BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JULY 22 and 29, 1932.*

I.—GENERAL; PLANT; MACHINERY.

Heat exchange in modern industrial practice. III. Heat transfer in stream-line flow. B. Heastie (Ind. Chem., 1932, **8**, 172—174).—A review and correlation of theoretical and experimental work on heat transfer from walls at const. temp. to oils flowing through a tube. C. A. K.

Heat transference by free convection. I. R. Hermann (Physikal. Z., 1932, **33**, 425—434).—Theoretical. A. J. M.

Similitude and the heat flow through a granulated material. O. A. Saunders (Phil. Mag., 1932, [vii], **13**, 1186—1188).—Theoretical. H. J. E.

Mercury vapour in industrial heat transfer. C. Field (Chem. & Met. Eng., 1932, **39**, 216—217).—Operating advantages of Hg are discussed. Hg vapour has no action on steel, and Hg-proof welded joints are readily obtainable. Hg boilers with air heater give an overall efficiency of 75%. The quantity of Hg required for large systems is 1 lb., or for small systems or those requiring accurate temp. control 2 or more lb., per 1000 B.Th.U. per hr. should be employed. Hg systems are best operated with a condenser pressure of 0·2 mm. abs. pressure. An improved automatic valve makes it possible to use one boiler system for a no. of reactors each with different temp. conditions. D. K. M.

Diphenyl-type compounds for high-temperature heating. J. J. Grebe (Chem. & Met. Eng., 1932, **39**, 213—216).—Ph_2 and its oxide are stable, non-corrosive, non-poisonous, and capable of withstanding high temp. for long periods without undue decomp., and are especially useful for heat transfer at 315—400°. Joints of piping for Ph_2 oxide should be welded, but if the piping is $\ngtr \frac{1}{2}$ in. in diam., threaded joints may be used up to 427°. Packing should be avoided, but where necessary flexible metal gaskets or dense asbestos coated with graphite should be used. Ph_2 or its oxide may be used in economisers to abstract heat from flue gas, for preheating air, or for heat storage in power plants. D. K. M.

Structural materials for modern heat technology. F. H. Norton (Chem. & Met. Eng., 1932, **39**, 226—228).—If the temp. of a furnace is to be varied periodically, massive walls are a disadvantage in that they absorb considerable heat. Material for furnace walls should have low thermal conductivity; for muffles, recuperators, and retorts, good conductivity and high mechanical strength to permit of thin walls; for chequerwork, high density and great conductivity. Jointing cements should be used as a thin slip. Coatings to protect the furnace wall from slag or abrasion or to make it tight may be of val. in some cases. A plastic mixture of clay and grog of about the same nature as the brick is used for making complicated shapes and for patching an eroded furnace. A new furnace should be carefully dried out before use. The more important properties of different refractories are given. D. K. M.

Materials for chemical plant construction. I. Timber. II. Clays and clay products. A. H. Loveless (Ind. Chem., 1932, **8**, 104—106, 141—143, 185—188).—I. The principal val. of timber for plant construction lies in its excellent resistance to a wide range of solutions of neutral or acid salts whether hot or cold, *e.g.*, up to 10% HCl, up to 20% H_2SO_4, AcOH, and other org. acids. Soft woods, though of open grain, are often resistant by reason of the resin content, *e.g.*, pitch pine. Teak is acid-resistant owing to the aromatic oil which it contains. Impregnation with insecticides prolongs the life of structural timber.

II. The origin and properties of the constituents of clays are discussed. C. A. K.

Heat insulation for every purpose. B. Townshend and E. R. Williams (Chem. & Met. Eng., 1932, **39**, 219—222).—The physical properties of most insulating materials and the most suitable working temp. for each are given. D. K. M.

Refrigeration systems applied to demands of modern industry. L. H. Morrison and H. C. Duus (Chem. & Met. Eng., 1932, **39**, 228—233). D. K. M.

Thixotropy and plasticity. II. Empirical equation expressing thixotropic fluidity changes. III. Effect of thixotropy on plasticity measurements. E. L. McMillen (J. Rheology, 1932, **3**, 163—178, 179—193; cf. B., 1932, 324).—II. The thixotropic properties of paints have been investigated viscosimetrically. The max. fluidity immediately after violent agitation changes too rapidly for measurement; Einstein's equation leads to an approx. val.

II. Thixotropy and plasticity of diphasic systems are considered to have the same origin. Immediately after violent disturbance, plastic materials appear to be no longer plastic, but are viscous. A method for detecting the max. yield val. of a plastic material is described. E. S. H.

The Engler viscosimeter and the theory of laminar flow at the entrance of a tube. L. Schiller (J. Rheology, 1932, **3**, 212—216).—Theoretical. E. S. H.

Scrubbing towers for recovery of volatile liquids. C. H. Butcher (Ind. Chem., 1932, **8**, 131—133).—A tower packing, preferably of simple design, should have

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

a rough surface to reduce the rate of flow of the absorbent. Raschig or Lessing rings or other specially-designed packings are much more efficient in practice than coke filling. The choice of absorbent is dependent on the process. Cresol is suitable for vapours of liquids which are miscible with H_2O, or tetralin for hydrocarbons non-miscible with H_2O; both serve indefinitely and are not corrosive. Coal-tar oils are more unstable and may contain S impurities. H_2SO_4 and solutions of bisulphites have been discarded as absorbents on account of inconvenience and inefficiency. C. A. K.

Rate of extraction by condensation pumps. M. Matricon (J. Phys. Radium, 1932, [vii], 3, 127—144). —Formulæ are obtained for the limiting pressure and the rate of extraction. A method for measuring the latter by very rapid vac. pumps is described and the results confirm the formula given. By means of the formula it is possible to design a pump which has a definite rate of evacuation. M. S. B.

Cottonseed and power production.—See II. **Urea phosphate [as fire extinguisher].**—See III. **Apparatus and machinery alloys. Thermo-elements.**—See X. **[Const.-temp. oven for] solubility of compounds.**—See XIV.

See also A., June, 567, **Diffusion const.** 593, **Extraction apparatus for solids. Porous plates. Upward-flow viscosimeters.**

Patents.

Furnaces. R. von Mattekovich (B.P. 371,998, 23.2.31).—A fuel high in moisture and/or volatile matter is supplied to a tall rack suspended over a peaked fire-bridge; after the volatile matter is driven off in the rack the fuel falls out on to the bridge, part being deflected to an auxiliary grate (*A*) towards the front of the furnace, and the remainder falling backwardly on to the main grate (*B*). The amount falling on to *A* is calc. to be just sufficient to provide heat to drive off the volatile matter which is ignited by and burns above *B*, or, if the volatile matter is mainly incombustible (*e.g.*, H_2O), a special vent is provided for it. B. M. V.

Apparatus for roasting material. C. J. Schifferle, Assr. to H. R. Struthers (U.S.P. 1,830,002, 3.11.31. Appl., 27.3.29).—A rotary cylindrical furnace is provided with flues for removal of gases from both ends, the proportion being adjusted by dampers. Fuel and some of the material are admitted at one end and air and the rest of the material through scoop-like apertures formed through the shell at intermediate points, the apertures being closed at the upper part of a revolution by external flaps. B. M. V.

Heating and de-aërating or degasifying water. Récupération Thermique et Épuration, Assees. of G. H. Gibson and V. A. Rohlin (B.P. 372,589, 12.6.31. U.S., 13.6.30).—The water is heated in two stages on trays by steam: in the first, for heating only, the trays are widely spaced in order to pass the total quantity of steam; in the second, for degasifying, the trays are closer together and are heated only by the excess steam from the first stage. The supply of steam is limited so that the amount vented with the gases is not very great. B. M. V.

(A) Attemperators or like devices. (B) Attemperators for regulation of the temperature of the wort during fermentation in brewing or distilling. W. J. Watkins, and Aluminium Plant & Vessel Co., Ltd. (B.P. 371,862 and 371,897, 24.1.31).—A cooling coil is mounted on an arch-shaped frame which is pivoted at the abutments so that the submergence of the coil can be varied. B. M. V.

Heat- and sound-insulating materials. C. O. Bower (B.P. 372,182, 31.7.31).—A panel is constructed of a no. of vessels on the Dewar principle mounted in a framework. B. M. V.

Heat and/or sound insulation. J. Todd and R. Baillie (B.P. 371,846, 27.1.31).—The apparatus comprises rigid frames (which may be flat or bent into various shapes), fabric sheets, and fibrous material between the sheets. B. M. V.

Heat-insulating packing materials. A. E. White. From Ric-wil Co. (B.P. 372,084, 24.4.31).—Siliceous fibres (*e.g.*, of asbestos) rendered water-repellent by treatment with a solution of metallic soap or of rubber are used for heat insulation of conduit systems. [Stat. ref.] B. M. V.

Making molten masses and slags become highly porous as they solidify. C. H. Schol (B.P. 372,197, 18.8.31).—The molten slag and the liquid which is to cause the foaming by expansion are caused to flow in thin sheets over a suitable surface, the volatile liquid being originally undermost. The porous mass while still fluid may be run into moulds. Suitable forms of surface are described. B. M. V.

Dryer. R. P. de Vries (U.S.P. 1,829,741, 3.11.31. Appl., 8.4.29).—Hot gases are caused to pass up a flue within a shaft kiln which may be elongated horizontally. In the supply hopper the material (*e.g.*, bone char) is heated by radiation from the upper part of the flue; it then travels downwards through passages, formed with walls of louvres, on each side of the heating flue and spaced from it, in which the drying is effected by air heated by the flue passing outwards through the louvres and the material. B. M. V.

[Spray-]desiccating apparatus. D. D. Peebles (U.S.P. 1,830,174, 3.11.31. Appl., 31.1.27).—A spray dryer is operated with two concentric, oppositely whirling vortices of drying atm., the liquid being supplied to the inner one. B. M. V.

Cooling tower. P. E. Fluor, Assr. to Fluor Construction Co. (U.S.P. 1,829,744, 3.11.31. Appl., 12.1.27).—In the upper part, H_2O is cooled by dripping through the atm.; in the lower part, the cooled H_2O passes over coils containing another fluid. B. M. V.

Crusher. E. H. Frickey (U.S.P. 1,829,895, 3.11.31. Appl., 5.10.28).—To an impact crusher the material is supplied by a plate conveyor running horizontally beneath a hopper; the conveyor bends downwards over a platen and forms the impact plate of the crusher. B. M. V.

Grinding mills. G. A. H. Mallickh (B.P. 371,793, 11.3.32).—Groups of loose rods are driven round inside a stationary cylindrical casing by means of a spider dividing the cylinder into three ¾ moon-shaped compartments. B. M. V.

Grinding mills. E. Kutaszewicz (B.P. 372,661, 11.9.31).—In a disintegrator the inside of the casing and outside of the rotor are provided with pockets so that the grinding takes place mainly by whirling; adjacent to the grinding zone is a screen extending around the whole circumference, the apertures being adjusted by sliding one screen upon another. Guides are provided to return oversize to the grinding zone. B. M. V.

Apparatus for washing sand, gravel, and like materials, or mixing tarred macadam and concrete. J. Cross (H. Cross) (B.P. 371,599, 20.4.31).—The material is caused to travel up a sloping trough by means of a series of blades pivoted on a reciprocating framework; the blades dig into the material on the upstroke and slide over it on the return. B. M. V.

Mixer. E. B. Rose (U.S.P. 1,829,812, 3.11.31. Appl., 11.9.29. Renewed 20.3.31).—A bowl is provided with a stirrer which is driven by a turbine on the cover of the bowl. The shaft is hollow so that liquid may be added while the stirrer is operating. B. M. V.

Mixing devices. P. Ritter (B.P. 372,046, 26.3.31).—The interior surface of a rotating drum is divided into cells by intersecting blades, some of which are helical and the others parallel to the axis. An internal rotor is also provided with helical blades. The speed of rotation with respect to the drum may be the same or different, and the direction the same or opposite. Sealed fixed-end closures embodying feed and outlet passages are described. B. M. V.

Separators for coal dust and the like. T. F. Hurley (B.P. 371,909, 31.12.30).—A cyclone separator is provided with an offtake in the form of volute passages in the lower outer edge of which are slits permitting the egress of dust into the outer casing, the main function of which is to act as a settling chamber. B. M. V.

Pneumatic apparatus for the separation and grading of solid pulverulent material. Clarke, Chapman & Co., Ltd., Assees. of Fours & Appareils Stein (B.P. 372,600, 19.6.31. Fr., 23.6.30).—The airborne material is supplied axially to a casing shaped like a cyclone separator, but the flow is outwards through two series of guide blades, producing whirling, which are surrounded by walls guiding the air and fine material upwards and the coarse material downwards. B. M. V.

Centrifugal machines [for paper pulp etc.]. Anc. Etabl. Cime, and D. Perrier (B.P. 371,753, 30.9.31. Fr., 9.12.30).—In a centrifuge making three products, *e.g.*, paper pulp, light and heavy impurities, the stationary skimmers are adjustable in an axial direction to vary the spaces between themselves and the bowl, the parts concerned being conical or tapering in cross-section. B. M. V.

Centrifugal bowls. Aktieb. Separator (B.P. 372,058, 2.4.31. Swed., 5.4.30).—Means are provided for supplying and distributing additional liquid to discharge solid matter from the bowls. [Stat. ref.] B. M. V.

(A) Centrifugal separators. (B) Scraping worms for centrifugal separators. Aktieb. Separator (B.P. 371,755 and 372,679, [A] 2.10.31, [B] 5.10.31. Ger., [A] 7.10.30, [B] 11.10.30).—In (B), a worm for the discharge of the collected solid matter is mounted on an open framework and is preferably of opposite hand on each half so that the material is dragged from the ends toward the middle. In (A), a centrifuge embodying a worm as in (B) is described; the supply of feed is also at the middle of the length of the bowl. B. M. V.

Rotary filters. H. A. Gill. From F. L. Smidth & Co. A.-S. (B.P. 371,572, 30.3.31).—The filter frames are in planes transverse to the axis, upon which is arranged a worm or belt conveyor for removal of the cakes. The frames may be fixed either to the interior of a rotating drum containing the prefilt or to the exterior of an intermediate rotating spider surrounding the conveyor but inside the leaves, the prefilt tank being stationary. B. M. V.

Filter-presses [for potter's clay etc.]. W. Boulton, Ltd., and H. H. Hall (B.P. 371,746, 19.9.31).—The press is closed by four long bolts at the corners, the nuts being operated in unison by gearing. B. M. V.

Oil filters. Dooley Improvements, Inc. (B.P. 371,649, 30.5.31. U.S., 5.6.30).—In a filter comprising a fabric tube held in deeply fluted form by means of slotted discs, means are described for holding the ends of the tube. A spring-loaded by-pass valve is provided to permit flow of (unfiltered) oil when the filter becomes clogged. B. M. V.

Foam-reducing apparatus. Pfaudler Co., Assees. of J. N. Jacobsen (B.P. 371,600, 21.4.31. U.S., 22.4.30).—The foam is injected tangentially into a cylindrical casing containing a no. of closely spaced annular discs between which the foam is broken up and at the central passage through which the gas leaves upwardly and liquid downwardly, the latter passing out through an inverted siphon which maintains the liquid level above the baffles. A screen is also provided across the gas outlet at the top. B. M. V.

Apparatus for evaporating and distilling liquids. D. G. Jack (B.P. 371,895, 29.1.31. New Zealand, 21.2.30).—An electrically heated still embodies a const.-level feed device which also switches off the current in the event of shortage of liquid. B. M. V.

De-frosting cold accumulators of apparatus for the separation of gaseous mixtures. M. Frankl (B.P. 371,966, 5.2.31. Ger., 6.2.30. Addn. to B.P. 246,172. Cf. F.P. 613,755; B., 1927, 512).—In a rectification process for the separation of air or other gaseous mixture part of which is supplied to the rectifier at a high pressure and part injected at a low pressure, any one (out of four) of the cold accumulators has the gases passed through in the following order, the stages being out of phase in the four accumulators: (1) compressed air to the separation apparatus, (2) part of the N_2 leaving the separator, (3) injected low-pressure air, (4) remainder of N_2. B. M. V.

Separation of gaseous mixtures. Ges. f. Linde's Eismaschinen A.-G. (B.P. 372,067, 9.4.31. Ger., 19.4.30).—The removal of a constituent of a gaseous mixture, *e.g.*, CO from coke-oven gas, is effected by dissolution in a liquid, *e.g.*, CH_4, at appropriate temp. and pressure, and the solution is then resolved at a lower pressure and in heat-exchange relation with the first stage, the evaporation of the constituent affording cooling. The operating temp. may be lowered to below the f.p. of the pure washing liquid by the presence of another dissolved gas, *e.g.*, N_2, which with the H_2 remaining from the coke-oven gas will yield a mixture suitable for the synthesis of NH_3. B. M. V.

Devices for purifying air or gases. H. Kohl (B.P. 372,426, 14.2.31).—A filter composed of spongy material kept moist by a suitable liquid which, to provide additional surface, may be allowed to form froth above the filter is described. B. M. V.

Purification or washing of furnace gases. J. Cuthbertson (B.P. 372,411, 3.11.31).—Uninterrupted, substantially horizontal sheets of water through which the gases are forced to pass are used in conjunction with other means, *e.g.*, wetted surfaces, water and steam sprays. B. M. V.

Filtering apparatus for air and other gases. H. Wittemeier, Assee. of "Delbag" Deuts. Luftfilter-Bauges. m.b.H. (B.P. 372,179, 29.7.31. Ger., 12.2.31. Addn. to B.P. 370,748; B., 1932, 581).—The filters are subjected to an air blast to remove excess moisture. B. M. V.

Apparatus for analysing gases. Y. Henderson and R. H. Davis (B.P. 372,221, 1.10.31).—An absorption chamber is formed out of a syringe having a frictionless piston and a cock to close the nozzle. The sample is brought to the same pressure before and after absorption by supporting the syringe in a vertical position on the piston only, the cylinder being supported on the gas cushion, or *vice versa*. B. M. V.

Furnace arches and like furnace structures. Babcock & Wilcox, Ltd., and H. J. Taylor (B.P. 373,961, 25.2.31. Addn. to B.P. 329,555).

Refrigerating machines. A.-G. Brown, Boveri & Co. (B.P. 373,753, 4.5.31. Ger., 11.8.30).

Continuously working absorption machines for refrigerating purposes. Siemens-Schuckertwerke A.-G. (B.P. 373,684, 10.3.31. Ger., 12.4.30).

Evaporators or degasifiers for continuously-acting absorption refrigerating machines. B. Lehmann (B.P. 373,688, 12.3.31. Ger., 7.4.30).

[Lid for removing vapours from] autoclaves, digestors, sterilising pans, and like apparatus. Hall & Kay, Ltd., P. Kay, and J. H. Hall (B.P. 371,900, 24.10.31).

Combustion of waste material. Combustibles in flue gases.—See II. **Gas-purifying apparatus.**—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Applications of the results of post-war research on coal to commercial problems. W. Francis (Fuel, 1932, 11, 171—176).—The application of the "rational analysis" of coal (cf. B., 1931, 466) to its evaluation for industrial purposes is discussed. The "permanganate no." of a coal is determined by refluxing 0·5 g. for 60 min. with 200 c.c. of N-$KMnO_4$ + 50 c.c. of N-$NaOH$, filtering, dissolving the MnO_2 in dil. H_2SO_4 and $H_2C_2O_4$, washing and drying, and expressing the loss of wt. of the original sample (with a correction for the ash) as a % of its ulmin content. Whereas a good correlation may be expected between the "reactivity val." (cf. *loc. cit.*) and properties depending on initial effects, *e.g.*, spontaneous combustion or the primary products of destructive distillation, processes involving the complete breakdown of the mol., *e.g.*, hydrogenation, high-temp. carbonisation, should show a better correlation with the permanganate no. The latter also appears to be closely related to the rank of the coal. A. B. M.

Carbon dioxide explosions in mines. G. Tammann and K. Seidel (Z. anorg. Chem., 1932, **205**, 209—229).—The composition, structure, and mode of formation of "Knistersalz" (80—90% KCl with 10—15% NaCl) have been studied. The included gas consists chiefly of air with small proportions of CO_2 and hydrocarbons under a pressure of about 12 atm. The rate of evolution of CO_2 from coal previously saturated under a higher pressure was also investigated. The source of the CO_2 causing the explosions is considered to be dolomitic marl, the temp. of which has risen in consequence of the superposition of other strata. This theory is supported by the observation that different specimens of marl, heated at 50—100° with or without H_2O, evolve considerable quantities of CO_2. F. L. U.

Coal assays. H. Nielsen (Gas J., 1932, **198**, 386—388).—A modified Fischer retort consists of a mild-steel block bored out conically. A lid is kept in position by a central bolt fitted with a perforated sleeve to allow rapid passage of the gases to the centre of the charge (100—150 g.). The liquid products condense in a special calibrated glass receiver, and the gases after passing a const. sampler are measured in a 5- to 10-litre aspirator. Readings may be taken every 5 min., and a wt. balance should be accurate to 0·2%. For high-temp. assays an alloy-steel retort must be used. R. N. B. D. B.

Estimation of nitrogen in coal using selenium as a catalyst. A. E. Beet (Fuel, 1932, 11, 196—199).—The variation in the val. obtained for the N content of a coal, by Kjeldahl's method, with time of heating after the solution has become colourless, and with variations in the quantities of K_2SO_4 and catalyst used, has been studied. With a factor of safety of 2, the times of heating necessary to give the max. val. for the N content, using 1 g. of coal, 30 c.c. of H_2SO_4, and 10 g. of K_2SO_4, were: with 1 g. HgO, 2 hr.; with 0·5 g. HgO + 0·5 g. Se, 36 min.; with 0·25 g. Se, 4 hr. With prolonged heating NH_3 is slowly lost, but so slowly that the above method of determination is unaffected thereby. A. B. M.

Combination of sulphur with the ash during the combustion of coal under the influence of the acidic or basic ash constituents. F. Foerster and A. Landgraf (J. pr. Chem., 1932, [ii], **134**, 1—50).—On heating an artificial wollastonite, containing SiO_2 in excess of that corresponding to $CaSiO_3$, for 1 hr. at 900° in a current of air containing 1 g. of SO_3 per litre it absorbed about 5% of SO_3, in accordance with the reversible reaction $CaSiO_3 + SO_3 \rightleftharpoons CaSO_4 + SiO_2$. The amount absorbed at 900° was slightly higher than at either 800° or 1000°. With continued heating at 900° the amount of SO_3 absorbed rose slowly to 7·7% after 25 hr. *X*-Ray analysis of the solid phase showed that when about 10% conversion of $CaSiO_3$ into $CaSO_4$ had occurred the lattice structure of the former had disappeared and only the lines due to cryst. $CaSO_4$ were obtained. When mixtures of wollastonite with 10—40% of FeS_2, with or without the further addition of C, were burned in air or O_2 at 650—900° SO_3 was absorbed by the $CaSiO_3$ in amounts equiv. to 0·01—0·05 mol. SO_3 per mol. CaO. Under the same conditions kaolin absorbed less SO_3 than did $CaSiO_3$. Much larger quantities of S were retained, in the form of $CaSO_4$ containing small amounts of $CaSO_3$ and CaS, when mixtures of $CaCO_3$, $(HCO_2)_2Ca$, or $Ca(OBz)_2$ with FeS_2 were burned in air at 900°. With a $CaCO_3 : FeS_2$ ratio of 10 : 1 almost the whole of the S was absorbed by the CaO formed. Addition of C or $CaSiO_3$ had little influence on the absorption. On continued heating in air the sulphite and sulphide were gradually oxidised to sulphate. On heating in the presence of SiO_2 the latter gradually displaced SO_3 from the $CaSO_4$. The above results have been confirmed by observations on the retention of S by the ash of coals and low-temp. cokes of high ash content. An ash of min. S content was obtained by burning a thin layer of the fuel at 900° in a current of air. Higher and variable vals. of S were found in the ash when the combustion was carried out in a crucible; a reducing atm. favoured the formation of sulphite and sulphide. A. B. M.

Utilisation of arachis nut shells as fuel. H. GUILLON (Bull. Mat. Grasses, 1932, **16**, 104—109. Cf. Martin, following abstract).—Arachis shells are too bulky to be burned economically in a hand-fired ordinary furnace; good results are obtained by special regulation of primary and secondary air, so that the fuel (automatically stoked) is consumed in two stages: partial combustion, *i.e.*, gasification, and complete combustion of the gases. E. L.

Utilisation of arachis nut shells as fuel. R. MARTIN (Bull. Mat. Grasses, 1932, **16**, 109—116).—The results obtained with the special furnace " RM " (cf. Guillon, preceding abstract) are reviewed. The shells are consumed without previous crushing, automatic stoking is employed, and smokeless combustion without entrainment of charred fragments is achieved. E. L.

Preparation of carbon black. H. HADERT (Chem.-Ztg., 1932, **56**, 349—351).—A description of modern practice. E. S. H.

Grit in carbon black. Effect on flexing resistance of vulcanised rubber. J. N. STREET (Ind. Eng. Chem., 1932, **24**, 559—562).—Channel black has been found to contain 0·05—1·7% of grit retainable on a 325-mesh sieve. Even if the coarser portion of this, which will collect on 200-mesh, is rejected, the grit impairs the flexing resistance of rubber which contains it. The coarser fractions appear to give rise to larger and earlier cracks than the finer material. The coarse material is regarded as foreign matter rather than as agglomerated black. D. F. T.

Direct accelerator-adsorption test [of carbon black]. F. H. AMON and R. K. ESTELOW (Ind. Eng. Chem., 1932, **24**, 579—583).—Details are given of a modified test as to the adsorption of diphenylguanidine by C black, using a very dil. solution of the accelerator in C_6H_6. Extensive experience with this test on many samples of C black from several plants shows its practical val. as a measure of the variations in adsorptive properties of significance to the rubber manufacturer and as an aid for control purposes by the latter as well as by the C black manufacturer. When the test reveals an adsorption exceeding 50% the C black leads to definitely slow rates of vulcanisation; below 40% no C black has been found definitely to cause slow vulcanisation. D. F. T.

Steaming of gas retorts. A. STEDING (Gas- u. Wasserfach, 1932, **75**, 374—381).—The working results obtained with four chamber-oven settings (two horizontal, one vertical, and one inclined) provided with the Otto system of steaming show an improved thermal val. of the gas yield with a relatively low fuel consumption for heating the setting. The production of water-gas in the chambers follows on the completion of carbonisation; the steam is highly superheated and is injected uniformly along the chamber through specially arranged ducts. To prevent the ducts from becoming choked during carbonisation a small amount of steam is passed continuously into the chamber; this also contributes to the improvement in the gas yield. In a modification of the system, tar or oil is sprayed into the chamber during the production of water-gas and the vapours are compelled to pass through the coke charge, whereby a carburetted gas is produced and the thermal val. of the gas yield is still further increased. Tables and curves have been constructed showing the gas yields, calorific val., comparative costs, etc. when operating (*a*) without steam, (*b*) with steam, and (*c*) with steam and with carburation of the water-gas. The cost per cu. m. of gas is greatest for (*a*) and least for (*b*); the cost per therm is the same for (*a*) and (*b*), and slightly higher for (*c*). The variation of these comparative vals. with varying coal, coke, and tar prices is discussed. A. B. M.

Gasification [destructive distillation] of cottonseed for power production. R. MARTIN (Bull. Mat. Grasses, 1932, **16**, 97—104).—Cottonseed obtained as a by-product in Central and West Africa is not worth transport to the oil mills, but may be destructively distilled to yield 51% of oil and 77·5 litres (per kg.) of gas (calorific val. 5700 g.-cal./cu. m.) containing $>$ 50% of hydrocarbons, mostly CH_4. The gas should be passed through a hot zone to crack entrained oils. Numerous experiments and analyses made in order to determine the best conditions are detailed. E. L.

Control of "distant-supply" gas. H. TRUTNOVSKY (Gas- u. Wasserfach, 1932, **75**, 369—372).—The methods used, and the precautions taken to ensure accuracy, in the examination of the gas supplied by long-distance transmission by the Westfälische Ferngas A.-G. are described. Determinations are made of calorific val., sp. gr., H_2S, O_2, $C_{10}H_8$, org. S, tar, and H_2O. A. B. M.

Ammonia and benzol recovery. Feld washers at a coke-oven installation. H. Weittenhiller (Glückauf, 1932, **68**, 313—319; Gas J., 1932, **198**, 378).—Data for the recovery of NH_3 and benzol from the carbonisation of 1500 tons of coal daily, by Feld centrifugal washers, are given. Comparison with hurdle-type washers shows a saving of 56 d. per ton of $(NH_4)_2SO_4$ and 0·43 d. per gal. of benzol produced. R. N. B. D. B.

Determination of the asphalt-bitumen content in asphalt-bitumen-tar mixtures. F. J. Nellensteyn and J. P. Kuipers (Chem. Weekblad, 1932, **29**, 291—292).—The tar colloid is flocculated by shaking with a mixture of 2 vols. of CS_2 to 1 vol. of ligroin (40/60°), boiling, and filtering. The solution is evaporated and the residue extracted repeatedly with a mixture of 1 vol. of NH_2Ph to 1 vol. of 96% EtOH, which dissolves the tar medium. The latter treatment dissolves some of the asphalt-bitumen medium, which must be recovered from the solution. S. I. L.

Properties and compositions of the gasoline fractions of representative Japanese crude petroleums. IX—XI. M. Mizuta (J. Soc. Chem. Ind., Japan, 1932, **35**, 157 b, 158—159 b, 159 b; cf. B., 1932, 409).—IX. A review of the characteristics of Japanese crude petroleums.

X. A classification of the gasoline fractions of Japanese crude oils.

XI. A report on the general properties and composition of Kinsui crude oils. D. K. M.

Isolation and determination of *n*-heptane and of methyl*cyclo*hexane in a midcontinent petroleum. Determination of the phase-equilibrium diagram for the condensed system: *n*-heptane–methyl*cyclo*hexane. M. H. Hicks-Bruun and J. H. Bruun (Bur. Stand. J. Res., 1932, **8**, 525—540).—n-C_7H_{16} and methyl*cyclo*hexane have been isolated from petroleum by fractional distillation after nitration of the PhMe. A freezing apparatus and a centrifuge adapted for low-temp. work, used for the final fractionation of the material by equilibrium melting, are described. The following data are given for n-C_7H_{16}: d_4^{20} 0·68365, n_D^{20} 1·3877, b.p. 98·4°, f.p. —90·62°, crit. solution temp. in NH_2Ph 70·0°. Methyl*cyclo*hexane (99·8%) has d_4^{20} 0·76918, n_D^{20} 1·4234, b.p. 100·8°, f.p. —126·53°, crit. solution temp. in NH_2Ph 41·0°. The crude petroleum contains $\not<$ 0·9% of n-C_7H_{16} and $\not<$ 0·3% of methyl*cyclo*hexane. A const.-boiling mixture is not formed by these two hydrocarbons. A eutectic mixture containing 93 wt.-% of methyl*cyclo*hexane freezes at —130·3°. E. S. H.

Toxic properties of motor spirit and its combustion products. W. Liesegang (Angew. Chem., 1932, **45**, 329—330).—The toxic properties of light petroleum, C_6H_6, methylated spirit, and MeOH are discussed. MeOH is probably the most dangerous constituent. Poisoning from exhaust gases is generally due to CO. E. S. H.

Colorimetry of lubricating oils. Herbrich (Ann. Chim. Analyt., 1932, [ii], **14**, 193—201).—The Duboscq colorimeter is considered to be unsatisfactory since the colour of oils may only be compared with each other and no permanent standard can be set. The Lovibond tintometer is unsatisfactory because the tinted glasses are not in algebraic proportion to each other. A holder for Lovibond glasses is placed under one of the plungers of a Duboscq colorimeter, and the depth of oil equiv. to the tint of known glasses is determined. T. McL.

Is the loss of viscosity in lubricating oil by dilution a criterion of lubricating power? M. Roegiers (Angew. Chem., 1932, **45**, 320—323).—Tausz and Staab claim (cf. B., 1931, 187) that if a lubricating oil is diluted with PhMe, the less the loss of viscosity the greater is the original lubricating power. If $\eta^x = \theta$, where η and θ are the viscosities, x for a given dilution is a measure of the lubricating power. This theory is criticised mathematically and experimentally and shown to lead to contradictory results. These authors' const. x bears no relation to the semi-dry coeff. of friction, which, *e.g.*, in the case of a mineral oil is greatly affected by the addition of as little as 0·5% of vegetable oil, whereas the val. x is unaltered. A relation is, however, found in the case of mineral oils between the const. x and the slope of the viscosity–temp. curve. This is no longer true with mixed oils, and in any case it is simpler to determine the viscosity–temp. curve directly. C. I.

Is classification or nomenclature of coals possible or desirable? C. A. Seyler (Chem. and Ind., 1932, 531—533).—A discussion.

Ten years' carbonising in vertical retorts. J. E. Blundell (Gas J., 1932, **198**, 733—745).

Use of gas as a fuel in industry. C. M. Walter (Gas J., 1932, **198**, 715—732).

Co-ordination of power relative to gas-works. F. M. Birks (Gas J., 1932, **198**, 701—714).

Recovery of volatile liquids.—See I. **Sulphonated products.**—See XII. **[By-products from] wood saccharification.**—See XVII.

See also A., June, 570, **Prep. of charcoal hydrosols.** 578, **Prep. of H_2 from water-gas.** 580, **C_2H_2 from CH_4.** 593, **Gas absorption pipette.** 594, **Natural gases in Russia.** 597, **Brown coal → bituminous coal.** 631, **Determination of hydrocarbons in air.**

Patents.

Vertical retort furnaces. J. Lutz (B.P. 371,617, 5.5.31).—A vertical retort, annular in cross-section, is heated from the outside by a no. of vertical flues which are provided both at the top and bottom with gas nozzles and air supplies, and at about the middle with outflow passages for the waste combustion gases. The air for combustion is preheated by being passed through suitably arranged passages in the outer wall of the furnace. Each heating flue may be provided with a separate recuperator. The volatile products of distillation are withdrawn through vertical slots on the inner side of the retort. A. B. M.

Internally-heated vertical retorts for distillation of shales, lignites, peats, coals, or other earthy oil-bearing substances. R. J. Money and H. D. Pontet (B.P. 371,962, 5.2. and 19.5.31).—Shale etc. is distilled by a process similar to that described in

B.P. 221,388 (B., 1924, 898) in a vertical retort provided with a grate, which is inclined downwards to one or more outlets for the removal of the treated material, and with means, *e.g.*, a series of valved vapour-outlet pipes communicating with different parts of the grate, for controlling the relative rates at which the distillate is withdrawn from different levels of the grate; the zone of distillation may thus be made to conform with the contour of the base during the later stages of distillation. A. B. M.

Low-temperature distillation of solid fuels. A. J. A. HÉRENG (B.P. 372,120, 30.5.31. Fr., 30.5.30. Cf. B.P. 325,809; B., 1930, 448).—The fuel, which is conveyed through the distillation chamber in a horizontal layer on an endless conveyor, is distilled by passing hot gases down through the layer. Rotary scrapers and adjustable stop-plates are arranged at intervals in the chamber to break up the crust of agglomerated fuel which is formed and to convey it laterally to side outlets. A. B. M.

Coking retort ovens. KOPPERS Co., Assees. of J. VAN ACKEREN (B.P. 371,407, 17.1.31. U.S., 28.1.30). —The flame flues of each heating wall are connected in pairs. A series of regenerators is arranged beneath each heating wall and is divided into groups of one large and two small regenerators. Each group conducts combustible media to, or conveys waste gases from, one member of each of two pairs of flame flues. The regenerator structure for each heating wall comprises two side walls, which are located beneath adjacent coking chambers, and transverse partitions. Between each pair of closely adjacent side walls is an expansion joint. The regenerators of the series beneath each heating wall are connected to a series of ducts located beneath the regenerators. The arrangement is such that none of the ducts traverses the expansion joint. A. B. M.

Regenerating coke oven. E. COPPÉE & Co. (B.P. 371,543, 11.3.31. Belg., 2.2.31).—The regenerators, max. no. two per coking chamber, are arranged parallel to the latter and extend below them over their whole length. Each heating wall comprises a series of pairs of coupled flues, the walls on both sides of the same coking chamber having their uptake flues connected to the same pair of fresh gas and air regenerators, and their downtake flues to the same pair of waste-gas regenerators, which are situated on one side only of the corresponding pair of fresh gas and air regenerators. A. B. M.

Chamber ovens for production of gas and coke. C. STILL (B.P. 371,723, 11.8.31. Austr., 11.8.30).—A set of collecting boxes is provided in the oven roof; these are connected, on the one hand, through removable suction tubes with vertical ducts formed in the central plane of the charge of coal, and, on the other hand, with one or more horizontal collecting pipes arranged in the oven roof parallel to the set of collecting boxes. At the end of each oven the liquid condensates and the gases are drawn off from the collecting pipes into a gas and tar main. A suction of at least 40 mm. water gauge, and if necessary considerably higher, is maintained in the suction tubes. A. B. M.

Arrangements for combustion of waste material. S. A. WALLANDER and E. L. UHLIN (B.P. 371,156, 9.4.31. Swed., 21.2.31).—The combustion gases from a fireplace in which waste material, *e.g.*, dust, kitchen waste, etc., is burned are passed through a glowing layer of coal or coke burning in a second fireplace wherein they are completely burned. The application of this principle to a steam-raising plant or hot-water system comprising two boilers each heated by one of the fireplaces is described. A. B. M.

Continuous production of cyanised coke mixture. J. SMITH (B.P. 371,384, 13.1.31).—Paraffin coke or similar carbonaceous material is mixed with an alkali and the mixture is passed continuously through an externally-heated vertical retort wherein it is subjected to the action of a current of air or NH_3, or a mixture thereof. A. B. M.

Treatment of peat and other fossil fuels. O. LINKER and (COUNT) Z. SCHOENBORN (B.P. 370,929, 7.1.31). —The crushed peat is treated with acid or alkaline H_2O in order to adjust the acidity of the material to the val. most favourable for the growth of the thermogenic and thermophilic bacteria which are present. It is then filtered, formed into shapes, and piled up to facilitate shrinking and hardening. The shapes may first be subjected to the effect of waste hot gases and exhaust steam before being stacked. During the shrinking and hardening process they are sheltered from the effect of light and the direct rays of the sun so that the growth of the bacteria is not hindered. Part of the peat may, after the initial treatment with H_2O, be converted into peat dust by atomisation. A. B. M.

Manufacture of acetylene and carbon black. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 371,916—7, 22.1.31).—(A) Hydrocarbon gases are subjected to the action of an electric arc and the products of reaction are immediately led in whirling motion into a large cooled space, the area of cross-section of which is considerably greater than that of the space containing the arc. The C black is then separated from the C_2H_2-containing gases, *e.g.*, by electrical pptn. (B) The gases from the arc may be cooled by heat exchange with a series of H_2O-cooled surfaces on which the C black is deposited and from which it is removed at intervals by means of scrapers. A. B. M.

Production of water-gas, or gaseous mixtures containing water-gas, poor in carbon monoxide. F. BÖSSNER and C. MARISCHKA (B.P. 372,089, 28.4.31. Austr., 28.4.30).—A water-gas plant is provided with a chamber containing a reaction mass consisting of CaO, to which other oxides or carbonates, *e.g.*, those of Fe or Mg, may be added. The water-gas produced during the run is passed through the chamber wherein it is freed from the greater part of its CO ($CaO + CO + H_2O = CaCO_3 + H_2$). The mass is reactivated by passing the blast gases, after combustion with secondary air in a heat-storage chamber, through it ($CaCO_3 = CaO + CO_2$). The process is so controlled as to give a temp. in the reaction chamber of 500—600° for the removal of CO, and of 800—900° for reactivation. The process may be used with a continuously operating water-gas plant by providing an excess of steam and air alternately in order to produce the requisite temp. for the reaction and for reactivation, respectively. A. B. M.

Manufacture of blue water-gas from bituminous fuel. Power-Gas Corp., Ltd., and N. E. Rambush (B.P. 371,841, 27.1.31).—The apparatus consists of a retort superposed on a water-gas generator. Distillation of the fuel is effected by passing the blow gases from the generator up through the retort, the mixed gas so formed, which approximates to a low-grade producer gas in calorific val., being utilised for steam production or furnace heating, etc. The blue water-gas formed during the run is withdrawn without coming into contact with the bituminous fuel. A. B. M.

Manufacture of combustible gas and apparatus therefor. Brit. Thomson-Houston Co., Ltd., Assees. of F. P. Wilson, jun. (B.P. 371,108, 5.3.31. U.S., 6.3.30).—A gas consisting of H_2 with or without a definite low content of CH_4 and/or an inert gas, *e.g.*, N_2, suitable for the brazing and annealing of metals, electric welding involving at. H, or the reduction of metallic oxides, etc., is produced by passing a mixture of coal gas and steam through an internally electrically-heated reaction chamber at about 1000°. The ratio of steam to coal gas is maintained const. by an automatic device which regulates the steam supply in accordance with the temp. of the mixture. A. B. M.

Activation of gas-purification masses. Gewerkschaft M. Stinnes (B.P. 371,117, 10.3.31. Ger., 5.5.30).—Dry gas-purification masses, *e.g.*, bog-Fe ore, and purification masses which have been regenerated and desulphurised are activated by the addition of 3—5% of alkaline-earth salts, *e.g.*, $CaCO_3$. A. B. M.

Apparatus for determining the content of combustible gases in gas mixtures, in particular flue gases. Siemens & Halske A.-G. (B.P. 372,251, 30.12.31. Ger., 12.2.31. Addn. to B.P. 282,080; B., 1929, 197).—Combustion as described in the prior process is effected by admitting the flue gas near the insulators and passing it through one or more baffles before it reaches the test wire. B. M. V.

Hydrogenation of phenols and tar acids. M. A. Matthews and H. E. Newall (B.P. 371,851, 24.11.30).—Phenols or tar acids are reduced to the corresponding hydrocarbons by passing the vapour mixed with H_2, or other reducing gas, over a Mo catalyst, preferably made by impregnating active charcoal with NH_4 paramolybdate, at elevated temp., usually about 450°, and pressures (1—10 atm.). A. B. M.

Production of benzines, benzenes, and other hydrocarbons from coal tars and oils. R. E. Goldsbrough (B.P. 371,042, 21.10.30).—The process is carried out as described in B.P. 320,619 (B., 1929, 1006) except that no oxide catalyst is used and the metal surfaces with which the vapours come in contact in the heating chamber are made of an alloy of Ni and Cr containing small proportions of Si, Zn, Fe, and Al, and also, if desired, Mo and/or Ti. A desulphurising agent, *e.g.*, Fe_2O_3 containing TiO_2, may be blown into the heating chamber. A. B. M.

Apparatus for cracking of hydrocarbons. N. E. Loomis, Assr. to Standard Oil Development Co. (U.S.P. 1,812,658, 30.6.31. Appl., 22.7.25).—Heavy crude oil preheated by the vapours and by the residue discharged from a horizontal still heated by internal flues and/or externally is fed into the still. The vapours pass to a dephlegmator and a condenser and the condensate from the former is pumped through a cracking coil to digesters and thence with reduction of pressure to the still. D. K. M.

(a, c, d) **Cracking of oil.** (b) **Hydrocarbon oil conversion.** G. Egloff, Assr. to Universal Oil Products Co. (U.S.P. 1,821,746 and 1,821,748—50, 1.9.31. Appl., [a] 6.6.20, [b] 7.12.25, [c, d] 21.12.25. Renewed [a] 7.2.30, [c] 2.9.30, [d] 3.7.28).—(a) Two heating coils deliver into an expansion chamber. An oil, *e.g.*, gas oil, is heated in one, *e.g.*, to 400°/150 lb. per sq. in., and another oil, *e.g.*, fuel oil, in the other, *e.g.*, at 357°/100 lb. per sq. in. The reflux from the dephlegmator may be returned in any desired proportion to either of the coils. The condenser and receiver and, if required, the expansion chamber operate under vac. (b) Three heating coils deliver into a common expansion chamber. The reflux flows through the hottest coil, the raw oil through the less hot one, and the residue from the expansion chamber through the coolest coil. (c, d) Four heating coils deliver to a common expansion chamber. Kerosene is heated in one to 538°/1200 lb. per sq. in., reflux condensate to 482°/800 lb. per sq. in. in another, fuel oil to 454°/200 lb. per sq. in. in another, and the residue from the expansion chamber to 426°/250 lb. per sq. in. in the fourth coil. In (d) the expansion chamber, condenser, etc. are operated under vac. D. K. M.

Conversion of hydrocarbons. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,820,057, 25.8.31. Appl., 18.6.31).—A stream of oil is continuously passed through a cracking zone and the vapours are removed under pressure. The heated residue is separately and continuously withdrawn, the pressure released, and heat applied to distil fractions therefrom which are returned to the cracking zone for re-treatment. H. S. G.

Production of gasoline from high-boiling hydrocarbon oils. J. C. Black and M. L. Chappell (U.S.P. 1,820,371, 25.8.31. Appl., 31.10.27).—A petroleum oil stock is heated to 455—460° under a pressure of $\nless$ 500 lb. per sq. in., and an unheated by-passed portion of the main stream of oil is introduced into the cracked oil to lower the temp. of the mixture to 370—400°. H_2 gas is introduced into the mixture while the pressure is maintained at approx. 1000 lb. per sq. in. and the exothermic heat generated is withdrawn by a stream of cooling fluid until all the higher-boiling unsaturated hydrocarbons have been hydrogenated. These are separated from the lower-boiling oils and returned to the system to be cracked. H. S. G.

Treatment of [hydrocarbon] oils. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,820,125, 25.8.31. Appl., 27.6.21. Renewed 17.1.29).—Oil is heated to cracking temp. under pressure and the vapours are passed to a dephlegmating zone to one part of which charging oil is passed in heat-exchange relation. The residual oil is passed to a zone of reduced pressure where flash-distillation takes place. The vapours are condensed and the condensate is passed in heat-exchange relation with vapours in that portion of the dephlegmating zone which is at a higher temp. than that of the portion to which the charging oil is subjected. H. S. G.

Treating hydrocarbon oils with metallic halides. R. W. Hanna, Assr. to Standard Oil Co. of California (U.S.P. 1,820,389—90, 25.8.31. Appl., [a, b] 27.11.26). —(a) Hydrocarbon oil is heated to a temp. sufficient to effect decomp. when contacted with metallic halides, and under sufficient pressure to maintain the mixture substantially in the liquid phase, the ratio of metallic halide to oil being maintained less than sufficient to effect complete conversion. The mixture is passed to a conversion chamber maintained under lower pressure wherein vaporised hydrocarbons are continuously separated from the residue containing almost the whole of the metallic halide in the spent condition. The vapours are dephlegmated, and the higher-boiling oils continuously recirculated to the reaction chamber. (b) The unconverted hydrocarbon oils are treated with a further portion of metallic halide in a second (separate) decomposing zone, under a pressure sufficient to keep the mixture in the liquid phase and at a temp. sufficient to effect decomp. into lower-boiling oils. H. S. G.

Oxidation of hydrocarbons. J. W. Pugh, E. Tauch, and T. E. Warren, Assrs. to Standard Oil Development Co. (U.S.P. 1,812,714, 30.6.31. Appl., 4.8.28).—Air is mixed with a liquid hydrocarbon under pressure; O_2 dissolves and excess N_2 may be withdrawn. The liquid–gas mixture is compressed to 70—230 atm. and passed through a reaction vessel at 200—600°. Liquid oxygenated products are removed by distillation under pressure, and by water-washing. R. N. B. D. B.

Distillation of [hydrocarbon] oil. H. N. Lyons, Assr. to Doherty Research Co. (U.S.P. 1,820,573, 25.8.31. Appl., 17.4.23).—The oil is passed through a series of stills, maintained at progressively higher temp. continuously in such a manner that a series of vapour fractions are separately obtained corresponding to the usual cuts of gasoline, kerosene, and heavier oils. The vapours are introduced into a single distilling column of the bubbling type at different levels corresponding to the relative boiling temp. of the vapour from each of the stills. Condensed vapours are withdrawn at different levels and the uncondensed vapours passed to a final condensing zone. H. S. G.

Oil-refining apparatus [condenser]. C. H. Leach (U.S.P. 1,821,346—7, 1.9.31. Appl., [a] 10.11.26, [b] 31.12.26. Renewed [a] 28.1.31, [b] 26.2.31).—Banks of tubes in the shells of condensers are fitted at the upper ends with floating heads to allow the upper part of the shells to be removed easily. D. K. M.

Production of motor spirit which is stable on storage. Gewerkschaft M. Stinnes (B.P. 371,752, 25.9.31. Ger., 25.9.30).—Motor spirit is washed first with H_2SO_4 ($d^{15\cdot5}$ 1·706, 3%) at room temp. then with 18% aq. NaOH (1%), and distilled from 18% aq. NaOH (1%), or the wash with and distillation from alkali may be combined, but in this case more alkali is required. D. K. M.

Refining of hydrocarbons [motor spirit]. E. W. Isom, Assr. to Sinclair Refining Co. (U.S.P. 1,812,439, 30.6.31. Appl., 29.2.28).—The vapours from vapour-phase cracking of hydrocarbon oils are freed from tarry matter and partly condensed to give vapours which on condensation yields a product containing 50—75% of gasoline, the remainder being higher-boiling hydrocarbons. These vapours are passed through an absorptive catalyst, *e.g.*, fuller's earth, and then partly condensed to remove high-boiling compounds. The resulting vapours on condensation yield motor spirit substantially free from undesirable unsaturated compounds. D. K. M.

Purification of oil. A. E. White. From Buckeye Twist Drill Co. (B.P. 371,484, 29.1.31).—Hydrocarbon oil is purified and electrical insulating oil reconditioned by filtering, heating with hot oil from a degasser and electrically to 32—71°, and spraying at 60—200 lb. per sq. in. pressure through a nozzle into a degassing chamber operating under a vac. of 28—30 in. Hg, in which it flows over baffles. The oil is then cooled to $<30°$, by oil passing to the degasser, and filter-pressed. D. K. M.

Refining [distillation] of oils. C. W. Stratford (U.S.P. 1,812,612, 30.6.31. Appl., 24.11.26).—Oil is fed on to sloping trays on the bottom of which is a coarse wire mesh situated in the vapour space of a horizontal cylindrical, direct-fired still. From the bottom tray the oil flows into the main body in which it is kept in agitation by a centrifugal pump in the still, discharging through nozzles on to the lower surface of the still. D. K. M.

Purification of mineral oils. J. Smith (B.P. 371,394, 13.1.31).—Mineral oils are freed from S and P and their derivatives by passing their vapours and steam up a tower down which cyanised coke (cf. B.P. 371,384; B., 1932, 633) passes. D. K. M.

Separating wax from mineral oils. H. T. Bennett, Assr. to Atlantic Refining Co. (U.S.P. 1,820,645, 25.8.31. Appl., 9.1.30).—The mineral oil is dissolved in a solution of an org. solvent, *e.g.*, petroleum naphtha, and a cryst. org. material, *e.g.*, Ph_2, $C_{10}H_8$, and the resultant solution is chilled sufficiently to ppt. the wax and Ph_2 or $C_{10}H_8$, which are subsequently separated. H. S. G.

Treatment of crude petroleum to prevent corrosion. C. D. Gifford, Assr. to Cannon-Prutzman Treating Processes, Ltd. (U.S.P. 1,812,629, 30.6.31. Appl., 28.5.28.).—Oil, demulsified if necessary, is heated to 38—50° with H_2O (5—6 lb. per barrel) and filtered through a cake of diatomaceous earth. On keeping, brine separates from the filtered oil. D. K. M.

Separation of oxygen-containing materials from their solutions in hydrocarbons. H. E. Buc, Assr. to Standard Oil Development Co. (U.S.P. 1,820,907, 1.9.31. Appl., 26.3.29).—Alcohols and aldehydes are removed from hydrocarbon oils by washing with 80—85% aq. H_3PO_4 to which may be added 5—50% by vol. of an O-containing compound miscible with H_2O and with a low b.p., *e.g.*, EtOH, MeOH, to dissolve more readily alcohols above C_6. The H_3PO_4 is diluted with an equal vol. of H_2O and the alcohols etc. are removed by distillation. The H_3PO_4 is conc. and re-used. D. K. M.

Heavy oil fuel. N. E. Loomis, Assr. to Standard Oil Development Co. (U.S.P. 1,820,983, 1.9.31. Appl., 15.2.26).—Up to 5% by vol. of a compound containing N and O, *e.g.*, $EtNO_2$, $C_6H_4(NO_2)_2$, nitroso*iso*propyl-*p*-toluidine, is added to fuel for engines of the Diesel type. D. K. M.

Treatment of crude petroleum. H. T. Bennett (U.S.P. 1,820,295, 25.8.31. Appl., 22.7.26).—The pour point of crude petroleum is lowered by dissolving therein a small quantity of a metal soap, *e.g.*, 0·1% of Al stearate, sufficient to render the product capable of flowing at low temp. without substantially affecting the viscosity. H. S. G.

Manufacture of lubricating oil. E. M. Clark, Assr. to Standard Oil Development Co. (U.S.P. 1,820,963, 1.9.31. Appl., 22.1.27).—Crude oil passes through a no. of stills in series from which light hydrocarbons are taken off. The oil is then heated to 426° and passed into a tower under pressure of 25 mm. Hg (abs.) into which steam is injected. The vapours are cooled to 254°, and the hot condensate is heated with NaOH and distilled under 15 mm. Hg (abs.). D. K. M.

[Manufacture of] lubricant. A. E. Becker, Assr. to Standard Oil Development Co. (U.S.P. 1,812,766, 30.6.31. Appl., 28.11.23).—Heavy hydrocarbons distilled in vac. from cracking residues are heated with 0·35—5·0% S at 200—260° until the S dissolves. R. N. B. D. B.

Fluid lubricating compounds. Yacco, S.A.F. (B.P. 371,643, 21.5.31. Belg. 18.7.30.)—A metal soap, *e.g.*, Cu oleate (1—2%), is dissolved in one or more vegetable oils, *e.g.*, a 2 : 2 : 1 mixture of olive, arachis, and sesamé oils, heated to a suitable temp., *e.g.*, 80°, and the solution mixed with one or more mineral oils at about 50—60°. When mineral oils of varying fluidity are used the solution is poured into the most fluid oil and then the thicker oils are added. D. K. M.

Dip pipes for gas, coke-oven, and like plant. Gas Light & Coke Co., S. Hay, and A. E. Burton (B.P. 373,333, 25.3.31).

Liquid-heating apparatus [for domestic gas-fires]. R. & A. Main, Ltd., and A. R. Bisset (B.P. 373,178, 18.2.31).

Separating coal dust etc. Tarred macadam. Oil filters. Separation of gaseous mixtures.—See I.

III.—ORGANIC INTERMEDIATES.

Urea phosphate. C. Matignon, Dodé, and (Mlle.) Langlade (Compt. rend., 1932, **194**, 1289—1294).—The only phosphate of urea, $CO(NH_2)_2,H_3PO_4$, the composition of which (P_2O_5 44·9, N 17·7%) makes it suitable as a fertiliser, is prepared by mixing equiv. amounts of its constituents in conc. aq. solution with agitation, when it is deposited as a powder, m.p. 117·5°, d^{10} 1·764, *d* (apparent) of powder about 1·0; at 18° 100 pts. of H_2O dissolve 91·9 pts. Aq. solutions in the cold are stable; a 3% solution on boiling is half hydrolysed in 3·5 hr., a 50% solution in about 6 hr. Heated alone it decomposes at 180° to $NH_4PO_3 + CO_2 + NH_3$, at 500° to $HPO_3 + CO_2 + 2NH_3$ with absorption of 48·5 kg.-cal., which suggests its use as a fire extinguisher. C. A. S.

Assay for alkali salts of organic acids. J. L. Mayer (J. Amer. Pharm. Assoc., 1932, **21**, 353—354).—In the U.S.P. method for the above assay a dish should be substituted for a crucible; this facilitates ashing and eliminates transference before titration. Excess of 0·5*N*-H_2SO_4 should be added and, after heating, the cool solution titrated with 0·5*N*-NaOH. E. H. S.

Ph_2 etc. for high-temp. work.—See I. ***n*-C_7H_{16} and methyl*cyclo*hexane from petroleum.**—See II. **S-D-O [for paint].**—See XIII. **Solubility of org. compounds in rubber.**—See XIV. **[By-products from] wood saccharification.**—See XVII. **Fractionation of fusel oil.**—See XVIII.

See also A., June, 578, **System AcOH–EtOH–EtOAc.** 579, **Oxidation of EtOH. Prep. of EtOAc.** 580, **C_2H_2 from CH_4.** 586, **Indicators.** 597, **Prep. of αβγδ-tetrabromobutane.** 598, **Prep. of abs. $Pr^{\beta}OH$.** 599, **Prep. of aliphatic mercaptans.** 617, **Prep. of substituted anthrones. Synthesis of munjistin, and of members of the hetero-coerdianthrene series.**

Patents.

Manufacture of ethyl ether. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 368,868, 18.12.30).—In the hydration of C_2H_4 to Et_2O below 300° at $>$ 10 atm., finely-divided inorg. or org. acids or anhydrides which are not volatilised are used as catalysts on carriers, or alternatively the catalysts are phosphates of rare earths. Examples are P_2O_5 and H_3PO_4 on active C at 200°/125 atm. (14% conversion), and Ce phosphate. C. H.

Manufacture of 1-phenyl-2-amino-alcohols-1 containing hydroxyl in the phenyl residue [β-amino-α-hydroxyphenyl alcohols]. I. G. Farbenind. A.-G. (B.P. 368,613, 1.6.31. Ger., 31.5.30).—Ethers or esters of hydroxyaryl alkyl ketones are nitrosated, reduced, and hydrolysed (or hydrolysed and reduced). *o*-, *m*-, and *p*-Benzyloxypropiophenones are converted by way of oximino-compounds, m.p. 89°, 85°, and 135°, respectively, into amines (*m*-compound, m.p. 125°) or directly into β-amino-α-*o*-, -*m*-, and -*p*-hydroxyphenyl-*n*-propyl alcohol hydrochlorides, m.p. 217° (decomp.), 180°, and 207°, respectively. 3 : 4-Dibenzyloxypropiophenone, m.p. 60°, similarly yields an oximino-compound, m.p. 117°, and β-amino-α-3 : 4-dihydroxyphenyl-*n*-propyl alcohol hydrochloride, m.p. 178°; *p*-benzyloxybutyrophenone (oximino-compound, m.p. 123—124°) gives β-amino-α-*p*-hydroxyphenyl-*n*-butyl alcohol hydrochloride, m.p. 211° (decomp.); *p*-acetoxypropiophenone, b.p. 160—162°/8 mm., is nitrosated (m.p. 120—121°) and hydrolysed to oximino-*p*-hydroxypropiophenone, m.p. 178°, and finally reduced to the amino-alcohol. C. H.

[Manufacture of] wetting and penetrating agents and utilisation of the same. Newport Chem. Corp. (B.P. 368,351, 8.12.30. U.S., 21.12.29).—The wetting power of agents of the sulphonated polynuclear hydrocarbon type is increased by addition of 0·25—1·0 pt. of a terpene alcohol. Examples are: abietenesulphonic acid with α-terpinol, *p*-menthanol; *iso*propylnaphthalenesulphonic acid with α-terpinol. C. H.

C_2H_2. Oxidation of hydrocarbons. C_6H_6 etc. from coal tars and oils. Hydrogenation of phenols. —See II. **Purifying AcOH.**—See XI.

IV.—DYESTUFFS.

Dyes and dermatitis. H. E. Cox (J. Soc. Dyers and Col., 1932, **48**, 124—127).—Mainly a summary of published information concerning the toxic properties of dyes, their intermediate and decomp. products, and associated metal and other impurities when present in dyed furs and textile materials; methods of testing are suggested. The preliminary extraction with hot HCl of fur and particularly wool suspected to contain p-$C_6H_4(NH_2)_2$ as an irritant base is not suitable since azo dyes under such conditions may yield p-$C_6H_4(NH_2)_2$ by decomp.; it is preferred to effect extraction with 0·1% AcOH containing NaCl. Callan and Henderson's method (J.S.C.I., 1919, **38**, 408 T) is suitable for determining small quantities of p-$C_6H_4(NH_2)_2$ extracted from furs, the sensitivity (using 0·01*N*-As_2O_3) being 0·00005 g. of the diamine; it is not suitable for the examination of dyed sheep-skin because of the absorption of HOCl by substances other than the diamine, but the indamine reaction may be used colorimetrically. A. J. H.

True weight of benzopurpurin-4B, and the electrical conductivity of the aqueous solutions. S. M. Neale and J. Hanson (Nature, 1932, **129**, 761).—The H_2O content of benzopurpurin-4B appears to vary continuously with the R.H. of the surrounding atm. Drying at 110° in an air oven leaves 1—2% of H_2O in the material. Recent data (cf. A., 1931, 908) will be in error by approx. 1·9%. L. S. T.

Recognition and determination of the flavines. P. J. Udall (Analyst, 1932, **57**, 295—299).—Conc. H_2SO_4 (or dil.), NaOH, HCl, HNO_3, and dil. HCl + KNO_3 give characteristic colour reactions with acri-, eu-, and proflavines and enable them to be distinguished from phenylacridine and from the commoner yellow dyes. Proflavine can also be differentiated from eu- and acriflavines, but the last two are distinguishable from one another only by means of determinations of the C and H, N, NH_2 group, or Cl contents of the pure substance. Antiseptic gauzes are first extracted with EtOH or H_2O, but the quant. methods are complicated by the presence of impurities from the fabric, the N and NH_2 determinations being most reliable. Euflavine reacts with Br or I, a brilliant red compound (the reactions of which are described) being formed in the former case by replacement of 6 H atoms, and a brown-black substance of uncertain composition in the latter. J. G.

See also A., June, 567, **Diffusion const.** 609, **[Colouring matters from] hydrazones. Azo sulphites.** 617, **Hetero-coerdianthrene series.** 621, **Dye of toad-flax petals, and of yellow dahlias.** 623, **Derivatives of homophthalimide.**

Patents.

Manufacture of vat dyes [of the dibenzanthrone series]. Newport Chem. Corp. (B.P. 368,315, 31.10.30. U.S., 21.11.29).—2 : 2′-Dihydroxydibenzanthrone is etherified with compounds of the type $Y{\cdot}CH_2{\cdot}CH_2{\cdot}O$ (or NH)$\cdot CH_2{\cdot}CH_2{\cdot}Z$, where Y is a reactive negative group (Cl, SO_4H, OSO_2Ar) and Z is either a reactive negative group or alkoxyl; products retaining the group Z may be hydrolysed to replace it by OH, which may subsequently be alkylated. The products are green vat dyes. Dihydroxydibenzanthrone is thus etherified with: diglycol di-*p*-toluenesulphonate (1 mol.) for a cyclic ether; β-(β′-methoxyethoxy)ethyl *p*-toluenesulphonate; corresponding β′-ethoxy- and β′-*n*-butoxy-compounds; di-(β-hydroxyethyl)amine di-*O*-*p*-toluenesulphonate; ββ′-dichloro- and -dibromo-diethyl ethers; diglycol di-*p*-toluenesulphonate (2 mols.) for the di-(β′-hydroxyethoxyethyl) ether, subsequently methylated. C. H.

Manufacture of thioindigoid vat dyes. I. G. Farbenind. A.-G. (B.P. 368,505, 23.2.31. Ger., 22.2.30. Addn. to B.P. 364,052; B., 1932, 463).—Thioindigoid vat dyes are prepared in presence of $<$ 1 mol. of a salt, oxide, or hydroxide of a metal other than an alkali or alkaline-earth metal, whereby readily reducible products giving improved fixation in printing are obtained. $FeSO_4$, $NiSO_4$, $CuSO_4$, $Cr_2(SO_4)_3$, or $Al_2(SO_4)_3$ is, *e.g.*, added in the oxidation of 6-ethoxythioindoxyl with NaOH and S, or to the aq. alkaline solution from alkaline fusion of 5-chloro-2-carboxy-3-methylphenylthioglycollamide, or in the alkaline condensation of 6-ethoxythioindoxylic acid with acenapththaquinone. C. H.

Manufacture of vat dye preparations. Newport Chem. Corp. (B.P. 368,294, 21.11.30. U.S., 26.2.30).—Readily dispersible preps. are made by incorporating sulphonated abietene or abietin with a vat dye. [Stat. ref.] C. H.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Action of sodium carbonate on cellulose. E. Paternò (Atti R. Accad. Lincei, 1932, [vi], 15, 11—16).—When immersed in H_2O for 3 hr., spruce, esparto, straw, and hemp celluloses lose 0·5% of their wt. at room temp. or double this at 50°. At 10—12° cellulose absorbs the same proportion of H_2O as of aq. Na_2CO_3 (10·36%) and this proportion, varying from 98 to 152% with different sulphite wood celluloses and with straw, esparto, and hemp celluloses prepared by the Cl_2 process, is characteristic of the particular cellulose. The absorption seems to be a simple imbibition due to the porosity of the cellulose. The presence of appreciable proportions of γ-cellulose and pentosans renders a cellulose unsuitable for the prep. of viscose, and pretreatment with Na_2CO_3 may be helpful in such cases. β-Cellulose is not harmful and may even be useful by hastening the maturation of the alkali-cellulose and of the xanthate itself. T. H. P.

Water-sensitivity of cellulose ethers. E. Dörr (Cellulosechem., 1932, **13**, 85—86).—H_2O-sensitivity decreases from complete solubility to very slight absorption of H_2O with increasing mol. wt. of the alcohol radical, and with increasing saturation of the cellulose OH groups. The sensitivity of the insol. ethers is conveniently measured by the increase in length of a strip when immersed in H_2O. A. G.

Action of oxygen on sodio-cellulose. E. Paternò (Atti R. Accad. Lincei, 1932, [vi], 15, 107—113).—The action of O_2 on sodio-cellulose at 100° or 60° gives β-(oxy)cellulose, and the carbonate present increases considerably, the CO_2 being derived together with pentosans from the cellulose: $C_6H_{10}O_5 + O_2 = C_5H_8O_4 + CO_2 + H_2O$. T. H. P.

Maturation of sodio-cellulose. E. Paternò (Atti R. Accad. Lincei, 1932, [vi], 15, 113—114).—The process is one of oxidation, the β-(oxy)cellulose passing through the xanthate to the artificial silk, in which it forms a normal constituent. T. H. P.

So-called regenerated cellulose. E. Paternò (Atti R. Accad. Lincei, 1932, [vi], 15, 114—115).—Cellulose may be described as regenerated only when the substances absorbed by it have been eliminated by washing with H_2O. If the cellulose has been converted into a derivative such as xanthate or viscose, or has been dissolved or colloidally dispersed in $ZnCl_2$ or in H_2SO_4, H_3PO_4, or HCl, it loses its original properties. Cryoscopic determinations of mol. wts. of colloidal derivatives of cellulose are valueless. T. H. P.

Analysis of pulp for rayon. Z. Kawata (J. Soc. Chem. Ind., Japan, 1932, 35, 174 B).—Cotton pulp is not suitable for the prep. of viscose as it contains Fe. About two thirds of the hemicellulose in pulp is pressed out in the production of alkali-cellulose. The oxidation method for determining hemicellulose gives erroneous results in the presence of resin. The latter is extracted with Et_2O and EtOH, but with EtOH colouring matters are also extracted. The turbidity of viscose is due to resin from the pulp. Pulps which show a heterogeneous absorption of aq. alkali are not suitable for making alkali-cellulose. D. K. M.

Determining the iodine value of pulps. K. G. Jonas and E. Borchers (Papier-Fabr., 1932, 30, 301—303).—The I val. determination cannot be used as a substitute for the Cu no. determination since it gives results, like those of the numerous Cl_2 methods, which are merely a measure of the lignin content or degree of cooking of the pulp. A simplified procedure, which is more suitable and quicker than that in which bleaching powder solutions are employed, may, however, be used for works control purposes in determining the degree of cooking of unbleached stuffs. The high price of I limits the general use of the I method. B. P. R.

Phloroglucinol method for determination of mechanical wood pulp in paper. H. B. Dunnicliff and H. D. Suri (Analyst, 1932, 57, 354—361).—Cross and Bevan's method (B., 1907, 942) has been modified to suit conditions in which a higher temp., 35°, has to be employed for the reaction. Anhyd. phloroglucinol in 12% HCl is used. The process of "absorption" of phloroglucinol appears to include both adsorption and subsequent chemical reaction, which is more rapid than the adsorption at first. A determination of the amount chemically combined after definite periods of time indicates that the chemical reaction is probably unimol. M. S. B.

Purity requirements in raw materials for the rayon industry. K. Roos (The Melliand, 1932, 4, 196—199).

Sugar from wood.—See XVII. **Oiled wraps for apples.**—See XIX.

See also A., June, 567, **Diffusion const.** 568, **Dissolution of cellulose nitrate.** 601, **Artificial fibres.** 604, **Exhausted cellulose.** 616, **Lignin of *Coniferæ*.**

Patents.

Manufacture of laminated [fibrous] materials. Brit. Thomson-Houston Co., Ltd., Assees of H. D. Segar (B.P. 370,323, 8.9.31. U.S., 8.9.30).—The impregnating and bonding agent consists of a composition containing equal pts. by wt. of shellac and an "alkyd" resin condensation product obtained, *e.g.*, by heating together phthalic anhydride, glycerin, linseed oil fatty acids, rosin, and castor oil. The resulting laminated product is suitable for use in oil-filled electrical apparatus. D. J. N.

Digestion of fibrous material. P. W. Neil, Assr. to T. L. Dunbar (U.S.P. 1,815,576, 21.7.31. Appl., 14.4.30).—Liquor is continuously pumped from the storage tank to the high-pressure accumulator (*A*) through two injector nozzles (*B*, *C*) in series. *B* draws off gases which collect at the top of *A*, while *C* carries away gas and steam from the high-pressure relief line and thereby ensures that the digesters relieve against a substantially const. pressure throughout the cook. The heated and conc. acid from these operations is subsequently fed into *A* at the bottom. D. J. N.

Production of artificial textile materials. Brit. Celanese, Ltd., W. I. Taylor, and J. W. Grebby (B.P. 370,017, 1.1.31).—Threads of irregular denier are produced by softening the thread at intervals along its length and then stretching it. Alternatively, the whole thread may be softened and the irregularities in denier produced by the methods described in B.P. 321,762 (B., 1930, 98). D. J. N.

Production of cellulose fibre for preparation of esters. G. A. Richter, Assr. to Brown Co. (U.S.P. 1,821,321, 1.9.31. Appl., 28.8.26).—Cellulose is impregnated with aq. NaOH of mercerising concn., allowed to age for 2—3 days, washed, and digested at 99° for about 4 hr. with a solution containing, *e.g.*, 4% CaO on the wt. of dry fibre. Ageing may be accelerated by heat, or by the addition of oxidising agents, *e.g.*, "bleach." The resulting depolymerised pulp has a high α-cellulose content, a low Cu no., a low solution viscosity and solubility in 3% aq. NaOH, and is suitable for direct xanthation or conversion into low-viscosity nitrocellulose. D. J. N.

Treatment of filaments, yarns, ribbons, etc. made of or containing cellulose esters or ethers. Brit. Celanese, Ltd., H. Dreyfus, and W. I. Taylor (B.P. 370,430, 20.12.30).—The filaments are softened, *e.g.*, by treatment with 40% aq. $COMe_2$ for 10—60 min., and are then stretched in at least 2, preferably 3—5, stages with a rest period of about 5 sec. between the first and second stages and preferably also between the second and third stages, during which period the tension is released. The stretch at each stage may conveniently be 15—20%. The tensile strength of the stretched silk is $\geqq$ that of natural silk. D. J. N.

Recovery of cellulose acetate from acetic acid solutions thereof. H. T. Clarke, Assr. to Eastman Kodak Co. (U.S.P. 1,823,348, 15.9.31. Appl., 6.1.28).—The cellulose acetate reaction mixture is added with vigorous agitation to aq. AcOH containing initially $\nless$ 20 wt.-% of AcOH, *e.g.*, 33—40%, and at the end of the pptn. $\ngtr$ 50 wt.-% of AcOH. A regulated quantity of H_2O may be added during pptn. to maintain the concn. of the pptg. bath approx. const. The cellulose acetate is obtained in a soft, easily-washed form, and the pptg. bath is of a convenient concn. for the recovery of glacial AcOH. D. J. N.

Treatment of fibrous materials for pulping purposes. J. H. Wallin (U.S.P. 1,820,994, 1.9.31. Appl., 22.6.29. Swed., 31.1.29).—Circulation of the liquor is maintained by the use of injectors. In sulphite-cooking two injectors are used: *A* (operated by low-pressure steam) for circulating the liquor, *B* (high-pressure) for introducing steam and gas, *e.g.*, from other digesters in the battery via an accumulator. Preferably *A* and *B* are combined, the outlet pipe of *B* opening into the steam-pipe of *A*. In this way the composition and temp. of the cooking liquor are maintained uniform throughout the cook. D. J. N.

Manufacture [pulping] of cellulose or cellulosic compounds. H. Dreyfus (B.P. 371,000—1 and 371,037—8, [A, C] 8.11.30, [B, D] 11.11.30).—(A) Alkaline- or (B) acid-digestion processes are conducted at moderate temp., *e.g.*, 100—150° under high pressure, *e.g.*, 20—100 atm., obtained by introducing into the digester 10—35% (on the wt. of wood) of a volatile org. liquid, *e.g.*, Et_2O or light petroleum. N_2 or other inert gas may be pumped into the digester to increase the pressure. (C) Volatile aliphatic alcohols, *e.g.*, MeOH, EtOH, are particularly suitable as pressure-producing agents for both alkaline and (D) acid digestions. By thus operating at relatively low temp., attack on the cellulose is avoided and higher yields are obtained. D. J. N.

Cooking liquor for production of sulphite pulp. G. A. Richter, Assr. to Brown Co. (U.S.P. 1,821,322, 1.9.31. Appl., 1.11.26).—The corrosive effect of $NaHSO_3$ on the digester lining is minimised without affecting the quality of the pulp if a mixed liquor is used containing at least 1% of SO_2 combined as $NaHSO_3$ and an alkaline-earth bisulphite to the limit of its solubility. *E.g.*, the liquor may contain 1% of SO_2 combined as $Ca(HSO_3)_2$, 1% as $NaHSO_3$, and 5% of free SO_2. When recovery of Na compounds is desired it is preferable to use Ba or Sr bisulphites, of which only comparatively small quantities are required owing to the lower solubilities of their sulphites and sulphates. D. J. N.

Production of textile yarns or threads. Brit. Celanese, Ltd., and W. I. Taylor (B.P. 370,040, 1.1.31).

Starting the spinning of threads with centrifugal spinning machines. Siemens-Schuckertwerke A.-G. (B.P. 373,363, 22.4.31. Ger., 7.5.30).

Steam-intake sleeve for sulphite-pulp digesters. E. Morterud (B.P. 373,906, 14.10.31. Norw., 19.11.30).

Apparatus for producing articles from pulp. L. Mellersh-Jackson. From Holed-Tite Packing Corp. (B.P. 373,683, 9.3.31).

Means for impregnating and coating sheet material [paper and textile fabrics]. C. J. Beaver, and W. T. Glover & Co., Ltd. (B.P. 373,697, 18.3.31).

[Gumming of non-curling] adhesive paper and the like. H. V. Major (B.P. 373,343, 7.4.31).

Centrifugal machines [for pulp].—See I. **Black liquor.**—See VII. **Rubber-cellulose derivative mixture.**—See XIV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Dyeing property of viscose silk. Z. Kawata (J. Cellulose Inst., Tokyo, 1932, **8**, 94—98).—Alkali has a beneficial, and acid a detrimental, effect on the dyeing properties of viscose rayon. Prolonged ageing of the soda-cellulose, high concn. of alkali in the viscose, long ripening, treatment of the rayon threads with alkali, complete elimination of acid during the washing of the spun cakes or bobbins, and use of less acid in the coagulating bath all make for better dyeing. The composition of the coagulating bath is of importance; Na salts give the best results, but when those of other metals are used the dyeing is poor. Centrifugal spinning is to be preferred to bobbin spinning, whilst by stretch and high-speed spinning and with fine threads the dyeing is adversely affected. Yarns from different mills give different dyeing results. B. P. R.

Sulphite faults and sulphur dioxide effects [in dyed textiles] in theory and practice. F. L. Goodall (J. Soc. Dyers and Col., 1932, **48**, 118—124).—Known facts relating to colour changes which may occur in textiles (especially wool) dyed with β-naphthol azo colours due to exposure to SO_2 (cf. King, B., 1928, 639, 707; Goodall, B., 1928, 639), whereby azo sulphites are formed, are summarised. Mention is also made of a new fault in which colour change in α-naphthol azo dyes occurs; this is due to complete reduction by SO_2 of the dye present with formation of unstable *N*-sulphonic acids as produced in the $Na_2S_2O_4$ reduction of azo dyes. Examination of 20 dyes indicates that hydroxyazo dyes have a max. reactivity towards SO_2 at p_H 7·6—7·8, NH_2-azo dyes at $p_H < 7·0$, and azo dyes containing both NH_2 and OH groups (the NH_2 and OH being equidistant from the azo linking) at p_H 7·0. Colour changes due to azo sulphite formation may be corrected by treating the fabric with dil. aq. NH_3, but in the case of complete reduction of the dye, stripping followed by redyeing was necessary. Faults due to azo sulphite formation are, in general, brought about much more rapidly than faults due to reduction. A. J. H.

Use of monel metal equipment for dyeing with developed colours, stripping, and bleaching. F. L. Laque (Amer. Dyestuff Rep., 1932, **21**, 283—288).—Monel metal vessels suffer corrosion during the diazotisation of textile materials, although the usual concn. of HCl or H_2SO_4 is insufficient to cause corrosion by itself; the rate of corrosion is directly proportional to the concn. of HNO_2, and varies with the temp. Corrosion is retarded by the presence of the textile material, and when all other factors are const. the rate of corrosion is decreased 20% when the proportion of dye used is increased from 5 to 15% (calc. on wt. of textile material). Monel metal satisfactorily withstands stripping processes in which hyposulphite compounds are used, if the liquor is maintained sufficiently alkaline ; solutions of $Na_2S_2O_4$ and basic Zn sulphoxylate should have a min. p_H of 10·8 and 3·2, respectively, otherwise brown tarnishing of the metal will occur, which may be removed by hot dil. (0·25—1·0%) KCN or boiling dil. H_2SO_4 and H_2O_2. Na formaldehydesulphoxylate (Rongalite etc.) solutions should have an addition of Na_2CO_3 or NH_3. Stripping solutions containing Ti salts do not corrode monel metal. Monel metal withstands ordinary Cl_2 bleaching processes, but should not be used in contact with solutions containing $>$ 3 g. of available Cl per litre ; the metal is not suitable for continuous contact with Cl_2 liquors, but their attack is inhibited by the presence of Na silicate (0·5 g./litre). Monel metal withstands alkaline H_2O_2 bleach liquors excellently, but is attacked by acidic liquors. The shade of a small no. of chrome mordant dyes is affected by monel metal ; this action may be much retarded by the presence of 0·5% of NH_4CNS. Monel metal is not corroded by S dyes. A. J. H.

New hyposulphite discharges [with basic dyes]. M. Richard (Sealed Note No. 2212, 19.11.12. Bull. Soc. Ind. Mulhouse, 1932, **98**, 185—193). Report by A. Musculus (*Ibid.*, 193—194).—Detailed printing recipes are given for obtaining coloured discharges by first mordanting fabric with tannic acid + Sb, then dyeing with a basic dye not resistant to hyposulphite, printing a discharge pattern with a paste containing Hyraldite C, K_2SO_3, and a basic dye resistant to hyposulphite, followed by prolonged steaming, washing, and drying ; Rongalite CL is used instead of Hyraldite C in white discharges. Musculus reports favourably. A. J. H.

[Printing of] alizarin-red and -pink on non-oiled fabric. J. Langer (Sealed Note No. 2199, 8.8.12. Bull. Soc. Ind. Mulhouse, 1932, **98**, 177). Report by H. Sunder and V. Mullet (*Ibid.*, 177—184).—Full details are given of printing recipes in which oleic acid forms an essential ingredient of the printing paste for alizarin-red, whilst Rhodamine 6G is used for brightening the alizarin-pink. Sunder and Mullet report that the resulting alizarin-red shade has satisfactory fastness, and that the method is more reliable than that of Wilhelm (B., 1908, 623) ; the alizarin-pink shade lacks fastness to light, but is of excellent brightness. A. J. H.

Printing of diazo [compounds] on naphthol-prepared fabric. P. Dosne (Sealed Note No. 2066, 4.2.11. Bull. Soc. Ind. Mulhouse, 1932, **98**, 173—175). Report by A. Musculus (*Ibid.*, 175—176).—In printing with azo colours the naphthol-prepared fabric is not dried, but is printed immediately after application of the naphthol with a diazo paste by means of a roller engraved in relief (as used for printing paper). Musculus reports favourably on the process. A. J. H.

Chemical affinities of wool. J. Rouffin (Rev. Gén. Mat. Col., 1932, **36**, 140—143, 184—186).—Curves are given showing the absorption of H_2SO_4 and Na_2CO_3 from boiling aq. solutions of these substances under defined conditions and such that they indicate the behaviour of wool during technical dyeing (with acid dyes) and scouring processes. In dyeing with dyes which require a strongly acid dye liquor the absorptions of dye and H_2SO_4 proceed similarly, and it is concluded that the dye follows the acid into the wool ; if the acid is absorbed unevenly (*e.g.*, when the acidity of the dye liquor is deficient) then dyeing is also uneven. Wool immersed in a boiling acid bath absorbs H_2SO_4 rapidly at first, but subsequently the rate of absorption decreases ; the acid absorbed in the early stage of absorption is retained by the wool (during washing) more strongly than that absorbed during the later stage. The absorption of Na_2CO_3 by wool is similar to, but much less strongly marked than, that of H_2SO_4. A soap scouring liquor loses its detergent action owing to absorption of alkali by the wool, but the detergent power can be restored by addition of Na_2CO_3. A. J. H.

Scouring [degumming] action of soap on [raw] silk. R. Tsunokaye (J. Soc. Chem. Ind., Japan, 1932, **35**, 147—153 B).—The degumming action of soaps of various fatty acids (measured by the loss of wt. on scouring) appears to increase in proportion to the degree of hydrolysis of the soap, a neutralised soap being markedly inferior. PhMe-extracted soap solution has a slightly less, or greater, scouring action according to the time of treatment of the silk, showing that the " acid soap " constituent plays some part in the degumming action, which is apparently related to the wetting power and absorbability of the " acid soap." The (ash from) sericin removed by soap-scouring contains more alkali than that obtained by treatment with H_2O alone under pressure, indicating a combination of sericin and fibroin with alkali. E. L.

Dyes and dermatitis.—See IV. **Products used in textile industry.**—See XII.

Patents.

Treatment [printing] of textile materials with vat dyes. Newport Chem. Corp. (B.P. 368,921, 26.1.31. U.S., 6.2.30. Addn. to B.P. 368,910 ; B., 1932, 503).—The tinctorial properties of oxidised dibenzanthrone and *iso*dibenzanthrone vat dyes (B.P. 181,304 and 193,431 ; B., 1922, 582 ; 1923, 395) are better utilised, and shades of greater brilliance free from blotchiness are obtained, by addition of ββ′-dihydroxydiethyl ether to the printing paste. A. J. H.

Colouring and decorating paper and other fabrics [by spraying]. J. D. MacLaurin (B.P. 373,215, 14.2.31. U.S., 15.2.30).

Machines for washing textile hanks. E. Simpson & Co., Ltd., and W. Baird (B.P. 373,375, 30.4.31).

Wetting etc. agents.—See III. **Cleansing compositions.**—See XXIII.

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

Determination of sulphur dioxide in sulphuric acid plants. A. Grounds (Ind. Chem., 1932, **8**, 189—190).—A convenient apparatus for conducting the Reich test consists essentially of a graduated vertical cylinder fitted with cocks which is used to aspirate the gas under test through a known vol. of 0·1*N*-I containing NaOAc and starch solution. The vol. of H_2O

run out of the cylinder is measured at the point of disappearance of the blue colour. C. A. K.

Comparison of the reaction velocity towards oxygen of different absorption agents used in technical gas analysis. Anon. (Chem.-Ztg., 1932, **56**, 452).—Data are given showing that a mixture of equal amounts of saturated aq. pyrogallol and 1 : 3 aq. KOH is a more rapid absorbent for O_2 than 20% $Na_2S_2O_4$ containing 20 c.c. of 5 : 7 NaOH or 130 c.c. of 1 : 3 KOH/250 c.c., or than $Cr(OAc)_2$ in 10% H_2SO_4. J. G.

Determination of active chlorine. J. C. Harral and F. W. M. Jaffé (Analyst, 1932, **57**, 308—309).—Nitrites and Cl_2 in H_2O may be distinguished by the starch–I test, which does not react to nitrites at $p_H > 4$, whilst Cl_2 reacts at p_H 9. The yellow colour produced by nitrites and *o*-tolidine or benzidine is due to partial hydrolysis of the diazonium salt, which increases with the p_H val., and the coupling of the resulting hydroxy-compound with the undissociated salt. If nitrites are present Cl_2 must be absent, and if they are absent *o*-tolidine may be used to determine Cl_2, $>0\cdot2$ p.p.m. of which also gives a pink colour with *m*-$C_6H_4(NH_2)_2$,HCl. J. G.

CO_2 explosions in mines.—See II. **Na_2CO_3 for glass.**—See VIII.

See also A., June, 571, **Pptn. of Ag_2CrO_4.** 578, **Prep. of H_2 from water-gas, and of H_2S from hydrocarbon mixtures. H_2SO_4 catalysis.** 579, **Prep. of catalysts (various).** 580, **Prep. of $K_4Fe(CN)_6$.** 581, **Synthesis of N_2H_4.** 583, **$Mg_3(PO_4)_2$. Perowskite and titanite.** 585, **Ferric and chromic hydroxide gels. Rinman's green.** 586, **Indicators [for acids].** 587. **Analysis of H_2SO_4, HCl, and HNO_3. Determination of H_2SO_4 in presence of $Cr^{\cdots}$. Titration of H_3BO_3. Use of fused NaOH in analysis.** 588, **Analysis of limestone.** 589, **Determination of PbO_2, and of Pb in minerals.** 602, **Prep. of Ca gluconate.** 663, **I in fruits of *Feijoa selloviana*.**

Patents.

Production of anhydrous magnesium chloride or saline mixtures containing same. I. G. Farbenind. A.-G. (B.P. 369,879, 4.11.31. Ger., 2.12.30).—Waste gases containing HCl from the chlorination of briquettes consisting of Mg and C are, after the removal of impurities, passed countercurrent to milk-of-magnesia to yield the $MgCl_2$ liquor required as binding medium. F. Y.

Treatment of black liquor [from the soda-pulp process]. L. Bradley and E. P. McKeefe, Assrs. to Bradley-McKeefe Corp. (U.S.P. 1,821,138, 1.9.31. Appl., 19.5.21. Renewed 25.10.30).—The liquor is treated with sufficient freshly pptd. $Al(OH)_3$ or basic Al carbonate to react with free NaOH to give Na_3AlO_3. The liquor is then filtered and treated with CO_2 to ppt. an intimate mixture of $Al(OH)_3$ and org. matter, which, after separation, is carbonised to give a mixture of Al_2O_3 and C in a form particularly suitable for use in the electrolytic production of Al. The clarified liquor is then conc., treated with the requisite quantity of NaOH or Na_2CO_3, and the whole causticised and returned to the cooking process. The NaOAc which accumulates in the liquor is periodically crystallised out. D. J. N.

Separation of gaseous mixtures.—See I. **Liquor for sulphite pulp.**—See V. **Lithopone, Ti and Cr pigments.**—See XIII. **Fertilisers.**—See XVI.

VIII.—GLASS; CERAMICS.

Effect of the anion [united to calcium] of the raw material on the properties of glass. K. Nakanishi (J. Soc. Chem. Ind., Japan, 1932, **35**, 172—174 B).—Na_2O–CaO glass and Na_2O–CaO–PbO glass samples of identical composition have higher coeffs. of expansion and greater hardness when prepared from CaO than when prepared from $CaCO_3$. The former have also the lower sp. gr.; the difference is probably due to a difference in gas inclusions. C. I.

Determination of specific gravity for the evaluation of sodium carbonate to be used for glass melts. O. Lecher (Chem.-Ztg., 1932, **56**, 325—326).—The suitability of crude Na_2CO_3 for glass melts is better judged by its sp. gr. than by its chemical analysis. For good soda-glass the sp. gr. of the soda should be $\nless 1\cdot3$. E. S. H.

Production and control of copper-reds in an oxidising kiln atmosphere. A. E. Baggs and E. Littlefield (J. Amer. Ceram. Soc., 1932, **15**, 265—269).—By introducing SiC (as a reducing agent) into the glaze or underglaze slip satisfactory reds are produced in an oxidising atm. The amount of SiC (0·5—2·5%) must be such that its reducing power is spent just before or at the maturing temp. J. A. S.

Copper-blue [glaze] at cone 9. E. Littlefield (J. Amer. Ceram. Soc., 1932, **15**, 269—270).—High-temp. Cu-blues can be made by using a glaze containing $<0\cdot35$ equiv. CaO, $<0\cdot4$ equiv. Al_2O_3, and a large amount of SiO_2. J. A. S.

Egyptian-blue glaze. C. F. Binns, M. Klem, and H. Mott (J. Amer. Ceram. Soc., 1932, **15**, 271—272).—A satisfactory self-glazing paste consisted of soda ash 35·7, Na_2CO_3 35·7, $CuCO_3$ 7·1, Georgia clay 3·6, dextrin 17·9%. J. A. S.

Chemistry of Rhineland trass. H. Hart (Tonind.-Ztg., 1931, **55**, 65—66; Chem. Zentr., 1931, ii, 3651).—Rheinland trass is a mixture of minerals. The combined H_2O is not uniformly distributed in the 5 separated fractions, but decreases with an increase in *d*. The alkali content decreases to zero in a similar way. The alkali-free constituent is sparingly sol. in H_2O and has a schistose structure. The sol. portion is sol. up to 35% and consists of a hydrated alkali Al silicate. The hydraulic properties are the most pronounced in this portion. L. S. T.

Materials for heat technology. Clay etc. for chemical plant.—See I.

See also A., June, 557, **Radiation colours in glass.** 574, **Systems CaO–Na_2O–Al_2O_3 and SiO_2–ZnO–Al_2O_3.** 593, **Crucibles of MgO.**

Patents.

Drying of china clay. W. Boulton, Ltd., and T. H. Gaskell (B.P. 371,346, 17.1.31).—Filter-press cakes are dried on fixed racks or on a moving conveyor in close association with the heating medium. B. M. V.

[Production of refractory] bricks and building blocks. A. SPRENGER (B.P. 371,905, 26.11.30).—A molten siliceous mass containing $\nless$ 80 wt.-% of a material (oxides of Al, Cr, Fe, and Mg) conforming to the spinel formula RO,R'_2O_3 and $\ngtr$ 15 wt.-% of SiO_2 is cast in a mould of stated dimensions. The oxides are so proportioned as to secure unimol. balancing (*a*) of the Fe_2O_3 by Al_2O_3 or by Al_2O_3 and Cr_2O_3, and (*b*) of the MgO by Cr_2O_3 or by Cr_2O_3 and Al_2O_3, the Cr_2O_3 and MgO being present in mol. proportions or in excess thereof. J. A. S.

Machines for producing glassware. O. EVANS. From EUROPÄISCHER VERBAND DER FLASCHEN-FABR. G.M.B.H. (B.P. 373,874, 28.8.31).

Manufacture of non-splintering and other compound glass. F. B. DEHN. From RÖHM & HAAS A.-G. (B.P. 373,277, 23.2.31).

Production of fibres or threads from glass, slag, and the like meltable materials. N. V. MAATS. TOT BEHEER EN EXPLOIT. VAN OCTROOIEN (B.P. 373,932, 16.11.31. Ger., 29.11.30).

Drawing of tubing particularly applicable to silica glass. QUARTZ & SILICE (B.P. 372,848, 23.2.31. Fr., 28.3.30).

[Form of] refractory brick [and] chequer-work for furnace regenerators. W. GILBERTSON & CO., LTD., and E. THOMAS (B.P. 372,632, 29.7.31).

Filter-presses.—See I.

IX.—BUILDING MATERIALS.

Action of sulphates on Portland cement. IV. Action of sulphate solutions on mortars prepared from some binary and ternary compounds of lime, silica, alumina, and iron. T. THORVALDSON, D. WOLOCHOW, and V. A. VIGFUSSON (Canad. J. Res., 1932, **6**, 485—517; cf. B., 1930, 146).—The action of solutions of $MgSO_4$, Na_2SO_4, and $CaSO_4$ on 1 : 10 mortars composed of standard sand and the following substances or their mixtures has been studied: Ca_3 silicate, β- and γ-Ca_2 silicates, Ca_3 aluminate, $5CaO,3Al_2O_3$, Ca aluminate, $3CaO,5Al_2O_3$, Ca_2 ferrite, and $4CaO,Al_2O_3,Fe_2O_3$. Some of the observations were extended to 1 : 7·5 and 1 : 5 mortars. All the silicate mortars expand and disintegrate ultimately when exposed to aq. $MgSO_4$; the action of 0·15*M*-Na_2SO_4 and saturated $CaSO_4$ after 3 years differs little from that of H_2O. The solutions cause a rapid increase in tensile strength of the mortars at first, which later falls off; the tensile strength of 1 : 5 sand mortars stored in 0·15*M*-Na_2SO_4 for 4 years was > that of mortars stored in H_2O. The aluminate mortars expand and disintegrate rapidly in the sulphate solutions, the rate of expansion decreasing as the ratio of Al_2O_3 increases. Na_2SO_4 attacks the surface of the specimens, gradually penetrating inwards, but $MgSO_4$ causes the whole specimen to expand rapidly and crack to pieces. The mixed mortars, which expanded more rapidly than Portland cement mortars, showed rapid loss of tensile strength, whilst those expanding more slowly retained their strength. The application of these results to the prep. of hydraulic cements is considered. All Portland cements rich in CaO and containing normal amounts of Al_2O_3 have a low resistance to natural waters containing the sulphates studied; the resistance can be increased by decreasing the amount of Al_2O_3 or by increasing the amount of Fe_2O_3. When this treatment is applied to Portland cements low in CaO the resistance can be increased until it exceeds that of the corresponding pure silicates. Cements rich in Al_2O_3 should be of a composition which gives no aluminate richer in CaO than Ca aluminate, and SiO_2 should be present as β-Ca_2 silicate; a large quantity of $3CaO,5Al_2O_3$ is undesirable. E. S. H.

Defects in concrete made from clinker bound with cement. H. W. GONELL (Angew. Chem., 1932, **45**, 317—319).—Defects in clinker cement used as a building material are usually attributed to S compounds, sol. salts, or $Fe^{\cdot\cdot}$ and $Mn^{\cdot\cdot}$. These are avoided by weathering and washing the clinker. Another type of defect appears as cracks the formation of which is due to expansion, and is associated with the appearance of depressions behind the plaster. An analysis of material from these spots showed that they consisted of inclusions of MgO + CaO with a considerable Fe content and that the failure was due to the gradual effect of atm. H_2O. The origin of these must be dolomitic nodules in the coal. These are present only in certain coals of marine origin. If clinker from such coal is to be used for building material it should be weathered for a year. C. I.

Structural materials for heat technology. Timber for chemical plant.—See I. **Sugar from wood.**—See XVII.

See also A., June, 574 and 583, **Synthesis of Ca silicates.**

PATENTS.

Production of improved lime suitable for constructional purposes. A. POZZI (B.P. 372,044, 24.3.32. Ital., 15.5.30).—CaO is slaked with dil. acid (*e.g.*, 6—10% HCl or H_2SO_4) in a closed vessel; other compounds, *e.g.*, acids or salts containing S or Cl, permanganates, or (when the CaO contains insufficient SiO_2) Al hydrosilicate, may also be added. L. A. C.

Production of plaster of Paris, modelling plaster, or other kinds of plaster. E. C. LOESCHE and E.W. STOLL (B.P. 372,223, 7.10.31. Ger., 28.11.30).—Crude gypsum is simultaneously ground and calcined in an air-current mill fed with hot gases. L. A. C.

Manufacture [artificial weathering] of bricks, tiles, etc. W. G. MELLS (B.P. 372,112, 20.5.31).—The surface to be exposed is roughened by treatment with a blast of air containing abrasive. L. A. C.

Roofing tiles. L. F. LUDOWICI, and C. LUDOWICI KOMM.-GES. AUF AKT. (B.P. 373,264, 20.2.31).

[Laminated] floor coverings and the like. R. BROWN (B.P. 372,031, 17.3.31. Addn. to B.P. 342,398).

Sound insulation. Porous masses. Tarred macadam.—See I. **Building blocks.**—See VIII. **Gum-resin compound [for floors etc.].**—See XIII. **Rubber compositions.**—See XIV. **Treatment of seaweed.**—See XV.

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

Theory of the silicate residues of blast-furnace slags. C. D. Abell (Ind. Chem., 1932, 8, 110—113, 128—130, 191—194).—Prior to the melting phase in the hearth the slag is gehlenitic in character; on the hearth and later it becomes more or less akermanitic according to the concn. of Al_2O_3 and MgO, and on further cooling spinel crystallises in primary form succeeded by tetragonal gehlenite, $2CaO,Al_2O_3,2SiO_2$, and akermanite, $2CaO,MgO,2SiO_2$, in varying proportions. A comprehensive review of the ternary systems involved is given, particularly with reference to cold-blast working. C. A. K.

Factors influencing the design of normalising furnaces. E. E. Griffiths (Proc. Inst. Mech. Eng., 1931, 121, 545—557).—The essential features of all normalising furnaces are that the metal sheets should be heated above the A3 point, and that the rate of heating and cooling should be controllable. Preheating the air for combusion reduces the oxidation of the metal, which may be almost completely prevented by filling the cooling zone of the furnace with gas generated from a small producer. Operating costs are discussed. C. A. K.

Action of molecular nitrogen on highly purified iron. H. H. Gray and M. B. Thompson (J. Physical Chem., 1932, 36, 889—908; cf. B., 1931, 1052).—Various very pure forms of Fe are acted on by mol. N_2 at temp. as low as 500°, forming a grey film which inhibits further action. Electrolytic flakes dissolve rapidly in 0·5*N*-HCl without residue, but after nitrogenating they dissolve more slowly, and a thin film remains. The higher the temp. of nitrogenation, the more slowly are they attacked. C. L. W. (*c*)

Effect of vanadium in high-speed steel. A. B. Kinzel and C. O. Burgess (Amer. Inst. Min. Met. Eng. Tech. Pub., 1932, No. 468, 9 pp.).—With steel containing $\not>$ 0·65—0·75% C the hardness of the heat-treated steel decreased for V $>$ 2·5%. The C should be increased about 0·2% for each 1% increase in V. Ch. Abs.

Inclusions—their effect, solubility, and control in cast steel. C. E. Sims and G. A. Lillieqvist (Amer. Inst. Min. Met. Eng. Tech. Pub., 1932, No. 453, 24 pp.).—Random globular inclusions have a min. effect on ductility, whilst network inclusions decrease it. The latter, probably formed after part of the steel had solidified, are most frequent in steels deoxidised with Al. The ductility appears to be independent of the quantity of inclusions, which are sol. in the molten steel. A high FeO content favours the formation of globular inclusions. Ch. Abs.

Electric welding of mild steel: effect of protection on distortion of the crystalline grains. D. Rosenthal and M. Mathieu (Compt. rend., 1932, 194, 1244—1245).—The increase in strength and diminution of distortion and stresses indicated by *X*-rays in mild-steel welds (cf. B., 1931, 493) when the welding and electrodes are protected, *e.g.*, by slag, is confirmed. Complete protection requires not only incorporation in the electrode wire of "special elements" to protect against oxidation, but also a covering of slag about 0·75 mm. thick. Annealing at 850° removed the stresses where insufficient protection had been given, but only reduced them in its entire absence. The covering of slag protects by providing annealing *in situ*. C. A. S.

Elastic limit of extra-soft steel drawn through a draw-plate. J. Galibourg (Compt. rend., 1932, 194, 1635—1637; cf. B., 1930, 196).—The elongation/stress curve for an annealed specimen of the drawn steel is straightened by spontaneous ageing, *e.g.*, 70 days of room temp.; to secure a horizontal portion at the end of the straight slope an elongation of the wire by direct traction must precede the ageing. C. A. S.

Electrolytic zinc and cadmium as anti-corrosives for steel. H. Figour and P. Jacquet (Compt. rend., 1932, 194, 1493—1495).—Plates of Thomas steel (0·063% C) were coated electrolytically with Zn (in cyanide and sulphate baths) and with Cd, and exposed to (*a*) salt spray at 15—20°, (*b*) H_2O spray at 40°, and (*c*) ordinary atm. conditions from 5.11.30 till 31.7.31. Cd showed marked superiority for (*a*) and (*b*), but Zn (especially from a cyanide bath) for (*c*). C. A. S.

Electrochemical potentials of nitrified steels. S. Sato (Amer. Inst. Min. Met. Eng. Tech. Pub., 1932, No. 447, 31 pp.).—The potentials of Cr–Al, Cr–Ti, and Cr–Zr steels were determined in H_2O, sea-water, saturated $CuSO_4$, and *N*-$FeSO_4$. After nitriding, the steels which responded to the treatment became about 0·6 volt nobler in H_2O and about 0·2 volt nobler in sea-water; in $FeSO_4$ they were 0·07 → 0·03 volt baser. In $CuSO_4$ they had a potential of about 0·2 volt. The potential in $FeSO_4$ was very sensitive to traces of $Fe_2(SO_4)_3$. In H_2O nitrided steels became black. Ch. Abs.

Stainless-steel ball bearings. W. Heinen (Chem. Fabr., 1932, 140—142).—Tests of ball-bearings of Krupp's V3MH stainless steel running in water in a brass housing showed that under these conditions they were destroyed in a few hr. A slight addition of oil to the water (1 : 10) resulted in only slight wear after 800 hr. If the brass housing was replaced by sheet Fe the rust produced greatly increased wear. It is an error to assume that the grease added to normal ball bearings is merely a rust-preventive. Lubrication is always necessary and stainless-steel ball bearings running in water should be lubricated once a week. Such bearings are not quite so hard as ordinary steel ball bearings. C. I.

Ferromagnetic carbides in molybdenum steels. T. Takei (Sci. Rep. Tôhoku, 1932, 21, 127—148).—The magnetic behaviour of steels (Mo $\not>$30%, C $\not>$2·1%) has been examined. Only one ferromagnetic phase exists, and its crit. point varies with the composition and heat-treatment of the specimen. In the high-C alloys the crit. point is at or below about 200°, and falls with increase of the Mo content up to about 4%, after which it remains const.; this effect is attributed to dissolution of Mo in cementite, whilst the lowering produced by increase of the C content is ascribed to the formation of a solid solution of cementite, Mo, and C, which is stable over a wide range and exists even in alloys containing 80% Mo. In the medium-C alloys the crit.

point lies between 200° and 400°, owing to the dissolution of Fe in the cementite–Mo–C phase, since if the rate of cooling is sufficiently low the crit. point is lowered to about 200°. The microstructure of the steels is described briefly. H. F. G.

Arsenic elimination in the reverberatory refining of native copper. C. T. Eddy (Trans. Amer. Inst. Min. Met. Eng., 1931, 104—118).—As, arising from association with Cu arsenide, is eliminated by using Na_2CO_3 at the end of the oxidising period after S has been removed from the charge. An O content of 0·85% results in the least soda consumption. The electrical conductivity of Cu decreases rapidly as the As content increases. Ch. Abs.

Copper–silicon alloys; new material for apparatus and machinery. E. Becker (Apparatebau, 1931, **43**, 241—242; Chem. Zentr., 1931, ii, 3658).—Cu–Si alloys are a satisfactory substitute for those of Cu and Sn. A Cu alloy with 3·5—4% Si possesses the same strength and corrosion properties as one with 8% Sn, and is superior as regards hot-rolling. Cu alloys with 2·5—4·5% Si and 2% Zn can be cast. A Cu–Si–Mn alloy "Everdur" is suitable for armatures. "Tombasil" is a Cu alloy containing 2—5% Si and 10—18% Zn, and can be cast, pressed, and drawn. These alloys are distinguished by their good heat-stability and resistance to corrosion. L. S. T.

Assay of rubber-insulated conductors [tinned copper wires]. A. R. Matthis (Ann. Chim. Analyt., 1932, [ii], **14**, 201—203; cf. B., 1929, 921).—An amount of wire is taken such that 1 sq. dm. of tinned Cu is always used, and the ends are sealed with wax. This is wound on a piece of glass rod and partly immersed in aq. NH_3 (*d* 0·910). The whole is rotated for 5 min. at 30 r.p.m., so that the wire is washed alternately by air and aq. NH_3, and the amount of Cu dissolved is determined by electrolysis or in a colorimeter. The method may be employed for tinned Cu without its insulation. T. McL.

Treatment of nickel ores. B. Bogitch (Compt. rend., 1932, **194**, 1500—1502).—An ore containing after calcination Ni 10·3, Fe 7·02, MgO 5·6, Al_2O_3 22·4, SiO_2 42·5% was smelted with varying proportions of coke with CaO and $CaSO_4$. With 100 pts. of ore and 20 pts. of CaO increasing amounts (2—6 pts.) of coke increased Fe in the metal and decreased Ni in the slag (22·3% Fe and 0·40% Ni for 5 pts. of coke). With 5 pts. of coke increasing amounts (0—30 pts.) of CaO diminishes Ni in the slag, but increases Fe in the metal (0·40% Ni and 22·3% Fe for 20 pts. of CaO). Increasing the proportion of Fe by additions of ore containing 12% Fe increases Fe in the metal and Ni in the slag. Replacement of part of the CaO by $CaSO_4$ introduces S into the matte, though not in proportion to the amount of $CaSO_4$, and decreases the Fe, but increases the Ni in the slag. The max. amount of $CaSO_4$ advantageous is double that of Ni in the ore. C. A. S.

Effect of supports on the catalytic activity of nickel. C. R. Glass and L. Kahlenberg (Trans. Amer. Electrochem. Soc., 1931, **59**, 113—130).—$NiCO_3$ is pptd. on the surface of various finely-divided solid substances ("supports") and reduced to Ni by heating in a current of H_2 at 450°, or, in the case of the more easily reducible supports, at 325°. The catalytic activity of these preps. in the hydrogenation of cottonseed oil is compared with that of the most active unsupported Ni. The oxides, phosphates, and borates of the heavy metals (except $FePO_4$) inhibit the catalytic action of Ni practically completely, probably owing to partial reduction to the metal which alloys with the Ni. BaO, SrO, CaO, and Li_2O notably decrease the catalytic activity, but an increase in activity is produced by oxides of Ti, Ce, U, Al, Mn, Cr, and Mg, phosphates of Fe, Mn, Li, and Al, borates of Mn, Ca, Ba, Sr, Mg, and Cr, and a particularly large increase by SiO_2, albite, orthoclase, kaolin, and the phosphates of Cr, Ca, Ba, Sr, Ce, and U. The results obtained are compared with corresponding effects on the catalytic activity of Pt and Pd. H. J. T. E.

Structurally hot-hard iron–nickel–tungsten alloys. A. Portevin, E. Prétet, and H. Jolivet (Compt. rend., 1932, **194**, 1237—1239).—Certain Fe–Ni–W alloys are hardened through separation of some Fe–W compound at a high temp., thus producing an alloy hard at that temp. A curve shows for alloys containing 33% Ni the % W (10—25) required to produce such separation at temp. from 800° to 1400°. Other curves show for an alloy containing 30% Ni + 25% W the hardness (up to 310 Brinell), measured cold, attained when the alloy is maintained for various periods (up to 8 hr.) at temp. of 650°, 800°, 875°, 1075°, and 1140°. The elastic limit of this alloy and of one containing 30% Ni + 30% W increases with heat-treatment, *e.g.*, from 15·4 and 26·7 kg./sq. cm. (measured at 800°), respectively, to 33·5 and 37 after 24 hr. at 850°. C. A. S.

Corrosion [of metals]. III. Aluminium, lead, copper. L. W. Haase (Gas- u. Wasserfach, 1932, **75**, 372—374. Cf. B., 1932, 552).—Present-day knowledge relating to the conditions causing corrosion of Al cooking utensils, Pb and Cu water-pipes, etc. is summarised. A. B. M.

Pickling pipes in sulphuric acid and sodium hydrogen sulphate solutions. Y. N. Kojhevnikov (Domez, 1930, No. 4, 9—41).—The temp. of the bath must be raised as the concn. of $FeSO_4$ increases, to prevent deposition on the tubes. With $NaHSO_4$ the bath is kept at 90—95° and H_2O lost by evaporation is replaced. Ch. Abs.

Determination of tin in ferrotungsten and tungsten ores. K. Kiefer (Z. anal. Chem., 1932, **88**, 243—249).—The material is fused with Na_2O_2, the melt is dissolved in HCl, and the greater part of the WO_3 removed by filtration. An aliquot part of the filtrate is then reduced with Al powder until the remaining WO_3 forms a brown solution. When all the Al is dissolved $FeCl_3$ is added slowly until the brown colour is replaced by the characteristic yellow of $FeCl_3$ and the remaining WO_3 is pptd. The filtrate is reduced with Al and the $SnCl_2$ titrated with I. A. R. P.

Degassing of metals. F. J. Norton and A. L. Marshall (Amer. Inst. Min. Met. Eng., Preprint, 1932, 28 pp.).—The solubility of N_2 in Mo and W and the rate of diffusion of N_2 through Mo were determined. For complete outgassing Mo must be heated at 1760°

in a vac. of 0·001 μ for a time which varies linearly with the thickness; CO and N_2 are removed.
Ch. Abs.

Throwing power of electroplating solutions. S. Kaneko (J. Soc. Chem. Ind., Japan, 1932, **35**, 146 B; cf. B., 1931, 722).—The throwing power (T) is defined by the equation $T = 100(l^{-1}—A)/l^{-1}$, where l is the distance between the electrodes. The relationship between A and the c.d., i, at the cathode, the current efficiency, ε, and the potential drop, v, at the cathode is also given. C. I.

Construction of thermo-elements by electrodeposition. H. Kersten and R. Schaffert (Rev. Sci. Instr., 1932, [ii], **3**, 189—195).—Full directions are given for the prep. of junctions by plating two metals on contiguous portions of a sheet of stainless steel so that they overlap slightly. The plating is then peeled off. Such junctions can be used at higher temp. than soldered ones, and their mass can be kept smaller. C. W. G.

Bright silver plating from the cyanide bath. L. C. Pan (Trans. Amer. Electrochem. Soc., 1931, **59**, 135—140).—Addition of aq. NH_3 to the Ag-plating bath leads to whiter deposits, especially in the presence of impurities which otherwise cause discoloration, but does not give really bright deposits. Addition of 1 g. of $Na_2S_2O_3$ per litre has a marked brightening effect, and in the presence of aq. NH_3 is still more effective. A c.d. as high as 0·8 amp./sq. dm. can then be used without appreciable fall in current efficiency. H. J. T. E.

Electrodeposition of platinum, palladium, and rhodium. W. Keitel and H. E. Zschiegner (Trans. Amer. Electrochem. Soc., 1931, **59**, 131—133).—A typical bath contains 100 g. of NH_4NO_3, 10 g. of $NaNO_3$, and 10 g. of Pt as $Pt(NH_3)_2(NO_2)_2$ in 1 litre of H_2O containing 5 vol.-% of conc. aq. NH_3, and is operated at 90—95° with about 7 amp./sq. dm. $Pt(NH_3)_2(NO_2)_2$ is practically insol. in H_2O, but dissolves readily in hot aq. NH_3, forming tri- and tetra-ammino-compounds. Similar baths have been used for plating with Pd, Rh, and Pt–Rh alloys. H. J. T. E.

Structure of electrodeposited metals. I. L. B. Hunt (J. Physical Chem., 1932, **36**, 1006—1021).—Factors influencing the electrodeposition of metals are reviewed. It is suggested that if the ratio of the metal concn. to that of the other constituents in the cathode film is high, coarsely cryst. deposits result. If, due to low degree of dissociation, complex ion formation, high hydration of metal ions, or presence of colloidal matter, it is low, crystal growth will be interfered with and many nuclei formed. This theory explains the properties of the metal and anion and the external conditions of deposit. C. L. R. (*c*)

Electrostatic explanation of the phenomenon of flotation. I. W. Wark (Nature, 1932, **129**, 833).—A discussion (cf. B., 1932, 347). L. S. T.

Bubble attachment in flotation. O. C. Shepard (Min. and Met., 1932, **13**, 282—283).—Mathematical.

Calorising and its applications. W. Smith (Metallurgia, 1932, **5**, 207—208).

Hg vapour for heat transfer.—See I. **Monel metal dyeing [baths].**—See VI. **Electron-emitting alloy.** **Corrosion testing.**—See XI. **Corrosion-resistant coating.**—See XIII.

See also A., June, 562, **Ferro-Ce.** 565, **Magnetic Fe and its alloys.** 566, **Systems Cu–Zn, Cu–Au, Ag–Cu, Au–Hg.** 567, **Systems Fe–Al, Bi–Sb. Yt and Pb–Ni–Cd alloys. Silumin containing Cu. System Al–Sn–Ni.** 580, **La free from Fe and Si. Electrodeposition of Zn.** 581, **Be.** 586, **Spectrographic (etc.) analysis.** 587, **Use of fused NaOH in analysis.** 590, **Test-paper for Mo.**

Patents.

Casting of compound metal blocks. Klöckner-Werke A.-G. Abtg. Georgs-Marien-Werke (B.P. 373,781, 21.5.31. Ger., 1.11.30).

Containers for heat-treating or carburising metal articles. Brit. Driver-Harris Co., Ltd. (B.P. 373,512, 18.9.31. U.S., 23.9.30).

Roasting of material.—See I. **Gas [for welding etc.].**—See II. **[Product from] black liquor.**—See VII. **Fusion deposition of metals.**—See XI. **Rubber compositions [for metal work].**—See XIV.

XI.—ELECTROTECHNICS.

Improved electrochemical [corrosion] testing apparatus. L. W. Haase (Chem. Fabr., 1932, 189).—A modified corrosion-testing apparatus (cf. B., 1931, 591) is described. E. S. H.

Development of an electron-emitting alloy. O. S. Duffendack, R. A. Wolfe, and D. W. Randolph (Trans. Amer. Electrochem. Soc., 1931, **59**, 157—173).—Variations in the sparking voltage across a gap between electrodes of a 98% Ni, 2% Mn alloy were found to be due to traces of Mg in the form of non-uniformly distributed inclusions. The Mg increases the thermionic emission of the alloy and lowers the sparking potential, but, being easily volatilised, these effects tend to disappear during continued use as a spark gap. Of other electropositive metals Ba can be most uniformly introduced into the alloy and it volatilises least, so that reproducible and const. low sparking voltages can be attained. Automobile sparking plugs with electrodes containing about 0·05% Ba have given good results in these respects. The voltage characteristics of the spark discharges have been investigated by means of the cathode-ray oscillograph and the peak voltages correlated with the thermionic emission of the alloys.
H. J. T. E.

Characteristics of lead storage batteries under high pressure. II. Variation of plate capacities under 110 atmospheres. S. Makio (J. Soc. Chem. Ind., Japan, 1932, **35**, 171—172 B).—In a pasted-type storage battery, the increase of capacity of the negative plates under 110 atm. is 6—33%, increasing with rate of discharge; that of the positive plates is 14—8%, decreasing with rate of discharge. The variation with discharge rate in the former case is less than at atm. pressure; in the latter case it is about the same.
C. I.

An iodine accumulator. F. Boissier (Compt. rend., 1932, **194**, 1069—1072).—The cell consists of a cylindrical Zn vessel (— pole) coated outside with insulating material; inside is a cellulose diaphragm between which and a central graphite rod (+ pole) is porous material, *e.g.*, C, saturated with aq. ZnI_2. On charging, the reaction is $ZnI_2 = Zn + I_2$, reversed on discharge. The sp. capacity is 60 amp.-hr. per kg.; e.m.f. of charge 1·25—1·35 volts, of discharge about 1·15 volts; suitable period for discharge is 10 hr.; efficiency 70—80%. C. A. S.

Survey of progress in insulating materials. A. R. Dunton (J. Sci. Instr., 1932, 9, 178—186).

Welding mild steel. Anti-corrosives for steel. Nitrified steels. Carbides in Mo steels. Tinned Cu wires. Electroplating solutions. Thermo-elements. Plating of Ag, Pt, Pd, and Rh. Structure of electrodeposited metals.—See X. **Dielectric const. of rubber.**—See XIV.

See also A., June, 562, **Ferro-Ce.** 565, **Magnetic Fe and its alloys.** 580, **La free from Fe and Si. Prep. of $K_4Fe(CN)_6$. Zn.** 581, **Synthesis of N_2H_4.** 582, **Be.** 592, **Measurement of p_H.** 602, **Prep. of Ca gluconate.**

Patents.

[Controlling the stirring in] electric induction furnaces. Electric Furnace Co., Ltd., Assees of E. F. Northrup (B.P. 371,553, 18.3.31. U.S., 18.3.30).—The induction coil comprises two parts connected in parallel to the supply and wound so that the current in each part produces a magnetic field in the same direction. Switching means, whereby one or each part can be operated, are provided. J. S. G. T.

Electrolyte for galvanic [Leclanché] cells. J. J. Pala (B.P. 371,478, 28.1.31).—Crude or partly purified natural salts, *e.g.*, $MgCl_2$, Stassfurt salt, thickened by addition of gluten, globulin, or aleurone, are employed. J. S. G. T.

Diaphragms for galvanic cells. J. P. Gjerulff (B.P. 371,502, 5.2.31. Denm., 26.8.30).—Diaphragms made of insol. colloidal material, *e.g.*, one or more salts of cellulose (Cellophane, Sidac, etc.), which swells in the electrolyte are used. J. S. G. T.

Creating high vacua in electric-discharge devices. Brit. Thomson-Houston Co., Ltd., Assees. of H. J. Nolte (B.P. 371,590, 14.4.31. U.S., 14.4.30).—A thin-walled, hollow electrode contained in an envelope is heated to remove occluded gases, and its interior is rough-evacuated while the envelope is fine-evacuated, so that pressures on opposite surfaces of the electrode are substantially equalised. A stream of air is admitted to the electrode to prevent overheating. J. S. G. T.

Luminous electric-discharge tubes. Gen. Electric Co., Ltd., Assees. of Patent-Treuhand-Ges. f. elektr. Glühlampen m.b.H. (B.P. 372,154, 7.7.31. Ger., 21.8.30).—The envelope, or an additional envelope surrounding the main one, is coated with a thin transparent metal layer, *e.g.*, of Au, having a strong absorption band in the infra-red. J. S. G. T.

(a) Initiating and maintaining high-tension currents in gas-purifying apparatus. (b) Supplying high-tension electric current to the emission electrodes of purifying chambers in electric gas-purifying plant. (c) Introducing and maintaining high-tension currents in gas-testing apparatus. Siemens-Schuckertwerke A.-G. (B.P. [a] 371,859, 22.1.31. Ger., 23.1.30. [b] B.P. 372,047, 26.3.31. Ger., 27.3.30. [c] B.P. 372,097, 8.5.31. Ger., 12.5.30. Addn. to [a]).—(a) On closing the transmitting switch, first the high-tension (h.-t.) rectifier is operated, then the h.-t. transformer is connected to the poles of the rectifier, and finally the tension is regulated. (b) A h.-t. continuous-current generator is connected to a bus-bar system which is connected to the emission electrodes of individual pptg. chambers through a rotating change-over switch so that the electrodes are charged at intervals by an impulse. (c) The tension in plant operated in accordance with (a) is regulated by a piston moved in a cylinder by pressure of a gas or liquid, *e.g.*, oil. J. S. G. T.

Apparatus for passing electric currents through gases. G. G. A. Brion and A. J. Krutzsch (B.P. 371,398, 18.12.30).—In dust-pptg. apparatus of the type described in B.P. 319,217 (B., 1931, 498), ionising electrodes are arranged to form a substantially plane surface. J. S. G. T.

Electrolytic process for purifying solutions [acetic acid]. Kodak, Ltd., Assees. of C. S. Webber and H. Le B. Gray (B.P. 371,338, 19.12.30. U.S., 20.1.30).—AcOH containing very mobile anions is electrolysed so that these anions traverse a relatively short path through a porous cell to the anode while purified AcOH is continuously withdrawn from the anode compartment. J. S. G. T.

Electr[olyt]ic purification of liquids. J. Billiter (B.P. 371,837, 24.1.31. Ger., 27.1.30).—Cells are built up from separate electrode frames each comprising two tightly-inserted diaphragms, and electrodes consisting of loose granulated material, *e.g.*, magnetite or graphite, and preferably connected bipolarly, are inserted between the diaphragms. Means are provided for maintaining in the electrode chambers a hydrostatic pressure less than that in the H_2O chamber between abutting frames. J. S. G. T.

Manufacture of coated electrodes for electric arc welding and other processes of fusion deposition of metals. B. Turner, and Ferro-Arc Welding Co., Ltd. (B.P. 371,422, 24.10.30).—Coating material encased in " Cellophane " is wound around the core and covered with asbestos yarn. J. S. G. T.

Dielectric materials. Brit. Thomson-Houston Co., Ltd., Assees. of F. M. Clark (B.P. 371,492, 2.2.31. U.S., 1.2.30).—Paper or other absorbent solid dielectric material is impregnated at about 150° with tolyl or other ester phosphates and coated with wax. J. S. G. T.

Insulating materials for submarine cables. W. W. Triggs. From Felten & Guilleaume Carlswerk A.-G. (B.P. 369,647, 17.11.30).—In insulating material containing deresinised gutta-percha or balata, pure synthetic rubber, and highly purified natural or synthetic hydrocarbon waxes, the last are replaced by hydrogenated synthetic rubber or by hydrogenated natural rubber from which the albumin has been removed. D. F. T.

Electric (A) ovens, (B) heating devices, [with "sheathed wire" heating elements]. Brit. Thomson-Houston Co., Ltd., Assees. of (A) G. W. Heinbuch, (B) Soc. Gén. de Constructions Electriques et Mécaniques "Alsthom" (B.P. 373,831 and 373,845, [A] 15.7.31, [B] 24.7.31. [A] Can., 16.7.30, [B] Fr., 31.7.30).

[Refractory-embedded] electrical heating elements. G. Bray (B.P. 373,909, 15.10.31. Ger., 24.8.31).

[Non-crumbling] cores for electric dry batteries and the like. Autom Spezial-Maschinen G.m.b.H., Assees. of H. A. Bumke Ges.m.b.H. (B.P. 373,723, 13.4.31. Ger., 24.2.31).

Electric-discharge lamps [for picture recording and television purposes etc.]. Marconi's Wireless Telegraph Co., Ltd., and G. F. Brett (B.P. 373,270, 21.2.31).

Evaporating liquids.—See I. **Combustibles in flue gases. Gas [for welding etc.]. C_2H_2 and C black.**—See II. **Laminated materials.**—See V. **Producing records [of light variations].**—See XXI.

XII.—FATS; OILS; WAXES.

Determination of higher saturated fatty acids in edible fats. J. Grossfeld (Allgem. Oel- u. Fett-Ztg., 1932, 29, 25—30, 92—96, 161—168, 220—229).—Investigations on pure acids and mixtures are detailed at length. The Bertram separation has been modified in an endeavour to apply the method to coconut oil etc. containing lauric acid. 0·5 g. of fatty acids (free from unsaponifiable matter) are oxidised with alkaline $KMnO_4$ at room temp. for ½ or 1 hr.; after addition of bisulphite and a proportion of EtOH (to increase the solubility of nonoic acid in the aq. layer) the mixture is acidified and the higher fatty acids are filtered off (not extracted). The separated acids are then washed, dried, and extracted with light petroleum, in order to separate them from hydroxy-acids, and weighed. The amount of nonoic acid entrained is measured by pptg. the acids once with $MgSO_4$ and determining the nonoic acid in the filtrate by distillation and titration: a correction is applied for the nonoic acid retained by the Mg soaps, which is shown by a series of check experiments to be almost const. at 13·8% of the amount present (this loss varies a little with the amount of nonoic acid present, but cannot be accounted for on the basis of simple adsorption or solubility of the Mg soap). Lauric and myristic acids are oxidised to a considerable extent by treatment with $KMnO_4$ at 25° for 1 hr. or more and cannot be quantitatively separated from oleic acid by this method. Palmitic acid is destroyed to a very small extent. Oleic acid alone is fully oxidised by treatment at 20° for 30 min., but any palmitic (or higher) acid present hinders the oxidation of oleic and lauric acids (apparently due to a salting-out effect of the higher soaps present). It is found empirically that with mixtures containing lauric acid (*e.g.*, coconut oil or butter fatty acids) if oxidation is allowed to proceed for only 30 min. at room temp., the loss of lauric acid by oxidation is almost exactly balanced by the oleic acid that remains undecomposed under the prescribed conditions of working; the figure (corrected for nonoic acid) obtained for the higher saturated fatty acids is reasonably correct. With other fats (free from lauric and myristic acids), oxidation for 1 hr. destroys all the oleic and linoleic acids without appreciable loss of palmitic acid. Thus 6% of saturated fatty acids were found in apricot-kernel oil (4·9% with oxidation prolonged overnight). The separation of lauric and nonoic acids by fractional pptn. from dil. EtOH may be possible. E. L.

Fundamental questions in the production of vegetable oils and fats. H. Wackerow (Allgem. Oel- u. Fett-Ztg., 1932, 29, 205—207).—To avoid costly after-treatments of the oil, the raw material should be cleaned and extraction and heat-treatments should not be too drastic, *e.g.*, extraction with solvents if carried too far extracts undesirable (phosphatide) constituents from soya beans. E. L.

Manufacture of cheap toilet soaps. R. Krings (Allgem. Oel- u. Fett.-Ztg., 1932, 29, 215—217; cf. B., 1932, 390).—The precedure for making a semi-boiled toilet soap (coconut-tallow base) is outlined. E. L.

Oil-mill practice. Works control in the processing of sunflower seed. E. J. Better (Allgem. Oel- u. Fett-Ztg., 1932, 29, 211—215. Cf. B., 1931, 401; 1932, 354).—Decortication under proper conditions should leave 0·4—1% of kernels in the husks, and about 6—11% of husks in the kernel meal. Oil contents of the whole seed, kernels, and husks are 30·2—32·8, 52—54, and 0·6—1·2%, respectively. Formulæ for checking the mill yields are deduced from analytical data for the seed and products. E. L.

Composition of linseed oil. R. S. Morrell (Analyst, 1932, 57, 377—378).—A statement by Cocchinaras (B., 1932, 560) relating to the author's results is contradicted. Analytical data are given for a sample of English-grown linseed. M. S. B.

Action of light on a drying [linseed] oil. I. I. Fukushima, M. Horio, and T. Miki (J. Soc. Chem. Ind., Japan, 1932, 35, 142—145 B).—Linseed oil was exposed (at 5°) to irradiation from a Hg-vapour lamp while a stream of O_2 from a capillary was drawn through. After 6 hr. the I val. had fallen from 180·5 to 176·8 and the *d* had increased from 0·9284 to 0·9353. The behaviour of the oil on subsequent oxidation at 55—70° was also studied. The longer the irradiation the sooner was the max. velocity of oxidation attained, although the actual oxidation rate reached was not very much greater than the corresponding rate of the unirradiated oil. E. L.

Qualitative tests for detection of rosin, rosin oil, and heavy metals in linseed oil. J. J. Deeney (Amer. J. Pharm., 1932, 104, 282—283).—The Liebermann–Storch reaction is applied to the detection of rosin and rosin oil, and heavy metals are sought for in the ash after incineration of the oil. A. A. L.

Sanza olive oils and detection of them in expressed olive oils. F. Wittka (Allgem. Oel- u. Fett-Ztg., 1932, 29, 207—211).—Carocci-Buzi's test formation of a ppt. in the Lüers–Bellier test, which is not dissolved on warming) for solvent-extracted olive oils is advocated and has been found to apply to these oils after refining by the ordinary methods. E. L.

Rape oil as an adulterant of olive oil. R. MILLER and C. W. BALLARD (J. Amer. Pharm. Assoc., 1932, **21**, 349—350).—The Valenta no. is the most satisfactory method of detection. E. H. S.

Cryoscopic researches on castor oil. (MLLE.) M. ROY (Compt. rend., 1932, **194**, 1356—1358).—The mol. wt. of castor oil may be determined cryoscopically in AcOH, $C_2H_4Br_2$, and COPhMe by measurement of the depression at varying concns., expressing the calc. mol. wt. graphically as a function of the depression, and extrapolating to zero concn.; COPhMe is the best solvent as the curve obtained is a straight line of slight inclination. Abnormal results are obtained in C_6H_6 and $PhNO_2$. The castor oil must be perfectly dry; commercial samples usually contain 5% H_2O, which is removed only with difficulty. The mol. wt. may then be used as a measure of the polymerisation of the oil due to natural or artificial ageing. A comparison is given of mol. wt., I val., d^{26}, η^{26}, n_D, and γ^{26} of fresh and heat-treated (in presence of Fe or Cu) castor oils. H. A. P.

Antimony trichloride colour test for cod-liver oil. ANON. (Analyst, 1932, **57**, 302—307).—An account of the experimental work on which the (Mar., 1931) report of the Brit. Pharmacopœia (B.P.) Sub-Committee was based. A reduction in concn. of $SbCl_3$ gives low results, but the blue colour is fugitive if the concn. is $> 23\cdot5\%$. EtOH in the B.-P. $CHCl_3$ used as solvent (which should be washed well, dried, and distilled) increases the solubility of the $SbCl_3$ but accelerates fading of the colour. Best agreement between different workers was obtained at 20° for readings of about 5 units, and the oil should be diluted accordingly. The intensity of the colour is not related linearly to the concn. of oil unless the unsaponifiable matter is used (cf. A., 1930, 379, 962), and the latter method is therefore a truer indication of the biological val. although the oil itself may be used when the reaction is applied as limit test. J. G.

Smoke–flash–fire points of certain fixed oils. W. H. DICKHART (Amer. J. Pharm., 1932, **104**, 284).—Figures are given for a no. of fatty oils, and also for pine and turpentine oils. A. A. L.

Sulphonated oils. X. Compositions of sulphonated oils on the market. XI. Properties of aqueous solutions of Na salts of sulphuric esters and fatty acids separated from commercial sulphonated oils. XII. Changes of ricinoleic acid and its sulphuric ester. XIII. Normal potassium and ammonium salts of the sulphuric ester of ricinoleic acid. K. WINOKUTI (J. Soc. Chem. Ind., Japan, 1932, **35**, 159—161 B, 161—163 B, 163—164 B, 164—165 B; cf. B., 1931, 211).—X. [With S. IGARASI and Y. YAGI.] A method has been devised whereby the sulphuric esters and the non-sulphated components may be separated from technical sulphated oils. The sulphated components (which are present in only moderate amount) isolated from 7 technical oils are of the ester type and analogous to sulphoricinoleic ester: the properties of the oils vary with the amount of fatty acids and their condensation products present. Neutral substances such as lactones, lactides, etc. are present only in very small amount.

XI. [With Y. YAGI.] Solutions of the Na salts of the sulphuric ester components resemble generally those of Na sulphoricinoleate in physical and chemical properties (viscosity, surface tension, stability to acids, etc.). Solutions of the Na salts of the non-sulphated constituents are more similar in properties to the ester solutions than to simple soap solutions, the interfacial tension (to kerosene) being markedly higher.

XII. The stability of sulphoricinoleic ester towards acids has been studied.

XIII. The hygroscopic, cryst., normal K salt of sulphoricinoleic ester has been prepared. The normal NH_4 salt loses NH_3 on dehydration, forming the acid salt. E. L.

Fatty alcohols and their sulphonated products. Uses in the textile industry. M. BRISCOE (J. Soc. Dyers and Col., 1932, **48**, 127—131).—Sulphonated fatty alcohols obtained by catalytic hydrogenation at high pressures of fatty acids followed by sulphonation have wetting, emulsifying, and detergent properties superior to those of ordinary soap and are stable to acids, alkalis, and hard water. The wetting and penetrating properties decrease and the detergent power increases with sulphonated saturated fatty alcohols from C_{12} to C_{18}; resistance to hard water decreases from C_{12} to C_{18}, but is quite ample with C_{18} products. The fatty alcohols appear to have possible uses as textile finishing agents. A. J. H.

Clay suspensions as emulsifying media, with particular reference to aqueous alcoholic suspensions. R. M. WOODMAN and E. MCK. TAYLOR (Chem. News, 1931, **143**. Reprint, 9 pp.; cf. B., 1929, 730).—China clay and fuller's earth in the natural state are not suitable emulsifiers for the prep. of spraying emulsions of the oil-in-H_2O type, but they act as H_2O-in-oil emulsifiers for various true oils and fatty acids. Ca-saturated and completely unsaturated bentonites suspended in H_2O–EtOH mixtures form aq. EtOH-in-oil emulsions with linseed oil containing free oleic acid; at certain phase-vol. ratios traces of oil are also definitely emulsified. Bentonite and Na-saturated bentonite in aq. EtOH yield both types of emulsions with the acid linseed oil. E. S. H.

Arachis nut shells as fuel. Cottonseed and power production.—See II. **Ni catalysts.**—See X. **S–D–O [for paint].**—See XIII. **Irish "bog butter."**—See XIX.

See also A., June, 567, **Diffusion const.** 601, **Hydrogenation of arachis oil.** 636, **Unsaponifiable fraction of cod-liver oil. Moon-fish oil.** 637, **Body fats of the pig.** 656, **Lovibond val. of liver oils. Hallibut-liver oil.** 659, **Vitamin-*D* and red palm oil.** 662, **Glyceride fatty acids of forage grasses.** 664, **Fats of brown sea-weeds.**

PATENTS.

[Dry] rendering process [for fats]. S. HILLER (U.S.P. 1,821,639, 1.9.31. Appl., 26.5.25).—In a continuous two-stage process, the material is first disintegrated, sterilised, and partly digested at high temp. under steam pressure (generated from the moisture of the material) of 5—80 lb./sq. in. in a heated cylinder provided with beaters, scrapers, etc., and is then passed through a steam-jacketed (10 lb./sq. in.) dehydrator, under atm. or reduced pressure, or subjected to hot air currents, in order to reduce the H_2O content of the material to $<$ 20% (preferably to 5—15%) before expressing the fat. E. L.

Preservation of fats and fatty oils. Swift & Co., R. C. Newton, and W. D. Richardson (B.P. 371,569, 27.3.31. U.S., 28.3.30).—Carotenoid pigments, particularly in the form of 5—10% of yellow palm oil, are added to the fat, which is then deacidified and heat-treated at, *e.g.*, 180—218° (accompanied by vac. deodorisation or hydrogenation as desired) to bleach the material. E. L.

Recovery of materials [oils or fats] from emulsions or dispersions. A. Nyrop (B.P. 369,718, 10.2.31).—The emulsion (*e.g.*, from the prep. of whale oil, pericarp oils) is strained, brought to $p_H < 7$ (*e.g.*, 3—5) by acidification or by passing gaseous combustion products, circulated through a flow-heater, and separated by centrifuging. E. L.

Stabilisation of compounds containing a fatty acid radical. P. I. Murrill, Assr. to R. T. Vanderbilt Co., Inc. (U.S.P. 1,822,108, 8.9.31. Appl., 7.8.28). —0·1—0·2% of a dialkylenedi-imine, especially piperazine (or its derivatives, *e.g.*, fatty acid salts), is added to a compound containing a fatty acid, *i.e.*, fatty oils or soaps. E. L.

Refining of animal or vegetable oils. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 371,503, 6.2.31).—About 1% of H_2O, or H_2O acidulated with 2—5% of conc. acid, is finely dispersed in the oil, which has been warmed to at least 60°, and the oil is rapidly chilled to room temp. (within 30 min.), whereby the phosphatides, mucilage, etc. settle out as coarse flakes. Addition of soda after chilling accelerates sedimentation and reduces the amount of oil entrained in the foots. E. L.

Production of core oils. E. H. McArdle, Assr. to A. Klipstein & Co. (U.S.P. 1,822,411, 8.9.31. Appl., 14.3.30).—Core oils can be prepared from any (semi-drying) fatty oil having an I val. $>$ 100 by incorporating (at 260—305°) a neutral resin, especially ester gum, with thinners as required. E. L.

[Floatable] cake of [milled] soap. C. A. and T. F. Crary (B.P. 373,522, 8.10.31).

Manufacture of rolled soap flakes. Etabl. Rocca, Tassy, & De Roux (B.P. 373,408, 22.5.31. Fr., 15.7.30.)

Lubricants.—See II. **Cashew nut-shell liquid.**—See XIII.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Effect of various driers on the physical and chemical properties of linseed oil paint films. F. Wilborn, F. Wachholtz, O. Walther, and H. Ulrich (Farben-Ztg., 1932, **37**, 1120—1121, 1156—1158).—A series of TiO_2–linseed oil paints was prepared, containing 4 different concns. of Co, Mn, Pb, Th, and Ce, respectively (the drier metals being used in chemically equiv. proportions), and the strength etc. of the dry paint films were tested after 10, 80, 280, and 700 days. Roch's view that the driers may be arranged in two groups, Co–Mn and Pb–Th–Ce, is corroborated. Co and to a lesser extent Mn produce elastic and readily saponifiable oil films, whilst Pb, Th, and Ce give films behaving similarly to " undriered " films. Ce imparts exceptionally high alkali resistance. S. S. W.

S–D–O: new corrosion-resisting coating. O. M. Hayden (Ind. Eng. Chem., 1932, **24**, 563—564).—S–D–O is a synthetic drying oil obtained by the partial polymerisation of divinylacetylene; the viscous oil, which would otherwise gel spontaneously, is stored and used in solution in coal-tar naphtha. Paints are made by grinding suitable fillers and pigments into the solution. Films dry to a tack-free condition in 1—2 hr. and to a high degree of hardness in 12—24 hr., polymerisation and oxidation being complete in 48 hr. The films are 15 times as impervious to H_2O as films of linseed oil paint and are resistant to all solvents. S–D–O is attacked by strong oxidising agents, *e.g.*, CrO_3 or hot H_2SO_4, and is penetrated but not destroyed by HF. It is not thermoplastic and can be applied satisfactorily on almost any material except glass and enamel, which substances are too smooth and dense to permit good anchorage; metal surfaces should be roughened. Successive coats must be applied before the previous coat is fully hardened. D. F. T.

" Passivifying " action of lead pigments. M. Ragg and A. Riedemann (Farben-Ztg., 1932, **37**, 1122—1124, 1154—1156).—Fe plates were kept in contact (under pressure) with various types of Pb pigments in the presence and absence of moisture, and the potential differences between the plates and *N*-KCl solution were measured. A diminution in e.m.f. was observed in all cases, confirming earlier work and supporting the view that a cohesive protective (passive) layer of Fe oxides is formed, particularly in the case of " grey lead," giving an additional rust-preventive function to these Pb pigments (further to the known beneficial Pb-soap formation). S. S. W.

Spanish colophony. M. Tomeo and J. García Viana (Anal. Fís. Quím., 1932, **30**, 159—173).—Details are given of the m.p., *d* (1·071—1·121), *n*, [α], acid val. (155—162), volatile acid val. (1·10—1·32), sap. val. (182—186·5), and I val. (100·1—159·5) of a variety of specimens of colophony. The difference between the setting points and m.p. is practically const. (10—15°) for all specimens; both temp. rise with increase of the depth of colour of the resin. The lighter resins have *d* 1·1 approx. and the darker *d* 1·12. $[\alpha]_D$ ranges from 0 to +49°, and bears no simple relationship to the colour, although it tends to be greatest for the darkest resins. The chemical characteristics of the resins vary considerably with the age of the specimen, and their determination is of val. only when carried out under closely regulated conditions. H. F. G.

Thixotropy [of paints].—See I. **Flash points etc. of fixed oils.**—See XII.

☞ See also A., June, 567, **Diffusion const.** 568, **Dissolution of cellulose nitrate.** 585, **Rinman's green.** 615, **Cholic acid [resin].** 618, **Polyene pigments.** 649, **Pseudo-peroxidase [and pigments].**

PATENTS.

[Cashew nut-shell liquid] composition and its manufacture. M. T. HARVEY, Assr. to HARVEL CORP. (U.S.P. 1,821,095, 1.9.31. Appl., 19.2.29).—Cashew nut-shell liquid (without, or after, heat treatment) is combined with an aldehyde, especially CH_2O, with or without the addition of driers or catalysts, *e.g.*, acids, alkalis, metals, Mn rosinate, over a large range of temp. The products harden uniformly on drying and are suitable for insulating varnishes, coatings, etc. E. L.

Manufacture of lithopone. J. GUILLISSEN, and UNION CHIM. BELGE, SOC. ANON. (B.P. 370,121, 19.2.31).—Calcined lithopone is treated with H_3PO_4 or substances which liberate it in solution, *e.g.*, NaH_2PO_4, in amount sufficient to neutralise ZnO and alkalinity. Lithopone of improved fastness to light, even in the presence of relatively large amounts of Cl_2, and free from tendency to "feeding" is obtained. S. S. W.

Production of chrome pigments. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 369,916, 15.11.30).—Mixed crystals of $PbCrO_4$, $PbMoO_4$, and/or $PbWO_4$ are pptd. from aq. solutions of the components, giving a range of yellow to red pigments. Pb may be partly replaced by Ba and/or Sr, and $PbSO_4$ may be incorporated if desired. [Stat. ref.] S. S. W.

Manufacture of composite titanium pigments. TITANIUM PIGMENT CO., INC., Assees. of G. W. THOMPSON and H. A. GARDNER (B.P. 370,088, 28.1.31. U.S., 29.1.30).— n oxygenated Ti compound, *e.g.*, calcined or hydrated TiO_2, co-pptd. with extender, *e.g.*, $BaSO_4$, if desired, is suspended in a solution of a Zn salt, *e.g.*, $ZnSO_4$, and a sol. sulphide, *e.g.*, an alkali sulphide, is added, ZnS being pptd. on the TiO_2 particles. The composite ppt. is separated, washed, calcined, quenched, ground, and dried. S. S. W.

Gum-resin compound. R. S. GOODENOW, Assr. to G. L. CURTIS (U.S.P. 1,821,703, 1.9.31. Appl., 13.8.27).—Finely-powdered "fossil" gum, such as kauri, is mixed uniformly into rubber, *e.g.*, by way of rubber latex, and the resulting sheeted material, which possesses the adhesive qualities of the gum resin and the elastic quality of rubber, is applied, preferably in solution, as a vulcanisable cement, *e.g.*, as a coating for walls or floors to be subsequently sprinkled with cork or granite granules. D. F. T.

Decoration of hard surface [floor-]covering material. ARMSTRONG CORK CO., Assees. of J. C. MCCARTHY (B.P. 373,737, 21.4.31. U.S., 26.5.30. Addn. to B.P. 337,924).

Laminated materials.—See V. **Conversion products of rubber.**—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Vulcanisation of rubber. V. Dielectric constant and power factor of vulcanised rubber. D. W. KITCHIN (Ind. Eng. Chem., 1932, **24**, 549—555; cf. B., 1930, 829).—Experiments on samples containing 2—32% of S tested at 30—100° at frequencies of 600—2,000,000 cycles show that the dielectric const. for a given composition falls with increase of frequency, a corresponding power-factor max. being concurrently observed. Rise in temp. notably shifts the power-factor max. for a given compound towards higher frequency or, at const. frequency, towards higher S contents; at higher temp. hard rubber is a poor dielectric. The agents responsible for the peculiar dielectric behaviour are probably the rubber–S mols. Increase in the S content modifies these agents as well as the stiffness of their environment. Also at a given S content the agents vary widely in relaxation time and in ability to respond; the rubber, indeed, depending on the temp., exists in two distinct states, viz., a hard state in which its behaviour with respect to compressibility, thermal expansion, dielectric const., and power factor resembles that of a solid, and a soft state in which it resembles a viscous liquid. The temp. of transition between these states increases almost linearly from —90° to 90° with the S content. Rubber with $< 2\%$ of combined S exhibits a low dielectric const. and power factor over the temp. and frequency range investigated, but hard rubber does so only at room temp. where its rigidity restricts the response to the field; at temp. sufficiently high to permit free response the dielectric const. increases with S content over the whole range. Hard rubber can hold an electric charge for 24 hr. or more. If a dipole mechanism is involved in the dielectric behaviour of rubber, as previously suggested, addition of S to more than half the double linkings does not cause the dipole moment of the mols. to vanish by compensation. Further evidence is required to prove or disprove a dipole mechanism. (Cf. B., 1929, 242.) D. F. T.

Effect of curing [vulcanisation] temperature on quality of vulcanised rubber. N. A. SHEPARD and J. N. STREET (Ind. Eng. Chem., 1932, **24**, 574—579).—Previous evidence on this subject is conflicting. Vulcanisation of a mixing containing reclaimed rubber and C black as additional ingredients and di-*o*-tolylguanidine as accelerator at temp. ranging from 138° to 160° indicates no influence on the tensile properties of the product, but its ageing qualities (natural and accelerated) are better in the vulcanisates obtained at the lower temp. With a stock of superior ageing resistance containing C black without reclaim, mercaptobenzthiazole as accelerator, and aldol-α-naphthylamine as anti-oxidant, the lower temp. show a tendency slightly to improve tensile strength and possibly to give better ageing. With unaccelerated rubber–S mixtures the temp. of vulcanisation has little influence on the initial tensile qualities of products with equiv. degrees of vulcanisation. D. F. T.

Effect of cadmium compounds on typical organic accelerators during vulcanisation [of rubber]. M. K. EASLEY and A. C. EIDE (Ind. Eng. Chem., 1932, **24**, 568—573).—Addition of a small proportion of various Cd compounds to a vulcanisable rubber mixture containing chemically pure ZnO shows that these with few exceptions retard tetramethylthiuram monosulphide, but slightly expedite vulcanisation with butaldehyde-aniline, di-*o*-tolylguanidine, or mercaptobenzthiazole. Identification of the various compounds of Cd present in commercial ZnO is difficult, and it is not possible at present to predict the action of Cd-containing Zn oxides. D. F. T.

Reactions during vulcanisation [of rubber]. II. Reaction between zinc soaps and mercaptobenzthiazole. H. A. Depew (Ind. Eng. Chem., 1932, 24, 565—573; cf. B., 1932, 316).—The need by mercaptobenzthiazole for the presence of a much larger proportion of fatty acids (and inferentially of sol. Zn) than is required by other accelerators of vulcanisation suggests the possibility of a dynamic equilibrium between mercaptobenzthiazole, its Zn compound, fatty acid, and Zn soap. Similar equilibrium conditions probably also apply in the case of other accelerators, but, the Zn compounds of these being more stable, a smaller excess of Zn soap suffices for conversion of a large % of the accelerator into its Zn derivative. Vulcanisation experiments are cited confirming the existence of the equilibrium, and experiments in a mixture of C_6H_6 and MeOH show that whereas at 50° ZnO and mercaptobenzthiazole fail to interact, the addition of increasing proportions of coconut oil fatty acids leads to an increasing % of Zn mercaptobenzthiazole in the equilibrium product. Particle size of the ZnO is not a serious factor in the activation of mercaptobenzthiazole. D. F. T.

Heat-resisting inner tube [rubber] stocks. E. W. Booth (Ind. Eng. Chem., 1932, 24, 555—559).—Heat-resisting quality is tested by enclosing test-samples stretched 50% in an air-filled bomb at 121° and 100 lb. pressure for 8—18 hr. Factors favourable to heat-resisting character include a low S content (1—1·25%), high content of accelerator (*e.g.*, 2% or more, on the rubber) and antioxidant (2%), and relatively high loading (*e.g.*, 20—25% of a soft black, on the rubber). The possibility of migration of S from the cover to the inner tube and of accelerator in the reverse direction must receive consideration. D. F. T.

Solubility of organic compounds in rubber. T. C. Morris (Ind. Eng. Chem., 1932, 24, 584—587).—A const.-temp. oven is described permitting microscopic observation of the material under examination. The temp. is gradually raised until a known proportion of substance which has been introduced just becomes completely sol. The phenomenon of supercooling is so general with rubber solutions that results obtained by a cooling method are untrustworthy. Solubility curves are given for dibenzthiazyl disulphide, mercaptobenzthiazole, diphenylguanidine, *m*-tolylenediamine, tetramethylthiuram mono- and di-sulphide. Only such substances as have a relatively high solubility at milling or vulcanisation temp. show any tendency to bloom. Calculation of the mol. wt. of rubber from the solubility of different substances and their heat of fusion leads to widely discrepant results. D. F. T.

C black for rubber. Accelerator-adsorption test.—See II.

Patents.

Manufacture of rubber [vulcanisation accelerators]. Soc. Ital. Pirelli (B.P. 368,509—10, 26.2.31. Italy, [A] 28.2.30, [B] 3.3.30).—The (A) mono- or (B) dialkylidene derivatives of NH_4 or disubstituted NH_4 substituted dithiocarbamates are non-scorching, delayed-action accelerators having also anti-ageing properties. Examples are the products from: CH_2O and piperidine pentamethylenedithiocarbamate (m.p. 61°); MeCHO and NH_4 phenylmethyldithiocarbamate (m.p. 72°); MeCHO (2 mols.) and NH_4 dimethyl- (m.p. 48—55°); phenylethyl- (m.p. 79°), dibenzyl- (m.p. 50°), or pentamethylene- (m.p. 50°) -dithiocarbamate; CH_2O (2 mols.) and NH_4 phenylmethyl- (m.p. 60°), phenylethyl- (m.p. 60°), or dibenzyl- (m.p. 55—60°) -dithiocarbamate. C. H.

Rubber product and its preparation. E. R. Bridgwater, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,822,561, 8.9.31. Appl., 12.4.29).—CdO, $Cd(OH)_2$, and Cd salts of the fatty acids, especially C_2—C_{18}, retard the action of powerful org. accelerators, especially those containing the group $\cdot N\cdot CS_2\cdot$, *e.g.*, tetramethylthiuram monosulphide, so that they can be used to prevent scorching during the processing of rubber mixtures containing such accelerators. D. F. T.

Manufacture of conversion products of rubber. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 369,716 and 369,725, [A] 6.2.31, [B] 23.2.31).—(A) Rubber, or a solution or dispersion thereof, treated with an aliphatic per-acid, *e.g.*, peracetic acid, or a mixture behaving as a per-acid, *e.g.*, Ac_2O and H_2O_2, at $\not>$ 45° gives powdery or fibrous products which are more sol. in org. solvents and can be used as constituents of varnishes or lacquers; they become plastic when heated and can also be used as substitutes for shellac, celluloid, etc. The polyhydroxy-compounds obtained by hydrolysis can be rendered harder by condensation with an aldehyde, *e.g.*, CH_2O. (B) Similar conversion products are obtainable by treating dissolved rubber with up to 1 mol. per diolefine group of a neutral peroxide of a carboxylic acid, *e.g.*, Ac_2O_2 or Bz_2O_2, below 80°. D. F. T.

Incorporating rubber with cellulose derivatives. Leather Cloth Co., Ltd., and M. Bandli (B.P. 369,576, 20.12.30).—A substitute for rubber or leather is produced by introducing into rubber solution a plastic mass prepared from a solution of cellulose derivative, *e.g.*, nitrocellulose, and a plasticiser, *e.g.*, tolyl phosphate, by pptn. with a liquid, *e.g.*, H_2O, which is miscible with at least one of the solvents, *e.g.*, $COMe_2$; the rubber solution may also contain a binding or dispersing agent, *e.g.*, dextrin or glue, which is miscible with the pptg. agent. The product is then sheeted. D. F. T.

Rubber compositions. R. Critchley, Ltd., and A. E. Bond (B.P. 369,561, 17.12.30).—A plastic composition is obtained by mixing into a conc. aq. dispersion of natural or synthetic rubber, to which a stabiliser may have been added to prevent coagulation, a cement (*e.g.*, aluminous or Portland cement) amounting to at least 150% by wt. of the liquid content of the dispersion. The composition, which may also include compounding ingredients and vulcanising agents, is applicable to such purposes as making roads, covering metal mesh-work, and producing moulded articles. D. F. T.

Insulating materials.—See XI. **Gum-resin compound.**—See XIII. **Treatment of seaweed.**—See XV.

XV.—LEATHER; GLUE.

Determination of the tannins of wattle bark. R. O. Page and H. C. Holland (J. Amer. Leather Chem. Assoc., 1932, **27**, 163—174).—The combined tannin was reduced by pretreating hide powder with anionic Cr solutions and increased by pretreatment with cationic Cr solutions and subsequent tannage in wattle-bark liquors. The sum of the combined tannin and the combined H_2O-sol. matter found in wattle-bark-tanned powders which had been pretreated with Na sulphitochromiate or $0 \cdot 1N$-NaOH or deaminised, respectively, was approx. const. and practically the same as the tannin content as determined by the official method of tannin analysis. A higher figure was obtained with powders pretreated with cationic Cr compounds. The combined H_2O-sol. matter is determined as tannin in the official method, but not in the Wilson–Kern method (cf. B., 1920, 522 A). Tannery practice is followed closely by the official method, where wattle bark is used, because it contains a small amount of non-tans, but the comparison would not be so close if and when a greater amount of non-tans is present. The concordance of analysis and practice in the presence of more non-tans is improved by adjusting the p_H of the hide powder and analytical solution to p_H 5. D. W.

Deterioration of leather by H_2SO_4 as influenced by tanning with blends of chestnut and quebracho extracts. R. C. Bowker and C. L. Critchfield (J. Amer. Leather Chem. Assoc., 1932, **27**, 158—163; cf. B., 1932, 198).—Leather tanned with a 1 : 1 mixture of chestnut and quebracho extracts was more resistant to the action of H_2SO_4 than that tanned with chestnut extract alone, but less resistant than leather tanned with quebracho extract. D. W.

[Qualitative] chemical examination of dyed leathers for presence of diamines and aminophenols. F. E. Humphreys and H. Phillips (Analyst, 1932, **57**, 290—295).—(1) Heating with Na_2CO_3 in steam at 200° gave distillates which, when tested by 8 of the most reliable existing methods (B., 1930, 183; 1931, 584; 1932, 1109), showed that *m*- and *p*-phenylene- and *m*-tolylene-diamines were qualitatively recoverable, whilst *o*- and *m*-aminophenols and amidol failed to give distinctive reactions. (2) Extracts of leather in 1% AcOH or $0 \cdot 1N$-HCl were extracted continuously for 24 hr. in C_6H_6 before and after addition of Na_2CO_3 or NaOH, and the final extracts evaporated under reduced pressure. AcOH is the better extractive for *o*-aminophenol and HCl for the *m*-diamines; positive qual. results were obtained in all other cases. Both methods avoid interference with the reactions by, *e.g.*, tannins, but the first is liable to decompose normally stable complex dyes into intermediates. J. G.

Dyes and dermatitis.—See IV.

Patents.

[Extracts of pyrocatechol] tanning materials and leather manufactured therewith. H. G. Bennett (B.P. 371,070, 2.2.31).—The p_H of the extract or infusion is adjusted to $4 \cdot 0$—$4 \cdot 5$, a metallic hyposulphite is added, optionally in the presence of a reducing agent, *e.g.*, $SnCl_2$, and the liquor is agitated until cool. D. W.

Treatment of seaweed for manufacturing purposes. J. S. Campbell (B.P. 371,811, 24.11.30).—Seaweed is boiled, *e.g.*, for 8 hr. with dil. aq. NaOH with the successive addition at intervals of aq. NH_3 and a tanning agent, *e.g.*, cutch. The jelly obtained may be used for the manufacture of floor or wall coverings or dried and mixed with latex, bitumens, oils, glue, etc. for making waterproof sheetings etc. L. A. C.

Hide, skin, and leather working and like machines. Turner Tanning Machinery Co., Ltd., and G. A. Schettler (B.P. 373,927, 5.11.31).

Rubber-cellulose derivative mixture.—See XIV.

XVI.—AGRICULTURE.

Soil structure. A. N. Sokolovski (Contr. Ukrain. Inst. Soil Res., 1931, **3**, 189—193).—A crumbly or granular structure is most suited for agriculture and is formed when soil contains sufficient "active" clay + humus, and Ca in an absorbed state. The "active" part of the colloidal complex is removed on leaching the soil with NH_4Cl or NaCl. Soil structure after removal of Ca and "active" clay + humus becomes laminary. Increase in fertility after drying is due to increase in stability of structure. Creation of a stable structure is connected with the ability of the soil colloids, humus in particular, to assume an irreversible state. Figures are given showing amounts of active colloids present before and after drying. A. M.

Composition of soil colloids in relation to soil classification. H. G. Byers and M. S. Anderson (J. Physical Chem., 1932, **36**, 348—366).—There are striking differences in colloid content between the great soil groups. Podsolisation, *i.e.*, fractionation of colloids, occurs wherever the humidity is sufficient to permit of extensive leaching of the products of soil hydrolysis, and the effects of hydrolysis are the more prominent the higher is the temp. It is impossible to build up a permanent store of plant food in soils of small colloid content, such as laterites and ferruginous soils, but the productivity of chernozem, prairie, podsol, and podsolitic soils, the exchangeable-base content of which has been exhausted by over-cropping, may be restored by adequate fertilisation. The first product of the hydrolysis of soil-forming minerals is an alumino-silicic acid complex, probably polybasic, in which the ratio $SiO_2 : Al_2O_3$ exceeds 2. When this constitutes a soil colloid, the acid H is partly replaced by bases. As hydrolysis proceeds, this is converted into a complex in which the ratio $SiO_2 : Al_2O_3$ has the val. 2, and Fe is present as hydrated oxide. H. M. S. (*c*)

Cyclic salt changes in soils. B. B. Polynov and S. Bystrov (Pedology, 1932, No. 3, 22—29).—The capillary rise of Cl′ and SO_4'' in a column of loam soil was studied. In the lower parts of the column SO_4'' predominates, but gradually decreases upwards, and at a height of 65 cm. no SO_4'' is found, whereas Cl′ is found at all heights. Sands showed similar results, the concn. of both ions, however, decreasing much more rapidly. A. M.

Dynamics of the coefficient of water percolation in soils and amelioration. A. N. Kostiakov (Pedology, 1932, No. 3, 17—21).—Darcy's coeff. of water infiltration in soils is not applicable to many problems in irrigation, and a coeff. of water percolation is suggested to take its place. A. M.

Processes in solonetz soils during amelioration. L. P. Rozov (Pedology, 1932, No. 3, 30—69).—Solonetz soils may retain their sp. properties for a long time under irrigation. Some cases show degradation with an increase in the alkalinity and absorbed Na and Mg in the lower layers. The presence of gypsum aids the degradation. A. M.

Influence of drying on the physico-chemical properties of moor soils. M. V. Dokukin (Pedology, 1932, No. 3, 70—72).—Dehydration of sphagnum peat gives rise to a decrease in the vals. of various physicochemical properties, the reverse being true for sedge-hypnum peats. A. M.

Reclamation of a greenhouse soil containing sodium-clay. E. McK. Taylor, R. M. Woodman, and F. Hanley (Chem. News, 1931, 143, 309—311).—Greenhouse tomato soil, rendered infertile by the continued use of brackish water containing approx. 1·6% NaCl, was economically reclaimed by treatment with $MgSO_4$ at the rate of 10 cwt. per acre followed by heavy waterings to leach the Na_2SO_4 formed by base exchange. W. G. E.

Soil-alkali problem in Western Australia. L. J. H. Teakle (Chem. Eng. Min. Rev., 1932, 24, 137—140).—A lecture describing methods of attack. N. H. H.

Continuous method for mechanical analysis of soils. M. M. Godlin (Contr. Ukrain. Inst. Soil Res., 1931, 3, 81—90).—The apparatus consists of a Cu vessel, 8 cm. in diam., the lower end being fitted with a wide-stemmed glass funnel. The top is covered with a Cu lid carrying a stopper which has a glass tube closed with a rubber tube and spring clip which, when opened after definite times, allows the suspension to flow out through the funnel. This method obviates the errors due to irregular settling and uneven suction. The results are quite comparable with the international standard method. A. M.

Determination of phosphate requirement of soils. A. T. Kirsanov (Bull. Leningrad Dept. Inst. Fert. and Agro-Soil Sci., 1932, No. 38, 31 pp.).—5 g. of air-dried soil are shaken for 5 min. with 25 c.c. 0·2*N*-HCl, allowed to settle for 15 min., and filtered. 5 c.c. of the filtrate are mixed with aq. NH_4 molybdate and the whole is stirred with a Sn rod until a blue colour is fully developed. The molybdate solution is prepared by dissolving 10 g. of the salt in 100 c.c. of H_2O, warming, and filtering hot; on cooling, 200 c.c. of conc. HCl (36%) and 100 c.c. of water are added. For use a dil. solution (1 : 4) is used. The colour is compared with a set of standards made with $CaHPO_4$. The method has been used successfully on podsolised soils in growing oats and barley, and a scale of indices has been evolved: soils containing 20 mg. or more in 100 g. of soil do not react to phosphate manuring; those with 8—20 mg. show medium reaction, whilst those with 7 mg. or less react readily. The method shows a correlation of 90% with field experiments on podsol soils. A. M.

Determination of exchangeable sodium in soil. M. M. Godlin (Contr. Ukrain. Inst. Soil Res., 1931, 3, 91—93).—10—25 g. of air-dried soil are wetted with 25—50 c.c. of $0·05N$-$H_2C_2O_4$, transferred to a filter, and washed with about 500 c.c. of this solution. The filtrate is evaporated and the residue ignited. The carbonates formed are leached with hot CO_2-free H_2O and the filtrate containing alkali carbonates is again evaporated with a few crystals of $H_2C_2O_4$ and ignited. Leaching, with successive evaporation and ignition, is repeated 3 or 4 times until all the residue dissolves in the first portion of H_2O. The mixed alkalis are determined by titration with 0·1*N*-acid or separated by the usual methods. A. M.

Absorption by plants. V. Ammonium nitrate and its influence on the absorption of potassium. F. Díaz Aguirreche and A. Castillo (Anal. Fís. Quím., 1932, 30, 228—235; cf. B., 1931, 318).—The presence of NH_4NO_3 produces an approx. proportionate reduction of the assimilation of K from KNO_3, and retards the growth of the plant (rye). Excess of NH_4NO_3 exerts a toxic influence. H. F. G.

Improvement of rough and hill grazings. II. Application of manures supported by heavy grazings. III. Sowing seeds, cultivation, and manuring. R. G. Stapledon (J. Min. Agric., 1932, 38, 1215—1222; 39, 36—46. Cf. B., 1932, 318).—II. Application of N and P fertilisers supported by heavy grazing by sheep considerably increases the yield and favourably modifies the botanical composition of the herbage of *Agrostis-Festuca* and *Molinia* types of open hill grazing.

III. Experimental results obtained at four centres in Wales are discussed. Application of a combined dressing of nitro-chalk and basic slag following adequate scratching and harrowing is most favourable to the establishment of the clovers and better grasses. W. G. E.

Farmyard [horse] manure as a source of carbon dioxide. I. I. Samoilov (Bull. Leningrad Dept. Inst. Fert. and Agro-Soil Sci., 1931, No. 42, 26—47).—The dung was placed on a thin layer of soil and covered with soil in cemented wooden channels between rows of potatoes so as to exclude any action of N compounds. The manure was used at the rate of 18, 36, 54, and 72 tons/hectare, and it is shown that the effect is proportional to the amount applied, giving almost a logarithmic curve. The plants on the manured parts flowered several days earlier and gave up to 140% increase in yield. The attempt at a quant. expression of the action of CO_2 by Mitscherlich's method, taking the amounts of manure as proportional to those of CO_2, gave positive results. $A = 309·3$ centners per hectare, $c = 0·295$, $b = 1·54$. A. M.

Basaltic black and red earths of Indo-China, their use in agriculture. G. Wery (Bull. Soc. d'Encour., 1932, 131, 349—359).—A discussion. C. W. G.

Urea phosphate.—See III. **Emulsifying media.**—See XII.

See also A., June, 597, **Soils of Nile and Gash.** 661, **Italian radioactive soils. Ripening of peaches.**

Patents.

Manufacture of fertilisers. H. Vanderputten (B.P. 371,556, 18.3.31. Ger., 19.3.30).—NH_4NO_3, fused or in hot, conc. aq. solution, is mixed with non-phosphated blast-furnace slag after this has been treated with sufficient H_2SO_4, *d* 1·71, to decompose compounds (CaS etc.) which interact with NH_4NO_3 with the liberation of NH_3. L. A. C.

Manufacture of fertilisers. Imperial Chem. Industries, Ltd. (B.P. 371,437, 21.1.31. U.S., 21.1.30).—Phosphate rock is decomposed with an $(NH_4)_2SO_4$–H_2SO_4 solution in which $(NH_4)_2SO_4 : H_2SO_4 = 0{\cdot}2$—$0{\cdot}5$ mol. : 1 mol. and $H_2SO_4 : H_2O$ corresponds to an acid concn. of *d* 1·60—1·71, and the product is treated with liquid or aq. NH_3, preferably in more than one stage. L. A. C.

Acridine derivatives.—See XX.

XVII.—SUGARS; STARCHES; GUMS.

Behaviour of some organic colouring matters in the crystallisation of sucrose. A. Brieghel-Müller (Z. Ver. deut. Zucker-Ind., 1932, **82**, 141—158).—Pure sucrose solutions, equally coloured with saccharan, ulmin, melanoidins produced from invert sugar and asparagine or glutamine, raw beet green syrup, and beet refinery molasses were boiled to massecuites and the centrifuged sugars were washed with saturated syrup and spun as dry as possible. Observations with the Zeiss–Pulfrich spectrophotometer showed that saccharan, the product of over-heating, was retained about 4 times as strongly as ulmin, produced by alkaline decomp. of invert sugar; the other colouring matters were retained to intermediate extents. All produced more discoloration in alkaline than in acid solutions. All the discoloured sugars showed most absorption at the red end of the spectrum (cf. Lundén, B., 1927, 395). The same character, in less degree, was observed with H_2O and highly purified sucrose. The bluish fluorescence shown by many technical sugars could not be traced to any one of the colouring matters studied. J. H. L.

Molasses with low purity quotients, and the crystallising capacity of molasses-like syrups rich in lime. O. Spengler and G. Dorfmüller (Z. Ver. deut. Zucker-Ind., 1932, **82**, 129—140).—It is probable that beet molasses which, according to current practice, are completely exhausted, may yet yield further sugar by crystallisation under certain conditions. By centrifuging 5 samples of raw beet sugar, 4—5 years old, at 5000 r.p.m., the authors separated 6—8% of molasses which, although still alkaline and free from invert sugar, showed purities of 50—53%. Molasses of still lower purities may be obtained in the working of spoiled or long-stored beets, and probably a high Ca content of the syrup is in part responsible (cf. Claassen, B., 1915, 241). From cossettes deteriorated by storage for several days acid juices were obtained which, after liming with 4% of CaO and double carbonatation, yielded syrups of purity 53·7—71·4% containing CaO equal to 11% of the Clerget sucrose present. These syrups crystallised with difficulty or not at all in the pan, but after addition of 1% of fine sugar and storage for several weeks at 20—22° with periodic stirring, the mother-syrups separated by centrifuging had purities of 37·1—52%. Before crystallisation the syrups contained reducers $\equiv 0{\cdot}6$—$0{\cdot}7$% of invert sugar, which, however, could not have been invert sugar. J. H. L.

Determination of moisture in honey. H. D. Chataway (Canad. J. Res., 1932, **6**, 532—547).—Determinations of viscosity, n, and H_2O content have been made with 60 honeys. Tables have been compiled, from which it is possible to ascertain the H_2O content from measurements of viscosity or n. Buckwheat honeys and possibly those which have become fermented give abnormal results. E. S. H.

Scholler–Tornesch process for saccharification of wood. B. Rassow (Chem.-Ztg., 1932, **56**, 329—331).—Scholler uses a 0·2—0·8% H_2SO_4 solution for the hydrolysis of cellulose. The solution is percolated through cellulose or wood at the proper pressure and temp. The systematic removal of the glucose produced prevents the reaction proceeding further. About 80% of the reducing products in the solution consist of fermentable sugars. The process is to be carried out in vertical cylinders filled with wood, the percolation H_2O being at 10 atm. and 160—190°. The acid sugar solution is neutralised with granulated phosphate rock and limestone. The yield in a trial run was 34·7% of the dry wood as fermentable sugar. The residual lignin is used as fuel. The process is ready for large-scale trials and if operated continuously should be capable of relatively small-scale working. It could then be used for the consumption of wood waste at the point of production. The production of EtOH, for use as motor spirit when mixed with petrol, by this process is intended. C. I.

See also A., June, 567, **Diffusion const.** 603, **Determination of fructose and sucrose.** 604, **Starch nitrates.**

XVIII.—FERMENTATION INDUSTRIES.

Prediction of extract of malt by Bishop's barley formula. W. J. Mitchell (J. Inst. Brew., 1932, **38**, 241—244).—Examination of a large no. of samples of Scotch barley and the resulting malts shows close agreement between the obtained extracts of the malts and those predicted from the 1000-corn wt. and N content of the barleys according to Bishop's formula. When the determined and predicted malt extracts do not agree, malting conditions have not been suited for the barley in question. C. R.

Detection of natural and sweetened wines. R. Linn (Chem.-Ztg., 1932, **56**, 451—452).—Unsweetened must and musts containing 5—25% of beet or cane sugar were fermented at 20°, and at intervals up to 44 days, 250 c.c. were decolorised with active C, evaporated at 65° to a syrup, and set aside at 0—5° for 24 hr. after addition of 1 c.c. of 50% H_2SO_4 and 4 drops of PhCHO; the amount of ppt. produced on adding 100 c.c. of H_2O was then noted. The unsweetened (control) must yielded 8·3% of EtOH, but no ppt., after 44 days, whilst all the sweetened musts showed a perceptible turbidity after 10—25 days (≡2—3·5% of EtOH), which increased as the EtOH production proceeded. The rate of appearance of the ppt. was slightly greater for beet than for cane sugar, and was a max. for additions of about 15% of either sugar. J. G.

Accidental presence of acraldehyde in distillates from cider. G. Warcollier and A. Le Moal (Compt. rend., 1932, **194**, 1394—1396).—Acraldehyde has been detected in the distillates from certain abnormal ciders and perries in which they had probably been produced from glycerol by abnormal bacterial fermentation. Methods for the detection of acraldehyde particularly in presence of CH_2O and MeCHO are discussed. W. O. K.

Fractionation of fusel oil and composition of the products obtained. V. V. Longinov and A. A. Prianischnikov (Trans. Inst. Pure Chem. Reagents, U.S.S.R., 1931, No. 12, 18—48).—The conditions for the fractionation of fusel oil are investigated, more particularly for the resolution of fractions consisting of mixtures of PrOH and $Bu^{\beta}OH$, and a fractionation–refractometric method of analysis which gives rapidly and sufficiently accurately the compositions of mixtures of 4 alcohols is developed. T. H. P.

[Bacterial] contamination of port wines. J. C. Botelho (Ann. Chim. analyt., 1932, [ii], **14**, 241—244).

[By-products from] wood saccharification.—See XVII.

See also A., June, 587, **Detection of SO_2 traces.** 648, **Determination of oxidase. Milk-peroxidase.** 649, **Tyrosinase and pseudo-peroxidase. α- and β-Amylase.** 650, **Phosphatase from bran. Prep. of succinodehydrogenase.**

Patent.

Attemperators for wort etc.—See I.

XIX.—FOODS.

Degree of grinding of flours. A. Heiduschka and R. Fischer (Pharm. Zentr., 1932, **73**, 337—339).—The ash, P_2O_5, furfuraldehyde, and pentosan contents of rye and wheat flours are in direct proportion to the degree of grinding of the flours. The largest relative differences occur in the pentosan vals. E. H. S.

Rapid determination of dry gluten in flour. P. Bruère (J. Pharm. Chim., 1932, [viii], **15**, 449—455).—Moist gluten is considered as a hydrogel the hydration capacity of which is a measure of baking val. and is given by 100×(moist gluten − dry gluten)/(moist gluten). Details of a method are described for the determination of dry gluten by separation of the gluten in the wet state from the dough by kneading over a no. 40-mesh sieve in a stream of H_2O, the process being repeated 4 times. The gluten is then weighed, spread over a glass surface, and dried in $<$ 3 hr. at 50° and finally, to const. wt., in warm air at 100—105°. Flours may then be classified according to the elasticity of the dry gluten, and fall into 3 classes according as the spreading coeff. (=no. of sq. cm. of glass surface covered by gluten/10×(wt. of dry gluten from 33·3 g. of flour) is 3, 4, or 5. J. G.

Effect of cooked potato in conjunction with fermentable carbohydrate in breadmaking. R. H. Harris (Canad. J. Res., 1932, **6**, 548—559).—Cooked white potato is not a satisfactory substitute for fermentable sugars in breadmaking; it stimulates yeast activity, but imparts a deleterious dark tint to the loaf. Addition of $KBrO_3$ without sucrose gives a greater loaf vol., except in the case of flours low in diastatic activity. No significant relation has been found between protein content and loaf vol. in absence of added fermentable carbohydrate. Addition of sucrose and malt to bakings with potato extract gave results equal to those obtained with other flour improvers. E. S. H.

Fluorescence of milk and butter in ultra-violet light. G. W. Baker and S. Taubes (Analyst, 1932, **57**, 375—376).—A bluish tint in such fluorescence is a fairly reliable indication of adulteration, and the absence of any yellow tint is to be regarded with suspicion. Samples of freshly rendered butchers' fat from the cow, sheep, or goat are not definitely outside the colour range of butter, but if kept they develop a dirty blue fluorescence. Artificial colouring matter may mask the fluorescence, but the colour may be removed by treatment with boiling H_2O and charcoal. M. S. B.

Analyses of two samples of Irish "bog butter." P. S. Arup (Analyst, 1932, **57**, 300—302).—Samples from Leitrim and Tyrone contained, respectively: H_2O 1·54, 1·10; non-fatty solids 1·31, 1·64; "Kjeldahl casein" 0·37, 0·16; unsaponifiable matter 0·65, 0·58 (contained cholesterol); ash 0·1, 0·29%; salt nil, nil; Reichert–Meissl val. 0·6, 0·45; Polenske val. 0·65, 0·75; acid val. 190·7, 196·9; acetyl val. 20·7, 10·1; I val. 9·2, 9·1; m.p. 45·6°, 47·0°; mean mol. wt. of acids 294·2, 284·9 (cf. J.S.C.I., 1907, **26**, 3). J. G.

Bacteria of salted fish. (Mlle.) H. F. M. Petter (Proc. K. Akad. Wetensch. Amsterdam, 1931, **34**, 1417—1423).—The following bacteria have been isolated and are described: from salted herring, a red rod, a red sarcina, and a colourless sarcina; from dried cod, a red rod; from "Trapani" salt, an orange rod. Isolation was carried out on peptone–agar with 30% NaCl. J. W. S.

Oiled wraps for apples. F. W. F. Arnaud (Analyst, 1932, **57**, 307—308).—Paper squares impregnated with a medicinal paraffin (wax is useless) serve as wraps to prevent "scald" on apples stored in CO_2. The oil is determined by extraction for 4 hr. in Et_2O or petroleum spirit and remains const. in amount for $>$ 3 months for bundles of the wraps, but decreases by $>$ 3% on exposure of the paper to air for 4 months. It has been stated that such wraps should contain 18% of oil, but 11·5—14·9% was found in wraps which were used with success. J. G.

Vitamins in canned foods. XII. Supplementary nature of grapefruit and prunes. W. H. Eddy, C. Z. Gurin, and E. F. Kohman (Ind. Eng. Chem., 1932, **24**, 457—460).—Canned prunes possess a high vitamin-*A* content in contrast to fresh or canned grapefruit, whilst the reverse holds good with vitamin-*C*. Canning has no adverse effect on the vitamin-*C* content of grapefruit. Both French and Italian prunes and

grapefruit are comparable with milk in their vitamin-*B* content and have a higher content of -*C* than of -*B*.
P. G. M.

Corrosion of Al.—See X. **Fatty acids in fats.**—See XII. **Moisture in honey.**—See XVII.

See also A., June, 587, **Detection of SO_2 traces.** 632, **Mohler's test for BzOH.** 638, **Determination of Zn in milk.** 648, **Milk-peroxidase.** 650, **Prep. of meal from jack-beans.** 652, ***Bacillus coagulans* [in milk].** 656, **Lovibond val. of liver oils. Halibut-liver oil.** 657, **Pecan nut as source of vitamin-*A*.** 658, **Plant foodstuffs and vitamin-*C*.** 659, **Determination of vitamin-*D*.** 666, **Sero-diagnosis in foodstuff investigations.**

PATENTS.

Manufacture of evaporated milk. J. M. McClatchie, Assr. to Borden Co. (U.S.P. 1,821,943, 8.9.31. Appl., 6.7.27).—A plant is described by which evaporated milk is sterilised before canning, thereby minimising the "cooked" flavour. Milk is heated in a coil to 40·5°, "flashed" up to 52·7—58·9° as a spray, cooled rapidly to 40·5°, and canned at that temp.
E. B. H.

Odourless desiccating method [for fish meal]. D. D. Peebles, Assr. to F. E. Booth Co., Inc. (U.S.P. 1,820,986, 1.9.31. Appl., 18.3.29).—The material is passed with superheated steam through a rotary dryer, the gases produced being passed around a complex closed circuit in which the excess steam is separated by condensation and the odoriferous gases are burned.
E. B. H.

Canning [of food etc. products]. F. B. Dehn. From Amer. Can Co. (B.P. 371,809, 21.10.30).—Food products are canned without brine or syrup, which cause undesirable changes in size, flavour, colour, or condition of the material. Cans are sealed and processed after removal of air and addition of H_2O, if not naturally present, to generate sufficient steam to provide efficient heat transference during processing. E. B. H.

Treatment of vegetable lecithin. Hanseatische Muehlenwerke A.-G. (B.P. 372,232, 2.11.31. Ger., 11.11.30. Addn. to B.P. 356,384; B., 1931, 1073).—A softer and more tenacious product is obtained by treatment with 0·4% of Bz_2O_2, which also effects bleaching.
E. B. H.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

So-called [Bourquelot] loganine reaction [for tinctures]. Coignet (J. Pharm. Chim., 1932, [viii], **15**, 456—463).—The colours obtained have been examined spectroscopically, and the specificity of the reaction is thereby greatly increased; 4 drops of a tincture of the sample and 1 drop of H_2SO_4 should be slowly warmed, the spectrum examined, and, after cooling, 4 drops of saturated $CaCl_2$ added. In all cases red or violet colours are obtained which change to grey, orange, or violet with $CaCl_2$, but the spectra of the first colours show one strong green band for St. Ignatius' bean, nux vomica, polygala, a feebler band for eucalyptus, guaiacum, gentian, and benzoin (2 for valerian), and no green band for asafœtida, quassia, opium, China anise, colombo, digitalis, or quillaia. J. G.

Determination of camphor in camphor liniment. III. Vacuum-oven method. C. F. Poe (J. Amer. Pharm. Assoc., 1932, **21**, 337—341).—5 c.c. of the liniment in a dish (not Al) of diam. > 70 mm. are heated for 2 hr. at 115—120° in a vac. oven and the loss in wt. is determined immediately after cooling. The method is more accurate than the U.S.P. method, as oxidation is minimised (cf. B., 1932, 160). E. H. S.

Standardisation and stabilisation of ergot preparations. VIII. E. E. Swanson, C. E. Powell, A. N. Stevens, and E. H. Stuart (J. Amer. Pharm. Assoc., 1932, **21**, 320—324; cf. B., 1932, 576).—The results described previously are discussed and a note on the ageing of fluid extracts containing 2—2·5% of buffer salts and reducing and oxidising agents is given. A solution of ergotamine tartrate in 40% EtOH appears to have the least deterioration at p_H 3 (approx.).
E. H. S.

Determination of hyoscyamine in the leaves of henbane and belladonna plants. T. Boehm (Apoth.-Ztg., 1931, **46**, 793—794; Chem. Zentr., 1931, ii, 3644). —A modification of procedure laid down in D.A.B. VI.
L. S. T.

Reactions of tropacocaine. L. Ekkert (Pharm. Zentr., 1932, **73**, 340—341).—Tropacocaine, in presence of H_2SO_4, gives with resorcinol yellow, rose-red, to violet and intense red on warming (violet-red in ultra-violet light); cocaine similarly gives yellow, brownish-yellow, and greyish-black (greenish-blue in ultra-violet). 10% of tropacocaine in cocaine can be detected by this reaction. Using β-naphthol instead of resorcinol, the order of the colour development is yellow, grey, greyish-brown to greyish-blue and green on heating (milky-blue in ultra-violet) and with α-naphthol violet-brown to dark violet and almost black. E. H. S.

Determination of morphine in opium. N. Rusting (Arch. Pharm., 1932, **270**, 323—328; cf. B., 1931, 905).—The Ca–Mn method is improved, but still gives higher results than the method given in D.A.B. VI. R. S. C.

Occurrence of *l*-*iso*menthone in Réunion geranium oil. O. Zeitschel and R. Eck (J. pr. Chem., 1932, [ii], **133**, 365—369).—When Réunion geranium oil (I) is oxidised with 2% $KMnO_4$ at 0°, treated with $NaHSO_3$ and then with $CaCO_3$ in the cold, and distilled in steam, an oil, $[\alpha]_D$ —74° 15′, is obtained containing much *l*-*iso*menthone. Hydrolysis of (I) and other geranium oils causes inversion of the *iso*menthone to menthone, and the latter is considered not to occur in geranium oils before hydrolysis. (I), when hydrolysed and freed from alcohols by the borate method, gives a mixture of largely inverted ketones, whence *l*-*neo*menthol (acetate, m.p. 36·5—37·5°, $[\alpha]_D$ —44° 40′) and *d*-menthol [odour indistinguishable from that of the *l*-isomeride (cf. B., 1912, 457)] were isolated on reduction. *dl*-Menthol has m.p. 35·5—36·5° (cf. *loc. cit.*). R. S. C.

Determination of essential oils in different pine-needle preparations. W. Peyer and H. Iffinger (Apoth.-Ztg., 1931, **46**, 740—741; Chem. Zentr., 1931, ii, 3644).—A modification of the D.A.B. VI method; extraction with C_5H_{12} is used. L. S. T.

Analyses and composition of California lemon and orange oils. H. D. Poore (U.S. Dept. Agric., Tech. Bull. 241, Mar., 1932, 31 pp.).—Complete figures are given for 73 samples of lemon oil, 63 of Valencia orange oil, and 31 of Washington navel orange oil, and are compared with those obtained from Italian oils. $[\alpha]_D^{20}$ of California lemon oils varied from 52·17° to 70·18°, and the citral by the Kleber method from 2·0% to 3·7%. With the orange oils the 11 samples of distilled oil resembled the 10% distillate from cold-pressed oil, containing, however, nearly as much aldehyde as the cold-pressed oils and 2/3 the quantity of esters. The Kleber figure for aldehyde may be 8 times as great as the Hiltner figure in the case of orange oils. Sealed samples of lemon and orange oils remained unchanged on storage, but were badly affected by the presence of H_2O or air. Many of the constituents of the lemon and orange oils were isolated, including, from lemon oils, a solid aldehyde, m.p. 58—59°, a *tert.* alcohol, $C_{10}H_{18}O$, and a white amorphous compound, m.p. 71—72°; traces of linalool and cadinene were found. The orange oils contained an unidentified white amorphous substance, m.p. 62—63°, and appeared to contain linalool. T. McL.

Flavines.—See IV.

See also A., June, 587, **Titration of H_3BO_3.** 611, **Amino-alcohols.** 618, **Podophyllin.** 622, **Heterocyclic -onium compounds. HgI_2 compound of pyridine.** 623, **Derivatives of anil- and styrylquinolines.** 628, **Synthesis of homo*iso*papaverine (and laudanosine).** 629, ***Aconitum* alkaloids. Pptg. agent for alkaloids.** 630, **Mercurochrome.** 632, **Detection of novocaine, tutocaine, anæsthesin, furols, and arecoline.** 648, **New choline derivatives.** 656, **Lovibond val. of liver oils.** 656—659, **Vitamins (various).** 657, **Cryst. oryzanin.** 659, **Determination of vitamin-*D*.** 662, **Non-alkaloidal fraction of ergot.** 663, **Essential oil of *Asarum*.** 664, **Alkaloids (various).**

Patents.

Manufacture of physiologically active substances from liver. M. Gänsslen (B.P. 372,128, 10.6.31. Ger., 10.6.30).—The pressed juices of the liver are freed from albumin, *e.g.*, by treatment with EtOH. E. H. S.

Purifying physiologically active substances. I. G. Farbenind. A.-G. (B.P. 371,550, 16.3.31. Ger., 14.3.30).—The active material of the crude extracts containing cardiac substances (cf. B.P. 359,523; B., 1932, 48) is pptd. by the addition of heavy-metal (*e.g.*, Cu, Ag, Pb, or Hg) compounds and the metal separated from the ppt. by the usual methods. Pptn. may be facilitated by the presence of alkali or alkaline-earth salts. E. H. S.

Manufacture of monoacyldiaminoacridines. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 368,884, 30.12.30).—A diaminoacridine is acylated in presence of 1 mol. of mineral acid, or the diamine is treated with an acyl halide; or the diamine monohydrochloride is treated with an acid anhydride. In each case only monoacyl compounds are formed. Mono-acetyl-, -phthaloyl, and -benzenesulphonyl derivatives of 3 : 7-diaminoacridine, the monourethane, and 10-amino-7-acetamido-2-ethoxyacridine are thus prepared. The products have good fungicidal action. C. H.

Manufacture of esters of [hydr]oxyacylaminobenzenearsinic acids. I. G. Farbenind. A.-G. (B.P. 369,117, 20.7.31. Ger., 19.7.30. Addn. to B.P. 347,083; B., 1931, 742).—The compounds of the prior patent are obtained by treatment of aminobenzenearsinic acids with acyloxyalkoxyl chlorides. *o*-Arsanilic acid is condensed with acetoxyacetyl, crotonoxyacetyl (m.p. 168°), or benzoyloxyacetyl (m.p. 183—185°) chloride. Acetoxyacetyl derivatives of 5-chloro-2-aminobenzenearsinic acid (m.p. 183°), 3-amino-*p*-toluenearsinic acid (m.p. 184°), and 3-amino-4-hydroxybenzenearsinic acid (m.p. 214—215°), crotonoxyacetyl derivatives of 4-chloro-2-aminobenzenearsinic acid (m.p. 170°), 3-amino-4-hydroxybenzenearsinic acid (m.p. 229°), and the 4 : 3-isomeride (m.p. 235°); α-acetoxypropionyl derivatives of *p*-arsanilic acid (m.p. $>$ 280°) and 3-amino-*p*-toluenearsinic acid (m.p. 170—171°), and α-crotonoxypropionyl derivatives of *p*-arsanilic acid (m.p. 217°) and 3-amino-*p*-toluenearsinic acid (m.p. 164—166°) are described. C. H.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Photographic plates for use in spectroscopy and astronomy. II. C. E. K. Mees (J. Opt. Soc. Amer., 1932, 22, 204—206; cf. B., 1932, 162).—New plates made by Eastman Kodak Co. are: three new types having high green sensitivity; a plate evenly sensitised up to the extreme red, the gap in the blue-green having been eliminated; a plate sensitive from visible red to the infra-red (0·85 μ), and a new plate, "Eastman infra-red Sensitive Plates B," sensitive up to 1·2 μ. J. L.

Polychrome photography. F. E. Ives (J. Opt. Soc. Amer., 1932, 22, 199—203).—A new two-colour process is described, using a green-blue sensitive plate and a panchromatic plate (with yellow filter). The bromide print from the panchromatic plate is toned blue; the other image is printed on positive film, developed, bleached and selectively hardened, developed in hot H_2O, fixed, washed, and dried, and then dyed with carmoisine and metanil-yellow, producing a gelatin relief in tones grading from yellow to deep red. This film is superimposed on the blue print. Excellent colour reproduction is obtained. J. L.

See also A., June, 581, **Becquerel effect with ZnO. Hypersensitisation. "Antagonism" and action of Ra-Em on plates. Photographic effect of pressure. $[Ag^{\cdot}]$ and $[H^{\cdot}]$ and sensitivity.**

Patents.

[Source of light for] production of photographic records. T. W. Case (U.S.P. 1,822,865, 8.9.31. Appl., 10.6.24).—Electrical variations, *e.g.*, produced by sound, are photographically recorded by means of a lamp containing He, giving a cathode glow about an electrode coated with an alkaline-earth, preferably BaO. (Cf. U.S.P. 1,747,287; B., 1930, 672). J. L.

Photometric or like apparatus. C. Zeiss (B.P. 369,845, 20.7.31. Ger., 27.12.30).—The rotating screen used in comparison measurements consists of two sector discs of unequal radii, mounted concentrically and adjustable relative to each other. The larger disc intercepts (and reduces the intensity of) both the measuring and comparison rays; the smaller disc intercepts only the latter. The screen is specially of use in cases where the intensity of the measuring ray is greater than half that of the comparison ray. J. L.

Colour photography. B. Gaspar (B.P. 369,616, 23.9.30. Ger., 24.9.29).—Two or three layers of Ag halide emulsions sensitive to different spectral zones respectively are superimposed on one carrier, forming a coherent whole. The two outer layers are thin in proportion to the intermediate layer, while containing the same amount of Ag. After exposure and development the whole Ag image is converted into a mordant compound, or dyed. The top layer is then bleached and recoloured in another colour; with three layers, the composite emulsion is then transferred to another support so that the bottom layer is now on top and is bleached and recoloured in a third colour. Suitable combinations of metallic mordants, or dyes, and their application, are given. J. L.

Colour photography. Du Pont Film Manufg. Corp. (B.P. 369,799, 27.5.31. U.S., 19.6.30).—In bi- and tri-packs the colour filter is composed of a gelatin layer mordanted with H_2O-insol. dye, superimposed on and mechanically inseparable from the emulsion. The dye is fixed in the gelatin by K alum, the mixture chilled to a jelly, shredded, washed, and then melted and diluted to the desired degree for coating. Such dye will not "bleed out" into the emulsion, and the gelatin surface makes close contact with the next emulsion. J. L.

Tinting of kinematograph films adapted for sound reproduction. Kodak, Ltd., Assees. of A. A. Young (B.P. 369,592, 12.12.30. U.S., 16.12.29).—Shrinkage and buckling of the film support after tinting the picture record are prevented by using a solution of the dye in a mixture of a solvent, *e.g.*, $COMe_2$, and a non-solvent, *e.g.*, MeOH, for the support; the non-solvent delays evaporation. Plasticisers may be added. J. L.

Production of gelatin reliefs. Syncomex Studien- & Finanzierungsges. (B.P. 371,872, 22.1.31. Ger., 22.1.30).—A Ag halide gelatin film mounted on an initial and temporary support is exposed on the film side, developed, and transferred to a non-metallic support (exposed side in contact), adhesion being aided with a H_2O-insol. cement, *e.g.*, varnish, gutta-percha. The initial support and sol. gelatin are removed in warm H_2O and the relief is employed as in the usual imbibition process. J. L.

Colour photography. W. Chapman (B.P. 371,477 and 371,867, 28.1., 28.1., and 17.2.31).

Photographic colour reproduction. G. Musaphia. From Du Pont Vitacolor Corp. (B.P. 373,203, 17.11.30).

XXII.—EXPLOSIVES; MATCHES.

Absolute measurement of available energy of high explosives by the ballistic mortar. W. Taylor and G. Morris (Trans. Faraday Soc., 1932, 28, 545—558).—It is shown, by means of the ballistic mortar described (expansion ratio 6·95), that the max. mechanical work which the explosion products can perform when utilised most efficiently in a given expansion can be determined in abs. units to within 1·3%. The theory of the mortar is that of the internal-combustion engine or a gun, with the provision that the whole of the explosive is converted into decomp. products before any mechanical work is performed. Experiments under standard conditions (loading density, 0·037 g. per c.c.) generally agree with theory when due allowance (approx. 10%) is made for heat losses, gas leakage, etc. With the charge too small or the loading density too great the discrepancies are larger, but can be evaluated from the expressions developed. The calc. conversion factors relating the throws given by different mortars with the same expansion ratio and loading density are verified by experiment. J. G. A. G.

See also A., June, 604, **Starch nitrates.**

XXIII.—SANITATION; WATER PURIFICATION.

Ammoniation in the Newark water supply. J. F. D. Bauermann (J. Amer. Water Works' Assoc., 1932, 24, 494—504).—Preammoniation tests on the water from the Pequannock watershed indicated that by this means higher residuals of Cl_2 could be carried without causing offensive tastes or odours and that the excess persisted for extended periods and so created additional safeguards to the purity of the supply. Aftergrowths in the mains were eliminated, and algal growths in the balancing reservoir greatly reduced. C. J.

Nomogram for evaluation of p_H, alkalinity, and carbon dioxide in water. I. L. Newell (J. Amer. Water Works' Assoc., 1932, 24, 560—561).—A chart connecting p_H, alkalinity (as $CaCO_3$), and free CO_2 is reproduced, whereby vals. determined for any two thereof can be used to give a rapid evaluation of the third. C. J.

Photometric micro-analysis of drinking and service water. II, III. C. Urbach (Mikrochem., 1932, 11, 37—50, 50—60; cf. B., 1932, 450).—II. Riegler's reagent (β-naphthol + Na naphthionate) has been used to determine HNO_2 in H_2O by means of a Pulfrich photometer. Calibration curves and tables are given for the range 0·005—1·8 mg. N_2O_3 per litre.

III. NH_3 has been similarly determined by means of Nessler's reagent. Curves and tables for the range 0·01—4·2 mg. NH_3 per litre are given. F. L. U.

Determination of the hardness of water. W. Wesly (Z. anal. Chem., 1932, 88, 241—242).—Polemical against Leick (B., 1932, 450). A. R. P.

Toxicity of motor spirit.—See II. **Corrosion of Pb and Cu.**—See X.

See also A., June, 654, **Oligodynamic action of metals.**

Patents.

Cleansing compositions especially for toilet use. E. M. Evans and H. L. Rees (B.P. 371,454, 24.1.31).—Solutions especially for the removal of nicotine stains contain 1—2% of free NaOH and NaOCl (or NaOBr). L. A. C.

Combustion of waste material.—See II.