washing liquid and up a drainage slope by fingers attached to a continuous belt.

B. M. V.

Manufacture or treatment of artificial filaments, threads, yarns, ribbons, fabrics, and the like made from or containing organic esters of cellulose. H. DREYFUS (B.P. 415,412, 20.2.33).—The filaments etc. of cellulose esters (acetate), which during manufacture have been highly stretched (and are made from cellulose acetate of high η), are superficially hydrolysed by $NaOH$ etc. in presence of an inert swelling agent (dioxan) under conditions such that hydrolysis does not occur. (Cf. B.P. 402,104—5; B., 1934, 91.)

H. A. P.

[Imitation spun] yarn manufacture. BRIT. CELANESE, LTD., and P. F. C. SOWTER (B.P. 415,055, 15.2.33. Addn. to B.P. 397,137).—A bundle of filaments of (1) regenerated cellulose or (2) cellulose derivatives is stretched in a softened state until individual filaments are broken and, in (2), is treated to regenerate the cellulose, e.g., by saponification. The bundle of discontinuous filaments is subsequently twisted.

F. R. E.

Production of dull-lustre rayon. R. A. J. THENOZ, Assr. to RUTH-ALDO Co., INC. (U.S.P. 1,944,378, 23.1.34.

Appl., 24.1.30. Italy, 16.7.29).—The dry-spun filaments, while in plastic condition near the spinneret, are subjected to the impact of a transverse (substantially at right angles) current of gas at a velocity sufficient to cause permanent deformation of their contour.

F. R. E.

Treatment of rayon fibre. G. J. NORD (U.S.P. 1,945,330, 30.1.34. Appl., 21.2.31).—Rayon waste or staple fibre is heated, with agitation, for 20 min. in a H₂O emulsion of olive and palm oils and NaCl or Na₂SO₄ at 54°, pressed, fluffed, and subsequently dried at 82° for 10 min. so as not to remove the oils.

D. A. C.

Paper making. C. I. GOESSMANN (U.S.P. 1,944,886, 30.1.34. Appl., 6.4.33).—Paper is impregnated with colloidal protein matter (*P*) (*e.g.*, gelatin, albumin) and laminated on a cylinder covered with paraffin-impregnated paper. Excess *P* is removed and the paper chilled at 7° in a bath containing a coagulating agent (*e.g.*, CH₂O, tannin, Cr salts). It is then dried and finally pressed flat.

D. A. C.

Paper manufacture. L. D. SMILEY, Assr. to CHEMIPULP PROCESS, INC. (U.S.P. 1,945,205, 30.1.34. Appl., 15.11.29).—The sensible heat of relief gases and liquors from a sulphite digester is utilised by passing them through a cooling coil placed in a liquor accumulator (*A*) and thence through a bubbler pipe into the fresh-liquor storage tank (*T*). They may alternatively be passed direct to *A*, with or without prior cooling. Any gas not absorbed in *T* passes to the absorption tower.

D. A. C.

Production of wallpapers from peeled wood veneers. H. A. HELLMERS (U.S.P. 1,945,686, 6.2.34. Appl., 31.1.33. Ger., 11.5.31).—The veneer is cut into strips of definite width which are dried, steeped in solution (1), dried, steeped in solution (2), dried, and finally backed with any kind of fibrous fabric. (1) comprises cellulose acetate 15, 14% solution of Cr alum 10, and H₂O 70 pts., and (2) 25% glycerin 30, gelatin 25, and H₂O 45 pts.

B. M. V.

Production of anti-tarnishing material for [wrapping] silverware and other metals. A. E. THURBER and R. H. SHOLTZ, Assrs. to ONEIDA COMMUNITY, LTD. (U.S.P. 1,946,508, 13.2.34. Appl., 9.12.31. Renewed 12.5.33).—S in paper is rendered inactive by the presence of CuSO₄ or other Cu compound in the pulp.

B. M. V.

Manufacture of artificial leather. F. O. WOODRUFF, Assr. to BECKWITH MANUFG. CO. (U.S.P. 1,945,173, 30.1.34. Appl., 27.7.32).—A wet, freshly formed web of H₂O-laid fibres (preferably waste leather) is sprayed with an aq. solution of a rubber coagulant (alum) (I), then with rubber latex, with or without vulcanising agents, and again with (I); it is then plied with a no. of other similarly treated webs to produce a sheet of the desired thickness, which is finally dried or heated to vulcanise the rubber.

F. R. E.

Pyroxylin sheet material. [Leather substitute.] G. E. ALLING, Assr. to ATHOL MANUFG. CO. (U.S.P. 1,945,250, 30.1.34. Appl., 20.8.32).—A layer of pyroxylin compound containing nitrated cotton, solvent, filler, colour, and plasticiser (castor oil) is spread on an air-

pervious, rubberised textile sheet (I), dried, and stripped from (I).

F. R. E.

(A) **Absorbent felt and artificial leather product made therefrom.** (B) **Impregnated paper product.**

(A) G. L. SCHWARTZ, (B) F. H. McCORMICK and G. L. SCHWARTZ, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,944,906—7, 30.1.34. Appl., [A] 9.6.32. [B] 1.4.33).—Chemical paper pulp is dispersed at room temp. with an aq. NaOH mercerising solution (A) of 6.5—14% concn., at > 10% consistency, washed, and beaten at 4—5% consistency without any substantial abrasive or cutting action to a freeness of 85—200 sec.; (B) of 10.5—35% concn. until the fibres are crinkled and superficially mercerised, and have a freeness of 15—28 sec. After felting, the sheets are impregnated with (A) rubber latex, (B) a mixture of drying oil and bituminous material, and are afterwards coated with pyroxylin compositions.

F. R. E.

Dryer. Insulation coverings. Diaphragms.

Composite bearing.—See I. **Laminated glass.**—

See VIII. **Wood filler.**—See IX. **Storage-battery separator.** **Paper cable insulation.**—See XI.

Porous masses. Sealing-wax substitute.—See XIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Influence of bleaching on the whiteness and tensile strength of cotton fabrics. G. H. JOHNSON,

A. I. ANDERSON, H. O. PARKER, and J. D. MACMAHON (Amer. Dyestuff Rep., 1934, 23, 519—520).—For the production of a good white in laundering it is necessary to wash with a liquor containing both a detergent (soap) and a bleaching agent (NaOCl). It is satisfactory to use 0.5 gal. of aq. NaOCl (1% of available Cl) per 100 lb. of dry fabric; use of more NaOCl results in serious tensile strength loss and no improvement of whiteness.

A. J. H.

Effect of electrolytes on absorption of direct dyes by cellulose [Cellophane]. A. M. PATEL (Amer. Dyestuff Rep., 1934, 23, 505—508, 521—522).—The

absorption of direct dyes is approx. \propto their degree of colloidality in aq. solution. *E.g.*, Benzopurpurine 4B (I) is more strongly absorbed than Chlorazol Sky Blue FF (II) by cellulose, and its aq. solution is much more colloidal. The method of Mills and Robinson (A., 1931, 908) for purifying direct dyes by repeated crystallisation from 50% EtOH was found very useful, but it is difficult to dry the purified dyes. Thus (I) and (II) retained 1.6 and 1.0% of H₂O when dried at 110° and were then very hygroscopic at room temp. The rate of absorption of a direct dye from its aq. solution by cellulose gradually diminishes up to an equilibrium point, and in presence of an electrolyte (III) the time required for attaining equilibrium passes through a min. with increasing concn. of (III). The absorption of dye by highly swollen cellulose is a diffusion process, but the rate of diffusion of the dye particles through the cellulose is much slower than their initial absorption at the cellulose surface. Any factor, particularly the influence of (III), which increases the aggregation of the dye particles increases their absorption, and *vice versa*. Thus the absorption of (II) decreases by 10, 21, and 10% in presence of small amounts of Peregol

O (I.G.), Na oleate, and gelatin (dispersing agents), respectively, and in presence of 3 g. of gelatin per litre the absorption of (I) is decreased 45%. Dyeings faster to washing result when increased absorption is effected by increasing the concn. of dye rather than of (III).
A. J. H.

Standards for fastness [of dyes] to light, perspiration, and washing. SOC. DYERS AND COL. FASTNESS COMMEE. (Rept. of Soc. Dyers and Col., 1934, 52 pp.).—For fastness to light, dyeings are divided into eight classes: seven of these are represented by both red and blue standards dyed on worsted serge, and class I consists of dyeings more fugitive than the most fugitive standard. Each standard is approx. twice as fast as the preceding one. The dyes chosen are little affected by moisture or by SO_2 , and the seven standards show the same order of fastness when exposed under different conditions and in different parts of the world. The Humid Fading Lamp of the Calico Printers' Association and the improved Fugitometer are equally recommended. On the basis of many analyses of perspiration two test-liquors are recommended containing (a) NaCl and urea, and (b) NH_4Cl , NaCl, and NH_3 , respectively. These are adjusted to p_{H} 5–6 and 7–8, respectively, with AcOH and represent fresh and aged perspiration. Dyeings are tested for bleeding by soaking in these liquors and incubating for 4 hr. at 37° in contact with undyed cotton and wool. Special pretreatments are described for acid and alkaline patterns. Fastness to washing is tested in a wash-wheel under four conditions of graded severity. The pattern is half covered with undyed cotton cloth and tested in comparison with appropriate standards, of which five are described, each in blue and red shades.
A. G.

New detergent and finishing agents. R. J. HANNAY (J. Soc. Dyers and Col., 1934, 50, 273–282).—A lecture. The requirements for textile finishes and the properties of the new types of assistants [sulphated alcohols (I) etc.] are discussed in comparison with soap, and in relation to the selection of the most suitable agent in a given case. When used in hard H_2O in conjunction with soap for scouring, (I) only emulsifies the Ca soaps, but does not prevent their formation. Hard waters reduce the efficiency of the new agents, but to an extent $<$ is the case with soap. A scheme of analysis of the new agents is described.
E. L.

Inefficiency of *p*-dichlorobenzene, naphthalene, and the cedar oils as repellents against adult clothes moths. S. C. BILLINGS, JUN. (J. Econ. Entom., 1934, 27, 401–405).—Claims to repellent effects could not be substantiated.
A. G. P.

PATENTS.

Manufacture of compositions and solutions for use in dyeing and textile printing. IMPERIAL CHEM. INDUSTRIES, LTD., M. MENDOZA, and A. G. MURRAY (B.P. 414,681, 8.2.33. Addn. to B.P. 377,978; B., 1932, 1026).—With the compositions of the parent patent are incorporated solid dispersing agents. Examples are: diazosulphonate from 4- or 6-chloro-*o*-toluidine with KBrO_3 , Na_2SO_4 , and Na formaldehyde-naphthalenesulphonate.
C. H.

Decoration of silk fabrics. H. SIEBEN, ASSR. to TEXTILE DYEING & PRINTING CO. OF AMERICA, INC. (U.S.P. 1,939,322, 12.12.33. Appl., 13.4.32).—Crinkled effects are produced by printing with a resist paste containing gum arabic (2 pts.) and any other gum (1 pt.), drying, passing (for > 30 sec.) through cold conc. HCO_2H , and washing. The shrinking effect of the acid is increased by the addition of 0.1–0.5% of H_2SO_4 . Two-tone effects are produced subsequently by S-n weighting the fabric and dyeing.
A. J. H.

Treatment [for increasing the stiffness and flexibility] of textile materials. BRIT. CELANESE, LTD., and W. H. MOSS (B.P. 414,040, 18.1.33).—Fabric is impregnated or coated with a solution (in an org. solvent) of solid polymerisation products of unsaturated aliphatic aldehydes (e.g., crotonaldehyde, acetaldehyde), or of esters of unsaturated aliphatic acids (e.g., of crotonic acid with the lower alcohols) and the solvent is then removed.
A. J. H.

Dyeing or bleaching of felt hat bodies. F. FISCHER, and S. R. CARRINGTON & SONS, LTD. (B.P. 415,963, 8.3.34).

Textile adjuncts. Acid amide derivatives.—See III. **Products from waxes.**—See XII.

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

Carboniferous pyrites in the manufacture of contact sulphuric acid, using vanadium catalysts. G. K. BORESKOV and T. I. SOKOLOVA (J. Chem. Ind. Russ., 1934, 10, No. 6, 18–22).—The gases (CO_2 , CO, H_2S , CS_2 , and hydrocarbons) obtained by roasting carboniferous pyrites (I) do not inactivate V catalysts. The optimum $[\text{SO}_2]$ in the reaction gas falls from 7.4% for C-free (I) to 4.4% for (I) containing 15% C. R. T.

Contact properties of powdered roasted pyrites. I. N. KUZMICH and E. J. TURCHAN (J. Chem. Ind. Russ., 1934, 10, No. 6, 27–31).—Max. (50%) conversion of SO_2 into SO_3 is attained at 690 – 700° . H_2O in the gas slightly increases conversion at $< 700^\circ$, but has no effect at $> 700^\circ$.
R. T.

Treatment of chamber [acid] sludge. A. V. VINOGRADOV and A. G. GETMANENKO (J. Chem. Ind. Russ., 1934, 10, No. 6, 37–39).—1 pt. of sludge is dissolved in 150 pts. of boiling saturated aq. NaCl, 1 pt. of H_2SO_4 and 16 pts. of Fe foil are added, and the mixture is boiled, when Pb is completely pptd. within 3 hr. The Pb so obtained contains 0.1–0.15% Fe. Alternatively, the solution of sludge is allowed to settle, when impurities, including Se, separate, and Pb is pptd. as PbCO_3 by Na_2CO_3 .
R. T.

Chemical treatment of flue dust from sulphuric acid factories. J. J. SLOBODSKOJ (J. Chem. Ind. Russ., 1934, 10, No. 6, 31–37).—50–60% of the As and Cu of flue dust is extracted by H_2O . As is pptd. together with Fe by adding a limited amount of Na_2CO_3 to the extract, and Cu is pptd. from the filtrate by Fe.
R. T.

Causes of clogging of a still with residues in the ammonia-soda process. K. LOSEV, S. BARANOVA, and R. LEVINA (Khimstroi, 1934, 6, 71–77).—Pptn. of

CaSO₄ is caused chiefly by increase in [Ca⁺⁺] with the progress of the reaction. CH. ABS.

Determination of nitrite in presence of sulphurous acid and sucrose in pickling salt. W. PLÜCKER (Z. Unters. Lebensm., 1934, 68, 187—196).—Grossmann's method is best for the determination of NO₂' in presence of sugar but absence of SO₃'. Improved end-point in the iodometric determination of SO₃' is obtained by addition of CaCO₃ to the I solution. When both NO₂' and SO₃' are present SO₃' is determined by the improved iodometric method and then NO₂' by Raschig's method. Oxidation of SO₃' is least in acid solution containing 5% of sugar or a trace of brucine. No decomp. of NO₂' occurs on storage of the dry salt. E. B. H.

Preparation of magnesium oxide from brine. E. V. GERNET (J. Chem. Ind. Russ., 1934, 10, No. 6, 61—63).—A product containing MgO 86.5, CaO 6.8, SiO₂ 0.7, and Cl 0.6% is obtained by adding CaO to brine containing 1.2% of Mg, and calcining the ppt. at 800—900°. R. T.

Dry process of preparation of sodium pyrosulphite. E. M. JAKIMETZ and L. M. GOLDWASSER (J. Chem. Ind. Russ., 1934, 10, No. 6, 46—48).—Dry Na₂S₂O₅ is obtained by passing damp SO₂ over Na₂CO₃ at room temp.; the partial H₂O-v.p. of the gas should exceed that of saturated aq. Na₂CO₃ by > 1 mm. R. T.

Occurrence of ferrous iron in phosphate rock. H. L. MARSHALL (J. Agric. Res., 1934, 49, 71—76).—In removing Fe⁺⁺ from natural phosphates for analysis, dil. (1:4) HCl is as effective as the customary H₂SO₄-HF mixture. On extraction with dil. (1:3) H₃PO₄ results were slightly lower than those obtained with HCl, and considerably lower in samples containing much acid-insol. sulphides. Data for a no. of samples indicate that Fe⁺⁺ is seldom > 50% of the total Fe present. A. G. P.

Determination of fluorine in phosphatic material, with special reference to the Willard and Winter method. D. S. REYNOLDS (J. Assoc. Off. Agric. Chem., 1934, 17, 323—329).—In carrying out the Willard-Winter method for determining F (A., 1933, 242) the aq. Th(NO₃)₄ is best standardised by titration with known amounts of fluoride, since the blank of the Zr-alizarin mixture increases with age, and is greater when titrated alone than in the actual F titration. For the max. recovery of F approx. 100 ml. of distillate should be collected from samples of commercial rock phosphate (I), and 150 ml. from (I)-furnace slag and Florida waste pond (I). E. C. S.

Sodium metaphosphate in mechanical dish-washing. C. SCHWARTZ and B. H. GILMORE (Ind. Eng. Chem., 1934, 26, 998—1001).—NaPO₃ (I) forms with Ca⁺⁺ and Mg⁺⁺ in solution a stable, sol. complex. Hence its use as an addition in the washing of dishes in hard H₂O should prevent the formation of films of Ca and Mg soaps. Trials confirm this view, and a mixture of (I), Na₃PO₄, Na₂SiO₃, and NaOH is recommended for use. At least 30% of Na₂SiO₃ is necessary to inhibit corrosion of Al. C. I.

Separation of borax from volcanic mud by flotation. E. LIBMAN (J. Chem. Ind. Russ., 1934, 10, No. 6,

58—59).—75% of the borax (I) content of Kertch volcanic mud [8.7% of (I)] is obtained as a concentrate containing 31.5% of (I) by a flotation method. R. T.

Potassium sulphate from syngenite by high-temperature extraction with water. L. CLARKE and E. P. PARTRIDGE (Ind. Eng. Chem., 1934, 26, 897—903).—The equilibrium concns. of K₂SO₄ and CaSO₄ have been determined at 100—200° in contact with (a) syngenite (K₂SO₄·CaSO₄·H₂O) (I)—K₂SO₄·5CaSO₄·H₂O (II), (b) K₂SO₄-(I), (c) K₂SO₄, (d) (II)-anhydrite. A two-stage method is described for extracting K₂SO₄ from (I) at approx. 200°, yielding a concn. 2.5 × that previously obtainable under atm. pressure, and a recovery of 95—99% of the K₂SO₄ in (I). Impurity of CaSO₄ in (I) does not greatly influence the yield, but the MgSO₄ content of (I) must be < 1.5%, as otherwise polyhalite (K₂SO₄·MgSO₄·2CaSO₄·2H₂O) (III) is formed in the first stage. A process is described for the conversion of (III) into (I) and gypsum, followed by the above two-stage extraction of this mixture, yielding conc. aq. MgSO₄, a residue of solid CaSO₄, and a recovery of 87% of the K₂SO₄ in (III). R. S. B.

Modern processing of felspar. J. H. WEIS (Ind. Eng. Chem., 1934, 26, 915—917).—Felspar as used in the ceramic industry is a mixture of microcline (K₂O, Al₂O₃, 6SiO₂), albite (Na₂O, Al₂O₃, 6SiO₂), and small amounts of anorthite (CaO, Al₂O₃, 2SiO₂). Impurities are quartz, mica, kaolin, etc. It is necessary to keep the Na content uniform as this controls the m.p. The mineral is sorted by hand, stored in separate bins, and deliveries are made up according to bin analyses. Biotite and other Fe minerals are removed from the crushed ore by high-intensity magnetic separators. C. I.

Oxidising fusion of chromium ore with caustic alkalis. K. I. LOSEV and E. G. TABAKOVA (J. Chem. Ind. Russ., 1934, 10, No. 6, 43—45).—Na₂CrO₄ is obtained in 98.5% yield by blowing air for 2.5 hr. through fused 4:1 NaOH-chromite mixture at 700°. The mass, at first liquid, acquires a progressively more solid consistency; prolongation of heating after max. viscosity is attained results in decomp. of Na₂CrO₄. R. T.

Examples of the industrial value of Kohlschütter's researches on highly-disperse matter. L. SCHERTEL (Kolloid-Z., 1934, 68, 147—149).—The technical production of finely-divided PbO, PbO₂, and S is discussed. E. S. H.

Catalytic effect of soda in reduction of carbon dioxide by charcoal. H. EDENHOLM and T. WIDELL (Iva, 1934, No. 2, 26—39).—By the use of Na₂CO₃ (> 4.2%) the temp. in the reaction zone can be reduced by 150—200°, steam or flue gas being blown in. The quality of the gas is improved, the fuel consumption reduced, and the temp. effects on the generator diminished. CH. ABS.

Catalysts for elimination of carbon monoxide from hydrogen-nitrogen mixtures. V. P. KAMZOLKIN and A. V. AVDEEVA (J. Chem. Ind. Russ., 1934, 10, No. 6, 40—43).—Up to 0.5% of CO in H₂-N₂ mixtures is converted into CH₄ by a Ni-pumice catalyst (I) and by Kusvinsk titanomagnetite at 250—300°; S compounds

inactivate (I). Fe—Cu and Ural magnetite catalyse the reaction $2\text{CO} \rightarrow \text{C} + \text{CO}_2$, and are progressively inactivated by the C produced.
R. T.

Determination of arsenic in sulphur. P. A. ROWAAN (Chem. Weekblad, 1934, 31, 546—547).—1 g. of S is boiled for 10 min. after dissolution is complete with 6 c.c. of H_2SO_4 (d 1.84), 1 c.c. of HNO_3 (d 1.3), and a little pumice stone, the solution is diluted with 15 c.c. of H_2O and treated with KBr, after which it is titrated with 0.01N-KBrO₃, using 0.1% indigotin solution as indicator.
S. C.

Solar evaporation—See I. **Corrosion of Pb by H_2SO_4** .—See X. **Zn chrome-yellow**.—See XIII. **Fertiliser mixtures**.—See XVI.

PATENTS.

Contact sulphuric acid process. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,945,811, 6.2.34. Appl., 20.2.30).—The catalyst comprises a V-containing mass of superior overload capacity to Pt arranged in layers with means of cooling between the layers. The first layer is of thickness limited to give a contact time producing a temp. \gt 650° at normal load and % conversion.
B. M. V.

Manufacture of hydrogen chloride. H. STOLTZENBERG (CHEM. FABR. DR. H. STOLTZENBERG) (B.P. 415,551, 21.6.33. Ger., 22.6.32).—Cl₂ and H₂ at 5—6 atm. are passed to an ignition device in a pressure apparatus, which is provided with safety devices, e.g., loaded flaps, at various points, as well as with wire nets or zones of incandescence in the neighbourhood of the burner to prevent the flame striking back. The compressed HCl may be withdrawn and liquefied by release of pressure, or passed through a series of pipes in countercurrent to a dissolving liquid, such as H₂O, EtOH, or a hydrocarbon (C₅H₁₂), and obtained as a highly conc. aq. solution.
W. J. W.

Production of potassium formate. H. D. ELKINGTON. From R. KOEPP & Co., CHEM. FABR. A.-G. (B.P. 415,871, 23.6.33).—A mixture of K₂SO₄ (\leq 6 mols.) and Ca(OH)₂ (5 mols.) is treated in H₂O with CO at elevated temp. and pressures (e.g., 170°/13.6 atm.). Other electrolytes (HCO₂K) may be added to reduce viscosity. HCO₂K and the salt 5CaSO₄.K₂SO₄.H₂O are formed; K₂SO₄ is recovered from the latter by heating with H₂O at \leq 200° and filtering from pptd. CaSO₄.2H₂O.
H. A. P.

Manufacture of calcium hypochlorite. M. WEBER, JUN., Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,937,613, 5.12.33. Appl., 14.1.32).—A solution of CaCl₂ and Ca(OH)₂ is treated with Ca(OH)₂ to produce a basic hypochlorite, which is collected, suspended in H₂O, and treated with Cl₂ and NaOCl to yield a Ca(OCl)₂ product containing $>$ 71% of this compound.
A. R. P.

Manufacture of barium salts [hydrosulphide or chloride]. A. J. MERTES, Assr. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,936,849, 28.11.33. Appl., 2.11.31).—BaS (2 mols.) and CaCl₂ (1 mol.) are mixed with H₂O and the ppt. of Ca(OH)₂ is removed. The filtrate is treated with NaCl (2 mols.) and evaporated to crystalline BaCl₂.2H₂O, and the mother-liquor is treated with

Na₂CO₃ to remove the remainder of the Ba and again evaporated to recover NaCl crystals and aq. NaSH.

A. R. P.

Manufacture of strontium carbonate. O. L. THOMAS, Assr. to GRASSELLI CHEM. Co. (U.S.P. 1,936,806, 28.11.33. Appl., 25.11.31).—Celestite is ground in a steam-jacketed ball mill with aq. Na₂CO₃ at 65°, the resulting aq. Na₂SO₄ is removed by decantation, and the residue of SrCO₃ reground with hot H₂O ($>$ 65°).
A. R. P.

Manufacture of copper compounds [basic sulphate and chloride for fungicides]. D. W. and B. H. MARSH (U.S.P. 1,937,524, 5.12.33. Appl., 9.2.31).—A voluminous, light green, insol. ppt. of basic CuCl₂ or CuSO₄ is obtained by boiling Cu with aq. CuCl₂ or CuSO₄ and blowing air or O₂ through the mixture.
A. R. P.

Manufacture of (A) nickel sulphate, (B) cadmium sulphate. H. P. CORSON, Assr. to GRASSELLI CHEM. Co. (U.S.P. 1,936,829—30, 28.11.33. Appl., 8.11.32).—(A) A Cu—Ni—Fe alloy, e.g., monel metal, or (B) granulated Cd, is heated with 20% H₂SO₄ at 140—150° in an autoclave into which is passed compressed air as an oxidising agent.
A. R. P.

Preparation of [cobalt oxide-alumina] catalytic material [for ammonia oxidation]. M. F. FOGLER, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,936,936, 28.11.33. Appl., 4.4.29).—In the manufacture of a granulated catalyst by heating Co(NO₃)₂ and Al(NO₃)₃ crystals to expel volatile matter and breaking up the product into granules, the fines from one operation are added to the crystal mixture in the next.
A. R. P.

(A) **Manganese dioxide [catalyst].** (B) **Production of a [manganese dioxide] catalyst.** L. G. JENNESS, Assr. to INTERMETAL CORP. (U.S.P. 1,937,488—9, 28.11.33. Appl., [A] 1.10.32, [B] 25.4.33).—(A) MnO₂ ore is heated in MeOH vapour to produce Mn₂O₃ and the product is leached with dil. HNO₃ to leave a porous mass of MnO₂ which is highly active as a catalyst; the activity may be increased by impregnating it with \gt 5% of CuO or Pt. (B) Claim is made for a more general application of the process of making porous catalysts as in (A); e.g., MnO₂ is made by leaching any manganite with a solvent for the other metal oxide present, and porous NiO is made by leaching Ni(AlO₂)₂ with NaOH or granular NiCrO₄ with NaOH or Na₂CO₃.
A. R. P.

Production of moulded bodies from practically pure aluminium oxide. L. MELLERSH-JACKSON. From SIEMENS & HALSKE A.-G. (B.P. 415,579, 12.8.33).—Products of high stability to changes of temp. are obtained by calcining the Al₂O₃ below its m.p., mixing it with an oxide of Be, Mg, Zr, or Th, moulding the mixture, and sintering it at $>$ 1600°. The oxides may be mixed with the Al₂O₃ before calcining.
W. J. W.

Regeneration and washing of a zeolite bed. D. BURKS, JUN., Assr. to UNIV. OF ILLINOIS (U.S.P. 1,947,248, 13.2.34. Appl., 13.6.31).—The brine for regenerating a zeolite bed (Na or Mg) is made up of effluents from a previous cycle, viz., the last $\frac{2}{3}$ of a previous brine and the first portion of a wash-liquor, with extra salt. The washing is conducted at a higher rate of flow than the

“softening.” The method is particularly applicable to the treatment of raw H_2O (for ice-making; cf. B., 1933, 895) containing Na salts with a Mg zeolite, so that the total solids are substantially converted into $Ca(HCO_3)_2$ and $Mg(HCO_3)_2$, which are both removed by subsequent addition of CaO . B. M. V.

Manufacture of titanium oxide of fine texture. M. L. HANAHAN, AssT. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,937,037, 28.11.33. Appl., 16.6.32).—Calcined TiO_2 pigment is made into a slurry with 7 pts. of H_2O containing $NaOH$, Na_3PO_4 , or Na_2SiO_3 to pH 7–10 and elutriated with an upward flow of < 2 cm./min. The fine suspension which overflows from the elutriator is flocculated by acidification of the liquor. A. R. P.

Production of hydrogen peroxide. DEUTS. GOLD- U. SILBER-SCHNEIDANSTALT VORM. ROESSLER, ASSESS. OF L. HESS (B.P. 415,658, 19.2.34. Ger., 14.8.33).—A solution of $H_2S_2O_8$ or a persulphate is drawn by vac. from above downwards through a series of horizontal tubes provided with internal and external heating, the inner heating tubes being of catalytically inactive metal, e.g., Pb. A vapour space is maintained above the liquid in the tubes, so that the H_2O_2 can be immediately separated from the liquid, and the vapours from the individual tubes are conducted separately to the condenser, a highly conc. product being thereby obtained from the last tubes, whilst only the vapour from the first tube or tubes requires fractional distillation. W. J. W.

Manufacture of colloidal sulphur. E. I. DU PONT DE NEMOURS & Co. (B.P. 415,407, 22.2.33. U.S., 23.2.32).—Molten S is emulsified by agitating it in a dispersing medium, having a higher b.p. than S, e.g., aq. glycerin or sucrose solution, in presence of a protective agent. Liquid media with b.p. $< 120^\circ$ may be used if a substance is dissolved in them to raise their b.p., or the m.p. of the S may be reduced by dissolving $C_{10}H_8$ or $C_6H_4Cl_2$ in it. W. J. W.

Crystalliser. Solid CO_2 container.—See I. **Gas purification.**—See II. **Urea. Alkoxythiophosphoryl chlorides. Neutralising Si esters.**—See III. **Chloridising ores. Cu catalyst. Treating Zn ores.**—See X. **ZnS and Ti pigments.**—See XIII.

VIII.—GLASS; CERAMICS.

Volatilisation of lithium oxide at high temperatures from lithium oxide-silica glasses. E. PRESTON and W. E. S. TURNER (J. Soc. Glass Tech., 1934, 18, 143–168; cf. B., 1933, 106, 915).—The volatilisation of Li_2O from Li_2O-SiO_2 glasses (I) (Li_2O 10–50%) on continued heating at $1100-1400^\circ$, within which temp. range the SiO_2 was again non-volatile, was measured by the methods used previously for Na_2O-SiO_2 and K_2O-SiO_2 glasses (II). (I) showed a strong tendency to devitrification. As with the (II), the volatility of Li_2O and the abs. temp. were connected by a v.-p. law; the relationship between volatility and $[Li_2O]$ in the (I) showed the existence (in accordance with the Li_2O-SiO_2 equilibrium diagram) of Li_2O, SiO_2 [in molten (I) containing 0–20% Li_2O], of $Li_2O, 2SiO_2$ and Li_2O, SiO_2 (20–33% Li_2O), and Li_2O, SiO_2 and $2Li_2O, SiO_2$ (33–

50% Li_2O), further evidence of which was provided by the application, to certain of the (I), of the equation previously found valid, viz., $\log(A-2x)/A = -kt$, where A = amount of Li_2O originally present, and x = loss after t hr.; this relation is applied to the calculation of the change in surface concn. of Li_2O after volatilisation has progressed for a given time. K_2O, Na_2O , and Li_2O were (molecularly) almost equally volatile at 1400° for (I) containing about 20 mol.-% of each oxide, and the heat of volatilisation of Li_2O at $1300-1400^\circ$ is calc. to be $-34,700$ g.-cal. per g.-mol. It is concluded that the volatilisation process of PbO, K_2O, Na_2O , and Li_2O from the surface of molten glasses is one of simple evaporation, and that the molten simple alkali silicate glasses are apparently mutual solutions of SiO_2 and an alkaline silicate, or of two silicates, according to the composition of the melt. A. L. R.

Indium glass. W. S. MURRAY (Ind. Eng. Chem., 1934, 26, 903–904).—The addition of In_2O_3 to glass containing Na_2SO_4 produces a yellow colour, the intensity of which $\propto [In_2O_3]$. 0.05% of In_2O_3 is sufficient—an amount 1/7 of that of metallic oxides previously used for colouring glass yellow. In may be used, with difficulty. The addition of In_2S_3 does not produce the same result. R. S. B.

Why is neodymium a better physical decolorising agent than nickel, cobalt, manganese, and selenium? J. LOEFFLER (Sprechsaal Keram., 1933, 66, 629–630; Chem. Zentr., 1933, ii, 3744).—Nd absorbs only in a narrow spectral region, approx. complementary to Fe^{III} . Ce preps. containing Nd are used technically, and Se must be added. H. J. E.

New principles of tunnel kiln design applied in a kiln for architectural terra cotta. W. A. HULL (Bull. Amer. Ceram. Soc., 1934, 13, 196–200).—The problems in the firing of terra cotta are the oxidation and removal of S, uniform heating throughout the truck, and controlled cooling throughout the crit. temp. range (approx. 570°). The Midland kiln, designed to overcome these difficulties, is described. Removal of S is facilitated by increasing the ventilation of the pre-firing zone by recirculating the flue gas through openings in the arch (A). This admission of cold gas also increases the circulation from top to bottom and so improves the uniformity of heating. Six burners in each side of the firing zone are placed so that the products of combustion, after passing through longitudinal flues in the superstructure of the trucks, are free to distribute themselves throughout the middle of the truck. Any additional heat which may be necessary to equalise the temp. of the top and bottom of the truck is provided by 3 burners in A. The cooling of the ware through the crit. range is slowed down by by-passing part of the cooling air. The kiln (364 ft. long \times 5½ ft. wide \times 3½ ft. high) is oil-fired. J. A. S.

The tunnel kiln. W. D. RICHARDSON (J. Amer. Ceram. Soc., 1934, 17, 279–282; cf. B., 1931, 101).—An improved Richardson kiln incorporates a flat, suspended arch and better baffles and flues in the truck superstructure. A new muffle-truck, double-track kiln is very briefly described. J. A. S.

Electrical lubrication of stiff-mud dies. J. O. EVERHART (J. Amer. Ceram. Soc., 1934, 17, 272—279).—Laboratory and plant experiments are described. The technique is possible with all types of dies unless the cores are so numerous as to complicate the wiring, and the efficiency is almost as great as when oil or steam is used. The effect is enhanced with clays low in sol. salts if they are tempered with dil. HCl. The anode should be close to the liners and cores; the operating voltage \propto the rate of operation. "Scumming" appears to be slightly reduced by electrical lubrication. J. A. S.

Felspar.—See VII. **Enamelling Fe.**—See X.

PATENTS.

Luminescent glass. M., M., and H. FISCHER (GLASWERK G. FISCHER) (B.P. 415,536, 9.5.33. Ger., 9.5. and 15.12.32).—ZnS and/or CaS etc. are/is either added to the glass or formed in the glass by reduction of the corresponding sulphates with Zn, Sn, Mg powders, C, S, etc., or by combination of the oxides or carbonates with S. The presence of 0.01—0.4% of a heavy metal (Cd, Cu, Sb, Mn, etc.) is also necessary. An orange-yellow glass is composed of SiO₂ 66, Al₂O₃ 3, B₂O₃ 3, CaO 3, ZnO 5, K₂O 5.5, Na₂O 11.5, MnS 0.63, and ZnS 2.37%. Formulæ suitable for making glasses for electric-discharge tubes are given. J. A. S.

Manufacture of laminated glass. W. H. MOSS, ASSR. to CELANESE CORP. OF AMERICA (U.S.P. 1,947,486, 20.2.34. Appl., 25.3.31).—The safety layer comprises an org. derivative of cellulose, e.g., the acetate, rendered more plastic by the presence of 1—5% of H₂O.

B. M. V.

Abrasive articles and solids of like constitution [grinding wheels]. H. C. MARTIN, ASSR. to CARBORUNDUM Co. (U.S.P. 1,937,043, 28.11.33. Appl., 1.7.31. Can., 29.4.29).—Carborundum (900 g.) is mixed with furfuraldehyde (10 c.c.) till moist, then with a phenolic resin (100 g.), and the mixture is pressed into shape at < 80°. The articles are then heated at a suitable temp. until complete hardening occurs. A. R. P.

Moulded bodies from Al₂O₃.—See VII.

IX.—BUILDING MATERIALS.

Clay of Portland cement. XVI. Preparation of Portland cement from rhyolite and limestone. XVII. Preparation of Portland cement from burnt rhyolite and limestone. XVIII. Preparation of Portland cement from kōkaseki and limestone. Y. SANADA (J. Soc. Chem. Ind., Japan, 1934, 37, 421—423 B, 423—425 B, 425—426 B; cf. B., 1934, 884).—Good-quality, high-SiO₂ Portland cements can be made from rhyolite (I) or kōkaseki (a variety of pumice), Cu slag (II), and limestone (III) by means of the wet process, and from burnt (I), (II), and (III) by the dry process. T. W. P.

Reaction between alumina cement and water. G. ASSARSSON (Sver. geol. Undersökn., C, No. 379. Unters. über Zement, 22—60; Chem. Zentr., 1933, ii, 3745).—The changes in [CaO] and [Al₂O₃] in the setting of cement at 20° and 40° have been measured. The hydration of technical cement consists of dissolution of Ca aluminate, followed by its hydrolysis forming

a gel [CaO, Al₂O₃, 10H₂O (I)], 2CaO, Al₂O₃, 8H₂O, 5CaO, Al₂O₃, 34H₂O, and Al₂(SO₄)₃ with varying SO₃ content. X-Ray investigation of the gels indicated three stages of hydration: an anhydro-aluminate gel, (I), and finally Al(OH)₃. The hydration of pure clinker minerals resembles that of cement. H. J. E.

Mechanism of setting of alumina cements. R. SALMONI (Atti Cong. naz. Chim. pura appl., 1933, 4, 799—812; Chem. Zentr., 1934, i, 1372).—Setting occurs rapidly on adding *N*-LiCl. LiH(AlO₂)₂·5H₂O is first formed and then hydrolysed. This establishes the optimum *p*_H (approx. 12) for hydration. The mechanism is discussed in terms of the Donnan equilibrium.

H. J. E.

Oiling earth roads. Application of surface chemistry. H. F. WINTERKORN (Ind. Eng. Chem., 1934, 26, 815—819).—Adhesion between road oil (I) and soil (II) is brought about by the surface-active constituents (III), which, however, are generally present in too low a proportion to give max. adhesion. Laboratory tests show that with the same amount of oil, tensile strength and H₂O-resistance are lowest for samples made from oil and dry soil only, higher when H₂O is added, and highest when additional (III) (e.g., soap solution) are present. The general properties of (II) are important; e.g., when the org. content of (II) is high, pretreatment with CaCl₂ and CuSO₄ is desirable. Road experiments confirm the beneficial effect of soap. A special "emulsion-like" treatment, found to be very satisfactory, consists in spraying the surface with (I) and aq. solution of emulsifier simultaneously. The road oils used conformed to specifications nos. 2 and 3 of the Missouri State Highway Commission, July, 1933.

C. C.

Road-tar consistometer.—See II.

PATENTS.

Means for controlling operation of cement kilns. C. W. MARTIN (U.S.P. 1,945,652, 6.2.34. Appl., 19.3.31).—A light-sensitive element focussed, on the material being burned, through the fixed wall at the burner end controls motors for the rotation of the kiln and the adjustment of the fuel valve. B. M. V.

Manufacture of [Portland] cement. W. E. SNYDER (U.S.P. 1,948,433, 20.2.34. Appl., 30.3.33).—The calcareous and argillaceous materials are heated separately to decarbonate and dehydrate them, the CaO is hydrated, and the materials are mixed and then reheated to dehydrate and form clinker. B. M. V.

Manufacture of cement product. H. R. STARKE, ASSR. to RIVERSIDE CEMENT Co. (U.S.P. 1,947,504, 20.2.34. Appl., 20.4.31).—To render it more plastic, 0.05—1.00% of oleaginous material is added to Portland cement during the final grinding. Specifications of the fineness of grinding are given. B. M. V.

Manufacture of porous gypsum products. H. O. KAUFFMANN, ASSR. to BUFFALO ELECTRO-CHEM. Co., INC. (U.S.P. 1,946,077, 6.2.34. Appl., 15.9.32).—CaSO₄ plaster is mixed with H₂O containing small quantities of (1) soft soap, (2) MnCl₂, CuSO₄, or CoCl₂, and (3) H₂O₂, and as late as possible before use the mass is made alkaline to activate the metallic catalysts (2) so

that the decomp. of (3) will be completed at about the same time as the real set commences. B. M. V.

Sand-rock asphalt pavement. G. H. ALVEY, Assr. to UVALDE ROCK ASPHALT CO. (U.S.P. 1,946,517, 13.2.34. Appl., 4.2.32).—Limestone rock asphalt ground so that 75% passes 10-mesh is mixed with sand which has been graded to max. voids, and the mixture heated to 150°; an asphaltic flux is added in sufficient quantity to coat and fill the voids of the sand. B. M. V.

Manufacture of synthetic lumber that is not attacked by moulds. O. R. SWEENEY, Assr. to IOWA STATE COLL. AGRIC. & MECHANIC ARTS (U.S.P. 1,946,952—3, 13.2.34. Appl., [A] 13.4.31, [B] 16.4.31).—CuSO₄ is embodied in artificial lumber formed from straw, (A) by admixture before, and (B) by spraying after, pressing and drying. (Cf. U.S.P. 1,803,737; B., 1932, 148.) B. M. V.

Wood filler. J. F. WALSH, Assr. to CELLULOID CORP. (U.S.P. 1,947,438, 13.2.34. Appl., 11.1.30).—The composition comprises a cellulose ester (nitrate) 100, non-volatile liquid modifier (15 are named) 35—60, resin 35—60, an org. filler (wood flour) 250, and a volatile solvent (70% C₂H₅O, 30% EtOH) 600—640 pts. B. M. V.

Sound-absorbing and -insulating composition. G. ADOLPHE, Assr. to NAT. GYPSUM CO. (U.S.P. 1,946,914, 13.2.34. Appl., 30.3.31).—To a wall or floor a comparatively thick coat of softer material (A) is applied and nearly pierced with a multitude of small holes forming sound-absorbing recesses; a thinner coat of harder, washable material (B) is then applied and pierced through into A. A may be composed of asbestos, mineral wool, and a binder, and B of Portland cement, mineral fibre, and Al stearate. B. M. V.

Sound-absorbing panel. B. D. MCINTYRE, Assr. to INSULATION DEVELOPMENT CORP. (U.S.P. 1,947,788, 20.2.34. Appl., 18.1.32).—Both outer coverings are of vulcanised sheet rubber; the filler is composed of fibrous material 60, asphalt and powdered rubber 40%. B. M. V.

Drying and heating slurries. Mixing concrete. Bloated-slag material.—See I. **Tar.**—See II. **Wall-papers.**—See V.

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

Low-grade iron ores. J. CSORDÁS (Magyar chem. Fol., 1933, 39, 86—105; Chem. Zentr., 1933, ii, 3911).—The Fe-rich upper layer of the Hungarian bauxite deposit at Gánt and Halimba after reduction roasting and magnetic separation gave a product (38% Fe) suitable for the production of Fe sponge. Wehrlite from Szarvaskő (Fe 25—30, TiO₂ 11—12%) was unsuitable for blast-furnace working. TiO₂ treated with C at 1600° in a vac. oven was reduced, 95% of the Ti passing into the Fe. H. J. E.

Rate of reduction of iron ores with carbon monoxide. Effect of particle size, gas velocity, and gas composition. W. H. WETHERILL and C. C. FURNAS (Ind. Eng. Chem., 1934, 26, 983—991).—The reaction FeO + CO \rightleftharpoons Fe + CO₂ at 825° was studied. At this temp. equilibrium is reached when the gas

mixture contains 37% of CO₂. Gas velocity, gas composition, type of ore, and particle size were varied. It is assumed that the particle is entirely reduced to FeO before reduction to Fe begins, and that "metal-lisation" occurs in a narrow band advancing from the surface to the centre of the particle. Rate of reduction (I) was calc. by two methods depending on gas analysis, and was also determined directly. Agreement in the results tends to confirm the hypothesis. In most cases (I) increased as the sq. root of the gas velocity, and decreased with increasing *d*. It decreases with increasing [CO₂], but the curves vary with different ores and are not linear. For particles up to 1 cm. diam. the time for complete reduction is independent of particle size. The time required for reduction of the ore to FeO is small compared with that for reduction to Fe.

C. I.

Oxidation stage of the iron in slags as a function of the chemical composition, the temperature, and the furnace atmosphere. H. SALMANG and J. KALTENBACH (Arch. Eisenhüttenw., 1934—5, 8, 9—13).—The FeO/Fe₂O₃ ratio (*R*) in slags containing SiO₂, CaO, and Al₂O₃ has been determined at 1230°, 1320°, and 1410° in an oxidising atm. An excess of CaO in the slag increases the Fe₂O₃, and an excess of SiO₂ the FeO content; in CaO—FeO—Fe₂O₃—SiO₂ slags *R* depends, therefore, on the CaO/SiO₂ ratio. Rise in temp. favours dissociation of the slag constituents and therefore increases *R*; dissociation of Fe₂O₃ in the range 1320—1410° is 50% > that in the range 1230—1320°. In CaO—FeO—SiO₂ slags 1 pt. by wt. of CaO can be replaced by 1.3 pts. of FeO, and 1 pt. of SiO₂ by 1.4 pts. of Fe₂O₃. Al₂O₃ behaves like SiO₂, but has much feebler acidic properties. A. R. P.

Decomposition of martensite. G. HÄGG (Iron and Steel Inst., Sept., 1934. Advance copy, 13 pp.).—The C content (initially 1.11%) of the martensite (I) of a 1.35% C steel falls when the steel is heated, becoming 0.65% after about 48 hr. at 80°, 11 min. at 125°, or 0.4 min. at 175°. The reaction velocity diminishes as the annealing proceeds, but the mechanism has not been established. The change is marked at room temp., e.g., from 1.35% to 1.02% in 40 months. Cubic (β) (I) does not appear to exist. H. F. G.

Magnetic properties of cast iron. E. SÖHNCHEN (Arch. Eisenhüttenw., 1934—5, 8, 29—36).—Magnetically soft (*S*) cast Fe is obtained with a high Si and a low carbide content, and magnetically hard (*H*) cast Fe with a low Si content and addition of Cr and Cu provided the graphite is finely dispersed. Addition of > 2% Ni improves the mechanical properties without appreciably affecting the magnetic properties; large additions of Ni, by stabilising the austenite, cause the metal to become gradually non-magnetic. E.g., cast Fe with 10% Ni and 5% Mn is entirely non-magnetic and can be used as a substitute for brass in making castings of high strength and high electrical resistance. P has practically no effect on the magnetic properties of cast Fe, but small amounts of Al make the alloy *S* whereas large amounts make it *H*. The relation between the magnetic hardness and the coercivity (*H_c*) of cast Fe is only approx. linear, but the max. permeability (*μ_{max}*),

H_c , and remanence (B_R) are connected by the equation $\mu_{\max} = 0.5B_R/H_c + 40$. A. R. P.

Enamelling iron. K. KAUTZ (Met. & Alloys, 1934, 5, 167—169).—The main characteristics of Fe plate for enamelling, as now manufactured, are described and the routine tests outlined. Theories of, and methods of determining, the adherence of enamel to Fe are described. The gases evolved when the Fe is heated in a vac., i.e., principally CO, are the probable cause of boiling of the enamel during firing of the ground-coat (I); secondary boiling does not appear to be a cause of black specking, which is attributable to burning of the (I), the use of too thin a (I), dirty Fe, or org. matter in the enamel or on the Fe surface. H. F. G.

Influence of silicon on the structure and shrinkage of iron-carbon alloys. A. MERZ and E. ISSLER (Mitt. Forsch.-Anst. Konz. Gutehoffnungshütte, 1934, 2, 271—282; Chem. Zentr., 1934, i, 1379).—The solubility of C in the stable γ mixed crystals (6—10% Si) has been studied. A heterogeneous structure was found in a temp. range in which a region of homogeneous γ mixed crystals was hitherto believed to exist. H. J. E.

Action of oxygen and hydrogen sulphide on iron-chromium alloys at high temperatures. R. L. RICKETT and W. P. WOOD (Trans. Amer. Soc. Met., 1934, 22, 347—379).— H_2S causes greater scaling of alloys containing $\geq 28\%$ Cr than does O_2 under similar conditions. Higher Cr contents increase resistance to oxidation, but only slightly to H_2S . In both atm. scaling increases with rise in temp. Increased resistance of the alloys high in Cr is accompanied by increase in the proportion of Cr in the scale. CH. ABS.

Influence of vanadium on carbon steel and on steels containing nickel and chromium. H. H. ABRAM (Iron and Steel Inst., Sept., 1934. Advance copy, 25 pp.).—V increases the hardness (I) of quenched low-C steels, and steels of low alloy content, e.g., 0.65% Cr, and although without influence on the max. (I) of H_2O -quenched, high-Cr steels it increases the (I) resulting from slower cooling or tempering. Temper-hardening (II) results from reheating at 500—700°, after quenching, of V steels of low- and high-C types and especially of Ni and Ni-Cr types containing 2—6% Ni. The relative hardening effect of a high initial temp. depends on the composition and rate of cooling. The hardening is most probably due to the partial breakdown of solid solutions of V_4C_3 in α -Fe, and not to the persistence of martensite; in rapidly cooled steels the breakdown may be effected by reheating. (II), although producing high tensile strength, may seriously lower the impact strength, particularly in C-V steels and low alloy steels; it may occur in steels containing 0.15—0.02% V, and its full effect is reached at 0.35—0.4% V; higher proportions of V did not improve the steels examined. H. F. G.

Tungsten and chromium alloys in the production of high-speed steel. B. MATUSCHKA (Stahl u. Eisen, 1934, 54, 845—853).—Ferrotungsten (I) for making high-speed steel (II) should contain $\leq 80\%$ W and preferably $\geq 0.6\%$ C since the compound Fe_3W_3C (1.6% C) has m.p. $> 2500^\circ$ and dissolves only slowly in the steel bath. Slag inclusions and segregations of

this carbide should also be absent. Aluminothermic (I) is usually purer than that prepared in the electric furnace, but has a higher content of more difficultly fusible slag inclusions (Al_2O_3). Refined, sintered W metal is therefore to be preferred to (I) for making (II). Ferrochromium (III) prepared by silicothermic reduction of chromite is the best grade for steel-making; the alloy made by C reduction is liable to contain inclusions of slag, unreduced chromite, and carbides. Analyses of commercial grades of (I) and (III) are given with micrographs of characteristic structures. A. R. P.

Production of tool steels in coreless induction furnaces. P. BARDENHEUER and W. BOTTENBERG (Arch. Eisenhüttenw., 1934—5, 8, 1—7).—The results obtained in a series of tests on the melting of 1% C steels in a 300-kg. acid-lined induction furnace are described. The FeO slags produced in the melting and refining stages were continuously removed and eventually replaced with a glass slag for the deoxidation stage. Two deoxidation methods were tested: (a) addition of ferromanganese and ferrosilicon just before casting, and (b) reduction of Si from the slag and lining at 1650°; the quality of the steel produced by (b) was much superior. To prevent inclusion of slag in the molten metal fairly fluid slags should be used, the slag should be frequently changed, and the metal kept for some time in the furnace or ladle to allow the slag to rise to the surface. A. R. P.

Physical properties of iron-aluminium alloys. C. SYKES and J. W. BAMPFYLDE (Iron and Steel Inst., Sept., 1934. Advance copy, 22 pp.).—The results of tensile, elongation, hardness, Izod, accelerated creep, and wire-drawing tests on Fe-Al alloys containing about 0.06% C and $\geq 17\%$ Al are recorded. The alloys are ductile, but oxide films readily cause fracture; in commercial alloys brittleness arises also from deposition of C at the grain boundaries. The coeff. of expansion passes through a min. at 6—8% Al, whilst at 12% Al there is evidence of a transformation. Density, sp. heat, and thermal (T) and electrical conductivity (E) data are recorded; d is that calc. additively. The temp. coeff. of T of the 16% Al alloy is practically 0; that of E is small above 600°, especially for alloys containing $> 11\%$ Al, which are suitable for resistance elements for use above 600°. Alloys containing 10—15% Al exhibit a higher corrosion-resistance (sea- H_2O) than does Fe, mild steel, or 5% Ni steel. The rate of oxidation at 900—1500° falls, at first very rapidly, with increase of the Al content, and the % Al necessary to prevent marked oxidation increases with rise of the temp. of test. At temp. $> 1200^\circ$ Al is lost from the surface, and the max. practicable Al content is desirable if max. life is required. H. F. G.

Belgian Research Committee on the behaviour of metals at elevated temperatures. H. DUSTIN (Iron and Steel Inst., Sept., 1934. Advance copy, 15 pp.).—All rapid methods of studying the strength of steels at high temp. are unsatisfactory; tests continuing for several hundred hr. are necessary. The National Physical Laboratory limiting creep stress (I) determination is too prolonged to serve as an acceptance test and is adopted only for prototype steels. The definition

of (I) should be extended and its val. regarded as acceptable only if, on the 40th day, the rate of creep is still decreasing regularly. In general, and especially as regards certain alloy steels, acceptance tests on treated material are satisfactory provided the max. temp. to be attained in use is $100-125^{\circ} <$ the tempering temp. Equipment for long-duration tests is described. Thermostatic control is effected by means of a device in which light reflected from the mirror of a galvanometer connected to a thermocouple on the furnace wall is projected on to a photoelectric cell if the temp. varies by 0.25° ; the cell operates the heating circuit through a relay.

H. F. G.

Properties of the bonding materials of moulding sands. K. MATSUZUKA (J. Iron Steel Inst. Japan, 1934, 20, 81—91).—Japanese and Manchurian moulding sands are classified according to the principal bonding material as Hirado and Fukuoka (kaolin), Kawaguchi (ferric hydrogel), and Kobe (both). Kaolin can be reversibly hydrated after being heated at 400° , whilst ferric hydrogel is generally irreversible after this treatment.

CH. ABS.

Production and treatment of copper precipitate. A. J. CADDICK (Metal Ind., London, 1934, 44, 366—368, 437—439).—In the pptn. of Cu from CuSO_4 by pig Fe (I), steel rails (II), and tinned steel cuttings (III) the Cu content is in the order (II) $>$ (III) $>$ (I), and As in the order (III) $>$ (II) $>$ (I). The commercial operation is discussed as regards purity of the product.

CH. ABS.

Spectrographic detection and determination of minute quantities of impurities in copper. M. MILBOURN (J. Inst. Metals, 1934, 55. Advance copy, 6 pp.).—Enhanced sensitivity in the detection of minute amounts of impurities is attained by using a globule of the sample (0.2—0.5 g.) as electrode in place of a solid rod. Suitable lines and their intensities are given for the detection and determination of Bi, As, Pb, Fe, Ni, Ag, Sb, and Sn by this method. With Cu oxidised with P, results for Pb, Sn, and Fe are not strictly quant. As tends to distil away rapidly from the globule.

J. S. A.

Protection of copper from corrosion by oxidation. L. W. HAASE (Chem. Fabr., 1934, 7, 329—330).—The patina formed on Cu by atm. influences, or similar coating prepared artificially, has no protective val., being discontinuous under the microscope. A truly protective coating is formed by controlled surface-oxidation to Cu_2O . Such a film has no sharp division from the metal and is about 0.003 mm. thick. It is best tested in a 10% KCl solution, using a Pt electrode of equal area. If the current is $< 10^{-7}$ amp./sq. cm. the coating is efficient. The coating formed naturally on Al is, however, protective.

C. I.

Formation of protective films on copper. L. W. HAASE (Z. Metallk., 1934, 26, 185—188).—The only effective protection of Cu against corrosion is afforded by a Cu_2O film. Such a film is always found next to the metal in the case of atm. and under- H_2O corrosion, as well as when the metal has been provided with an artificial patina; it appears to be a product of the reaction of the metal with the innermost layer of corro-

sion product, whether this is a basic chloride, sulphate, or carbonate.

A. R. P.

Elongation values of copper and copper-rich alloys. M. COOK and E. C. LARKE (Month. J. Inst. Met., 1934, 1, 367—386).—The effect of variations in the dimensions of flat test-pieces on the elongation vals. (E) of (I) high-conductivity Cu, (II) 70:30 brass, (III) 64:36 brass, (IV) 80:20 cupronickel, and (V) 95:5 gilding metal has been studied. With specimens 0.5 in. wide, varying the length of the parallel portion from 1.5 to 8.5 in. has no effect on the total E on gauge-lengths (G) of 1 in. Variations in thickness (T) from 0.125 to 0.02 in. with $G = 2$ in. are similarly without effect, but with metal thinner than 0.02 in. E decreases rapidly with decrease in T . Decrease in width also decreases E , but the effect is smaller when G is simultaneously increased. The effect of G on E for (I)—(V) in the soft condition and for (II) in various degrees of hardness has been determined.

A. R. P.

Ageing phenomena in copper-nickel-silicon alloys. E. CREPAZ (Atti Congr. naz. Chim. pura Appl., 1933, 4, 454—468; Chem. Zentr., 1934, i, 1104).—The occurrence of two hardness maxima in the alloys was confirmed (cf. A., 1932, 907). The changes during ageing are discussed.

H. J. E.

Deformation lines in α -brass. C. H. SAMANS (Month. J. Inst. Met., 1934, 387—393).—X-Ray and micrographic examination of the lines of deformation observed in cold-rolled single crystals of 70:30 brass has shown that these lines are the edges of thin mechanical twins parallel to octahedral planes.

A. R. P.

Bearing metals of lead hardened with alkali and alkaline-earth metals. L. E. GRANT (Met. & Alloys, 1934, 5, 161—164).—Available data on the two-component systems of Pb with Na, Ca, Ba, Sr, and Li are reviewed, and the possible applications of the alloys as bearing metals are discussed.

H. F. G.

Corrosion of leads of various chemical composition in sulphuric acid manufacture. A. SCHÜNEMANN (Korrosion u. Metallschutz, 1933, 9, 325—331; Chem. Zentr., 1934, i, 1241).—Addition of other metals to Pb does not improve its corrosion-resistance to hot Glover acid, but diminishes its resistance to the nitrated acid. The resistance to corrosion of Pb samples placed in the Gay-Lussac acid was improved by additions of Cu, Ni, Cu + Ag, or Bi. The tenacity of the PbSO_4 film is also important.

H. J. E.

Methods of corrosion testing. W. R. HUEY *et al.* (Proc. Amer. Soc. Test. Mat., 1933, 33, I, 178—208).—Results of the salt-spray and CuSO_4 -stain methods applied to alloys containing Cr 13 or 17% or Cr-Ni 18:8% were untrustworthy; the boiling HNO_3 test was satisfactory.

CH. ABS.

Atmospheric corrosion of non-ferrous metals and alloys. W. H. FINKELDEY (Proc. Amer. Soc. Test. Mat., 1933, 33, I, 234—251).—A report of Subcommittee VI.

CH. ABS.

Reducibility of beryllium chloride with metallic aluminium. W. KANGRO (Metall u. Erz, 1933, 30, 389—390; Chem. Zentr., 1933, ii, 3912—3913).—

Reduction of BeCl_2 with Al occurs readily at 200–350°. AlCl_3 formed may be removed by volatilisation. Reduction also occurs with Na, Li, Ca, Mg, or Ce, but the subsequent separation of Be is difficult. H. J. E.

Reducibility of beryllium chloride with metallic aluminium. H. FISCHER and N. PETERS (*Metall u. Erz*, 1933, 30, 390–391; *Chem. Zentr.*, 1933, ii, 3913; cf. preceding abstract).—Reduction of BeCl_2 with Al occurs readily at 260–350°, but the Be formed is very reactive, due to its fine dispersion. Oxidation occurs owing to traces of H_2O in BeCl_2 and to contact with air used in removing the Be from the apparatus. H. J. E.

Diminution in local elements in the working of aluminium. H. RÖHRIG (*Korrosion u. Metallschutz*, 1933, 9, 332–334; *Chem. Zentr.*, 1934, i, 1104).—Methods of removing or avoiding impurities causing local elements, and so reducing corrosion, are discussed. H. J. E.

Corrosion-resistance of structural aluminium. E. H. DIX, JUN. (*Proc. Amer. Soc. Test. Mat.*, 1933, 33, II, 405–415).—Corrosion of duralumin-type alloy in 3.5% sea-salt is practically self-stopping, and the depth of penetration is independent of the thickness of the section. Thick specimens are unchanged in corrosive conditions which markedly affect the mechanical properties of thin sheet. CH. ABS.

Properties of aluminium and two of its alloys at high temperatures. F. M. HOWELL and D. A. PAUL (*Met. & Alloys*, 1934, 5, 176–179).—The metals studied are commercially "pure" Al (I), (I) containing 1.25% Mn (II), and (I) containing 1.25% Mn and 1.0% Mg (III). The hard-drawn or rolled metals are not softened materially by prolonged heating (up to 600 days) at 93–150°; half-hard (II) is also unchanged, but with half-hard (I) and (III) there is a small loss of hardness. In the cases of hardened (I) and (II) prolonged heating at 100–150° leaves the tensile strength unaltered but raises the yield strength by about 20%, owing probably to relief of internal strain. At higher temp. the hard materials lose strength more rapidly than do the half-hard. H. F. G.

Application of heat-treatment to aluminium alloys with protective coatings. G. GUIDI (*Alluminio*, 1933, 2, 323–326; *Chem. Zentr.*, 1934, 1, 1382).—A short heat-treatment at 460–505° improves the mechanical properties of Al alloys with a protective coating of pure Al. Deterioration occurs at a higher temp. with prolonged treatment, or after rapid cooling in H_2O . H. J. E.

Determination of magnesium in aluminium-magnesium alloys containing manganese. H. BLUMENTHAL (*Mitt. deut. Materialprüf.-Anst. Spec. No.*, 1933, 22, 42–43; *Chem. Zentr.*, 1934, i, 1359).—The alloy is decomposed with aq. NaOH, and the residue on filtration dissolved in HCl-HNO_3 . The Mg is pptd. (together with some Mn) as MgNH_4PO_4 and weighed. The Mn content of the residue is determined either directly by Volhard's method (I), or by treatment with NaKCO_3 . The PO_4^{3-} goes into solution, Mn remaining in the ppt. and being determined by (I). H. J. E.

Quantitative spectrography: application to silicon. H. TRICHÉ (*Compt. rend.*, 1934, 199, 419–

421).—The Si in light alloys can be determined by comparison of the intensities of the Si 2881 Å. and Sn 2840 Å. lines. The Si is brought into alkaline solution, a known amount of Sn added, and the spark passed between the solution and a Zn electrode. For concns. < 0.5% the spark can be passed between the alloy and a Sn solution, or an arc passed between the alloy and an electrode containing Sn. This method is not affected by the [Al]. J. W. S.

Volume changes [in alloys] by diffusion and relation to inverse segregation. II. C. HAASE (*Z. Metallk.*, 1934, 26, 181–185; cf. B., 1933, 66).—On annealing cast Sn-Cu, Ag-Cu, Mn-Cu, Cu-Al, and Zn-Al alloys within the solidification range expansion occurs, followed by inverse segregation. With some of the Cu alloys, and probably also with the Al alloys, these vol. changes are influenced by the gas content and porosity of the castings, and themselves influence the piping. In many cases it is difficult to ascertain whether the gas content or the expansion by diffusion is the determining factor for inverse segregation and piping. A. R. P.

Action of chromium in nickel-plating baths. F. PIETRAFESA (*Atti Cong. naz. Chim. pura appl.*, 1933, 4, 776–785; *Chem. Zentr.*, 1934, i, 1384).—Very small amounts of Cr^{VI} in a Ni bath ($\text{NiSO}_4 + \text{NH}_4\text{Cl}$) produce a Ni deposit resembling Pb. Cr^{III} [$\text{as Cr}_2(\text{SO}_4)_3$] is less harmful. Continued electrolysis regenerates the Ni bath, the Cr separating as Cr_2O_3 , CrO_3 and NiCrO_4 . The effect of Cr is due to formation of Cr_2O_3 , CrO_3 or $\text{Cr}(\text{OH})_3$, which act as centres for gas-bubble formation on the cathode. H. J. E.

Sources of failure in brass plating and their removal. R. G. SNELLING (*Chem.-Ztg.*, 1934, 58, 680–681).—Difficulties in the electrodeposition of brass coatings are discussed. E. S. H.

Palladium as plating metal in the noble-metal industry. R. W. HARBISON (*Deut. Goldschmiede-Ztg.*, 1934, 37, 32–34; *Chem. Zentr.*, 1934, i, 1384).—Pd is best deposited on Ag, Cu, or Cu alloys. A sol. or insol. anode may be used. The operating conditions are described. H. J. E.

Field tests of metallic coatings. R. F. PASSANO *et al.* (*Proc. Amer. Soc. Test. Mat.*, 1933, 33, I, 149–165).—A report of Sub-Committee VIII. CH. ABS.

Heating large furnaces.—See I. Coke for foundry use.—See II. Determining colloidal Pb in air.—See XXIII.

PATENTS.

Metallurgical furnace. H. O. BREAKER, Assr. to INDUSTRIAL FURNACE CORP. (U.S.P. 1,946,270, 6.2.34. Appl., 14.11.30. Renewed 28.6.33).—A gastight joint for the bottom of a closed furnace which is withdrawable vertically comprises a sand seal filled with Fe oxide < 40–80-mesh. B. M. V.

Ore-concentrating unit. C. LIVINGOOD (U.S.P. 1,946,219, 6.2.34. Appl., 13.6.31).—A form of jig with sloping screens and tail-boards is described. B. M. V.

Treatment of metals. [Manufacture of cast iron.] W. E. MOORE, Assr. to PITTSBURGH RESEARCH

CORP. (U.S.P. 1,937,064, 28.11.33. Appl., 5.1.25. Renewed 19.8.27).—Molten Fe direct from the converter is poured by means of a ladle through a tower (I) packed with incandescent coke heated by resistance from 3 electrodes from a source of 3-phase current and immersed in the top of the coke bed. Pure cast Fe is tapped from the bottom of (I).
A. R. P.

Treatment of slags [from iron refining]. J. JOHNSTON and H. C. LEE, ASSTS. to UNITED STATES STEEL CORP. (U.S.P. 1,937,039, 28.11.33. Appl., 28.8.31).—The slag is allowed to cool slowly to allow the MnO-FeO constituents (I) to crystallise separately from the P_2O_5 - SiO_2 constituents. The slag is then ground finely and (I) are separated magnetically, leaving a product enriched in P_2O_5 .
A. R. P.

Manufacture of forging tools [cast-iron dies for stamping blanks]. L. I. YEOMANS, ASSR. to UNIVERSAL PRODUCTS CO., INC. (U.S.P. 1,936,652, 28.11.33. Appl., 12.1.31. Renewed 20.9.33).—Cast Fe is cast in a chill mould, removed therefrom immediately on solidification ($> 890^\circ$), subjected to pressure in master dies to produce flow of the metal, removed therefrom while at $> 550^\circ$, soaked at 540 – 650° for 1–2 hr., and quenched.
A. R. P.

Treatment of springs. P. O. F. VORWERK, ASSR. to (CORP. OF) EDELSTAHLWERK RÖCHLING A.-G. (U.S.P. 1,947,927, 20.2.34. Appl., 10.10.30. Ger., 16.10.29).—After the usual heat-treatment and preferably after an ordinary sand-blast the surface layer is compacted by blasting with small hard bodies free from acerbities.
B. M. V.

Steel alloy. J. V. EMMONS, ASSR. to CLEVELAND TWIST DRILL CO. (U.S.P. 1,937,334, 28.11.33. Appl., 20.8.32).—Steel for drills contains C 0.5–1.3 (0.61), Cr 0.2–1.0 (3.65), Mo 0.6–1.5 (6.67), Si 0.1–0.45 (0.29), W < 0.2 , and V about 1%. The W content should preferably be 5–40% of the Mo.
A. R. P.

Steel alloy. G. CHARLTON, ASSR. to WILCOX-RICH CORP. (U.S.P. 1,946,522, 13.2.34. Appl., 27.5.29).—A non-scaling steel contains Cr 20, Zr 2.0, C 1.25, Mn 0.80, Si 0.80 (approx.) % with a min. amount of P and S.
B. M. V.

Dry chloridising of [nickel and copper sulphide] ores. R. F. MEYER, ASSR. to MEYER MINERAL SEPARATION CO. (U.S.P. 1,937,661, 5.12.33. Appl., 4.5.32).—The roasted ore is treated with natural gas at 600 – 650° to reduce the Fe_2O_3 partly to FeO, then heated in dil. Cl_2 at 200 – 350° to form $FeCl_2$, and finally heated in air to reconvert the $FeCl_2$ into Fe_2O_3 and chloridise the CuO and NiO.
A. R. P.

Metal [copper] refining. H. N. GILBERT, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,937,650, 5.12.33. Appl., 9.5.31).—In the deoxidation of Cu with Ca, the excess of Ca is removed by passing H_2 , N_2 , or NH_3 through the molten metal.
A. R. P.

[Copper] catalyst. H. H. STORCH, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,937,728, 5.12.33. Appl., 14.8.28).—An inert carrier (I) is suspended in ammoniacal $CuSO_4$ solution and the mixture boiled with NaOH to deposit CuO on the particles of (I) and expel the NH_3 . The product is collected, washed, dried, and

heated at 200 – 300° in N_2 - H_2 or MeOH to reduce the CuO to Cu.
A. R. P.

[Bronze] bearing. C. F. SHERWOOD, ASSR. to SHERWOOD PATENTS, LTD. (U.S.P. 1,937,465, 28.11.33. Appl., 29.1.30).—An intimate mixture of Cu 85, Sn 10, and Fe 5%, all in powder form, is ground with 0.5–1% of stearic acid and the product is pressed into the desired shape and sintered in a reducing atm. at 780 – 790° to produce a porous bronze bearing containing hard Fe particles evenly disseminated throughout.
A. R. P.

Bimetal thermostat. H. SCOTT, ASSR. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,947,065, 13.2.34. Appl., 23.4.30).—The high-expansion alloy comprises Ni 20–40, Cu 30–25, Zn 20–35%, and the low-expansion alloy Ni 30–39, Co 2–10%, traces of Mn and C, remainder Fe.
B. M. V.

Treating (A–D, H) zinc ores, (E, G) lead sulphide ores, (F) lead-zinc sulphide ores. N. C. CHRISTENSEN (U.S.P. 1,937,631–8, 5.12.33. Appl., [A, C] 18.3.31, [B] 25.9.31, [D, H] 23.9.31, [E, G] 29.9.31, [F] 12.10.31. Renewed [G] 10.10.33).—(A) ZnS ore is heated with 60–70% H_2SO_4 , whereby H_2S is evolved and $ZnSO_4$ formed, the excess of H_2SO_4 is removed, and the $ZnSO_4$ extracted with spent electrolyte. The solution is evaporated to 60–70% free H_2SO_4 to deposit $ZnSO_4$ which after purification is passed to the electrolytic cells, the H_2SO_4 being returned to the first stage. (B) The crude $ZnSO_4$ obtained as in (A) is dissolved in H_2O and the solution treated with $CaCl_2$ to ppt. $CaSO_4$, leaving aq. $ZnCl_2$, which is first purified with a small amount of $Ca(OH)_2$ and then boiled with $CaCO_3$ to regenerate $CaCl_2$ and give a ppt. of basic Zn carbonate, which is converted into ZnS by treatment with H_2S . (C) In the processes of (A) and (B) CaO and H_2S are used for pptn. of ZnS. (D) In (A) the spent electrolyte is first evaporated to remove $ZnSO_4$ and the acid is used to decompose the ore, the final $ZnSO_4$ solution is neutralised with roasted ore, the impurities are removed by boiling with Zn dust, and the solution is electrolysed for Zn. (E) PbS ore is heated with 60–70% H_2SO_4 in a ball mill, whereby the S is removed as H_2S and the $PbSO_4$ continually abraded from the surface of the galena particles. (F) The method claimed in (E) is applied to Pb-Zn ores, and the Zn recovered by any of the methods claimed in (A)–(D). (G) After decomposing the Pb ore, as in (E) the $PbSO_4$ is boiled with brine containing $CaCl_2$ and, after filtration, the $PbCl_2$ is recovered by cooling and converted into a basic salt by digestion with $Ca(OH)_2$. (H) The ore is decomposed as in (F), the $ZnSO_4$ solution purified as in (D), and the aq. $ZnSO_4$ treated with aq. $Ca(SH)_2$ made by treating milk-of-CaO with the H_2S produced in the ore treatment. The ppt. of ZnS and $CaSO_4$ is collected, washed, dried, calcined in a non-oxidising atm., and ground to form a white pigment.
A. R. P.

Manufacture of beryllium and light alloys thereof. L. BURGESS (U.S.P. 1,937,509, 5.12.33. Appl., 16.1.32).—The electrolytic cell is divided into two parts by a refractory partition which dips just below the surface of a molten alloy of Cu with 4–12% Be (I). In one compartment (I) is covered with a molten electrolyte of BeF_2 20–25, BaF_2 35–40, and KF 35–40% to which is added BeO; electrolysis with a C

anode results in enrichment of (I) in Be. In the other compartment the enriched (I) becomes the anode, and an electrolyte of BeO and BeF₂ is used, whereby metallic Be is deposited on the C cathode. The process may be used for making Be-Al alloys. A. R. P.

Cleaning and disinfecting metallic articles. H. KANTOROWICZ (U.S.P. 1,937,229, 28.11.33. Appl., 16.12.30. Ger., 24.12.29).—The cleaning material (I) comprises a mixture of 300 g. of aq. Na₂SiO₃ (*d* 1.38) with 500 g. of a mixture of 562 g. of aq. NaOCl (*d* 1.125) and 250 g. of aq. NaOH (*d* 1.383). To remove grease and bacterial infection from metals the articles are immersed in a 0.25–2% solution of (I). A. R. P.

Black-finishing [chromium-plated] metal articles. H. R. CARVETH, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,937,629, 5.12.33. Appl., 19.8.31).—The articles are immersed for 20–30 min. in a bath containing NaCN (45), Na₂CO₃ (35), and NaCl (20%) at 700–900° (850°). A. R. P.

Recovery of silver [from photographic fixing baths]. L. WEISBERG and W. F. GREENWALD, Assrs. to WEISBERG & GREENWALD, INC. (U.S.P. 1,937,179, 28.11.33. Appl., 28.7.33).—The Ag content of a fixing bath is maintained approx. const. by continuously withdrawing a portion and electrolysing it with a c.d. of 25–75 amp./sq. ft. to recover the Ag as non-colloidal Ag₂S and to regenerate the solution, which is returned to the bath. A. R. P.

Oxidation catalyst [for converting alcohols into aldehydes in the vapour phase]. H. A. BOND and L. B. SMITH, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,937,381, 28.11.33. Appl., 19.12.31).—Claim is made for electrolytic Ag crystals (I) coated with an oxide of W, V, Mo, Ce, Th, Zn, Al, or Cr. Preferably (I) which passes through a 4- and rests on a 20-mesh screen is moistened with aq. Ce(NO₃)₄, dried, and heated until the latter is converted into CeO₂. A. R. P.

[Iron] welding electrode. D. L. MATHIAS, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,936,799, 28.11.33. Appl., 16.5.31).—A mild steel, Ni-Cr steel, or Ni-V steel rod is coated with a mixture of kaolin 45–66 (50), CaCO₃ 20–30 (20), 80% ferromanganese 10–20 (10), and Na resinate 10–20 (20)%. A. R. P.

Welding electrode and flux therefor. L. G. ANASTASIADIS, Assr. to UNA WELDING, INC. (U.S.P. 1,946,958, 13.2.34. Appl., 25.6.32).—The rod is predominantly of Al and is coated uniformly (0.025–0.045 in. thick) with a flux composed of KCl 55–65, NaF 0.2–5.0, LiF 22–26, Na₂AlF₆ 10–14, and (optionally) (NH₄)₂Cr₂O₇ 0.1–1.0%, the m.p. of the flux being < that of the rod. B. M. V.

Annealing furnaces. Bowl separator [for Au].—See I. Wrapper for Ag ware etc.—See V. Ore separator. Treating blast-furnace gases.—See XI. Corrosion-resisting coatings.—See XIII.

XI.—ELECTROTECHNICS.

Lubrication of dies.—See VIII. **Magnetic properties of cast Fe. Tool steels. Behaviour of metals at elevated temp. Detecting impurities in Cu.**

Spectrography of Si. Ni-plating baths. Pd-plate. Brass plating.—See X. **Shellac. Plastics from coal. Laminated plastics.**—See XIII. **Sugar-boiling control.**—See XVII. **X- and γ-ray photography. Comparing reflexion densities.**—See XXI.

PATENTS.

Electric furnace. W. E. MOORE, Assr. to PITTSBURGH RESEARCH CORP. (U.S.P. 1,947,612, 20.2.34. Appl., 10.5.32).—The resistance wire is looped vertically in alternate long and short loops so that the lower part of the wall has a heat supply about double that of the upper. Suitable insulating bobbins are described. B. M. V.

Electric furnace. F. E. O'NEIL and J. F. CALLAHAN, Assrs. to ACHESON GRAPHITE CO. (U.S.P. 1,947,793, 20.2.34. Appl., 17.10.29).—A C resistance is protected from O₂ by a refractory casing which has considerable clearance from the resistor rods (R) so that if any O₂ does find access its effect is evenly distributed. A no. of R may be joined end to end in one protecting tube (T) by means of high-conductivity graphite blocks which are a slip fit in T and are formed with recesses for the ends of R. B. M. V.

Induction furnace and its operation. W. E. MOORE, Assr. to PITTSBURGH RESEARCH CORP. (U.S.P. 1,937,065, 28.11.33. Appl., 10.10.31).—The melting crucible is provided with a relatively thin pocket (P) projecting from the bottom and with electrical means for causing an alternating magnetic flux to pass through the metal in P in the direction of its smallest dimension. A. R. P.

Magnetic ore separator for wet and other operations. P. H. THOMAS (U.S.P. 1,948,080, 20.2.34. Appl., 10.5.30).—A rotary magnetic drum is provided with alternate north and south poles substantially evenly over the surface. After the non-magnetic material has dropped off, the magnetic is dragged off by a surrounding non-magnetic belt. B. M. V.

Magnetic separation of materials. B. GRANIGG (U.S.P. 1,948,419, 20.2.34. Appl., 10.6.30. Austr., 2.9.29).—An apparatus depending on the difference of permeability of the materials comprises a magnetised shaft provided with a single pole in the form of a helical ridge (A), the mixed material being mechanically conveyed below A and the magnetic material lifted out and removed at some higher point either by scraping, or by reduction of the local flux density by a mass of Fe or the like intercalating with A. B. M. V.

Storage-battery separator. J. H. REILLY, Assr. to RICHARDSON CO. (U.S.P. 1,937,205, 28.11.33. Appl., 18.4.29).—A porous, acid-proof diaphragm for accumulators is prepared by beating jute fibre (I) with aq. Na₂SiO₃, adding asphaltum (II) and a filler (III) to give a 50:10:40 mixture of (I):(II):(III), making just acid with HCl, and draining the mixture on a screen to produce a felted mass which dries hard. A. R. P.

Manufacture of copper oxide rectifiers for high-voltage application. H. KAHLER, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,936,792, 28.11.33. Appl., 6.2.29).—Cu sheets are heated in air at 1000–1025° for 8 min. to produce an oxide film, and

then allowed to cool to room temp. during several hr. Alternatively, the oxidised metal can be cooled to 490° in 2½ min., allowed to cool in air for another 2 min., and quenched in H₂O. A. R. P.

Electric condenser. A. E. MAIBAUER, Assr. to HALOWAX CORP. (U.S.P. 1,937,490, 28.11.33. Appl. 9.7.31).—The insulating material between the plates is impregnated with a dielectric composed of a halogenated derivative of a Ph ether or alcohol, or of a OH-derivative of Ph₂. A. R. P.

Electric resistance. R. BEYER, Assr. to R. BEYER CORP. (U.S.P. 1,947,692, 20.2.34. Appl. 6.2.30).—The resistor proper comprises finely-divided C impregnated with an oxide of metal (*e.g.*, W, Mn) of high m.p. A refractory material having high electrical resistance and a bonding agent may also be present and the metallic oxide may be added in the form of a salt solution prior to being compacted and heat-treated. B. M. V.

[Filling for] electrical apparatus. C. F. HILL and J. T. GOFF, Assrs. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 1,947,085, 13.2.34. Appl. 22.9.31).—An insulating but heat-conducting filling for transformers and the like comprises quartz sand impregnated with tung or other vegetable oil that has been gelled by heat. Preferably the sand is rather coarse and the grains are first coated with molten H₃BO₃. B. M. V.

Insulating material. L. McCULLOCH, Assr. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 1,947,096, 13.2.34. Appl. 14.12.28).—Asbestos paper is rolled to crush conducting particles, impregnated with tung oil, and heated to 200–400° to polymerise and partly carbonise the oil. B. M. V.

Composition for impregnation of [paper] cable insulation. G. F. KENNEDY, Assr. to HERCULES POWDER Co. (U.S.P. 1,946,322, 6.2.34. Appl. 24.12.28).—The mixture comprises a hydrocarbon oil (*e.g.*, cylinder oil) 95–50, and rosin free from oxidised components, especially abietic acid, 5–50%. B. M. V.

[Electrical] plant for precipitation of dust or other solid particles from an atmosphere. G. M. PESTARINI (B.P. 415,701, 23.1., 28.4., and 14.12.33).—Electrical plant comprising a metadyne generator (*M*) or transformer and a d.-c. low-voltage generator for limiting the current delivered to *M* is claimed. J. S. G. T.

Removal of suspended particles from blast-furnace gases. LODGE-COTTRELL, LTD. From RESEARCH CORP. of NEW YORK (B.P. 416,209, 14.11.33).—At least a portion of the collected particles is removed from a carrier liquid having a v.p. < 40 mm. of Hg at 121°, *e.g.*, used crank-case oil, which has passed over the collecting electrodes, and the liquid after separation is returned to the collecting electrodes. [Stat. ref.] J. S. G. T.

Electron-emitting cathodes for electron-discharge devices. BRIT. THOMSON-HOUSTON Co., LTD., and J. A. V. FAIRBROTHER (B.P. 416,043, 4.3.33).

Propagating reactions. Resolving emulsions. Vac.-pan control. Filtering air or gases.—See I. **Pure succinic acid.**—See III. **Moulded bodies from**

Al₂O₃.—See VII. **Luminescent glass.**—See VIII. **Cement-kiln control.**—See IX. **Treating Zn ores. Be and its alloys. Cast Fe. Cr-plate. Ag recovery. Welding electrodes.**—See X. **Treating food products.**—See XIX.

XII.—FATS; OILS; WAXES.

Hardened fats in food chemistry. K. H. BAUER (Z. Unters. Lebensm., 1934, 68, 38–41).—Elaïdic acid is produced during the hydrogenation of linolenic acid at 100° with a Ni catalyst to an I val. of 42.4. E. C. S.

Autoxidation of fats and oils used in preparing margarine. C. WOLF and G. MARTIN (Lait, 1933, 13, 1201–1214; Chem. Zentr., 1934, i, 1413).—Oxidation by O₂ at 95° increases the acidity, diminishes the I val., and does not change the f.p. of the fatty acid. The oxidation shows an induction period (I), which is short for animal fats, arachis and cottonseed oils and long for cacao butter and hardened oils. Addition of H₂O to the fat lengthens (I). H. J. E.

Fat, oil, or fatty acid determination by melting out with wax or ceresin. C. A. ROJAHN and J. HAUGG (Apoth.-Ztg., 1933, 48, 1236–1237; Chem. Zentr., 1934, i, 1362).—The method described (*cf.* B., 1934, 545) is useful technically. In presence of palm or coconut oil soaps the solubility of the fatty acids is reduced by addition of NaCl or Na₂SO₄. H. J. E.

Determination of acetyl values of fats. I. Determination of combined acetic acid. K. TÄUFEL, H. THALER, and M. DE MINGO (Fettchem. Umschau, 1934, 41, 156–158).—Comparative trials with diacetoxystearic acid, cholesteryl acetate, and octadecyl acetate showed Freudenberg's modification of Perkin's distillation method (A., 1923, ii, 884; J.C.S., 1905, 87, 107) to be the most reliable, giving results a little low. Benedikt's method gave high vals. and Lewkowsitch's low. Data are given showing that fatty acids lower than lauric are sufficiently volatile to distil with the AcOH and vitiate the results. G. H. C.

Methods of determination and the different definitions of the acetyl value. (MLLE.) M. T. FRANÇOIS (Ann. Falsif., 1934, 27, 334–339).—Three methods of determination are compared and criticised, and results are given for castor oil. Acetylation in presence of C₅H₅N, followed by titration of the excess Ac₂O, is preferred. A plea is made for an official definition of the Ac val., based on the wt. of the original fat, and expressed as mg. of AcOH per g. of fat. Abolition of the superfluous OH val. is also advocated. E. B. H.

Pycnometric and refractometric determination of fats. W. LEITHE (Z. Unters. Lebensm., 1934, 68, 33–38; *cf.* B., 1934, 522, 602).—A review. E. C. S.

Analytical methods for testing "winter[ised]" and "summer" cottonseed oils. H. SCHMIDT-HEBBEL (Pharm. Zentr., 1934, 75, 573–576).—I vals., f.p., and titers are given for a few samples of these oils from the United States and Chile; solid fatty acids are not completely eliminated by the destearinating (chilling) treatment. E. L.

Composition of tomato-seed oil. R. CULTRERA (Ind. ital. Conserve aliment., 1933, 8, 245–247; Chem

Zentr., 1933, ii, 3782).—The seed analysis gave H_2O 7.50%. The dry substance yielded oil 26.30, protein 30.35, and ash 5.51%. The yellow-brown oil (d_{20}^{25} 0.92065, refraction at 25° 68°) gave a green-brown colour, turning to red, with the Bellier reaction. The Heidenreich reaction gave a yellow-orange colour. Vitamin-D, -B, and -C were not detected. H. J. E.

Volatile oil in cardamom seed. J. F. CLEVENGER (J. Assoc. Off. Agric. Chem., 1934, 17, 283—285).—The yield of volatile oil (I) from seed from green cardamoms (II) is > that from seed from bleached (II). There is little loss of (I) from husk-protected seed in 8 months, but removal of the husk results in the loss of 30% of (I) in that time. Physical and chemical data on various samples of (I) are given. Approx. 3 hr. are required for complete saponification of (I).

E. C. S.

Photochemical studies on vegetable oils and fatty acids. V, VI. After-effects and peculiarities of olive oil. M. HORIO and Y. KASAKAWA (J. Soc. Chem. Ind., Japan, 1934, 37, 415—416 B).—The peroxide val. of irradiated linseed and olive oils continues to increase for some time after irradiation (I) has been discontinued, before decreasing finally to 0, as storage in the dark is prolonged. Olive oil is peculiar in that the rate of formation of peroxide gradually decreases to a min. as the time of (I) is prolonged, and is also greater immediately after the (I) period than during it. Also the rate of reaction is not \propto the square root of the light-intensity (L), but displays a max. at a particular L .

E. L.

Theory of hydrogenation of vegetable oils. II. F. BLOEMEN (Fettchem. Umschau, 1934, 41, 151—154, 154—155).—The author's theory (B., 1934, 588) is extended and applied to the conditions prevailing in technical practice. In presence of large quantities of catalyst, hydrogenation is less selective because the stages can occur simultaneously in the more extended "reaction phase," whereas with less catalyst the equilibria cannot be established.

In a supplement to Part I of this paper (*loc. cit.*), the data of Waterman and van Vlodrop (A., 1932, 1018; 1933, 258) are shown to be in general accord with the author's theory.

G. H. C.

Drying oils. XVIII. Specific heat and features of heating drying oils. J. S. LONG, J. B. REYNOLDS, and J. NAPRAVNIK (Ind. Eng. Chem., 1934, 26, 864—868).—The sp. heats of linseed, soya-bean, and tung oils have been determined over the respective temp. ranges 75—290°, 75—287°, 69—155°. The forms of heating vessel which will give an exactly, and an approx., const. ratio of air-oil surface to oil vol., and a const. ratio of heated surface to vol., independent of vol., are treated mathematically. In the case of linseed oil the sp. heat rises rapidly between 140° and 200°, and then becomes nearly const.; it is suggested that the rise is due to endothermic reaction. Heat-bodding of these oils over a direct fire yields a dispersion of highly polymerised mols. in a medium which is only slightly associated.

R. S. B.

Chromium compounds formed by the oxidation of cod-liver oil with acidified dichromate solutions.

A. DOHOGNE and G. REZABEK (J. Soc. Leather Trades Chem., 1934, 18, 430—432; cf. B., 1934, 684).—The oxidation products were extracted with light petroleum (I), EtOH, and H_2O , respectively, and the Cr^{+++} and SO_4^{--} determined in the extracts. The amounts of each depended on the respective amounts of $Na_2Cr_2O_7$, H_2SO_4 , and H_2O used in the oxidation process. The Cr^{+++} in the (I) extract diminished as the amount of $Na_2Cr_2O_7$ used was increased; the amount of SO_4^{--} was small so that most of the Cr was present as Cr soaps. No conclusions were possible as to the nature of the EtOH extract. The H_2O -sol. portion contained more Cr^{+++} when 4 mols. of H_2SO_4 were used instead of 1 mol., due to the formation of less basic Cr sulphates. Insol. Cr compounds were formed only when the smaller amount of acid was used.

D. W.

Drying property of the polymerised products of sardine oil and of methyl esters derived from sardine oil. K. KINO (J. Soc. Chem. Ind., Japan, 1934, 37, 439—442 B).—(i) The Me esters of the highly unsaturated fatty acids, obtained by the Na salt-COMe₂ method from (iii), (ii) Me esters (fraction b.p. 170—220°/3 mm.) of the liquid fatty acids from (iii), and (iii) refined sardine oil were heated in H_2 at 280—300° and sampled at intervals. The polymerised products were separated into distillate (D) and residue (R) by distillation under reduced pressure in the case of (i) and (ii), whilst for (iii) the product was separated into COMe₂-sol. and -insol. fractions. For (i) and (ii) the I val. decreased rapidly within 1 hr. while the mol. wt. of R rose to a val. twice that of D or of the original esters, indicating that preferential intramol. reaction occurs between two double linkings of the same mol. In drying tests, D dried slowly, whilst the polymerised (iii) and the COMe₂-insol. fraction of it did not dry.

E. L.

Formation of unsaturated fatty acids (so-called isooleic acid) in the hydrogenation of oils. VII. Effect of hydrogenation temperature and quantity of catalyst on the formation of solid unsaturated fatty acid. S. UENO (J. Soc. Chem. Ind., Japan, 1934, 37, 457—458 B).—The formation of isooleic acid is somewhat depressed when sardine oil is hydrogenated with a Ni-kieselguhr catalyst at high temp. (250—300°) under atm. pressure; the amount of catalyst is an unimportant factor. At > 275° the results are irregular, indicating the influence of side-reactions such as polymerisation, decomp., etc.

E. L.

Oils and blubber of whales. Analytical constants of the fats of some marine animals. II. S. SCHMIDT-NIELSEN and A. FLOOD (Kong. Norske Vidensk. Selsk. Forhandl., 1933, 6, 115—118; Chem. Zentr., 1934, i, 1130).—Data for n , d , sap. val., I val., and unsaponifiable matter are recorded for products from *Balaena australis*, and *Balaenoptera physalus*, *musculus*, and *borealis*. Vitamin-A concns. from 10—70 American units were found. The fat cannot be obtained from whale liver by heating with H_2O . Extraction with solvents is necessary. The liver blubbers are thick liquids containing glycerides, phosphatides, and other (unspecified) constituents.

H. J. E.

Sulphonated oils. XXI. Properties of Intrasol. K. NISHIZAWA and S. SHIMMEN (J. Soc. Chem. Ind.,

Japan, 1934, 37, 444—445 B; cf. B., 1934, 770).—Intrasol (I) contains sulphuric and sulphonic esters, 12.69 of the total 17.24% of org. SO_3 being present in the latter form. Measurements of surface tension and η show that the aq. solutions of (I) have less colloidal properties than the sulphonated oils examined previously; the stability (turbidity tests) to acids and salt solutions is high and of the same order as that of Plästabit-oil V (cf. *loc. cit.*). E. L.

Ti soaps.—See XIII. **Contact insecticides.**—See XVI. **Butter aroma. Determining fat in marzipan.**—See XIX.

PATENTS.

Manufacture of reaction products from natural or synthetic waxes of the ester type. I. G. FARBEININD. A.-G. (B.P. 415,789, 3.3.33. Ger., 3.3.32).—Waxes (esters) are treated at $\geq 200^\circ$ with a nitrogenous base containing either 1 or 2 N atoms and ≤ 1 replaceable H atom attached to each N atom (e.g., NH_3 , ethanolamine, aryl- or alkyl-amines, piperidine, etc.) until amides are formed from at least part of the esters in the wax. The products, which may be further treated with alkylene oxides, acids, etc., have an enhanced solubility or dispersibility in H_2O , and are useful for polishes, textile finishes, rubber compounding, etc. E. L.

Lubricants.—See II. **Wax-like esters. Acid amide derivatives.**—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Uses of rubber in paints. R. L. FINE (Paint, Oil and Chem. Rev., 1934, 96, No. 18, 9—12).—The composition, method of manufacture, properties, and uses of paints containing latex, crêpe, and molten rubber are described. D. R. D.

Water-seal gasometers: their maintenance by painting. E. PERRY (Paint and Var. Prod. Man., 1934, 11, No. 3, 8—13, 27—28).—The causes and methods of detecting and preventing corrosion are examined and recipes for a no. of special H_2O -resistant anticorrosive paints given. Alternatively, the lift-plates (*P*) may be protected by means of a non-drying composition consisting of a 20% solution of petroleum pitch in a non-volatile mineral oil. This solution is poured on to the H_2O in the gasometer (*G*) tank and automatically coats *P* during the operation of *G*. D. R. D.

Four-year exposure test on white-lead paints. W. J. CLAPSON and J. A. SCHAEFFER (Ind. Eng. Chem., 1934, 26, 956—961).—Exposure tests of a large no. of samples of white-lead paint, with and without driers, on various woods and in various positions are detailed. As a result 3 pairs of formulæ for first and second coats which gave good service in most or all cases are recommended. In all of these the pigment concn. in dry paint is 24—25 vol.-% for the first coat and 32—35% for the second. Gloss when applied is associated with low pigment concn., and flatness with high pigment concn. of the second coat. C. I.

Antimony chloride process for determining the lead dioxide content of red lead. H. BLUMENTHAL (Mitt. deut. Materialprüf.-Anst., Spec. No., 1933, 22, 40—41; Chem. Zentr., 1934, i, 1393).—Excess of

standard SbCl_3 solution is added, and the excess not oxidised to SbCl_5 by PbO_2 is determined by titrating with 0.1N-KBrO₃. H. J. E.

Determination of the copper content of commercial red lead. H. BLUMENTHAL (Mitt. deut. Materialprüf.-Anst., Spec. No., 1933, 22, 41; Chem. Zentr., 1934, i, 1393).—PbS and CuS are pptd. together, PbS being then converted into PbSO_4 , by conc. H_2SO_4 , and filtered off. CuS is reprecipitated from the filtrate, ignited, dissolved in HNO_3 , and determined colorimetrically after addition of excess aq. NH_3 . The method is suitable for small amounts of Cu. H. J. E.

Preparation of zinc chrome-yellow from sodium dichromate. I. N. SAGIR and N. S. RASSUDOVA (J. Chem. Ind. Russ., 1934, 10, No. 6, 63—64).—Good-quality Zn chrome-yellow is obtained by adding 1 mol. of ZnO in 560 c.c. of H_2O containing 0.62 mol. of HCl, or 0.31 mol. of H_2SO_4 , to 0.31 mol. of $\text{Na}_2\text{Cr}_2\text{O}_7$. R. T.

Preparation of anhydrous metallic soaps. Titanium soaps. L. W. RYAN and W. P. LECHNER (Ind. Eng. Chem., 1934, 26, 909—910).—Ti soaps have been prepared by adding gradually a small excess of the equiv. amount of TiCl_4 to the fatty acid (HR) in which is suspended CaCO_3 sufficient to react with the HCl liberated according to: $\text{TiCl}_4 + 4\text{HR} = \text{TiR}_4 + 4\text{HCl}$. The mass is heated on a H_2O -bath, cooled, and extracted with C_6H_6 . Ti linoleate and resinates have poor anti-settling properties when added to paint, but Ti stearate is better for the purpose than Al stearate. Ce, Th, Zr, and Al stearates have been similarly prepared. R. S. B.

Ink drying. Atmosphere versus inks. C. R. CONQUERGOOD (Amer. Ink Maker, 1934, 12, No. 8, 15—25).—Printing inks dry through the simultaneous occurrence of four processes, viz., penetration into the paper, evaporation of solvent, oxidation and polymerisation of the oil medium. The influence of atm. conditions [temp., humidity (*h*), movement of air] on each of these factors and on the resultant drying time (*t*) is considered. *t* passes through a min. when *h* is 50—55%. The explanation is offered that increase in *h* causes acceleration of oxidation and polymerisation, but that when *h* is $> 55\%$ the increasing dampness of the paper, which hinders penetration, is the predominant effect. Increase of *h* also causes reduction of the rate of evaporation. In very damp air the deposition of a film of H_2O on the ink may retard drying. D. R. D.

Driers. A. H. SABIN (Decorator, 1934, 33, No. 389, 32).—The addition of rosin to varnishes containing linoleate driers (I) in order to overcome cloudiness is undesirable. The abietic acid displaces the linseed oil acids from the driers, and the product no longer has the advantageous properties due to the use of (I). The cloudiness disappears on keeping. (I) prepared by pptn. are preferable for most purposes to (I) prepared from metallic oxides and linseed oil at high temp., since the latter are too rapid in their action and cause wrinkling of oil varnishes and paints, although they are suitable for bituminous paints. D. R. D.

Analysis of phthalate resins and paint media containing phthalic acid. D. CANNIGETER (Verf. kroniek, 1934, 7, 256—257).—Phthalate resins and

plasticisers may be detected by the fluorescein reaction, which can be applied directly to synthetic resins and to dried films, and, after removing volatile thinners, to paint media and varnishes. The material should be heated with resorcinol without addition of H_2SO_4 , since the latter causes charring. For the determination of phthalic acid (I), 0.5–1 g. of the material is heated and the distillate collected, dissolved in H_2O , filtered from insol. decomp. products of drying oils etc., and the (I) titrated (phenolphthalein) with alkali.

D. R. D.

Natural resinous products. I. E. ASTER (Verf. kroniek, 1934, 7, 253–255).—Methods of manufacture and the properties of the different grades of rosin and turpentine are described.

D. R. D.

Electrodeposition of shellac. N. NARASIMHAMURTY and M. SCREENIVASAYA (Ind. Eng. Chem., 1934, 26, 882–884).—A 10% solution of shellac (I) in 1% Na_2CO_3 solution has been electrolysed, using a Pt anode and a Ni cathode, at 6 volts and 0.2 amp. (0.0052 amp./sq. cm.). (I) is deposited on the anode. In presence of NaCl deposition is more rapid, but oxidation and polymerisation occur. The deposit with NaCl consists of (a) a portion sol. in EtOH (most of which also dissolves in Et_2O) of approx. the same composition as the Et_2O -sol. portion of (I), and (b) a portion insol. in EtOH, 70% of the whole, consisting of a polymerised modification of "pure resin" [the Et_2O -insol. portion of (I)]. The sap. val. of the electropolymeride is $>$, and the I val. $<$, for the untreated "pure resin," whereas for HCl-polymerised samples very little change occurs in either case. The insol. portion of the electrodeposited lac is sol. in EtOH, but insol. in Et_2O , after treatment with glacial AcOH with a trace of HCl.

R. S. B.

Refraction of resins in relation to the chemical mechanism of resinifications. R. HOUWINK (Brit. Plastics, 1934, 6, 100–104).—Physical measurements, viz., n , η , etc., are advocated as methods of following the course of resin formation. Published work is critically summarised and the conclusion drawn that $PhOH-CH_2O$ resinifications are of the condensation type since n increases with time (for polymerisation types, styrene or tung oil, n decreases). Vals. of d , n , and $[\alpha]$ of 19 natural and 13 synthetic resins are tabulated. Prolonged heating at 100° of Manila copal and shellac produced a small change in n .

E. L. H.

Preparation of plastic masses from brown coal. F. FISCHER, O. HORN, and H. KÜSTER (Brennstoff-Chem., 1934, 15, 327–332).—The properties of the plastic materials ["kolinit" (K)] made by treating lignitic brown coal with phenols have been further examined (cf. B., 1933, 132). Similar materials can be produced by replacing the phenols by org. bases, e.g., NH_2Ph . The strength and plasticity of K are improved by the addition of small amounts of rubber. Its low bulk d before compression can be increased considerably by pre-compression. The material melts at $100-150^\circ$, without, however, exhibiting the fluidity shown by some artificial resins, and consolidates to a product of d 1.3. A product of max. strength is obtained by using compression temp. of $150-190^\circ$ and pressures of 300–600 atm. Introduction of wire or wire-netting into K

confers increased strength. K possesses high electrical insulating properties, high resistance to the action of H_2O and acids, and is easily worked.

A. B. M.

Plastic sheet materials for designation labels. ANON. (Brit. Plastics, 1934, 6, 123–128, 130).—The suitability of various materials for use in the prep. of labels is discussed. Tabulated H_2O -immersion and heat tests on casein and cellulose acetate, $CS(NH_2)_2$ and phenolic resin-bonded paper indicate that the synthetic resins are preferable. Production and engraving of the labels are described.

E. L. H.

Coloured laminated plastics for electrical purposes. ANON. (Brit. Plastics, 1934, 6, 116–118).—The effect of colouring impregnated sheets with 7 different dyes on the properties of the laminated boards prepared from them was found by exposure to rays from a Hg-vapour lamp, loss in wt. on heating for 6 hr. at 110° , H_2O -absorption and surface-resistance tests to be slight.

E. L. H.

Uses of a flow-test mould. H. W. ROWELL (Brit. Plastics, 1934, 6, 106).—The Brit. Plastics Federation flow-test (beaker) mould (*ibid.*, 54) can be used for moulding tests at higher temp. and varying cure times, with particular reference to powders for more complicated moulds.

E. L. H.

Two-roll [paint] mill. Structure of powders in bulk.—See I. [Production of] highly-disperse matter.—See VII. Oil of turpentine.—See XX.

PATENTS.

Manufacture of zinc sulphide pigment. N. C. CHRISTENSEN (U.S.P. 1,937,639, 5.12.33. Appl., 23.9.31).—Finely-divided ZnO, basic Zn carbonate or chloride is treated with H_2S to make ZnS, which is calcined, quenched, and ground.

A. R. P.

Purification of titanium pigments. TITAN Co., INC. (B.P. 415,602, 23.10.33. U.S., 29.10.32).—The pptd. TiO_2 is mixed with $2\frac{1}{2}-10$ wt.-% of starch, oil, or other carbonaceous material and heated at $200-400^\circ$ for 1 hr.

S. M.

Self-hardening graphite lead for pencils. J. E. THOMSEN, Assr. to J. DIXON CRUCIBLE Co. (U.S.P. 1,937,105, 28.11.33. Appl., 9.3.32).—Graphite (G) is ground with 5–10 vol.-% of paraffin wax and chlorinated $C_{10}H_8$ (I), the (I) is distilled off, and the waxed G is mixed with lampblack, an alkylcellulose binder, and bentonite. The mixture is extruded into leads which remain flexible for some weeks when kept in an airtight container, but harden on exposure to the air.

A. R. P.

Preparation of synthetic [Japanese] lacquers. SOC. DES LAQUES ET MATIÈRES PLASTIQUES (B.P. 415,582, 22.8.33. Fr., 23.8.32).—A polyhydric phenol, e.g., pyrocatechol, is heated in an inert atm. with an unsaturated acid above C_{11} , e.g., oleic, in presence of an acidic condensing agent, e.g., anhyd. $ZnCl_2$; the products when polymerised in air resemble oriental lacquers and do not irritate the skin.

S. M.

Manufacture of [aniline-formaldehyde] condensation products capable of being moulded. Soc. CHEM. IND. IN BASLE (B.P. 415,555, 5.7.33. Switz., 5.7.32).—Improved heat-resistance and flow are obtained

by causing $\leq \frac{1}{2}$ of the NH_2Ph to react with > 2 mol. proportions of CH_2O initially above 50° in presence of 1 equiv. of HCl or other mineral acid (I); no solvent is used. The resin is pptd. by removing (I) and may be worked up into sheets with asbestos etc. S. M.

Corrosion-resisting coverings for pipes and other articles. CHEMIEPRODUKTE GES.M.B.H. (B.P. 415,384, 16.2.33. Ger., 15.7.32).—A permanently plastic layer of petroleum jelly or soft bitumen etc., with or without a filler, is followed by a harder layer and the whole protected with a covering of high-melting asphalt and fibre or concrete etc. S. M.

Manufacture of compositions containing cellulose derivatives. R. BURNS, D. TRAILL, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 415,764, 3.2.33).—Benzylcellulose is plasticised with a substantially H_2O -insol. sugar ether containing ≤ 1 OH and ≤ 1 alkyl, aryl, or aralkyl ether group for every C_6 sugar mol., e.g., benzylsucrose (prep. described). S. M.

Production of [porous] masses consisting of or containing cellulose esters and/or ethers. F. J. FARRELL and A. A. LAUTENBERG (B.P. 415,728, 29.12.32).—A plastic mass consisting of cellulose esters or ethers with a small quantity of solvent (I) is mixed with a finely-divided (100–250-mesh), H_2O -sol. filler (NaCl , Na_2SO_4) (II), and the whole is subjected to pressure, dried to remove (I), and treated with H_2O to dissolve (II). If desired, a plasticiser (triacetin), a fibrous filler (asbestos), and materials for reducing the inflammability (Ph_3PO_4) or raising the m.p. (Sn phosphate or silicate) may be incorporated, and the surface coated with a waterproofing composition (cellulose acetate). The product has low apparent d and high insulating power. F. R. E.

Adjuvants for plastic materials, resins, gums, waxes, and other organic substances. G. B. ELLIS. From SOC. DES USINES CHIM. RHÔNE-POULENC (B.P. 415,838, 27.3.33).—The use is claimed of partial or complete esters of glycerol and *n*- and/or *iso*-crotonic acid as plasticisers for cellulose acetate etc. S. M.

Refining of gum kauri and apparatus therefor. N. L. WRIGHT. From E. MARSDEN (B.P. 412,252, 19.12.32).—The crude gum is dissolved, e.g., in a 3:1 mixture of C_6H_6 with COMe_2 or "Me-acetone" (a technical product containing 35–60% of COMe_2 , 20–40% of MeOH , and 20–30% of MeOAc), and from the filtered solution most of the solvent is recovered by distillation and the rest by injection of steam, which also ppts. the purified gum. H_2O is finally removed in a vac. (Cf. B.P. 237,576; B., 1925, 965.) J. H. L.

Sealing-wax substitutes. J. JANZ (B.P. 415,601, 23.10.33).—A mixture of cellulose acetate, plasticiser (Ph_3PO_4 , NPhMeAc), fat (stearin), resin, and filler (asbestos) is kneaded with CH_2Cl_2 , with or without a little EtOH , to yield a cold-sealing product which dries rapidly on exposure without shrinking. F. R. E.

[Fusible] cement. M. E. DELANEY, ASST. to HALO-WAX CORP. (U.S.P. 1,945,803, 6.2.34. Appl., 6.3.29).—The cement is composed of approx. equal pts. by wt. of a normally solid chlorinated C_{10}H_8 and an ester gum, with approx. 5% of rubber latex. B. M. V.

[Lacquer]-drying oven.—See I. Polymerised esters of ethylenedicarboxylic acids. Separating borneol from pine oil.—See III. Treating cellulose nitrates.—See V. TiO_2 .—See VII. Grinding wheels.—See VIII. [Pigments from] Zn ores.—See X. Rubber substitute. Plastics. Rubber article with lustre finish. Coatings containing rubber.—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Selection and use of age-resisters in rubber compounds. R. A. CRAWFORD (Ind. Eng. Chem., 1934, 26, 931–940).—Other properties beside tensile strength to be considered in the choice of an age-resister (I) are plasticising effect, influence on vulcanisation, improvement of resistance to flexing and abrasion, and tendency to bloom. The softening effect of most (I) is small and even this is discounted to some extent by their antioxidant action during the mastication process. Most (I) are basic and tend to activate acidic accelerators such as mercaptobenzthiazole. For absence of blooming, (I) should have m.p. $< 30^\circ$ or $> 200^\circ$, low tendency to crystallisation, and high or very low solubility in rubber. Methods for combating (I) bloom are indicated. The effect of (I) is observable in the vulcanised rubber not only during and after ageing but also at once. "Super-ageing" compounds can be obtained by the use of relatively large proportions of powerful accelerators such as the thiuram disulphides and little or no S; they are inferior, however, in resistance to H_2O , freezing, and abrasion and flexing under heavy loads, although definitely superior in all kinds of accelerated ageing test and in high-temp. service in air. The choice of (I) for any sp. use must depend on experience and crit. knowledge of the composition and service factors involved. D. F. T.

Rubber in paints.—See XIII.

PATENTS.

Production of rubber having age-resisting properties. E. I. DU PONT DE NEMOURS & Co. (B.P. 415,436, 24.2.33. U.S., 26.2.32).—*tert*-Aminodiarylamines or indophenols derived from *as*-dialkylated or *cyclo*-alkylated phenylenediamines are added as antioxidants to rubber mixes. Examples are: *p*-morpholyphenyl- α - and - β -naphthylamine, *p*-dimethylamino-phenyl- and *p*-piperidylphenyl- β -naphthylamine, the indophenol from *p*-aminophenylmorpholine and PhOH , the corresponding leucoindophenol and its Me ether, and Me, OMe-, and NH_2 -derivatives of these. H. A. P.

Production of halogen derivatives of rubber or like substances. METALLGES. A.-G. (B.P. 413,559, 30.11.33. Ger., 2.12.32).—The rubber material (in any other than a dead-rolled condition), in complete or partial solution in an org. liquid, is halogenated with simultaneous or alternating oxidation, e.g., by a current of O_2 or air or by the addition of higher oxides such as MnO_2 , PbO_2 , or of per-acids. The product gives solutions of low η . D. F. T.

Manufacture of rubber substitute. L. LAURIN and E. BIDOT (B.P. 415,832, 21.3.33. Fr., 21.3.32).—An

incombustible, elastic, and insol. substitute for rubber is formed by mixing, with a hydrogel of glue, gum tragacanth, wood dust, glycerols, vegetable oils, greasy matters such as greasy soap and tallow, resinates, and a solution of artificial resin; the mixture is then tanned with $K_2Cr_2O_7$ and K alum. D. F. T.

Manufacture of plastic elastic materials. Vulcanisable rubber-containing mixture. NAUGATUCK CHEM. CO., Asses. of S. D. SHINKLE (B.P. 415,953—4, 5.2.34. U.S., 18.8.33. Addns. to B.P. 407,948; B., 1934, 512).—(A) In the condensation of an ethylene dihalide (I) with an aromatic hydrocarbon (II) in presence of $AlCl_3$, a smaller, *e.g.*, equimol., proportion of (I) is used with (II) and the reaction allowed to proceed for several hr. at 70° after gelation occurs. (B) Approx. 25—300 pts. by wt. of the plastic elastic material so obtained are mixed with 100 pts. of rubber. Such a mixture on vulcanisation with 15—25 pts. of S yields a flexible, oil-resistant product suitable for petrol hose etc. D. F. T.

Rubber article [with lustre finish]. E. E. MCKAY, Assr. to REVERE RUBBER CO. (U.S.P. 1,940,315, 19.12.33. Appl., 4.12.29).—Rubber articles are given a coloured lustre finish by coating the surface with a mixture of low- η , coloured rubber ink and Al powder. Parts of the coating may then be removed and a second coat applied of different colour. The article may finally be vulcanised with S_2Cl_2 . D. F. T.

Production of articles and coatings, with a roughened surface, and consisting of rubber and like substances. METALLGES. A.-G., and H. MIEDEL (B.P. 415,942, 15.1.34).—A dispersion of rubber etc. stabilised by the aid of a volatile substance, *e.g.*, NH_3 , with or without the additional presence of $ZnSO_4$ or of an NH_4 salt with ZnO, is applied by spraying. The loss of NH_3 leads to early coagulation so that coalescence of the rubber particles to a smooth coating is prevented and a grained surface resembling lambskin results. D. F. T.

Vulcanisation of rubber. GOODYEAR TIRE & RUBBER CO. (B.P. 413,283, 11.10.32. U.S., 16.1.32).—The hardness and bending strength of highly loaded rubber stocks containing an ultra- or semi-ultra-accelerator of vulcanisation are enhanced by incorporating a relatively small amount, *e.g.*, 3%, of a cyclic monocarboxylic acid, such as *p*- $C_6H_4(NO_2) \cdot CO_2H$, a chlorobenzoic acid, or furoic acid. D. F. T.

Vulcanisation of rubber. I. G. FARBENIND. A.-G. (B.P. 415,790, 3.3.33. Ger., 3.3. and 23.7.32).—For the safe use of accelerators liable to produce prevulcanisation such as the dialkyldithiocarbamates, xanthates, mercaptobenzthiazoles, and certain thiuram sulphides such as tetramethylthiuram disulphide, these are used in admixture with a thiuram sulphide with no tendency to prevulcanisation, *e.g.*, diphenyldiethylthiuram disulphide or tetrabutylthiuram disulphide. D. F. T.

Vulcanisation of rubber. GOODYEAR TIRE & RUBBER CO. (B.P. 415,700, 20.1.33. U.S., 25.2.32).—The accelerative power of the substituted dithiazyl monosulphides, such as the nitro- and chloronitro-dibenzthiazyl monosulphides, is enhanced without risk of "scorching" by the additional presence of an org. base, *e.g.*, diphenylguanidine or crotonylideneaniline. [Stat. ref.] D. F. T.

Rubber vulcanisation. I. WILLIAMS and A. M. NEAL, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,940,280, 19.12.33. Appl., 15.1.30).—The time of vulcanisation is decreased and the tensile strength of the product increased by the presence of a substituted NH_4 salt, *e.g.*, $NH_2Bu_2 \cdot OAc$, and an accelerator of a different class, such as one containing the grouping $\cdot N \cdot CS_2 \cdot$, *e.g.*, tetramethylthiuram monosulphide or mercaptobenzthiazole. D. F. T.

Accelerator for rubber vulvanisation. A. F. HARDMAN, Assr. to KELLY-SPRINGFIELD TIRE CO. (U.S.P. 1,939,692, 19.12.33. Appl., 4.5.28).—Vulcanisation is accelerated by a substance of the structure $R \cdot CS \cdot SR' \cdot CO \cdot OM$, where R is an org. radical free from CO_2H , R' is a bivalent aliphatic radical, and M is an alkali metal, *e.g.*, the reaction product of an alkali salt of a monobasic dithiocarboxylic acid (NH_4 dithiofuroate) and a similar salt of a halogen-substituted fatty acid, *e.g.*, $CH_2Cl \cdot CO_2NH_4$. D. F. T.

Artificial leather.—See V. Products from waxes. See XII.

XV.—LEATHER; GLUE.

Pickling of sheepskins. I. Pickling in solutions of sulphuric acid and sodium chloride. (Miss) W. B. PLEASS (J. Soc. Leather Trades Chem., 1934, 18, 464—488).—The quality of sheepskin pelts which had been pickled with NaCl and H_2SO_4 was assessed from their macro- and micro-scopical appearances after 3 months' storage at $0-37^\circ$. The max. initial concn. of the pickle liquor was 1% H_2SO_4 and 10—12% NaCl, and the max. final concn. was about 0.8% H_2SO_4 and 9—10% NaCl. Mould growths developed more readily on greasy than on degreased skins. The p_H of the aq. extract of the pickled pelt and its NaCl content are suggested as simple, reliable criteria of efficient pickling with NaCl- H_2SO_4 . D. W.

Chrome-vegetable tannin combination tannage. C. OTIN and G. ALEXA (J. Soc. Leather Trades Chem., 1934, 18, 418—424).—The degree of tannage (*D*) in a combination tannage (*C*) of this type increased proportionally with the Cr_2O_3 fixed by the pelt, and was also increased by pickling the pelt before tanning it with vegetable tannin or with *C*. The figures obtained for *D* with different vegetable tanning materials in *C* were, respectively: sol. quebracho 49.7, chestnut 39.9, "meleze" 30.9, "skumpia" 27.1. D. W.

Theory of mineral tannage. E. ERÖD and T. SCHACHOVSKOY (Collegium, 1934, 414—432; cf. B., 1934, 72).—When gelatin is tanned with $Co(OH)_3$ (I) or substituted derivatives, the (I) retains its chemical individuality as shown by light-absorption tests, so that tannage is not the combination of 2 mols. through the medium of intermol. forces. The tanning material must (a) possess sufficiently strong powers of attraction to overcome those of the H_2O for the polar groups, (b) be sufficiently stable to resist heat and hydrolysis, and (c) be of such a character that it can be brought in a suitable form into contact with the active groups in the protein. It co-ordinates with these to the exclusion of H_2O . D. W.

Technology of certain synthetic tannins. F. STATHER and K. LÖCHNER (Collegium, 1934, 374—399).—Analytical solutions of synthetic tannins (*S*) must be of a definite concn. if the results of the tannin analysis are to be comparable, since they vary with the concn. The amount of *S* fixed by hide substance (*H*) varies with *S* and is much < that of vegetable tannins. The irreversibly fixed *S* increases as the concn. and duration of tannage are increased and as the p_H of the aq. *S* is diminished. The tannin irreversibly fixed on *H* from vegetable tannin solutions is increased by mixing *S* with quebracho or chestnut liquors and some *S* with valonia, and diminished with additions of *S* to mimosa and oak-bark liquors and other *S* to valonia liquors. The effect of such additions of *S* to vegetable tan liquors increases as the amount of added *S* is increased. *S* are highly dispersed, and the extent to which they disperse the insol. matter in vegetable tan liquors with which they are mixed \propto the amount added. The diffusion of *S* into pelt follows the law $E = K\sqrt{t}$. Their penetrability varies with different *S* in about the same limits as the vegetable tannins and increases as the concn. is increased. Some *S* are suitable alone for tanning leather, but most *S* should be used with vegetable tannins. Leather tanned with *S* alone shows a positive reaction for free strong acid, those tanned with *S* + vegetable tannin do not. The free strong acid in *S*-tanned leather can be removed by careful washing. *S*-tanned leathers have greater or less tensile strength and stretch according to the *S* used. The colour and fastness to light vary for different *S*, but in combination with vegetable tannins they always improve the colour of the leather. D. W.

Chrome[-tanning] liquors. E. R. THEIS and E. J. SERFASS (J. Amer. Leather Chem. Assoc., 1934, 29, 431—461).—The amount of unreduced $K_2Cr_2O_7$ (I) in (I)- H_2SO_4 -sucrose (*S*) mixtures decreased directly as the excess *S* was increased in mixtures containing > 7.5% Cr_2O_3 , and as the concn. of the mixture was increased up to 10% Cr_2O_3 . Complete reduction was impossible with the theoretical amount of *S*. The oxidation of *S* proceeds differently in acid concns. < 3*N* from that in solutions > 3*N*- H_2SO_4 . Less *S* was required as the time of reduction was increased. The unreduced (I) diminished as the liquor was allowed to age. As the basicity of the liquor was increased the unreduced (I) was increased, but the curve illustrating this showed a break at 33% basicity. The unreduced (I) increased as the temp. of the reaction was lowered. The heat of the reaction was sufficient to boil mixtures containing 17.5% and 25% Cr_2O_3 but not those containing < 10% Cr_2O_3 , and the efficiency of the reduction was increased by increasing the concn. of the mixture. In more dil. solutions at room temp., much more excess *S* was required to complete the reduction. D. W.

Modified Riess method for filtration of tannin solutions. D. McCANDLISH (J. Soc. Leather Trades Chem., 1934, 18, 407—409).—The filtration apparatus and method of procedure necessary to ensure concordant results are described in detail. D. W.

Grease stains on [vegetable-tanned sole] leather. II. Microscopical study of natural animal skin lipins. F. O'FLAHERTY and W. T. RODDY (J. Amer.

Leather Chem. Assoc., 1934, 29, 476—489; cf. B., 1934, 213).—Vertical sections of raw hide have been stained with Sudan IV, which stains neutral fats, fatty acids, soaps, and cholesterol-fatty acid mixtures a red shade. Photomicrographs of such sections revealed relatively few fat cells in the corium in the shoulder region, but a very large no. in the kidney region of the hide. These fat cells have been formed from the corium fibroblasts. The lipin content on such cells may be forced out by mechanical or physical stress, and such escaped lipins have been observed in salt-cured hides. Cholesterol crystals have also been observed in some fat cells, but in relatively small quantities. D. W.

Comparative permanence of chrome and vegetable[-tanned] leathers as indicated by gas-chamber tests. R. W. FREY and C. W. BEEBE (J. Amer. Leather Chem. Assoc., 1934, 29, 489—511).—Vegetable-tanned cowhide, sheepskin, and goatskin were badly, and chrome-tanned leathers slightly, deteriorated by exposure for 180 days to the fumes from a gas jet. The grain of the vegetable-tanned leathers scuffed badly, whilst only two of the chrome leathers showed this defect. Goat-skin leather was more permanent than cowhide or sheepskin. D. W.

Deterioration of [vegetable-tanned] leather. D. WOODROFFE (J. Soc. Leather Trades Chem., 1934, 18, 424—430).—The discoloration of pyrocatechol-tanned leathers on exposure to light is discussed. The presence of free mineral acid is not the only cause of deterioration, but there are probably other contributory processes, e.g., oxidation, polymerisation, and condensation. D. W.

Determination of strong acid and of buffer salts in vegetable-tanned leather. R. F. INNES (J. Soc. Leather Trades Chem., 1934, 18, 457—464).—10 g. of the finely divided leather are extracted with 4 pts. of 25 c.c. of H_2O , 5 c.c. of the mixed extracts diluted with 45 c.c. of $COMe_2$, and the p_H of the product is determined. Strong acid is present if the p_H is < 4.0. The amount of buffer salts in the aq. extract can be calc. from the no. of c.c. of 0.02*N*-HCl required to bring the $COMe_2$ mixture to p_H 4.0. D. W.

Procter-Searle method for determining the acidity of vegetable-tanned leather. R. C. BOWKER and E. L. WALLACE (J. Amer. Leather Chem. Assoc., 1934, 29, 421—426).—The Procter-Searle val. (*P*) is always < the amount of acid added to the leather, partly owing to loss of *S* during the first ignition. *P* is high in leathers on which sulphited extracts or synthetic tannins have been used. The determination of *P* alone should be discontinued in determinations of acidity. D. W.

Preservation of [raw] lizard skins. B. M. DAS, B. B. DHAVALA, and P. N. PAL (J. Soc. Leather Trades Chem., 1934, 18, 415—417).—The skins are treated with a mixture of $ZnCl_2$ (2), NaCl (10—20), and H_2O (100 pts.). D. W.

Gelatin in buttermilk, ice cream, and soup cubes.—See XIX.

PATENTS.

Treatment of diaphragm leathers for gas meters and like apparatus having leather diaphragms.

ALDER & MACKAY, LTD., E. CROWTHER, and W. I. INESON (B.P. 415,740, 25.11.32).—The leather is dressed with a mixture of tallow (48.5%), paraffin wax (23.5%), and hydrocarbons obtained by cooling the gas in the gas mains to 5° (28%). D. W.

Artificial leather.—See V.

XVI.—AGRICULTURE.

Soil structure. II. V. NOVÁK (Mitt. Czechoslov. Akad. Landw., 1934, 10, No. 1; Proc. Internat. Soc. Soil Sci., 1934, 9, 116—117).—In black earths and humus-carbonate soils aggregate analysis (I) indicates smaller proportions of the finer fractions than does the customary mechanical analysis (II), although the proportions of the individual fractions are similar. In the complete profiles both (I) and (II) show a definite regularity of changes. Brown earths, and especially podsoles, exhibit either considerable divergence between (I) and (II) with fewer and less stable aggregates in A_2 than in B , or, in successive horizons, there is a marked uniformity of individual fractions by (I) even when (II) records wide variations. A. G. P.

Introduction of beech into pine forests as an edaphic factor in sandy podsol and brown-earth soils. E. CHODZICKI (Wydane zasilk. Minist. Roln. Reform Roln., 1934; Proc. Internat. Soc. Soil Sci., 1934, 9, 130—131).—In pine forests the CaO content of the surface soil (0—10 cm.) was much < that at 30—40 cm. In mixed pine and beech these proportions are practically reversed. Leaching of Fe is retarded by beech. The N content of subsoils (30—40 cm.) is higher under beech. A. G. P.

Carbon-nitrogen ratio in relation to soil classification. M. S. ANDERSON and H. G. BYERS (Soil Sci., 1934, 38, 121—138).—Considerable differences are established in the C:N ratios of the principal soil groups and also in the ratios of individual soils in the same group. In all groups the ratio decreases with depth, but not regularly. Determinations of the N in soils are of little val. in assessing either the org. matter (I) or C contents. Essential differences in the nature of the (I) of different soil groups are indicated. A. G. P.

Laws of soil colloidal behaviour. XV. Ion exchange with hydroxides. A. J. PUGH (Soil Sci., 1934, 38, 161—173; cf. A., 1934, 730; B., 1934, 32).—Adsorption of $C_2O_4^{4-}$ and SO_4^{2-} by hydroxides of Ti^{3+} , Su^{3+} , Fe^{3+} , and Cr^{3+} decreases with increasing p_H to a very low val. at the isoelectric p_H . Solubility is an important secondary factor in ion-exchange reactions with colloids. Neither the age of the colloid nor the concn. of the salt used affects the point of exchange neutrality. A. G. P.

Iron sorption by soils. L. SMOLÍK (Czechoslov. Acad. Agric., 1933, 9, No. 6/7; Proc. Internat. Soc. Soil Sci., 1934, 9, 119).—Adsorption of Fe^{3+} from $FeCl_3$ solutions (I) by carbonate-free soils increases with the p_H of the filtrate from suspensions of soil in (I). A. G. P.

Organic base-exchange compounds in soils. W. T. McGEORGE (J. Amer. Soc. Agron., 1934, 26, 575—79).—Plant residues and green manures materially

increase the base-exchange capacity of soils. Ash constituents of plants also contain base-exchanging substances. A. G. P.

Application of the theory of probability to the size distribution of soil aggregates. C. AFFLECK (Soil Sci., 1934, 38, 113—119).—Mathematical discussion. A. G. P.

Soil and hydrological conditions of the Jordan Valley as causes of plant diseases. F. MENCHIKOWSKY (Hadar, 1931, 4, 34—38).—Analyses of H_2O are reported. Certain soils contain $\gt 1.16\%$ NaCl in the upper and $\gt 0.64\%$ NaCl in the lower strata; $\gt 0.15\%$ of $NaHCO_3$ is present in some soils. CH. ABS.

Acidity of forest soil types of Peloponnesus. N. B. LIATSIKAS (Veröff. Geol. Landesanst., Greece, 1931, No. 18; Proc. Internat. Soc. Soil Sci., 1934, 9, 132).—The active acidity of these soils serves to differentiate between podsollic and brown-earth types. A. G. P.

Physiological importance of alumina and silica gels in acid mineral soils. M. TRÉNEL (Ernähr. Pflanze, 1934, 30, 249—256).—Of the decomp. products of acid mineral soils the Al^{3+} alone is injurious to plants. Al_2O_3 and SiO_2 gels may favour growth. In acid media plants may obtain sufficient PO_4^{3-} from Al phosphates. Thus the fixation of PO_4^{3-} by Al does not, in itself, explain the injurious effects of Al^{3+} in acid soils. The presence of colloidal SiO_2 has no effect on the assimilation of PO_4^{3-} . A. G. P.

Determination of lime requirement of soils. B. MALÁČ (Mitt. Czechoslov. Akad. Landw., 1933, 9, No. 5; Proc. Internat. Soc. Soil Sci., 1934, 9, 139).—For rapid determinations Kappen's method for S vals. and Hissink's method for T vals. are satisfactory. A. G. P.

Determination of readily available potash in soils. N. J. VOLK and E. TRUOG (J. Amer. Soc. Agron., 1934, 26, 537—546).—Soil is shaken intermittently for 5—10 min. with $N-NH_4OAc$ (p_H 6.8) and K in the filtered extract is determined by the cobaltinitrite method. 96% of the exchangeable K is thus recorded. Results so obtained agree well with those of Neubauer's method and rather less closely with Mitscherlich's and the *Aspergillus* methods. In defining min. val. indicative of manurial requirements, the nature of the crop, subsoil, and climate must be considered. A. G. P.

Rapid determination of total nitrogen in soil. E. M. EMMERT (Soil Sci., 1934, 38, 139—142; cf. A., 1933, 1063).—The N of soils is oxidised to NO_3^- by $NaClO_3$ in H_2SO_4 solution. Hydroxides and SiO_2 are pptd. by excess of NaOH, and residual ClO_3^- is decomposed by fuming H_2SO_4 . NO_3^- is then determined by the $C_6H_5(OH)(SO_3H)_2$ method. A. G. P.

Newer aspects of nitrification [in soils]. I. G. G. RAO (Soil Sci., 1934, 38, 143—159).—Nitrification in soils is partly a photochemical action. Oxidation of NH_3 to NO_2^- takes place on exposure to a quartz Hg-vapour lamp, a Cu arc, or, more slowly, to sunlight. The oxidation is catalysed by heated TiO_2 , Al_2O_3 , ZnO , or sterile soil. NH_4^+ salts are similarly oxidised in presence of a suitable base ($CaCO_3$). In sunlight and in

presence of catalysts amides (NH_2Ac , urea), NH_2 -acids (glycine, alanine), and amines are also oxidised to NO_2 following the preliminary hydrolysis or decomp. to NH_3 . A modified Griess-Iolsvay method for the micro-determination of NO_2 is described. A. G. P.

Determination of carbon dioxide evolution in soil. M. H. BROWN (J. Amer. Soc. Agron., 1934, 26, 481—485).—Removal of CO_2 from the soil surface by an air current, whether continuous or intermittent, did not affect CO_2 production as compared with that under conditions in which the gas was allowed to accumulate and reach a concn. of 12% CO_2 . A. G. P.

Soil as a direct source of carbon dioxide for ordinary plants. B. E. LIVINGSTON and R. BEALL (Plant Physiol., 1934, 9, 237—259).—Plants may obtain from soil up to 5% of the total CO_2 used in photosynthesis. Plants grown in soil artificially supplied with additional CO_2 showed definitely accelerated development. A. G. P.

Comparison of the Neubauer, plant-sap analysis, and Hoffer stalk-test methods for determining the nutrient supply of soils. N. A. PETTINGER and S. F. THORNTON (J. Amer. Soc. Agron., 1934, 26, 547—561).—Close agreement is shown between the Neubauer and sap-analysis methods for available K, and between all three methods for available P. A. G. P.

Efficiency of certain ammoniated superphosphates and other phosphate fertilisers. F. B. SMITH, P. E. BROWN, H. T. MILLER, and C. C. MENSING (J. Amer. Soc. Agron., 1934, 26, 591—599).—With a variety of P fertilisers comparison is made of availability data obtained by the Bray (I), Truog (II), neutral NH_4 citrate, and *Aspergillus* methods, and of the response of wheat to these fertilisers. All laboratory methods except (I) agreed closely with crop yields. The superiority of superphosphate over rock phosphates was suitably shown by all but method (II). In no case was the efficiency of all fertilisers indicated by any one method. A. G. P.

Preparation of physiologically neutral fertiliser mixtures. Reactions of monoammonium phosphate with limestone and with dolomite. K. G. BEESON and W. H. ROSS (Ind. Eng. Chem., 1934, 26, 992—997).—All mixtures of superphosphate and $(\text{NH}_4)_2\text{SO}_4$ contain $\text{NH}_4\text{H}_2\text{PO}_4$ (I) or $(\text{NH}_4)_2\text{HPO}_4$. 1 pt. of (I) requires 0.65 pt. of CaCO_3 to give a physiologically neutral mixture. Such a mixture stored for a no. of days with moisture loses both CO_2 and NH_3 at 30° . Loss of NH_3 commences when the mols. of CaCO_3 exceed the mols. of P_2O_5 . At 90° NH_3 is lost from any mixture. Rate of loss increases with reduction of particle size. If CaCO_3 is replaced by dolomite (II) no loss of NH_3 occurs at 30° with any proportions. Some increase of citrate-insol. P_2O_5 occurs with CaCO_3 but not with (II). With (II) H_2O -insol. MgNH_4PO_4 is formed to the extent of $\frac{1}{3}$ of the NH_4 content. At 90° other reactions with (II) occur, with loss of NH_3 . (II) therefore offers advantages over CaCO_3 as a neutralising agent. If CaCO_3 is used, the max. addition without loss is the same whether the mixture contains superphosphate, (I), or both. C. I.

Fertilising value of green manures rotted under different conditions. J. A. DAJI (J. Amer. Soc. Agron., 1934, 26, 466—475).—The manurial val. of green manures, whether incorporated with soil immediately, allowed to rot on the surface before turning in, or rotted apart from soil in presence of CaCO_3 , depends principally on the amount of N actually added to the soil. A. G. P.

Green manure and soil fertility. J. J. THERON and L. P. VAN WYK (Univ. Pretoria Ser., 1933, 1, No. 26, 26 pp.).—Added org. matter (cowpeas) and N disappeared rapidly from the soil; the rate was unaffected by application of superphosphate. It is suggested that green manuring is effective only on soils which require assistance in the replacement of electrolytes in the liquid phase. CH. ABS.

Synthetic farmyard manure. A. ZUSMAN (Hadar, 1931, 4, 121—122).—The "Adco" starter contains N 8.42, P_2O_5 9.72, K_2O 2.22, and CaO 51.76%; the active bacterial agent is *Spirochaeta cytophaga*. CH. ABS.

Effect of thallium on plant growth. E. E. HORN, J. C. WARD, J. C. MUNCH, and F. E. GARLOUGH (Science, 1934, 80, 167—168).—Laboratory and field experiments show that the addition of > 10 p.p.m. of Tl compounds to the soil has no injurious effect on the growth of vegetables and grasses. In many cases, growth appeared to be stimulated (cf. B., 1934, 338). L. S. T.

Effect of variations in concentration of mineral nutrients on growth of turf grasses. M. E. REID (Bull. U.S. Golf Assoc., Green Sect., 1933, 13, 122—131).—The effect of various concns. of N, P, K, Ca, Mg, and S in SiO_2 cultures is described. CH. ABS.

Use of peat and other organic materials on golf courses. J. MONTEITH, JUN., and K. WELTON (Bull. U.S. Golf Assoc. Green Sect., 1933, 13, 90—110).—Increase in loss on ignition, air-dry H_2O content, max. H_2O -holding capacity, and soil acidity was observed. The deleterious effect of peat was overcome by the use of large amounts of N fertiliser. CH. ABS.

Renovation of an old lawn. F. A. WELTON and J. C. CARROLL (J. Amer. Soc. Agron., 1934, 26, 486—491).—Practically all lawn weeds (including dandelion, plantain, yarrow, and sorrel) were killed by NaClO_3 (1 lb. per gal. of H_2O per 100 sq. ft.) applied in autumn or winter, or at least 3 months before reseedling. A. G. P.

Microbial decomposition of successive cuttings of lucerne hay under aërobic conditions. E. A. BEAVENS and L. H. JAMES (J. Agric. Res., 1934, 48, 1121—1126).—In three successive cuts of lucerne the rates of decomp. were in the order 1st $>$ 3rd $>$ 2nd. Analytical data are given showing the composition of the products. A. G. P.

Duration of the favourable influence of lucerne on the cotton fields of Armenia. K. P. MIRIMANIAN (J. Amer. Soc. Agron., 1934, 26, 475—480).—The increase in humus, total N, exchangeable Ca, H_2O -holding capacity, and porosity of soils following cropping with lucerne is substantially effective for 3 years. A. G. P.

Lime requirements of lucerne on Wisconsin soils. H. H. HULL (J. Amer. Soc. Agron., 1934, 26, 506—513).—To ensure maintenance of supplies of available PO_4^{4-} in soils p_{H} 6.5 (approx.) is probably desirable. On soils having $p_{\text{H}} > 6.0$ lucerne did not respond to liming. An appropriate supply of Ca and PO_4^{4-} within 5 ft. of the soil surface suffices for lucerne, even if the surface soil is deficient in these nutrients. A. G. P.

Distribution of fertiliser residues in the soil after fourteen years of a fertiliser experiment with lucerne. W. H. METZGER (J. Amer. Soc. Agron., 1934, 26, 620—625).—Superphosphate (I), applied alone, accumulated near to the surface. Easily-sol. P at depths > 12 in. in unmanured plots was $>$ that in plots receiving (I) with K_2SO_4 or K_2SO_4 alone. Rock phosphates penetrated to considerable depths, as also did (I) when used in a mixed fertiliser containing NaNO_3 . Penetration of K_2SO_4 was small and > 12 in. $> 50\%$ of the K_2SO_4 applied accumulated in the surface 6 in. CaO applied to the surface penetrated approx. 6 in. in 14 years. A. G. P.

Root habits of certain crop plants as observed in the humid soils of New Jersey. N. F. FARRIS (Soil Sci., 1934, 38, 87—111).—Root extension is but little affected by the acidity, % of org. matter, or texture of soils, or the composition of fertilisers applied. The H_2O content of the soil is an important factor in this respect. A. G. P.

Do soil organisms compete for nutrients useful to crops? R. E. STEPHENSON (J. Amer. Soc. Agron., 1934, 26, 513—518).—Appreciable withdrawal of plant nutrients in soils by micro-organisms occurs only in the case of N. Bacterial decomp. of org. manures containing mineral matter (I) (legume residues, stable manure) results in increased H_2O -solubility of (I) and specially of K. A. G. P.

Magnesium deficiency induced by previous fertiliser treatments. H. C. KNOBLAUCH and T. E. ODLAND (J. Amer. Soc. Agron., 1934, 26, 609—615).—Poor growth and chlorosis in highly manured potatoes were remedied by additions of MgSO_4 to soil. Heavy applications of K fertilisers induce or accentuate Mg deficiency. A. G. P.

Cause of blind wood in roses. D. S. HUBBELL (Plant Physiol., 1934, 9, 261—282).—The physiological condition of blindness (I) in rose shoots is associated with high proportions of non-colloidal N and insol. carbohydrates in stems and leaves. Flowering shoots contain a high % of reducing sugars. Deficient supplies of NO_3^- in soil favour (I). A. G. P.

Ensilage with addition of mineral acid. J. C. DE R. DE WILDT (Vereen. Expl. Proefzuiv. Hoorn, 1932—3, 209—229; Chem. Zentr., 1934, i, 1409).—Addition of acids hinders protein degradation, especially the production of NH_3 . H. J. E.

Halowax as a contact insecticide. E. P. BREAKEY (J. Econ. Entom., 1934, 27, 393—398).—Successful use of Halowax (chlorinated C_{10}H_8 product) in petroleum oil emulsions is described. Scorching of foliage in greenhouse plants is prevented by use of blood-albumin

or casein (1 in 1000), the former yielding a spray of better keeping quality. A. G. P.

Oil retention, oil-emulsifier ratio, and oil-water ratio as affecting the insecticidal efficiency of emulsions. A. W. CRESSMAN and L. H. DAWSEY (J. Agric. Res., 1934, 49, 1—19).—The insecticidal efficiency (I) (toward camphor scale) of soap-oil emulsions was controlled mainly by the amount of oil retained (II) by sprayed surfaces and the density of insect population (III). Irrespective of (II), (I) varied inversely as (III). Also (I) varied directly as (II). (I) and (II) were inversely related to the concn. of soap in the aq. phase of the emulsion, and directly to the concn. of oil. A. G. P.

Sulphur fumigation of mushroom houses. A. C. DAVIS and H. D. YOUNG (J. Econ. Entom., 1934, 27, 518—525).—Comparison is made of concns. attained by use of different forms of S and various methods of burning. A. G. P.

Prevention of cereal rusts by sulphur-dusting. F. J. GREANEY (Sci. Agric., 1934, 14, 496—511).—Stem and leaf rusts of wheat and oats were almost completely controlled by appropriately timed, light applications of S dusts. The development of leaf and stem spotting diseases was depressed and the quality of the grain improved. A. G. P.

Effect of leaf rust (*Puccinia triticina*) on yield, physical characters, and composition of winter wheats. R. M. CALDWELL, H. R. KRAYBILL, J. T. SULLIVAN, and L. E. COMPTON (J. Agric. Res., 1934, 48, 1049—1071).—The grain of rusted wheat contained less protein and sucrose and a higher starch % than did healthy grain, although the actual starch per kernel was lower in diseased samples. The % of ash and P were not appreciably changed. In culms and leaves rust caused an increase in total N and in N per tiller, and (in the near-ripe stage) a decrease in sucrose and reducing sugars. A. G. P.

Derris as an insecticide for cabbage-worm control. H. C. HUCKETT (J. Econ. Entom., 1934, 27, 440—445).—Derris dusts were superior to wet sprays. Talc, clay, and tobacco dust were more satisfactory as diluents than was $\text{Ca}(\text{OH})_2$. Dusts containing 0.5% of rotenone gave effective control. A. G. P.

Use of derris and pyrethrum dusts for control of insects attacking cruciferous crops. H. G. WALKER and L. D. ANDERSON (J. Econ. Entom., 1934, 27, 388—393).—Comparative trials with the cabbage looper and diamond-back moth larvae on broccoli are recorded. When used as carriers for derris dusts, talc and gypsum were more effective than $\text{Ca}(\text{OH})_2$, flour, tobacco dust, or ZnSO_4 -CaO preps. A. G. P.

Relative value of Bordeaux mixture, sulphur, and pyrethrum products in reducing populations of the potato leaf hopper (*Empoasca fabae*, Harris). D. M. DELONG (J. Econ. Entom., 1934, 27, 525—533).—Bordeaux mixture produces a toxic condition in plants which results in the death of hoppers a few days after hatching. No such "residual" action occurs when the contact insecticides are used. A. G. P.

Efficiency of derris, pyrethrum, and hellebore powders on different insects. C. C. HAMILTON and L. G. GEMMELL (J. Econ. Entom., 1934, 27, 446—453).—Comparative tests relating to general efficiency, rate of kill, and persistence of action in wet and dry sprays against a no. of species of insects are described.

A. G. P.

Seed treatment for control of root maggots. H. GLASGOW (J. Econ. Entom., 1934, 27, 303—308).—Great reduction in the proportion of cabbage plants injured by the root fly followed the coating of moistened seed (aq. gum arabic) with Hg_2Cl_2 (I). In the case of the onion fly seed treatment is profitably supplemented by direct application of (I) in seed drills.

A. G. P.

Rôle of some southern pine products in the control of *Aphis rumicis*, Linn. C. O. EDDY (J. Econ. Entom., 1934, 27, 398—400).—The action of pine-tar and tar oils in improving the wetting efficiency and insecticidal val. of coconut oil soap or soap-nicotine preps. is associated primarily with the higher-boiling fractions, tar oils being more effective than tars. Activators of nicotine were not detectable in pine products.

A. G. P.

Tentative standard concentration of tar distillates for certain insects. F. Z. HARTZELL and G. W. PEARCE (J. Econ. Entom., 1934, 27, 453—459).—Discussion of various factors concerned in standardising and compounding tar oil-petroleum oil preps.

A. G. P.

Arsenic deposit and codling-moth control. R. L. WEBSTER (J. Econ. Entom., 1934, 27, 410—417).—Comparison is made of deposits from various As sprays, and of the effects of various adhesives and supplementary materials used in conjunction with these.

A. G. P.

Willow flea weevil (*Orchestes rufipes*, Lec.) and its control in Maine. R. W. NASH (J. Econ. Entom., 1934, 27, 336—339).—Customary stomach poisons were ineffective. Two applications of nicotine sulphate (1 in 600) with K soap (1 in 500) gave satisfactory control.

A. G. P.

Effects of ethylene oxide on various stages of the bean weevil and the confused flour beetle. W. R. HORSFALL (J. Econ. Entom., 1934, 27, 405—409).—Pupæ were less injured than prepupæ. Oviposition by adult females was delayed. Unfertilised females were killed or prevented from ovipositing by dosages of $(CH_2)_2O$ which had no effect on males.

A. G. P.

Effectiveness of *p*-dichlorobenzene and naphthalene in preventing oviposition by the Japanese beetle. J. W. LIPP (J. Econ. Entom., 1934, 27, 500—502).—Incorporation of *p*- $C_6H_4Cl_2$ or $C_{10}H_8$ with soil afforded protection from oviposition for considerable periods. In the case of $C_{10}H_8$ a period of approx. 21 days elapsed before full activity was exerted.

A. G. P.

Effectiveness of stomach-poison insecticides on the Japanese beetle. W. E. FLEMING and F. E. BAKER (J. Agric. Res., 1934, 49, 39—44).—The efficiency of acid Pb arsenate (I) increased with the concn. of the spray liquid up to 8 lb. per 100 gals., no further improvement resulting from higher concns. Additions of flour,

fish oil, or 1% Pb oleate increased the effectiveness of (I) although the last-named sticker lost much of its val. when sprayed foliage was washed with H_2O . Ba and Ca arsenates were inferior to the Pb salt. Nicotine and anabasine sulphates absorbed in bentonite and also 2-phenylbenzthiazole were of little val. as dusts. The efficiency of rotenone was approx. 75% of, and that of dihydrorotenone =, that of (I).

A. G. P.

Testing contact insecticides on the Japanese beetle, and results with some sodium and potassium soaps. W. E. FLEMING and F. E. BAKER (J. Agric. Res., 1934, 49, 29—38).—Direct spraying and submersion tests show Na soaps to be more effective than K soaps, and those containing excess of alkali to be superior to neutral soaps and those containing excess of fatty acid. In a series of K soaps efficiency increases with mol. wt., members of the series below octoate having little val. The relative efficiencies of K soaps of industrial oils are in the (decreasing) order, soya-bean, cottonseed, linseed > olive > blown castor, peanut, coconut oils.

A. G. P.

Relationship of fineness of sulphur particles to effectiveness against citrus thrips in central California. E. A. MCGREGOR (J. Econ. Entom., 1934, 27, 543—546).—Field trials with various grades of S are recorded. Improved adhesion and distribution on sprayed foliage contribute largely to the greater efficiency of finer grades.

A. G. P.

Control of the European pine-shoot moth. R. B. FRIEND and A. S. WEST, JUN. (J. Econ. Entom., 1934, 27, 334—336).—A Pb arsenate-fish oil mixture proved the most practicable of insecticides examined.

A. G. P.

Calcium and lead arsenates as general insecticides for apple. P. J. CHAPMAN, G. W. PEARCE, R. W. DEAN, and O. H. HAMMER (J. Econ. Entom., 1934, 27, 421—431).—Commercial brands of Ca arsenate (I) varied considerably in their injurious action on foliage. Relationships are established between injury, carbonation, and rate of weathering of the As in various samples. $Ca(OH)_2$ reduces injury by (I), but may only postpone its action. $Al_2(SO_4)_3$ was a better injury corrective than $Ca(OH)_2$ or $FeSO_4$. (I) was less adhesive than Pb arsenate.

A. G. P.

Effects on apple foliage of different arsenicals and fungicides in combination. C. R. CUTRIGHT (J. Econ. Entom., 1934, 27, 417—420).—Five arsenicals (I) and five fungicides (II) in various combinations are compared. The nature of (II) was a greater factor in defoliation than that of (I). Flotation S was relatively safe with Pb or Mg arsenate, but very injurious with the Ca, Mn, or Zn compound. Mg arsenate was the least effective in codling-moth control.

A. G. P.

Bentonite compounds as agents for the retention of nicotine on apple foliage and fruit in codling-moth control. B. F. DRIGGERS and B. B. PEPPER (J. Econ. Entom., 1934, 27, 432—440).—Bentonite-S used in conjunction with nicotine tannate sprays improves the amount and period of retention of nicotine on sprayed foliage, and as a result increases the efficiency of codling-moth control.

A. G. P.

Kerosene emulsions [as insecticides] against the apple curculio (*Tachypterellus quadrigibbus*, Say). O. H. HAMMER (J. Econ. Entom., 1934, 27, 367—369).—Complete control of the insect in fallen infested fruit was obtained by spraying with \leq 25% oil emulsions. Addition of $p\text{-C}_6\text{H}_4\text{Cl}_2$ or C_{10}H_8 did not improve the efficiency of the spray. A. G. P.

Summer oil [insecticidal] emulsions. S. W. FROST (J. Econ. Entom., 1934, 27, 459—461).—Emulsions containing 2% of summer oils may be used with safety on apple and peach, but combination with many fungicides results in considerable injury to apple (notably CaO-S and finely-divided forms of S). A. G. P.

Control of *Glossonotus crataegi* on plum and apples. R. HUTSON (J. Econ. Entom., 1934, 27, 365—367).—Dormant sprays give insufficient control. Summer oil-nicotine preps. effectively eliminate nymphs. A. G. P.

Effect of petroleum oil fly sprays on dairy cattle. S. B. FREEBORN, W. M. REGAN, and L. J. BERRY (J. Econ. Entom., 1934, 27, 382—388).—The rise in body temp. of cows after spraying (B., 1932, 523) results from chemical interaction with the tissues rather than from a purely mechanical surface action. A. G. P.

Diseases of King Island stock arising from mineral deficiency. T. PHILP (Australian Vet. J., 1933, 9, 42—53).—Fe and P deficiency in stock is found on coastal dunes where the soil is high in Ca; P deficiency is found on the plains where the soil is low in Ca. Bone-meal feed corrects P deficiency, but feeding Fe only delays the development of aphosphorosis. CH. ABS.

Determining F in phosphatic materials.—See VII. Tobaccos.—See XX.

PATENTS.

Manufacture of parasiticide. M. L. TOWER and (A) H. W. DYE, (A) ASSY. to NIAGARA SPRAYER & CHEM. CO., INC. (U.S.P. 1,945,542, 6.2.34. Appl., 7.2.29).—Powdered fungicide (*e.g.*, S) is suspended in H_2O together with a dye and dye-carrier (*e.g.*, gelatinous bentonite and gelatin) which ppts. itself and the dye on the S, which by this means is coloured to resemble the foliage on which it is to be dusted. B. M. V.

Cu fungicides.—See VII. Seeds.—See XIX.

XVII.—SUGARS; STARCHES; GUMS.

Function of dead spaces in [sugar-beet] diffusion. E. POKORNÝ and J. VONDRAK (Chim. et Ind., 1934, 31, Spec. No., 982—985).—Calculations and results of large-scale tests show that in a diffusion battery the spaces above and below the cossette charges and in the connecting pipes and caloriser tubes do not lower the d of the juice drawn off. These dead spaces increase the vol. of waste- H_2O from a battery, but do not affect the d of the final juice. The practical trials were made with a battery of 16 vessels, only alternate ones being charged with cossettes, the others acting as exaggerated dead spaces. For a given draw-off, 100% on cossettes, the juice obtained was slightly denser than when the

battery was operated as usual. The authors therefore recommend the use of (i) connecting pipes of large diam. to permit more rapid flow of juice, and (ii) caloriser tubes in preference to heating by injection of steam. J. H. L.

Compound compared with single clarification [of sugar juice]. PETREE & DORR ENGINEERS, INC. (Internat. Sugar J., 1934, 36, 326).—Savings realised by the adoption of the Petree & Dorr process of compound over single clarification in the case of a factory grinding 100,000 tons of cane are estimated to be: increase in recovery 1%, equiv. to 110 tons of sugar; lowered press-cake losses 0.04%, equiv. to 40 tons of sugar; reduced cloth consumption about 50%. This process is based on the separate treatment of the juice from the first pressings mixed with the already defecated secondary juice. The latter results from the separate treatment of the juices from the last pressings mixed with the settlings from the primary Dorr clarifier. Colloids are thus eliminated to a larger extent than would otherwise be possible. J. P. O.

Heating of massecuites previous to centrifuging. B. B. HENDERSON and G. H. W. BARNHART (Internat. Sugar J., 1934, 36, 326—327).—Using crystallisers provided with 30% of cooling or heating surfaces in stationary copper coils, it was possible to cool the massecuite (I) to a suitable temp. in 54—60 hr., then by introducing warm H_2O in the coils to raise the temp. of (I) to 72—74° before discharging to the centrifugal mixer. When the temp. of the centrifuged (I) is high, a sugar of much higher purity is obtained as the result of the better elimination of the molasses resulting from the reduction of η . It was possible by adopting this system to reduce the purity of the final molasses from the former average of 39.18 to that of 33.07. It was found necessary carefully to control the temp. of the H_2O used for warming the (I). J. P. O.

Zeiss[Pulfrich] step-photometer for characterising the colour of sugar solutions. E. LANDT and H. WITTE (Z. Ver. deut. Zucker-Ind., 1934, 84, 450—469).—This instrument (A., 1931, 1257) is well suited to replace the Stammer colorimeter in technical sugar work (cf. B., 1933, 887). With a single light filter (S 53), identical vals. for the extinction coeff. of a molasses solution were obtained in cells of different thickness (10—30 mm.); but on varying the concn. of the solution over a 4:1 range the coeff. varied by about 10%, probably owing to changes in colloidal constituents. With a supplementary fitting the instrument can be used for measuring turbidities, and the theoretical principles involved are described, with some experiments on sugar products, but the manipulation is considered too exacting for routine purposes. J. H. L.

Control of sugar boiling by means of electrical conductivity. V. O. SPENGLER, F. TÖDT, and J. WIGAND (Z. Ver. deut. Zucker-Ind., 1934, 84, 443—449; cf. B., 1934, 551).—It is not certain that temp. correction is desirable in electrical control apparatus. A fall in temp. in the vac. pan, like evaporation of H_2O , lowers conductivity by increasing supersaturation. A new control apparatus by Wösthoff is provided with an

instrument which automatically measures the ash content of syrups to be drawn into the pan and corrects the main conductivity indicator accordingly. The practical val. of such compensation has yet to be tested, and seems doubtful where syrups of different purities are drawn in for the same strike. J. H. L.

Treating bone char. Bagasse C.—See II. **Determining fat, and sugar, in milk etc. Honey granulation.**—See XIX.

PATENTS.

Preparation of a dry product from glucose syrup. DEUTS. STÄRKE-VERKAUFSGENOSS. EINGETRAGENE GENOSS. M.B.H. (B.P. 411,308, 7.7.33. Ger., 20.12.32).—Syrups similar in character and glucose (*D*) content (28—33%, calc. for *d* 1.45) to ordinary glucose syrups are made by mixing a highly converted starch liquor (*e.g.*, containing > 55% of *D*, calc. for *d* 1.45) with a slightly converted one (*e.g.*, containing < 25% of *D*, for *d* 1.45) and concentrating. The mixture is dried, preferably in a vac., yielding a product which, unlike that from ordinary glucose syrup, is non-hygroscopic. J. H. L.

Manufacture of corn [maize] sugar [glucose]. C. EBERT, Assr. to INTERNAT. PATENTS DEVELOPMENT Co. (U.S.P. 1,936,157, 21.11.33. Appl., 12.7.30).—A product of purity about 93% (on solids), and resembling that hitherto made from slab-glucose (I) by pressing out part of the mother-syrup and reducing the pressed slabs to pellets, is made by mixing comminuted but unpressed (I) (purity about 89—90%) with centrifuged cryst. glucose (II) of higher purity, representing, *e.g.*, the second crop obtained in the manufacture of pure cryst. (II) (cf. U.S.P. 1,471,347, and 1,521,830; B., 1924, 27; 1925, 183). J. H. L.

Conditioning spray-dried products. Precoating in filtration [of starch by-products].—See I. **Alcohols by fermentation.**—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Detection of addition of beer [bottom-fermentation] yeast to pressed yeast. A. BOAS (Mitt. Lebensm. Hyg., 1934, 25, 22—39).—Methods were tested as follows. (1) Since beer yeast (I), chemically treated or otherwise, produces a smaller loaf than pressed yeast (II) in presence of 3% of NaCl and is more sensitive to the influence of temp., baking experiments may be used to detect adulteration. (2) Similarly, measurements of CO₂ evolved (after Hayduck) in presence of 4% of NaCl will indicate 5—10% of (I) in (II). (3) NaCl stimulates the colour absorption in 24 hr. of (I), but not of (II), from erythrosin, especially when warmed or in presence of EtOH, and from methylene-blue, especially in presence of 10—20% of glycerin. (4) Examination of the spectrum of the cytochrome enables 30% of (I) in (II) to be detected; bands observed are at 568—544 and 534—514, and at 604, 564, 549, and 532—512, respectively. (5) The most reliable method is selective fermentation by (I) of melibiose (after Herzfeld and Bau). Lindner's observation that (II), but not always (I), ferments raffinose is of theoretic

cal interest only; his quant. microscopical method of distinction, though reliable, entails difficult technique. J. G.

Apparatus for testing filtering materials [for beer]. J. RAUX (Chim. et Ind., 1934, 31, Spec. No., 986—988).—The apparatus enables beer to be filtered under any desired pressure, with a counter-pressure on the filtrate, while the pulp or other medium is held between perforated plates under adjustable pressure. The filter itself, supported on a tripod, consists of a metal cylinder 8 in. in diam., contains a pair of horizontal perforated and channelled plates between which the pulp is compressed, and has a cap fitting like a piston and held by bolts. The beer inlet in the cap is connected by tubing to a small cylindrical pressure reservoir from which the beer is fed under CO₂ pressure. The outlet from the filter has valved central and lateral connexions for taking samples and filling bottles under counter-pressure. A special press is provided in which filter cakes of the required size can, if desired, be prepared before insertion in the filter. J. H. L.

Valaisian wines. B. ZURBRIGGEN (Mitt. Lebensm. Hyg., 1934, 25, 8—16).—A general description of the various types from the geographical, climatological, agricultural, and botanical points of view. The EtOH content is usually 11—13 vol.-% and the acidity 4.5—6 g./litre, of which 50—88% may be tartaric acid, this proportion being highest in the white wines; the ash content may be as low as 1%. J. G.

Wine from Müller-Thurgau vines. C. VON DER HEIDE (Z. Unters. Lebensm., 1934, 68, 172—178).—The advantages of cultivating Müller-Thurgau vines are described. The wine produced differs from other varieties in flavour and extract, total acidity, and ash contents. E. B. H.

Clarification of wine. L. G. SAYWELL (Ind. Eng. Chem., 1934, 26, 981—982).—More certain and more rapid clarification is effected by addition of 1 pt. of Wyoming bentonite to 2000 pts. of wine, especially at 49—82°. The Fe content is reduced to < 15 p.p.m. and the flavour and colour are not affected. Filtration is assisted by addition of Super-Cel or Hi-Flo. E. B. H.

Clarification of white wine by casein. R. MARTIN and CASTAING (Ann. Falsif., 1934, 27, 340—348).—Casein has been employed successfully as a preventative and as a cure for wines sensitive to "madérisation." It is mixed quickly into small vols. of wine at 10—15°, in concn. > 100 g./hectolitre, and left for 24 hr. before filtering. The process is capable of removing Fe from wine efficiently enough to protect it against "casé." E. B. H.

Determination of volatile acidity in sulphited wines. R. MARCILLE (Ann. Falsif., 1934, 27, 348—351).—After determination of the total volatile acidity by titration with alkali, the free and combined SO₂ in the distillate are determined by titration with I before and after alkali treatment. The true volatile org. acid = total volatile acid — (free SO₂ × 1.5) — (combined SO₂ × 0.8). E. B. H.

Determination of the tannin content of wine. P. BALAVOINE (Mitt. Lebensm. Hyg., 1934, 25, 222—

223).—A modified Nessler-Barth method is suggested which avoids errors due to variations in the vol. of the ppt. resulting from the use of varying quantities of pptg. reagents: 2 c.c. of sample, 18 c.c. of H_2O , 0.2 c.c. of 1% $FeCl_3$, and 0.5 c.c. of 20% $NaOAc$ are mixed, and the resulting colour is matched against a series containing 0.01–0.001% of tannin in 0.5% tartaric acid. Acidity $> 0.1\%$ in white wines is neutralised, but dilution is unnecessary. J. G.

Unification of methods of analysis of wines.

L. BENVENIGNI (Mitt. Lebensm. Hyg., 1934, 25, 268–276).—Standard methods are described (a) for routine sorting tests (organoleptic examination, *d*, EtOH, dry extract, reducing matters, SO_4^{4-} , total and volatile acidities, ash, preservatives); and (b) for detailed analyses [in addition to (a), org. acids, glycerin, sucrose, fixed acidity, K, P, and alkalinity of the ash]. J. G.

Spectrophotometric studies of kirsch.

H. MOHLER (Mitt. Lebensm. Hyg., 1934, 25, 8).—The 16 fractions (b.p. 76.5–99°) collected from 21 samples (1931–32, 50% EtOH) gave extinction curves with characteristic maxima and minima between 2300 and 3400 Å., increasing in initial steepness up to the principal bouquet-containing fractions (nos. 8–11, b.p. 85–93°), and then decreasing. The nature of the curve from no. 13 is an indication of furfuraldehyde content. The method may be used in conjunction with extraction with sp. solvents to investigate the source of aroma of kirsch. J. G.

Daily problems in brandy and liqueur manufacture.

C. LUCKOW (Pharm. Zentr., 1934, 75, 548–550).—Questions on the colouring of blood-orange liqueur, the correctness of the name "Getreidekummel" for kummel distillate-corn spirit mixture, and whether "Wünschelberger" is a type or origin name are discussed. Increase in EtOH content occurs in barrel-stored wine kept in an atm. of low R.H.; with high R.H. the opposite is the case, the EtOH evaporating more quickly through the barrel walls than the H_2O . E. H. S.

Determination of aldehydes and furfuraldehyde

in "trois-six" and brandy. G. VEZZI and P. HALLER (Mitt. Lebensm. Hyg., 1934, 25, 39–47).—These determinations are made by the $m-C_6H_4(NH_2)_2$ (I) and $NH_2Ph-AcOH$ (II) methods, the colours being compared against calibrated standard solutions of tropæoline-OO and safranin, respectively; the effects of EtOH content, time of reaction, and the aldehyde/furfuraldehyde ratio are discussed, and empirical data are given for the determination of 0.02–0.2 and 0.002–0.01%, respectively. (I) is unaffected by Cu or Zn, but Fe^{+++} produces a red-brown colour which does not result if 10 c.c. of a 10% solution of reagent is treated with 0.5 c.c. of H_3PO_4 and 0.5 g. of animal C and filtered. Interference of Fe and Cu with (II) is eliminated by addition of 4% $Ca(OH)_2$ and filtration. J. G.

Colorimetric determination of aldehyde [in spirits etc.]. S. HÄHNEL and B. HOLMBERG (Svensk Kem. Tidskr., 1934, 46, 43–61).—A further study of the method described previously (B., 1933, 328). Up to 2 g. of $NaOAc$ per litre has little effect on the results. The NH_2OH method gives low results. If the liquid

investigated contains sugar, colouring matter, or essences, the aldehyde must first be distilled off. If very small quantities of aldehyde are present, the liquid should be conc. by distillation. R. P. B.

Purification of alcohol and spirits [by bone charcoal].

A. ZAHARIA, E. ANGELESCU, and D. MOTOC (Chim. et Ind., 1934, 31, Spec. No., 989–995).—50-c.c. portions of dil. EtOH containing single added impurities [*iso*- $C_5H_{11}OH$ (I), Bu^tOH (II), furfuraldehyde (III), $AcOH$ (IV), $MeCHO$ (V), and $EtOAc$ (VI)] in amounts such as may occur in spirits, were treated with 1 g. of Merck's pure bone charcoal and filtered after 10 min., a time $>$ sufficient for adsorptive equilibrium but too short for any oxidation to occur. For each impurity except (IV) and (VI) the % of the original quantity adsorbed, from EtOH of a given concn., was the same for different original quantities. In all cases the % adsorption was greater from dil. than from conc. EtOH. (III) was completely adsorbed from 25% EtOH and about 90% was adsorbed from 50% EtOH. Of (I) about 70% was adsorbed from 12.5% EtOH and 45–60% from 25% EtOH. Of (II) 35–40% was adsorbed from 12.5% EtOH and 15–25% from 25% EtOH. Of (IV), present in quantities from 200 to 2000 mg. per 100 g. of EtOH, 32–11% was adsorbed from 12.5% EtOH, 15–6% from 25% EtOH, and 9–2% from 50% EtOH. Of (V), 20% was adsorbed from 12.5% and 25% EtOH and 10% from 50% EtOH. The treatment described, applied to a Rumanian spirit (tzuica) containing 25% of EtOH, distilled from fermented prunes, not only reduced the content of known impurities, but also improved the flavour and bouquet, by removing unknown substances of unpleasant flavour. J. H. L.

Production of fusel oil from barley- and oat-malt.

W. KILP (Z. Spiritusind., 1934, 57, 219–220).—Flaked-potato mashes gave approx. the same yields of fusel oil, whether saccharification were carried out with barley- or oat-malt, given similar conditions of experiment, particularly similar N content in the barley and oats used. I. A. P.

Unsatifiable high-boiling substances in fusel oil.

II. T. TAIRA and T. MASUJIMA (J. Agric. Chem. Soc. Japan, 1934, 10, 232–247; cf. B., 1933, 1031).—The fraction of b.p. $> 132^\circ$ in fusel oil from sweet potato and molasses contains cetyl alcohol and *tert*-sesquiterpene alcohols, $C_{15}H_{24}O$, named ipomeol and saccharol, respectively. Molasses fusel oil contains $C_2H_5Ph.OH$. CH. ABS.

Determining citric acid in wine.—See III. **Detecting amylase.**—See XIX. **Ionic Ag sterilisation.**—See XXIII.

PATENTS.

Preparation of dried yeast. K. MIZOBATA (U.S.P. 1,934,941, 14.11.33. Appl., 16.12.30. Jap., 27.12.29).—Moist yeast cultures are rendered dry enough for safe transport by absorption on steamed rice in sterilised receptacles. J. H. L.

Production of butyl and isopropyl alcohols [by fermentation]. S. C. PRESCOTT and K. MORIKAWA (Assee.) (U.S.P. 1,933,683, 7.11.33. Appl., 26.1.27. Jap., 8.7.26).—Sterilised mashes containing about

10% of fermentable sugars, preferably with some koji extract or similar cereal product, are fermented at about 37° by a new organism, *Bacillus technicus*, which yields Bu^oOH and Pr^oOH with practically no EtOH. The organism (described), first isolated from koji, grows very readily under aerobic conditions, but is also a facultative anaerobe. It ferments all the common sugars and produces H₂ and CO₂ besides the alcohols mentioned. The organism is Gram-positive and liquefies gelatin. In nutrient broth it shows vigorous cloudy growth and forms an abundant, compact sediment. Growth is slow at 20° but rapid between 30° and 40°. The optimum reaction occurs at p_H 6.6–7.0 and the limiting range at about p_H 4.8–8.0. J. H. L.

Dehydration etc. of alcohols.—See III.

XIX.—FOODS.

Quality of wheat and wheat flour. T. SCHARNAGEL (*Z. ges. Getreide- u. Mühlenw.*, 1933, 20, 289–296; *Chem. Zentr.*, 1934, i, 1124).—The quality of the sample is judged from its fermenting properties and from the quality of the adhesive which it yields. H. J. E.

Evaluation of flour from its ash content. K. MOHS (*Z. ges. Getreide- u. Mühlenw.*, 1933, 20, 216–220; *Chem. Zentr.*, 1933, ii, 3927).—A scale gives the ash content of rye and wheat flours. H. J. E.

Relation between yield and protein content of wheat. J. G. MALLOCH and R. NEWTON (*Canad. J. Res.*, 1934, 10, 774–779).—An inverse relation between yield and protein content was observed, being more pronounced in 1930 than in 1931. In both these years reduction of the yield by removal of tillers or heads led to an increased protein content and, in 1930, to an increase in kernel wt. The quality and kernel texture were unaffected by this pruning. H. N. R.

Band breadth in farinograms. L. A. SZEGFY (*Mezőg. Kutat.*, 1933, 6, 327–334; *Chem. Zentr.*, 1934, i, 1256).—The band breadth is shown to represent the resultant of several components, and not a single property of the paste. H. J. E.

Detection of rye flour in wheat flour. T. VON FELLEBERG (*Mitt. Lebensm. Hyg.*, 1934, 25, 260–265).—When η^{20} of a filtered 10% extract of sample in cold H₂O is > 1.5, addition of rye flour (I) is indicated because of the high η of rye gum. In doubtful cases an improved Tillmans-Fiehe reaction (cf. B., 1929, 70) is used, viz., a 20% suspension of sample is pptd. in succession with a 15% K₄Fe(CN)₆ solution and with a 30% ZnSO₄·7H₂O solution in 5N-HCl, a portion of the filtrate being heated with HCl and pptd. with phloroglucinol, and the ppt. oxidised with K₂Cr₂O₇-H₂SO₄; 1 c.c. of 0.1N-K₂Cr₂O₇ ≡ 1.49 mg. of trifructosan, > 0.75% of which indicates that (I) has been added. J. G.

Benzoyl peroxide in flour: detection as benzoic acid. D. B. SCOTT (*J. Assoc. Off. Agric. Chem.*, 1934, 17, 302–304).—The EtOH extract of the flour is made alkaline and evaporated until dry. The residue is taken up in H₂O, acidified, and steam-distilled. After further purification the solids in the distillate are

nitrated and tested with aq. NH₃ and NH₂·OH·HCl. A red coloration indicates the presence of BzOH.

E. C. S.

Shortening value of plastic fats. J. F. CAWOOD (*Ind. Eng. Chem.*, 1934, 26, 968–969).—The amounts of different fats which show equal shortening results in a baked pie-crust cannot be calc. from the relative shortening vals. (S) obtained at the same fat level, but must be determined by experiment. The relative S of fats were found to be of the same order for general-purpose flour and for pastry flour. E. B. H.

Evaluation of rice. III. M. T. KOKS (*Pharm. Weekblad*, 1934, 71, 1053–1058).—Further discussion on the determination of vitamin-B₁ and the nutritive val. of rice by chemical methods (cf. B., 1934, 858). Millon's reagent is preferred to phosphomolydate solution. S. C.

Rapid determination of ether extract in paprika meal products. S. HORVÁTH (*Z. Unters. Lebensm.*, 1934, 68, 201–203).—Results agreeing well with those given by Rőzsényi's method are obtained in 4 hr. by shaking for 1 hr. 4 g. of the dried meal (or 2 g. of air-dried meal) with 50 c.c. of EtOH-free Et₂O dried over CaCl₂, centrifuging for 15 min., evaporating 25 c.c. of the solution in a weighed flask, and heating the residue for 2 hr. in a steam oven. E. B. H.

Soya lecithin. II. **Hydrogenation under high pressure.** Y. SHINOZAKI and M. SATO (*J. Soc. Chem. Ind., Japan*, 1934, 37, 432–433B; cf. *J. Agr. Chem. Soc., Japan*, 1933, 9, 728).—Hydrolecithin (I) (having, e.g., P 3.82, N 2.23, NH₂-N 0.1, C 64.63, H 11.33%; I val. 0.38; m.p. 84°) can be prepared successfully by hydrogenating soya lecithin (II) with a Ni catalyst under pressures > 80 atm. Experiments on partly hydrogenated products show that (I) has a greater effect than (II) in lowering the interfacial tension of cacao butter towards H₂O (Donnan drop method), the advantage increasing with the saturation of (I). The increase in relative η of cacao butter (at 60–70°) \propto the amount of added (I) and its degree of saturation, when the amount added is > 1%; if < 1% is used the relative η is decreased. E. L.

Detecting pasteurisation of milk. K. EBLE and H. PFEIFFER (*Z. Unters. Lebensm.*, 1934, 68, 203–204).—A modification of the Wilkinson-Peters benzidine test, described formerly (B., 1931, 413), will differentiate between flash-pasteurised, holder-pasteurised, and raw milk. The order of the addition of the reagents must be rigidly observed, otherwise holder-pasteurised milk cannot be detected. E. B. H.

Detecting pasteurisation of milk. M. F. BENGEN and E. BOHM (*Z. Unters. Lebensm.*, 1934, 68, 204; cf. B., 1934, 522).—Owing to the gradation of colour of different milks the benzidine test is not satisfactory for the detection of holder-pasteurisation. Provided that the 0.05 c.c. of H₂O₂ is accurately measured the test is satisfactory for flash-pasteurised milk. The use of 1 drop of H₂O₂ is not sufficiently accurate. E. B. H.

Detecting pasteurisation of milk. M. F. BENGEN (*Z. Unters. Lebensm.*, 1934, 68, 80–84; cf. B., 1934, 522).—A review. E. C. S.

Pyknometric determination of fat in milk and condensed milk with simultaneous optical determination of sugar. W. LEITHE (Z. Unters. Lebensm., 1934, 68, 196—200).—Results agreeing well with those obtained by standard methods are obtained as follows. 5 g. of sample are treated with 30 c.c. of boiling H₂O and then shaken with 1 c.c. of basic Pb acetate. 30 c.c. of C₂H₂Cl₄ (I) are added, and the whole is shaken and centrifuged. Lactose and sucrose are determined polarimetrically, in the aq. layer, and the fat is determined pyknometrically by measuring the *d* of the (I) layer. The method of calculation of the sugar is given. E. B. H.

Determination of protein in milk. L. BURUANA (Lait, 1933, 13, 1214—1221; Chem. Zentr., 1934, i, 1409).—1 c.c. of milk is refluxed for 2 min. with 6—7 c.c. of HNO₃ (*d* 1.39—1.40). The product is neutralised with a small excess of 40% aq. NaOH, filtered, and the protein determined colorimetrically, using aq. K₂Cr₂O₇ + aq. KMnO₄ for comparison. In determining the casein it is first pptd. with AcOH, filtered, and determined colorimetrically as above, by the xanthoproteic reaction. H. J. E.

Detection of amylase in milk. P. WEINSTEIN (Z. Unters. Lebensm., 1934, 68, 73—80).—A "shaking" method is described. This may be used in the case of sour milk if the acidity is > 26 degrees, but the acidity must be reduced to 4—5 degrees (*p*_H 6—6.5) before the test is applied. Amylase is associated with the albumin or globulin. E. C. S.

Evaluation of butter quality. UMBRECHT (Z. Unters. Lebensm., 1934, 68, 85—87).—Quality is judged by an official tasting panel. E. C. S.

Bacteria concerned in the production of butter aroma. R. BURRI (Mitt. Lebensm. Hyg., 1934, 25, 1—7).—The advantages of pure cultures for this purpose are discussed, but neither *S. lactis* (I) nor *S. cremoris* (II) produce an aroma exactly typical of Danish butter, and such butters yield less volatile fatty acids. Hammer's *S. citrovorus* and *S. paracitrovorus* give more successful results, but are slower in action and are probably not pure types. Ac₂ is produced by (II), but not by (I), and 0.0002—0.0004% has been found in butter. Laboratory technique with pure cultures cannot always completely simulate dairy conditions. J. G.

Detection of gelatin in cultured buttermilk and cottage cheese. G. A. RICHARDSON and N. P. TARASSUK (J. Assoc. Off. Agric. Chem., 1934, 17, 314—319).—In absence of gelatin (I) a ppt. is formed when cultured buttermilk or cottage cheese (II) is tested for (I) by Stokes' method (A., 1898, ii, 220), particularly when rennin is used for the manufacture of (II). The derived proteins, which Hg(NO₃)₂ fails to remove, are pptd. by 20% aq. CCl₃·CO₂H. When the filtrate is treated with picric acid a cloud is formed in presence of 0.1—0.25% of (I), and a yellow ppt. when larger amounts of (I) are present. E. C. S.

Determination of salicylic acid, *p*-hydroxybenzoic acid esters, benzoic acid, and *p*-chlorobenzoic acid in cheese. H. HOSTETTLER (Mitt. Lebensm. Hyg., 1933, 24, 247—258; Chem. Zentr., 1933, ii, 3931).—The preservatives are isolated by

shaking with Et₂O and light petroleum. Only 40—50% of the *p*-hydroxybenzoic esters are isolated by this means. H. J. E.

Manufacture of ice cream. N. PETERSEN (Milch. Zentr., 1934, 63, 213—220).—American ice cream (*i.e.*, ice cream rich in butter fat and milk solids) is described. The layout of the plant is briefly outlined and the composition of the ice-cream mix indicated. The effect on the finished product of varying the amounts of the ingredients (gelatin etc.) is examined, and the conditions of freezing necessary to obtain a smooth ice cream free from large ice crystals are discussed. E. B. H.

Determination of gelatin in ice cream. T. VON FELLEBERG (Mitt. Lebensm. Hyg., 1934, 25, 246—249).—Milk proteins (I) are pptd. from 25 c.c. of a 20% solution of sample at 50° by 2.5 c.c. of 5% CuSO₄, 95% of the gelatin (I) being then pptd. from the filtrate by 2.5 c.c. of 20% H₃PO₄·12MoO₃ in 10% H₂SO₄. The N content of the centrifuged ppt. is then determined (Kjeldahl method); 1 c.c. of 0.1N-H₂SO₄ ≡ 0.009 g. of dry (II), and 0.1% is deducted from the final result to correct for unpptd. (I) in (II). J. G.

Investigation of eggs. K. BRAUNSDORF and W. REIDEMISTER (Z. Unters. Lebensm., 1934, 68, 59—72).—For the detection of cold-store (I) or preserved eggs (II), Weinstein's method (B., 1933, 1080), depending on the difference (*D*) between the f.p. of the white, and a mixture of 2 pts. of the yolk with 1 pt. of 0.9% aq. NaCl, has proved most valuable. The min. *D* for new-laid eggs is 9 units and for fresh eggs 7. The *D* of commercial (I) and (II) is much decreased, varying between 3 and 6 in the case of (II), without change in *d*. The val. of tests depending on changes in the ultra-violet fluorescence, the size of the air chamber, *d*, and certain chemical tests (B., 1932, 399; 1933, 330) are discussed. E. C. S.

Detection of the removal of the stamp [of origin] from eggs. H. MOHLER and J. HARTNAGEL (Mitt. Lebensm. Hyg., 1934, 25, 265—268).—In filtered ultra-violet light (cf. B., 1933, 170) the outsides of shells of normal eggs or eggs from which the stamp has been removed mechanically appear homogeneously bluish-violet to red, with isolated more intense spots in the latter (especially on old eggs), and sometimes markings from scratches. Areas treated chemically (I) or with EtOH can be distinguished, and spots of residual colour detected, with a lens. Soaking in EtOH-thymol-blue and washing, or in a solution containing 1 c.c. of saturated alcoholic fuchsin and 5 c.c. of AcOH per litre (cf. B., 1932, 399), facilitates detection of (I). J. G.

Transmission of light by egg-albumin. H. J. ALMQUIST, J. W. GIVENS, and A. KLOSE (Ind. Eng. Chem., 1934, 26, 847—848).—The transmission (*T*) of light of λ 5876 Å. has been measured for different layers of egg-albumin (I). *T* is correlated with the mucin content, the *p*_H, and the temp. Cold storage of eggs lowers *T*. When (I) is stored in CO₂ for a few days *T* is considerably decreased, whereas on storing in NH₃ *T* is increased, especially for the inner layers. Owing to these factors differences in the "candling" appearance of eggs occur which are not necessarily due to changes in interior quality. R. S. B.

Losses in meat during cooking. F. W. F. ARNAUD (Analyst, 1934, 59, 405).—The loss in wt. of English beef on cooking was found to be only one half that of New Zealand frozen and of Argentine frozen and chilled beef. E. C. S.

Losses in meat on cooking. A. SCIVER (Analyst, 1934, 59, 536—537).—Arnaud's results (cf. preceding abstract) are not confirmed. No appreciable difference between Argentine chilled and English beef in respect of gross and nett loss of wt. on cooking, mineral matter, and undigestible matter could be detected. E. C. S.

Tyndallmetric detection of gelatin in soup cubes. E. HERZFELD (Mitt. Lebensm. Hyg., 1934, 25, 244—245).—The length and intensity of the Tyndall cones (I) obtained in presence of picric acid and a drop of AcOH from a series of dilutions of a filtered 10% solution of sample are matched against those obtained from a solution of gelatin, 0.01 mg. of which gives a (I) 15 mm. long and is most suitable for comparison purposes. Results satisfactory for routine testing are obtained in a working time of < 2 hr. (cf. B., 1934, 425). J. G.

Formaldehyde in canned marine products. G. LUNDE and E. MATHIESEN (Ind. Eng. Chem., 1934, 26, 974—976).—CH₂O (I) was found in fresh and canned herrings, in crab, sardines, etc., in quantities up to 20 p.p.m., using the A.O.A.C. method. The formation of (I) does not depend on the type of container or the time of storage. At least 1 pt. of (I) in 25,000 must be present before it can be stated that it has been added as a preservative. E. B. H.

Soft scald and soggy breakdown of apples. C. BROOKS and C. P. HARLEY (J. Agric. Res., 1934, 49, 55—69).—Soggy breakdown (I), but not scald (II), was reduced by a gradual pre-cooling treatment before actual storage. Tendency to (II) was largely eliminated by coating the fruit with an oil-paraffin wax mixture, or by short pretreatment under reduced pressure, or exposure to CO₂ [which also prevents (I)], or to moderately high temp. (35—43.5°). CO₂ treatment improves the firmness of the fruit without impairing flavour. A. G. P.

Iron, copper, and manganese content of California prunes. L. G. SAYWELL, W. H. DIETZ, and P. D. ROBERTSON (J. Assoc. Off. Agric. Chem., 1934, 17, 290—293).—The average Fe, Cu, and Mn contents of 5 samples of prunes from each of 3 districts are 0.00412, 0.0003, and 0.00044%, respectively, all vals. being calc. on the basis of a fleshy edible portion of 20% H₂O content. E. C. S.

Detection of sorbitol in fruit products. G. REIF (Z. Unters. Lebensm., 1934, 68, 179—186).—Sorbitol (I) was found to be present in apples, pears, quinces, stone fruit, raisins, currants, sultanas, and dried dates, but not in grapes, berries, citrus fruits, bananas, pineapples, and figs. The amount present depends largely on the ripeness of the fruit. Precautions to be observed in the use of Werder's method for the determination of (I) are given. E. B. H.

Control of granulation of Iowa honeys. E. I. FULMER, W. BOSCH, O. W. PARK, and J. H. BUCHANAN (J. Econ. Entom., 1934, 26, 652—656).—The rate of granulation of honey may be altered by artificial adjust-

ment of the glucose : fructose ratio, or the H₂O content (I). For each honey there is a definite (I) which just prevents granulation. A. G. P.

Colorimetric determination of chlorogenic and caffeic acids in roasted coffee. W. PLÜCKER and W. KEILHOLZ (Z. Unters. Lebensm., 1934, 68, 97—109; cf. B., 1933, 650, 1081; 1934, 40, 524, 700).—A substance is present in roasted coffee which interferes in the determination of chlorogenic acid by Hoepfner's method (B., 1932, 1053). A simplification of the latter and a new indirect method of determination are described. E. C. S.

Determination of fat and detection of glycerin in marzipan. H. MOHLER and H. BENZ (Mitt. Lebensm. Hyg., 1934, 25, 47—50).—Braundsdorf's method for fat (B., 1931, 859) is simplified by digesting a 10% mixture of sample and 10% HCl for 1 hr. on the H₂O-bath, the dried residue after filtration being powdered with sand and extracted for 8 hr. with Et₂O. Glycerin (I) is detected by twice evaporating the EtOH-sol. portion with CaO and re-extracting with EtOH. The (I) in this solution is oxidised to CO(CH₂·OH)₂ with aq. Br, the Br removed by heat, and 0.4 c.c. warmed with 0.1 c.c. of 2% β-C₁₀H₇·OH in EtOH and 2 c.c. of H₂SO₄; 1% of (I) gives a yellow-green colour and fluorescence. J. G.

Importance of the correlation field in food chemistry. A. BECKEL (Z. Unters. Lebensm., 1934, 68, 41—51).—The correlation area (I) is defined as the area in a correlation field ≡ 99% frequency. Examples are given of the application of (I) in the interpretation of data on meat, milk, and raspberry juice. E. C. S.

Colorimetric determinations with the Zeiss stephotometer in the examination of foodstuffs. H. RIFFART and H. KELLER (Z. Unters. Lebensm., 1934, 68, 113—138).—Application of this instrument to the improvement of the colorimetric determination of cholesterol, BzOH, salicylic acid, creatinine, higher alcohols, MeCHO, and furfuraldehyde is described. Colour reactions involved follow Beer's law, excepting that for MeCHO. E. B. H.

Micro-determination of nitrogen, with special reference to foodstuffs and condiments. E. ISELIN (Mitt. Lebensm. Hyg., 1933, 24, 263—273; Chem. Zentr., 1933, ii, 3780).—A simplified method is described. H. J. E.

Determination of protein in fodder by Van Slyke's method. T. TOMIYAMA, K. KASHIWADA, and K. KATAI (J. Agric. Chem. Soc. Japan, 1934, 10, 217—224).—Addition of glucose, sucrose, starch, agar, filter paper, or olive oil to casein affects the results obtained. The material is preferably boiled with H₂O acidified with AcOH, and the ppt., which contains 91—95% of the protein, is treated with EtOH and Et₂O. CH. ABS.

Determining NO₂' in pickling salt.—See VII.
Hardened fats in foods. Margarine.—See XII.
Ionic Ag sterilisation. Detecting nitrates [in milk].
Dilution of waste waters.—See XXIII.

PATENTS.

Production of bread and like baked dough products. R. BENNETT (B.P. 415,648, 31.1.34).—A permanent

record of the cut surface of bread or cake is obtained by treating with a pigment, and making an impression on paper. E. B. H.

Conversion of milk and cream into butter. P. FEREMUTSCH (B.P. 415,819, 10.3.33. Ger., 10.3.32. Addn. to B.P. 398,666; B., 1933, 1034).—A process for kneading butter in an atm. of CO_2 , thereby avoiding the incorporation of air in the butter, is claimed. E. B. H.

Treatment of food products. S. TRANIN (Assee.) and R. M. SNYDER (U.S.P. 1,945,102, 30.1.34. Appl., 18.8.30).—Liquid egg, milk, or other fluid is treated with germicidal gas, or volatile liquid or solid, e.g., H_2O_2 , O_3 , or a halogen, and passed in a thin stream close to a source of ultra-violet light, the heat produced being said to evaporate the germicide. E. B. H.

Wax-emulsion coating [for preparing fresh fruits and vegetables for market]. W. A. BRIDGEMAN and J. A. SCHADE, Assrs. to WILBUR WHITE CHEM. CO. (U.S.P. 1,943,468, 16.1.34. Appl., 22.11.32).—An aq. emulsion (I) is used to coat citrus and other fruits, vegetables, and nuts, giving a lustrous coat without brushing. The surface tension of the coating varies for different fruits. E.g., (I) contains a wax (carnauba) 5–15, an emulsifier [Na oleate and $\text{N}(\text{C}_2\text{H}_4\text{OH})_3$] 1–4, resinous component (pontianak gum) 2–6, H_2O 92–75%. A sterilising agent (e.g., borax) may be mixed into the emulsion. E. B. H.

Preparation of stable fruit juice and fruit syrup suspensions. POMOSIN-WERKE GES.M.B.H. (B.P. 415,868, 7.6.33. Ger., 20.6.32).—The separation of fruit solids in such products as lemonade and orangeade syrups is prevented by the addition of pectin and acid in such quantities that gelling just fails to occur. E. B. H.

Apparatus for concentration of fruit juices. P. C. LEMALE (B.P. 415,977. 9.4.34).—In the vac. evaporator (V) claimed, the heating steam (S) is used first to drive the vac. pump attached to V; V may be used for batch operation and, until the juice (J) is in V and the proper vac. obtained, S is allowed to escape to atm. through an automatic valve. This prevents overheating of both the tubes in V, and also of J. A. WE.

Preservation of roasted or roasted and ground coffee. F. ILLY (B.P. 415,656, 17.2.34).—Roasted ground coffee is preserved permanently fresh by (1) roasting, cooling, grinding, and packing in an inert atm. e.g., N_2 or He; or (2) roasting in partial vac. and then cooling etc. as in (1); or (3) roasting in normal atm., evacuating, then cooling etc. as in (1). E. B. H.

Obtaining the pure germinal substance of seeds. TRES GYOGYSZER-VEGYESZETI IPARI ES KERESKEDELMI R.T. (B.P. 415,638, 9.1.34. Hung., 11.5. and 24.6.33).—The seeds of plants of the *Casalpinaceae* and *Mimosaceae* etc. groups are subjected to flotation in a medium of d 1.40 (approx.), when the pure germ may be skimmed off the surface and dried. At room temp. mixtures of org. liquid of low b.p. are used; at higher temp. single solvents may be used, the d being adjusted by altering the temp. E. B. H.

Drying tea etc.—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Identification of substituted barbituric acids of therapeutic importance. J. C. JESPERSEN and K. THOUHAHL-LARSEN (Dansk Tidsskr. Farm., 1934, 8, 212–226).—The solubility in H_2O at 20° and at 37° and the m.p. of a no. of 5-substituted barbituric acids are recorded. They may be identified by means of their *xanthhydrol* or (preferably) *p-nitrobenzyl* derivatives, of m.p. as follows (where only one m.p. is quoted, it is that of the *p-nitrobenzyl* derivative): methyl-, 208.0°, ethyl-, 213.5°, diethyl-, 246.5°, 193.5°; isopropyl-, 207.5°, 189°; dipropyl-, 269°, 182.3°; ethyl-*n*-butyl-, 250°, 148.5°; ethylisooamyl-, 251°, 145.5°; ethylallyl-, 242°, 196.3°; isopropylallyl-, 226.5°, 192°; *n*-butylallyl-, 240°, 127.5°; diallyl-, 242.5°, 192.5°; phenylmethyl-, 282°, 197°; phenylethyl-, 219°, 183.5°; phenylallyl-, 222.5°, 152°; cyclohexenylethyl-, 257°, 196°; 1-methyl-5-phenyl-5-ethyl-, 114.5°; 5-cyclohexenyl-1:5-dimethyl-, 114.5°; isopropylbromopropenyl-, 200.5°; *sec*-butylbromopropenyl-, 191.5°.

R. P. B.

Analysis of antipyrine and some of its derivatives. A. DÓZSA (Magyar gyóg. Társ. Értés., 1933, 9, 476–506; Chem. Zentr., 1934, i, 1223).—In determining antipyrine the picrate method is recommended for micro- or macro-use. The determination of pyramidone, novalgin, and melubrin is discussed. H. J. E.

Rapid volumetric determination and separation of metals (aluminium, copper) with 8-hydroxyquinoline in medicinal preparations. Z. CSIPKE (Magyar gyóg. Társ. Értés., 1933, 9, 437–444; Chem. Zentr., 1934, i, 1086).—Cu is separated from Al in alkaline tartrate solution by oxine. The Cu oxinate is dissolved in HCl and titrated directly iodometrically. Al is pptd. from the filtrate as Al oxinate by adding excess of AcOH, and determined iodometrically.

H. J. E.

Adulteration of drugs and its microscopical detection in filtered ultra-violet light. R. FREUDWEILER (Pharm. Acta Helv., 1933, 8, 147–154, 155–164, 190–201; Chem. Zentr., 1934, i, 1362).—Adulterants may be detected and frequently identified, in small samples. H. J. E.

Nicaraguan ipecacuanha seeds. G. DULTZ (Pharm. Zentr., 1934, 75, 598–600).—Titration of the residue from Et_2O -HCl extraction of the seeds indicated a total alkaloid content of 0.031–0.032%. Cepheline was present, but tests for emetine were negative. F. O. H.

Determination of morphine. IV. Determination of morphine in opium by the lime method. H. BAGGESGAARD-RASMUSSEN, K. A. JACKEROTT, and I. C. JESPERSEN (Dansk Tidsskr. Farm., 1934, 8, 185–212; cf. B., 1932, 48).—The method proposed by the Commission of the League of Nations is investigated and modified. The loss of wt. on drying is most reproducible by drying at 100°/1–2 mm. Shaking with H_2O and $\text{Ca}(\text{OH})_2$ ppts. most of the other opium alkaloids and other impurities. The morphine (I) is pptd. from the filtrate by adding NH_4Cl , a little Et_2O and EtOH being added to keep codeine and narcotine in solution. The ppt. is washed, dissolved in MeOH, and titrated (Me-red

with 0.1*N*-acid. This titration was tested electrometrically. The sp. rotation of the pptd. (I) is a little < that of the pure substance; this and the presence of OMe groups in the ppt. (Zeisel's method) suggest the presence of other alkaloids. The overall reproducibility of the determination is $\pm 3\%$. R. P. B.

Cigarette and cigar tobaccos. W. W. GARNER, C. W. BACON, and J. D. BOWLING, JUN. (Ind. Eng. Chem., 1934, 26, 970—974).—The chemical composition and physical properties of representative tobaccos are considered in relation to methods and conditions of culture. The cigarette types are essentially high-carbohydrate tobaccos, whilst the cigar types are high in N compounds and almost free from starch and sugar. The difference in the quantity of N used as fertiliser is an important factor in producing this contrast. E. B. H.

Reactions of papaverine, eupaverine, perparine, and cryptopine. L. EKKERT (Pharm. Zentr., 1934, 75, 545—548).—Eupaverine can be distinguished from papaverine (I) and perparine (II) by the colour reactions with NaOAc solution, hot H_2SO_4 , HNO_3 , H_3PO_4 , $H_3PO_4-HNO_3$, $HCl-H_2O_2$, $K_3Fe(CN)_6-H_2SO_4$, $K_2Cr_2O_7-H_2SO_4$, $H_2SeO_3-H_2SO_4$, and $ZnCl_2-BzCl$ and (II) from (I) by the HNO_3 , $K_2Cr_2O_7-H_2SO_4$, and $H_2SeO_3-H_2SO_4$ reactions. Cryptopine is easily identified by the cold H_2SO_4 reaction. E. H. S.

Possibility of using the flowers of *Colchicum autumnale* instead of colchicum seed. E. NIEMANN (Pharm. Acta Helv., 1933, 8, 92—107; Chem. Zentr., 1933, ii, 3723).—The determination of colchicine (I) in the flowers and leaves is described. The flowers contain about 0.8%, and the leaves traces, of (I). The alkaloid from the flowers has the same properties as that from the seed. H. J. E.

Oil of turpentine. Camphor from pinene hydrochloride. W. E. HANFORD and G. W. PERKINS (Amer. J. Pharm., 1934, 106, 287—294).—Good-quality pinene, anhyd. HCl, and careful maintenance of the temp. at 5° are necessary for max. yields. If NaOAc is used to remove Cl there is no increase in yield with increase of NaOAc. Cl may be removed by treatment with $Ca(OH)_2$ and a carbohydrate under pressure. The use of the Friedel-Crafts reaction for the formation of camphor derivatives from pinene hydrochloride has given promising results. E. H. S.

Essential oils from East Africa. ANON. (Bull. Imp. Inst., 1934, 32, 195—252).—Geranium oils. (I) Kenya (K.). (a) "Nyeta." Oils (2 samples) from this undetermined species of *Pelargonium* had, respectively: $d_{15.5}^{15.5}$ 0.872, 0.873; α_D -0.06°, +0.09°; n_D^{20} 1.4615, 1.4615; acid vals. 1.9, 2.0; ester vals. 17.1, 16.6 (after acetylation 242.2, 243.7). (b) "Mawah" (*P. graveolens*, Ait) oil: $d_{15.5}^{15.5}$ 0.892, α_D -18.47°, n_D^{20} 1.470, acid val. 5.8, ester val. 22.0 (after acetylation 205.8). (c) *P. radula* (rosea), S. African and Kew varieties, respectively: $d_{15.5}^{15.5}$ 0.9055, 0.9008; α_D^{23} -9.17°, -9.28°; n_D^{20} 1.4721, 1.4705; acid vals. 7.3, 6.3; ester vals. 71.8, 63.4. (d) Oils from five experimental growings of *P.* varieties are described. (II) Tanganyika (*T.*). *P. capitatum* (2 types): yields 0.21, 0.26%; $d_{15.5}^{15.5}$ 0.8948, 0.8880; α_D -8.95° (19°), -30.73° (21°);

n_D^{20} 1.4705, 1.4578; acid vals. 15.2, 7.9; ester vals. 13.2, 12.4. (III). Uganda (*U.*) *P. radula*: $d_{15.5}^{15.5}$ 0.8941, α_D^{22} -15.83°, n_D^{20} 1.4718, acid val. 8.7, ester val. 22.5 (after acetylation 214.2). Peppermint oils: (I) (K.) "Ngong" (2 samples; plants of English origin), "Kipipiri" (2 samples), and "Molo" (grown at 9300 ft.) oils, respectively: $d_{15.5}^{15.5}$ 0.9219, 0.9282, 0.9415, 0.9188, 0.9089; α_D^{23} -25.38° (19°), -12.16°, -24.53°, -41.79° (17°), -36.36°; n_D^{20} 1.4606, 1.4642, 1.4627, 1.4590, 1.4606; acid vals. 1.5, 2.1, 5.0, 1.6, 0.3; ester vals. 75.1, 72.6, 147.4, 94.4, 47.2 (after acetylation 200.6, 192.8, 239.2, 234.6, 228.9); menthone (NH_2OH) —, 14.9, 16.1, —, 8.4%; solubility in 70% EtOH at 15.5° 1 in 3.9, 9.0 (turbid), 5.2, 3, 3.3 vols. (II) *T.* (Mitcham plants): $d_{15.5}^{15.5}$ 0.9346, α_D^{21} +10.36°, n 1.4674, acid val. 0.7, ester val. 50.6 (after acetylation 149.5), not clear in 12 vols. of 70% EtOH at 15.5°. Lemon-grass oils. (I) (*T.*) *Cymbopogon citratus* (?): $d_{15.5}^{15.5}$ 0.8846, n_D^{20} 1.4860, α_D -0.35°, citral ($NaHSO_3$) 81% sol. in 1 vol. of 80% EtOH at 15.5°, insol. in 10 vols. of 70%. (II) (*U.*) *C. citratus* (2 samples): $d_{15.5}^{15.5}$ 0.9178, 0.8846; α_D +1.43° (20°), -0.21° (22°); n_D^{20} 1.4913, 1.4859; citral (Na_2SO_3) 72.0, 74.5%; ($NaHSO_3$) —, 77%. No. 2 was insol. in 12 vols. of 80% EtOH. *C. afronardus*, Stapf. (K.): $d_{15.5}^{15.5}$ 0.8940, α_D^{19} -0.17°, n_D^{20} 1.4755, acid val. 1.4, ester val. 52.0 (after acetylation 249.1), aldehydes and/or ketones 3.0%. Vetiver root oils (*U.*) (2): $d_{15.5}^{15.5}$ 1.0477, 1.0383; n_D^{20} 1.5222, 1.5248. *Eucalyptus citriodora* (K.): $d_{15.5}^{15.5}$ 0.8723, α_D^{22} +2.79°, n_D^{20} 1.4521, acid val. 3.8, ester val. 11.1 (after acetylation 277.7). Patchouli oils (*U.*) (2): $d_{15.5}^{15.5}$ 0.9443, 0.9271; α_D -12.6° (20°), -1.3° (21°); n_D^{20} 1.5048, 1.5021; acid vals. —, 0.3; ester vals. —, 5.8. Cinnamon leaf oil (*U.*): $d_{15.5}^{15.5}$ 1.0477, α_D^{22} +1.3°, n_D^{20} 1.5364, total phenols (as eugenol) 69.5%, aldehydes 5.5%. *Aframomum amaniense* seeds (*T.*): $d_{15.5}^{15.5}$ 0.8966, α_D^{18} -4.68°, n_D^{20} 1.4743, acid val. 0.7, ester val. 69.5 (after acetylation 233.6). Muhugu (*Brachylaena Hutchinsii*) oil (K.): 3 consecutive fractions, viz., 50% (cedar-wood oil odour), 26%, and 10% (vetiver-like odour), had, respectively: $d_{15.5}^{15.5}$ 0.9719, 0.9905, 0.9961; α_D^{26} +3.19°, -8.0°, -9.54° (23°); n_D^{20} 1.5108, 1.5138, 1.5170; acid vals. 0.7, 1.1, 1.4; ester vals. 10.8, 17.2, 18.3 (after acetylation 89.4, 143.5, 155.1). Kawamala (*Coleus* sp.) oil (*U.*): (a) 2 samples: $d_{15.5}^{15.5}$ 0.8859, 0.8815; α_D +43.0° (16°), +29.93° (19°); n_D^{20} 1.4828, 1.4808; acid vals. —, 0.6; ester vals. —, 18.3 (after acetylation —, 42.3); aldehydes and/or ketones —, 3.5%; phenols —, 1.5%. (b) Fleshy-leaved sp. of *C.*: $d_{15.5}^{15.5}$ 0.8939, α_D^{19} -20.33°, n_D^{20} 1.4940, acid val. 0.7, aldehydes and/or ketones 2.5%, phenols 6.0% (carvacrol present), ester val. (phenol-free oil) 7.6 (after acetylation 35.0). *Coleus* sp. from (K.): $d_{15.5}^{15.5}$ 0.9139, α_D^{16} -25.91°, n_D^{20} 1.4950. Kamynye (*Hoslundia opposita*) oil (*U.*): $d_{15.5}^{15.5}$ 0.9278, α_D^{17} -11.96°, n_D^{20} 1.5130, mainly sesquiterpenes. Mujaja Omunene (*Ocimum* sp.) oil (*U.*), 2 samples: $d_{15.5}^{15.5}$ 0.9117, 0.8955; α_D -20.21° (16°), -4.25° (18°); n_D^{20} 1.5040, 1.4941; acid vals. —, 1.1; aldehydes and/or ketones —, 1.0%; phenols (mainly eugenol and thymol) 24, 26.5%; ester vals. (phenol-free oil) —, 10.0 (after acetylation —, 20.5). *O. menthaefolium* (*U.*): $d_{15.5}^{15.5}$ 0.9122, α_D^{16} +13.51°, n_D^{20} 1.4763. *O. americanum*, Nyasaland (*N.*): oil from flower heads

and stems (1.6%), d 0.9219, $\alpha_D^{20} +45.08^\circ$, n_D^{20} 1.4715, acid val. 0.6, ester val. nil (after acetylation 15.5), camphor content low. Wood oil of "Manje cedar" (*Widdringtonia Whytei*) (N.): yield 14.1% on dry wood, $d_{15.5}^{15.5}$ 0.9645, $\alpha_D^{18} -31.13^\circ$, n_D^{20} 1.5098, acid val. 7.2, ester val. 15.2 (after acetylation 69.0), sol. in 0.5 vol. of 90% EtOH, becoming turbid with 1.6 vols. and finally sol. in 4.2 vols. Detailed trials with four other samples are described (yields 1.0–12.2%); the oil is present mainly in the heartwood. *Zanthoxylum* sp. (K.): $d_{15.5}^{15.5}$ 0.8715, $\alpha_D^{15} -6.50^\circ$, n_D^{20} 1.4589, acid val. 3.2, ester val. 16.1, Me *n*-nonyl ketone 53.4%. Importers' reports of all the above oils are given. E. H. S.

Some East African [Amani, Tanganyika] essential oils. R. R. LE G. WORSLEY (Bull. Imp. Inst., 1934, 32, 253–269).—I. *Aframomum* oils; leaf, peel, and seed oils, respectively: *A. amaniense*, Loes, yields 0.03, 0.0075, 0.82%; d 0.8935, 0.892, 0.8971; n 1.4879, 1.4835, 1.4743; $\alpha_D -6.7^\circ$, —, -4.5° ; acid vals. 0.8, 0.4, 0.5; ester vals. 7.5, 4.3, 100.9 (after acetylation 31.9, —, 241.1); hydrocarbons 75.0, —, 0.5; α - and β -kayene, $C_{16}H_{28}$ (b.p./8 mm., α - 33.5–34.5°, β - 44.5–45.5°; d 0.8600, 0.8591; n 1.4713, 1.4721; $\alpha_D -7.9^\circ$, -15.1° ; mol. refraction 71.55, 71.70), 33.0, 50.0 (calc.), 2.2%: caryophyllene 37.1, 10.0 (calc.), —; β -pinene 6.2%, —, —; terpineol —, 25.0% (calc.), —; geraniol —, —, 47.0%; geranyl acetate —, —, 35.3%. *A. mala*, K. Schum., yields 0.05, 0.13, 3.42%; d 0.8695, 0.8603, 0.8810; n 1.4781, 1.4712, 1.4693; $\alpha_D -8.7^\circ$, $+10.8^\circ$, -10.9° ; acid vals. 1.5, 0.2, 0.2; ester vals. 10.5, 6.0, 3.4 (after acetylation 35.6, 54.2, 31.1); hydrocarbons 77.0, —, 67.0%; α - and β -kayene 50.0, 73.0, 37.3%; caryophyllene 24.6, 4.0, 4.1%; β -pinene 5.3, —, 0.9%; terpineol —, 2.5, 6.4%; cineole —, —, 41.5%. *A. mala* roots give 0.011% of oil, n 1.4887. The fruits and seeds are described. II. Grass oils. (a) *Cymbopogon citratus*, 3 samples (Amani, Kenya, Kwamkembe): yields 0.27, 0.61, 0.25%; d 0.8949, 0.8962, 0.8928; n 1.4854, 1.4821, 1.4842; $\alpha_D +0.4^\circ$, $+0.3^\circ$, 0.0° ; citral ($NaHSO_3$) 75.5, 73.6, 84.0%. (b) *C. Martini*, d 0.9261, n 1.4875, $\alpha_D -9.9^\circ$, ester val. 11.5 (after acetylation 201). (c) *Vetiveria zizanioides* roots, yield 0.84%, d 1.017, n 1.5118, $\alpha_D +29.5^\circ$, acid val. 17.4, ester val. 12.2 (after acetylation 135). III. Geranium oils, *P. capitatum* var. and *P. capitatum*, respectively: yields 0.26, 0.21%; d 0.8880, 0.8948; n 1.4578, 1.4705; $\alpha_D -30.7^\circ$, -8.95° ; acid val. 7.9, 15.2; ester val. 12.4, 13.2. The oil from the second sample was improved by keeping the leaves for 24 hr. before distillation. IV. *Ocotea usambarensis* (bark oil): yield 0.37%, d 0.9178, n 1.4770, $\alpha_D -8.3^\circ$, acid val. 0.3, ester val. 13.9 (after acetylation 127.2), aldehydes 6.0. V. *Cananga odorata*: (a) first 2/3 of distillate, (b) last 1/3: yields 0.64, 0.32%; d 0.9334, 0.9414; n 1.4855, 1.4965; $\alpha_D -15^\circ$, -33.5° ; acid vals. 0.3, 0.2; ester vals. 147.3, 141.3. VI. *Michelia champaca* flowers: yield 0.11%, d 0.911, n 1.4711, $\alpha_D +6.1^\circ$, ester val. 34.5. VII. *Lantana camara*, air-dried leaves: yield 0.08%, d 0.9187, n 1.4942, $\alpha_D +9.1^\circ$. VIII. *Conopharyngia Holstii* flowers: yield 0.008–0.01%, odour unpleasant. IX. *Cinchona* sp. flowers: yield 0.64%, odour strong. E. H. S.

Essential oils of the genus *Calythrix*. I. *Calythrix virgata*. A. R. PENFOLD and F. R. MORRISON (J. Proc. Roy. Soc. New South Wales, 1933, 67, 376–384).—Steam-distillation of the leaves and terminal branchlets of *C. virgata* gave 0.5% of an oil having (average of 6 fractions): d_{15}^{15} 0.8885, $\alpha_D^{20} +11.7^\circ$, n_D^{20} 1.4742. It contained *d*- α -pinene, citronellol (Ag salt of H phthalate, m.p. 126°), and geraniol (diphenylurethane, m.p. 82.2°), both free and combined as formic, acetic, citronellic (I), and dehydrocitronellic acid (II) esters. The presence of linalool is suspected, but not confirmed. Small quantities of sesquiterpenes and sesquiterpene alcohols are present in the higher-boiling fractions. The acid in some Australian oils previously reported as decoic acid is probably (I) or (II). C. M. B.

o-Phenylphenol.—See XXIII.

PATENTS.

Manufacture of hydroxyalkyl-hydroxy- [β -hydroxyethoxy]-derivatives of 2-phenylquinoline-4-carboxylic acid. [Pharmaceuticals.] SCHERING-KAHLBAUM A.-G. (B.P. 415,083, 22.2.34. Ger., 22.2.33).—Hydroxyalkyl ethers of hydroxy-2-phenylquinoline-4-carboxylic acids (I) are less toxic than (I) but therapeutically are equally active. 4', m.p. 241°, and 2'- β -hydroxyethoxy-2-phenylquinoline-4-carboxylic acid, m.p. 139°, are prepared by condensation of isatin with the corresponding alkoxyacetophenone in presence of KOH. 6- β -Hydroxyethoxy-2-phenylquinoline-4-carboxylic acid, m.p. 198°, is obtained from glycol mono-*p*-aminophenyl ether, PhCHO, and $AcCO_2H$ at the b.p. H. A. P.

Cyclic α -cyano-ketimides and β -ketones.—See III.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Granular structure and resolving power of photographic layers. A. KÜSTER (I. G. Veröff. Wiss. Zentr. Lab. Phot. Agfa, 1933, 3, 93–105; Chem. Zentr., 1934, i, 1435).—The relation between the scattering of light and the granular structure of the developed layer has been studied. H. J. E.

Photographic plates for use in astronomy. C. E. K. MEES (Phot. J., 1934, 74, 448–461).—The properties required in emulsions are discussed. Reciprocity law failure, resolving power, graininess, the Eberhard effect, and range of spectral sensitivity are considered. J. L.

Change of the latent image in silver halide-gelatin layers on storage. E. HEISENBERG (I. G. Veröff. Wiss. Zentr. Lab. Phot. Agfa, 1933, 3, 47–51; Chem. Zentr., 1934, i, 1432).—For several hr. after exposure the latent image is strengthened, further storage resulting in the reverse process (except for highly sensitive layers). The reverse process is more pronounced in fine-grain emulsions, and is favoured by the presence of I in the AgBr, by KBr, by acidity, and by moisture. H. J. E.

Improvement of X- and γ -ray photography by the use of heavy-metal filters. R. BERTHOLD (Arch. Eisenhüttenw., 1934–5, 8, 21–24).—The interposition of thin Sn or Sn-Pb filters between the X-ray tube (I

and the material under test improves the definition of the photograph of the faulty places, especially when there are appreciable differences in the thickness of various parts. The use of filters necessitates a higher voltage in (I) and a longer exposure, but reduces the diffusion of the rays. A. R. P.

Comparison of reflexion densities measured photo-electrically and visually. R. E. OWEN and E. R. DAVIES (Phot. J., 1934, 74, 463—470).—The errors affecting photo-electric apparatus, caused by the colour of the light used, the colour-sensitivity of the photo-electric cell, selective absorption of the wedge, and selective reflexion of the paper and image, are considered mathematically. If, however, the light source is a W lamp, operated at 2700° abs., screened with a piece of "Calorex" heat-absorbing glass, the wedge becomes more nearly neutral over the wave-length range transmitted. It is then possible to approximate to the necessary condition that the product of the sensitivity function and energy distribution of the cell shall be equal to that of the eye. A large no. of different papers have been examined, using the Davies densitometer (cf. *ibid.*, 1932, 72, 57); very good agreement between the photo-electric and visual reflexion densities was obtained, except in the one case of a poor-coloured sepia print. J. L.

Standardisation of colour sensitometry. M. BILTZ and H. BRANDES (I. G. Veröff. Wiss. Zentr. Lab. Phot. Agfa, 1933, 3, 85—92; Chem. Zentr., 1934, i, 1435).—A discussion. Colour reproducibility and the standardisation of yellow filters are feasible. H. J. E.

Theory of sensitisation. E. HEISENBERG (I. G. Veröff. Wiss. Zentr. Lab. Phot. Agfa, 1933, 3, 115—124; Chem. Zentr., 1934, i, 1433).—In a fine-grain emulsion sensitised with pinacyanol (I) the dye is almost completely adsorbed on the grains, only a few % remaining in the gelatin. The decreased sensitivity with large amounts of (I) is due to decreased grain-sensitivity as well as to absorption by the dye. H. J. E.

PATENTS.

Production of light-sensitive layers by means of diazo compounds. KALLE & Co. A.-G. (B.P. 415,081, 16.2.34. Ger., 18.2.33).—The use of diazotised halogenobenzylaminoarylamines, e.g., the 2:4- and 2:6-dichloro-, 2:6-dibromo-, and 6-chloro-2-bromo-benzyl derivatives of $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ is claimed. H. A. P.

Ag from fixing baths.—See X.

XXII.—EXPLOSIVES; MATCHES.

PATENTS.

Percussion caps, detonators, and the like. DYNAMIT-A.-G. VORM A. NOBEL & Co. (B.P. 416,034, 10.3.34. Ger., 11.3.33).

XXIII.—SANITATION; WATER PURIFICATION.

Usefulness of some types of filter in determining colloidal lead smoke in air, and a new filter modification. H. H. WEBER (Zentr. Gewerbehyg., 1933,

20, 154—157; Chem. Zentr., 1933, ii, 3896).—Two methods using paper filters retained the Pb completely, whilst a wash-flask removed only 15% of the Pb.

H. J. E.

Chlorine disinfection of sewage. W. J. SCOTT and L. W. VAN KLEECK (Sewage Works J., 1934, 6, 784—796).—The total Cl_2 demand is influenced by the temp. of the sewage, the presence of H_2S , and the nature of pretreatment. If contact periods of 15 min. are given, the Cl_2 residue need not exceed 0.5 p.p.m. Prechlorination corrects odours and facilitates subsequent treatment, whilst post-chlorination improves the bacterial quality of the H_2O into which the effluent is discharged. C. J.

Adsorption and flocculation as applied to sewage sludges. A. L. GENTER (Sewage Works J., 1934, 6, 689—720).—Studies at Baltimore indicated that solids in domestic sewage sludges act like capillary adsorbents. They are of a mixed suspensoid and emulsoid nature and when surrounded by relatively pure H_2O require little coagulation to render them readily dewaterable by vac. filtration. The optimum p_{H} (4.7) for max. filtration rates is approx. the p_{H} of the isoelectric point of colloids containing protein. Owing to their putrefactive nature the liquors surrounding the sludge particles become relatively rich in ammoniacal compounds which react with Fe^{III} coagulants intended for flocculating the colloids. A considerable saving in coagulant is obtained by washing the sludge one or more times with relatively clean H_2O , particularly in the case of digested sludges of high NH_3 content. C. J.

Settling and compacting of activated sludge. W. RUDOLFS and I. O. LACY (Sewage Works J., 1934, 6, 647—675).—The rate of settling (I) of activated sludge (S) increases with rising temp. of aëration, but decreases with rising temp. of settlement. Suction increases (I), but sudden changes of pressure have little effect. In deep vessels (I) is retarded, but compacting may outbalance the advantage to be gained by rapid settling in a shallow tank. The greater is the angle of the settlement vessel from the vertical, the less is the vol. occupied by the sludge after 30 min., but, in general, the shape of the vessel makes little difference. Continuous aëration of good S floc showed a gradual decrease in the vol. settled; with increasing septicity the sludge settles and compacts at a lower rate. A mixture of S and fresh sewage solids settles and compacts at a more rapid rate than S alone, but the quality of the S (i.e., its ability to clarify and oxidise) also affects (I) even when mixed with fresh solids. C. J.

Bacterial numbers in activated-sludge mixtures. H. HEUKELEKIAN (Sewage Works J., 1934, 6, 676—688).—The addition of CuCl_2 to the aërating sludge mixture up to a concn. of 4 p.p.m. had no appreciable effect on the no. of bacteria (I) present, but 8 p.p.m. of CuCl_2 resulted in a definite increase and a reduced efficiency of purification. With low concn. of sludge in the mixture (I) was generally high per unit amount of solids, and this relative increase was again accompanied by a lower purification efficiency. Aëration of such mixtures caused an increase in (I), whilst in those of high solids concn. the reverse was the case. The stirring of

activated sludge without aëration sometimes used an increase in (I) and sometimes a decrease. C. J.

Ionic silver sterilisation. C. H. BRANDES (Ind. Eng. Chem., 1934, 26, 962—964).—Clear drinking H_2O ($p_H > 7.0$) can be rendered sterile in 1 hr. by the presence of 0.05 p.p.m. of Ag^+ . Swimming-pool H_2O may be kept permanently sterile by a concn. of 0.15 p.p.m. in the daily make-up H_2O . More conc. solutions may be obtained electrolytically (up to 0.9 p.p.m.) and form effective, but harmless and non-corrosive, germicides of great val. to the brewing and dairy industries. C. J.

Detection of nitrates and iron in water. O. MAYER (Z. Unters. Lebensm., 1934, 68, 51—59).—Modifications of the $NHPh_2$ method for the detection of < 10 mg. of N_2O_5 per litre of H_2O are described. The sensitivity of this method when applied to milk, and the sensitivity of the usual methods for detecting Fe, are discussed. E. C. S.

Removal of iron and manganese from water. S. B. APPLEBAUM and M. E. BRETSCHGER (Ind. Eng. Chem., 1934, 26, 925—931).—Fe and Mn, in absence of excessive CO_2 , may be oxidised and pptd. by simple aëration. If excessive amounts of CO_2 are present more air is required or the CO_2 may be neutralised by alkalis. Before filtering, the p_H of acid waters containing Fe and Mn as sulphates should be raised to < 8.0 , and those with Fe and Mn in org. combination should be treated by special coagulants. Mn-zeolite (M), prepared by treating Na-zeolite (N) with $MnCl_2$ and then with $KMnO_4$, completely removes Fe and Mn from H_2O by base exchange. Regeneration requires 0.01 lb. of $KMnO_4$ per 1000 gals. of average H_2O . Certain types of N will continue to remove Fe and Mn after the softening powers are exhausted. The Ca-zeolite is exchanged for Fe and Mn, which are removed during the subsequent regeneration with NaCl. If desired, a portion of the softening units may be over-run, in this way giving a final H_2O which still contains some hardness, Fe, and Mn, or the H_2O may be softened to any desired degree and completely freed from Fe and Mn by passing through a Mn-zeolite plant. C. J.

Removal of copper sulphate from water by ferric floc. C. J. BROCKMAN (Ind. Eng. Chem., 1934, 26, 924; cf. B., 1934, 302).— Fe^{III} floc is more efficient than Al floc for removing Cu^{++} from H_2O . The p_H range is wider and a low [Fe] will effect complete removal of Cu^{++} , even at $p_H 3.8$; this was impossible with Al floc. C. J.

Determination of phenols in water and effluents. F. MEINCK and M. HORN (Angew. Chem., 1934, 47, 625—628).—The main difficulty in the determination of phenols (I) in H_2O and effluents by Br lies in the choice of the factor for the conversion of the titration results into mg. of (I) per litre. A further uncertainty is introduced when the determination of (I) volatile and non-volatile with steam is attempted since the separation is not sharp. Colorimetric methods have the disadvantage that the solution under examination has not usually the same composition as that used for comparison. It is recommended that results of analyses be not expressed in mg./litre, but by a "volatility no." expressing approx. the content of volatile (I) per litre determined bromo-

metrically or colorimetrically and a "total phenols val." The process followed should be specified. H. W.

Relation of the p_H of dilution water to the biochemical oxygen demand of various wastes. J. M. HOLDERBY and W. L. LEA (Sewage Works J., 1934, 6, 734—741).—Domestic sewage, packing plant waste, and milk waste may be expected to give higher biochemical O_2 demand (B) vals. with bicarbonate dilution H_2O the reactions of which are alkaline than with those reacting acid. Pea and milk wastes show a max. B when the initial p_H of the diluting H_2O is 8.0, whereas in the range 7.0—9.0 the p_H of the dilution H_2O has little or no effect on the B of sewage or packing-plant waste. C. J.

Disposal of [petroleum] refinery waste waters. W. B. HART (Ind. Eng. Chem., 1934, 26, 965—967).—If the vol. of oil-polluted H_2O is kept low it can be dealt with in separators to produce an effluent containing < 30 p.p.m. of oil, which would not cause a visible film. Oil- H_2O emulsions require individual treatment to discover the best method of splitting before passing to the separator. If the river- H_2O is subsequently used as a public supply the waste caustic solutions should be eliminated. C. J.

o-Phenylphenol as an antiseptic. H. C. FULLER (Ind. Eng. Chem., 1934, 26, 946).— $o-C_6H_4Ph \cdot OH$ (I) and its derivatives have high antiseptic vals. and are relatively non-toxic. Also when mixed with substances such as menthol, camphor, thymol, and Me salicylate in salves, ointments, and sprays (I) produces increased absorption of the other antiseptics. Application in the treatment of throat infections and septicæmia is suggested. E. B. H.

Determination of naphthalene in insecticides. W. L. MILLER (J. Assoc. Off. Agric. Chem., 1934, 17, 308—313).—Procedures are given for the determination of $C_{10}H_8$ in mineral oils, low-boiling solvents, in mixtures with $p-C_6H_4Cl_2$, camphor, and inorg. fillers, and in vermin powders. E. C. S.

Purifying boiler feed- H_2O .—See I.

PATENTS.

Treatment and purification of sewage. J. A. COOMBS and W. HEDGE (B.P. 415,775, 2.3.33 and 8.3.34).—A modification of the activated-sludge process is claimed in which the mixture of sewage and activated sludge passes < 2 aërating stages in each of which it is mixed by compressed air and has a free surface in contact with a cushion of air. The pressure (P) of the air in each stage is different but > 1 atm. and the air from a stage of higher P is used to aërate the mixed liquor in one of lower P in counter-flow to the sewage which passes from the stage at lowest P to those at successively higher P. C. J.

Water purification. R. A. STEVENSON, Assr. to GREAT WESTERN ELECTRO-CHEM. CO. (U.S.P. 1,946,818, 13.2.34. Appl., 21.7.31).—Sludge obtained from a purification process is chlorinated after removal from the bulk of the H_2O and recycled as precipitant for suspended matter. B. M. V.

Screen [for sewage etc.].—See I. **Regenerating zeolites.**—See VII.