BRITISH CHEMICAL AND PHYSIOLOGICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAY, 1938.

I.—GENERAL; PLANT; MACHINERY.

Action of slag from fuel in boiler furnaces. E. G. Bailey (Bull. Amer. Ceram. Soc., 1938, **17**, 55—67).—The conditions of slag and ash-dust deposition appertaining to various types of steam boiler are discussed and the history and development of air- and H_2O-cooled refractory walls are described. Many installations are illustrated by drawings. J. A. S.

Fly ash prevention. S. Brown (Paper Trade J., 1938, **106**, TAPPI Sect., 76—78).—The Buell cyclone dust eliminator for boiler flues is described (cf. B., 1937, 1143.) H. A. H.

Temperature conditions in boiler furnaces. R. A. Sherman (Bull. Amer. Ceram. Soc., 1938, **17**, 43—55).—Theoretical calculations and actual measurements of the working temp. of the refractories are discussed. It is not possible to calculate the temp., but it is usually well above that at which slag erosion occurs but < the softening point of the refractory. J. A. S.

Radiation and conduction losses in steam-boiler practice. K. Adloff (Wärme, 1938, **61**, 81—82).—Curves showing the % heat loss due to radiation and conduction plotted against heating surface and load are given for various types of boiler. R. B. C.

Representation of properties of superheated steam. P. Tongas (Chaleur et Ind., 1937, **18**, 459—465).—Empirical equations are derived for expressing the total heat in the steam at various temp. R. B. C.

Fractures in superheater tubes made of two materials by resistance welding. E. Kuhn (Wärme, 1937, **60**, 485—488).—The breakdown of a weld between austenitic Cr–Ni steel containing 0·5% of Cr and mild steel was traced to thermal and mechanical stresses resulting from faulty design and to insufficient heat-treatment. R. B. C.

Water conditioning. Anon. (Rayon Text. Month., 1938, **19**, 125—126).—An increased removal of mud from a river-H_2O supply was obtained after installing a modern, adjustable, chemical feeder, an accurate proportioner, and coagulating equipment, and including Na aluminate in the alum–soda ash coagulating mixture. W. A. R.

Boiler-water conditioning. F. J. Williams (Rayon Text. Month., 1938, **19**, 126—127, 129).—The Elgin system is described. W. A. R.

Scale-preventing action of protective colloids. N. F. Jermolenko and N. M. Shuromskaja (J. Appl. Chem. Russ., 1937, **10**, 2008—2012).—The stabilising action of a no. of colloids on $CaCO_3$ suspensions falls in the series gelatin > agar-agar > starch, whilst scale-preventing activity falls in the order tannin > agar-agar > starch > gelatin. Scale prevention is a result both of stabilisation of the suspension, and of formation of a protective film of colloid on the walls of the vessel. R. T.

Heat transmission through walls. II. H. Sheard (J. Inst. Heat. Vent. Eng., 1937, **5**, 388—390).—For a 9-in. Fletton brick wall the heat-transmission coeff. is 0·41 (B.Th.U./sq. ft./hr./°F. temp. difference), with or without outside rendering, and 0·42 for a 9-in. wall plastered on the inside. For an 11-in. cavity wall the coeff. was 0·30—0·31 with the cavity unventilated (0·32 ventilated). Further tests are in progress with forced ventilation of the cavity. It appears that an air brick 3 in. thick with 39 holes about $\frac{3}{8}$ in. square has a very high pneumatic resistance. T. B.

Heat transmission by radiation. E. F. M. van der Held (Gesundh. Ing., 1937, **60**, 201—202).—An equation is developed which takes into account the first reflected and the direct radiation. It is claimed to be more generally applicable than Christiansen's formula. R. B. C.

Reliability of thermal-conductivity measurements for [heat-]insulating materials. H. Oliver (Trans. Ceram. Soc., 1938, **37**, 49—61).—k tests on samples of almost identical insulating materials were made by the author (using a calorimetric method), and by three independent workers, two of whom used calorimetric methods and the third the apparatus of Blakeley and Cobb (B., 1932, 424). It was found that the variation in the vals. reported by the different workers (*e.g.*, max. differences of 25 and 15% at mean temp. of 204° and 427°, respectively) was in some cases considerably > that due to the limits of reproduction of an apparatus (*e.g.*, 3·7%). It is concluded that some tolerance is necessary when making comparison of the relative insulating efficiency of materials of this type from the k vals., unless these were obtained under comparable conditions of testing. A. L. R.

Errors in optical pyrometry. D. Vermeulen and J. J. Zaalberg van Zelst (Het Gas, 1937, **57**, 257—260).—Errors encountered with total radiation and monochromatic pyrometers due to deviations from the requirements of "black-body" radiation, energy losses by passage of the radiation through windows, and errors arising from the size of the aperture are discussed. As a rule the monochromatic instruments are less liable to error, but

they have the defect of requiring delicate electrical equipment for measuring the radiation. S. C.

Calorimetric measurements on refrigerants. A. PERLICK (Z. ges. Kälte-Ind., 1937, 44, 201—206).—Calorimetric data obtained with a vac. calorimeter are given for SO_2, CH_2Cl_2, $C_2H_3ClF_2$, and CCl_2F_4. R. B. C.

Use of the coercimeter in grinding tests. F. D. DEVANEY and W. H. COGHILL (Min. Tech., 1938, 2, Tech. Publ. 862, 13 pp.).—The relationships of coercive force to particle size, sp. surface, and power input during crushing were determined experimentally, using cleaned magnetite; the grinding efficiencies of various types of machine were compared by measuring the corresponding power input and sp. surface. The method is stated to be useful for studying the principles of grinding, but gives no indication of the grindability of ores other than magnetite. A. K. G. T.

Theoretical and commercial aspects of flocculation. J. O. SAMUEL (Inst. Chem. Eng., Mar. 8, 1938, Preprint, 3—10).—An account is given of the development from a theoretical investigation into the flocculation of coal and clay slurries to a commercial two-stage process applicable to a wide range of materials. The first stage consists of addition of a suitable reagent such as $Ca(OH)_2$, and it is suggested that the preferential adsorption of the OH′ increases the negative charge on the particles, which is then discharged in the second stage by a positively-charged gel represented approx. by $(C_6H_{10}O_5)XCl_2,nH_2O$ formed by the action of certain salt hydrates on starch paste. The flocculated material can be readily thickened and then filtered on continuous filters (cf. B., 1936, 964). F. J. B.

Physico-chemical basis of wetting. A. LOTTERMOSER (Fette u. Seifen, 1938, 45, 131—133).—The theory of the wetting of solids is outlined with special reference to froth-flotation. E. L.

Size analysis by photographic sedimentation. W. F. CAREY and C. J. STAIRMAND (Inst. Chem. Eng., Mar. 8, 1938, Preprint, 11—16).—An apparatus is described which operates on the principle of photographing the tracks of solid particles over definite time intervals as they fall in a well-illuminated field in a stagnant liquid under the action of gravity. The tracks recorded on the photographs obtained are measured and counted, and the diameters of the equiv. spheres calc. It is claimed that accurate size analysis can be made over the range 1—100 μ. F. J. B.

Design or adaptation of storage bunkers to prevent size segregation of solids. H. M. PEACOCK (J. Inst. Fuel, 1938, 11, 230—239).—As a result of several experiments with models, later confirmed by large-scale tests, it has been found that segregation, which occurs mainly during the filling of the bunker, can be almost entirely eliminated by fitting the bunker with a system of vertical baffle plates which divide it into a no. of small compartments after the manner of an egg-box. The size of the compartments and the shape of the upper and lower edges of the baffle plates are very important. For the case of filling from a central point, the vertical plates should be so shaped that their upper edges are bounded by the surface of an imaginary cone, with sides of uniform slope equal to the average angle of repose of the material (*e.g.*, coal), and with an apex immediately below the filling point. It is considered that the experimental data so far obtained are sufficient to permit the design of a baffle system for any existing type of bunker without the necessity of constructing further models. H. C. M.

Measurement of dissimilarities of distribution. Practice of statistics. C. BOEHM (Chem. Fabr., 1938, 11, 65—74).—Elementary methods of measuring dissimilarities (arithmetic mean, mean deviation, upper and lower limits) are compared with methods based on statistical theory (t- and χ^2-tests) for three series of measurements of the tensile strength of alloys. Safe conclusions as to the true val. of the batch can be drawn only by using theoretical methods, which consider the no. of samples. Results for the comparison of the strength of two alloys by the theoretical ($\Delta_{0\cdot0005}$), mean, mean-deviation, and lower-limit methods gave ratios of 2·29, 1·40, 0·86, and 1·40, respectively. I. C. R.

Physico-mechanical properties of compounds of high mol. wt. S. I. SOKOLOV and N. A. KROTOVA (Ann. Sect. Anal. Phys. Chim., 1938, 10, 367—372).—The sp. properties of elastic substances (rubber, leather, cellulose) are characterised by the elasticity coeff., the resilience modulus, and by limiting uniform deformation. R. T.

Classification of unit processes. R. N. SHREVE (Ind. Eng. Chem., 1937, 29, 1329—1333).—A review. H. A. P.

Influence of expansion of vapours on efficiency of distillation. W. SWIENTOSŁAWSKI and E. RAMOTOWSKI (Bull. Acad. Polonaise, 1937, A, 131—139).—The efficiency of fractionation of a system of dephlegmators is considerably increased by allowing the vapours to expand when passing from one unit to the other. K. S.

Emulsions and dispersions. R. J. JOHNSON (Oil and Col. Tr. J., 1937, 92, 1923—1928).—A lecture. D. R. D.

Measurement of large quantities of gases. Z. NOSEK (Chem. Obzor, 1937, 12, 160—162, 186—188, 201—203, 221—223).—Measurement is made by estimating the difference of pressure on two sides of a properly dimensioned screen, nozzle, or Venturi tube inserted in the conduit. A knowledge of the d, temp., and static pressure of the gas at the screen furnishes a const. for the calibration of the device, which is incorporated to give a continuous-reading apparatus for the quantity of gas passed. Detailed theoretical and practical explanations are given. F. R.

Measurement of temperature of gases. H. JÄGER (Arch. Wärmewirts., 1938, 19, 23—25).—A study of the literature shows that the effect of radiation is almost completely ignored in current methods of measuring gas temp. Examples are given showing that this leads to considerable errors, various methods of eliminating or reducing which are sug-

gested. Schmidt's gas pyrometer gives accurate results. R. B. C.

Dew-point potentiometer for determining moisture content of gases. S. S. STACK (Gen. Elect. Rev., 1938, 41, 106—108).—A portable instrument is described and its applications, *e.g.*, to determination of H_2O in annealing-furnace gases, are discussed. A thin metallic mirror placed in the gas and connected with a thermocouple is cooled to the dew point. The % of H_2O is obtained from a chart relating dew-point temp. with H_2O content. R. B. C.

The hygrometer constant. E. F. M. VAN DEN HELD (Gesundheits-Ing., 1937, 60, 741—743).—The const. is calc. on the basis of modern views of heat transfer, air flow, and evaporation. The effects of radiation and of the *k* of the supports are discussed. R. B. C.

Microprojection method for counting impinger dust samples. C. E. BROWN, L. A. H. BAUM, W. P. YANT, and H. H. SCHRENK (U.S. Bur. Mines, 1938, Rept. Invest. 3373, 9 pp.).—The method, which is described in detail, differs from the normal microscopical method solely in that images of the dust particles magnified to 1000 diameters are projected on to a ruled translucent screen, where they can be counted with both eyes and, consequently, with relatively little eye strain. The method also permits more conc. samples to be counted without the need for secondary dilution. H. C. M.

3rd report [of American Public Health Association] on methods of analysing industrial dusts. SUB-COMMEE. ON DUST PROCEDURES IN AIR ANALYSIS (Amer. J. Publ. Health, 1938, 28, Suppl., 85—90).—Samples consist of materials contributing to the dust, settled dust, or dust from filtration of air in suitable dust-collecting instruments. The dust samples are graded according to particle size (4 fractions) and the composition of each fraction is determined. Petrographic (optical and density measurements) and chemical analyses are carried out. Free SiO_2 is most important. W. L. D.

Formation, measurement, and properties of finest dust particles (aërosols). A. WINKEL (Z. Ver. deut. Ing., 1937, 81, 1495—1497).—A review. R. B. C.

Powdered-fuel-fired boilers. Combustion in boiler furnaces. Fuels for heating and hot-H_2O supply.—See II. **Refrigeration in rayon plants. Drying paper.**—See V. **H_2O-softening.**—See VI. **Reaction furnaces. Vaporisation of liquid SO_2.**—See VII. **Refractories.**—See VIII. **Cleaning blast-furnace gas. Open-hearth furnace efficiency. Deterioration of boiler-furnace grates. Steel pipes for high-pressure steam. Metals and steam engineering. Pistons for vehicle engines. Materials for precision machinery. Steam-turbine blades and condenser tubes. Dynamic tests on bearings. Welding boiler drums. Clad-metal vessels.**—See X. **Electrical pptn. of gases. Dust pptn.**—See XI. **Wetting and dispersion.**—See XIII. **Rubber-asbestos [packings].**—See XIV. **Grinding tanning materials.**—See XV. **Testing filter aids.**—See XVII. **Photothermometry.**—See XXI.

PATENTS.

Furnace construction and operation. G. T. SHOEMAKER (B.P. 479,645, 24.3.47. U.S., 28.4. and 5.12.36).—In a pulverised-fuel furnace, slag is collected in a thin sheet on a sloping floor and flows around a lip to a quenching device. B. M. V.

Furnace for heating granular materials. F. B. DEHN. From AMER. POTASH & CHEM. CORP. (B.P. 479,713, 8.5.36).—A fluid-fuel firebox is situated above a sloping hearth for the material or, preferably, a bank of the material itself. Ploughing means to facilitate the feeding of fresh material to the upper part of the slope and a chiller to condense molten particles out of the flue gases are described (cf. B.P. 475,041; B., 1938, 162). B. M. V.

Furnace [for enamelled-iron goods etc.]. E. W. DANY, Assr. to FERRO ENAMEL CORP. (U.S.P. 2,069,057, 26.1.37. Appl., 6.4.35).—A furnace in which the goods are supported through a slot in the roof is provided with an inverted channel forming a sand seal over the slot, long enough to close the slot in all cases whether the carriers are inside or outside the furnace. B. M. V.

Furnace walls. BABCOCK & WILCOX, LTD., Assees. of R. H. HARDGROVE, R. SHELLENBERGER, L. W. HELLER, and R. L. GODSHALK (B.P. 478,784, 2.4.37. U.S., 24.4.36).—A wall of fluid-cooled tubes is provided on the fire side with metallic projections of various patterns and the projections are secured, between the tubes, to a rigid impervious outer wall. B. M. V.

Mercury boiler. A. R. SMITH, Assr. to GEN. ELECTRIC CO. (U.S.P. 2,069,629, 2.2.37, 21.9.34).—The working liquid being dil. Na or Al amalgam, means are provided in the main drum to keep the composition const. by local circulation. Longitudinal gutters are placed to catch Hg lifted by ebullition and lead it endways. If several drums are provided they are interconnected in such a way as to produce circulation between them. B. M. V.

Muffle ovens. GIBBONS BROS., LTD., and T. TALBOT (B.P. 479,005, 19.7.37).—Heat-transferring slabs are secured at the top by channel members inverted over them and over projections on the main wall of the oven. B. M. V.

Apparatus for dry distillation. A. E. VOGT (B.P. 479,793, 27.1.37. Ger., 13.3., 23.4., and 3.10.36).—For distillation of coal (*e.g.*), at $<530°$, vertical retorts of elongated rectangular cross-section alternate with heating spaces between their long sides. Removable covers are provided, and also internal, partly nested containers by which the materials are inserted and withdrawn from above. B. M. V.

Apparatus for drying granular or powdered materials [*in vacuo*]. G. W. RILEY, and G. SCOTT & SON (LONDON), LTD. (B.P. 479,090, 30.7.36).—The material is fed continuously and descends through two vac. dryers (one being heated, the other unheated). They are normally in free communication,

but at intervals the transfer passage is closed and the unheated dryer subjected to a higher vac. to effect cooling, after which a portion of the dry material is discharged and the transfer reopened. The material may be fed as a pulp with H_2O and the free H_2O sucked out by means of a barometric column in a preliminary chamber. B. M. V.

Drum dryers for milk and the like. LÜBECKER METALLGIESSEREI U. MASCHINENFABR. G.M.B.H. (SCHRÖDER & Co.), and R KNOLLENBERG (B.P. 478,874, 29.6.37. Ger., 23.7.36).—The valley between a feed roll and a counter roll forms a reservoir for the supply of material; the feed roll and heated drum run upwards at their nip and excess feed is allowed to drop freely away into a special channel. B. M. V.

Pasteurising apparatus. B. E. GETCHELL, Assr. to TRUMBULL ELECTRIC MANUFG. Co. (U.S.P. 2,069,714, 2.2.37. Appl., 22.6.35).—A holding chamber for a const.-flow apparatus comprises a tubular body with a no. of baffles alternately annular and circular supported on rods and distance pieces. B. M. V.

Cabinets for conditioning textile and other materials. HALL & KAY, LTD., J. H. HALL, and A. MYERS (B.P. 478,947, 25.4.36).—A cabinet for testing samples or for experimental work contains separate chambers for the samples and for conditioning the air; in the latter are electric heaters of low heat-retaining capacity for heating the air under control of a thermostat and for evaporating H_2O under control of a humidistat. A fan and lock chamber are also provided. B. M. V.

Apparatus for subjecting materials to drying or cooling treatments. BUELL COMBUSTION CO., LTD. From BÜTTNER-WERKE A.-G. (B.P. 478,843, 23.10.36).—Very delicate materials are dried slowly on a slat conveyor most of which is within the drying chamber in the form of vertically superposed helices, but a portion of the run is brought outside for charge and discharge of material. B. M. V.

Cooling fluids to low temperatures, and diffusion refrigerating machines therefor. G. MAIURI (B.P. 479,536, 28.8.36).—The cold is produced by evaporation of the refrigerant at successively lower temp., brought about by adjusting the vac.; the fluid to be cooled travels countercurrent in each stage. B. M. V.

Heat-exchange apparatus. C. MORTENSEN (U.S.P. 2,069,555, 2.2.37. Appl., 4.8.36).—The apparatus comprises a tank containing upper and lower U-shaped headers connected by pairs of plates to provide the heat-transmitting surface. B. M. V.

Heat-exchange devices for fluids of the kind comprising a pile of superposed spaced partitions between which the fluids to be subjected to interchange are caused to flow. H. BEHRINGER (B.P. 479,840, 10.7.36. Holl., 10.7.35).—Apparatus comprising alternate plane and corrugated (or otherwise deformed) plates is constructed with the plates of foil thickness, separated around the edges by filling material which when clamped forms a box-like frame. B. M. V.

Fins or gills for tubular heat-exchange elements. A. J. BERG and J. O. HUSE (B.P. 479,887, 18.8.36. U.S., 14.2.36).—Strip or wire is bent to triangular form and the elements are secured to the tube by a helical tape. To ensure that the triangles stay upright the base (and the other two sides, if desired) may be kinked. B. M. V.

[Rotary] regenerative heat exchangers. AKTIEB. LJUNGSTRÖMS ANGTURBIN (B.P. 479,311, 12.10.36. Ger., 23.1.36).—Sealing means between the rotor and end plates are described. B. M. V.

Heat extractor. B. R. FAUNCE (U.S.P. 2,070,427, 9.2.37. Appl., 22.5.35).—Heat from flue gases is transferred to cold air by means of an apparatus including horizontal tubes in which are twisted metal ribbons to increase the heat-collecting surface. The hot gases pass inside the tubes, the entry to which is baffled in a graduated manner so that the smaller proportion of the hotter gases passes through the upper tubes. B. M. V.

Generation of heat by chemical action. B. DREIDING (B.P. 479,671, 16.8.37. Switz., 24.11.36 and 19.6.37).—A sheet coated with Al or an Al alloy on at least one side makes contact with an absorbent sheet containing $SnCl_2$, $CuCl_2$, or Cu_2Cl_2 and is activated, where desired, by moisture. B. M. V.

Production of pipe conduits for chemical purposes. H. BANGERT (B.P. 479,411, 3.6.37. Ger., 3.6.36).—A tube of glass, porcelain, or the like is introduced with clearance into a tube of Fe or other cheap metal, and the combination is drawn hot or cold through a die to cause the metal to bear tightly on the inner tube. B. M. V.

Crushing machine. O. C. GRUENDER, Assr. to NORDBERG MANUFG. Co. (U.S.P. 2,070,270, 9.2.37. Appl., 12.12.32).—A detachable mantle for a gyratory cone crusher is described. B. M. V.

Ore-reducing machines. HARDINGE CO., INC. (B.P. 479,659, 25.6.37. U.S., 18.7.36).—A rotating drum having buckets formed on the interior cylindrical surface is provided with means for diverting part of the material lifted by the buckets into spaces, at one end wall, containing screening devices, whence the undersize is discharged through the trunnion, the feed being through the other trunnion. B. M. V.

Apparatus for grinding or pulverising solid materials. W. F. CAREY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 479,283, 2.7.36).—Crushed material and new feed are sent together to a classifier; oversize forms the only feed to the crusher, which is of the roll type, and prior to it is a reservoir so that material may be fed in a continuous ribbon of thickness varying with the amount of material in the reservoir. One roll preferably forms one lower wall of the reservoir. B. M. V.

Apparatus for [comminuting solids and] straining liquids. JONES & ATTWOOD, LTD. (B.P. 479,639, 20.2.37. U.S., 21.2.36).—Apparatus for cutting up the solids in sewage or the like and passing them through the bars of the screen is described. B.M.V.

Pulverising melted products by atomisation. A./S. NIRO ATOMIZER (B.P. 478,925, 14.4.37. Denm., 14.4.36).—Immediately prior to impingement on the centrifugal disc or other mechanical atomiser the melted soap, soda, NH_4NO_3, or the like is passed through a cooler containing a rapidly rotating agitator wherein a substantial proportion of the latent heat is removed and crystals are formed of the same size as, or smaller than, those that will next be produced in the atomiser. B. M. V.

Machines or apparatus for washing granular and like materials. F. PARKER, LTD., and F. W. PARKER (B.P. 479,349, 31.7.36).—A feeding device for a rotary, cylindrical, contra-flow apparatus, divided into compartments, is described. B. M. V.

Separation of intermixed divided materials. J. D. MORGAN, Assr. to R. PEALE, W. S. DAVIES, and W. B. OAKES (U.S.P. 2,069,325, 2.2.37. Appl., 5.8.31).—Separation of raw coal or the like is effected (float-and-sink method) in a dry heavy "fluid," *e.g.*, sand or fine coal, kept circulating by air in a direction away from the feed in the upper part of the separating vessel and back in the lower part. B. M. V.

Mechanism for separating intermixed divided materials. R. PEALE, jun., Assr. to PEALE–DAVIS Co. (U.S.P. 2,069,326, 2.2.37. Appl., 6.4.31. Renewed 21.9.35).—In a pneumatic separator, the blast chamber below the deck is divided into compartments to which the blasts can be individually regulated by rotatable vanes. B. M. V.

Vibratory screen. H. H. RUMPEL and A. L. MUNRO, Assrs. to SMITH ENG. WORKS (U.S.P. 2,069,331, 2.2.37. Appl., 13.8.34).—An inclined screen is surrounded by a horizontal fixed frame carrying the bearings of a driving shaft; at the centre the screen is hung from and vibrated by a sleeve shaft eccentric to the main shaft, but most of the wt. is taken by springs at each end. B. M. V.

Hardness-testing machines. G. REICHERTER (B.P. 478,978, 28.1.37. Ger., 1.2.36).—An apparatus in which an impression-making element is moved aside and a microscope brought into action is described. B. M. V.

Centrifugal machines. MACHINEFABRIEK REINEVELD N.V. (B.P. 478,808, 24.9.37. Ger., 25.9.36).—A perforated basket is surrounded by an imperforate wall rotating with it, and a carrier liquid is supplied to the interspace, which is so shaped as to be self-discharging. B. M. V.

Centrifugal machines for [continuous] separation of solid and liquid materials. C. E. HARVEY (B.P. 478,816, 25.7.36).—The bowl has a conical wall and at the periphery of the larger (lower) end the solids are discharged by star-wheel devices driven at low speed by shafts and bevel gears from the main shaft or the rotor. B. M. V.

Centrifuging machines, more particularly for treatment of tobacco. M. NISZCZYNSKI and M. PEREPLOTCZIKOW (B.P. 479,706, 30.12.36).—The tobacco is enclosed between co-axial perforated walls in a completely enclosed machine and is treated with H_2O, steam, and compressed air supplied through a distributing device hinged with the cover. B. M. V.

Centrifugal separators. AKTIEB. SEPARATOR, Assees. of BERGEDORFER EISENWERK A.-G. ASTRA-WERKE (B.P. 479,007, 3.8.37. Ger., 25.8.36).—A labyrinth seal in the bowl neck through which a pared-off constituent is discharged is described. B. M. V.

Centrifugal separators. W. W. TRIGGS. From MACHINEFABRIEK REINEVELD N.V. (B.P. 479,010, 27.8.37).—In a bowl-type separator with horizontal axis, collected solid matter is dislodged at the crown by an elongated rotor parallel to the bowl wall, comprising an assemblage of castellated discs, and the freed material is collected in a trough with worm conveyor. B. M. V.

Centrifugal separators. A.-G. BROWN, BOVERI & Co. (B.P. 479,691, 14.8.36. Ger., 16.8.35).—Tangential stationary apparatus for separating liquid from gas is constructed so that at a convenient point within it the pressure is > that at entry, *i.e.*, some of the kinetic energy is converted into static pressure, and the excess pressure is caused to circulate a constituent, preferably the liquid, through external apparatus (*e.g.*, an evaporator) and back again to the entry. B. M. V.

Centrifugal separators. M. VOGEL-JØRGENSEN (B.P. 479,872 and 479,891, 13.8.36).—In apparatus of the type in which helical conveyor flights are attached to an inner rotor element and substantially touch an outer imperforate wall rotated at different speed: (A) the flights are formed of resilient material to prevent damage by presence of hard particles; (B) the material is fed through the inner rotor, emerging through passages that will give it a component of tengential velocity. B. M. V.

Separation of sludge-containing liquids. AKTIEB. SEPARATOR (B.P. 479,267, 5.7.37. Swed., 10.7.36).—In a centrifugal bowl containing a pack of discs and provided with sludge outlets which are opened and closed during rotation: when the sludge has accumulated, but before the outlets are opened, the liquid between the discs is replaced by another, supplied at a rather higher rate than that of normal feed. The added fluid may be previous sludge or liquid (H_2O for oil separation) of intermediate *d*. B. M. V.

Operating a thickener. H. F. ADAMS (U.S.P. 2,069,989, 9.2.37. Appl., 19.2.35).—In a circular thickener having a peripheral overflow and a central outlet for thickened sludge, the feed is to a no. of points near the periphery and the feeding device travels around with the sludge-raking device. The settled sludge then has to travel substantially the full radius and will become dense even in a shallow tank. B. M. V.

Continuous-flow strainers. H. J. C. WELLS (B.P. 479,749, 9.6.36).—A cylindrical strainer is secured (in a quickly detachable manner) between conical seats and is provided with a helical scraper to transfer solid matter to a sump. B. M. V.

Rotary [vacuum drum] filters or separators. R. C. CAMPBELL (B.P. 478,887, 27.7.36).—Construction of the passages and rotary valve for filtrate is described. B. M. V.

Dehydration of pulps. J. F. GEARY, Assr. to DE W. and J. W. VAN EVERA (U.S.P. 2,070,201, 9.2.37. Appl., 26.5.34).—Pulp from a thickener is directed into a container which is vibrated with differential acceleration to cause the solids to move to one end, where they are compacted and extruded. B. M. V.

Sedimentation apparatus. DORR CO., INC. (B.P. 479,519, 5.6.36. U.S., 14.6.35 and 25.4.36).—The rake-supporting arms are hinged on an inclined axis so that they will rise on abnormal load. B. M. V.

Filters. A. WOOSNAM. From PERFEX OIL RE-REFINERY SYSTEM, INC. (B.P. 479,292, 4.8.36).—A filter mass is contained in a casing which diverges downwards; the feed is to the upper surface and the prefilt is prevented from creeping down the walls by curtain baffles. B. M. V.

Apparatus for discharging filters. F. W. YOUNG, Assr. to OLIVER UNITED FILTERS, INC. (U.S.P. 2,070,074, 9.2.37. Appl., 24.9.34).—A doctor for a rotary drum filter is provided underneath with a no. of nozzles delivering air (or other fluid) at such an angle that it passes inwards through the filter medium, is reflected back by suitable means to emerge under the cake, and is then exhausted through channels between the nozzles. B. M. V.

Filter-papers for filtration of liquids in funnels. R. SCHÜLL (C. SCHLEICHER & SCHÜLL) (B.P. 479,393, 8.3.37. Ger., 6.3.36).—A V-notch is formed in the edge of the disc and is caused to coincide with one of the creases. The depth of the notch is about ¼ of the radius of the disc and the angle about 90°. B. M. V.

Spraying apparatus. J. G. MAYNARD and W. M. GODFREY (B.P. 479,079, 10.3.37).—The nozzles are supported by linkwork on a mobile carriage so that they may follow the surface to be sprayed, *e.g.*, a row of hop vines. B. M. V.

Purification of liquids. C. J. RODMAN (U.S.P. 2,070,453, 9.2.37. Appl., 18.3.29. Renewed 10.12.31).—Hydrocarbon oils or the like are dehydrated and degasified by spreading in thin films in an evacuated chamber. The films are formed on rotating spreader discs and conical collecting baffles, both being perforated with apertures so small that they are bridged by oil films; both sides of the films are thus exposed. B. M. V.

Emulsification device. R. L. GILBERT, Assr. to GILBERT FOUNDATION (U.S.P. 2,070,545, 9.2.37. Appl., 24.11.33).—In the lower part of a vessel containing the mixtures is a disc rotating closely below a stationary disc, the latter being perforated at the centre and provided with a stand-pipe. Under suitable conditions gas from above the liquid level will be drawn down this pipe. B. M. V.

(A) High-vacuum distillation processes. (B) Distillation process. EASTMAN KODAK CO., Assees. of K. C. D. HICKMAN (B.P. 479,802 and 479,816, [A] 5.3.37, [B] 19.4.37. U.S., [A] 5.3. and 21.11.36, [B] 18.4.36).—(A) In a mol. still for oils containing vitamins, the undistilled residue is also quickly cooled and returned to the reservoir of feed material, the latter being circulated until a desired fraction has been completely removed, and then the temp. is raised and another fraction removed, and so on. (B) Fish oils or like difficultly volatile materials are distilled at 70—250°/<0·1 mm. Hg in presence of an indicator having about the same distillation point, or, better, two indicators volatilising before and after the desired constituent, respectively. B. M. V.

Distillation control. M. R. FENSKE, Assr. to PENNSYLVANIA PETROLEUM RES. CORP. (U.S.P. 2,069,490, 2.2.37. Appl., 13.9.33).—From a main still the ratio of top condensate returned as reflux to that delivered as product is regulated by redistilling a sample of the product in a test column in which is a thermocouple (or no. of thermocouples selected one at a time by a switch) having both junctions in the column but considerably spaced vertically, the liquid flowing over the junctions countercurrent to its own vapour. If there is any difference in the final and initial b.p. of the fraction a current will be generated, and such current, if > any desired val., is caused, by means of a mirror galvanometer, photo-electric valve, etc., to control a valve determining the ratio of reflux. B. M. V.

Surface-type condenser arrangement. P. HÖSEL, Assr. to GEN. ELECTRIC CO. (U.S.P. 2,069,653, 2.2.37. Appl., 15.9.34. Ger., 19.12.33).—In a rising portion of the outlet conduit for permanent gas is placed a spray of cooled condensate, the total liquid formed running down the walls of the conduit into the condenser and being recovered with the main condensate. B. M. V.

Apparatus for separating dust from gaseous fluids. J. HOWDEN & CO., LTD., and P. H. N. ULANDER (B.P. 479,429, 4.7.36).—In a power-driven centrifuge the outlets for both dusty and clean air are in the end walls of the vortex chamber. B. M. V.

Separation of substances from gaseous mediums. D. D. PEEBLES (U.S.P. 2,069,389, 2.2.37. Appl., 3.8.34).—The gas is sprayed with volatile liquid and the mixture passed through a multi-tubular heater at a velocity > the crit., so that liquid is evaporated from the walls of the tubes and forms condensed drops away from the walls; subsequently the drops and entrained impurity are removed in a cyclone or other separator. B. M. V.

Washing out of weak acids from gases. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 479,301, 11.8.36).—Scrubbing with dil. alkali is effected in two stages (*A*, *B*), *A* being to remove substances, *e.g.*, C_2N_2, which are difficult to regenerate, and *B* to remove the main acids, forming a solution which is regenerated and used again in the same stage. In stage *B* the reagent is an org. base or alkaline-reacting salt of a weak org. acid, and in *A* a volatile base, *e.g.*, NH_3, or alkali carbonate, the solution being passed over S prior to re-use, and the

NH_3 (if present) removed from the scrubbed gas by H_2SO_4 prior to passing to *B*. B. M. V.

Dehumidifying air and other gases. G. M. CLARK. From WEISS & DOWNS, INC. (B.P. 479,373, 9.10.36).—Gas and hygroscopic liquid are passed concurrent in thin streams on heat-conducting surfaces so that, simultaneously with the scrubbing, heat is removed by means of another liquid, the surfaces being maintained at progressively lower temp. in the direction of flow. A final treatment with solid hygroscopic material may be given if desired. B. M. V.

Differential manometer. R. B. COBB and A. L. SLATER (B.P. 479,282, 1.7.36 and 28.1.37).—A container is provided with two manometers, one of which registers flow into and the other flow out of the container. Both manometers comprise a float suspended in a tapering tube. The position of the floats is recorded graphically. B. M. V.

Salinometer. V. H. GODFREY (U.S.P. 2,067,914, 19.1.37. Appl., 28.8.35).—A hydrometer constructed of material of uniform *d* throughout and having the same coeff. of expansion as the liquid to be tested is described. B. M. V.

Methods of rendering vessels vacuum-tight. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 479,812, 6.4.37. Ger., 8.4.36).—The completed and closed vessel is filled with a medium (I) and dipped in another medium (II) such that they will interact in the pores of any leak and form a solid metallic product, the pressure of (II) being substantially > that of (I). *E.g.*, (I) may be CH_2O vapour, and (II) $CuSO_4$ solution. The use of carbonyls and nitrosyls of Fe and Ni is also claimed. B. M. V.

Slurry filter.—See II. **Stabilising glass [of] thermometers.**—See VIII. **Preventing corrosion due to $(CH_2{\cdot}OH)_2$. Prep. of Al granules.**—See X. **Temp. control. Determining vac. in vac. insulation. Pptg. particles from gases. Measuring turbidity of fluids etc.**—See XI. **Purifying solutions by contact with a gas.**—See XVII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Petrology and the classification of coal. C. A. SEYLER (Proc. S. Wales Inst. Eng., 1938, 53, 254—305).—The "isovol law" deduced previously (B., 1933, 899), correlating the volatile matter (*V*) of a coal to its elementary composition, has been found to be valid for British bright coals (vitrains and clarains), but durains and fusains show a positive displacement of *V* for the same elementary composition. This "volatile displacement" (d*v*) is defined, without any assumptions, as the excess of the actual *V* over that of a pure vitrain (vitrinite) of the same elementary composition, as calc. by the equation $V = 10{\cdot}61H - 1{\cdot}24C + 84{\cdot}15$. British grey durains have d*v* 5—6, whilst that for black durains and fusains is much higher. The author states that these regularities and variations can be explained on the supposition that coals are a mixture of the three macerals, viz., vitrinite, fusinite, and exinite (definitions given), and that each maceral follows a similar law to vitrinite, viz., $V = a_mH - b_mC + k_m$, but with a different const., k_m. Assuming that the slope of the "isovols" (*i.e.*, b_m/a_m) is the same for all macerals, then, if *i* and *e* are the wt.-% of fusinite and exinite, respectively, in a coal sample, and if dv_i and dv_e are the corresponding d*v* of fusinite and exinite, then the d*v* of the coal (dv_c) will be given by the equation $100dv_c = idv_i + edv_e$. Similarly, the H content (H_c) of the coal can be represented by $100H_c = uH_u + iH_i + eH_e$, where H_u, H_i, and H_e are the characteristic H contents of vitrinite, fusinite, and exinite, respectively, the *u*, *i*, and *e* are the corresponding wt.-% of the three macerals in the coal. By a combination of these two equations the petrological composition of a coal can be deduced from the H and d*v*, or vice versa if the characteristic H and d*v* of the macerals are known. A triangular graph in which both the petrological composition and the petrochemical characteristics (H and d*v*) of a coal can be represented by the same point, whereby one can be calc. from the other, is described. H. C. M.

Upper carboniferous coals from Western Australia. C. R. KENT (Proc. Roy. Soc., 1937, A, 163, 568—574).—Five representative coals from the Collie Coalfield of Western Australia are analysed. The geology of the field is briefly described. It is concluded that the fundamental benzenoid structure resembles that of British bituminous and anthracitic coals in spite of the considerable differences in the flora from which the coals of the northern and southern hemispheres originate. G. D. P.

Sulphur study of some Assam coals. N. N. CHATTERJEE (Quart. J. Geol. Soc. India, 1937, 9, 157—162).—The major portion of the S in coke is present as some unknown org. complex which is not attacked by nascent H at high temp. H. C.

Chemical studies of Polesian [E. Poland] peats. W. GRODZINSKA (Rocz. Nauk Roln. Leśn., 1937, 43, 238—240).—Data relating to the mineral content of a no. of types of peat are tabulated. R. T.

Chemical study of Hokkaido peat. I. T. TADOKORO and N. TAKASUGI (J. Soc. Chem. Ind. Japan, 1938, 41, 37B).—Dry distillation of the peat yields gas (CO_2 61, CO 12%), liquor (total N 0·83, N as NH_3 0·56, AcOH 1·9%), and oil (distillation range 60—260°, *d* 0·84—0·89). A. R. PE.

Movement of firedamp in [coal-mine] air. H. F. COWARD (Trans. Inst. Min. Eng., 1937—8, 94, 446—453).—Firedamp in a roof cavity diffuses away under stagnant conditions at a rate corresponding with the known coeffs. of interdiffusion of CH_4 and air (A., 1937, 506). Its removal is greatly accelerated by the passage of objects along the roadway beneath. The rate of flow of CH_4 along the roof of an inclined gallery depends on the level at which the gas enters the gallery, the rate of delivery, and the inclination of the gallery up to an angle depending somewhat on the rate of delivery; other factors, including the shape and roughness of the roof, are also involved. A. R. PE.

Distance recorder for firedamp [in mine air]. H. LLOYD (Trans. Inst. Min. Eng., 1937—8, 94,

458—466).—A mechanically driven camshaft operates the valves of a vessel whereby every 6 min. a sample of air is taken, the CH_4 in it is burned on a hot wire, and the resulting pressure change is communicated to an aneroid operating a thread recorder or an electrical relay, the latter being used when it is desired to record at a distance or to actuate an alarm. The apparatus is portable and has a range of 0—3% of CH_4 (error $\not>$ ±0·05%). A. R. PE.

Statistical interpretation of laboratory coal tests and sampling methods. G. B. GOULD (Amer. Inst. Min. Met. Eng., Tech. Publ. 849, 1937, 24 pp.; Fuel, 1938, 17, 69—80).—Laboratory tests (for ash content) of samples of coal from successive shipments follow very nearly the "normal" distribution; the actual distribution is slightly asymmetrical, giving more results on the low-ash side of the average. There is a rough linear relation between the probable error and the ash content for similar coals. S contents and the fusion points of the ash are also distributed approx. normally. The principle that the probable error of the ash content of a sample comprising n increments $= r/\sqrt{n}$, where r is the probable error of the ash contents of individual increments, has been confirmed experimentally; the importance of finely crushing the sample before reducing it in size to the laboratory sample is emphasised. The experiments support the view that an accuracy suitable for commercial uses can be attained by comparatively small gross samples, consisting, *e.g.*, of 20 increments of proper size for the size of the coal. Increased accuracy can be attained by the use of groups of samples. The application of tolerances to commercial practice is discussed. A. B. M.

Radiographic examination of coal. R. BEECHING (J. Inst. Fuel, 1938, 11, 240—242).—By impregnating the coal with a solution rich in heavy atoms, *e.g.*, Pb salts, prior to radiographing, partings in the coal are shown more clearly and with more detail. Radiographs of slices from lumps of 4 different coals are shown. H. C. M.

Relationship between microstructure of coal and pure coal. F. L. KÜHLWEIN (Berg u. Hüttenmänn. Jahrb., 1937, 85, 221—228).—The distribution of ash-forming material in the banded constituents of coal and methods for the prep. of ash-free coal are discussed. Data for various types of coal are given. R. B. C.

Pneumatic methods of coal cleaning. C. BERTHELOT (Génie Civil, 1937, 111, 541—544).—Advantages of such methods are summarised, and the Birtley process is diagrammatically described. R. B. C.

Performance of a Baum-type coal-washing jig. H. F. YANCEY and M. R. GEER (U.S. Bur. Mines, 1938, Rept. Invest. 3371, 18 pp.).—Data are given for the performance of a full-sized Baum-type jig operating on 3-in. slack coal, ash content 15·6%. The influence of the two principal factors, size and d, was evaluated by making screen and d analyses of the feed, washed coal, and refuse. The jig operated most efficiently on the intermediate range, $1\frac{1}{2}$—$\frac{3}{16}$ in., and least on the finest particles. The overall efficiency when washing to a final ash content of 10·5% was 98%. H. C. M.

Performance of a pulsator-type coal-washing jig. H. F. YANCEY, M. R. GEER, and R. E. SHINKOSKEY (U.S. Bur. Mines, 1938, Rept. Invest. 3372, 19 pp.).—Determinations have been made of the performances, under ordinary plant conditions, of two pulsator-type jigs, one treating raw 3—$1\frac{1}{4}$ in. egg coal, ash content 20·9%, and the other treating raw $1\frac{1}{4}$—$\frac{1}{4}$ in. nut coal, ash content 16·4%. The separate influences of d and particle size were evaluated by separating the feed, washed coal, and refuse from each jig into two size fractions and making complete d analyses of each fraction. H. C. M.

Clarification of coal-washery effluent. F. K. T. VAN ITERSON (Proc. K. Akad. Wetensch. Amsterdam, 1938, 41, 81—94; cf. B., 1938, 2).—Various methods of flocculation are discussed. It is suggested that in coagulation by starch the mols. of the latter are adsorbed on the surface of the particles of the suspension in such a way that their dipoles point towards the particle. The surface presented to the H_2O exposes, therefore, mainly hydrophobic pyronoid rings which will attract one another much more than they attract H_2O mols. A coal-effluent clarifying plant employing starch as coagulating agent is described in detail. J. W. S.

Physico-chemical methods of examination of coal extracts. S. S. URAZOVSKI and J. S. ROZUM (Ukrain. Chem. J., 1937, 12, 525—535).—The possibility of chromatographic analysis (Al_2O_3 adsorbent) of C_5H_5N extracts of coal is indicated by preliminary experiments. R. T.

Experimental investigation of the use of oil for treatment of coal. R. A. SHERMAN and J. M. PILCHER (Trans. Amer. Soc. Mech. Eng., 1938, 60, 97—109).—The reduction in dustiness effected by spraying various sizes of coal with varying amounts ($<$1 quart to 12 quarts per ton) of five different petroleum oils or petrolatum was investigated. The Powell–Russell dust-testing cabinet (cf. B., 1933, 1040) was employed. Data for two different types of American coal are tabulated and discussed. The dustiness of oil-treated samples increased after storage, the rate of increase decreasing with increase in the quantity of oil applied. The amount of oil required for effective dust-proofing varied with the size of the coal; the removal of finer sizes reduced the amount of oil required for a given reduction in dustiness. R. B. C.

Dependence of the briquetting properties of raw brown coals on their colloidal structure. G. AGDE and K. E. VETTER (Braunkohle, 1938, 37, 135—138; cf. B., 1938, 11).—Curves showing the rates of drying of 4 brown coals in air at const. temp. are given. The rates of drying are at first uniform and similar for all the coals; they later fall off until practically const. vals. for the H_2O content are reached (the "hygroscopic H_2O" content). For 3 of the coals the hygroscopic H_2O content can be correlated with the strength of the briquettes produced from the coal; the exceptional behaviour of the

fourth coal is attributed to a difference in its capillary structure, which is indicated by a difference in the shape of the drying-rate curve. A. B. M.

Fixation of sulphur in briquettes. K. YAMARA and T. SAWAMURA (J. Fuel Soc. Japan, 1938, 17, 15—17).—Anthracite briquettes containing 5—6% of added BaO, $Ca(OH)_2$, and/or Fe_2O_3 retained 95—99% of their S on combustion. H. C. M.

Symposium on fuels for heating and hot-water supply. I. Fuel oil. I. LUBBOCK. II. Other fuels. H. L. PIRIE (J. Inst. Fuel, 1938, 11, 167—180, 180—185).—I. The advantages of oil as a fuel for central heating and hot-H_2O supply are discussed in detail, and illustrated descriptions are given of various types of installations. Recent technical advances in oil-burner development are reviewed: they include (*a*) an automatic burner with photo-electric control, (*b*) the dual system of heating and hot H_2O, and (*c*) the combined oil burner and air-conditioning unit.

II. The use of coal and coke as fuel for these purposes is discussed. Attention is drawn to the importance of selecting a fuel of a size suited to the particular plant in question. Reference is made to the "Eske" system of combustion, which enables coking slacks to be burned in central-heating boilers and with the min. of attention. H. C. M.

Ignition of coal. K. BUNTE, H. BRÜCKNER, and W. BENDER (Gas- u. Wasserfach, 1938, 81, 178—183, 200—203).—O_2 is passed at 5 litres/hr. through 2 g. of coal ground to pass a sieve of 4900 meshes per sq. cm., the temp. being raised by 1° per min. until ignition of the coal and deflagration occur. Ignition and deflagration temp., determined under these standard conditions, are reproducible within 1°. They are the lower the more volatile matter the coal contains or the greater is its $KMnO_4$-reducing power; they rise when the coal is "aged" by exposure to air. A. R. PE.

Inflammability limits of bituminous coal dust–stone dust mixtures according to English–American and German investigations. M. WITTE (Schlägel u. Eisen, 1937, 35, 278—281).—The results of Godbert and Wheeler (B., 1936, 771) and of Simon (B., 1938, 242) are summarised d represented graphically. Both investigations show the decisive influence exerted by the particle size of the two components or the inflammability limits. Stone dusting with 50% of stone does not prevent the inflammation of the finest sizes of coal dust (fly dust). R. B. C.

Powdered-fuel firing. Means of increasing the output of Lancashire boilers. T. F. HURLEY and R. COOK (J. Inst. Fuel, 1938, 11, 195—202; cf. Rept. Fuel Res. Bd., 1936).—It is shown that when firing with pulverised fuel the factor limiting the permissible heat release in a H_2O-tube boiler is the low ratio of surface to vol. obtaining in the combustion chamber and that because this ratio is large in the case of the Lancashire boiler it should be possible to obtain high heat releases provided that suitable means be adopted of securing rapid ignition and controlled mixing of the fuel and air. A detailed description is given of the Grid and Multijet burners, developed at the Fuel Research Station, with which high heat releases combined with reasonably good efficiencies have been obtained. The results of a series of trials using both types of burner over a wide range of loads from 50 to 250% of the normal rating that have been carried out on a Lancashire boiler and superheater are given. In general, slightly higher efficiencies were obtained with the Multijet burner. When operated at a max. load of 250% of the rated load, an efficiency of 60—65% was obtained. H. C. M.

Combustion of pulverised coal [in water-cooled boiler furnaces]. H. KREISINGER (Combustion, 1938, 9, No. 7, 23—28).—Factors influencing the combustion rate, *e.g.*, fineness of the coal and % of H_2O and volatiles therein, [O_2], and furnace temp., are discussed. Raising the furnace temp. beyond the point required for quick ignition retards combustion. R. B. C.

Calculation of combustion temperatures of solid and gaseous substances. KOVACHE (Arts et Mét., 1937, 91, 241—246).—Mathematical. Producer gas and blast-furnace gas are considered in detail. R. B. C.

Burning of various coals continuously and intermittently on a domestic overfeed stoker. H. F. YANCEY, K. A. JOHNSON, A. A. LEWIS, and J. B. CORDINER, jun. (U.S. Bur. Mines, 1938, Rept. Invest. 3379, 30 pp.).—Non-caking coal of 0—1 in. size was burned in a hot-H_2O boiler on an overfeed stoker with overall efficiencies ranging from 76% at a rate of feed of 12 lb. per hr. to 65% at 20 lb. per hr. When using sized coal, material $<\frac{1}{4}$ in. having been removed, efficiencies of 70% were obtained at the higher firing rate and, at the same time, the ashpit loss was reduced from 7% to 2·9%. Weakly caking coals proved, in general, to be unsuitable, mainly owing to the large loss of unburned coke to the ashpit, even at low burning rates. Intermittent operation, such as occurs where the stoker operates as demanded by a thermostat, gave the same overall efficiencies as, or only slightly lower vals. than, did continuous operation. H. C. M.

Effect of moisture content of coal on fuel consumption [in carbonisation]. E. DUBOIS (Gas- u. Wasserfach, 1938, 81, 148—151).—The effect depends on the thermal efficiency of the carbonising plant and on the nature and state of subdivision of the coal. Tables are given showing its val. under various conditions. A. R. PE.

Carbonisation of woods and their principal constituents. II. P. LEBEAU, P. MARMASSE, R. MICHEL, G. VIEL, and M. VOYER (Ann. Off. nat. Comb. liq., 1937, 12, 651—709; cf. B., 1936, 353).—The H_2O and ash contents, and the residual C and yield and composition of the gases obtained on dry distillation, in 100° stages up to 1000°, were determined for raw and purified cotton, purified celluloses from broom, chestnut, pine, elder, teak, etc., and pentosans from these woods. Data are tabulated and discussed. R. B. C.

Carbon. H. WIESENTHAL (Teer u. Bitumen, 1938, **36**, 37—39).—Methods for producing finely-divided C, *e.g.*, from C_2H_2, are reviewed. R. B. C.

Is carbon black amorphous or is it crystalline carbon, *i.e.*, graphite powder? W. ESCH (Kautschuk, 1938, **14**, 30—31).—The view is expressed that the forms of finely-divided C which do not reinforce rubber are graphitic in character. C blacks made by the channel process from natural gas in the United States, or from artificial mixtures containing hydrocarbon vapours in Germany, do not consist of simple C, but represent highly carbonaceous compounds with a small proportion ($\not>5\%$) of graphitic impurity. C_2H_2-black and "inactive" gas blacks contain a larger proportion of graphitic C ($\sim15\%$), but the main portion is still not graphitic. D. F. T.

Distillation of coal–oil mixtures. A. THAU (Glückauf, 1938, **74**, 97—104).—Diagrammatic descriptions are given of the following processes: Knowles, Catalysts, Ltd, Hampton–Ryan, Coal & Allied Industries, Ltd., and National Coke & Oil Co., Ltd. R. B. C.

Curran–Knowles coke-oven process. W. W. STEVENSON (Amer. Gas J., 1938, **148**, No. 2, 9—13).—The construction of ovens operated by an American firm is diagrammatically described. Heat is applied through flues forming the floor of the oven over which a layer of coal 10—12 in. thick is spread. Only the underside of the charge is heated. It is claimed that strong cokes can be obtained from coals of inferior quality. R. B. C.

Chemical purification of coke and some allied problems. O. DONY-HÉNAULT (Chim. et Ind., 1938, **39**, 225—234).—Laboratory- and semi-industrial-scale experiments show that substantial demineralisation and desulphurisation of a coke can be effected by treatment with dry Cl_2 at temp. up to 1100°, and that the reactivity of the resultant coke to CO_2 is increased 2- to 4-fold. H. C. M.

Increasing the benzol yield from [coke] ovens with roof channels. W. DEMANN and W. BRÖSSE (Tech. Mitt. Krupp, 1937, **5**, 176—196; cf. B., 1937, 638).—Tests on full-scale ovens showed that the yield could be increased by about 10% by fitting Goldschmidt and Schlanstein roof-channels and maintaining the temp. of the oven crown and roof-channel at 600—800° and 620—680°, respectively. Consideration of the yields and composition of the tar and gas indicated that the increased benzol yield is due to avoidance of thermal decomp. of gaseous products in the channel and not to the cracking of the tar, the pitch content of which was about normal. The benzol contains a slightly higher % of PhMe than that from a normal oven. If the temp. of the oven crown is >800—850° cracking processes occur and the benzol yield is reduced. R. B. C.

Aspects of electrical equipment of coke-oven and by-product works. W. F. COOPER (Gas World, 1938, **108**, Coking Sect., 32—36).—Precautions against (*a*) fire risks in explosive atm., by segregation of plant and by use of "flameproof" or "intrinsically safe" equipment, and (*b*) breakdowns due to corrosion, overloads, and other causes, are reviewed. A. R. PE.

Rules for size-testing of graded coke. F. WEHRMANN (Gas- u. Wasserfach, 1938, **81**, 164—168).—The sample is divided, by manual testing on circular holes of diameters suited to its particular grade, into oversize, undersize, and normal fractions. Certain rules for sampling are given and results reported from various works recorded. A. R. PE.

Combustion of [town's gas]. E. BIARD (J. Usines à Gaz, 1938, **62**, 27—32).—The dependence of the vol., *d*, and dew point on the CO_2 content of the products of combustion of gas of a particular composition, and the effect on the dew point of excess of secondary air, are shown by formulæ, tables, and graphs. A. R. PE.

Catalytic decomposition of carbon monoxide in town gas with steam. J. A. VAN DIJK (Het Gas, 1937, **57**, 225—229).—Experiments are described on the removal of CO from town gas by treatment with H_2O at 400—450° in presence of a Rütgerswerke A.-G. catalyst. In mixed gas, containing 11—20% of CO, the content was reduced to <2% at a max. gas speed of 400 c.c. per c.c. of catalyst. The CO_2 can be removed by the usual methods, but the $N(C_2H_4{\cdot}OH)_3$ process is preferred. Gas containing 2% of CO is as safe as gas containing 1%. S. C.

[Extraction of] naphthalene, benzol, and sulphur [from gas]. C. COOPER (Gas World, 1938, **108**, Coking Sect., 27—32).—Technical aspects of the extraction of these substances by oil-washing are discussed. Refrigeration improves recovery but should not be adopted until satisfactory efficiency in other directions has been attained. A. R. PE.

Tar-reconditioning plant for M.A.N. waterless holder. D. J. WARD (Gas J., 1938, **221**, 963—966).—The condensed H_2O and benzol are removed from the sealing tar, and its original physical properties are restored, by steam-heating and by circulating heated gas from the holder through it. (Cf. B., 1934, 532.) A. R. PE.

Determination of hydrogen sulphide in coke-oven gas. V. V. SHDANOV (Zavod. Lab., 1937, **6**, 1448—1451).—The gas is passed through 10% $Zn(OAc)_2$ or 5% $Cd(OAc)_2$ solution, in dil. AcOH, and 0·1N-I in KI is added, excess of which is titrated. H_2S cannot be determined by absorption in standard I in KI, as other constituents of coal gas also react with I. R. T.

Effect of paraffin hydrocarbons on determination of carbon monoxide [in gas samples]. K. A. KOBE and N. R. DUNBAR (Oil and Gas J., 1938, **36**, No. 42, 59).—In the I_2O_5 method, interference is caused by >1% of H_2, C_2H_6, or C_3H_8. Hydrocarbons above C_3H_8 must be removed by a liquid air trap. CH_4 does not interfere. J. W.

Determination of the amount of gas contained by steel bottles. J. OTTO (Physikal. Z., 1938, **39**, 137—141).—Errors in the calculation of vols. of gases (particularly mixtures, *e.g.*, coal gas) filling the bottles under pressure from the corresponding vols. at atm. pressure, making use of the ideal-gas laws, are considered. The compressibilities of Berlin coal gas at −50°, 0°, and 50° and at pressures up to 200 kg. per sq. cm. have been determined. Formulæ are given

for the calculation of the vols. of gas-filling vessels at different temp. and pressure. A. J. M.

Loss in power in gas-driven vehicle engines and methods for its reduction. W. RIXMANN (Z. Ver. deut. Ing., 1937, **81**, 1357—1363).—The causes of the loss in power when low- and high-speed petrol engines were run on C_3H_8–C_4H_{10}, town's gas, CH_4, and producer gas from wood charcoal or bituminous low-temp. coke, properties and combustion characteristics of which are tabulated, were investigated. Data are discussed. The power developed depended on the volumetric efficiency, the calorific val. of the gas–air mixture, and the thermal efficiency. The loss in power could be considerably reduced by use of the special types of gas–air mixer described. R. B. C.

Acetylene generators. E. SAUERBREI (Proc. XII Int. Congr. Acetylene, 1936, **1**, 240—261).—The manufacture and operation of the principal types of generator are described. S. J. K.

Modern economic tar-distillation plant utilising all waste heat. J. F. KESPER (Öel u. Kohle, 1938, **14**, 131—133).—The tar is distilled to pitch in two stills which are operated alternately in conjunction with a separate tube heater; the stills are not heated directly. The pitch leaving the stills serves to preheat the crude tar. Before passing to the stills the tar is predistilled by utilising the waste heat from the condensing system. Distillation is effected under reduced pressure. All details of the plant are designed to effect the max. economy in heat. A. B. M.

Influence of ash content of brown coal on yield of extract and of low-temperature tar. H. HOCK and O. ENGELFRIED (Braunkohle, 1938, **37**, 161—165).—German brown coals yield 80—90% more bitumen on extraction with EtOH–C_6H_6 if they are pretreated with dil. HCl; *e.g.*, 15·5% of bitumen was obtained from acid-treated Ilse coal (0·6% of ash, on the dry basis) as compared with 8·6% from the untreated coal (6·4% of ash). The acid-treated coals yielded 6—24% more tar, and slightly higher amounts of coke, than the untreated coals on low-temp. carbonisation. The acid, it is concluded, sets free bitumen ("*C*-bitumen") which was present in the form of a salt. Whether the increased yield of tar and the decreased ash content of the coke would render the acid pretreatment of the coal commercially economical is questionable. A. B. M.

Rational utilisation of primary Lisitschansk coal tar. G. B. KAGAN (Ukrain. Chem. J., 1937, **12**, 423—438; 1938, **13**, 22—39).—Methods of utilisation of the primary tar are described. R. T.

Hydrometric determination of analytical data and engine characteristics of brown-coal tar oils. R. HEINZE and F. PESCHKE (Brennstoff-Chem., 1938, **19**, 81—87).—The close relationships between *d* and calorific val., and *d* and ultimate composition, pointed out by Marder (B., 1937, 204, 316, 1006) have been confirmed for a series of brown-coal tar oils covering a wide range of *d*. The relationship between *d* and the cetene no. of Diesel oils (B., 1936, 966; 1937, 110) has also been confirmed. Such data can therefore be estimated by the use of the hydrometer. A. B. M.

Density as a measure of the combustion properties of brown-coal and bituminous-coal tar oils. M. MARDER (Braunkohle, 1938, **37**, 145—149; cf. preceding abstract).—The simple quant. relationships which exist between the *d* of tar oils from brown or bituminous coals and their calorific val., C or H content, disposable H, cetene no., etc. are illustrated by curves based on a wide range of data. Such properties of the oils can be estimated directly by the use of suitably calibrated hydrometers. For calorific val. and C content corrections have to be made for the tar acid content of the oils. A. B. M.

Processing of coal for production of motor fuel. A. THAU (Z. Ver. deut. Ing., 1938, **82**, 129—138).—Illustrated descriptions are given of various types of retort for the distillation of brown and bituminous coal and of producers for the production of "synthesis" gas. Recent developments in connexion with the low-temp. carbonisation and hydrogenation of coal, and the Fischer–Tropsch, Pott–Broche, and Uhde processes are reviewed. R. B. C.

Production of synthetic motor spirit with special reference to the Fischer–Tropsch process. H. G. SHATWELL (J. Inst. Fuel, 1938, **11**, 209—213).—The production of motor spirit by (*a*) pyrolysis of cracked gas, (*b*) low-temp. carbonisation, (*c*) destructive hydrogenation of coal, and, more particularly, (*d*) the Fischer–Tropsch process, is described. H. C. M.

Production of benzine from coal. F. NEUWIRTH (Österr. Chem.-Ztg., 1938, **41**, 75—82; cf. B., 1937, 1153).—Tars produced by the low-temp. (500°) carbonisation of a no. of brown coals have been examined. They contained 11·6—35% of tar acids. PhOH was present in appreciable quantities only in a tar from an older coal. All tars contained the three isomeric cresols, the *m*-4- and -5-xylenols, mesitol, and pyrocatechol. In the neutral oils were O-containing compounds, probably coumarone derivatives, which decomposed on distillation yielding further amounts of phenols. The processes for the production of motor spirit by the hydrogenation of tar or coal and by synthesis from water-gas are outlined. A. B. M.

Hydrogenation—a review of the early difficulties. C. H. LANDER (Proc. S. Wales Inst. Eng., 1938, **53**, 424—447).—The eleventh Menelaus Memorial lecture. A. B. M.

Degree of dispersion of bituminous dispersions. A. G. NASINI and C. ROSSI (Annali Chim. Appl., 1937, **27**, 582—594).—The mean size, size distribution, and diameter of particles in some commercial bitumen were determined. The degree of dispersion (inverse of the mean particle diameter) was 0·25—0·50. The observed results agree with those calc. from statistical considerations. The ratio between the theoretical and actual mean diameters affords the "index of prep.," a criterion of the regularity with which the emulsion has been prepared. F. O. H.

The search for oil. J. ROBERTS (J. Soc. Arts, 1938, **86**, 488—525).—A lecture.

Chemical treatment of Trinidad drilling fluid. I. MCCALLUM (J. Inst. Petroleum Tech., 1938, **24**, 1—15).—Quebracho solution was found experimentally

to be superior to aq. Na silicate for reducing the η of the mud. Overdosage with quebracho can take place without the mud acquiring a high gelling rate. Silicate-treated muds rapidly developed dangerously high gel strengths after the optimum point had been reached. The gelling of mud contaminated with cement was due to $Ca^{\cdot\cdot}$. Na silicate had no effect as regards reversing the action of the cement, but quebracho, Na tannate, and Na gallate lowered η to its normal val., although in absence of cement the action of the Na salts was much less. As regards the mechanism of mud-η reduction a fibrillar theory is necessary to explain the observed results and this assumes polarity of the individual clay particles. C. C.

Properties of typical crude oils from fields of the Eastern Hemisphere. A. J. Kraemer and E. C. Lane (U.S. Bur. Mines, 1937, Bull. 401, 153 pp.).—A comprehensive survey is recorded. Comments, tabulated data, and individual analyses of 142 samples drawn from 21 different countries are presented. In general, the yield of gasoline obtainable from the oils compares favourably in quantity and quality with that from crude oils of the Western Hemisphere. H. C. M.

T.V.P. [true vapour-phase] cracking process [for oils]. O. Zechetmayr (Mitt. Forschungsanst. Gutehoffnungshütte-Konz., 1937, 5, 167—171).—Data on the cracking and polymerisation of oil boiling between 140° and 360° produced by the Fischer–Tropsch process are given. The resultant spirit responds well to treatment with $PbEt_4$, addition of 0·3 c.c. of which to 1 litre of fuel raises the C_8H_{18} no. from 73 to 82. R. B. C.

[Petroleum] distillation and cracking plant heat-exchange systems. C. T. Chave (Refiner, 1938, 17, 4—11).—An illustrated review. R. B. C.

Separate pipe still and cracking units versus the combination [distillation-cracking] unit in petroleum refining. F. N. Chamberlain (Refiner, 1937, 16, 571—572).—An analysis of the cost data for the two processes shows that the installation of a combination unit is preferable. R. B. C.

Heating tubes in petroleum refineries. J. Dauvergne (Rev. Mét., 1937, 34, 676—689).—Safe limits of heating in tubes of the following materials are: mild steel 450—475°, C–Mo steel 500°, Cr–Mo–Al steel (Cr 0·5, Mo 0·5, Al 0·5%) 550°. C deposition may lead to high temp., and design is based on a high factor of safety. Mild steel is rapidly corroded and Cr–Cu steel is better; for higher temp. Cr–Mo and Cr–Mo–Al steels give greater resistance to corrosion. The use of 18 : 8 stainless steel is limited. S. J. K.

Pyrolysis of Fushun shale oil. II. N. Kishi and T. Ueda (J. Soc. Chem. Ind. Japan, 1937, 40, 405—406B; cf. B., 1938, 245).—When coal-tar light neutral oil was passed in the vapour state through shale ash, Cu, or P acid at the b.p. of the oil, unsaturation of all fractions of the oil was reduced and the 270—300° fraction was cracked, producing gasoline and kerosene. With crude shale oil, the 300—360° fraction was readily cracked and polymerised oil was obtained. On rapid heating of the crude oil in a cryst. Fe vessel, cracking of the wax and resinous fractions of the oil occurred, whereas when using a bronze vessel only the wax was cracked; in both cases, gasoline and kerosene were produced. H. C. M.

Production of high-speed Diesel fuel from Fushun shale oil. I, II. K. Ishibashi (J. Soc. Chem. Ind. Japan, 1937, 40, 406—407B).—I. The cetene nos. of the crude oil and of its fractions have been determined. The cetene no. was linearly $\propto$ the d or average b.p. of the fractions. Oils of higher cetene no. were obtained by hydrogenation or by solvent extraction of the crude oil with liquid SO_2 or NH_2Ph; cracking gave an oil of greatly reduced cetene no.

II. The effect of changes in operating conditions of the C.F.R. test engine on the accuracy of determination of the cetene no. of a fuel has been studied. Increase in fuel quantity or raising the temp. of the intake air and jacket-cooling agent tended to increase the cetene no., whilst elevation of the generator voltage and compression ratio tended to decrease the cetene no. Delay of the injection point tended to decrease and that of ignition point to increase the cetene no. H. C. M.

Modern methods of fractionating mineral oil by lower aliphatic hydrocarbons. M. Godlewicz (Petroleum, 1938, 34, No. 8, 1—5).—Methods of fractionating the oil by treating its solution in liquid *cyclo*propane with increasing amounts of CH_4, by warming its solution in this solvent near the crit. temp., and by lowering the pressure over this solution about the crit. temp. are explained. R. S. C.

Influence of distillation pressure on yield and quality of Diesel fuels from brown-coal tar. R. Heinze (Braunkohle, 1938, 37, 129—135).—Distillation of a brown-coal tar under increased pressure (3 atm.) gave 70% of a Diesel fraction (neutral oil freed from benzine and wax) having a cetene no. of 50, whereas distillation under normal pressure gave 65% of oil of cetene no. 47. Distillation in vac. gave a Diesel fraction of cetene no. 40. At pressures >3 atm. cracking became excessive. A. B. M.

Solvent extraction of Formosan petroleum oils. II. K. Kafuku and S. Syôno (J. Soc. Chem. Ind. Japan, 1937, 40, 394—395B; cf. B., 1937, 1296).—Treatment of the kerosene fraction (b.p. 175—275°) from Tôsikyaku crude with >20 wt.-% of liquid SO_2 gave three layers. The relations between quantity of SO_2 added and distribution of oil and SO_2 in each layer were studied, and the d and n of the purified oils were determined. The best results were obtained at 50—60% of SO_2 in the mixture, when the distribution of the oils in the upper, middle, and lower layers were, respectively, 11, 54, and 32%, the loss being 3%. On treatment of the same kerosene with conc. H_2SO_4, 13·5% of the oil was absorbed, 76·5% unabsorbed, and 10% unrecoverable. H. C. M.

Solvent extraction of Formosan petroleum oils. III, IV. S. Syôno (J. Soc. Chem. Ind. Japan, 1937, 40, 457—458B; cf. preceding abstract).—III. The fraction of b.p. 175—275° of Syukkôkô petroleum gives three layers with 30% of liquid SO_2, max. separation being obtained with 55—65%. SO_2 and H_2SO_4 give similar oils.

IV. The fraction of b.p. to 175° gives three layers with 55% of liquid SO_2. The degree of separation increases with increasing amounts of SO_2 used, and with 90% of SO_2 is about the same as that obtained with H_2SO_4. R. S. C.

Solvent extraction of Formosan petroleum oils. V, VI. S. SYÔNO (J. Soc. Chem. Ind. Japan, 1938, **41**, 60—61B, 61—62B; cf. preceding abstract). —V. The *d* of successive SO_2 extracts from the gasoline fraction and their aromatic, naphthene, and paraffin contents are shown.

VI. Results of similar tests on the kerosene fraction are recorded. A. R. PE.

Compressibility and velocity of pressure waves in petroleum oils. R. MATTESON (J. Appl. Physics, 1938, **9**, 44—49).—Curves are given which enable the adiabatic compressibility at 5—93°/5000 lb. per sq. in. to be calc. The effects of η and of tube expansion on pressure-wave velocity are discussed. The application of these data in Diesel injection systems is reviewed. H. J. E.

Mechanically induced orientation in [mineral] oils. M. AUBERT and A. PIGNOT (Ann. Off. nat. Comb. liq., 1937, **12**, 283—294).—The phenomenon of birefringence has been observed in films of oil subjected to mechanical stress. The apparatus used consists of a cylinder rotating inside a fixed outer cylinder, the space between being filled with oil which is tested for birefringence by means of polarised light. It is concluded that the condition of asymmetry is the result of orientation of the mols. R. B. C.

Optimum conditions of alkaline extraction of oxidised vaseline oil in the synthesis of carboxylic acids. A. I. LAPTEV and G. I. BARBASCHOVA (J. Appl. Chem. Russ., 1937, **10**, 2013—2021).—The oxidised oil is boiled with a 10% excess of 29% NaOH, in presence of 3% of fusel oil, or 1% of β-$C_{10}H_7$·OH; the oil separating from the soap solution contains 2·5—2·9% of acids, chiefly ether-acids. Separation of the oily from the aq. layer takes place readily when the latter contains $\not>$42% of soaps. R. T.

Pressure hydrogenation of Fushun crude shale oil. IV. N. KISHI and M. ANDÔ (J. Soc. Chem. Ind. Japan, 1937, **40**, 405B; cf. B., 1938, 246).—By partial cracking of the oil in H_2 at 450°/32 kg. per sq. cm. with Mo, Cr, or Fe oxide as catalyst, benzine (10% of crude oil) and wax (70% of that originally present in the oil) were obtained. H. C. M.

Fischer–Tropsch process for making synthetic gasoline. M. NAPHTALI (Refiner, 1938, **17**, 47—51). —A review. R. B. C.

Refining cracked gasoline from oil produced outside the United States. J. C. MORRELL, C. G. DRYER, and G. EGLOFF (Oil and Gas J., 1937, **36**, No. 33, 101, 104, 109; cf. B., 1938, 342).—Refining methods included simple H_2SO_4 treatment, doctor-sweetening alone and in combination with H_2SO_4, and vapour-phase adsorption. Results of refining and the properties of the products are given for crude oils from Russia, Venezuela, Rumania, Iran, Sumatra, and Mexico. J. W.

Synthesis of benzine from carbon monoxide and hydrogen under ordinary pressure. XXXVI. Relation between the activity of the catalyst and too high temperature. S. TSUNEOKA and Y. MURATA (J. Soc. Chem. Ind., Japan, 1937, **40**, 478—484B; cf. B., 1938, 130).—In presence of a Co-Ni catalyst (optimum temp. 195°) 1 : 2 CO-H_2 gives rapidly decreasing amounts of petrol as the reaction temp. is raised, none being obtained at 240°; at 270° a little petrol is formed, but none at 300°. The amount of CH_4 formed shows a sharp max. at 250°. The yield of CO_2 rises slowly to 220°, greatly increases at 230°, and then slowly decreases. The I val. of the petrol increases with the reaction temp. Catalyst used for reaction at too high a temp. loses efficiency for the reaction at 195°, the loss being the greater the higher is the initial reaction temp. and the longer it is maintained; an initial reaction temp. of 250° causes a 90% loss of activity. The loss occurs mostly during the first 1—2 hr. The activity is not regenerated by heating in H_2. Heating in N_2 does not cause loss of activity. The I val. of the petrol formed at 195° increases with rising temp. of the preliminary high-temp. reaction. R. S. C.

Motor fuels. F. SPAUSTA (Österr. Chem.-Ztg., 1938, **41**, 65—75).—The production and properties of a wide range of motor fuels (benzine from petroleum, benzol, motor spirits produced by hydrogenation or synthesis, EtOH, C_3H_8 + C_4H_{10} and other compressed gaseous fuels, suction gas produced *in situ* from wood, coke, etc., coal dust) are summarised. A. B. M.

Fuels for high-speed Diesel engines. D. V. JACOVLEFF (Rev. Univ. Min., 1937, **13**, 24—30, 67—78).—Factors influencing the ignition and combustion process, *e.g.*, composition and η of the fuel and engine design, are reviewed. R. B. C.

Correlation of laboratory tests on Diesel fuels with service-engine operation. W. F. JOACHIM (Trans. Amer. Soc. Mech. Eng., 1938, **60**, 137—144). —The work of the U.S. Naval Engineering Experimental Station is reviewed. R. B. C.

Experiments with fuels of different octane number. Y. SOGA and K. OGAWA (J. Fuel Soc. Japan, 1938, **17**, 18—21).—Fuels that have had their C_8H_{18} no. increased by addition of $PbEt_4$ can be used, without knocking, at a high thermal efficiency with a comparatively weak mixture. The effect on engine performance of blending fuels with EtOH is also discussed. H. C. M.

Formula for the calculation of octane numbers. M. AKITA (J. Fuel Soc. Japan, 1938, **17**, 1—3).—Experimental formulæ for calculating (*a*) C_8H_{18} nos. of pure *n*-paraffins, (*b*) C_8H_{18} nos. of two-component mixtures, (*c*) blending C_8H_{18} no. of a hydrocarbon, (*d*) blending C_8H_{18} no. index of a hydrocarbon, and (*e*) increase in C_8H_{18} no. of a base gasoline produced by addition of $PbEt_4$ are given. H. C. M.

Critical solution temperatures of mixtures of gasoline, *n*-propyl alcohol, and water. E. W. ALDRICH (J. Res. Nat. Bur. Stand., 1938, **20**, 9—16). —The crit. solution temp. of various mixtures of Pr^nOH and H_2O with three different gasolines are recorded. The H_2O-tolerances of gasoline-Pr^nOH

mixtures are generally > those for corresponding gasoline–EtOH mixtures. This gives $Pr^{\alpha}OH$–gasoline mixtures an advantage for use as motor fuels, but a possible disadvantage arises in that, if separation occurs at < −15°, or if a two-phase mixture is cooled to this temp., a solid phase is formed. J. W. S.

Water-tolerances of mixtures of gasoline with ethyl alcohol. O. C. Bridgeman and E. W. Aldrich (J. Res. Nat. Bur. Stand., 1938, **20**, 1—8).—Equations are derived which permit calculation of the H_2O-tolerance of any mixture of a gasoline with EtOH from the crit. solution temp (T_c) for a few mixtures containing the particular gasoline. The vals. of T_c can also be calc. for mixtures of known composition. J. W. S.

Rapid determination of lead tetraethyl in motor fuels. W. Ulrich (Oel u. Kohle, 1938, **14**, 131).—100 c.c. of the fuel are shaken (½ min.) with 10 c.c. of a 10 vol.-% solution of Br in CCl_4. 5 c.c. of conc. HNO_3 are then added and the mixture is again shaken until the pptd. $PbBr_2$ is dissolved. The acid solution is separated from the benzine and transferred to a porcelain crucible. The benzine is washed twice with 5 c.c. of 10% HNO_3 and the washings are also transferred to the crucible. The contents of the latter are treated with 1 c.c. of 10% H_2SO_4, evaporated to dryness, ignited to destroy all org. material, treated, after cooling, with dil. HNO_3, evaporated to dryness, treated with 2 drops of conc. H_2SO_4, and finally ignited to const. wt. The wt. of $PbSO_4 \times 0{\cdot}6427$ = vol.-% of $PbEt_4$ in the original motor fuel. A. B. M.

Determination of sulphur in combustible liquids. E. Boye (Chem.-Ztg., 1938, **62**, 208—209).—An apparatus suitable for the usual combustion in a stream of air and built up from ordinary laboratory materials is described. A. R. Pe.

Engine deposits—causes and effects. W. A. Gruse and C. J. Livingstone (Amer. Soc. Test. Mat. Symp. on Lubricants, Mar., 1937, 1—28).—The origin and character of the deposits found in the combustion chamber, valves, piston rings, etc. are discussed. R. B. C.

New combustion bomb and Berthelot–Mahler–Kroeker calorimeter apparatus. W. Lüdering (Oel u. Kohle, 1938, **14**, 133).—The bomb is made entirely of V2A steel and is provided with a cone joint so that no Pb or brass ring is required. The O_2 inlet is designed to close automatically. Other minor improvements are briefly described. A. B. M.

Determination of benzol vapour in the atmosphere. Anon. (Air Hyg. Found. Amer., Bull. 2, Part I, 1938, 8 pp.).—The air containing benzol vapour is passed slowly through nitrating acid and the $C_6H_4(NO_2)_2$ so formed is determined either by titration with aq. $TiCl_3$ or colorimetrically (A., 1936, 1308). The latter method is unaffected by homologues of C_6H_6. A. R. Pe.

Fundamental principles of lubrication. J. E. Southcombe (Gas World, 1938, **108**, Coking Sect., 41—44).—A general discussion.

Constitution of lubricating substances obtained from coal-distillation products [*e.g.*, hydrogenation products of pitch]. K. Zerbe and K. Grosskopf (Brennstoff-Chem., 1938, **19**, 61—73).—Pitch, pitch distillates, and pitch resins from bituminous coals were hydrogenated in a 3-litre rotary autoclave, using MoS_2 as catalyst (initial H_2 pressure 80 atm., reaction temp. 420°); fractionation of the product yielded viscous oils which were shown, on the basis of their C and H contents, *d*, *n*, and absorption spectra, to consist of pyrene, chrysene, octahydrochrysene, and other hydrogenated condensed-ring compounds. The lower-boiling oils in the product contained $C_{10}H_8$, anthracene, phenanthrene, and their homologues and hydrogenated products. Carbazole, which was practically unaffected by the hydrogenation process, was present in some of the fractions, but separated therefrom in the solid form. The viscous oils are similar in properties to the aromatic fractions separated from mineral lubricating oils (cf. B., 1935, 615, 710); they possess somewhat steep η–temp. curves. They are not equal in quality to mineral lubricating oils, but could replace the latter for some purposes. A. B. M.

Significance of petroleum resins for the coking tendency and viscosity of lubricating oils. H. Schindler and A. Bondi (Petroleum, 1938, **34**, No. 10; Motorenbetr., **11**, 2—6).—The resins were separated from the oils by adsorption on fuller's earth from a solution of the oil in light petroleum (cf. B., 1937, 407), being subsequently recovered from the earth by extraction with $CHCl_3$ and C_6H_6. Removal of the resins greatly diminished the amount of C residue obtained in the coking test (Conradson). The change was unaccompanied by any marked decrease in the volatility of the oil; in some cases the mol. wt. of the resin-free oil was > that of the original oil. The η of the oils was considerably lowered by removal of the resins; the resins themselves were highly viscous. The NH_2Ph points of the oils were raised by removal of the resins. Measurements of γ lead to the conclusion that the abnormally high Eötvös consts. of heavy mineral oils (cf. B., 1929, 118) are due to a concn. of the capillary-active resins in the surface. A. B. M.

Oiliness of liquids. V. Lubricants consisting of two or three chemical compounds. H. Akamatu. VI. Measurements of the kinetic friction coefficients by the method of sliding velocity. T. Sasaki (Bull. Chem. Soc. Japan, 1938, **13**, 127—133, 134—141; cf. A., 1937, I, 72, 130, 231, 294).—V. Static boundary-friction coeffs. have been determined for solutions of fatty acids, $C_{14}H_{29}{\cdot}OH$, tripalmitin, BzOH, and $COPh_2$ in various hydrocarbons, and for mixtures of these solutes in *m*-xylene, on glass surfaces. Friction seems to be governed by the surfaces with the adsorbed layer of lubricant, the friction-reducing power of which depends on the individual mol. structure of the adsorbed mols. rather than on the stability of the film. Readiness of adsorption follows the order AcOH > $C_{15}H_{31}{\cdot}CO_2H$ > $Pr^{\alpha}CO_2H$ > tripalmitin.

VI. An apparatus is described for measuring the velocity of a slider on an inclined surface lubricated with a test liquid. The kinetic friction coeff. deduced from such measurements is generally independent of velocity. Results are given for glycerin, AcOH, H_2O, and various alcohols and paraffins. J. W. S.

High-pressure viscosity as an explanation of apparent oiliness. H. A. EVERETT (J. Soc. Auto. Eng., 1937, **41**, 531—544T).—Pressure–temp.–η curves for three petroleum lubricants of the same η but different η index, obtained at pressures up to 15,000 lb./sq. in. and at 38°, 53°, and 99°, showed that differences in apparent oiliness were due to differences in the effect of pressure on η. R. B. C.

Use of extreme pressures in investigation of lubrication. T. C. POULTER (Oil and Gas J., 1937, **36**, No. 32, 46, 51).—Pressures up to 1,500,000 lb./sq. in. may now be obtained. The effects of high pressures on the properties of lubricating oils are discussed. J. W.

Hypoid lubricants. C. E. ZWAHL (J. Soc. Auto. Eng., 1937, **41**, 555—565T).—The analyses and properties of 182 types of lubricant approved for service by the Chevrolet Motor Co. are discussed. R. B. C.

Addition agents for motor [lubricating] oils. G. M. MAVERICK and R. G. SLOANE (Amer. Soc. Test. Mat. Symp. on Lubricants, Mar., 1937, 53—74).—The types of agents employed and their purpose are discussed. Engine tests have shown that the phosphite type of inhibitor in lubricants reduces corrosion in Cu–Pb and Ag–Cd bearings and inhibits oxidation of the oil to acidic compounds. R. B. C.

Testing lubricating oils with the Thoma machine. E. H. KADMER (Oel u. Kohle, 1938, **14**, 147—151).—In the Thoma machine two crossed rollers rotate in contact with one another with different angular velocities (50 and 300 r.p.m.). One roller also moves axially. The rollers rotate in a case containing the oil to be tested. The friction is measured for a range of loads from 200 to 2000 g. Oils are compared at a standard η (40 or 80 centipoises), obtained in each case by suitably adjusting the temp. Results for 54 oils are tabulated. The mean val. of the friction (for different loads) increases with increase in d, in η-pole height, and in % of C rings in the oil; it varies nearly linearly with n, and (for the hydrocarbon oils) with the NH_2Ph point. Oils of vegetable or animal origin show lower vals. for the friction than mineral oils, whereas tar oils show higher vals. A. B. M.

Laboratory extraction apparatus and its use in separating a lubricating oil fraction with acetic acid. S. T. SCHICKTANZ (J. Res. Nat. Bur. Stand., 1938, **20**, 83—86).—A glass extraction apparatus is described, suitable for use with solvents heavier than the liquids to be extracted. The solvent is distilled so that the condensate falls continuously through a column of the liquid. Data are given for the fractional extraction with AcOH of a fraction of "H_2O-white" lubricating oil of narrow b.p. range. J. W. S.

Lubricating problems in connexion with high-speed Diesel engines. C. G. A. ROSEN (Trans. Amer. Soc. Mech. Eng., 1938, **60**, 145—151).—Cylinder and piston-ring scratching, the life of bearings, and the influence of C and binder-forming substances on piston-ring sticking are discussed in relation to the choice of lubricant. R. B. C.

Industrial applications of the physical properties of graphite. V. A. H. STUART (Engineering, 1938, **145**, 260—262; cf. B., 1938, 339).—The graphoidal film developed by use of colloidal graphite in lubricating oil or presence of colloidal graphite in an oil or H_2O medium always tends to render metallic surfaces less liable to corrosion. A method of applying a tenacious film of graphite to almost any surface is described. Such a film is, at the same time, an efficient lubricant over a wide range of temp., a relatively good conductor of electricity and heat, is chemically inert, has a high "black-body" factor, and exhibits no vapour-tension effects. H. C. M.

Properties and uses of lubricating greases. S. BALLARD (Steel, 1938, **102**, No. 2, 36—40).—A review. R. B. C.

Flocculation. Storage bunkers.—See I. **Mineral oil sulphonic acids. Sulphonation of naphthenic acids.**—See III. **Mineral oils in textile industry.**—See VI. **Bentonites. Reducing properties of active C. CO determination.**—See VII. **Cements for oil wells.**—See IX. **Oil fuel for foundries. Lubrication in steel plant. Steel-mill lubrication.**—See X. **Selective electrostatic separation.**—See XI. **Whale oil [for fuel]. Lubricating greases.**—See XII. **Printing inks.**—See XIII. **Coal-tar distillates as insecticides.**—See XVI. **Firedamp.**—See XXII. **Mine gases. Determining phenols and acids in effluent waters. Poisoning by C oxides etc.**—See XXIII.

See also A., I, 201, **Band spectra of oxy-coal gas flame. Detonation ranges of hydrocarbon–air mixtures.** 202, **Spontaneous ignition under pressure of liquid fuels.** II, 132, **Production of coronene [from coal].** III, 334, **Toxicity of ψ-cumene and heavy coal-tar naphtha. Latent benzol poisoning.**

PATENTS.

Filtering apparatus for coal-washery slurry. H. J. GREAVES (B.P. 478,758, 24.10.36).—The apparatus comprises settling and grading compartments and an external drum filter. B. M. V.

Manufacture of solid fuel briquette. A. J. DECKER (U.S.P. 2,066,457, 5.1.37. Appl., 9.10.35).—Wood pulp (21) is ground in H_2O to a mush to which is added coal dust (67), excess of H_2O is squeezed out, asphalt (12%) is added, and the mixture briquetted and dried. A. R. P.

Obtention of coal extracts. GEWERKSCHAFT M. STINNES (B.P. 480,214, 11.3.37. Ger., 28.3.36).—Coal is extracted with 1·5 times its wt. of hydrogenated oils, acid oils, or mixtures of the two, *e.g.*, 80% of tetrahydronaphthalene and 20% of cresols, at 425—435°/1000 atm. for throughputs of 1 kg. of coal/solvent mixture per litre of reaction space, the temp. being raised to 440—450° if the throughput is doubled. D. M. M.

Process for obtaining coal extracts. GEWERKSCHAFT M. STINNES (B.P. 480,644, 17.6.37. Ger., 17.6.36. Addn. to B.P. 480,214; preceding abstract).—Extraction is effected in presence of H_2 under

pressure in order to inhibit dehydrogenation of the hydrogenated oils, *e.g.*, tetrahydronaphthalene, in the solvent. Known hydrogenating catalysts, *e.g.*, Mo compounds, may be added. A. B. M.

Working-up of products obtained by solvent extraction or mild hydrogenation of solid carbonaceous materials. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 481,108, 31.8.36).—Solid carbonaceous material is treated with a solvent, *e.g.*, tetrahydronaphthalene, or a mixture of solvents, under elevated temp. and pressure, *e.g.*, 370—420°/50—200 atm., and in presence of H_2 to cause a mild hydrogenation if desired. H_2O is distilled off from the product, solid residues are filtered and/or centrifuged off, and the remaining extracting agent is at least partly distilled off. The residue is divided mechanically, *e.g.*, by centrifuging at 150°, into separate fractions of which one is wax-like and one asphaltic. D. M. M.

Coke ovens. W. W. GROVES. From DR. C. OTTO & CO. G.M.B.H. (B.P. 479,558, 13.1.37).—Each of the lean-gas supply pipes is connected to the corresponding regenerator sole channel by a series of short pipes each fitted with an interchangeable solid disc for the purpose of regulating the flow of gas therein. A. B. M.

Coking retort ovens KOPPERS CO. OF DELAWARE (B.P. 480,174, 17.8.36. U.S., 17.8.35. Addn. to B.P. 477,962; B., 1938, 248).—In ovens of the type described in the main patent, means are provided whereby all or part of the combustion air may be supplied from an alternative source in order to prevent the temp. in the substructure reaching such a low level that the temp. of the foul gas falls below its dew point. D. M. M.

Carbonisation of pitch. W. W. GROVES. From DR. C. OTTO & CO. G.M.B.H. (B.P. 480,652, 15.9.37).—Pitch in granular form is moistened with enough H_2O (5—10%) to inhibit its tendency to flow when heated to above its softening point, and is carbonised in an externally-heated chamber oven. A. B. M.

Destructive hydrogenation of coal, in particular bituminous coal. INTERNAT. HYDROGENATION PATENTS CO., LTD., Assees. of I. G. FARBENIND. A.-G. (B.P. 481,141, 23.2.37. Ger., 3.3.36).—Increased yields of liquid products are obtained in the hydrogenation of bituminous coals with $<82\%$ C by treatment, when pasted with oil in the usual manner, with a stream of H_2 at $>400°/<250$ atm. under such conditions that the partial pressure of the H_2 can be found from $\log p = 0{\cdot}063283C - 2{\cdot}809$, where C is the % C in the ash- and H_2O-free coal and p the partial pressure (atm.) of H_2. D. M. M.

Automatically controlling the production of water vapour and the supply thereof to a gas producer. A. L. GALUSHA (B.P. 480,902, 4.12.36. U.S., 31.10.36).—A gas producer is claimed in which all the air supplied to the combustion zone is caused to pass over hot H_2O in a water-jacket, the temp. of the air supplied and its H_2O content being automatically regulated. Means are provided for removing ash from the wall of the jacket to maintain uniform heat-transfer conditions. D. M. M.

Carburetted water-gas sets. SEMET-SOLVAY ENG. CORP., Assees. of C. V. MCINTIRE and W. TIDDY (B.P. 479,832, 11.9.37. U.S., 17.9.36).—The set is so connected that the top of the generator communicates only with the base of the carburettor (which is elevated to be in alinement with the top of the generator) and the top of the carburettor only with the top of the superheater. This arrangement ensures that the direction of gas flow during both the run and backrun is such as to give the most efficient heat transfer and the best conditions for cracking and gasifying the oil supplied to the carburettor. A. B. M.

Production of hydrogen-containing gases. NAT. COKE & OIL CO., LTD., and J. L. STREVENS (B.P. 480,820, 4.1.37).—Water-gas which may have been treated with steam to lower its CO content, the CO_2 formed being washed out with aq. alkali, is mixed with a permanent gas from coal (etc.) distillation containing a low $CO : H_2$ ratio, *e.g.*, a gas of the composition H_2 39, CO 5, CH_4 39%, with smaller quantities of CO_2, N_2, and C_nH_m, in such proportions that the mixture contains 2 vols. of H_2 to 1 vol. of CO and 30—35% of hydrocarbons, N_2, CO_2, etc. The mixed gas is then freed from S and used for the catalytic production of aliphatic hydrocarbons. D. M. M.

Manufacture of combustible gas. A. R. STRYKER and C. TIETIG (B.P. 480,955, 28.8.36. U.S., 30.9.35).—Solid hydrocarbonaceous materials, *e.g.*, coal, wood, vegetable matter, liquid or gaseous materials, are continuously admitted with the min. of air in a finely-divided state if solid, or as a fine spray if liquid, to the top of a tall, narrow producer-retort, 80—90 ft. high × 11 ft. in diameter tapering to 4 ft. in diameter at the top. The material is carbonised by the heat of the retort as it descends to rest on a fuel bed at the bottom. Gases generated are drawn off from peripheral ports at any distance below the top of the fuel bed according to the composition desired. D. M. M.

Combustion of waste furnace gases. G. FRENGER (B.P. 479,962, 7.10.36).—Low-val. fuel, *e.g.*, garbage, is fed into one of two fires, the other being fed with normal fuel, and the waste gases from the first fire are drawn off by a fan and forced into the combustion zone of the second fire, where they are burned. Admixture of these waste gases with air may take place either in the suction fan or in the combustion zone of the second fire. D. M. M.

Manufacture of acetylene from hydrocarbons containing more than two carbon atoms in the molecule. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 480,781, 24.7.36).—The hydrocarbons are added to a current of an inert gas, *e.g.*, H_2, CO, or town's gas, under such conditions that they are vaporised (*e.g.*, if an oil is used it may be sprayed into the preheated gas) and the vapour-laden gas is passed through an electric arc. The gases leaving the arc are immediately quenched with an oil spray. A. B. M.

Separation of the oil from foreign matter in crude oil emulsions. H. PASSLER and A. BRUNNBAUER (B.P. 481,121, 4.9.36. Austr., 5.9.35).—

Foreign matter is separated from the emulsions by treatment with high-tension a.c. in a vessel where the preheated emulsion is made to pass between a series of equally-spaced electrodes insulated from the emulsion by a solid dielectric coating, *e.g.*, of glass, to prevent high current leakage through the emulsion. D. M. M.

(A, B) Conversion of hydrocarbon oils. UNIVERSAL OIL PRODUCTS CO., Assees. of (A) L. C. HUFF, (B) C. H. ANGELL (B.P. 472,304 and 472,594, [A] 17.2.36, [B] 29.5.36. U.S., [A] 18.2.35, [B] 7.8.35).—(A) Hydrocarbon oils are cracked in presence of normally gaseous hydrocarbons at >450° (480—565°)/>6 (20—55) atm. The products are fractionated and the low-boiling constituents separated and condensed, isolating the normally gaseous products from which C_3H_8, C_4H_{10}, and corresponding olefines are absorbed in raw oil charging stock. The relatively high-boiling, normally gaseous products with the liquid absorber oil are converted at high temp. and pressure. Motor fuel of high antiknock val. and minor yields of good-quality liquid residue and lean uncondensable gas are obtained. (B) Hydrocarbon oils of relatively wide boiling range are fractionally distilled, accompanied by pyrolytic conversion of the relatively high-boiling fractions (425—510°/>100 lb. per sq. in.) and separate conversion of relatively low-boiling fractions. Low-boiling fractions of the charging stock and primary cracked products are commingled and cracked concurrently with special treatment of the intermediate liquid conversion products of the second cracking stage. High yields of motor fuel of high antiknock val. are obtained. C. C.

Pyrolytic conversion of hydrocarbon oils. GYRO PROCESS CO. (B.P. 472,601, 23.3.36. U.S., 22.3.35).—Hydrocarbon oil is mixed with liquefied, normally gaseous hydrocarbons, *e.g.*, C_4H_{10}, to separate asphaltic material, and the cracking stock obtained is subjected to mild liquid-phase cracking. The cracked products are separated to give a primary residue and vapours. The latter are cracked in vapour phase and the product is separated into secondary residue and vapours. The distillate from the primary residue and vapours from vapour-phase cracking are fractionated to give motor fuel. The original oil–solvent mixture may be separated into cracking stock, solvent, and residue, the last-named being blended with the secondary residue to form low cold test fuel oil. Bitumen free from wax and oil may be separated in the initial stages. C. C.

Manufacture of products from hydrocarbon oils. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 472,767, 9.4.36. Holl., 15.4.35).—Hydrocarbon oils are extracted with anhyd. selective solvents consisting of a mixture of one or more mono- or poly-nuclear, iso- or hetero-cyclic (aromatic) compounds having one polar group substituted in the nucleus and a dipole moment of $\nless 1{\cdot}5 \times 10^{-18}$ e.s.u. and one or more compounds of the same type with >1 polar group substituted in the nucleus. Diluents (cyclic compounds without substituted polar groups) may be added to oil and/or solvent. Numerous suitable compounds are mentioned; *e.g.*, mixtures of $PhNO_2$ and $OH{\cdot}C_6H_4{\cdot}NO_2$, $C_{10}H_7{\cdot}NO_2$ and $C_6H_4(NO_2)_2$, or $C_{10}H_6(NO_2)_2$ and aminopyridine. C. C.

Treatment of hydrocarbons with chromyl chloride to produce oxidation, chlorination, and polymerisation products of hydrocarbons. EDELEANU GES. M.B.H., Assees. of E. TERRES, E. SAEGEBARTH, and J. MOOS (B.P. 472,898, 26.3.36. U.S., 26.3.35).—Hydrocarbon oils are treated with CrO_2Cl_2 in the vapour phase, with or without the use of a carrier gas, *e.g.*, CO_2, N_2, or air. A solid ppt. is formed from which aldehydes, ketones, acids, chlorinated and polymerised hydrocarbons are obtained by distillation or by treatment with H_2O, an alcohol, ether, caustic alkali, or acid. C. C.

Preparing fractions with m.p. lower than that of paraffin wax from liquid hydrocarbon mixtures. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 479,957, 28.9.36. Holl., 3.10.35).—A mixture of hydrocarbons, free from paraffin wax, is cooled to <−20° in absence of a diluent and the entirely or partly solid mass thus obtained is extracted at this temp. with a non-polar or only slightly polar liquid, *e.g.*, PhMe, chlorinated hydrocarbons, etc., a separation being thus obtained into a fraction rich in straight-chain paraffins and one rich in branched-chain paraffins, unsaturated and cyclic hydrocarbons. D. M. M.

Production of hydrocarbons. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 479,940, 19.8.36. U.S., 26.8.35).—Hydrocarbons boiling within the gasoline range are produced by heating to 60° with H_2SO_4 (64—72%) a mixture of *iso*butene with excess of one or more other *tert.* or *sec.* olefines, *e.g.*, propene, α- or β-butene, and/or trimethylene, or a mixture of alcohols which yields such an olefine mixture on treatment with H_2SO_4. The products may be catalytically hydrogenated (Ni catalyst) at 150—300°. D. M. M.

Refining of [hydrocarbon] oils. P. J. ROELFSEMA, Assr. to SHELL DEVELOPMENT CO. (U.S.P. 2,069,329, 2.2.37. Appl., 20.3.35).—The main distillation of hydrocarbons is effected in presence of polar substances [*e.g.*, furfuraldehyde, $MeNO_2$, MeCN, NH_2Ph, $(CH_2{\cdot}NH_2)_2$, Ac_2O] which are preferential solvents of the S compounds, the conditions being such that a substantial portion of the solvent is volatilised and refluxed, the S concentrating in the bottom product. The solvent is added with the feed in proportion substantially = the proportion appearing in the top product. B. M. V.

Synthesis of hydrocarbons under ultra-pressure. E. FISCHER and B. DONATH (B.P. 479,931, 9.6.36. Czechoslov., 15.2.36).—A mixture of gases containing H_2 and CO, *e.g.*, water-gas, after cleaning, is compressed in five stages to >1500 (5000) atm., being cooled between each compression stage. In the last stage the temp. is allowed to rise to 800—1000°, when the gases react, without the need for any catalyst, and the products are separated in a fractionating tower. D. M. M.

Manufacture of antiknock benzine by destructive hydrogenation. H. E. POTTS. From INTERNAT. HYDROGENATION PATENTS CO., LTD.

(B.P. 472,691, 31.3.36).—Middle oil is subjected to aromatising destructive hydrogenation at 500—550°/200—500 atm. in presence of compounds of metals of group VI as stationary catalysts. Part of the benzine formed is continuously removed, unconverted or insufficiently converted product being recycled. In a preliminary stage the middle oil may be subjected to non-aromatising destructive hydrogenation at 375—450° in presence of the same catalysts. C. C.

Motor fuels. ANGLO-IRANIAN OIL CO., LTD., A. E. DUNSTAN, and S. F. BIRCH (B.P. 472,463, 18.12.35).—The C_4H_8–C_4H_{10} fraction of gases from cracking petroleum or industrial gas containing *iso*butylene is treated in the liquid phase in an absorber (*e.g.*, of the Holley–Mott type) with 50—65% H_2SO_4 at <40° until the acid has *d* 1·1—1·2. The acid liquor is separated and polymerised by heat, giving a supernatant layer of crude di- and tri-*iso*butylene. The original hydrocarbon liquid may be diluted with light petroleum before absorption, the diluent being subsequently removed by distillation. The final product may be hydrogenated. C. C.

Motor fuels. E. V. BERESLAVSKY (B.P. 479,969, 2.11.36. U.S., 9.11.35).—Diesel-engine fuels are improved and their cetene or cetane nos. raised by addition of ≯ 10 vol.-% of one or more amyl nitrates. D. M. M.

Composition fuel. F. H. FORD, Assr. to SHALER CO. (U.S.P. 2,070,428, 9.2.37. Appl., 26.7.34).—A composition (not claimed) for generating heat for vulcanisation, to a great extent independent of air for combustion, is formed in a no. of plies separated and bonded by Na silicate so that combustion from ply to ply is delayed and its radial spread promoted. The whole is contained in a shallow metallic pan. B. M. V.

Lubrication of [resinous] composition bearings. E. C. EASTMAN and E. R. BARNARD, Assrs. to STANDARD OIL CO. (U.S.P. 2,059,856, 3.11.36. Appl., 14.5.34).—Bearings containing synthetic resin (of PhOH–CH_2O condensation type) are lubricated with a polyhydric alcohol (I), *e.g.*, ethylene glycol, glycerol, etc. For "running-in" the bearing a solution comprising 1—20% of an alkaline material, *e.g.*, hydroxides, carbonates, and bicarbonates of Na, K, or NH_4, in (I) is used. C. C.

Manufacture of lubricants. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 481,154, 13.9.37. U.S., 12.9.36).—High-film strength lubricating oil compositions, non-corrosive to metal surfaces, are provided by intimately mixing 0·1—2·0% of PhCHO, $OH{\cdot}C_6H_4{\cdot}CO_2H$, or BzOH with a hydrocarbon oil. D. M. M.

Dry distillation [of coal]. Separating divided materials. Purifying [hydrocarbon] liquids. Washing out weak acids from gases.—See I. **Saturated hydrocarbons. Polymerising olefines. Treating hydrocarbons. Coloured hydrocarbons. Treating oxygenated org. compounds.**—See III. **Aralkylaminoanthraquinones.**—See IV. **Removing CO from gases. SO_2 [from oil-refinery sludge].**—See VII. **Preventing corrosion due to $(CH_2{\cdot}OH)_2$.**—See X.

III.—ORGANIC INTERMEDIATES.

Recent progress in chlorination [of aliphatic hydrocarbons]. H. B. HASS, E. T. MCBEE, and L. F. HATCH (Ind. Eng. Chem., 1937, **29**, 1335—1338).—Mainly a review of existing work. In the chlorination of *n*-C_7H_{16} at 900 lb. per sq. in. the "relative chlorination rate" (A., 1936, 587) follows a logarithmic curve from −65° to 125°; from 125° to 300° the results are less regular but fall near a straight line. It is postulated that above 125° the reaction occurs in the vapour phase. In the chlorination of C_3H_8 at 300° (vapour phase) increase of pressure favours primary substitution. H. A. P.

Products derived from acetylene. H. MASTBAUM (Rev. Chim. pura appl., 1937, [iii], **12**, 53—65).—An account of work already noted (cf. Nicodemus, B., 1936, 1139). F. R. G.

Detection and identification of alcohols. W. MEYER (Apoth.-Ztg., 1937, **52**, 1440—1441).—Whitmore and Lieber's method (B., 1935, 486) is described. The I val. and m.p. of the xanthates of alcohols, glycols, etc. are tabulated. F. O. H.

Esterification. E. E. REID (Ind. Eng. Chem., 1937, **29**, 1344—1350).—A review and bibliography (262 references). H. A. P.

Preparation of vinyl acetate from paraldehyde. M. JEANNY (Rev. Gén. Mat. Plast., 1937, **13**, 325, 327—328).—A description of continuous and discontinuous processes for the prep. of vinyl acetate from paraldehyde, Ac_2O, and H_2SO_4, and for its polymerisation to form plastic products. The yield in the former process was 40% and in the latter 31% of theory. F. McK.

Esterification. Manufacture of malonic ester. A. A. ROSS and F. E. BIBBINS (Ind. Eng. Chem., 1937, **29**, 1341—1343).—A description of plant and a summarised process for the manufacture of $CH_2(CO_2Et)_2$ from $CH_2Cl{\cdot}CO_2H$ is given; $CN{\cdot}CH_2{\cdot}CO_2Na$ is directly hydrolysed and esterified by H_2SO_4–EtOH. H. A. P.

New system of organic synthesis. A. F. BOWLES (Rayon Text. Month., 1938, **19**, 177—178, 186).—The use of ortho-esters of weak inorg. acids, especially of H_3BO_3, in the prep. of org. compounds is reviewed with particular reference to glyceryl esters and ethers for use as textile assistants. The prep. of glyceryl orthoborate, monoglyceryl stearate, and the sulphated derivative are described. R. J. W. R.

Acetone. L. C. CORLEY (Ind. Eng. Chem., 1937, **29**, 1399—1407).—A review. H. A. P.

"Tailor-made" organic solvents. G. B. WILKES (Amer. Ink Maker, 1937, **15**, No. 9, 49—57, 61).—The properties of synthetic solvents are reviewed, evaporation rates being represented graphically. A table indicating qualitatively the solubility of 18 different resins in 39 solvents at two temp. is appended. The η^{25} of a 50% solution is quoted in cases where a solution of this concn. can be obtained. D. R. D.

Recovery of dirty volatile solvents and washing liquids. O. MERZ (Farbe u. Lack, 1938, 101—102).—Distillation with low-pressure steam has the dis-

advantage that the products may contain H_2O which cannot always be removed by adding aq. KOH or aq. NaCl. Distillation at 100° by use of steam-coils and treatment of the residue with steam is recommended. S. M.

Recent progress in amination by ammonolysis. P. H. GROGGINS and A. J. STIRTON (Ind. Eng. Chem., 1937, 29, 1353—1361).—A summary of literature information. Details are given for the prep. of $\alpha\gamma$-diaminopropan-β-ol from $CH(CH_2Cl)_2{\cdot}OH$, morpholine from $(CH_2Cl{\cdot}CH_2)_2O$, $(CH_2{\cdot}NH_2)_2$ from $(CH_2Br)_2$, mixed methylamines from MeOH and NH_3 over Al_2O_3 gel at 450°, glucamine from glucose, and urea by a continuous process from CO_2 and NH_3. H. A. P.

Amination in liquid ammonia. R. N. SHREVE and L. W. ROTHENBERGER (Ind. Eng. Chem., 1937, 29, 1361—1364).—The interaction of metallic amides with alkyl halides ($\nless C_5$) in liquid NH_3 gives amines and olefines, the yield of the former being greatest at $<-50°$ and with relatively high concns. of reagents (the latter slightly favours *sec.*-amine formation); $NaNH_2$ gives better yields (up to 53%) than does KNH_2 with *iso*amyl bromide, but with *n*-hexyl (74%) and β-ethylbutyl bromide (5—11%) the yields were more nearly comparable; $Ca(NH_2)_2$ and $Ba(NH_2)_2$ do not give measurable amounts of amines. Formation of *sec.* amine is favoured, as expected, by excess of alkyl halide. H. A. P.

Nitration. H. MCCORMACK (Ind. Eng. Chem., 1937, 29, 1333—1335).—In the technical nitration of PhCl, C_6H_6 [to $C_6H_4(NO_2)_2$], $C_{10}H_8$, and NHPhAc with HNO_3–H_2SO_4, operation is easier and less mixed acids are needed if the compound is added to the acid than if *vice versa*. The HNO_3 can be recovered from the spent acid by washing with the compound to be nitrated. H. A. P.

Quantitative control of sulphonation processes. W. A. SIMPSON and J. C. OLSEN (Ind. Eng. Chem., 1937, 29, 1350—1353).—The determination of the extent of sulphonation and sulphone formation and of the composition of isomeric mixtures is described. Details are given of the prep. of 2 : 6- and 2 : 7-$C_{10}H_6(SO_3H)_2$ and of *m*-$NO_2{\cdot}C_6H_4{\cdot}SO_3H$. H. A. P.

Mineral oil sulphonic acids. VI. Preparation of naphthenesulphonic acids. S. VON PILAT and N. TURKIEWICZ (Petroleum, 1938, 34, No. 8, 5—8; cf. A., 1937, II, 489).—Esters of technical naphthenic acid are fractionated and the fractions reduced to alcohols, converted by PCl_5 into chlorides, and thence by cryst. Na_2SO_3 at about 200°/>1 atm. in 80% yield into *naphthenylmethanesulphonic acids*, which are purified by way of the Na salt, or, better, the Ba or Ag salts. Thus are obtained acids, $CH_2R{\cdot}SO_3H$, in which R = C_9H_{17}, $C_{11}H_{21}$, and $C_{13}H_{25}$. That in which R = C_7H_{13} was not obtained free from aliphatic impurities. They are strong acids, H_2O-sol., and give sol. Na, Ca, Ba, and Ag salts. The Na salts are surface-active and foam-producing. R. S. C.

Sulphonation of naphthenic acids. W. KISIELEWICZ, S. [VON] PILAT, and J. SEREDA (Petroleum, 1938, 34, No. 10, 1—4).—The naphthenic acids (I) were recovered from the waste alkali liquor from the refining of petroleum distillates, and were carefully purified. 10 g. of the acid were mixed with 10 g. of oleum (10·3% of free SO_3) without external heating; the temp. rose to 65—70° and after 1 hr. fell again to room temp. Under these conditions the (I) of higher mol. wt. or of more aromatic structure were more readily sulphonated (38—52% conversion). A small quantity of CO_2 was evolved during sulphonation; this appears to be due to oxidation rather than to removal of the CO_2H groups. In sulphonating larger quantities of acid it is advantageous to add the oleum in successive small portions. It is improbable that repeated sulphonation will leave a residue of (I) which cannot be sulphonated. The loss of (I) from petroleum fractions during acid refining is due in part to sulphonation and in part to dissolution in the H_2SO_4. A. B. M.

Conversion of phenylglycine into monomethylaniline. F. HENESEY (J. Soc. Dyers and Col., 1938, 54, 66—67).—*p*-Hydroxyphenylglycine when heated above its m.p. is decarboxylated to *p*-hydroxymonomethylaniline (Paul, A., 1898, i, 17); under similar conditions phenylglycine (I) yields mainly 2 : 5-diketo-1 : 4-diphenylpiperazine (II) together with a small amount of NHPhMe. If, however, (I) is heated in PhOH a yield of 85% of NHPhMe is obtained; optimum conditions are 182°/4 hr. with (I) dissolved in 10 times its wt. of PhOH, (I) being added in small portions to molten PhOH with good agitation [this is essential if formation of (II) is to be avoided]. R. G.

$C_{10}H_8$ from gas. Hydrogenation products of pitch. Carboxylic acids from vaseline oil.—See II. **Determining Ca_3N_2 in $CaCN_2$. Bentonites. Ni formate.**—See VII. **Electro-org. reduction.**—See XI. **Higher fatty alcohols from soaps. Detection etc. of glycerin.**—See XII. **Al naphthenate.**—See XIII. **Detection of vulcanisation accelerators.**—See XIV. **Synthetic tanning materials.**—See XV. **EtOH from horse chestnuts. Fusel oil.**—See XVIII. **Detecting CH_2O in preserved foods.**—See XIX. **Determining nitroglycerin.**—See XXII.

See also A., I, 205, **Electrolysis [of acetates] with flowing liquid.** II, 131, **Prep. of $CPhF_3$.** 132, **Production of coronene.** 147, **Prep. of *p*-benzoquinone.** III, 338, **Prep. of colloidal solutions of 1 : 2 : 5 : 6-dibenzanthracene, retene, and similar hydrocarbons.**

PATENTS.

Preparation of liquid saturated hydrocarbons. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 479,827, 1.7.37. Holl., 16.7.36).—*iso*-C_4H_{10} is alkylated with olefines (C_3—C_4) in presence of 90—100% H_2SO_4 at −10° to 30°, with rapid stirring, to yield liquid saturated hydrocarbons of high octane no. suitable for use as motor fuels. A. H. C.

Provision of hydrocarbons with distinctive colourings. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 480,604, 24.8.36).—Solid or liquid hydrocarbons are coloured by condensation products of a cyanuric halide with 1—3 mols. of a polynuclear

aromatic compound. The colour and fluorescence in paraffins and C_6H_6 and preps. of products from cyanuric chloride and phenanthrene, chrysene, *N*-ethylcarbazole, pyrene, and perylene, in presence of $AlCl_3$ and in solvents, are described and the application of the last two is claimed. A. H. C.

Treatment of hydrocarbons in presence of phosphorus pentoxide. B. MALISHEV (B.P. 480,011, 14.5.36. Cf. B.P. 478,424; B., 1938, 353).—Aromatic hydrocarbons and olefines (gasoline) are converted into naphthenes and branched paraffin hydrocarbons, respectively, by reducing with H_2 at 200—550°/100 atm. in presence of P_2O_5 with an activator (a hydride or hydride-producing compound, *e.g.*, HCl, H_2S, alkyl chlorides or nitriles). The reduction of C_6H_6, C_4H_8, di*iso*butene, and gasoline (using cresol as peptiser and lampblack as stabiliser) is described. A. H. C.

Manufacture of products from olefines. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 480,756, 28.8.36).—Olefines ($>C_3$) are polymerised or condensed with aromatic or partially hydrogenated aromatic compounds in presence of heteropoly-acids (oxyacids) derived from a metal oxide or acid salts thereof at 100—200°/>1 atm. The addition of heavy-metal (Cu) salts is also claimed. Examples describe the polymerisation of *iso*-C_4H_8 and the condensation of *iso*-C_4H_8 and *iso*-$C_{12}H_{24}$ with PhOH and of *iso*-C_9H_{18} with crude cresol in presence of phosphotungstic acid and Cu. A. H. C.

Polymerisation of olefines. N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of A. H. BOULTBEE (B.P. 479,657, 17.6.37. U.S., 19.6.36).—Olefine-containing hydrocarbon gases are fractionated to give a light fraction (*A*) consisting essentially of C_2H_6 and lighter gases, a middle fraction (*B*) consisting essentially of C_3H_8 and C_3H_6, and a heavy fraction (*C*) comprising substantially *tert.* and non-*tert.* olefines having 4 and/or 5 C; *C* is treated at 150—220° with a polymerisation catalyst (containing H_3PO_4) capable of converting normally gaseous olefines into gasoline-type hydrocarbons, the polymerisation being predominantly of *tert.* olefines; the polymeride is separated from the unchanged olefines, the latter being mixed with *B* and subjected to a thermal non-catalytic polymerisation at >590° to produce additional polymerides. These are separated from unaltered gaseous hydrocarbons, and the latter are returned to the fractionating zone. In this way a total amount of gasoline can be produced equal to that obtainable by the thermal treatment process alone and ≫ that produced by catalytic polymerisation. About half of this amount of gasoline has an octane rating and Pb-susceptibility > that of a gasoline produced by catalytic treatment conducted under conditions of max. gasoline yield or by thermal polymerisation, while the other half has the properties of an ordinary thermal polymer gasoline. Apparatus is described. R. G.

Polymerisation of olefines. F. H. GAYER, Assr. to GEN. MOTORS CORP. (U.S.P. 2,068,016, 19.1.37. Appl., 6.3.33).—Low-boiling olefines (I) of ≮3 C are polymerised by passing (I) and H halide (HCl) at ≫400° over a catalyst comprising porous SiO_2 having on its surface a coating of Al_2O_3 prepared by hydrolytic adsorption from a solution of an Al salt, washing until free from the salt anion, and drying. The mixture of (I) with acid is preferably prepared by passing (I), particularly $CHMe{:}CH_2$, over an alkyl halide, *e.g.*, *n*-$C_5H_{11}Cl$, so that about 1% of the latter is taken up and bringing the mixture in contact with a catalyst comprising Fe_2O_3 and SiO_2 at ≫400°. R. G.

Oxidised "hydroformed solvent." C. WINNING, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,068,834, 26.1.37. Appl., 10.5.32).—Hydroformed solvents (*i.e.*, the products obtained by destructive hydrogenation of liquid non-paraffinic hydrocarbons of b.p. <370°) are partly oxidised at <300°/>3·3 atm. in the liquid phase with air to yield products of improved solvent and drying properties suitable for use as vehicles for resins, lacquers, etc. An oxidised hydroformed solvent of b.p. <232° is claimed. A. H. C.

Stabilised alkyl halide. J. F. OLIN, Assr. to SHARPLES SOLVENTS CORP. (U.S.P. 2,068,607, 19.1.37. Appl., 13.10.34).—An alkyl chloride (C_{4-7}), particularly *n*-amyl or mixed amyl chlorides, is stabilised by addition of >10% of an olefine of C_{4-7}, *e.g.*, about 15—30% of amylenes, particularly about 20% of $CMe_2{:}CHMe$. The product may be purified by treatment with activated C. The stabilised mixture may be prepared by chlorinating C_5H_{12} and distilling the resulting mixture of primary, *sec.*, and *tert.* chlorides with CaO so that the *tert.* chloride is converted into $CMe_2{:}CHMe$. R. G.

Simultaneous production of vinyl chloride and polychloroethylenes. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 480,568, 28.5.37. Ger., 16.6.36).—C_2H_2 and a chlorinated C_2H_6 (≮ Cl_3) are passed at 200—300° over porous contact substances (activated C) which may also contain metallic chlorides (the use of $BaCl_2$, $BiCl_3$, $FeCl_3$, $CdCl_2$, $HgCl_2$, and $ZnCl_2$ is described). *E.g.*, 378 g. of $C_2H_2Cl_4$ and 60—80 g. of C_2H_2 passed per hr. over active C at 250° yield 8 g. of vinyl chloride and 271 g. of C_2HCl_3 per hr. A. H. C.

Manufacture of β-chloro-αγ-butadiene. J. ERINGER (B.P. 480,320, 17.8.36. Ger., 17.8.35).—A mixture of C_2H_2 and $CH_2{:}CHCl$ is introduced into a heated (88°) solution of Cu_2Cl_2 without metallic Cu. $CH_2{:}CCl{\cdot}CH{:}CH_2$ (yield 43%) and HCl are produced, C_2H_2 and Cu_2Cl_2 being regenerated. A. H. C.

Apparatus for producing carbon disulphide. I. G. FARBENIND. A.-G. (B.P. 479,591, 23.8.37. Ger., 19.10.36).—A cast-iron retort with two diametrically opposed attachments for holding the charge is described (cf. B.P. 291,382; B., 1929, 510). A. H. C.

Purification of alcohols by contact catalysts. R. ROSEN and F. M. ARCHIBALD, Assrs. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,068,872, 26.1.37. Appl., 13.6.32).—Aliphatic (*sec.*) alcohols (C_3—C_7) contaminated by S and O impurities are deodorised by passing the preheated alcohols at 350—600° over a dehydrogenating catalyst (brass) at a rate of 2—5 vols. of liquid alcohol per vol. of catalyst per hr. A. H. C.

Production of higher unsaturated aliphatic alcohols. BÖHME FETTCHEMIE-GES.M.B.H. (B.P. 479,642, 12.3.37. Ger., 16.3.36 and 16.2.37).—Catalysts of CuO containing 20—60% of CdO and supported on a carrier (kieselguhr, pumice, etc.) are reduced by H_2 at 100—200°/<30 atm. in presence of higher aliphatic unsaturated acids ($\nless C_8$) so that H_2O formed is removed, and reduction to the corresponding alcohol is effected by raising temp. and pressure to $\nless$280°/200 atm. The use of a steel autoclave plated with Cu-Cd is claimed and examples describe the reduction of oleic acid with Cu-Cd on kieselguhr, animal and wood charcoal. A. H. C.

Manufacture of wetting, sudsing, emulsifying, and detergent agents. PROCTER & GAMBLE CO., Assees. of A. O. SNODDY and W. S. MARTIN (B.P. 479,553, 18.12.36. U.S., 18.1.36. Addn. to B.P. 453,134; B., 1936, 1141).—Aliphatic unsaturated alcohols of $\nless C_{12}$ (C_{12-22}), *e.g.*, sperm oil alcohols, or a mixture with saturated alcohols, are treated at $\ngtr$50—60° with the reaction product obtained from $ClSO_3H$ and NH_4Cl, $(NH_4)_2SO_4$, or the chloride or sulphate of a metal (Na) which forms a H_2O-sol. alkyl sulphate, the free acidity being neutralised and the product preferably purified by crystallising from a solvent (EtOH). R. G.

Manufacture of products having wetting, emulsifying, and like properties. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 480,117, 2.9.36 and 14.6.37).—Polyglycol ether derivatives (I) of aliphatic or *cyclo*aliphatic alcohols and/or carboxylic acids of $\nless C_6$ containing impurities such as high mol. wt. hydrocarbons, aldehydes, ketones, or esters are purified by dissolving in H_2O-insol. org. solvents (liquid hydrocarbons, chlorohydrocarbons, high mol. wt. alcohols, ethers, or esters), adding H_2O-sol. org. solvents of low mol. wt. (alcohols, $COMe_2$, C_5H_5N), and then adding sufficient H_2O to cause formation of layers; (I) is recovered from the aq. layer. R. G.

Treating oxygenated organic compounds. P. K. FROLICH, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,068,854, 26.1.37. Appl., 30.7.32).—Oxygenated mixtures ($> C_{20}$) obtained by oxidation of paraffin wax are cracked in either the vapour (1 atm.) or liquid (>1 atm.) phase in presence of $CaCO_3$ or FeO at 400—700° (contact time approx. 1 sec. at 600—700°) to yield ketones, aldehydes, etc. of low and medium mol. wt. Thermal decomp. of mixtures which have been first neutralised and also a continuous process in which heavy products are recirculated are described. A. H. C.

Manufacture of ketones. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 479,939, 19.8.36).—An αβ-unsaturated Me ketone is converted by interaction with CH_2O and a salt of a *sec.* amine into a salt of a β-aminoketo-base, which is then decomposed to form a polyunsaturated vinyl ketone. In examples, CH_2O (30) and $NHMe_2,HCl$ (83) are dissolved in EtOH (300 c.c.) and $CMe_2{:}CH{\cdot}COMe$ (98 g.) is run into the boiling solution; *vinyl* iso*butenyl ketone*, b.p. 132—133°, is recovered by steam-distillation. Similarly ethylidene- and crotylidene-acetone afford *vinyl propenyl* and $\Delta^{\alpha\gamma}$-*pentadienyl ketones*. K. H. S.

Preparation of carboxylic acids. G. B. CARPENTER and W. H. CAROTHERS, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,068,265, 19.1.37. Appl., 6.1.32).—Aliphatic acids are prepared by interaction of a lower aliphatic alcohol or a compound containing at least one alkoxy-group and CO in the vapour phase, using a catalyst consisting of V chemically combined with an element of group VIA, particularly Cr vanadate. The conversion of MeOH (into AcOH) and PrOH is claimed. R. G.

Manufacture of polyenecarboxylic acids. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 477,774, 2.7.36).—Polycyclic acids containing C:C·OAcyl and at least one ethylenic linking conjugated thereto are reduced, *e.g.*, by Al–Hg or Zn dust, to H_2-compounds, which readily lose HOAcyl and give polyenepolycarboxylic acids when hydrolysed. (Cf. Kuhn *et al.*, A., 1936, 1093, 1230.) R. S. C.

Manufacture of halogen-substituted aliphatic carboxylic acids and of unsaturated aliphatic carboxylic acids therefrom. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 479,690, 11.8.36).—Alkaline oxidation of β-halogeno-alcohols yields the corresponding acids, which are converted into αβ-unsaturated acids on further treatment with alkali. The oxidation of $Cl{\cdot}[CH_2]_3{\cdot}OH$ and $CHMeCl{\cdot}[CH_2]_2{\cdot}OH$ with cold aq. $KMnO_4$–Na_2CO_3 and further conversion of the products into acrylic and crotonic acids is described. A. H. C.

Manufacture of wetting, cleansing, dispersing agents, solvents, and the like. I. G. FARBENIND. A.-G. (B.P. 477,499, 1.3.37. Ger., 29.2.36. Addn. to B.P. 343,872; B., 1931, 622).—Fatty acids (C_5—C_{11}), their esters, or anhydrides are ketonised (cf. B.P. 410,087; B., 1934, 710) and the ketones reduced to *sec.* alcohols, which are converted into acid sulphuric esters. The treatment of acid mixtures obtained by oxidising paraffin wax and train oil fatty acids is described. A. H. C.

Preparation of ether acids. H. A. BRUSON, Assr. to RESINOUS PRODUCTS & CHEM. CO. (U.S.P. 2,068,905, 26.1.37. Appl., 6.1.36).—Ether acids, particularly $RO{\cdot}CH_2{\cdot}CO_2H$, where R = alkyl of $> C_2$, are prepared by treating anhyd. monohydric alcohols with an alkali monoxide (Na_2O) to form a solution of the metal alkoxide containing the metal hydroxide, adding an anhyd. ester of a halogenated carboxylic acid ($CH_2Cl{\cdot}CO_2H$), and heating to condense the ester and alkoxide and simultaneously to saponify the ester. The prep. of a $C_8H_{17}{\cdot}O{\cdot}CH_2{\cdot}CO_2H$ by heating an anhyd. $C_8H_{17}{\cdot}OH$ with Na_2O, heating the resulting mixture with an anhyd. $CH_2Cl{\cdot}CO_2C_8H_{17}$, removing the $C_8H_{17}{\cdot}OH$, and acidifying the mixture is claimed. R. G.

Manufacture of dialkylaminophosphorus fluorides. I. G. FARBENIND. A.-G. (B.P. 477,534, 1.7.36. Ger., 2.7.35).—Compounds of the types $NR_2{\cdot}PX_2$, $NR_2{\cdot}POX_2$, and $NR_2{\cdot}PSX_2$ (R = alkyl; X = halogen other than F) are converted into the F analogues by heating with fluorides of metals or metalloids in a solvent (*e.g.*, by refluxing with KF in H_2O). The prep. of *diethylaminophosphorus oxyfluoride*, b.p. 45—46°/13 mm., and *sulphofluoride*, b. p. 50—51°/12

mm., is described and the application of such compounds as parasiticides is claimed. A. H. C.

Preparation of nitriles. ARMOUR & Co. (B.P. 477,463, 30.6.36. U.S., 9.12.35).—Aliphatic acids ($\not< C_6$) or their esters (glycerides) are treated in the liquid phase at a high temp. with NH_3 so that excess of NH_3 and H_2O formed are continuously removed and the former is recycled. Traces of vaporised acid are retained as nitriles by a dehydrating catalyst, which, however, is not essential to the main reaction. The prep. of nitriles from stearic (330°; 1·33 atm.), lard and garbage-grease fatty acids is claimed and apparatus is described. A. H. C.

Separation of nitrile–hydrocarbon mixtures. ARMOUR & Co. (B.P. 479,813, 10.4.37. U.S., 9.7.36).—Aliphatic nitrile–hydrocarbon mixtures formed by cracking higher nitriles (stearonitrile) are separated by extracting nitriles with aliphatic carboxylic acids, phenols, amines, or alcohols, or graded solutions of these in H_2O, and recovering the nitriles (*e.g.*, by diluting with H_2O or alkali). The use of $MeOH–H_2O$ is claimed and the use of AcOH, $PhOH–H_2O$, and NH_2Ph is described. A. H. C.

Production of light coloured highly halogenated naphthalene. E. R. HANSON and S. BROWN, Assrs. to HALOWAX CORP. (U.S.P. 2,069,183, 26.1.37. Appl., 2.4.34).—Chlorinated $C_{10}H_8$ of d^{150} $\not< 1·49$ is distilled at $\not> 100$ mm. in presence of a base (CaO), and a light-coloured fraction of m.p. between 115° and 138° and containing 59—62% Cl is collected. R. G.

Manufacture of phenyltrifluoromethylsulphones. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 479,774, 12.8.36).—Products which are valuable parent materials for the prep. of dyes, pharmaceutical products, fungicides, and insecticides are prepared by heating technical anhyd. HF or SbF_3 with a compound $PhS·CCl_3$ wherein the C_6 nucleus may contain a further $S·CCl_3$ group or other substituents, and oxidising the resulting Ph CF_3 sulphides to the corresponding sulphones, *e.g.*, with CrO_3 + AcOH. The following are described, figures for the *sulphones* being given in parentheses: *Ph*, b.p. 140—142° (b.p. 203—205°), 2-*chloro*-, b.p. 69—72°/15 mm. (b.p. 120—123°/17 mm.), 3-*chloro*-, b.p. 58—62°/12 mm., 4-*chloro*-, b.p. 173—174° (m.p. 55—56°), 2 : 4-*dichloro*-, b.p. 83—86°/10 mm. (b.p. 128—130°/12 mm.), 3 : 4-*dichloro*-, b.p. 82—85°/10 mm., 2 : 5-*dichloro*-, b.p. 82—86°/11 mm. (m.p. 50°), 4-*methyl*-, b.p. 163—167° (m.p. 34—35°), 3-*nitro*-, b.p. 103—105°/10 mm. (b.p. 146—148°/11 mm.), 4-*nitro*-, b.p. 115°/20 mm., f.p. 30° (m.p. 85—86°), 2-*chloro*-4-*nitro*-, b.p. 130—133°/17 mm. (b.p. 170—172°/17 mm., f.p. 36°), 4-*chloro*-3-*nitro*-, b.p. 130—134°/17 mm., 4-*nitro*-3-*trifluoromethyl*-, b.p. 100—105°/15 mm., and 3-*trifluoromethyl-phenyl*, b.p. 155° (b.p. 93°/20 mm.), 1-*trifluoromethyl sulphide*; m-*di(triphenylmethylthiol)benzene*, b.p. 88—93°/18 mm. (m.p. 75—76°). R. G.

Manufacture of amino-compounds. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 478,304, 13.7. and 4.11.36).—Aminocarboxylic acids are obtained in good yield by interaction of $CH_2{:}CH·CO_2H$ (I) or $CH_2{:}CMe·CO_2H$ and NH_3 or primary or *sec.* amines in presence of H_2O at 40—150° (70—100°). If desired, catalysts (HCl, H_3BO_3, $ZnCl_2$, org. acids, *tert.* org. bases), solvents (alcohols, hydrocarbons), or substances which suppress the polymerisation of unsaturated acids (quinol, Cu salts) may be used. According to the proportions of the reactants used 1 or 2 mols. of the unsaturated acid may be added on to 1 mol. of the primary amine or 1, 2, or 3 mols. added to 1 mol. of NH_3. *E.g.*, NH_2Ph (93) and aq. 56% (I) (65) with a trace of Cu acrylate at 95—100° give β-anilinopropionic acid. Other amines used to give similar β-substituted propionic acids are *m*-toluidine, $NH_2·[CH_2]_2·OH$, NHPhEt, β-$C_{10}H_7·NH_2$, *p*-anisidine, phenylglycine, 1 : 4-diaminoanthraquinone, etc. Other examples describe the condensation of 1 mol. of these amines with 2 mols. of (I). The following have been prepared: β-m-*toluidino*-, β-(N-β-*hydroxyethyl*)*anilino*-, β-N-*ethylanilino*-, β-2-naphthyl-, β-n-*butylamino*-, β-cyclo*hexylamino*-, β-N-*piperidyl*-, β-*dodecylamino*-, β-N-*indolyl*-, m.p. 91°, β-N-2′-*methylindolyl*-, m.p. 125°, β-*p*-nitroanilino-, β-(N-*hydroxyethyl*)-m-*toluidino*-, β-(β-*hydroxyethyl*)*amino*-, β-*anilino*-α-*methyl*-, β-(β-*aminoethyl*)*amino*-, β-p-*anisidino*-, β-2 : 5-*dimethoxyanilino*-, β-(N-β-*cyanoethyl*)-m-*toluidino*-, β-(N-β-*sulphoethyl*)*anilino*-, β-(N-β-*carboxyethyl*)*anilino*-, β-1 : 2 : 3 : 4-*tetrahydroquinolino*-, β-7 : 8-*benzo*-3-*hydroxy*-1 : 2 : 3 : 4-*tetrahydroquinolino-propionic acids*, di-(β-carboxyethyl)-aniline, -m-*toluidine*, -β-*naphthylamine*, -n-*butylamine*, -*dodecylamine*, -p-*nitroaniline*, m.p. 161—165°, -β-*hydroxyethylamine*, -*aniline*-m- and -p-*sulphonic* and -o-*carboxylic acids*, -p-*hydroxyaniline*-m-*carboxylic acid*, *tri*-(β-*carboxyethyl*)*amine*, *tetra*-(β-*carboxyethyl*)*ethylenediamine*, and 1 : 4-*di*-(β-*carboxyethylamino*)*anthraquinone*. N. H. H.

Ethers of dihydric phenols. J. H. WERNTZ, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,067,960, 19.1.37. Appl., 27.12.34).—Ethers of monocyclic dihydric phenols, particularly *p*-$C_6H_4(OH)_2$, are prepared by heating a salt (K) of the phenol with a saturated alkyl halide having $\not< 10$ (12—14) C in abs. EtOH. The mono- and di-alkyl ethers are separated by extraction with an alcohol (EtOH). The halide may be formed from the mixed alcohols obtained by carboxylic reduction of a fatty oil, *e.g.*, coconut or palm-kernel oil, and consisting mainly of $C_{12}H_{25}·OH$. The following are described: *quinol didecyl*, m.p. 68°, *didodecyl*, m.p. 72°, *ditetradecyl*, m.p. 75·8°, *dipentadecyl*, m.p. 84°, *diheptadecyl*, m.p. 90°, and *dioctadecyl ether*, m.p. 88°; *pyrocatechol*, b.p. 180—182°/3 mm., *resorcinol*, b.p. 180—200°/3 mm., and *quinol dodecyl ether*, m.p. 78°; *pyrocatechol didodecyl ether*, m.p. 46—47°; *resorcinol didecyl*, m.p. 51·6°, *didodecyl*, m.p. 59·4°, *ditetradecyl*, m.p. 59·2°, and *dipentadecyl ether*, m.p. 64°. The mono-ethers are useful as antioxidants and for the prevention of rancidity in vegetable and animal oils, whilst the di-ethers are useful as plasticisers with ethyl- and nitro-cellulose and as compounding agents for rubber. R. G.

Preparation of nitro- and amino-derivatives [of acylamidoquinol diaryl ethers] and of [azo] dyes derived therefrom. COMP. NAT. DE MAT.

COL. ET MANUF. DE PROD. CHIM. DU NORD RÉUNIES ETABL. KUHLMANN (B.P. 480,551, 5.3.37. Fr., 5.3.36).—4-Halogeno-5-nitro-2-acylamidodiaryl ethers (the substituted nucleus is C_6H_6) are condensed with (alkali) salts of phenols and the products are reduced and used as diazo components (excepting where the aryl is *cyclo*aliphatic) for ice colours. *E.g.*, 4 : 2-$OPh{\cdot}C_6H_3Cl{\cdot}NHBz$ is nitrated (HNO_3–AcOH) and the 5-NO_2-derivative, m.p. 139°, is condensed with PhOH and KOH at 150°; the resulting 5-*nitro*-2-*benzamidoquinol Ph*$_2$ *ether*, m.p. 201—202°, is reduced and the NH_2-compound, m.p. 121°, is converted into the *diazonium chloride* (I), which is made into a dry prep. by admixture with $Al_2(SO_4)_3$. Other examples describe the prep. of: 2-*nitro*-, m.p. 182°, and 2-*amino*-5-*benzamidoquinol* 4-*phenyl* 1-p-*tolyl ether*, m.p. 119°; 4-*chloro*-2-*acetamidodiphenyl ether*, m.p. 80—81°, and its 5-NO_2-derivative, m.p. 148°; 2-*nitro*-, m.p. 172°, and 2-*amino*-5-*acetamidoquinol Ph*$_2$ *ether*, m.p. 54°; 4-*chloro*-, m.p. 77—78°, and 4-*chloro*-5-*nitro*-2-*acetamidophenyl* p-*tolyl ether*, m.p. 182°; and 2-*nitro*-5-*acetamidoquinol* 1-*phenyl* 4-p-*tolyl ether*, m.p. 140—141°. Dyes from (I) and 2 : 3-hydroxynaphthoic arylamides are described. H. A. P.

Manufacture of isocyclic compounds. [Textile assistants.] W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 479,835 and 479,897—9, 5.6.36).—(A) Mono- or poly-nuclear aromatic or mononuclear hydroaromatic compounds having as substituents a hydrocarbon residue of $\nless C_3$, and an alkyl residue attached directly or by N or S and terminated by OH or SH, are treated with polybasic inorg. acids, their halides or anhydrides, or with $NH_2{\cdot}SO_3H$ to give wetting, dispersing, emulsifying, and cleansing agents. *E.g.*, $C_6H_2Bu_3{\cdot}[CH_2]_2{\cdot}OH$ [reduction of $C_6H_2Bu_3{\cdot}CH_2{\cdot}CO_2H$] is sulphonated ($ClSO_3H$–$CCl_4$), as are also *C-iso*hexyl-β-hydroxyethylaniline, p-$C_6H_4Bu^{\gamma}{\cdot}SH$, the products from p-$CH_2Bu^{\gamma}{\cdot}CMe_2{\cdot}C_6H_4{\cdot}SH$ and $(CH_2)_2O$ (5 mols.), 1 : 2 : 4-$C_6H_3Bu_2{\cdot}NH_2$ and $(CHMe{\cdot}CH_2)_2O$, an alkylated $C_{10}H_8$ (alkyl approx. C_{10} from petroleum) and $(CHEt{\cdot}CH_2)_2O$, *C-iso*hexylphenol and $(CH_2)_2O$ (3 mols.), and *iso*butylnaphthylthiol and $(CH_2)_2O$ (40 mols.), and δ-p-dodecyl*cyclo*hexylbutyl alcohol [prepared by condensation of $(\cdot CH_2{\cdot}CO)_2O$ with $C_{12}H_{25}Ph$ and reduction]. (B) Aromatic or hydroaromatic compounds having as substituents a hydrocarbon residue of $\nless C_3$ and an alkyl residue attached directly or by O, N, or S and terminated by halogen are caused to interact with salts of polybasic inorg. acids. *E.g.*, *iso*-$C_{12}H_{25}{\cdot}C_6H_3Me{\cdot}S{\cdot}[CH_2]_2{\cdot}Cl$ (from the OH-compound and $SOCl_2$ in C_5H_5N) is heated with $Na_2S_2O_3$ in EtOH to give the corresponding thiosulphonic acid. Other examples describe the condensation of $C_6H_4Bu{\cdot}[CH_2]_4{\cdot}Cl$ and $CH_2Bu^{\gamma}{\cdot}CMe_2{\cdot}C_6H_4{\cdot}[CH_2]_2{\cdot}Cl$ with $Na_2S_2O_3$, and of *tert.*-octylnaphthoxyethyl chloride and mixed alkylphenylethyl chlorides {from $Ph{\cdot}[CH_2]_2Cl$ and olefines, C_{12}—C_{14}, obtained by polymerising ($AlCl_3$, BF_3) the olefines corresponding with the C_6 and C_7 alcohols from MeOH synthesis} with Na_2SO_3. (C) Primary and *sec.* alkylamines derived from the above halides are converted into H_2O-sol. sulphonic acids (SO_3, $ClSO_3H$, $NH_2{\cdot}SO_3H$). *E.g.*, 4-butyl*cyclo*hexylamine is treated with SO_3 in SO_2 at —10°, β-aminoethylaminododecylbenzene [from n-$C_{12}H_{25}{\cdot}C_6H_4{\cdot}NH_2$ and $(CH_2)_2NH$] is heated at 110—120° with $NH_2{\cdot}SO_3H$, and p-$CH_2Bu^{\gamma}{\cdot}CMe_2{\cdot}C_6H_4{\cdot}[O{\cdot}C_2H_4]_3{\cdot}NHMe$ is treated with $ClSO_3H$ in CH_2Cl_2 at 5—10°. (D) Mononuclear aromatic and hydroaromatic compounds having as substituents at least one aliphatic hydrocarbon residue of $\nless C_3$ and a polyalkylene ether group united by O and terminated by OH are treated with polybasic inorg. acids, their anhydrides or halides, or $NH_2{\cdot}SO_3H$. Examples of products obtained are *iso*octylphenyl diethylene glycol ether H sulphate and H orthophosphate, *iso*octylphenyl triethylene glycol ether H sulphate and H pyrophosphate, and the H sulphates of decylphenyl and decyl*cyclo*hexyl triethylene glycol ether, and of condensation products of $(CH_2)_2O$ with n- and/or *iso*-$C_{12}H_{25}{\cdot}C_6H_4{\cdot}OH$ and mixed cresols alkylated with the halides of mixed hydrocarbons of b.p. 55—120° from coal hydrogenation. H. A. P.

Production of nitrophenols. J. SCHINDELMEISER (B.P. 479,765, 10.8.36).—HNO_3 is heated with urea, cooled, and the phenol in H_2O or AcOH containing also urea is added. The mixture of nitrophenols which separates on keeping is separated into o- and p-isomerides by distilling in steam. The nitration of PhOH is described. A. H. C.

Manufacture of *o*-aminophenols. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 479,865, 13.8.36).—o-Aminophenols are prepared by treating amino-alkoxy-compounds, 1 : 3 : 4 : 6-$NH_2{\cdot}C_6H_2X_2{\cdot}OR$ (where one X = alkoxy and the other X = H, alkyl, alkoxy, or halogen, and R = alkyl) with $AlCl_3$ in an org. solvent, *e.g.*, NH_2Ph, *cyclo*hexane, at $\ngtr 100°$. The following derivatives of o-$NH_2{\cdot}C_6H_4{\cdot}OH$ are described: 4-*methoxy*-, m.p. 136° (*hydrochloride*, m.p. 209°; N-*Ac*, m.p. 157—158°, and ON-*Ac*$_2$ derivative, m.p. 121°), 4-*ethoxy*-, m.p. 132° (*hydrochloride*, m.p. 203°; N-*Ac*, m.p. 167°, and ON-*Ac*$_2$ derivative, m.p. 135·5°), 5-*chloro*-4-*methoxy*-, m.p. 135° (decomp.) (N-*Ac*, m.p. 213·5°, and ON-*Ac*$_2$ derivative, m.p. 165°), 4-*chloro*-5-*methoxy*-, m.p. 158° (N-*Ac*, m.p. 206°, and ON-*Ac*$_2$ derivative, m.p. 145°), 4-*methoxy*-5-*methyl*-, m.p. 178—179° (*hydrochloride*, m.p. 262°; N-*Ac*, m.p. 160°, and ON-*Ac*$_2$ derivative, m.p. 147°); also 2-*amino*-4 : 5-*dimethoxyphenol hydrochloride* (N-*Ac*, m.p. 138°, and ON-*Ac*$_2$ derivative, m.p. 176°). R. G.

Preparation of polyhydroxy-leuco-derivatives of triphenylmethane. CHINOIN GYÓGYSZER ÉS VEGYÉSZETI TERMÉKEK GYÁRA R.T. (KERESZTY & WOLF) (B.P. 480,549, 1.3.37. Hung., 4.3.36).—Pure cryst. derivatives of hexahydroxytriphenylmethane are obtained by condensing protocatechualdehyde (I) or monoalkyl ethers thereof with o-$C_6H_4(OH)_2$ (II) or nuclear alkylated or monoalkyl ether derivatives thereof in presence of condensing agents (mineral acids). *E.g.*, (II) (44) and vanillin (III) (30) in EtOH (30) are treated with H_2SO_4 (44) in EtOH (30 pts.) at <10° for 2½ hr. to give a *product*, m.p. about 195—198°, and (I) (7) and guaiacol (IV) (12·4) in EtOH (15 pts.) with gaseous dry HCl give 3 : 4′ : 4″ : 4″-*tetrahydroxy*-3′ : 3″-*dimethoxytriphenylmethane*, m.p. about 197°. Similarly, (III) and (IV) give 4 : 4′ : 4″-

trihydroxy-3 : 3′ : 3″-*trimethoxytriphenylmethane*, m.p. 128—130°, and (I) and (II) give *hexahydroxytriphenylmethane*, decomp. about 250°. N. H. H.

Purification of alcohols [β-phenylethyl alcohol]. K. H. KLIPSTEIN, Assr. to CALCO CHEM. CO., INC. (U.S.P. 2,068,415, 19.1.37. Appl., 18.5.35).—Ph·$[CH_2]_2$·OH (I) is purified by forming a stable high-boiling ester with H_3BO_3, *o*-$C_6H_4(CO_2H)_2$, $(CH_2·CO_2H)_2$, $H_2C_2O_4$, maleic or fumaric acid, removing impurities by vac. distillation, hydrolysing the ester, and recovering the alcohol. *Triphenylethyl borate*, b.p. 215°/1 mm., is prepared from crude (I) with H_3BO_3 or an ester such as Bu_3BO_3 in presence of C_6H_6 etc., H_2O is removed by azeotropic distillation, and the product is distilled in a current of dry air or N_2; the borate is hydrolysed with hot H_2O and (I) is separated and vac.-distilled. R. G.

Manufacture of benzenecarboxylic acid fluorides containing trifluoromethyl groups. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 480,105, 12.8.36).—HF or SbF_3 is allowed to act on a derivative of BzCl which contains at least one CCl_3 and may contain other substituents; the Cl is replaced by F. In examples, m-, b.p. 156°/15 mm., and p-*trichloromethylbenzoyl chloride*, b.p. 159—160°/18 mm., afford m-, b.p. 159—162°, and p-*trifluoromethylbenzoyl fluoride*, b.p. 158—162°, the former by heating with SbF_3 at 180—200° under a rectifying column and the latter by heating in an Fe pressure vessel at 100—150° for 2—3 hr. and rectifying the product. Similarly there are obtained 3 : 5-*bistrifluoromethylbenzoyl fluoride*, b.p. 158—162°, 4-*trifluoromethyl*-1 : 2- and 5-*trifluoromethylbenzene*-1 : 3-*dicarboxyl fluoride*, b.p. 88°/15 mm. K. H. S.

Production of benzoylbenzoic acid compounds. I. GUBELMANN and J. M. TINKER, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,068,321, 19.1.37. Appl., 27.6.35).—4′-Halogeno-3′-amino-2-benzoylbenzoic acids and their halogen-substitution products with halogen in at least one of positions 3, 4, 5, and 6 are diazotised and the diazo compounds treated with an alkali cyanide and a Cu salt to give the corresponding 4′-halogeno-3′-cyano-2-benzoylbenzoic acids which on hydrolysis with alkali (NaOH) give 4′-halogeno-3′-carboxy-2-benzoylbenzoic acids. 4′-*Chloro*-3′-*cyano*-2-*benzoylbenzoic acid*, m.p. 193·2°, is claimed. R. G.

Manufacture of acyl peroxides. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 479,912, 12.8.36).—Diaroyl peroxides (Bz_2O_2) are prepared by the interaction of an acid chloride with H_2O_2 or a metal peroxide in presence of a H_2O-sol., inert org. dispersing agent. The peroxides may be diluted during or after prep. with an anhyd. compound which unites with H_2O to yield a fine homogeneous product. The prep. of Bz_2O_2 and 3:3′-dichlorobenzoyl peroxide in presence of oleylmethyltauride, oleyl alcohol–$(CH_2)_2O$, Na salts of sulphonic acids, and also with $CaHPO_4$, $CaCO_3$, NaCl, or NaOAc is described. A. H. C.

Production of derivatives of cyclic β-ketocarboxylic acids. K. ZIEGLER, Assr. to SCHERING-KAHLBAUM A.-G. (U.S.P. 2,068,284, 19.1.37. Appl., 16.11.34. Ger., 18.11.33).—Cyclic β-cyano-ketones and -ketimines are produced by the interaction in solution of an aromatic αω-dinitrile and an alkali (Na, Li, Mg, Al) derivative of an alkylarylamine by adding the former very gradually to the latter in solution in a solvent which is preferably nearly saturated. Examples are: 1 : 13-dicyanotridecane (21) added to NMePhNa in boiling Et_2O (1·3 l.) [from NHPhMe (116), Na (20), and $C_{10}H_8$ (56 pts.)] during 72 hr. gives α-*cyanotetradecanone*-β-*imide*, m.p. 147—148°, which by boiling with 70% H_2SO_4 gives *cyclo*tetradecanone, m.p. 53°. Similarly, from 1 : 15-dicyanopentadecane and azelaodinitrile are obtained respectively *cyclo*hexadecanone (77% yield) and *hexan*-β-*oneimide*, m.p. 106—107°. N. H. H.

[Preparation of] (A) halogenoaminoflavanthrones and (B) compounds of the anthraquinone series. W. DETTWYLER, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,068,312—3, 19.1.37. Appl., 24.5.33).—Dihalogenotetra-acylamino-1 : 1′-dianthraquinonyls are prepared by heating an αα-dihalogeno-ββ-diacylaminoanthraquinone, *e.g.*, 1 : 5- or 1 : 8-dichloro-2 : 6- or -2 : 7-dibenzamidoanthraquinone, with Cu (in boiling $PhNO_2$ with Na_2CO_3) to give the corresponding dianthraquinonyl, *e.g.*, 5 : 5′-*dichloro*-2 : 6 : 2′ : 6′-*tetrabenzamido*-1 : 1′-*dianthraquinonyl*, which (A) by simultaneous hydrolysis and ring-closure give (in H_2SO_4 at 85—90° for 4 hr.) the flavanthrone, *e.g.*, 5 : 5′-*dichloro*-6 : 6′-*diaminoflavanthrone*. The latter can be converted into the corresponding thiazoles by known methods. N. H. H.

Preparation of diaminodiphenoxyanthraquinonedisulphonic acids. E. C. BUXBAUM, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,068,373, 19.1.37. Appl., 20.5.36).—1 : 4-Diamino-2 : 3-diphenoxyanthraquinonedisulphonic acid or its derivatives, prepared by sulphonating, *e.g.*, 1 : 4-diamino-2 : 3-diphenoxyanthraquinone (I), are isolated in the form of cryst. sulphates by diluting the reaction mixture with H_2O to a concn. of 45—65% H_2SO_4. Examples are the isolation from 100% H_2SO_4 of the sulphonation product of (I) and the corresponding di-(*p*-methylphenoxy)-derivative by pouring the reaction mixture into sufficient H_2O to give 50% H_2SO_4. N. H. H.

Introduction of aryl groups into αβ-unsaturated carbonyl compounds and their derivatives. SCHERING-KAHLBAUM A.-G. (B.P. 480,617, 5.9.36. Ger., 17.9.35).—Aryl groups are introduced (by elimination of an α-H) into αβ-unsaturated non-quinonoid carbonyl compounds (excluding compounds containing 2 CO and 2 double linkings in one *cyclo*hexane ring) by treatment (in presence of Cu or Cu salts) with aromatic diazonium salts or their equivs. (containing negative groups) in, *e.g.*, AcOH, EtOH–H_2O, $COMe_2$–H_2O, or non-H_2O-miscible solvents (CH_2Cl_2). *E.g.*, *p*-$NH_2·C_6H_4·NO_2$ (6·9) → coumarin (7·3 pts.) in aq. $COMe_2$ with $CuSO_4$ (0·5 pt.) at 19° gives 3-p-*nitrophenylcoumarin*, m.p. 264°. Similarly, *p*-$C_6H_4Cl·NH_2$ (I) → CHPh:CH·CO_2H, (I) → CMe_2:CHPh, (I) → CHPh:CH·CHO, and (I) → coumarin give respectively p-*chloro*-, m.p. 127·5—128·5°, and p-*chloro*-α-*acetyl*-*stilbene*, m.p. 105—106°, α-p-*chlorophenylcinnamaldehyde*, m.p. 125—126°, and 3-p-*chlorophenylcoumarin*, m.p. 187—188°, and β-

$C_{10}H_7{\cdot}NH_2$, p-$NH_2{\cdot}C_6H_4{\cdot}CO_2H$, and p-$NH_2{\cdot}C_6H_4{\cdot}SO_3H$ → coumarin give respectively 3-β-*naphthylcoumarin*, 3-*phenylcoumarin*-4-*carboxylic* and -*sulphonic acids*. N. H. H.

Production of photographic sensitising compounds. M. BARENT and J. D. KENDALL (B.P. 477,983, 6.4.36).—The compounds used as sensitisers in B.P. 456,362 (B., 1937, 395) are prepared by condensing a quinoline base having reactive α- or γ-Me with a quaternary salt of a heterocyclic base having a reactive α-thio- or -seleno-ether or -thione, -selenone, -amino-, or substituted amino-group in presence of an acid-binding agent. *E.g.*, 1-methylthiolbenzthiazole metho-*p*-toluenesulphonate (I) is heated at the b.p. with quinaldine (II) in C_5H_5N to give 2-*methyldihydrobenzthiazolylidenequinaldine*, m.p. 161—162° (also obtained from the corresponding 1-methylseleno-compound); similar *compounds* are formed from (I) and lepidine, m.p. 260°, 2 : 3-dimethylquinoline, m.p. 188°, 6-aminoquinaldine, m.p. 256°, 4-ethylthiolquinaldine, m.p. 185°; from 1-ethylthiolbenzthiazole etho-*p*-toluenesulphonate and (II), m.p. 137°; 2-methylthiolquinoline metho-*p*-toluenesulphonate and (II), m.p. 153°; 1-methylthiol-5 : 6-benzbenzthiazole (III) metho-*p*-toluenesulphonate and β-naphthoquinaldine, m.p. 305°, and (II), m.p. 226°; 1-methylthiolbenzoxazole metho-*p*-toluenesulphonate and (II), m.p. 244°; 1-ω-acetanilidovinylbenzthiazole methiodide and (II), m.p. 160°; 1 : 3 : 3-trimethyl-2-ω-acetanilidovinylindoleninium iodide and (II), m.p. 160°; 6-ethoxyquinaldine, m.p. 192°, and *p*-toluquinaldine (IV), m.p. 187°; 4 : 5-dimethoxy-1-methylthiolbenzselenazole metho-*p*-toluenesulphonate and (II), m.p. 233°; 4 : 5-methylenedioxy-1-methylthiolbenzthiazole metho-*p*-toluenesulphonate and (II), m.p. 235°; 4 : 5-dimethoxy-1-methylthiolbenzthiazole metho-*p*-toluenesulphonate and (II), m.p. 226°; 1-methylthiol-3 : 4-benzbenzthiazole metho-*p*-toluenesulphonate and (IV), m.p. 248°, and (II), m.p. 256°; and the etho-*p*-toluenesulphonate of (III) and (II), m.p. 186°. H. A. P.

Manufacture of mercaptothiazoles. WINGFOOT CORP. (B.P. 479,855, 11.8.36. U.S., 16.10.35).—Mercaptothiazoles (mercaptobenzthiazole) prepared by the interaction of S, CS_2, and an amine are pptd. in a purified and denser form by pouring the molten product into dil. acid (1% aq. H_2SO_4) at 50—90°. A. H. C.

Manufacture of pyrimidine compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 475,507 and 475,559, 19.5.36. Cf. B.P. 473,193; B., 1938, 140).—(A) Interaction of 4-amino-5-aminoalkylpyrimidines with HNO_2 gives 4-amino-5-hydroxyalkylpyrimidines, convertible by standard methods into esters or halides. *E.g.*, 4-amino-2-methyl-5-aminomethylpyrimidine hydrochloride is converted by $NaNO_2$ in H_2O at 50—60° into 4-*amino*-2-*methyl*-5-*hydroxymethylpyrimidine*, m.p. 191° [-5-*bromomethylhydrobromide*, m.p. 208° (decomp.); *benzenesulphonate hydrochloride*]; in conc. HCl 4-*amino*-2-*methyl*-5-*chloromethylpyrimidine*, m.p. 163°, is formed. Other examples describe the prep. of 2 : 4-*diamino*-6-*methyl*-5-β-*chloroethyl*-, b.p. 163°/4 mm., and -5-β-*acetoxyethyl*-, decomp. >200°, 4-*amino*-2-*phenyl*-5-*hydroxymethyl*- (*hydrochloride*, m.p. 199°; *picrate*, m.p. 177°) and -5-*bromomethyl*- (*hydrobromide*, m.p. 165°), 4-*methylamino*-2-*methyl*-5-*hydroxymethyl*-, m.p. 160°, and -5-*chloromethyl-pyrimidine*, m.p. 200°; *Et* 4-*hydroxy*-, m.p. 174°, and 4-*chloro*-2-*phenylpyrimidyl*-5-*acetate*, m.p. 77°, and 4-*amino*-2-*phenylpyrimidyl*-5-*acetamide*, m.p. 209°. (B) 4-Amino-2-alkyl-5-aminoalkylpyrimidines are prepared by methods similar to those of B.P. 473,193, using suitably substituted hydroxymethylene- or carboalkoxy-acetonitriles in the place of similarly constituted acetic esters. *E.g.*, Et_2 cyanosuccinate is condensed with $NH{:}CMe{\cdot}NH_2,HCl$ and Na in EtOH to give *Et* 4-*amino*-6-*hydroxy*-2-*methyl*-5-*pyrimidylacetate*, converted by $POCl_3$ and reduction of the Cl-compound (Zn–aq. EtOH) into *Et* 4-*amino*-2-*methylpyrimidyl*-5-*acetate*, m.p. 168°; the corresponding amide, m.p. 250°, is converted into 4-amino-2-methyl-5-aminomethylpyrimidine as in B.P. 473,193. The following are also described: 4-*amino*-5-*cyano*-2-*methyl*-, m.p. 249° [*picrate*, m.p. 215° (decomp.)], -2-*ethyl*-, m.p. 198°, and -2-*benzyl-pyrimidine*, m.p. 180°; 4-*amino*-6-*hydroxy*-, m.p. 317°, and 6-*chloro*-4-*amino*-2-*methyl*-5-β-*phthalimidoethylpyrimidine* (I); 4-*amino*-6-*hydrazino*-2-*methyl*-5-β-*aminoethylpyrimidine* (*picrate*, m.p. 195—196°) [from (I) and N_2H_4,H_2O]; *Et* 4-*amino*-6-*hydroxy*-2-*benzyl*-, m.p. >300°, 6-*chloro*-4-*amino*-2-*benzyl*-, m.p. 136°, and 4-*amino*-2-*benzylpyrimidyl*-5-*acetate*, m.p. 130°, and the *dihydrochloride*, m.p. 115°, of 4-amino-2-ethyl-5-aminomethylpyrimidine. H. A. P.

Hydrocarbons. Synthesis of hydrocarbons. H_2-containing gases [for synthesis of hydrocarbons]. C_2H_2. Treating hydrocarbons with CrO_2Cl_2.—See II. **Intermediates. Aralkylaminoanthraquinones. Oxazines of anthraquinone series. Perylene compounds.**—See IV. **Sulphonic acids.**—See VI. **H_2O_2.**—See VII. **Alkylolamines from soaps.**—See XII. **Artificial materials.** See XIII. **Insecticides.**—See XVI. **Sulphanilamide. Derivatives of αβ-aliphatic diamines.**—See XX.

IV.—DYESTUFFS.

[Properties of new] Benzo Fast Copper dyes. K. OTTENSCHLÄGER (Textilber., 1938, 19, 282—283).—Benzo Fast Copper Yellow GGL, Blue FBL, and Navy Blue RL are recent additions to this previously-described range (B., 1935, 721) of dyes fast to light and washing; their properties and uses in selected combinations are described. A. J. H.

Vat dyes of the benzanthrone series. XIX, XX. T. MAKI and Y. NAGAI (J. Soc. Chem. Ind. Japan, 1937, 40, 471—472B).—A summary of work already reported (cf. A., 1937, II, 460). R. S. C.

Synthesis of indigotin. F. HENESEY (J. Soc. Dyers and Col., 1938, 54, 105—115).—Experiments on the technical synthesis of indigo (I) are described. Optimum yields of indoxyl (II) are obtained by fusing $NHPh{\cdot}CH_2{\cdot}CO_2Na(K)$ (1 mol.) with $NaNH_2$ (<2 mols.) and "mixed caustic" (approx. 3 mols. of KOH and 3 mols. of NaOH) at 220—225° for 5½ hr. at <40 lb./sq. in. The reaction takes place in two

stages and is adversely affected by H_2O. A deficiency of $NaNH_2$ leads to the formation of NH_2Ph. Optimum yields of (I) are obtained by oxidising a 4% solution of (II) at $\not>70°$ with a regulated stream of air in presence of 1—1·5% of a metallic oxide (*e.g.*, MnO). Lower yields are obtained by slower oxidation due to the formation of o-$NH_2{\cdot}C_6H_4{\cdot}CO_2H$ and by too rapid oxidation due to the formation of compounds of the flavindine type. Suspended oxidation of the (II) melt solution or suspended filtration of the dye also has an adverse effect on yield. A method of analysing indigotin (III) by sulphonation to indigo-carmine and titration until colourless with 0·05% aq. $KMnO_4$, a sample of (I) of known (III) content being taken as standard, is described. S. C.

Lake pigments for rubber.—See XIV. **Detecting artificial colourings in farinaceous foods. Annatto in cheese.**—See XIX.

See also A., II, 134, **Azo dyes from aryl esters of hydroxynaphthoic acids.** 153, **New rhodamine dye from *p*-cymene.** 159, **Azine compounds derived from diaminobenzidine.**

PATENTS.

Manufacture of azo dyes and intermediates. E. I. DU PONT DE NEMOURS & Co., and F. ZWILGMEYER (B.P. 479,848, 10.8.36).—Furoylacetarylamides are made by interaction of furoylacetic esters and primary arylamines, preferably in presence of an inert solvent (xylene) and a catalyst (C_5H_5N). In examples there are described *α-furoyl-4-chloro-*, m.p. 131—133°, *-4-methyl-*, m.p. 142—144°, *-4-ethoxy-*, m.p. 125—126°, *-2 : 5-diethoxy-*, m.p. 118—120°, *-5-chloro-2-methyl-*, m.p. 131—133°, *-4-chloro-2 : 5-dimethyl-*, m.p. 147—149°, *-4-chloro-2 : 5-diethoxy-*, m.p. 154—156°, *-2-methoxy-*, m.p. 108—109°, *-2 : 5-dimethoxy-*, m.p. 121—123°, *-5-chloro-2-methoxy-*, m.p. 116—117°, and *-4-methoxy-acetanilide* and *α-furoylacet-2-methoxy-1-naphthalide*, m.p. 173—175°. The substances are used to produce azo dyes on the fibre with diazo compounds derived from arylamines free from groups imparting solubility in H_2O. K. H. S.

Manufacture of azo dyes and preparations for the production thereof. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 480,169, 14.8.36).—Diazo compounds derived from arylamines free from H_2O-solubilising groups are combined with amines or imines containing SO_3H or CO_2H and the diazo-amino-compounds thus formed are converted, either wholly or in part, into salts of volatile org. bases, preferably having b.p. 30—80°. The org. salts are mixed, either dry or in solution, with coupling components, printed, and developed by steaming alone, the org. base being removed, whereupon the residual acidity of the CO_2H or SO_3H is sufficient to regenerate the diazo compound and permit coupling. Non-volatile bases, if present, must be substantially $<$ the quantity necessary to neutralise the acid liberated by removal of the volatile base. The dyes can be developed simultaneously with vat dyes. Among examples (46), 1 : 4 : 2-$C_6H_3MeCl{\cdot}NH_2$ (42·5) is diazotised and run at 0—5° into a solution of 1 : 2 : 5-$NH_2{\cdot}C_6H_3(CO_2H){\cdot}SO_3H$ (80) dissolved in H_2O (300) and C_5H_5N (700). After 4—5 hr. H_2O (1000) is added and NH_4Cl (500 pts.), whereupon the diazoamino-compound (I) is pptd. as yellow crystals. Salts of NH_4, $NHEt_2$, NH_2Pr^{α}, NH_2Pr^{β}, and NH_2Bu^{α} are obtained from similar diazo compounds with other amines and imines, *e.g.*, $NHMe{\cdot}CH_2{\cdot}CO_2H$, taurine, proline, and piperidine-2-carboxylic acid. A printing paste is made by dissolving 2 : 3-$OH{\cdot}C_{10}H_6{\cdot}CO{\cdot}NH{\cdot}C_6H_4Me$-$o$ (2·8) and the NH_4 salt of (I) (5) in 75% aq. $NHEt_2$ (20 pts.) and adding to neutral thickening. After printing and steaming a red print is obtained. K. H. S.

Manufacture of disazo dyes. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 480,601, 24.8.36. Addn. to B.P. 458,370; B., 1937, 884).—An aminoazo compound (I) made by diazotising 1 : 3 : 5 : 4-$NO_2{\cdot}C_6H_2Cl_2{\cdot}NH_2$ and coupling with 1 : 2 : 5-$NH_2{\cdot}C_6H_3(O{\cdot}C_2H_4{\cdot}OH)_2$ (II) is diazotised and coupled, either in substance or on the fibre, with arylamides of 2 : 3-$OH{\cdot}C_{10}H_6{\cdot}CO_2H$. The $ZnCl_2$ salt of the diazonium chloride of (I) may also be employed. The shades obtained are navy-blues and blacks which are superior in fastness to light to the dyes of B.P. 100,804, 203,032, and 214,516 (B., 1916, 888; 1923, 1016; 1924, 505). Instead of (II) the di-β-hydroxypropoxy- or -γ-hydroxybutoxy-ethers may be used. K. H. S.

Manufacture of [azo etc.] dye derivatives. SOC. CHEM. IND. IN BASLE (B.P. 480,358, 17.8.36. Switz., 17.8., 1.10., and 21.12.35).—The H_2O-solubility of hydroxylated (azo) dyes is increased by acylation in presence of a *tert.*-amine (C_5H_5N) with a compound which in addition to the acylating group contains at least one salt-forming group or a group convertible into quaternary NH_4 by combination with the *tert.*-amine or by addition of an alkyl salt, *e.g.*, polycarboxyl or -sulphonyl halides, sulphocarboxyl halides, dialkylamino- and halogenoalkyl-benzoyl halides. *E.g.*, the dye (I) α-$C_{10}H_7{\cdot}NH_2 \rightarrow \beta$-$C_{10}H_7{\cdot}OH$ is heated with p-$CH_2Cl{\cdot}C_6H_4{\cdot}COCl$ in C_5H_5N to give the *chloride* of the corresponding p-pyridinium-methylbenzoate, a H_2O-sol. compound, readily reconverted into (I) by dil. aq. alkali. Other examples describe the prep. of H_2O-sol. *products* from α-$C_{10}H_7{\cdot}NH_2 \rightarrow$ 2 : 3-hydroxynaphthoic anilide (II), (I), or 4 : 4′-$(\cdot C_6H_4{\cdot}NH_2)_2$ (III) $\rightarrow \beta$-$C_{10}H_7{\cdot}OH$ and m-$COCl{\cdot}C_6H_4{\cdot}SO_2Cl$; (I), 1 : 4-$NH_2{\cdot}C_{10}H_6{\cdot}SO_3H \rightarrow$ (II), p-$NHAc{\cdot}C_6H_4{\cdot}NH_2 \rightarrow$ 2 : 5 : 7-$NHBz{\cdot}C_{10}H_5(OH){\cdot}SO_2{\cdot}NHPh$, 1-2′ : 4′-dinitrophenylamino-8-hydroxynaphthalene, 1 : 5-diamino-4 : 8-dihydroxyanthraquinone and m-$CO_2H{\cdot}C_6H_4{\cdot}SO_2Cl$; (I), (III), the Cu derivative of 4 : 2 : 1-$NH_2{\cdot}C_6H_3Cl{\cdot}OH \rightarrow \beta$-$C_{10}H_7{\cdot}OH$, or 16 : 17-dihydroxydibenzanthrone and 1 : 3 : 5-$CO_2H{\cdot}C_6H_3(SO_2Cl)_2$; (I) and 2 : 1 : 5-$OH{\cdot}C_6H_3(CO_2H){\cdot}SO_3H$, and 1 : 5-dibenzamido-4 : 8-dihydroxyanthraquinone and p-chloromethylbenzoyl chloride. The colour in H_2O of numerous other similarly solubilised derivatives of hydroxyazo dyes is given. H. A. P.

Preparation of aralkylaminoanthraquinones. E. C. BUXBAUM, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,068,371—2, 19.1.37. Appl., 25.3.36).—(A) Aralkylaminoanthraquinones useful for colouring acetate rayon and gasoline are obtained by

heating at 100—200°, if desired in presence of inert org. solvents ($PhNO_2$, o-$C_6H_4Cl_2$) and a catalyst (Na_2CO_3), a mixture of an aralkyl alcohol ($CH_2Ph{\cdot}OH$) and an amino- or nitro-anthraquinone. Examples are: 1 : 8-diamino-, 1 : 4 : 5 : 8-tetra-amino-, and 2-bromo-1-amino-4-toluidino-anthraquinone with excess of $CH_2Ph{\cdot}OH$ at about 200° give 1 : 8-*di(benzylamino)*- (violet), 4 : 8-*diamino*-1 : 5-*dibenzylamino*- (greenish-blue), and 2-*bromo*-4-*toluidino*-1-*benzylamino*-*anthraquinone* (greenish-blue), respectively. Similarly, from the appropriate anthraquinone derivatives, 1 : 8-*dibenzylamino*-4 : 5-*dihydroxy*-, -4 : 5-*dimethoxy*-, and 8-*amino*-1-*benzylamino*-4 : 5-*dihydroxy*-*anthraquinone* are obtained. From 1-nitro- and 1-nitro-2-methyl-anthraquinone are likewise obtained 1-benzylamino- (red) and 1-benzylamino-2-methyl-anthraquinone (orange). Another example illustrates the use of $Ph{\cdot}[CH_2]_2{\cdot}OH$ in the prep. of 1 : 8-di(phenylethylamino)-4 : 5-dihydroxyanthraquinone (blue). (B) Polyaminoanthraquinones containing $\nless 3$ α-NH_2 are caused to interact with aralkyl halides, sulphates, or alcohols at 100—200° in presence of alkalis so that at least one NH_2 is substituted. Examples are: 1 : 4 : 5 : 8-tetra-aminoanthraquinone (I) (100) with CH_2PhCl (300) and Na_2CO_3 (80 pts.) at 140—145° for 4 hr., or at 175° for 4 hr. give respectively 1 : 4 : 5 : 8-tetrabenzylamino- (II) and -tetra(dibenzylamino)-anthraquinone. Similarly, from 1-amino- and 1 : 4-diamino-anthraquinone are obtained the corresponding di(dibenzylamino)-derivatives. Other examples describe the interaction of (I) (100) with $CH_2Ph{\cdot}OH$ (400 pts.) at 200° for 4 hr. to give 4 : 8-*diamino*-1 : 5-*di*(*dibenzylamino*)*anthraquinone* (III) and of (I) in $PhNO_2$ with CH_2PhCl (in slight excess over theory) at 170—180° for 6 hr. to give 4 : 5 : 8-*triamino*-1-*benzylaminoanthraquinone* (IV). In the interaction of (I) in PhOH with CH_2PhCl, by the regulation of the amount of the latter, the formation of (II), (III), or (IV) can be controlled. N. H. H.

Manufacture of acid wool dyes of the anthraquinone series. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 480,270, 20.8.36).—The chlorination or bromination of 1-amino-4-arylamino-anthraquinone-2-sulphonic acids or their alkali salts gives dyes of redder shade than the starting materials and of good fastness properties. *E.g.*, Na 1-amino-4-*p*-acetamidoanilinoanthraquinone-2-sulphonate (I) is chlorinated (Cl_2) in conc. H_2SO_4 containing a little I at 0—10° to give a blue *Cl*-compound; with Br at 0—5° a Br_1- and at room temp. a Br_2-derivative is produced. The Br_2-derivative of the *p*-*N*-Me derivative of (I), and the *Br*- and Br_2-derivatives of 1-amino-4-anilinoanthraquinone-2-sulphonic acid are similarly prepared. H. A. P.

Manufacture of vat dyes of the anthraquinone series. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 480,749, 26.8.36).—The use of trifluoromethylbenzoyl halides (fluorides) as acylating agents for aminoanthraquinones and cyclic derivatives is claimed. Examples of the dyes produced are: 1 : 5-, m.p. 363°, 1 : 8-, m.p. 292° (both yellow), and 1 : 4-*bis*-p-*trifluoromethylbenzamido*- (scarlet), m.p. 352—353°, 1-*benzamido*-5-p-*trifluoromethylbenzamido*- (yellow), m.p. 297—298°, 1 : 5-*dihydroxy*-4 : 8-*bis*-p-*trifluoromethylbenzamido*- (violet), m.p. 349°, 1 : 5-, m.p. 290—292°, 1 : 8-, m.p. 218° (both yellow), and 1 : 4-*bis*-m-*trifluoromethylbenzamido*-, m.p. 212° (red), 1-*benzamido*-5-m-*trifluoromethylbenzamido*- (yellow), m.p. 250°, 1 : 5-*dihydroxy*-4 : 8-*bis*-m-*trifluoromethylbenzamido*- (violet), m.p. 320°, and 1 : 5-*bis*-o-*trifluoromethylbenzamidoanthraquinone* (yellow), m.p. 311°; 4-m-*trifluoromethylbenzamido*-2 : 1-*anthraquinonebenzacridone*, m.p. 284° (Cl_2-fast), and its 6′-*Cl*-, m.p. 318°, and 3′ : 5′-Cl_2-derivative, m.p. 291° (all blue), and -1(*S*) : 2-*thioxanthone* (blue-red), m.p. 305°; 3′ : 5′-*dichloro*-4 - 3″ : 5″ - *bistrifluoromethylbenzamido*-2 : 1 - *anthraquinonebenzacridone*, m.p. 341° (blue); 4 - p - *trifluoromethylbenzamido* - 1 : 9 - *anthrapyrimidine* (green-yellow), m.p. 220°, and -2 : 1-anthraquinonebenzacridone (6′-*Cl*-derivative, m.p. 393°). H. A. P.

Manufacture of vat dyes of the dibenzanthrone series. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 480,284, 22.8.36).—Blue-green to blue vat dyes are obtained by interaction of aroyl halides with dihydroxy-di- or -*iso*di-benzanthrones, their alkyl ethers, or acyl esters, or with a dibenzanthrone-16 : 17-quinone in presence of Fe or Fe halides; one or more aroyl groups are introduced, apparently directly into the nucleus, and the compounds having >2 of such are in general vatted with difficulty. *E.g.*, (16 : 17-) dihydroxydibenzanthrone (I) is heated with BzCl and Fe in $C_6H_3Cl_3$ at the b.p. for 48 hr.; a green-blue vat dye is produced. Similar products are obtained from (I) and 2 : 4 : 1-$C_6H_3Cl_2{\cdot}COCl$ (II), 1-chloroanthraquinone-2-carbonyl chloride, from the Me_2 ether of (I) and BzCl, from the bis-2′ : 4′-dichlorobenzoate of (I) (with $FeCl_3$), and from dihydroxy*iso*dibenzanthrone and (II). H. A. P.

Preparation of dyes of the anthraquinone series. [Brominated dimethoxydibenzanthrones.] W. L. RINTELMAN and W. H. LYCAN, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,068,350, 19.1.37. Appl., 23.10.35).—In the bromination of dimethoxydibenzanthrones in conc. H_2SO_4 demethylation is avoided by adding (*a*) to the H_2SO_4 before dilution or (*b*) to the H_2O used for dilution substances capable of removing free Br, *e.g.*, (*a*) PhOH, *cyclo*hexanol, quinol, (*b*) $NaHSO_3$. H. A. P.

[Preparation of] anthraquinone [vat] dyes. R. J. LOVELUCK, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 480,745, 24.8.36).—Tribenzamidotrianthrimidecarbazoles, prepared by interaction of a 4 : 5-dihalogeno-1-benzamidoanthraquinone with 1-amino-4- (I) or -5-benzamidoanthraquinone (II) (in $PhNO_2$ in presence of a Cu salt and an acid-binding agent) and cyclisation (H_2SO_4, $AlCl_3$) followed by oxidation (NaOCl, CrO_3) are dark brown vat dyes of good fastness to light, chemick, washing, and kier-boiling. The *trianthrimides* and *carbazoles* from 4 : 5-dichloro-1-benzamidoanthraquinone and (I) or (II) (2 mols.) or (I) plus (II) (equimols.) are described. H. A. P.

Manufacture of oxazines of the anthraquinone series. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 480,693, 25.8.36).—1-Halogenoanthraquinone-2-sulphonic acids are caused to interact with

an *o*-hydroxyamino-compound in presence of an acid-binding agent (and Cu or a Cu compound); the products are optionally sulphonated to give wool dyes. *E.g.*, K 1-iodoanthraquinone-2-sulphonate (I) is heated at 50—55° with o-OH·C_6H_4·NH_2, NaOH, Na_2CO_3, and CuCl in H_2O under N_2 to give anthraquinone-2 : 1-oxazine; this is converted by 8% oleum at 25° into a blue wool dye. Other examples describe the prep. of *oxazines* and their sulphonic acids (where not already sulphonated) from (I) and 1 : 2 : 3 : 5 : 6 : 4-OH·$C_6Cl_3(NH_2)$·SO_3H (blue-red), 1 : 3 : 4 : 5 : 6 : 2-OH·C_6Cl_4·NH_2 (II) (not sulphonated: blue-red vat dye), 1 : 6 : 2 : 4-OH·$C_6H_2Cl(NH_2)$·SO_3H (red-violet), 4 : 1 : 3 : 5-OH·$C_6H_2Me(NH_2)$·SO_3H (violet), 1 : 2 : 4 : 6-OH·$C_6H_2(NH_2)(NHAc)$·SO_3H (III) (violet), 3-amino-4-hydroxybenzophenone-2′-carboxylic acid [cyclised without sulphonation by H_2SO_4 at 90—100° to a violet vat dye; a similar dye is obtained from (I) or the corresponding Br-compound and 1-amino-2-hydroxyanthraquinone], 3-amino-4-hydroxydiphenylsulphone-3′-sulphonate (red-violet), and 2-amino-1-naphthol-4-sulphonate (blue-grey); from 1-iodo-4-anilinoanthraquinone-2-sulphonic acid and (II); from Na 1-bromoanthraquinone-2-sulphonate and 1 : 2 : 4 : 6-OH·$C_6H_2(NH_2)(NO_2)$·SO_3H (red-violet); from 1-iodoanthraquinone-2 : 6-disulphonic acid and 5 : 2 : 4 : 1-NH_2·$C_6H_2(OH)_2$·CO_2H (blue; green after chroming); from Na 4-bromo-1-iodoanthraquinone-2-sulphonate and (III) (violet); and from Na 4-bromo-1-aminoanthraquinone-3-sulphonate with o-OH·C_6H_4·NH_2 (violet).

H. A. P.

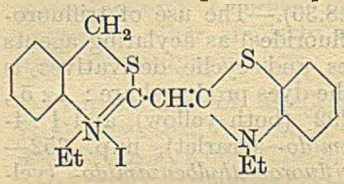
Manufacture of vat dyes of the anthraquinone oxazole series. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 478,700, 20.7.36).—Vat dyes of good fastness to light, Cl_2, and kier-boiling are obtained by condensation of anthraquinone-oxazoles derived from a non-vattable aromatic acid having reactive halogen or NO_2 with cyclic primary or *sec.* amines, by condensation of oxazoles of the above type but having NH or NH_2 as substituent with cyclic acylating agents or with cyclic carboxylamides in presence of acid catalysts, or by interaction of cyclic compounds attached by NH or CO·NH to a non-vattable aromatic carboxylic acid, amide, or halide, or aldehyde or di- or tri-halogenomethyl compound with *o*-halogeno- or hydroxy-aminoanthraquinones. *E.g.*, μ-*p*-aminophenylanthraquinone-1(*N*) : 2-oxazole (from 1-amino-2-hydroxyanthraquinone and p-NO_2·C_6H_4·COCl, followed by reduction with $Na_2S_2O_4$) is heated at the b.p. with anthraquinone-2-carboxyl chloride until HCl is no longer evolved, to give a green-yellow vat *dye*; similar *dyes* are obtained using 1 : 4-dichloroanthraquinone-6- (I), 1-aminoanthraquinone-2- (II), anthraquinone-2(*S*) : 1-thioxanthone-6′-, benzanthrone-6-, 1(*N*) : 2-*pyrazoloanthraquinone*-Py3- (from 1-amino-2-ethylanthraquinone and HNO_2, followed by oxidation) and its N-*Me* derivative (oxidation of 1-chloro-2-*p*-tolylanthraquinone to 1-chloro-2-*p*-carboxybenzoylanthraquinone, and treatment with N_2H_4,H_2O), and anthraquinone-1(*N*) : 2 : 1′ : 2′-benzacridone-5′-carboxyl chloride (III), and BzOH or NH_2Bz and HCl; μ-*p*-aminophenylanthraquinone-2 : 3-oxazole and (I), (II), (III), and 1-nitroanthraquinone-2-carboxyl chloride; μ-*p*-chlorophenylanthraquinone-1(*N*) : 2-oxazole and 1-amino-5-benzamidoanthraquinone (IV) [heated with NaOAc and $Cu(OAc)_2$ in $PhNO_2$], 1-amino-4-benzamidoanthraquinone (V), or 5-amino-1 : 9-anthrapyrimidine; μ-*m*-nitrophenylanthraquinone-1(*N*) : 2-oxazole and 1-aminoanthraquinone (VI) or (IV); μ-2′ : 4′-dichlorophenylanthraquinone-1(*N*) : 2-oxazole [from 1-amino-2-hydroxyanthraquinone (VII) and 2 : 4 : 1-$C_6H_3Cl_2$·CO_2H in $PhNO_2$] or the corresponding 3 : 4-Cl_2-compound and (IV), (V), or (VI); (VII) and *p*-1-anthraquinonylaminobenzoyl chloride (from 1-chloroanthraquinone and p-NH_2·C_6H_4·CO_2H, followed by $SOCl_2$), *p*-2-anthraquinonylcarbamidobenzoyl chloride, or the chloride of 1-*m*-carboxybenzamidoanthraquinone.

H. A. P.

Manufacture of [chrome] dyes of the triarylmethane series. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 480,328, 18.8.36. Addn. to B.P. 472,757; B., 1938, 142).—Very fast dyes of the triarylmethane series, capable of being chromed, are obtained by interaction of 1 mol. of 3- or 5-hydroxytrimellitic acid or anhydride with 1 mol. of an *N*-substituted m-NH_2·C_6H_4·OH, and condensing the resulting *N*-substituted benzoylbenzoic acid derivative, containing the OH and CO_2H in adjacent positions, with monoazo dyes derived from m-$C_6H_4(OH)_2$, preferably in presence of an acid condensing agent (H_2SO_4, p-C_6H_4Me·SO_3H) at 60—95°. In the examples, dimethyl- or diethyl-aminodihydroxycarboxybenzoylbenzoic acids (from 5-hydroxytrimellitic acid and m-$NAlk_2$·C_6H_4·OH] are condensed with monoazo dyes obtained by coupling 1 : 2 : 4-NH_2·$C_{10}H_5(OH)$·SO_3H, 1 : 2-NH_2·$C_{10}H_6$·OH, 3-amino-5-sulpho- or *p*-amino-salicylic acid, o-OH·C_6H_4·NH_2, p-OMe·C_6H_4·NH_2, or 1 : 2 : 3-NH_2·$C_{10}H_5$·(OH)·CO_2H with m-$C_6H_4(OH)_2$. The products dye animal fibres orange to blue and brown shades, the fastness being enhanced by after-chroming. They may be used also for chrome printing on cotton and viscose and may be chromed in substance to give acid dyes of good fastness properties.

S. C.

Manufacture of cyanine dyes, and their use in modifying the properties of photographic emulsions. Kodak, Ltd., and B. Beilenson (B.P. 478,945, 24.4.36).—A quaternary salt of a 2-alkylthiol-4 : 5-benz-1 : 3- or a 3-alkylthiol-5 : 6-benz-1 : 4-thiazine (or the thiazine and an alkylating agent) is/are condensed with a heterocyclic quaternary NH_4 salt having a reactive α- or γ-Me (or similar components) (in presence of a base, *e.g.*, Na_2CO_3, NaOH, strong *tert.* org. bases). The products are photographic sensitisers. *E.g.*, 2-methylthiol-4 : 5-benz-1 : 3-thiazine (I) is heated with p-C_6H_4Me·SO_3Et (II) and 1-methylbenzthiazole (III) at 150°, the product is dissolved in EtOH containing NEt_3 and heated at the b.p., and aq. KI is added, which ppts. the yellow dye as *iodide* (annexed formula), m.p. 263°; similar dyes are prepared (isolated as *iodides*) from (I), (II), and quinaldine, m.p. 244°, benzselenazole, m.p. 271°, 1-methyl-5 : 6-benzbenzthiazole, m.p. 274°,



1-methyl-3 : 4-benzbenzoxazole, m.p. 249°, 2-methylthiazoline, m.p. 226°, from the methiodide of (I) and 1-ethylbenzthiazole ethiodide, m.p. 233°, and from 3-methylthiol-5 : 6-benz-1 : 4-thiazine, (IV), *p*-$C_6H_4Me{\cdot}SO_3Me$, and (III). (IV) is prepared by interaction of the 3-ketodihydrobenz-1 : 4-thiazine (A., 1907, i, 525) with P_2S_5 and methylation of the resulting thiol (Me_2SO_4 and NaOH). H. A. P.

Manufacture of [phthalocyanine] dyes. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 480,249, 18.7.36).—Alkyl- and dialkyl-phthalocyanines, usually contaminated to some extent with phthalocyanine, are obtained by treating *o*-$C_6H_4(CN)_2$ or a substituted derivative with a Mg alkyl, *cyclo*-alkyl, aryl, or aralkyl halide, heating the product, preferably in C_5H_5N or quinoline, and finally dissolving the Mg-base complex in conc. H_2SO_4 and drowning the mixture in H_2O to cause simultaneous hydrolysis and demetallisation. The alkylphthalocyanines, which may be sulphonated and halogenated and dispersed to give pigments, are greener in shade than the parent substance. S. C.

Manufacture of intermediate products and sulphuretted dyes therefrom. SOC. CHEM. IND. IN BASLE (B.P. 480,213, 11.3.37. Switz., 11.3.36).—Indophenols, obtained by interaction of carbazoles with nitrosophenols, when heated with dil. mineral acid yield new intermediates which are converted by S into dyes of great fastness, particularly to Cl_2; *e.g.*, the indophenol from carbazole and *p*-$NO{\cdot}C_6H_4{\cdot}OH$ is heated with 2% H_2SO_4 at 60—70°, and the product treated with a polysulphide solution, dried, and baked with S and NaCl; by dissolving the product in dil. Na_2S and air-blowing a bath is obtained which dyes cotton black shades fast to Cl_2. R. G.

Manufacture of water-insoluble dyes [pigments]. A. CARPMAEL. From I. G. FARBENIND. A.-G. B.P. 480,539, 22.8.36).—A 4 : 4′-diaminostilbenedisulphonic acid is condensed with an aromatic *o*-hydroxy-aldehyde (2 mols.) and the product is converted into a H_2O-insol. metal (complex) salt, which has good fastness to oils, spirit, solvents, and light and may be used for the manufacture of colour lakes. Examples are the *Zn*, *Ni*, *Co*, and *Cr* salts of the 2-*hydroxy*-1-*naphthylidene* derivative of 4 : 4′ : 2 : 2′-$[{:}CH{\cdot}C_6H_3(NH_2){\cdot}SO_3H]_2$ (I) (all red), and the *Zn* salts of the 5-*chloro*-2-*hydroxy*- and 4 : 5-*dimethylbenzylidene* derivatives of (I) (orange). 2-*Hydroxycarbazole*-3-*aldehyde*, m.p. 213—214°, is prepared by the action of $CHCl_3$ and NaOH at 60—70° on 2-hydroxycarbazole. H. A. P.

Manufacture of vat dyes [condensed naphthalene-1 : 4 : 5 : 8-bisiminazoles]. I. G. FARBENIND. A.-G. (B.P. 480,602, 24.8.36. Ger., 22.8.35. Addn. to B.P. 237,294; B., 1925, 840).—The dyes of the chief patent are prepared by the use of a *N*-substituted *o*-diamine, *e.g.*, the (mono-)*N*-Me, dimethyl- and phenyl-carbamyl derivatives of *o*-$C_6H_4(NH_2)_2$ (I), instead of the free *o*-diamine. The *dyes* from 2-*sulphondimethylamido*- (II) and 2-*phenylsulphonyl*-*naphthalene*-1 : 4 : 5 : 8-*tetracarboxylic acid* (III) and derivatives of (I) (both red-brown) are described. (II) is prepared by action of $ClSO_3H$ on acenaphthalic anhydride, conversion of the sulphonyl chloride (IV) into its dimethylamide ($NHMe_2$), and oxidation ($KMnO_4$); (III) by condensation of (IV) with C_6H_6 ($AlCl_3$), and oxidation ($KMnO_4$) of the resulting sulphone. H. A. P.

Manufacture of vat dyes. SOC. CHEM. IND. IN BASLE (B.P. 480,573, 30.6.37. Switz., 9.7.36).—Pyrene or a substitution product is heated with aq. H_2SO_4. The products may be halogenated or nitrated and the halogeno-derivatives condensed with arylamines (aminoanthraquinones). *E.g.*, 3-hydroxypyrene is sulphonated (30% oleum at 20—22°), the sulphonation mixture is diluted, and heated at 190—200° to give a violet-black vat dye (I) which contains S; similar products are obtained from 3-hydroxypyrene-di- (93% H_2SO_4 at 135—140° or 53% H_2SO_4 at 185—190°) or -mono-sulphonic acids (prepared with $ClSO_3H$–$PhNO_2$). Other examples describe the prep. of grey to black dyes from pyrene and 3-aminopyrene, the prep. of a Cl- (II) (SO_2Cl_2 and I in $PhNO_2$), Br- (Br and I in $PhNO_2$ or conc. H_2SO_4), and NO_2-derivative of (I), and the condensation of (II) with NH_2Ph and with 1-aminoanthraquinone. H. A. P.

Manufacture of compounds of the perylene series. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 480,162, 13.7.36 and 2.6.37).—Dibenzanthrone (I) or *iso*dibenzanthrone (II), or their OH or SH derivatives, the leuco-compounds of (I) or their ethers or esters, alkoxy- or alkylthiol derivatives of (I), dibenzanthronyls, CO, OH, or SH compounds of perylene or dinaphthyl, or perylenetetracarboxydiimides, are heated with unsaturated hydrocarbons of $\nless C_6$ or with aliphatic or *cyclo*aliphatic alcohols, alkyl halides, mercaptans, ethers, or thioethers having a group of $\nless C_6$ and a catalyst of Friedel–Crafts type. There are produced oil-sol. fluorescent coloured compounds. *E.g.* HCl is led at 220° into (I) and *n*-$C_{12}H_{25}{\cdot}OH$, $ZnCl_2$ is added, and heating is continued in HCl at 215—220° until all (I) has disappeared; the C_6H_6-sol. fraction is a deep red oil having an olive-yellow fluorescence. In other examples the leuco-compound of (I) is heated at 150° with *n*-$C_{12}H_{25}Br$ (III) and $ZnCl_2$, (II) is heated with (III) (large excess), Na_2CO_3, and Zn dust at the b.p., (I) is heated with *n*-$C_{12}H_{24}$, vinyl dodecyl sulphide, or *n*-$C_{12}H_{25}{\cdot}SH$ and $ZnCl_2$, or didodecyl ether and Zn, perylene-3 : 10-quinone is heated with (III) and $ZnCl_2$, and perylenetetracarboxydi-imide is heated with $C_{12}H_{25}{\cdot}OH$, HCl, and $ZnCl_2$ at 200—210°. H. A. P.

Azo dyes.—See III and VI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Kiering [of cotton]. L. KOLLMANN (Textilber., 1937, 18, 994—997).—24 variations of the usual kiering process were compared with regard to their efficiency in removing the 0·4—0·7% of wax normally present in raw cotton and their simultaneous increasing of the wettability of the fabric; the detailed results are tabulated. Max. removal of wax does not, in most cases, run parallel to max. increase of wettability, but the Cekit kiering process (2 hr. at 2 atm. pressure),

using a liquor containing (per l.) NaOH (9), Monopol soap (1), and Na aluminate (1 g.), is the most effective for both purposes; successive kiering with aq. CaO and Na_2CO_3 is next in efficiency. Treatment of the cotton with aq. Cl_2 or Br before kiering very favourably increases the ultimate increase in wettability. The Cekit and CaO–Na_2CO_3 kiering processes are best as regards leaving the cotton white. No appreciable increase of wettability or decrease of wax is obtained by adding Nekal BX to the usual kier liquor containing NaOH. A. J. H.

Use of organic fat solvents in textile processing and purification. L. Kollmann (Textilber., 1938, **19**, 269—271).—Cotton wax is completely sol. in Et_2O, C_6H_6, PhMe, xylene, pine oil, CCl_4, methylhexalin, $CHCl_3$, and cresol, but only partly sol. in light petroleum, benzine, petrol, EtOH, $COMe_2$, C_5H_{11}·OH, glycerin, and C_5H_5N. The effect on the wax content, wettability, and colour of raw desized cotton (wax content 0·76%) produced by kiering it at 95° and under pressure (2—2·5 atm. = 120—130°) with liquors containing about 5% of C_6H_6, xylene, pine oil, methylhexalin, or $CHCl_3$, with or without the presence of 1% of NaOH, was determined. The most satisfactory result was obtained by kiering under pressure with 1% aq. NaOH containing 5 g./l. of xylene; the resulting cotton had a wax content of only 0·11% and wetted completely in <1 sec. With volatile solvents better purification is obtained by kiering at 95° instead of 120—130°. It is concluded that the advantages to be obtained by using org. solvents in kier liquors are frequently exaggerated; simple kiering with aq. NaOH (cf. preceding abstract) gives excellent removal of the cotton wax. The results indicate that good wettability can be secured with but a small removal of wax, and it is recommended to evaluate a kiering treatment by its effect on the wettability and colour of the cotton rather than by wax removal. A. J. H.

Mongolian sheep wool. II. Physical properties. M. Saito (Rep. Inst. Sci. Res., Manchoukuo, 1937, **11**, 397—420).—Mongolian sheep wool consists of a mixture of fine and coarse fibres (cf. B., 1937, 123), the former having an average diameter of 25·6 μ. The tensile strength, elongation, and Young's modulus of single samples of the fine fibres were determined by means of a specially designed, self-recording testing machine and compared with a Merino wool of 56's quality having approx. the same diameter. Both wools were tested, first in the greasy condition, and later after degreasing with Et_2O. In both these conditions these three properties of the Mongolian wool were > those of Merino wool. Removal of grease increases the properties in both wools. S. G. S.

Wool lubrication. S. Kershaw (Rayon Text. Month., 1938, **19**, 23, 112).—The reasons for lubricating wool during manufacture into tops and yarns are given, and the methods of applying oil briefly described. W. A. R.

Silk fibroin. VII. Adsorption of acids, dyes, and metallic salts. H. Kaneko. VIII. Action of nitric and nitrous acids. H. Kaneko and Y. Nakazawa (Bull. Agric. Chem. Soc. Japan, 1937, **13**, 1215—1225, 1226—1230; cf. A., 1937, III, 340).—VII. Fibroin-*A* components adsorb inorg. acids, acid dyes, I, and heavy-metal salts to a greater extent than -*B*, but org. acids and basic dyes are adsorbed more strongly by the latter. The results may be due to differences in active groups on the surface of component micelles, to the degree of diffusion of ions through the particles, and to the effect of anions in solution. With mol. colloidal and colloidally dispersed compounds the adsorption curve is mainly one of surface adsorption.

VIII. Fibroin adsorbs HNO_3, becoming yellow in colour due to formation of nitrofibroin. -*A* acquires a deeper yellow than -*B*. Fibroin components can be diazotised and coupled with naphthols, phenols, and amines to form azo dyes. J. N. A.

Fixation of sericin of raw silk. I. Fixation by chromium salts. M. Oku and Z. Hirose (Bull. Agric. Chem. Soc. Japan, 1937, **13**, 1257—1267).—By fixation is meant making sericin (I) insol. in boiling H_2O and fixing it firmly to the fibroin by chemical treatment. During fixation of (I) on raw silk by Cr salts, the adsorption of Cr followed Freundlich's adsorption isotherm. The amount of Cr taken up by white raw silk is ≫ that taken up by yellow raw silk, and it is concluded that in the latter there is a physico-chemical combination between (I) and xanthophyll. Adsorption of 1% of Cr_2O_3 greatly facilitates fixation. The strength and elongation of the raw silk are not affected by fixation of (I) by Cr salts, but the surface of the original fibre is altered, giving a wool-like appearance. J. N. A.

Acetylation of silk fibroin by the action of keten. I. M. A. Kise and E. L. Carr. **II.** E. L. Carr (Text. Res., 1936, **7**, 103—109; 1938, **8**, 125—133).—I. Samples of silk fibroin, prepared by degumming Italian and Japanese silks and then extracting with $COMe_2$, EtOH, and Et_2O, were exposed to cold and hot (≯100°) keten gas, obtained by pyrolysis of $COMe_2$ at 700°, whereby they became yellow and acquired a max. Ac content of 7·3% (this was obtained in both cold and hot ketenisation) so that they gave negative tests (when the Ac content was >5%) with the Millon and ninhydrin reagents. It is assumed that this gas reacts with and blocks the 10% tyrosine-NH_2 and -OH normally present in silk, but this would account only for 2·5% of the Ac content. The Ac content of the ketenised fibroin is stable to cold 1% aq. $NaHCO_3$ and is only lowered from 7·2 to 6·0% when it is dissolved in aq. LiBr at 80°, then pptd. with $COMe_2$, and further extracted (Soxhlet) for 6 hr.

II. In the ketenisation of silk fibroin at 15—125° the max. Ac content obtained under optimum conditions (5 or 12 hr. at 125° or 15°, respectively) is 7·3%. Ketenisation is not effected by interaction of the fibroin with a 3·4% solution of the gas in Et_2O during 8 hr. The tan colour formation which accompanies ketenisation is partly due to simultaneous formation of polymerised keten, which was removed by extraction with $COMe_2$, EtOH, or Et_2O to leave a soft, amber-coloured, lustrous silk. The ketenised fibroin (Ac content 5%) is now found to give a positive

test with Millon's reagent after keeping for >10 min. Negative tests with the Millon and ninhydrin reagents are obtained when the Ac content reaches 7 and 3%, respectively. A. J. H.

Scientific research in Indian jute manufacture. S. G. BARKER (J. Soc. Arts, 1938, **86**, 457—481).—A lecture.

Disintegration of broom into fibres suitable for spinning. K. KELLERMANN and W. MÜNCH (Textilber., 1938, **19**, 2—6, 137—139, 225—226).—Broom (rush) fibre is obtained by digesting the highly woody stems, preferably of 1-year-old plants, with an alkali since a retting treatment as used for flax fails to yield a pure fibre. Digestion of the stems at 160°/5·5 atm. for 3 hr. with aq. $Ca(OH)_2$ (8—9% of CaO on the wt. of stems is required; the concn. is unimportant) gives 11% of pure fibre and 22% of wood sufficiently pure for use in cellulose-rayon manufacture. The use of $Mg(OH)_2$ instead of $Ca(OH)_2$ is not recommended. Digestion with H_2O alone removes the pectin within 1 hr., but the complete disintegration does not occur. Disintegration of the stems by digestion at 100—160° with H_2O and aq. $Ca(OH)_2$ was followed quantitatively by measurement of the acidity developed in the liquor by formation of acid decomp. products; the numerous acidity curves given show that their high initial steepness suddenly decreases at the stage of complete pectin removal (after the first hr.). Similar curves obtained with $Ba(OH)_2$ have not this characteristic bend, but they indicate this alkali to be considerably more reactive than $Ca(OH)_2$. Microscopical investigations are described (with photomicrographs) to show that the resistance of broom to retting is due to a specially hard epicuticle the dissolution of which requires hot alkaline treatment; the high resin content of the broom is not responsible for the necessary severity of the digestion process. Tensile strength data are given which show that the recommended aq. $Ca(OH)_2$ digestion process produces no appreciable weakening of the fibre. A pre-retting does not assist the alkaline disintegration process. A. J. H.

Importance of ultra-violet [light] fluorescence in fibre analysis. H. J. HENK (Kunstseide u. Zellwolle, 1937, **19**, 426—427).—Results are given for several natural and artificial fibres and wood pulps, and the differences shown by various fibres when dyed with Oxydianil Yellow O are described. 8-Hydroxyquinoline sulphate is used to intensify the difference between cotton and linen. The examination of characteristically coloured zones on capillary strips is helpful and colorations for various oils are given. H. WH.

Survey of oiling problems in the worsted industry. J. BARRITT (J. Text. Inst., 1938, **29**, P47—59).—The presence of tea-seed oil in olive oil can be detected by the absorption spectrum, the former having a band at 2700 A. which is absent in the latter. Combing and spinning tests with oiled tops and scouring tests with the yarn showed definite differences between olive oil and various proprietary oils, but the differences in shade after dyeing were very small. The best spinning results were obtained with 3—4·5% of oil. A. G.

Effect of temperature in drying on cost of operation and resistance to wear of textiles. B. R. ANDREWS (Amer. Dyestuff Rep., 1938, **27**, 141—144).—Rapid drying at high temp. allows the cost of the necessary steam and power to be reduced by 66% and the resulting dried textile material generally has a higher resistance to wear. Wear-resistance curves obtained by drying white and coloured worsted gabardine fabrics at 15—170° are given in support. Resistance to creasing is higher for rapid drying at $\not>60°$, but is lower at >60°; the elasticity of the fabric is higher when drying is effected rapidly at >60°. These advantages gained by rapid drying are lost by over-drying. At any temp. rapid drying yields textile material of higher quality. A. J. H.

[Comparison of the] long and short drying [of textiles]. H. HAAS (Textilber., 1937, **28**, 912—913).—The adverse effect of drying on textile fibres, especially cotton and wool, is discussed. It is concluded that prolonged low-temp. drying may be as damaging to the fibre as rapid high-temp. drying. During drying, cotton and wool are hydrolysed with formation of end OH- and CHO-groups (cotton) and NH_2-acids and NH_3 (wool); splitting of the cystine linking in wool also occurs. Heating of wool for 24 hr. at 50° or for 3 hr. at 110—115° produces the same loss of S, and equal losses of strength occur when wool yarns are heated for 24 hr. at 50° or for 1 hr. at 85—90°. It is necessary to pre-dry at $\not<80$—100° for the rate of H_2O-absorption of the dried fibre to be diminished. The characteristic bead-like swelling of cotton in cuprammonium solution is prevented by drying at high temp. A. J. H.

Moisture in relation to textile materials. A. C. GOODINGS (Canad. Text. J., 1938, **55**, No. 3, 35—37).—Data are given showing the H_2O-absorptions of wool, cotton, silk, and viscose rayon at 20—90%; these are discussed with reference to the manufacture of wool materials under the different climatic conditions of Canada and Great Britain, whereby Canadian-manufactured goods contain 3·5% more wool. A. J. H.

Breaking strengths of dress fabrics and the relation of strip- to grab-test results. H. A. MERENESS (Text. Res., 1938, **8**, 165—167).—The breaking strengths are capable of correlation by formulæ of the types $S = nG$ (for silk) and $S = G + n$ (for other fibres). Wool fabrics (especially after felting) are the most irregular. A. J. H.

Abrasion and wear-testing [of textiles]. H. J. BALL (Text. Res., 1938, **8**, 134—137).—Methods and testing machines are briefly discussed. A. J. H.

Detection and investigation of faults in raw and manufactured [textile] materials. A. HERZOG, P. A. KOCH *et al.* (Textilber., 1938, **19**, 245—264).—Further methods and faults are reviewed (cf. B., 1938, 357). A. J. H.

Chemical modifications of cellulose. L. E. WISE (Trans. Electrochem. Soc., 1938, **73**, Preprint 18, 245—259).—A review. W. A. R.

Chemical nature of flax cellulose. A. Nowakowski (Rocz. Nauk Roln. Lesn., 1937, **43**, 90—98).—A sample of Polish flax contained H_2O 7·21, ash 0·36, α- 96·95, β- 0·01, and γ-cellulose 3·96%. The cellulose mol. consisted of 1030 $C_6H_{10}O_5$ units, as compared with 1080 for cotton (as determined from η measurements of solutions of the tri-β-hydroxyethyl ethers). The order of micellar orientation is: flax > cotton > artificial silk fibres. R. T.

Action of ozone on cellulose and modified cellulose. C. Dorée and A. C. Healey (J. Text. Inst., 1938, **29**, T 27—42).—The action of 2% O_3 (*i.e.*, ozonised O_2 containing 2% of O_3) on cellulose, as measured by the Cu no., is a max. when the latter contains 45—50% of H_2O and at a temp. of 40°. Hydrocellulose behaves very similarly to cellulose in respect to the increase of both Cu no. and absorption of methylene-blue (I), but the Cu no. of mercerised cotton rises more rapidly. An acidic oxycellulose behaved differently in that the absorption of (I) fell, whereas the Cu no. increased at first more slowly than that of cellulose but later more rapidly; a cellulose triacetate also behaved in this latter manner, but its absorption of (I) was scarcely affected. A theoretical explanation is given. A. G.

Photochemical reactions of cellulose. X. Effect of wave-length of radiation on photochemical reactions of cellulose. S. Oguri and M. Takei. **XI. Effect of water on the photochemical reaction of cellulose.** S. Oguri (J. Soc. Chem. Ind. Japan, 1938, **1**, 3B, 3—4B; cf. B., 1938, 260).—X. Filter-paper was subjected to the rays from a quartz Hg-vapour lamp, and the effects of interposing various filters on the degradation of the cellulose were judged by measuring the increase in Cu no. Thus λλ >3640 A. transmitted by glass and Cellophane have scarcely any effect on the Cu no., whilst quartz transmits practically all the harmful rays. The total effects of various λλ are > the sum of the individual constituents of monochromatic light.

XI. The effects on Cu no. of similarly illuminating moistened paper in an atm. of increasing O_2 content is investigated. 20% H_2O content of the paper appears to be a crit. point above which the Cu no. increases fairly rapidly. The effects of moistening, however, decrease with increase in O_2 content until with > about 20% of O_2 the change in Cu no. on moistening becomes const. D. A. C.

Use of electrodialysis for purification of cellulose and its derivatives. V. A. Kargin and E. T. Vinetzkaja (J. Phys. Chem. Russ., 1937, **10**, 788—792).—The ash contents of cellulose and nitrocellulose (I) are lowered by electrodialysis, whilst acetylcellulose is partly decomposed. Conc. solutions of electrodialysed (I) in $COMe_2$ have a much lower η than those of untreated (I). J. J. B.

Preparation of xylose from waste plant material by hydrolysis with sulphuric and *p*-toluenesulphonic acid. R. E. Keller (J. Appl. Chem. Russ., 1937, **10**, 2041—2049).—15% of the xylan content of straw is very resistant to hydrolysis with 1% H_2SO_4 or p-$C_6H_4Me{\cdot}SO_3H$. Hydrolysis of straw xylan and decomp. of xylose proceed at the same rate in presence of either acid. R. T.

Nature of the reducing substances of straw hydrolysates. V. G. Panasiuk and G. F. Chaladshi (J. Appl. Chem. Russ., 1937, **10**, 2037—2040).—The reducing substances of the pentose and hexose fractions of straw hydrolysates consist, respectively, of furfuraldehyde 1·94, 0; methyl- + hydroxymethylfurfuraldehyde 4·67, 5·12; pentoses 82·35, 10·39; methylpentoses 3·56, 5·19; uronic acids 7·91, 3·95; galactose 3·52, 2·81; glucose 2·81, 34·16; and mannose 2·88, 4·62%. HCO_2H and fructose are absent. R. T.

Cellulose formate. VIII. Effects of kind of cellulose material on quality of product. Y. Ueda and S. Nakamura (J. Cellulose Inst. Tokyo, 1938, **14**, 10—13; cf. B., 1937, 1319).—The effects of formylation on absorbent cotton and sulphite pulp are compared. The latter reacts more rapidly than the cotton, and the max. tensile strength of fibres obtained with the pulp is higher. Attempts are made to correlate tensile strength and elongation, both of which, together with sp. η, decrease with increase in time of formylation due to degradation of the cellulose. D. A. C.

Stabilisation of cellulose acetate. M. Jeanny (Rev. Gén. Mat. Plast., 1938, **14**, 7—9).—Stabilisation is effected by removal of the final traces of H_2SO_4 and degradation products of cellulose. Suitable methods, including treatment with very dil. (0·02%) mineral acids (H_2SO_4, HCl), or with org. solvents (EtOH, amyl acetate, etc.), are examined. F. Mc. K.

Flexibility of cellulose mixed-ester films. R. Peroldi-Ciacca (Rev. Gén. Mat. Plast., 1937, **13**, 307—311).—A review of methods of prep. of cellulose mixed esters, with particular reference to cellulose aceto-propionates and -butyrates. Properties of the products and influence of various propylene-MeOH solvent mixtures and esters of fatty acids used as plasticisers on the flexibility of such films are described. F. Mc.K.

Nitrocellulose. J. M. De Bell (Mod. Plastics, 1937, **15**, No. 2, 30—31, 120).—A review of historical and technical development of nitrocellulose and of present trends in the industry, such as the replacement of cotton cellulose as a raw material by the less expensive wood pulp. F. Mc.K.

Determination of the chemical homogeneity of cellulose esters by fractionation. A. Deripasko and I. Drujan (J. Phys. Chem. Russ., 1937, **10**, 798—806).—Samples of cellulose acetate which cannot be separated into different fractions by pptn. from their solutions in $COMe_2$ by H_2O give fractions of different Ac contents if the solution in $COMe_2$ is pptd. by Et_2O or that in EtOAc by EtOH. *E.g.*, a specimen with 54·7% AcOH gives 5 fractions with 53·8—58·5% AcOH. J. J. B.

Ethylcellulose films. S. N. Uschakov, I. M. Schneer, E. N. Djemina, and C. Ijboldina (Rev. Gén. Mat. Plast., 1937, **13**, 301—304, 341—345).—The influence of varying amounts of a series of plasticisers on the mechanical properties, H_2O absorption, and

hygroscopicity of ethylcellulose films, 0·10—0·11 mm. thick, has been studied with a view of their use for cinema films, and the results are compared with those obtained for nitro- and acetyl-cellulose films. Permeability to gases, resistance to light, and ageing properties are also reviewed. F. Mc.K.

Viscosity of spinning solutions as a factor of spinnability [of rayon]. B. ROBERTS (Rayon Text. Month., 1938, **19**, 17—19, 107—108).—A brief general discussion of abnormal η and thixotropy, and the importance of η, elasticity, γ, homogeneity, and concn. of rayon solutions for spinning. W. A. R.

[Production and properties of] rayon staple fibre. F. BONNET (Canad. Text. J., 1938, **55**, No. 1, 33—36).—Viscose rayon staple fibre made by spinning the usual viscose solution through jets having $\nless$10 times the no. of holes used for producing continuous-filament rayon is withdrawn from the coagulating bath in the form of tow or rope, then purified, and cut into short lengths before or after drying; wet cutting gives crimped fibres which are better suited to spinning into yarn by cotton machinery. Cellulose acetate, cuprammonium, and casein-rayon staple fibre is also being made. Yarn spun from the viscose-rayon fibre is usually softer but more crushable than similar cotton yarn. A. J. H.

Report of the rayon-crêpe research [Committee]. L. A. OLNEY *et al.* (Amer. Dyestuff Rep., 1937, **26**, 670—687P).—A preliminary report is presented on large-scale methods for producing rayon-crêpe yarns from the viewpoint of facilitating the production of crêpe fabrics free from the irregularities commonly observed by dyers and finishers. A. J. H.

Strength of rayon in the dry and the wet state. Y. KONISI (J. Soc. Chem. Ind. Japan, 1937, **40**, 408B).—The tensile strength of rayon filaments is more regular along the length when wet than when dry. A. G.

Analysis of mixtures of cotton and regenerated cellulose rayon. F. HOWLETT and A. R. URQUHART (J. Text. Inst., 1938, **29**, T 43—54).—Methods are described for the analysis of mixtures of cotton with viscose or cuprammonium rayons; the viscose is dissolved in Na zincate at 14° and the residual cotton weighed. For viscose rayon the solution is 2·5N or 3·5N in NaOH and the ZnO/NaOH ratio is 0·15 (by wt.); corresponding vals. for cuprammonium rayon are 2·75N and 0·30. Details of the methods are given. When the cotton has not been scoured, 1/30th must be added to its wt. to allow for H_2O-sol. impurities. A. G.

Refrigeration in American rayon plants. J. G. SKIDMORE (Rayon Text. Month., 1938, **19**, 183—184, 194).—Refrigeration equipment for temp. control and air conditioning is described. R. J. W. R.

Application of osmosis to recovery of caustic soda solutions containing hemicellulose in the rayon industry. L. E. LOVETT (Trans. Electrochem. Soc., 1938, **73**, Preprint 19, 261—269).—A discussion, with particular reference to the Cerini cotton-cloth ($MgCl_2$-impregnated) multiple-diaphragm dialyser, on the commercial applications and economics of osmosis in the viscose-rayon industry. J. W. C.

Spinning properties of liquids. V. Polystyrene threads. H. ERBRING (Kolloid-Z., 1938, **82**, 132—134; cf. A., 1937, I, 461).—Solutions of polystyrene in C_6H_6 yield, on spinning, threads which show double refraction. The structure is more completely developed as the velocity of extrusion increases. Modifications of the structure due to rotation of the spinnerets are described. F. L. U.

Importance and development of artificial fibres in Germany. W. ELLER (Chim. et Ind., 1938, **39**, 235—244).—An account is given of the production of staple fibre in Germany, and of its use alone or in mixed yarns with cotton and wool. W. A. R.

Method of differentiating the heart- from the sap-wood of pine. J. E. KOCH and W. KRIEG (Chem.-Ztg., 1938, **62**, 140—141).—Tetrazotised benzidine colours the heartwood dark red and the sapwood yellow. Solutions of 5 g. of benzidine in 25 g. of (approx. 25%) HCl and 970 g. of H_2O, and of 10% aq. $NaNO_2$, are stored separately and mixed together when required, the reagent being painted on to the wood; excess of reagent should be removed in order to make the colours as permanent as possible. The method is not satisfactory for woods other than pine, but it can differentiate other woods from pine without resort to the microscope. D. A. C.

Chemical investigations of wood substances. VIII. Properties of pulps obtained from woods in the course of thinning out forests. K. NISHIDA, R. MIYAMA, and H. IMAZATO (J. Cellulose Inst. Tokyo, 1938, **14**, 5—9; cf. B., 1937, 893).—The chemical properties of the sulphite pulp prepared from *Cryptomeria japonica* (Masugi and Kuroshinsugi), *Chamæcyparis obtusa*, *Pinus densiflora*, and *P. thunbergii* are tabulated. *Cryptomeria japonica* is easily digested and the pulp is white and fine-fibred, but the yield is low. *Chamæcyparis obtusa* requires a conc. liquor for satisfactory delignification but the yield is higher. Both the pine species produce high yields, but the pulps are mostly rather resinous and the fibres coarser than those from the other species. D. A. C.

Pulp woods and pulps. I. Manufacture of pulps from Manchurian woods. N. MIGITA (J. Cellulose Inst. Tokyo, 1938, **14**, 14—28).—The woods investigated are *Picea obovata*, Ledeb. (*A*), *Abies nepherolepis*, Max. (*B*), *Pinus koraiensis*, S. & Z. (*C*), *Populus maximowitzii*, A. Henry (*D*), *Tremula*, L. (*E*), *Tilia mandschurica*, R. & M. (*F*), and *Betula mandschurica*, Nakai (*G*). The changes in chemical properties on sulphite pulping and bleaching these woods are investigated, and the fibre length measurements both before and after beating are given. *A* gives a long-fibred pulp of medium strength, the chemical consts. of which after bleaching, however, are = and in some cases > those of some commercial rayon pulps on the market. The $EtOH \cdot C_6H_6$ extract of *A* is low (1·97%). As a source of rayon pulp *B* is a little inferior to *A* although its strength

is higher. *C*, which in comparison is highly resinous (4·95% of EtOH–C_6H_6 extract), is digested only with difficulty by the sulphite process, but since its fibres are quite as long as those of *A* and its strength > that of *B* it offers, under suitable cooking conditions, a good material for papermaking. The hardwoods *D*—*G* are unsuitable for both paper and rayon pulps because of their inferior physical and chemical properties, although they are easily digested to give good pulp yields. D. A. C.

Production of pulp from flax wastes. G. Jayme, H. Pfretzschner, and J. Ditz (Papier-Fabr., 1938, **36**, 46—55).—About 38% of the total flax plant is material which is wasted after retting in liberating the bast fibre for textile purposes. This material, after screening to eliminate dust and very short fibres (50% of the flax waste), was subjected to various pulping treatments to test its suitability as a raw material for papermaking. Thus by sulphite digestion a 36·7% yield of pulp was obtained, which, however, was too dirty for use. Three-stage bleaching produced a fairly good colour, but the strength was very low. By alkaline digestion, using 3% aq. solution containing 65% of NaOH, 15% of Na_2S, and 20% of Na_2CO_3, a similar yield was obtained, but bleaching (6% loss) produced a pulp of high whiteness, low ash, and strength approaching that of bleached straw. The α-cellulose content was only 81·3%, but was raised to 98% after treatment with cold 10% aq. NaOH. An extremely short-fibred pulp is obtained, however, which limits its use for papermaking, whilst the expensive purifying treatments required to produce a satisfactory α-cellulose content combined with very low pulp yield make it economically unsuitable for the artificial silk industry. D. A. C.

Bagasse pulp for paper manufacture. Y. Yatsuhama (Int. Sugar J., 1938, **40**, 39).—Bagasse does not differ much from coniferous wood fibre as raw material for the manufacture of paper pulp, but it contains less lignin. The sulphite process is not applicable to it, but the nitrate method can be employed to advantage, giving a pulp containing >7% of pentosan and 88—90% of α-cellulose. For rayon manufacture the pulp is unsuitable, its fibres being too short and its impurities too high. J. P. O.

Continuous recausticising system control [for kraft-pulp mills]. C. L. Knowles (Paper Trade J., 1938, **106**, TAPPI Sect., 159—164).—Suitable apparatus is described and simple methods of sampling and analysis are briefly discussed. Several graphs to facilitate computations are given. H. A. H.

Alkaline treatments of [wood] pulp, and their influence on swelling characteristics. G. Jayme (Proc. Tech. Sect. Paper-Makers' Assoc., 1938, **18**, 389—427).—Processes of purification of wood cellulose, particularly with respect to hemicellulose removal, are critically surveyed, the patent literature dealing with both hot- and cold-alkaline purification treatments for the manufacture of high-α-cellulose pulps from both spruce and beech wood being discussed in detail. Differences in pulp quality, especially swelling characteristics, even at the same α-cellulose content, brought about by these two processes have been investigated. Methods of determining the ability of pulp to swell are reviewed and details of a standardised procedure using NaOH of mercerising concn. given. The relation between swelling ability and such pulp properties as α-cellulose content, furfuraldehyde content, Cu no., whiteness, and *d* has been examined for several types of pulp. (Cf. B., 1937, 1188.) H. A. H.

Wood-pulp qualities and uses [in papermaking]. J. S. Bates (Paper-Maker, 1938, **95**, TS 38—48).—A wide range of wood-pulp types in current use for papermaking purposes are discussed, with particular reference to their chemical and physical properties and their individual suitability for various types of paper. H. A. H.

Developments in multi-stage bleaching of wood pulp. M. W. Phelps and J. Schuber (Paper Trade J., 1938, **106**, TAPPI Sect., 81—84).—Bleached kraft pulp of exceptionally high quality both as regards colour and strength can be made by a 5-stage process consisting of chlorination, caustic extraction, high- and medium-consistency hypochlorite bleaches, and acidification with Cl_2–H_2O or H_2SO_3, the pulp being finally washed. Details of consistency, temp., amounts of Cl_2 and alkali, and the effective time of operation at each stage are given. H. A. H.

Determination of ligninsulphonic acid, both free and in soap and wax products. A. Noll (Papier-Fabr., 1938, **36**, 41—45).—The NH_2Ph and cinchonine tests for ligninsulphonic acid (I) were found to be extremely insensitive, whilst β-$C_{10}H_7$·NH_2 was capable of detecting 378 p.p.m. Of a no. of org. substances tried, by far the most sensitive was found to be trypaflavine, which produced a voluminous yellow ppt. with 126 p.p.m. and detected 32 p.p.m. Fluorescence in ultra-violet light is observed at 63 p.p.m., whilst the characteristic odour on heating (I) is stated to be apparent at 16 p.p.m. The org. substances which will and will not react with dil. (I) solutions are listed. The reaction in each case is less sensitive for (I) in soaps or synthetic wax media, whilst in sulphite waste liquor the reaction is undisturbed by $CaCl_2$ treatment. D. A. C.

Determination of fermentable sugars in sulphite [pulp] waste liquors. R. Schepp and G. Kretzschmar (Angew. Chem., 1938, **51**, 79—81).—An apparatus is described for absorbing and weighing the CO_2 from fermenting liquors, the last traces being driven over by a stream of N_2. A. Li.

Retention of solids on the [paper-machine] wire, and treatment of white-water going to the save-alls, by the Sveen process. F. Juell (Proc. Tech. Sect. Paper-Makers' Assoc., 1938, **18**, 547—559).—The use of a specially prepared solution of glue for increasing the retention of fillers on paper machines is discussed, particular consideration being given to the conditions of acidity, [Al], etc. under which flocculation is best effected. Extremely small amounts of glue, varying from 1 to 3 lb. per ton of paper (depending largely on the amount of H_2O used for sheet formation rather than on the amount of fibre present), are

required, and the coagulating action is extremely rapid. Experimental data collected from a no. of large-scale trials indicate a marked increase in filler retention by the paper, with consequent elimination of it from the white-H_2O. Flocculation is not limited to machine wire conditions, but continues in the sedimentation tanks or other white-H_2O recovery equipment. For this purpose, however, the Sveen solution is usually most satisfactory when used in conjunction with the Sveen–Pederson air-flotation recovery process, which is also briefly described.

H. A. H.

Dryers in the paper industry. O. MINTON (Paper Trade J., 1938, **106**, TAPPI Sect., 58—62).—The relative merits of the usual steam-heated drying cylinders, of air-dryers, and of vac. dryers for various papermaking purposes are discussed.

H. A. H.

Drying [of paper]. F. C. STAMM (Paper Trade J., 1938, **106**, TAPPI Sect., 67—70).—The adverse effect of air admixed with steam in paper-machine drying cylinders is briefly discussed. H. A. H.

Effect of animal surface sizing on properties of paper. J. J. L. LUTI (Chem. Weekblad, 1938, **35**, 211—218).—Four samples of paper representing thin and thick types made from pine sulphite pulp sized with rosin and from rags sized with rosin and gelatin, respectively, have been systematically examined after conditioning at 40, 50, 65, and 85% R.H. for breaking strength, elongation, folding no., bursting strength, curl test, moisture, ash, size and apparent size contents, the last-named being determined by extraction with boiling H_2O. It is concluded that factors for calculating breaking strain and elongation at R.H. 65% from figures observed at other vals. of R.H. are unreliable. They are not const. and vary with the kind of paper examined and the direction in which the test strips are cut. The folding no. determined on a Schopper apparatus depends chiefly on the breaking strain and the suppleness of the paper. It is not possible to work out a factor for converting the folding no. determined at one R.H. into that at 65% R.H. The bursting strain is only slightly affected by the R.H. Gelatin sizing has practically no effect on the H_2O content of paper; this depends on the materials from which it is made, but greatly diminishes the rate at which the paper absorbs H_2O from the air. The determination of the gelatin content of surface-sized papers by extracting the size with boiling H_2O gives unreliable results since resin sizes are also partly removed. S. C.

Requirements of paper for food packages. C. A. SOUTHWICK, jun. (Paper Trade J., 1938, **106**, TAPPI Sect., 157—159).—Methods of testing paper for such food-wrapping requirements as resistance to penetration by grease, moisture, and org. vapour and freedom from odour are briefly discussed. There is no relation between proofness to H_2O vapour and resistance to the transmission of org. vapours.

H. A. H.

Oil oxidation in impregnated paper. J. B. WHITEHEAD and T. B. JONES (Elect. Eng., 1937, **56**, 1492—1501).—Cellulose paper impregnated with cable oil containing various amounts of O_2 was heated at 80° for 200 hr. and changes in power factor, capacitance, and ionisation factor were determined. Data are shown in curves. The relative unimportance of small amounts of O_2 as the cause of changes in electrical properties was established. R. B. C.

Volumetric determination of α- β-, and γ-cellulose in pulps and papers containing sizing, filler, and other materials. H. F. LAUNER (J. Res. Nat. Bur. Stand., 1938, **20**, 87—95).—The volumetric method of determining the celluloses (cf. B., 1937, 534) is applicable to papers containing rosin, glue, starch, oxidisable fillers, and lignin, and to pulps containing natural resins in any amount, providing corrections are applied for the reducing action of these impurities. Methods of determining these corrections are described in detail. J. W. S.

Instrumentation studies. XXV. The Williams smoothness tester [for paper]. INST. OF PAPER CHEM. (Paper Trade J., 1938, **106**, TAPPI Sect., 34—38; cf. B., 1938, 361).—The instrument and its method of operation are described, and its satisfactory reproducibility is confirmed. Some doubt is cast on whether, for very smooth coated papers at any rate, the so-called smoothness vals. are not in fact rather a measure of transverse porosity. Since such factors as thickness, apparent *d*, and the fibrous furnish of the paper can affect the transverse porosity without affecting true smoothness, it is obvious that a correction to eliminate this variable is essential. The correction formula advocated by the instrument manufacturers is not entirely satisfactory. Good correlation is shown between the Williams and the Bekk instruments over a range of some 75 samples of paper, provided no correction for the transverse porosity was made with the readings of the former instrument so as to be in line with the latter which ignores a similar correction. It is pointed out, however, that neither instrument does more than afford a practical suitability test for paper, as distinct from the measurement of some fundamental property.

H. A. H.

Cowles classifiner and waste-paper systems. E. C. COWLES (Paper Trade J., 1938, **106**, TAPPI Sect., 146—150).—Large-scale installations in which the Cowles "classifiner" (B., 1936, 365) is operating on the screening and clearing of waste-paper stock are described. The possibilities of fibre fractionation are discussed. H. A. H.

Influence of atmospheric humidity and temperature on moisture content of paper board. R. W. K. ULM (Paper Trade J., 1938, **106**, TAPPI Sect., 71—75).—The existence of a hysteresis effect in the moisture contents of paper boards (comprising straw, so-called "jute" consisting of kraft liner with waste-paper middles, kraft, and bleached manila-lined chip-board) at equilibrium with air of given R.H. at all ordinary temp. is confirmed. The direction of approach to the equilibrium condition determines more than any other factor the moisture content at any given R.H. The effect of temp. on the moisture content of board in equilibrium with air at a specified R.H. is apparent under all conditions studied. At high R.H. the effect is relatively small, the moisture content being at a min. at about 21°.

At low R.H. the effect is larger, the content decreasing linearly with rising temp. At a const. abs. humidity the moisture content at equilibrium decreases with rising temp. Ignoring hysteresis, therefore, the moisture content may be determined by fixing any two of the three variables temp., R.H., and abs. humidity. H. A. H.

Erratum.—In B abstracts, 1931, on p. 240, col. 2, line 6 from bottom, *for* anaërobic *read* aërobic.

Properties of high mol. wt. compounds.—See I. **Bleaching flax. Perborates for textile treatment.**—See VI. **Causes of corrosion [in sulphate-pulp industry].**—See X. **Ethylcellulose. Plastics.**—See XIII. **Starch for tub size.**—See XVII.

See also A., I, 189, **Solubility of cellulose and its esters.** II, 128, **Glyceryl ethers of cellulose.** 151, **Lignin and related compounds.** III, 337, **Artificial lighting and worsted weavers.**

PATENTS.

Treatment of vegetable fibres. T. P. HAUGHEY, Assr. to H. H. BROWN (U.S.P. 2,070,273, 9.2.37. Appl., 5.1.35).—Green flax, hemp, or like fibre, cut to lengths suitable for cotton machinery, is violently agitated in H_2O at $<27°$ to remove seeds etc. and to taper the ends of the fibres. The gums are removed by digestion at 1 atm. in a suitable solution and a proportion of cotton stock is admixed prior to drying and carding. B. M. V.

Solutions for curling and waving hair. N. V. S. KNIBBS (B.P. 472,745, 24.2.37).—Solutions containing sulphites of amines and/or hydrazines effect rapid waving. The free base ($NH_2 \cdot C_2H_4 \cdot OH$) (I) or H_2SO_3 may be added to the solutions, an excess of (I) being preferred. Wetting agents and soaps (to assist penetration) and oils and waxes (as protective agents) may also be added. *E.g.*, a suitable solution consists of a mixture of $(I)_2,H_2SO_3$ (80), (I) (60), and *cyclo*hexanol (10 g.) made up to 1 l. with H_2O. R. J. W. R.

Funnel for use in spinning rayon and other synthetic threads. G. J. WIDER, Assr. to DREHER BROS. & WIDER (U.S.P. 2,060,964, 17.11.36. Appl., 20.7.35).—The glass spinning-pot funnel is provided with a hard, hollow, cylindrical tip resistant to acid and alkali, *e.g.*, synthetic ruby. F. R. E.

Viscose and cuprammonium cellulose spinning solutions and products thereof. R. S. BLEY, Assr. to NORTH AMER. RAYON CORP. (U.S.P. 2,060,787, 17.11.36. Appl., 22.10.35).—1—10% (calc. on the wt. of cellulose) of an alkyl- or phenyl-naphthalene of b.p. $>100°$, which is insol. in H_2O and alkali, is added to the spinning solution. The products exhibit soft lustre. F. R. E.

Manufacture from viscose of a substitute for wool. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 472,603, 24.3.36. Addn. to B.P. 450,257 and 469,905; B., 1936, 927; 1938, 151).—Continuous threads of cellulose xanthate, spun from viscose of $\eta >$ that equiv. to a ball fall of 200 sec. (determined as described), are converted into cellulose by heating at $>70°$ with an inert liquid (glycerin), before or after cutting to staple length. F. R. E.

Production of alloprene-rayon and products thereof. R. S. BLEY, Assr. to NORTH AMER. RAYON CORP. (U.S.P. 2,060,786, 17.11.36. Appl., 8.10.34).—A mixture of viscose or cuprammonium cellulose with 0·5—20% (calc. on the wt. of cellulose) of alloprene (chlorinated rubber), either finely divided or in solution, and a vulcanising agent is spun into the usual coagulating bath and vulcanised. F. R. E.

Manufacture of transparent cellulosic sheets and films. BRIT. CELLOPHANE, LTD. (B.P. 472,264—5, 18.3.36. U.S., 19.3.35).—Plain, transparent, regenerated cellulose sheets (A) containing (15—25% of) a softener (glycerin) are given a thin surface sizing with an aq. suspension or emulsion of soap and wax, with or without a resin, to prevent surface tackiness and adhesion of adjacent sheets; or (B) after formation but before drying, are surface-treated with a natural or synthetic resin, H_2O-sol. cellulose derivative, gum arabic, dextrin, or pectin to cause slight adhesion to the drying rolls and so prevent shrinkage. F. R. E.

Manufacture of artificial structures. L. LILIENFELD (B.P. 472,888 and 472,933—5, 27.12.35).—A shaped, preferably liquid, mass consisting of a solution in caustic alkali of at least one (A, B) cellulose ether xanthate (I), or (C, D) cellulose xanthate (II), which has been made by using a proportion of CS_2 (A, C) $\nless 20\%$, or (B, D) $<20\%$ (<10—15%), of the wt. of the original cellulose ether or cellulose, is coagulated at $>40°$ in a solution containing a secondary alkali carbonate (Na_2CO_3), together, if desired, with an alkaline or neutral org. or inorg. salt. In the prep. (dissolution) of the (I) or (II) a temp. of $<5°$ ($5°$ to $-10°$) is at least temporarily employed, and, before shaping, the (I) (A) or (II) (C) is allowed to mature to a stage substantially $>C_{24}$ ($>C_{36}$). F. R. E.

Manufacture of elastic yarn. UNITED STATES RUBBER PRODUCTS, INC. (B.P. 472,349, 21.7.36. U.S., 14.12.35).—A cellulose derivative solution is extruded through small apertures to form a large no. of filaments which are spun with a tensioned rubber core so that they are wound helically around the rubber as a cover. If desired, a second covering of filaments is wound on in the reverse direction. F. R. E.

Paper-pulp beating engines, washing and bleaching engines, and the like. S. MILNE (B.P. 479,030, 28.7.36).—Construction of a roll and breast plate is described. B. M. V.

Papermaking. H. and P. KLEIBAUMHÜTER (P. BAUMHÜTER) (B.P. 472,871, 26.3.36. Addn. to B.P. 446,049; B., 1936, 588).—Plant is claimed for continuously producing paper, reinforced with endless strands of manila or sisal fibres, in combination with a paper machine. The strands are arranged to lie parallel to each other in two layers forming a loose fabric, *e.g.*, the first in the direction of travel of the paper and the second deposited in zig-zag manner over the first. The fabric is then covered on both sides with a pulp suspension, *e.g.*, by passing it over cylinder moulds. D. A. C.

Paper manufacture. R. F. REMLER, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,068,151, 19.1.37. Appl., 5.11.34).—The production of paper pulp from wood, straw, etc. is carried out by boiling with an alkaline medium [aq. $NaOH$–$Ca(OH)_2$–Na_2S] containing a little turpentine (1·5—2 lb./100 gals.). H. A. P.

Production of coated crêped paper. E. H. ANGIER, Assr. to ANGIER LABS. (U.S.P. 2,061,748, 24.11.36. Appl., 20.1.34.)—The paper is doctored off a suction roll while under vac. On the same roll and at a point just in front of the doctor, aq. rubber dispersion is applied to the top side of the paper as a coating agent. D. A. C.

Manufacture of decorative covering. J. J. JACKSON, Assr. to PAULSBORO MANUFG. CO. (U.S.P. 2,061,705, 24.11.36. Appl., 2.3.33).—The base paper is printed with a decorative design, using pigments or dyes, then impregnated with a toughening agent (drying oil, rubber latex), and finally lacquered with cellulose nitrate. The toughening and lacquering steps are so controlled that the first reduces the porosity of the paper to 60—70% and the second to a total $\not>$50% of the val. of the untreated paper. D. A. C.

[Manufacture of decorative] foils or films of [regenerated] cellulose. CELLULOID CORP. (B.P. 472,454, 6.11.36. U.S., 22.11.35).

Textile-conditioning chamber.—See I. **Adhesive sheets etc.**—See XV. **Wrapping for explosive.**—See XXII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

History of bleaching. A. WAHL (Bull. Soc. Ind. Mulhouse, 1938, **104**, 53—69).

Rôle of protein in cotton during bleaching. E. KORNREICH (Textilber., 1938, **19**, 61—63).—The 1·0—1·5% of protein usually present in raw cotton is largely removed by dissolution in the alkaline kier liquor (this thereby acquires fat-emulsifying properties), but partial reabsorption occurs so that complete removal cannot be affected. The behaviour of this residual protein in subsequent bleaching with Cl and H_2O_2 is discussed. The initial rapid whitening of kiered cotton when immersed in a Cl bleach liquor is due to the conversion of brown protein into a greenish-yellow chloroamine (I); this can further react with Cl_2 to form a monochloroamine which slowly oxidises other impurities in the cotton. Protein is sol. in alkalis and insol. in acids; dissolved protein in alkaline Cl bleach liquors gives them strong foaming power. Protein is changed in presence of alkalis into a modification having latent oxidising power which is developed only by acidification (*e.g.*, with $HCl + KI$). In alkaline H_2O_2 bleach liquors protein readily dissolves and stabilises the liquor. In bleaching successively with Cl and H_2O_2, the protein formed in the first bath dissolves in the second (usually hot) and acts as a stabiliser until destroyed; stabilisation does not occur if the material is soured between the two bleaching treatments. A. J. H.

[Hydrogen] peroxide bleaching [of cotton–viscose staple fibre mixtures]. H. BAIER (Canad. Text. J., 1938, **55**, No. 4, 43—44).—Cotton fabrics containing 16% of viscose staple fibre (I) were bleached by five processes (described), using kiering, chemicking, and H_2O_2-bleaching (at least one of these processes), and their effect on the cotton and viscose staple fibre was compared by the usual methods. The essential difference between the processes is in respect of the wt. losses of the viscose fibre and it is concluded that the two most satisfactory are those which comprise steeping, washing, H_2O_2-bleaching, washing, souring, and washing, or successive treatments with chemick and aq. H_2O_2 liquors without intermediate washing (*e.g.*, the Mohr process; cf. B., 1926, 534). A. J. H.

Properties of bleached hog's bristle: effect of bleaching in sulphur dioxide. R. C. HOATHER and P. G. T. HAND (J.S.C.I., 1938, **57**, 93—95).—The effect of bleaching moist bristle with gaseous SO_2 after preliminary bleaching with dil. H_2O_2 has been studied; the time of bleaching was 6 hr. and the concn. 0·2 g. of SO_2 per l. in air. $>$1% each of SO_2 and of H_2SO_4 was left in the bristle, and bleaching with SO_2 reduced the stiffness and made the bristle much more brittle. The measurement of these properties is described. No practicable method was found for overcoming these defects of this method of bleaching.

Bleaching of flax. V. D. PONOMAREV (J. Appl. Chem. Russ., 1937, **10**, 2050—2053).—Successful bleaching depends on as complete removal of lignin as is possible. The flax is treated with boiling 1% Na silicate in 1% NaOH (45 min.), then for 15 min. with NaOCl (3 g. of active Cl and 5 g. of HCl per l.), with H_2O_2 (3 g. of active O per 100 g. of flax, in 0·2% Na silicate and 0·7% NaOH) for 90 min. at 90°, and finally with dil. H_2SO_4 for 10 min. R. T.

Stripping of dyed textiles. R. HALLER (Textilber., 1938, **19**, 281—282).—Methods for stripping dyed vegetable, animal, and acetate-rayon fibres are discussed. The preferred method for cotton dyed with indigo and azoic dyes is to digest the material under moderate pressure with aq. NaOH (*d* 1·02) since it produces much less degradation of the cellulose than does the usual HOCl treatment. Direct and certain vat dyeings are dischargeable by treatment in a bath at 80° containing 4% (on the material) each of $Na_2S_2O_4$ and aq. NaOH (*d* 1·34), but anthraquinone vat dyeings require the further addition of sulphonated $CH_2Ph{\cdot}NPhMe_2Cl$ (2 g./l.) or Albatex PO (Ciba; 4 g./l.). Wool dyeings (including those obtained with Neolan dyes) may be stripped by treatment at 60—100° for ½—¾ hr. in a bath containing 2—5% each of Hydrosulphite BZ (Ciba; a ZnS_2O_4) and HCO_2H. Dyed acetate rayon is stripped with acidified aq. NaOCl. A. J. H.

Method for discharging indigo dyeings with nascent chlorine. R. HALLER (Chem.-Ztg., 1938, **62**, 239).—The dyed fabric is printed with a paste containing gum 50, KNO_3 50, $PbCl_2$ (50%) 280, and H_2O (100 g.), passed rapidly through H_2SO_4 (*d* 1·38) at 80°, rinsed, and dried. The reaction can be carried out with other oxidising agents, especially

$NaClO_3$, and chlorides, but of the latter, $PbCl_2$ is the most satisfactory. Red effects can be obtained by incorporating diazotised *p*-nitro-*o*-anisidine in the printing paste and applying it to the naphtholised dyeing. R. J. W. R.

New process of electrolytic bleaching. J. MAILLARD (Rev. Gén. Mat. Col., 1938, 42, 104—105).—The production of NaOCl liquor from NaCl by electrolysis (cf. B.P. 470,762; B., 1938, 292) is described and costs of preparing bleach liquor by this process are indicated. The electrolytic cell employed is surmounted by two vertical tubes and the electrolyte is maintained in const. circulation through these and the cell by the H_2 evolved. R. J. W. R.

Dry cleaning and dyeing of textile materials. R. ROWATT (Canad. Text. J., 1938, 55, No. 2, 37—38).—Practical difficulties are discussed. Shrinkage is the chief difficulty. A. J. H.

How quaternary compounds help the dyer. H. PETERS (Rayon Text. Month., 1938, 19, 167—168, 172).—Uses of long-chain quaternary NH_4 salts as stripping agents and vat retardants, for improving the H_2O-fastness of dyeings, producing permanent waterproof finishes, and giving cellulosic materials affinity for acid dyes, are outlined. R. J. W. R.

[Applications of] Indigosols. W. CHRIST (J. Soc. Dyers and Col., 1938, 54, 93—100).—A discussion of the various methods of applying Indigosols in dyeing and printing. S. C.

Significance of temperature in wool dyeing. F. L. GOODALL (J. Soc. Dyers and Col., 1938, 54, 45—65; cf. B., 1937, 660).—Dyeing with molecularly (*e.g.*, Acid Orange GG) and colloidally dispersed dyes (*e.g.*, Polar Yellow R Conc.) is discussed. The equilibrium distribution of the former between dyebath and fibre is independent of temp. if a sufficiently long dyeing time is employed. With dyes of the colloidal type, however, dyeing at low temp. does not occur to the same extent or in the same manner as at 100°, since at low temp. the particle size of the dye is large and the fibre is insufficiently swollen to allow satisfactory penetration. Rise of temp. aids dispersion of the dye and swelling of the fibre and thus facilitates dyeing. When dyeing with Polar Yellow R Conc. in presence of AcOH and Na_2SO_4, a "crit. sorption temp." of 60° is observed below which complete penetration is impossible. Below 80° ("crit. dispersion temp.") the dye is taken up in the form of coarse particles, and rise of temp. disperses these on the fibre in a finer form; these temp. vary with the amount and nature of reagents added to the dyebath. Thus, when material is entered into a dyebath of Polar Yellow R Conc. at <40° in the normal manner, penetration by the coarse dispersion occurs first, and this is then followed by penetration of the smaller particles and dispersion of the coarse aggregates as the temp. is raised to complete the dyeing. Presence of large particles on the fibre leads to unsatisfactory shades, levelness, and fastness properties. In order to produce the satisfactory dyeing which is apparent at high temp., an alternative method of dyeing is proposed, whereby the goods are entered into the boiling dyebath which is free from Na_2SO_4 and contains acid, partly or completely neutralised with NH_3. Both laboratory and bulk trials show that improved shades, levelness, penetration, etc. can be obtained, and a table indicates the satisfactory results given in 42 large-scale trials using this process under normal dyehouse conditions. R. J. W. R.

***X*-Ray study of the dyeing of wool.** W. T. ASTBURY and J. A. T. DAWSON (J. Soc. Dyers and Col., 1938, 54, 6—16).—The deamination of hair destroys its property of being set in the β form by steam; *X*-ray photographs indicate, however, that the keratin network is left unchanged. $K_2Cr_2O_7$ and smaller acid mols. (H_2SO_4, HCl, HCO_2H, $H_2C_2O_4$) penetrate the fibre rapidly and combine with the $\cdot NH_2$ groups, thus preventing setting, but prolonged washing with H_2O removes the acid and restores the setting property. BzOH, α-$C_{10}H_7\cdot CO_2H$, 1 : 4-$OH\cdot C_{10}H_6\cdot SO_3H$, and boiling aq. NH_4Cl also produce a similar non-setting effect, but AcOH is inactive (due to evaporation). Acid dyes do not penetrate the fibre structure completely and there is no exact relation between the acid dye absorbed and the total basicity of the wool fibre. Solway Blue-B and -SEN and indigo occur on the fibre as cryst. aggregates, but other dyes are combined or molecularly dispersed. In the case of indigo-dyed wool, the crystallites of the dye present are partly oriented and become further oriented on stretching the fibre. Marked differences are observed between the *X*-ray photographs of some free dyes (*e.g.*, Orange II and Coomassie Navy Blue 2RNS) taken before and after purification. R. J. W. R.

Theory of dyeing wool with acid dyes. IV. Character of the free dye-acids. V. Relations between levelling, fastness to water, exhaustion, mol. wt., and chemical constitution of acid wool dyes. VI. Dyeing of wool with Palatine Fast (I.G.) dyes. VII. Influence of dye-liquor p_H and presence of levelling agents on dyeing behaviour of Palatine Fast dyes. W. ENDER and A. MÜLLER (Textilber., 1937, 18, 906—907, 991—992; 1938, 19, 65—67, 181—183, 272—273; cf. B., 1937, 1326).—IV. Determination and comparison of the p_H changes produced by adding 0·1N-NaOH to 0·05N-H_2SO_4 or -AcOH, or a 1 : 1 mixture of these, and the free dye acids obtained from the 11 mono-, di-, and tri-sulphonic acid wool dyes described previously (B., 1937, 1194) indicate that these (except Milling Red G, Wool Yellow, and Acid Anthracene Red G) are strong acids and behave in aq. solution similarly to H_2SO_4. Comparison of their dyeing properties and dissociation consts. (K) shows that dye acids having $K < 10^{-2}$ are definitely fast to washing; a $K > 10^{-1}$ indicates considerable looseness to washing. Although an acid dye becomes attached to wool mainly through chemical combination of its SO_3H groups with the wool basic groups, this attachment may be strengthened and the washing-fastness thereby increased by the influence of auxiliary valencies which become stronger as the complexity of the dye mol. increases. There is no definite division between acid and substantive (direct cotton) dyes, and dyeings on wool produced with

substantive dyes usually have good washing-fastness.

V. In producing level dyeings it is necessary that any wool + dye-acid complex initially formed unevenly within the wool shall be easily hydrolysable so that subsequent more even distribution of the dye acid may be possible in the later stages of dyeing; this implies that a level-dyeing dye will have only moderate fastness to washing properties. Dyes which combine rapidly with the wool (the rate of combination is not always to be judged by the loss in colour of the dye liquor) are usually not level-dyeing, but yield dyeings fast to washing; exceptions are Orange II, 2G, and RO (cf. B., 1937, 1194), and Azo Carmine GX (level dyeing) which dyes faster than Wool Fast Red 3B (unlevel). Dyed patterns of Crystal Ponceaux 6R and Milling Red G are given to show that the rate of loss of colour of the dye liquor during dyeing is not an accurate measure of the rate of dye-acid combination with the wool. Dyes having a strong affinity for wool so as to give shades of good washing-fastness may dye slowly because it is difficult for their poorly dispersed particles to penetrate the wool substance. Data showing the total combination of wool with various mono-, di-, and tri-sulphonic acid wool dyes at 90° in 8 hr. indicates that for dyes having the same no. of SO_3H groups the rate of absorption decreases and the washing-fastness increases with increase of mol. wt. The rate of dyeing increases and the resulting washing-fastness decreases with an increase in the no. of SO_3H groups in the dye mol.

VI. The use of Palatine Fast (mono- and di-sulphonic) acid wool dyes, which resemble Neolan (C.A.C.) dyes in having a Cr residue in the mol., being difficultly levelling, and requiring application from a strongly acid dyebath, has been studied. A curve showing the change of p_H (measured electropotentiometrically) of a 0·02N solution of Palatine Fast Bordeaux BN (2 SO_3H) produced by gradual addition of 0·1N-NaOH has a sharp deflexion after neutralisation of the first SO_3H and is then similar to that obtained in neutralising a very dil. or buffered acid solution; this is attributed to the influence of the Cr residue. Similar measurements with the mono-SO_3H dyes (I) are made impossible by their very small solubility in H_2O (*e.g.*, $\not>$0·003N and 0·006N solutions of Palatine Fast Blue BN and Violet 3RN, respectively, are possible). Curves are given showing the rates of chemical combination (determined gravimetrically; B., 1937, 1326) between wool and eight Palatine dyes [4 mono- and 4 di-SO_3H dyes (II)] at 90° in 1—8 hr. The rate of combination is much higher with (II) than with (I), but is not appreciably different from that of slow-dyeing ordinary acid dyes, *e.g.*, Milling Red G and Acid Anthracene Red G. Addition of HCl to the dyebath much increases the rate of combination of wool with (I), but not with (II); the greater affinity of (II) for wool is therefore not due to the higher p_H of their dye solutions. Wool combines with about 0·08 g.-mol. equiv. of (I), thereby indicating that these dyes behave similarly to ordinary acid dyes, but combination with up to 0·123 g.-mol. equiv. occurs with (II) if these are considered to be dibasic acids. It is therefore uncertain whether (II) combine with wool by their SO_3H groups only. During dyeing, simple chemical combination (salt formation) occurs first between these dye acids and the wool, followed by combination between the Cr and the wool NH_2-acid residues so that ultimately a complex much faster to washing is formed in which the Cr is the main link between the dye acids and the wool. This view is supported by Eistert's discovery (not published) that Cr–C_5H_5N complexes behave towards wool as ordinary (loose-to-washing) acid dyes. The Cr of these dye acids is able to combine with Cr mordant wool dyes, with an accompanying change of shade; thus a violet shade is produced by overdyeing a 1% shade of Palatine Fast Yellow GRN with 1% of the Cr-mordant dye Chrome Blue GGN. In dyeing wool with Palatine dye acids only 10% of the basic groups of the wool are neutralised by the Cr, so that further combination can be effected with an ordinary dye acid. The Cr of the acids forms no stable combination with the CO_2H of wool.

VII. The absorption by wool of the mono-sulphonated Palatine Fast Blue BN, Yellow GRN, and Violet 3RN and the disulphonated Palatine Fast Blue GGN and Violet 5RN from buffered solutions having p_H 1·6—8·3 was measured. The optimum p_H for max. absorption is 3·5—5·5 for both classes of dyes, but is higher for the latter, and in this the behaviour of the latter class more closely resembles that of ordinary acid dyes as described previously (B., 1937, 1326). This is due to the ability of the Cr residue within the Palatine Fast dyes to combine with the basic wool groups. Combination between the Cr and the wool CO_2H group is considered to be responsible for the surprisingly high absorption of Palatine Fast dyes in dye liquors of high p_H. Better levelling is obtained by dyeing with these dyes in strongly acid dyebaths since the stability of the wool–Cr linking is decreased so that the dye is freer to migrate from the initially deeply dyed parts to those lightly dyed (cf. Anacker; B., 1937, 660). Similarly, the improved levelling obtained by adding Palatine Fast Salt to the dyebath is ascribed to a weakening of this linking due to combination between this salt and the dye, whereby a larger, less easily diffusible complex is obtained as described by Valko (B., 1938, 154). A. J. H.

[After-treatment for] improving the fastness to water of one-bath dyed half-wool and discharge-printed [cotton and rayon] goods. H. Hoz (Textilber., 1938, 19, 284).—Half-wool materials (*e.g.*, wool mixed with cotton or viscose-rayon staple fibre) dyed in one bath with union dyes or with acid and direct dyes have only a moderate fastness to washing because of the usually poor H_2O-fastness of the dyed cellulose fibre; the usual after-chrome treatment as applied to wool dyeings is insufficient to improve this lack of fastness appreciably. Satisfactory H_2O-fastness is, however, obtained (with a simultaneous improvement of fastness to light and perspiration) by after-treating the dyed material for 20—30 min. at 90° (40—50° is less satisfactory) in a bath containing 3% (on the goods) of Chrosozin N (Gy) and 1% of AcOH. This treatment is also recommended for cotton and rayon goods dyed with

direct dyes and discharge-printed so as to prevent colour-bleeding in the subsequent washing process. A. J. H.

Calendering of dyed cotton fabrics. ANON. (Canad. Text. J., 1938, **55**, No. 4, 41—42).—Schreinering, which involves the use of high temp. and pressure, makes the shade of dyed fabric considerably paler and may be accompanied, in the case of fabrics "filled" with starch and dextrin, by a simultaneous change of tone. Filled fabric dyed with Rhodamine B and 6G on an Sb tannate mordant became yellower or bluer in schreinering according as the filling paste used was slightly acid or alkaline. Fabric dyed with NH_2Ph-black and filled with a starch paste coloured black with logwood and $Na_2Cr_2O_7$ (I) acquired a brown film on its surface during schreinering at very high temp., due to "burning-out" of the filling. The only remedy found was to use an acid black dye of the Acid Black SO type instead of (I) for colouring the filling paste. A. J. H.

Dyeing of fur felt hats with acid dyes. R. W. REDSTON (Canad. Text J., 1938, **55**, No. 4, 38—40, 59).—Felted fur hats (made from hare, musk rat, and especially rabbit fur previously carrotted with aq. $HgNO_3$ to increase its felting properties) are preferably dyed in the half-shrunk (acid-felted) state so as to obtain good penetration, but dyeing must be commenced under acid conditions (an initially neutral dye bath causes excessive surface colouring) so that a pretreatment with aq. $H_2C_2O_4$ is recommended, whilst $H_2C_2O_4$ is also preferred to H_2SO_4 and AcOH in the dyebath to promote exhaustion. $\not>20\%$ of $Na_2SO_4,10H_2O$ as a levelling agent in the dyebath is used since excess adversely affects the handle of the fur. A borax–shellac stiffening is applied to the brims in finishing so that the dyes used must be fast to alkalis. Suitable dyes are specified. A. J. H.

Japanese dyeing tannins. XVIII. Time function of absorption of tannin by cellulose. Y. UEDA (J. Soc. Chem. Ind. Japan, 1937, **40**, 472B; cf. B., 1937, 1326).—The amount of tannin absorbed by cotton increases rapidly in the first 1—2 hr. and thereafter more slowly; it is decreased by rise in temp. R. S. C.

Wetting, mercerising, and dyeing of cellulose. C. F. GOLDTHWAITE (Amer. Dyestuff Rep., 1938, **27**, 70—78P).—The portion of cotton fabric or filter-paper which is partly wetted through capillarity when the material is spotted with or partly dipped into distilled H_2O is found to be less readily wetted than the adjacent dry or wetted parts when afterwards completely immersed in H_2O; this is confirmed by wt. determinations and by cold-dyeing with direct dyes (the capillarity-wetted part dyes to a lighter shade). Parts of the material made damp (but not wet) by exposure to a humid atm. (*e.g.*, steam) behave similarly. This phenomenon is discussed in relation to the wet-processing (*e.g.*, dyeing) of cotton piece-goods. Curves showing the swelling and heat liberation resulting from the treatment of cotton with aq. NaOH of increasing concns. as obtained by Bancroft, Coward and Spencer, Barratt and Lewis, Higgins, Knecht, and the present authors were re-plotted on semi-logarithm paper; the straight-line curves thereby obtained indicate that these changes follow the compound-interest law such that the rate of change (*e.g.*, of vol.) at any [NaOH] is $\propto$ the change already effected, except that the change is less rapid when the [NaOH] is $>13\%$. Contrary to Coward and Spencer (B., 1923, 221A) it is concluded that the swelling of a cotton fibre is not limited by its cuticle. The amount of H_2O retained by cotton yarn after wetting and draining is sometimes 3 times greater with cold (10°) than with hot (98°) H_2O; this difference is greater with mercerised than with non-mercerised yarn, but cannot be explained by the slightly higher rate of drainage resulting from the lower η of hot H_2O. Non-mercerised cotton holds more H_2O than the mercerised yarn. The dyeing produced on cotton with a dye liquor prepared by mixing 3 separate solutions each containing one dye differed as regards depth and tone of shade from that obtained with a similar dye liquor but prepared by dissolving the 3 dyes together. A. J. H.

Pretreatment of viscose staple fibre materials [for dyeing]. A. MOLNAR (Textilber., 1937, **18**, 990).—Starch is preferably removed by steeping the fabric, free from tension (*e.g.*, in "book" or "hank" form), in a bath at 75° containing Igepon-T, Laventin-KB or -HW, and 6—10 g./l. of Biolase; the softness of the fabric is simultaneously improved. A. J. H.

Dyeing of solid shades on acetate-rayon mixture materials. W. STEGER (Textilber., 1938, **19**, 278—280).—Conditions for scouring, crêping, and dyeing acetate-rayon goods containing viscose-rayon, and/or wool, and/or silk are described. Celliton and Celliton Fast (I.G.) dyes are used for acetate-rayon. In scouring, efficient removal of oxidised and hardened linseed oil size requires the further addition to the soap liquor of 1 c.c./l. of conc. aq. NH_3 and 0·5—1·0 g./l. of $NaBO_3$. Much less soap is used in the soap crêping bath for materials containing wool. Dyeing of the mixed rayons, using direct dyes for viscose rayon, is commenced in a soap bath at $\not>45°$, but after $\frac{1}{2}$—$\frac{3}{4}$ hr. the temp. is raised to 80° (max.). Dyeing of acetate-rayon–wool mixtures is effected in a neutral bath, using neutral-dyeing acid dyes for the wool, commencing at 40° and ending at 85° (max.), or in an acid bath (a better appearance of the wool is thereby obtained) using acid dyes and AcOH or HCO_2H. Dyeing of mixtures of the rayons with wool is effected with union dyes for viscose-rayon and wool, or (for shades of good all-round fastness, but with a loss of lustre of the rayons) with metachrome dyes for the wool and Cr-insensitive direct dyes for the viscose-rayon. Degumming of silk in mixtures with acetate-rayon without adversely affecting the former is effected by steeping for several hr. in a bath at 40° containing (per l.) 10 g. of soap and 3 g. of Laventin HW (I.G.), then heating to 70° and further steeping overnight, followed by steeping at 75—90° and then treating for 2—3 hr. at 75° in a bath containing (per l.) 5 g. of soap and 2 c.c. of Prestabit Oil G (I.G.); dyeing is effected in a neutral bath with neutral-dyeing acid dyes for the silk. Suitable dyes for all of these materials are specified. A. J. H.

Analysis of dyestuffs on the fibre. J. P. REDSTON (Canad. Text. J., 1938, 55, No. 6, 34—37).—Standard methods of analysis are discussed and simplifications and modifications suggested to make them more useful in dyehouse practice. A. J. H.

Applications of fluorescence phenomena. G. MARTIN (Rev. Gén. Mat. Col., 1938, 42, 81—84).—Sources of ultra-violet illumination for the production of fluorescence and the use of fluorescence tests in the dyeing and printing industries, *e.g.*, for the determination of the Naphthol constituent in azoic dyeings and the detection of faults during printing, are outlined. The production of novel effects by application of fluorescent compounds to fabrics, lacquers, resins, etc. is also described. R. J. W. R.

Dyeing of anodised aluminium. V. F. HENLEY (J. Soc. Dyers and Col., 1938, 54, 100—104).—The choice of suitable dyes, based on fastness to light, resistance to leaching, cost, and stability, is discussed. Immersion in dye liquor at the b.p. is favoured as an alternative to separate dyeing followed by wax or hot-H_2O sealing. An inhibitor, *e.g.*, a chromate, added to the dye liquor increases the corrosion-resistance of the finished product, but with chrome dyes is liable to effect colour changes. J. W. C.

Trilon-*A* and -*B*, two new-type water-softening agents for the textile industry. W. ENDER (Fette u. Seifen, 1938, 45, 144—146).—Trilon-*A* and -*B* (composition not stated) convert the metal salts responsible for hardness into H_2O-sol. complex metal compounds, thus preventing the pptn. of the metal ions by soap etc. The amount required therefore depends on the degree of hardness of the H_2O, and, in the case of -*A*, on the temp. These agents can also be used to redissolve Ca soaps etc. deposited on textiles by previous washing in hard H_2O. E. L.

Metallic perchlorates [for textile treatment]. A. H. PETTINGER (Amer. Dyestuff Rep., 1938, 27, 122, 136).—The uses of perchlorates for dissolving cellulose and assisting the acetylation of cellulose are briefly reviewed. A. J. H.

Economical cleaning of industrial textiles (cleaning-rags etc.). A. FOULON (Fette u. Seifen, 1938, 45, 147—149).—The dry-cleaning and washing of soiled cleaning-cloths, overalls, etc. is briefly discussed with special reference to the use of *P*3 (alkaline silicate) as detergent. E. L.

Use of oils, soaps, and chemical aids in the [woollen] textile industry. R. BRAUCKMEYER (Fette u. Seifen, 1938, 45, 125—131).—A lecture. E. L.

Importance of fat-solvent soaps for the textile industry. M. MÜNCH (Fette u. Seifen, 1938, 45, 137—142).—A lecture. E. L.

New experiences with olefines and mineral oils in the textile industry. M. KEHREN (Fette u. Seifen, 1938, 45, 142—144).—Experiments illustrating the difficulty of scouring wools oiled with products containing mineral oils are quoted, and the importance of avoiding contamination of oleines with Fe is stressed. E. L.

Emulsifiers in the textile industry. G. SCHULZ (Fette u. Seifen, 1938, 45, 146—147).—The inclusion of oil-sol. emulsifiers such as "Emulphor" in textile oils containing mineral oil facilitates their removal in the subsequent scouring; H_2O-sol. emulsifiers may be used in emulsion-oiling. E. L.

Problem of rancidity in fixed oils used for finishing textile fabrics. K. L. DORMAN (Amer. Dyestuff Rep., 1938, 27, 89—92).—Development of rancidity in such oils is objectionable mainly because of the resulting odour and colour. Causes and methods for detection and prevention of rancidity are discussed. A modified Swift method is described for determining the resistance of an oil to rancidity in which purified air is bubbled through the oil and thence through 0·01N-NaOH; the rate of neutralisation of this alkali is a measure of the rancidity-resistance. Antioxidants (phenols, naphthols, aminophenols, amines, unsaturated dibasic org. acids, NH_2-acids, etc.) suitable for adding to textile finishing oils to prevent rancidity are listed. A. J. H.

Rôle of catalysis in textile chemistry. III. H. J. HENK (Textilber., 1937, 18, 1003—1004; cf. B., 1938, 48).—The uses and properties of enzyme textile auxiliaries are further discussed with special reference to malt, pancreas, and bacterial amylases, lipases, and proteases. A malt extract contains a dextrin- (but not sugar-)forming amylase (made inactive by maintaining the extract for 15 min. at p_H 3·3 and then increasing this to 6·0 by addition of aq. Na_2HPO_4) and a sugar-forming amylase (inactivated by maintaining the extract for 15 min. at 70° and p_H 6·5). Mixtures of malt and bacterial amylase (Biolase) hydrolyse starch beyond maltose to glucose. In preparing sol.-starch sizes (blue with I) by the action of an amylase on starch (optimum temp. 60—70°) it is necessary to stop the action (by heating to 100°) just before the first formation of reducing products (*e.g.*, dextrin), but for textile-printing thickening pastes the action is prolonged for dextrin formation. Bacterial amylases but not malt are activated by neutral salts (*e.g.*, KCl) and NH_2-acids and their optimum p_H are 7·0 and 4·6—5·2, respectively; the harmful effect of acid formation during the action of the bacterial amylases may be avoided by having small amounts of halogenated fatty acids or their salts (*e.g.*, $CH_2Br{\cdot}CO_2H$ and $CH_2Br{\cdot}CO_2Na$) present, and it is convenient to use amylase compositions containing 2·5% of such salts. Amylases are useful additions to detergent products, but it is unsatisfactory to use together malt and trypsin or lipase since the optimum p_H of the latter are 8—9. Diastases assist the removal of pectin impurities from raw cotton, and pancreatic products can assist the degumming of silk. A. J. H.

Crease-resisting finishes on rayon materials with the aid of formaldehyde. ANON. (Textilber., 1938, 19, 286).—Finishing processes which use tannic acid–CH_2O and synthetic resins (B.P. 291,473—4; B., 1928, 636) are described. A. J. H.

Processing of [rayon] crêpe fabrics. ANON. (Canad. Text. J., 1938, 55, No. 6, 37—38).—The usefulness of pre-embossing as a means for ensuring

uniform or new forms of shrinkage in the fabric during the usual crêping treatment in a hot soap liquor is discussed and reference is made to large-scale experiments. "Gaping" (due to the presence of innumerable small warp gaps resulting from irregular shrinkage) is avoided by entering the fabric into the soap liquor at 90° instead of at 100° as is usual.

A. J. H.

Mercerisation of staple-fibre yarn. W. SCHRAMEK (Kunstseide u. Zellwolle, 1937, **19**, 428—432).—Max. swelling of natural cellulose occurs in 15—18% aq. NaOH, whereas this occurs in 10% solution with regenerated fibres. The changes produced by NaOH are best observed by *X*-rays. Two types of staple fibre are recognised: cuticle, *i.e.*, fibres to which viscose and especially the stretched silks belong; and core, *i.e.*, fibres comprising the Cu, acetate, and special types of viscose. Staple fibre should be mercerised only when unavoidable and the usual precautions for artificial silks should be taken. Results are given of mercerising mixed yarns of cotton and staple fibre and of 50 repeated-washing tests of mercerised and unmercerised yarns and of the action of NaOH on single staple fibres. The usual technological vals. are insufficient indication of the utility of a mixed yarn, and "Dauerbiegfestigkeit" (duration of bending strength), which would include tensile strength, elongation, and elasticity, is proposed.

H. WH.

Precautions necessary for producing good waterproofing [of textiles]. ANON. (Textilber., 1938, **19**, 271).—In waterproofing yarn or fabric by impregnating with 2·5—5·0% of Ramasit K (I) it is recommended that the material be free from alkali, acid, or wetting agents (*e.g.*, sulphonated fatty alcohols), and that the subsequent drying be sufficiently slow for complete decomp. of (I); hard H_2O should be adjusted with AcOH. Drastic decatising of the waterproofed fabric may reduce its H_2O-repellency. Increased H_2O-repellency may be obtained by adding 1% of Al formate or acetate (not sulphate) to the solution of (I) and by calendering the waterproofed fabric while it is slightly damp. A. J. H.

Application of rubber in the textile industry. F. B. GRIBNAU (Chem. Weekblad, 1938, **35**, 218—222).—A review. S. C.

Difficulties in the complete impregnation of textiles with [rubber] latex. J. C. BONGRAND (Gummi-Ztg., 1938, **52**, 180—181).—The difficulties are enumerated and methods for obviating them, *e.g.*, by using loosely twisted threads and dewaxed fibres, and ensuring a comparable p_H in the textile material and the latex (by increasing the p_H of the former), are indicated. Impregnation is additionally aided by removing the air from the textile material by a vac., increasing the time of contact with the latex, prolonging the fluid condition of the latex on the threads by exposure to a moist ammoniacal atm., and leading the thread through a coagulant bath when the latex in it has attained the state of a soft gel. Applications are indicated for the treated material obtained by the procedure described (which is, in part, patented). Comment is made on the possibility of advantages to be derived from the use of acid-stable *Funtumia* latex for impregnation of textiles should this ever be commercially available.

D. F. T.

New system of org. synthesis. Recovering dirty solvents etc.—See III. **Silk fibroin. Rayon crêpe. Bleaching wood pulp.**—See V. **Aeroplane fabric finishes.**—See XIII.

PATENTS.

Preparation of sulphonic acids and insoluble azo dyes [on the fibre] derived from these acids. SOC. ANON. DES MAT. COL. & PROD. CHIM. DE ST. DENIS, A. WAHL, and M. PAILLARD (B.P. 479,708, 6.1.37. Fr., 6.1.36).—Textiles composed either of vegetable or animal fibres are grounded with *N*-substituted derivatives of 2 : 1-$NH_2 \cdot C_{10}H_6 \cdot SO_3H$ (I) and developed with diazo compounds derived from primary arylamines free from H_2O-solubilising groups; the SO_3H is eliminated on coupling. Alternative modes of application are: (i) the sulphonate and the diazo compound in a form incapable of coupling, *e.g.*, as a diazoimino-compound or an *iso*diazotate, are applied together and developed by acid; (ii) the sulphonate and arylamine are applied together and developed with HNO_2; (iii) sulphonate, arylamine, and a nitrite are applied together and developed by acid. The sulphonic acid is made by interaction of (I), a sulphite, and a primary amine NH_2R, where R = a saturated aliphatic radical which may also contain a terminal amino- or acylamino-group. Among examples there are described 2-*methyl*-, -n-*butyl*-, and -n-*amyl-naphthylamine*-1-*sulphonic acids* and their *Na* salts and N-β-*aminoethyl*-2-*naphthylamine*-1-*sulphonic acid* [from (I) and $(CH_2 \cdot NH_2)_2$], and its *Ac*, *Bz*, and p-$C_6H_4Me \cdot SO_2$ derivatives.

K. H. S.

Coloration of textile and other materials. H. DREYFUS and R. W. MONCRIEFF (B.P. 479,866, 13.8.36).—Vat dyes dissolved in C_5H_5N are reduced and the solution is diluted with petrol until the liquid contains 5—15% of org. base; the solution is used to dye cellulose acetate fibres. K. H. S.

Coloration of textile materials. H. DREYFUS and R. W. MONCRIEFF (B.P. 479,867, 13.8.36).—Textiles in package form, *e.g.*, bobbins of cellulose acetate yarn, are dyed by circulation of a dye liquor containing a reduced vat dye in aq. solution which contains about 10% of $Pr^{\beta}OH$. Among examples, bobbins of cellulose acetate are dyed at 50° for 2 hr. with a vat made up of Ciba Blue 2B (10), NaOH (20), $Na_2S_2O_4$ (40), H_2O (18,000), $Pr^{\beta}OH$ (2000 g.), Turkey-red oil (300), and aq. NH_3, *d* 0·880 (30 c.c.), and oxidised by circulation of a solution of alkaline H_2O at 60° for ½ hr. The dyeing is of very good uniformity.

K. H. S.

Production and dyeing of materials from cellulose esters. L. S. E. ELLIS. From SOC. RHODIACETA (B.P. 480,297, 29.6.37).—Artificial resins obtained by polymerising NH_2-derivatives of $CH_2{:}CH \cdot CO_2H$ or its α-substituted homologues are incorporated in cellulose esters and confer affinity for acid, direct, diazotisable, chrome, vat, and S dyes. In examples, the polymeride of $CH_2{:}CMe \cdot CO_2C_2H_4 \cdot NEt_2$ (I) (4) is dissolved with

cellulose acetate (20) in $COMe_2$ and affords threads or films which are dyed with Diazol Pure Blue NFF. A thread of similar properties is prepared by using the interpolymeride from the di*cyclo*hexyl (65) and Me_2 (35 pts.) analogues of (I). K. H. S.

Dyeing with vat dyes. J. G. KERN, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 2,067,927—9, 19.1.37. Appl., 8.4.35. Japan, 3.9.34).—Improved results are obtained in both vat dye pigment padding and printing processes by incorporating into the padding liquor or the printing paste sol. salts of acid esters ($<C_6$) of polybasic inorg. acids (H_2SO_4, H_3PO_4, H_3BO_3, H_2SiO_4, boro-sulphuric and -phosphoric acids) from (A) aliphatic alcohols and (B) polyhydric alcohols. The alkali salts are particularly effective. (C) covers the incorporation of the above compounds into vat dye baths used for straight dyeing. S. C.

Printing of textile materials. E. I. DU PONT DE NEMOURS & CO. (B.P. 479,847, 10.8.36. U.S., 10.8.35).—The H_2O-sol. sulphate, or salt thereof, of an aliphatic primary or *sec.* alcohol of C_{6-12}, or a mixture of such alcohols, containing branched chains (excluding chains first branched beyond C_6 from the SO_4H), is added to the printing paste for vat dyes. The alcohols are obtained as a fraction of b.p. 133—260° in the fractionation of synthetic MeOH. The prints have improved levelness, penetration, strength, and brilliancy. K. H. S.

Process for refining [waterproofing] textiles. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 479,753, 5.8.36 and 19.3.37).—Textiles are made H_2O-repellent by esterification with anhydrides of dibasic carboxylic acids containing saturated or unsaturated open or cyclic chains of $\nless C_7$, applied either as solution or emulsion, followed by treatment with a base which still further reduces the capacity of the fibre to take up H_2O. Alternatively the esterified fibre is first treated with a base which forms a salt sensitive to H_2O and the latter converted by double decomp. into an insol. salt of Ca, Zn, or Al. Among examples, cotton fabric is treated for 15 min. at 65° with a 0·6% solution of *iso*pentadecenylsuccinic anhydride in CCl_4 and when dry rinsed in hard H_2O for 5 min. at 80°, dried, and again rinsed, whereby Ca salts are formed which render the fabric waterproof. Similarly artificial silk is impregnated with *n*-octadecenylsuccinic anhydride, treated with dil. aq. Na_2CO_3, and then treated with dil. aq. $ZnCl_2$. K. H. S.

Treatment of cellulose esters and materials comprising the same. BRIT. CELANESE, LTD. (B.P. 473,004, 3.4.36. U.S., 3.4.35).—Filaments, yarns, and fabrics of cellulose esters (especially cellulose acetate) are subjected to a damp atm. and saponified while still possessing a high moisture content. Saponification can also be carried out by subjecting the materials (which may have been conditioned in a moist atm.) to a preliminary saponification sufficient to produce only a small loss in wt. (2—7%) and completing the saponification, without removing the reaction products, with a substance less alkaline (p_H 8—11) than that used initially (*e.g.*, with soap, NaOAc, etc.). *E.g.*, acetate yarn ($COMe_2$-sol.) is exposed at R.H. >65% until the moisture content is 4%, and saponified with 20% aq. NaOH to give a 5% loss in wt. Saponification is completed by treating the unwashed yarn with a 10% aq. soap solution at 90° for ½ hr. The final loss in wt. is 10% and the product has affinity for cotton dyes. Local saponification may also be carried out by this process. R. J. W. R.

Treatment of yarns, filaments, fabrics, and like materials. BRIT. CELANESE, LTD. (B.P. 473,005, 3.4.36. U.S., 3.4.35).—Indicators which have no affinity for and can easily be removed from the materials are applied to materials of regenerated cellulose or cellulose derivatives to indicate changes in p_H which occur during treatment with acids or alkalis, *e.g.*, in saponification, crêping, etc. They are conveniently applied as a solution or dispersion in a lubricant. In an example, Violet 5BK (4) is dissolved in sulphonated naphthene (20) and the solution dispersed in light mineral oil (75 pts.) to give a composition useful as the indicator in the local saponification of cellulose acetate yarn. R. J. W. R.

Manufacture and treatment of textile materials [weighting, delustring, etc.]. BRIT. CELANESE, LTD., G. H. ELLIS, and A. J. WESSON (B.P. 472,905, 1.4.36).—H_2O-insol. metal compounds are incorporated in textile materials (especially those composed of cellulose esters or ethers) by treatment with two metal salts which interact to give insol. derivatives. The material can be treated with a third reagent (after application of one or both salts) which will convert suitable salts into compounds capable of interacting with each other. *E.g.*, material is treated with aq. $Ba(CNS)_2$, then with aq. Na_2CO_3, and finally with aq. $Al_2(SO_4)_3$. Softening agents, *e.g.*, glycerol, may also be present. R. J. W. R.

Treatment of cotton fabric. C. B. WHITE, Assr. to W. E. HOOPER & SONS CO. (U.S.P. 2,061,686, 24.11.36. Appl., 14.9.33).—A film of cellulose is formed on the materials by superficial treatment with cuprammonium solution to dissolve a portion of the fibre, and the Cu salts are then removed by application of $Na_2S_2O_3$ solution. The treated materials resemble linen and are of good colour. R. J. W. R.

Porous adhesive fabrics. D. SARASON (B.P. 479,795, 28.1.37. Ger., 29.1.36).—Open-mesh fabric for bandages or the like is treated with non-viscous (3—6%) solution of rubber, in such quantity that the mesh remains open, and is dried by hot air, with slight vulcanisation if desired. B. M. V.

Impregnation [of pile fabrics]. G. S. HIERS, Assr. to COLLINS & AIKMAN CORP. (U.S.P. 2,062,178, 24.11.36. Appl., 31.7.34).—The fibres in a loosely-woven pile fabric in which the tufts form bights on the back are rendered secure by treating the material with a non-vulcanisable, aq. dispersion containing rubber, a non-tacky wax, and, if desired, antioxidants. The fabric is then heated to coagulate the rubber and melt the wax so that the latter forms a "bloom" on the surface of the coating and prevents tackiness. Scouring, dyeing, etc. may then be carried out. The presence of the pile bights prevents the formation of a continuous backing coating. R. J. W. R.

[Poly*iso*butylene] impregnated fibrous material. P. K. FROLICH and P. J. WIEZEVICH, Assrs. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,061,570, 24.11.36. Appl., 19.7.33).—Fabrics, paper, leather, wood, etc. are coated or impregnated with a polymeride (I) of *iso*butylene (obtained, *e.g.*, by treatment with an inorg. halide at $< -10°$) to give products which are waterproof and resistant to oxidation, rotting, and corrosion. (I) is preferably used in org. solution, *e.g.*, in CCl_4 or naphtha, to which fungicides etc. may be added, and the solvent evaporated from the impregnated material. Tacky finishes are obtained by the use of a solution ($\nless 20\%$) of (I) of mol. wt. 1000—5000, whilst the use of a solution ($<20\%$) of (I) of mol. wt. 5000—10,000 gives a waterproof finish. (I) may be added to dry-cleaning solvents to render the shape of cleaned garments more durable, and also used for carpet backing and as an interlayer in two-ply fabrics. R. J. W. R.

Direct cold permanent waving [of hair]. J. Y. MALONE, J. H. CARROLL, and C. R. MCKEE, Assrs. to PERWAY CO. (U.S.P. 2,061,709, 24.11.36. Appl., 24.7.33).—Hair is treated at about room temp. with a softening composition (I) (p_H 9—14) containing a basic compound (preferably of a reducing nature) of an amphoteric metal, and then waved, after which is applied an acidic fixing material (II) (*e.g.*, an acid salt or org. acid) which destroys the action of (I). A conc. solution (III) of a neutral salt may finally be used to remove excess of (I) and (II). Reducing agents, *e.g.*, alkali sulphides, to prevent atm. oxidation, and enzymes may be added to (I). (II) and (III) may contain reagents to interact with any S compounds formed during treatment. *E.g.*, (I) is an aq. solution of Na_2SnO_2 (0·01—4%), $Na_2S_2O_4$ (0·5—2%), Na_2S_n ($<2\%$), and trypsin (0·001—10%); (II) an aq. solution of $Al_2(SO_4)_3$ (10—50%) and $ZnSO_4$ (5—15%); and (III) an aq. solution of NaCl (10—30%). R. J. W. R.

[Mechanically] forming designs on fabrics. L. and J. REYCHLER (B.P. 481,284, 5.8.36. Belg., 7. and 9.8.35).

Textile assistants. Wetting etc. agents.—See III. **Azo dyes.**—See IV. **Rubber yarns etc.**—See XIV.

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

Production of sulphuric acid from moist gas by the contact process. I. E. ADADUROV, O. N. TZEITLIN, and T. L. FOMITSCHEVA (Ukrain. Chem. J., 1938, **13**, 1—5).—Optimum conditions for production of H_2SO_4 from damp SO_2 are: $P_{H_2O}/P_{SO_2} = 18—19$ (where P_{H_2O} and P_{SO_2} are the partial pressures of H_2O and SO_2), [SO_2] 4—6%, contact temp. 480°, temp. gradient of the condensation zone 380—200°, and condensation time 10—11 sec. 80—99% H_2SO_4 is thus obtained in theoretical yield. R. T.

[Manufacture of] sulphuric acid by the lead chamber process. Laboratory experiment. H. A. SMITH (J. Chem. Educ., 1937, **14**, 479). L. S. T.

Colorimetric determination of nitric acid in spent sulphuric acid. PEKKER (Zavod. Lab., 1937, **6**, 1280).—0·5 ml. of acid is added to 8·5 ml. of conc. H_2SO_4 and 1·5 ml. of 4—5% $FeSO_4$, and the red coloration developing is compared with that given by a series of standard solutions containing 0·01—1% of HNO_3. R. T.

Packing materials for sulphuric acid towers. II. G. OSAME (J. Soc. Chem. Ind. Japan, 1937, **40**, 434—435B; cf. B., 1937, 1333).—When streams of H_2O and H_2SO_4 (*d* 1·52 and 1·70) flow at equal rates down vertical surfaces the widths of the streams are approx. equal; roughness has no appreciable effect. Only small quantities of H_2O were required to remove dye from square packing, Raschig rings packed regularly, or from 2-holed bricks packed flat, but random-packed Raschig rings and spiral rings were not completely washed out even with larger quantities of H_2O. With square packing the amount of H_2O which flows inside or out is $\propto$ the area, but with Raschig rings piled tetrahedrally much more H_2O per unit area flows outside than inside. I. C. R.

Determination of sulphuric in concentrated nitric acid. KOTELNIKOV (Zavod. Lab., 1937, **6**, 1280—1281).—20 ml. of formalin and 10 ml. of H_2O are added to 10 g. of HNO_3, and the mixture is evaporated to small vol., 2—3 drops of formalin are added to the residue, and, should further NO not be evolved, H_2SO_4 in the solution is titrated with standard alkali. R. T.

Effects of addition of common salt during calcination of limestone. VII. Microscopical observation of quicklime. T. NODA (J. Soc. Chem. Ind. Japan, 1937, **40**, 417—418B; cf. B., 1937, 1042).—Photomicrographs show that CaO prepared by calcining $CaCO_3$ at 1000° is a loose aggregate of minute globular crystals (1 μ.); calcination at 1300° yields 3 μ. crystals, and at 1670° a hard mass of rounded 20—60 μ. crystals. In presence of NaCl the CaO is a loose porous aggregate of globular polyhedra of uniform size, 4 μ. at 1400° and 11 μ. at 1300°. At 1300°, when some NaCl has condensed on the crystals, 15 μ. cubes are formed. I. C. R.

Ammonia-synthesis column for testing of catalysts. V. M. GRINEVITSCH (Zavod. Lab., 1937, **6**, 1493—1494).—Apparatus is described. R. T.

Production of sodium sulphide in rotating ovens. N. F. LJAMIN (J. Appl. Chem. Russ., 1937, **10**, 2001—2007).—Na_2SO_4 is mixed intimately with powdered coke (grain diameter 2—5 mm.), and air at 1100° is passed through the mixture in a rotating oven; the product contains 75—80% of Na_2S. The duration of the process depends on the size of the oven and the magnitude of the charge. R. T.

Rapid determination of magnesium in magnesites and dolomites. S. I. SCHODTZEV and V. I. BLAGOVESCHTSCHENSKAJA (Zavod. Lab., 1937, **6**, 1484—1485).—The sample is dissolved in HCl, and a vol. of solution corresponding with 0·1 g. of the sample is made exactly neutral (neutral-red) with N-NaOH and 0·1N-$Ba(OH)_2$, 100 ml. excess of which is added, followed by H_2O to 250 ml. The solution is filtered and an aliquot part of the filtrate is titrated (neutral-

red) with 0·05N-HCl; the Mg content is calc. therefrom. R. T.

Determination of calcium nitride in calcium cyanamide. A. A. KORINFSKI (Zavod. Lab., 1937, 6, 1440—1442).—25 ml. of 3% H_2SO_4 are added gradually to 1—1·5 g. of $CaCN_2$, a stream of air being aspirated through the flask and then through 25 ml. of 3% H_2SO_4. The two solutions are then mixed, 10 ml. of 10% $Pb(OAc)_2$ are added, and the solution is filtered. 10 ml. of 5% citric acid solution are added to the filtrate + washings, and the solution is made neutral to phenolphthalein with 0·5N-NaOH, 10 ml. of neutral 40% aq. CH_2O are added, and the solution is titrated with 0·1N-NaOH. Ca_3N_2 % = 0·740852a/w, where w is the wt. of the sample and a the no. of ml. of 0·1N-NaOH used. R. T.

Ore-dressing practice with Florida pebble phosphates, Southern Phosphate Corporation. J. W. PAMPLIN (Min. Tech., 1938, 2, Tech. Publ. 881, 19 pp.).—Plant handling approx. 7½ long tons of phosphate pebbles (66—80% of $Ca_3P_2O_8$) in 4000 gals. of H_2O per min. is described. The process consists in ridding the phosphate pebble of all clay and then separating fine phosphate pebble from quartz of the same sizes. A. K. G. T.

Reaction of phosphates with sulphur monochloride. Systems calcium orthophosphate–, Kursk phosphorite–, artificial apatite–, and Chibin apatite–sulphur monochloride. A. P. PALKIN and L. F. DENISOVA (J. Appl. Chem. Russ., 1937, 10, 1993—2000).—Phosphates react with S_2Cl_2 at room temp. as follows: $2Ca_3(PO_4)_2 + 6S_2Cl_2 = 6CaCl_2 + 2P_2O_5 + 3SO_2 + 9S$; $2P_2O_5 + 6S_2Cl_2 = 4POCl_3 + 3SO_2 + 9S$; $POCl_3 + 3H_2O = H_3PO_4 + 3HCl$. The process is complete in 24 hr. R. T.

Examination of commercial calcium arsenates. O. A. NELSON and C. C. CASSIL (J. Econ. Entom., 1937, 30, 474—478).—Analytical data are recorded. The commercial product contains 40—47% of As_2O_5 and 30—40% of combined CaO, together with free $Ca(OH)_2$, $CaCO_3$, and minor impurities. No relation is apparent between the proportion of free $Ca(OH)_2$ and the % of H_2O-sol. As. Individual brands of Ca arsenate vary considerably in CaO/As_2O_5 ratio; wider differences occur between different brands [free $Ca(OH)_2$ and $CaCO_3$ being excluded]. H_2O-sol. As tends to diminish with increase in % of fine particles and with increase in the CaO/As_2O_5 ratio. Commercial samples probably contain $CaHAsO_4,H_2O$ and a basic solid solution of tri- and tetra-calcium arsenates. A. G. P.

Particle size of commercial calcium arsenates by sedimentation analysis. L. D. GOODHUE (J. Econ. Entom., 1937, 30, 466—474).—Size distribution of particles is determined by sedimentation in EtOH–H_2O (1 : 1). The loose bulking val. is an unreliable measure of particle size. A relation between particle size and d is indicated. A. G. P.

Manufacture of zinc oxide. A. G. ELLIOTT (Oil and Col. Tr. J., 1938, 93, 674—679).—A review. The development of different methods for the manufacture of ZnO is traced historically, and modern methods, including the production of acicular and small particle-size ZnO (for rubber compounding), are described. The properties and uses of the different products and the causes of discoloration are discussed. D. R. D.

Wet-chlorination process for preparation of zinc chloride. V. PŘISTOUPIL (Chem. Obzor, 1937, 12, 217—221).—The usual wet process using Cl_2 gas is simplified for flotation blende by omitting the $FeCl_3$ catalyst, which has otherwise to be removed from the product. The products are $ZnCl_2$ solution of arbitrary concn. and elementary S. The process, which requires ¼—⅓ of the total Zn to be added as roasted blende, is regarded as solved technically, but as presenting no economic advantage over present practice. F. R.

Preparation of pure alumina from Manchurian aluminous shale. II. Treatment of Fukushu shale with a mixture of sulphuric acid and ammonium sulphate under pressure. T. ARIMORI (J. Soc. Chem. Ind. Japan, 1937, 40, 411—412B; cf. B., 1937, 1335).—Extraction of the shale (Al_2O_3 68·23, SiO_2 12·08, Fe_2O_3 3·15, TiO_2 3·37, loss on ignition 14·16%) with this mixture is best effected by heating the ore (ground to pass 100-mesh and calcined at 600—700° for 5 hr.) with a mixture of H_2SO_4 (d 1·52) (4 mols.) and $(NH_4)_2SO_4$ (1 mol. per mol. of Al_2O_3) in an autoclave at 180° for 3 hr., the pressure being 12 kg./sq. cm. Extractions are 96·20, 90·97, and 53·82% for Al_2O_3, Fe_2O_3, and TiO_2, respectively. In practice, however, the simplicity of treatment by H_2SO_4 alone makes it preferable despite the lower extraction efficiency for Al_2O_3 (94·36%). I. C. R.

Analysis of technical products derived from the working up of bauxite. U. PELAGATTI (Chim. e l'Ind., 1938, 20, 75—76).—Satisfactory analyses of $Fe_2O_3 + Al_2O_3 + TiO_2$ mixtures can be made by titrating the Fe with $KMnO_4$ after reduction with H_2S, titrating the Ti with Fe alum after reduction with Zn in H_2SO_4, and determining the total oxides gravimetrically. The method is very suitable for the analysis of titaniferous materials obtained from bauxite. O. J. W.

Direct determination of aluminium in aluminium earths [*e.g.*, bauxite]. P. URECH (Z. anal. Chem., 1938, 111, 337—342).—To determine Fe_2O_3, 50 c.c. of the bauxite solution containing 2·4 g. of Al_2O_3 per litre, and freed from SiO_2, are acidified with 2 g. of tartaric acid, neutralised with aq. NH_3, and acidified with 1 c.c. of H_2SO_4 (d 1·6). The solution is decolorised with H_2S, made alkaline with aq. NH_3, and again reduced with H_2S. The ppt. is washed with aq. $(NH_4)_2S$ and dissolved in dil. HCl. The solution is oxidised with HNO_3 and the Fe determined as Fe_2O_3. For the determination of TiO_2, the solution, freed from Fe, is acidified with H_2SO_4 and evaporated to 100 c.c. After S has been filtered off the solution is treated with 10 g. of malonic acid and 1 g. of NaOAc, neutralised with NH_3, acidified with 1—2 c.c. of AcOH, warmed to 60°, and the Ti determined by means of hydroxyquinoline. To determine Al_2O_3 the filtrate free from Ti and Fe is diluted to 500 c.c., 250 c.c. are treated with 10 c.c. of 3% oxine acetate at 70°, and Al oxine is pptd. by means of aq. NH_3. R. S. B.

Canadian bentonites. W. GALLAY (Canad. J. Res., 1938, **16**, B, 6—34).—Various bentonites have been investigated as refining and bleaching agents for lubricating oil distillates, cracked motor fuel distillates, peanut, cottonseed, coconut, and palm oils, lard and beef tallow, linseed oil, pilchard oil, used crank-case oils, insulating oils, and dry-cleaning solvents. Comparisons of Canadian with imported clays are given. Bentonite (analysis given) from the Morden, Manitoba, district possesses high absorbent power, and in the activated condition is superior to the other bentonites examined. The best methods of activation are discussed. Bentonites are not suitable for use in the vapour-phase percolation treatment of cracked distillates. L. S. T.

Reducing properties of bleaching earths and active carbons. A. KUTZELNIGG (Österr. Chem.-Ztg., 1938, **41**, 82—83; cf. Erdheim, *ibid.*, 1937, **40**, 344, 380).—Instances of the reducing or oxidising properties of active C or fuller's earth are quoted (cf. A., 1930, 435, 1133; 1934, 1310; 1936, 806; 1937, I, 474; Angew. Chem., 1937, **50**, 353). A. B. M.

Rapid analysis of electro-corundum and natural corundum. A. I. MIKLASCHEVSKI (Zavod. Lab., 1937, **6**, 1209—1213).—SiO_2 and Al_2O_3 in corundum are determined by known colorimetric and hydroxyquinoline methods. R. T.

Utilisation of mother-liquor from precipitation of nickel formate. M. V. DMITRIEVSKAJA and B. N. SLEPTZOV (Maslob. Shir. Delo, 1937, No. 6, 14—15).—The mother-liquor + wash-H_2O from pptn. of Ni formate (I) is cooled to 12—14°, when 50% of the Na_2SO_4 present separates as decahydrate. The filtrate is evaporated to 65% of its initial vol., when (I) separates; alternatively, $NiSO_4$ is dissolved in it and (I) is pptd. with HCO_2Na in the usual way. R. T.

Determination of low concentrations of carbon monoxide. CHEM. DEPT. SOUTH METROPOLITAN GAS CO. (J.S.C.I., 1938, **57**, 79—82).—The reaction between CO and $PdCl_2$ has been examined and the conditions under which it can be used for the determination of traces of CO have been ascertained. Two forms of test have been devised, covering between them concns. of CO ranging from zero to approx. 4000 p.p.m. These methods give results generally in agreement with those obtained by the I_2O_5 method, but are more rapid and require relatively small vols. of air or gas. A method for preparing standard mixtures of CO and air for calibration purposes is described.

Accuracy of carbon monoxide determinations particularly at low percentages. J. A. VAN DIJK and J. C. JACOBS (Het Gas, 1937, **57**, 288—293).—A comparison is made of the various methods of determining small amounts (0—3%) of CO, the method of Meyer and Sloof (A., 1936, 39) being taken as standard. The usual absorption methods with Cu_2Cl_2, I_2O_5, etc. gave results 0·3—0·8% too high, but satisfactory results were obtained by gravimetric determination as H_2O after reduction with H_2 in presence of a Ni–ThO_2 catalyst, as used in the ter Meulen method for determination of O in coal. S. C.

Influence of streaming, diffusion, and heat transference on output of reaction furnaces. IV. Dependence of reaction yield on streaming velocity in the decomposition of nitric oxide on cupric oxide. G. DAMKÖHLER and G. DELCKER (Z. Elektrochem., 1938, **44**, 193—199).—Theoretical. In regions of laminar streaming the velocity has little effect on the reaction. In regions of turbulence the data are inconclusive, but theory does not indicate that the velocity has any influence (cf. B., 1937, 399). C. R. H.

Determination of sulphur in pyrites. R. FRESENIUS (Chem.-Ztg., 1938, **62**, 120—121).—$BaSO_4$ pptd. in the analysis of pyrites containing lignite should be set aside for $\not<$ 12 hr. before filtration in order that the colloidal portion may become cryst. Addition of much $KClO_3$ to destroy org. matter is to be avoided, otherwise the result is too high owing to co-pptn. of K salts with the $BaSO_4$. F. L. U.

Determination of traces of hydrogen sulphide and carbon oxysulphide in soil air. S. I. SOLOVEITSCHIK (Zavod. Lab., 1937, **6**, 1451—1454).—1·54 μg. of H_2S in 15 ml. of solution can be determined by Mecklenburg and Rosenkränzer's method (B., 1914, 352). COS in air is absorbed in 40% KOH in 50% EtOH, excess of acid is added, and the H_2S evolved is determined as above. R. T.

Vaporisation of sulphur dioxide with delayed boiling and bubble formation. E. HAIDLEN (Z. ges. Kälte-Ind., 1937, **44**, 183—187, 206—212).—The degree of superheating of a liquid depends on the rate of vapour transfer across the surface and is reduced by bubble formation. The temp. within liquid SO_2 increased with depth below the surface, up to 5 mm., and thereafter was const. There was no sharp distinction between delayed boiling and boiling with bubble formation, both types being possible at vaporisation rates of 45 and 60 kg./sq. in./hr., respectively. A discontinuity between the temp. of boiling SO_2 and its vapour varying from 0·1° to 0·7° according to conditions was observed. The degree of superheating in liquid SO_2 covered by a film of oil depended on the d, η, and layer thickness of the oil. R. B. C.

S from gas.—See II. **Amination by ammonolysis.**—See III. **Electrolytic bleaching.**—See VI. **ZnO and Zn-white in glass etc. industry.**—See VIII. **By-product gypsum.**—See IX. **Purifying $Ni(OH)_2$. Treating material with O_3.**—See XI. **Barytes. Al naphthenate.**—See XIII. **Sludges in K-salt fertilisers. Determining Ca in fertilisers etc.**—See XVI. **Determining BO_3' in flour, and SO_3 in dried fruit.**—See XIX. [I from] **Black Sea algæ.**—See XX. **Mine gases.**—See XXIII.

See also A., I, 205, **Electrolysis of molten salts.** 208, **Prep. of metal carbonyls and of $H_4P_2O_6$.** 209, **Prep. of phosphotungstic acid. Use of AcCl as chlorinating agent.** 211, **Analysis of mixtures of Cl_2, $COCl_2$, and NOCl.** 212, **Colorimetric determination of K [in fertilisers].** III, 337, **Hazards in Ra and MsTh refining plant.**

PATENTS.

Manufacture of hydrochloric acid from calcium chloride. SOC. INTERNAT. DES IND. CHIM. ET DÉRIVÉS, and A. CONSALVO (B.P. 478,851, 15.12.36).—Aq. $CaCl_2$ is treated with $Al_2(SO_4)_3$, the $CaSO_4$ (I) removed, and the aq. $AlCl_3$ distilled to obtain HCl and $Al(OH)_3$ (II) by hydrolysis; the (II) is then agitated with (I) in presence of CO_2 to yield $CaCO_3$ and $Al_2(SO_4)_3$ for further use. F. M. L.

Manufacture of hydrochloric acid and sodium sulphate. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 478,217, 21.7.36).—In the prep. of HCl by the interaction of H_2SO_4 with NaCl, increased efficiency is obtained by preheating the reactants separately to >200° (250—400°). F. M. L.

Purification of caustic soda lyes. I. G. FARBENIND. A.-G. (B.P. 472,754, 20.5.37. Ger., 23.7.36).—In the process for separating NaOH from liquors containing NaCl, *e.g.*, electrolytic lyes, by concentrating to 50% of NaOH, removing the NaCl crystals, diluting to 38%, cooling to 14°, and collecting the $NaOH,7H_2O$, the crystals are collected in a centrifuge and washed with H_2O at 10—14°. H_2O at higher or lower temp. causes the cake to harden. The product contains 0·1—0·2 g. of NaCl per 100 g. of NaOH. I. C. R.

Production of finely-divided calcium carbonate. A. H. STEVENS. From PITTSBURGH PLATE GLASS CO. (B.P. 479,054, 30.7.36).—Aq. $CaCl_2$ is mixed with a sol. carbonate, or $CaCO_3$ is ground in H_2O the p_H of which is adjusted by addition of alkali to 9·5—11·5 (10), to prevent flocculation. F. M. L.

Manufacture of alkali-metal and magnesium salts. M. DRUJON (B.P. 477,744, 14.4.37).—MgO is dissolved in H_2O saturated with CO_2 under pressure, and the aq. $Mg(HCO_3)_2$ passed over an alkali zeolite to yield aq. $NaHCO_3$. A Mg salt is obtained when the zeolite is regenerated. F. M. L.

Recovery of aluminium compounds. L. FRELING and J. DORREN (B.P. 479,293, 4.8.36).—Waste shale etc. from coal-mining operations is intimately mixed with $Ca(OH)_2$, the mixture calcined, and the product extracted with boiling HCl, which dissolves 80—85% of the Al_2O_3 present. F. M. L.

Manufacture of active regeneratable bleaching earths from highly dispersed salt- and fresh-water muds. PLANKTOKOLL CHEM. FABR. G.M.B.H., and J. B. CARPZOW (B.P. 479,023, 23.6.36).—Mud rich in colloidal Si compounds and having an O content < that of H_2SiO_3 is dried at 110—115°, heated to 450—500° to decompose org. matter, boiled with HCl, washed, boiled with H_2SO_4, washed, and dried at 110—500°. F. M. L.

Purification of titanium sulphate solutions. UNITED COLOR & PIGMENT CO., INC. (B.P. 479,082, 8.6.37. U.S., 16.6.36).—$Cr^{\cdot\cdot\cdot}$ and $Mn^{\cdot\cdot}$ are removed from $Ti(SO_4)_2$ solutions, obtained by digestion of ilmenite with H_2SO_4, by absorption on activated C or cotton fibre. F. M. L.

Apparatus for removal of carbon monoxide from gases containing hydrogen. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 478,973, 31.7.36).—Cuprammonium solution, after use in washing the gases, is regenerated by ≮2 different degrees of vac., the gas from a later (higher) vac. stage being preferably compressed and admitted to a previous stage; the effect of vac. may be enhanced by presence of inert gases. B. M. V.

Means for removing from gases oxygen or other active gases. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., and P. DUNSHEATH (B.P. 479,914, 14.8.36).—The gas is scrubbed with molten metal that will readily combine with O_2, in an apparatus in which the lifting and subdivision of the metal is not dependent on the movement of the gas. B. M. V.

Production of hydrogen peroxide. MATHIESON ALKALI WORKS, Assees. of J. C. MICHALEK and E. C. SOULE (B.P. 479,994, 23.6.37. U.S., 25.6.36).—Production of H_2O_2 by aërial oxidation of hydrazo compounds in an inflammable solvent is safely effected at such a temp. that the concn. of vapour in the evolved gas is > the upper explosive limit. The oxidation of *p*-hydrazotoluene with O_2 in C_6H_6 at 57°, in C_6H_{14} at 45°, and with air in PhMe at 59°, is described. A. H. C.

(A, B) Production of sulphur dioxide. (C) Reduction of sulphur dioxide. (A, B) T. V. FOWLER and (B, C) H. F. MERRIAM, Assrs. to GEN. CHEM. CO. (U.S.P. 2,066,562, 2,066,774, and 2,066,896, 5.1.37. Appl., [A] 5.12.33, [B] 20.10.33, [C] 31.12.34).—(A) Acid sludge from oil refining is heated with heavy oil under pressure to reduce the H_2SO_4 to SO_2 and carbonise the org. matter in the sludge; the oil is then removed from the coke by distillation. (B) Acid sludge is heated to convert the mixture into a cokey residue and the hydrocarbon vapours in the issuing gas mixture are condensed; the residual gases are passed through an absorbent for the SO_2 and the saturated solvent is then heated to expel the SO_2, which is purified from org. gases by mixing it with air and heating it to >500°. (C) The SO_2 evolved in (A) or (B) is reduced to $S + CO_2 + H_2O$ by mixing it with the non-condensible hydrocarbons produced in the heating of the acid sludge and passing the mixture over a hot catalyst; the issuing gases are used to preheat new quantities of sludge. A. R. P.

Apparatus for extraction, purification, and collection of radium [radon] emanation. T. H. ODDIE (B.P. 479,224, 10.11.36).—Radon and CO_2 associated therewith are frozen while the entrained H_2, O_2, and He remain in the gaseous state and are later removed as completely as possible. A first stage of freezing removes H_2O, org. vapours, and HCl; CO_2 is removed after thawing. The apparatus is a combination of Pb glass and Pyrex, with ground and waxed joints. B. M. V.

[Manufacture of] monocalcium phosphate. VICTOR CHEM. WORKS, Assees. of W. H. KNOX, jun., and R. T. COCHRAN (B.P. 472,815, 24.2.36. U.S., 4.3.35).—See U.S.P. 2,062,064; B., 1938, 270.

Heating granular materials. Atomising melted products. Washing out weak acids from gases.—See I. **CrO_3.**—See X. **Ti pigments.**—See XIII.

VIII.—GLASS; CERAMICS.

Properties of oxygen providers in glasses during melting and purification. C. KÜHL, H. RUDOW, and W. WEYL (Glastech. Ber., 1938, **16**, 37—51).—The appearance of glass in melts of different composition is detected by the onset of fluorescence, Na uranate being added as indicator. By following the CO_2 loss in the same melts it is shown that glass formation takes place at different stages of reaction according to the composition of the melt. The equilibria between As_2O_3 and As_2O_5, Sb_2O_3 and Sb_2O_5, and Cr_2O_3 and CrO_2 and the decomp. of $NaNO_3$, CeO_2, PbO_2, and MnO_2 in glass melts have been followed at temp. up to 1200°. O. D. S.

Variation of the reaction velocity in glass mixtures with the physical condition and chemical composition of the raw materials. III. Relative fusion velocity of glass mixtures with anhydrous borax and with borax containing water of crystallisation. F. H. ZSCHACKE (Glastech. Ber., 1938, **16**, 13—19).—Fusion of mixtures of sand, Na_2CO_3, and borax takes place more rapidly when the borax contains H_2O of crystallisation than when anhyd. O. D. S.

Ruby formation in a damaged glass-furnace stone. W. BÜSSEM and W. WEYL (Glastech. Ber., 1938, **16**, 57—60).—The action of alkaline melts on a sillimanite crucible in presence of Cr oxide led to the formation of Cr-containing corundum (ruby). The formation of ruby in mixtures of Al_2O_3 and Cr_2O_3 is investigated. O. D. S.

Bubbles in glass. L. SPRINGER (Glashütte, 1937, **67**, 785—786, 798—800; 1938, **68**, 79—80).—Bubbles may arise in the melting (from inefficient clearing, from excess of Na_2SO_4, from materials derived from the pot or tank, and from particles of Fe_2O_3), or they may consist of gases entrapped or evolved during working. G. H. C.

New dilatometer for investigation of glass. A. METZ (Glastech. Ber., 1938, **16**, 19—20).—Direct-reading and self-recording dilatometers for the measurement of thermal expansion up to 1200° are described. O. D. S.

Spectral analysis and its use in the investigation of glass and raw materials. Principles and methods. W. GERLACH (Glastech. Ber., 1938, **16**, 1—4).—A general survey. O. D. S.

Use of spectral analysis in glass technology. A. DIETZEL (Glastech. Ber., 1938, **16**, 5—6).—Examples are given. O. D. S.

Use of the flaming arc for glass analysis. W. ROLLWAGEN and E. SCHILZ (Glastech. Ber., 1938, **16**, 6—10).—Spectra obtained in the flaming arc are not complicated by electrode materials. Local analyses can be made without destruction of the specimen. O. D. S.

Semi-quantitative spectral analysis [of glass] by the flaming-arc and spark methods. W. ROLLWAGEN (Glastech. Ber., 1938, **16**, 10—13).—Analyses of glass samples by chemical and the arc and spark methods are compared. It is shown that a semi-quant. analysis can be made by spectroscopic methods. The flaming arc is preferred to the spark except for quantities <1 mg. or when the presence of small traces of spectrally insensitive elements is important. O. D. S.

Spectrographic studies on ancient glass. Egyptian glass, mainly of the eighteenth dynasty, with special reference to its cobalt content. M. FARNSWORTH and P. D. RITCHIE (Tech. Studies, 1938, **6**, Reprint, 155—168).—Blue Egyptian glass of this period contains 0·08—0·20% Co. Pb, Sn, and Sb were present in small quantities in all the glasses examined. The Mn content was 0·05% in a white and 0·5—0·7% in an amethyst glass. O. D. S.

Spectral absorption of neodymium glasses. K. ROSENHAUER and F. WEIDERT (Glastech. Ber., 1938, **16**, 51—57).—The variation in form of the orange Nd band in glasses of different composition has been investigated. The sharpness of the band is determined by the mol. field in the glass. O. D. S.

Safety glass. J. M. DEBELL and J. DAHLE (Mod. Plastics, 1938, **15**, No. 5, 47, 62, 64).—A historical review of the development of safety glass manufacture using cellulose nitrate, cellulose acetate, and vinyl resin plastics as the intermediate layer. F. Mc.K.

Manufacture of shatter- and splinter-proof glass. L. ŠPIRK (Chem. Listy, 1937, **31**, 425—430).—Known methods are reviewed. R. T.

Zinc oxide and zinc-white in the glass and enamel industries. ZSCHACKE (Glashütte, 1938, **68**, 50—51).—The methods of the German ZnO industry are described. The ores are worked up for Pb and Cu; Zn is recovered from the slags by mixing with coke dust and pitch, briquetting, and smelting in a current of air. Some ZnO is made from Zn also. G. H. C.

Enamel calculations. R. ALDINGER (Glashütte, 1937, **67**, 739—742).—The practice of calculating enamel compositions from the mix, using text-book figures for the compositions of the components, and of estimating physical properties from such "analyses" is deprecated. G. H. C.

Arrangements for mixing and fusing [enamels]. C. P. OTTERSBACH (Glashütte, 1937, **67**, 767—770).—Use of well-disposed, modern machinery reduces risk of errors. G. H. C.

Consistency of eight types of vitreous enamel frits at and near firing temperatures. W. N. HARRISON, R. E. STEPHENS, and S. M. SHELTON (J. Res. Nat. Bur. Stand., 1938, **20**, 39—55).—The consistencies of 8 commercial vitreous enamel frits have been studied at 700—1000° with a rotation viscosimeter, the results being expressed as viscosities or apparent viscosities (η). In all cases η varies very rapidly with temp., and in many cases also with the speed of rotation, but the average val. under firing conditions is about 4000 poises. The differences in firing temp. used with different frits, however, are insufficient to equalise their viscosities, and hence an acid-resistant enamel (with high η) generally yields a more wavy surface than "ordinary" enamel. Thixotropic effects are also observed in some cases. J. W. S.

Vitreous or porcelain enamelling. E. L. STINE (Metal Ind., N.Y., 1937, 35, 622—623).—The operations involved, formulæ for the enamels, and colouring are detailed. L. S. T.

Application properties of enamels. H. HADWIGER (Glashütte, 1937, 67, 751—753; 1938, 68, 22—25).—As criteria for keeping const. the working properties of slip, it is proposed to determine the rate of efflux from and the residue remaining on the walls of a cup-type viscosimeter, using successively two efflux nozzles of differing diameters. The *d* of the slip is also required, as it is convenient to measure the vol. of efflux and mass of residue. When the slip is too thick the amount of residue decreases with increasing orifice diameter. G. H. C.

"Soft" glazes of low thermal expansion. R. F. GELLER, E. N. BUNTING, and A. S. CREAMER (J. Res. Nat. Bur. Stand., 1938, 20, 57—66).—Mixtures containing PbO 25—40, B_2O_3 15—30, and SiO_2 40—55% show promise as glazes maturing at <1150° on talcose bodies of relatively low thermal expansion, but their low resistance to weak acids may limit their application to goods which do not come in prolonged contact with food. J. W. S.

Difficulties in enamelling cast iron. H. F. KELLER (Glashütte, 1938, 68, 47—49).—Trouble due to blistering was traced to a high S content in the Fe. Addition of KNO_3 to the enamel overcame the defect. G. H. C.

Control of enamelled sheet- and cast-iron articles. H. LANG (Glashütte, 1938, 68, 127—129).—Methods of testing the impact strength and resistance to boiling, acids, alkalis, weathering, and gases are briefly discussed. J. A. S.

Geology of some British pottery materials. W. O. WILLIAMSON (Trans. Ceram. Soc., 1938, 37, 27—48).—The origin of igneous rocks commonly used as fluxes in pottery manufacture is described. The occurrence and constitution of Cornish stone and felspars are described with illustrative analyses, and it is concluded that, despite the inaccessibility of some of the felspars in the British Isles, the resources are sufficient to merit their being more extensively worked. The sources of possible substitutes for Cornish stone, especially (*a*) white-burning rocks rich in alkali-felspar and (*b*) rocks with CaO-rich felspar but dark-burning, thus combining both fluxing and staining powers, are indicated. The origin of the China and ball clays is described and mention is made of the possibility of finding bentonites among the fuller's earths of this country. A. L. R.

Composition and properties of millstone grits. J. NAVARRO ALCÁCER (Anal. Fís. Quím., 1937, 35, 269—284).—A no. of Spanish grits have been examined and the SiO_2, CaO, Fe_2O_3, and clay contents and the grain size of the sand are recorded. F. R. G.

Properties of clay. F. H. CLEWS, H. H. MACEY, and G. R. RIGBY (Chem. and Ind., 1938, 221—227).—The present knowledge of the constitution of the clay minerals and of the drying, plasticity, colloidal nature of, and action of heat on clays is briefly reviewed. J. A. S.

White-burning Schletta pitchstone kaolins and clays. A. LAUBENHEIMER and H. LEHMANN (Ber. Deut. Keram. Ges., 1937, 18, 531—538).—The nature and properties of the Schletta clays are compared with those of Kemmlitz and Löthain kaolins, special reference being made to the parent rocks (pitchstone, Rochlitz and Dobritz quartz porphyrys, respectively). Full physical, chemical, and ceramic examinations are described. J. A. S.

Chemical analyses of china clays and other ceramic raw materials in 1791. E. BUBLITZ (Ber. Deut. Keram. Ges., 1937, 18, 444—449).—Extracts from the records of the Berlin State Porcelain Factory illustrate the early attempts to determine rational analyses and the difficulties (*e.g.*, with impurities in the reagents) which had to be overcome. J. A. S.

Impact bending strength of ceramic bodies and glasses and its relationship to the resistance to thermal shock. O. BARTSCH (Ber. Deut. Keram. Ges., 1937, 18, 465—489).—The results of extensive tests are described. The order of decreasing impact bending strength (*S*) was: glasses, stoneware and porcelain, earthenware, fireclay ware. The *S* of fireclay bodies with normal grain size increases with firing temp. to a max. at 1000°, then decreases, and finally increases again at higher temp., and only very fine-grained bodies fail to show the decrease. The effect of thermal shock on the *S* of clay bodies was greatly dependent on the sp. thermal expansion, *d*, grain size, and firing temp. For bodies fired at >1200° the *S* decreased rapidly with rise in firing temp., but for bodies fired at <1200° the relationship was more complicated. The methods of measuring the resistance to thermal shock by (1) repeated quenching until fracture occurs (using a whole brick, a cylinder, or a strip test-piece) and (2) measuring the decrease in *S* after, *e.g.*, 3 quenchings were compared for 14 clay bodies. The two types of measurement did not give consistent results. J. A. S.

Most important processes for sealing ceramic materials to metal and glass. H. HANDREK (Ber., Deut. Keram. Ges., 1937, 18, 539—548).—Joints to metals can be made by rivetting etc., shrinking-on, or soldering to Ag films fired to the ceramic material. The theory and practice of sealing ceramic materials to glass are described, with special reference to the vac.-tight joints in thermionic valves and similar apparatus. J. A. S.

Talc porcelain. XIII. Thermal conductivity. S. KONDO and S. SUZUKI (J. Soc. Chem. Ind. Japan, 1938, 41, 35B; cf. B., 1938, 373).—Measurements were made on 13 bodies (free from alkali oxides) at 50—350°. The *k* increased with decrease in SiO_2 and increase in Al_2O_3 and MgO contents, and with rise of temp. Those bodies having the lower temp. coeff. of resistance usually have the greater temp. coeff. of *k*. J. A. S.

Determination of the amount of barium carbonate necessary to produce bricks of sound colour. MARSCHNER (Tonind.-Ztg., 1938, 62, 242—243).—The amount of sol. SO_4'' gives a correct indication of the amount of Ba required in the brick. A practical procedure is to weigh 100 g. of clay (or less

if the SO_4'' content be high) into each of a series of flasks, suspend it in H_2O, and add increasing amounts of $BaCl_2$ solution to each successive flask. After shaking and setting aside for 12 hr., each is filtered and tested for excess of Ba with H_2SO_4. A suitable solution contains 10 g. of $BaCl_2,2H_2O$ per l. and 24 gm. of $AlCl_3$, which latter hinders adsorption of the excess of Ba. G. H. C.

Properties of bricks and their most effective utilisation. H. HECHT (Tonind.-Ztg., 1938, **62**, 207—212).—Strength, H_2O absorption, air- and H_2O-permeability, capillary attraction, tendency to show efflorescence, and the thermal conductivity of typical common bricks, light-weight and honeycombed bricks, engineering bricks, and clinkers are tabulated. G. H. C.

Measurements in brick drying sheds. W. RUF (Tonind.-Ztg., 1938, **62**, 233—234).—The amount of H_2O which can be evaporated depends on the temp. and the amount and initial H_2O content of the ingoing air. Allowance must be made for the fall of temp. during passage due to latent heat and losses, otherwise deposition of H_2O may occur in places. Self-recording instruments assist in controlling these factors. G. H. C.

Dryers for roofing tiles. T. A. GOSKAR (Trans. Ceram. Soc., 1938, **37**, 62—73).—The principles and practical details of operating the dryers on waste heat from cooling kilns are discussed. A. L. R.

Refractory trends and developments [in the United States] in 1937. J. D. SULLIVAN (Blast Furn. Steel Plant, 1938, **26**, 64—67, 98; Heat Treat. Forg., 1938, **24**, 39—42).—A review. R. B. C.

Sintered magnesite. III. Sintering processes in magnesites with unequal distribution of the constituents. K. KONOPICKY (Ber. Deut. Keram. Ges., 1937, **18**, 419—427; cf. B., 1937, 1051).—A series of raw magnesites were coated in the lump form with various fluxing materials (CaO, Fe_2O_3, SiO_2, slag, etc.) and calcined at cone 17—18. Only those materials rich in $2CaO,Fe_2O_3$ and poor in SiO_2 caused a good sintering throughout the magnesite lumps. This result is in agreement with the observations that raw magnesites sinter well only if their ground-mixture consists of an isomorphous mixture of the carbonates of Mg, Fe, and Ca, and that the sintering behaviour of a magnesite is affected only slightly by the presence of macroscopic pockets or seams of SiO_2, MgO,SiO_2, $MgCO_3,CaCO_3$, etc. which do not themselves sinter. Such unsintered impurities may be removed from the crushed sinter by suitable (*e.g.*, magnetic) physical treatment. J. A. S.

Volumetric analysis of silica brick and quartzites. M. VOLINETZ (Ukrain. Chem. J., 1937, **12**, 507—515).—Analytical procedures involving known methods are described. R. T.

Acceptance tests on refractories. R. RASCH (Chem.-Ztg., 1938, **62**, 193—196).—Firebricks should be tested for size, and a proportion should be cut to ascertain that the texture is suitable and free from foliation, cracks or cavities caused by air, foreign bodies, moisture pockets, or shrinkage in drying or firing. Cracks are sometimes concealed by smearing with clay or Na silicate. The latter is readily rendered visible by phenolphthalein. The chemical composition should also be checked, and this should include tests on the raw materials. G. H. C.

Basic refractories, with particular reference to their use in the lining of induction furnaces. C. BOOTH and W. J. REES (Iron and Steel Inst. Carnegie Schol. Mem., 1937, **26**, 57—122).—Additions of cordierite ($2MgO,2Al_2O_3,5SiO_2$), up to 25%, to dead-burnt magnesite lower the firing shrinkage, thermal expansion, and refractoriness-under-load, and increase the porosity, but have little effect on spalling. The ternary diagram for Al_2O_3–MgO–SiO_2 is of little val. in interpreting microstructure, as equilibrium conditions are never attained. The best bonds for electrically fused magnesite are CaF_2 and $Ca_3(PO_4)_2$. Increasing the moulding pressure reduces the firing shrinkage, porosity, permeability, and thermal sensitivity and increases considerably the green strength and refractoriness-under-load. S. J. K.

Mechanically supported refractories for industrial heating furnaces. ANON. (Indust. Heating, 1937, **4**, 916—922, 1007—1010, 1103—1108).—Various designs of refractory arches and suspended walls are described. R. B. C.

Boiler furnaces. Flocculation.—See I. **Enamelling Fe. Baking enamel on automobile frames.**—See X. **Insulation resistance of ceramic materials.**—See XI.

See also A., I, 180, **Structure of glasses.** 218, **Identification of gems. Production of synthetic gems.**

PATENTS.

Kilns. SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 478,879, 21.7.36. Ger., 10.6.36).—A muffle or electric furnace with a curtain of protective gas across the opening is provided with automatic valves to turn on the gas and bring the nozzles in the operative position only when the door is opened. B. M. V.

Rotary kilns. M. VOGEL-JØRGENSEN (B.P. 479,459, 6.8.36).—The kiln is fired by an axial flame from the lower end, secondary air being admitted through the cylindrical wall through apertures provided with automatic dampers which reduce or stop admission of air near the surface of the material. The secondary air is preheated by the clinker in planetary cooling tubes attached to the outlet end. B. M. V.

Tempering of glass. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (B.P. 479,878, 14.8.36. Fr., 5.9.35).—Casings suitable for applying cooling medium at different intensity to different parts and shaped to be closer to the glass article at some parts than at others are described. The objects are to vary the temper at different parts and to treat articles of non-uniform thickness. B. M. V.

Manufacture of tempered glass. C. T. PUGH and W. ASH (B.P. 478,811, 15.11.37).—The sheet is heated to the plastic state and then quenched by air in two stages, the air pressure at first being <2 lb./sq. in. until the glass is hardened (0·33 lb./sq. in./4

sec. or 1·5 lb./sq. in./1 sec.) and afterwards increased to any desired extent. B. M. V.

Tempered glass articles. CORNING GLASS WORKS, Assees. of J. T. LITTLETON, W. W. SHAVER, and H. R. LILLIE (B.P. 479,173, 30.6.36. U.S., 24.9.35).—For cooking utensils and the like the glass has annealing temp. (in 3 separate claims) $\nless$540°, 585°, and 630°, and softening temp. $\nless$260°, 240°, and 240°. It contains $\nless$10 or 15% of Al_2O_3, $\ngtr$2% of alkali, and $\nless$10% of alkaline-earth oxides. The coeff. of expansion is $<6{\cdot}5$ (or $<4{\cdot}5$) $\times 10^{-6}$. The glass is tempered in a bath of molten inorg. salts to just short of explosive fracture, *i.e.*, to a max. tension of 2—3 kg./sq. mm. B. M. V.

Stabilising annealed glass articles, particularly thermometers. CORNING GLASS WORKS (B.P. 479,631, 24.12.36. U.S., 30.12.35).—The glass is held for a relatively short time at a temp. substantially > the max. temp. of use but < the strain temp. In the case of a thermometer made of two glasses, the softer stem is supported against deformation and a temp. near the strain point of the hard bulb is maintained for a short time, then a falling temp. for longer periods; it is then heated for a short time near the strain point of the softer glass, and for still longer periods at lower temp. B. M. V.

Manufacture of enamelled product. O. E. HARDER and J. D. SULLIVAN, Assrs. to BATTELLE MEMORIAL INST. (U.S.P. 2,070,272, 9.2.37. Appl., 8.8.34).—A pptn.-hardenable alloy is coated with enamel at a temp. > the m.p. of the enamel and high enough to keep the constituents of the alloy in complete solid solution. The coated article is cooled rapidly to room temp. and then reheated to produce hardening of the alloy. When max. hardness is not necessary the maturing temp. of the enamel may be matched to the pptn.-hardening temp. of the alloy and one heating will suffice. B. M. V.

Method for enamelling tanks. W. G. MARTIN, Assr. to A. O. SMITH CORP. (U.S.P. 2,070,368, 9.2.37. Appl., 8.6.35).—Vitreous enamel is applied to the interior of a tank after it has been heated to produce a coating of oxide; prior to raising the temp. to the m.p. of the enamel the air is forced out by introduction of solid CO_2 and the internal pressure is maintained at >1 atm. during the fusing and setting. B. M. V.

Purification of natural deposits [sands or clays]. R. W. FLINN (U.S.P. 2,070,161, 9.2.37. Appl., 21.1.35).—The material, *e.g.*, SiO_2 sand for glass-making purposes, is passed continuously through, and agitated in, an oven in presence of a continuous stream of Cl_2 gas. A heat gradient is maintained and the exhaust gases from different zones of temp. are removed separately. B. M. V.

De-airing and degassing ceramic bodies. GEWERKSCHAFT KERAMCHEMIE-BERGGARTEN (B.P. 479,157, 2.12.36. Ger., 7.12.35).—After shaping, the plastic mass is subjected to vac. and afterwards to rapidly increased pressure ($\nless$1 atm.). B. M. V.

Ceramic bodies, in particular for use as insulators for spark-plugs. GEN. MOTORS CORP. (B.P. 479,124, 27.6.36. U.S., 27.6.35 and 22.5.36).—The material is free from quartz and contains $\ngtr$ a trace of alkali; it comprises a mixture of finely-ground materials, containing Al_2O_3 85—99 and SiO_2 15—1% (corundum 46—96, mullite 53—3%), sintered to a dense (apparent $d \sim 3{\cdot}75$) non-porous mass at Seger cone 30—35. No bond or void filler is incorporated, but the material may be highly compressed before fritting. B. M. V.

Connexion between ceramic bodies and metals. R. SCHARFNAGEL (B.P. 479,084, 27.7.36. Ger., 25.7.35, 2.4. and 8.7.36).—The two bodies are arranged in their final relative position and a connecting metal is melted in the joint, the whole being preheated to near the m.p. of the connecting metal and the latter alone, or it and the metallic body, being further heated by high-frequency induction. Examples of connecting alloys claimed are: Ag 65, Cu 25, Fe 10%; Ag 75—80, Cu 25—20%; Ag 15, Cu 80, Be 5%; Ag with 2—25% Cd and optionally Cu and/or Fe. The alloy is preferably formed by melting in vac. B. M. V.

Manufacture of abrasive articles. NORTON GRINDING WHEEL CO., LTD. From NORTON CO. (B.P. 479,703 and 479,789—90, 15.12.36).—Diamond, BC, or other grains of hardness >13 Moh are bonded with: (A) powdered metal (Al 40, Si 60%) of m.p. $\ngtr$1400°, the whole being subjected to heat and pressure; (B) an alloy selected to have d 4·0—3·0, which may be used molten, *e.g.*, Cu 38, Al 62%, Mg, Si, and Zn also being claimed as suitable constituents; (C) a brittle alloy comprising Cu with Sn, Ni, Al, Mn, and/or Be. B. M. V.

Manufacture of [flexible] abrasive articles. CARBORUNDUM CO. (B.P. 479,767, 10.8.36. U.S., 5.9.35).—A single layer of grains is partly embedded in a self-supporting or reinforced sheet of bonding material of thickness < the major diameter of the grains. The bond is preferably applied as a solution to a temporary support, grains are added, and combination is set by heat and removed from the support. B. M. V.

Preparation of grinding or polishing tools. E. ETHEL and O. SUSSENGUTH, Assrs. to BAKELITE CORP. (U.S.P. 2,070,158, 9.2.37. Appl., 4.6.31. Ger., 17.6.30).—Abrasive grains are formed into a mouldable composition with a solution of resin in the *B*-state, the resin being of the urea–aldehyde or polybasic acid–polyhydric alcohol type, a phenol–aldehyde resin being also present if desired. B. M. V.

Method of balancing a grinding wheel. C. J. HUDSON, Assr. to NORTON CO. (U.S.P. 2,070,360, 9.2.37. Appl., 9.12.36).—An aq. suspension of finely-pulverised mineral with a wetting agent is introduced into the pores on the light side of the wheel. B. M. V.

Chequer-brick assemblies for furnace regenerators. OPEN HEARTH COMBUSTION CO. (B.P. 479,125, 29.6.36. U.S., 2.3.36).

Production of [glass etc.] threads. THERMOLUX GLASS CO., LTD. (B.P. 482,021, 25.3.37. It., 23.12.36).

Furnace for enamelled Fe.—See I.

IX.—BUILDING MATERIALS.

Coal-dust sprayer for rotary [cement] kilns. E. O. Chodorov (Bull. Union Res. Inst. Cement, U.S.S.R., 1937, No. 2, 10—40).—Laboratory tests and experimental work on the design of a suitable coal-dust sprayer are discussed. Various designs are illustrated and a sprayer which is to be tested under large-scale conditions is described. D. G.

Production of puzzuolana Portland cement at the Komsomoletz factory. P. P. Gorski (Bull. Union Res. Inst. Cement, U.S.S.R., 1937, No. 2, 41—52).—Particulars of the manufacture of puzzuolana cement from clinker and trepel (a local puzzuolanic material available in enormous quantity on the banks of the Volga) are given. Methods of quarrying and grinding trepel are described and the properties of the cement are given. D. G.

Magnesia in Portland cement. VII. Effect of magnesia on preparation of calcium silicates. Y. Sanada (J. Soc. Chem. Ind. Japan, 1938, **41**, 10B; cf. B., 1938, 377).—Synthetic cements containing CaO, SiO_2, and MgO were prepared. According to the composition, the reactions in burning were: $CaCO_3 + SiO_2 + 2MgO \rightarrow CaO,SiO_2,MgO + MgO$; $2CaCO_3 + SiO_2 + MgO \rightarrow 2CaO,SiO_2 + MgO$; $3CaCO_3 + SiO_2 + 2MgO \rightarrow 2CaO,SiO_2 + CaO + 2MgO$. In cements, when the ratio $CaO : SiO_2$ is >2, the MgO is uncombined. T. W. P.

Magnesia in Portland cement. VIII. Raw mixtures of high-magnesia cement. Y. Sanada (J. Soc. Chem. Ind. Japan, 1938, **41**, 36B; cf. preceding abstract).—Mixtures of SiO_2, Al_2O_3, Fe_2O_3, CaO, and MgO were calcined at 800—1400° for 2 hr. The clinkers contained free MgO, but no free CaO, after calcination at 1400°. J. A. S.

Approximate glass content of commercial Portland cement clinker. W. Lerch (J. Res. Nat. Bur. Stand., 1938, **20**, 77—81).—The glass content of 21 samples of clinker, determined by the heat of dissolution method (Concrete, 1937, **45**, 199), varied from 2 to 21%. Laboratory heat-treatment of the clinker shows that the highest glass content is obtained from the rapidly cooled material, which also has the highest content of sol. MgO. J. W. S.

Effect of certain mineralising substances on synthesis of calcium aluminates and aluminoferrites. N. A. Toropov and T. M. Diuko (Bull. Union Res. Inst. Cement, U.S.S.R., 1937, No. 2, 3—9).—The possibility of adding small quantities of substances which strongly promote the formation of compounds required in clinkers is investigated. Tests showing the favourable effects of additions of mineral borate, obtained from the newly discovered deposits in the Inder region, on the formation of CaO,Al_2O_3, $4CaO,Al_2O_3,Fe_2O_3$, and $5CaO,3Al_2O_3$ are described. Graphs and tables are given. D. G.

Quick-setting and heat-evolving cements. IV. K. Akiyama (J. Soc. Chem. Ind. Japan, 1938, **41**, 5—6B; cf. B., 1938, 378).—Four series of cements having CaO contents of 40, 50, 60, and 70%, respectively, were prepared. In each series cements were made having $SiO_2 : Al_2O_3$ ratios varying from 0 to 1·0. Cements of the first series gave progressively shorter setting times as $SiO_2 : Al_2O_3$ was reduced, and also higher strength vals. in the region $SiO_2 : Al_2O_3 = 0·33—0$. Data on the other series are given. T. W. P.

Setting of hydraulic cements. V. Rodt (Tonind.-Ztg., 1938, **62**, 188—190).—A CaO mortar does not set if loss of H_2O is prevented. When moist $Ca(OH)_2$ is dried it retains a considerable amount of H_2O even in an atm. of low humidity, whilst at high humidity the excess is >1 mol. Truly hydraulic cements, which set even in presence of excess of H_2O, do not show this behaviour. G. H. C.

Automatic calorimeter for determining the heat of hardening of cements. D. C. Avdalian (Bull. Union Res. Inst. Cement, U.S.S.R., 1937, No. 2, 89—92).—The apparatus is described and illustrated. D. G.

Cements for oil wells. A. Rainu (Ciment si Beton, 1937, **5**, 1; Zement, 1938, **27**, 49).—High-Al_2O_3 cements are desirable owing to their greater tolerance of excess of gauging H_2O. A special product for the purpose has an Al_2O_3 modulus of 2·82 and a SiO_2 modulus of 2·53. G. H. C.

Celite. VI, VII. Preparation, and testing, of cements with iron modulus 0·5—0·3. Y. Sanada (J. Soc. Chem. Ind. Japan, 1938, **41**, 8—9B; cf. B., 1938, 377).—VI. Synthetic cements were prepared in which the ratio $Al_2O_3 : Fe_2O_3$ was decreased from 0·5 to 0·3. The formation of clinker became easier with the decrease and the celite content increased.

VII. The properties of the resulting cements showed that the resistance to chemical attack by SO_4'' was better than that of ordinary Portlands. With decrease in the $Al_2O_3 : Fe_2O_3$ ratio the setting time was accelerated and the strength reduced. T. W. P.

Use of cements, mortars, and concretes for marine works. II, III. P. Dumesnil (Rev. Mat. Constr., 1937, 221—229, 241—247; cf. B., 1937, 442).—II. Various factors affecting the suitability of concretes for marine structures, including the use of fresh or sea-H_2O for mixing, fineness of the cement and compactness of the concrete, the effects of the addition of trass on tensile and compressional strengths, and the problem of producing better resistance by the incorporation of H_2O-repellent substances, are discussed. Theories on the internal physical nature of freshly prepared concrete and accelerated hardening by application of pressure are considered.

III. The construction of new harbour works at La Rochelle-Pallice (France) is described. R. J. W. R.

Recent work in the U.S.S.R. on corrosion and protection of cement and concrete. M. von Pohl (Korros. u. Metallschutz, 1937, **13**, 417—424).—A colloquium of the Russian Academy of Sciences. *Action of aggressive waters on concrete and the evaluation of aggressiveness.* I. E. Orlov. CO_2 is the most active agent; rate of attack $\propto [CO_2]^2$. During the construction of the Moscow underground railway it was observed that aggressiveness was $\propto$ salinity. *Corrosion research.* V. M. Moskvin. The reaction of $CaSO_4$ with Ca aluminates ceases in presence of Ca

or Mg salts (>600 mg./litre) even with high $[SO_4]$. *Corrosion of concrete by aggressive water or impure gauging-water.* B. A. KUVIKIN and P. N. LEVTONOV. The amounts of CaO lost by puzzuolana cement and by Portland cement + 10% of tripoli on exposure to solutions of $MgSO_4$, $MgSO_4 + CO_2$, and $MgCl_2 + Na_2SO_4$ were appreciably < that lost by pure Portland cement at an age of 18 days, and considerably less at 90 days. Presence of CO_2 slows the initial rate of loss of CaO, but accelerates it later. Concrete made with distilled H_2O was less resistant than that made with an artificially impure H_2O containing S'', SO_4'', $NH_4^{\cdot}$, NO_3', and Cl'. *Corrosion of concrete in water.* V. A. KIND. CaO can be dissolved from concrete by H_2O which is free from aggressive salts. Presence of puzzuolana hinders this. *Activity of puzzuolanas.* P. P. BUDNIKOV. Activities were measured colorimetrically and from electrical conductivities. The most efficient contained a high proportion of colloidal matter. *Additions to cement for dam construction.* V. P. NEKRASSOV. Cement is not deemed ready for use if any special materials have to be added when it is gauged. *Use of a protective shell of reinforced precast slabs for dams.* V. P. NEKRASSOV. Reinforced watertight slabs with a slag aggregate are used. *Salt-resistance of cement.* L. S. KOGAN. A new testing procedure indicates that puzzuolana cements are more resistant than is Portland cement. *Gas-permeability of concrete in relation to corrosion.* S. I. IDASCHKIN. Easily permeable concrete is more readily attacked, *e.g.*, by SO_3 in the air. Hardeners, *e.g.*, $CaCl_2$, or a surface coating of acidproof cement prevents this. *Corrosion of reinforced concrete.* I. A. ALEXANDROV. The steel should be free from rust and scale, and the p_H of the concrete should be kept high. The aggregate should be dense and excess of cement must be avoided. All aggregate should be washed with clean H_2O. Concrete must be placed mechanically, not poured, and the H_2O content must be watched during setting. *Effect of biological factors on the resistance of concrete to sea-water.* A. A. SADOVSKI. Plant growths cause formation of protective carbonate films, whilst animal growths destroy them. Biological processes may cause extensive and destructive p_H changes. *Resistance of concrete to surface cracking.* J. A. NIELANDER. Cracking may be due to bad placing, incorrect temp. or moisture conditions, or incorrect proportioning. It is rare in plastic concrete. *Use of puzzuolana cements on the Svir hydroelectric plant.* N. F. CHOZALOV. Very dense concrete was used. *Concreting in winter.* I. A. KIRJENKO. The H_2O–cement ratio must be watched. *Draft limits for impurity of water.* B. G. SKRAMTAEV. Tables given indicate that H_2O may be considered dangerous in contact with concrete when the CO_2 content exceeds specified limits for given hardness and $SO_4'' + Cl'$ content. For mixing or damping concrete it is suggested that the p_H should be >4 and the $[SO_4]$ <1500 mg./litre, excepting for use indoors, in hot climates, or with high-Al_2O_3 cements. *Attack of concrete by CO_2.* M. I. SUBBOTKIN. The attack is due to H ions, and the term "aggressive CO_2" is applied to that present as H_2CO_3, as distinct from free CO_2 or CO_3''. Protection may be obtained by: interposition of a carbonate layer to regulate the p_H of the H_2O reaching the concrete; use of special cements, *e.g.*, slag cement etc., or by concrete of high density, *e.g.*, vibrated, or containing hardeners or waterproofers. *Building materials and their applicability to concrete under water.* P. FILOSOFOV. The strength of various cements was tested after varying periods of immersion in 16% $MgCl_2$ and Na_2SO_4 solutions. Most Portland cement mortars and concretes lost strength under these conditions, but when 10% of tripoli was added to a 3 : 1 sand–cement mortar the strength continued to increase. Slag and puzzuolana cements also strengthened. *Aggressive CO_2 in sea-water.* A. A. SADOVSKI. Practical tests on concrete with sea-H_2O from three localities demonstrated the destructive action of CO_2. *Protection of a concrete structure against aggressive water in the Kanakir hydroelectric plant.* G. A. MEYER. Practical protection was obtained by coating ordinary concrete with a Na silicate cement. *Practical case of chemical attack of concrete.* I. W. WOLF. A reinforced concrete coke-washing tower was disintegrated by $(NH_4)_2SO_4$ and SO_2 from the coke, and by the mechanical stresses imposed by spraying H_2O on to incandescent coke. G. H. C.

Titrimetric determination of gypsum in cement. H. SCHALTEGGER (Helv. Chim. Acta, 1938, **21**, 180—185).—1 g. of powdered cement and 1 g. of $(NH_4)_2CO_3$ are heated with 10 c.c. of H_2O until NH_3 ceases to be evolved. The liquid is decanted through a filter and the residue twice treated with 1 g. of $(NH_4)_2CO_3$ as before. The residues are washed with hot H_2O and the filtrate is neutralised with HCl, using bromophenol-blue, and the vol. adjusted to 50 c.c. To 5 c.c. of this solution are added 2 c.c. of a benzidine–HCl solution and 2—3 c.c. of 60% $COMe_2$, and the mixture is centrifuged. The ppt. of benzidine sulphate is washed with 60% $COMe_2$, warmed with 2—3 c.c. of H_2O, and titrated with 0·025N-NaOH, using phenol-red. 1 c.c. of 0·025N-NaOH = 1 mg. of SO_3. C. R. H.

Determination of the granulometric composition of the fine fraction of cement by Robinson's method. V. N. DOMINIKOVSKI and I. I. IVANOVA (Zavod. Lab., 1937, **6**, 1251—1253).—The method is applicable to cement. R. T.

Effect of time of storage of cement on its physico-chemical properties. M. S. KUROTZAPOV (Bull. Union Res. Inst. Cement, U.S.S.R., 1937, No. 2, 85—88).—21 different kinds of Russian cement were tested (*a*) on receipt at the warehouse, (*b*) after 2 months' storage, (*c*) after 6 months' storage. The results of the tests are tabulated. D. G.

Standard tests and the strength of concrete. A. GESSNER and A. FRANK (Zement, 1938, **27**, 97—100).—From comparisons, made on 9 cements of all classes, between the Czechoslovak and Swiss standard methods and Hagermann's procedure, the last is chosen as the best. G. H. C.

Crust formation on masonry. A. SCHMÖLZER (Korros. u. Metallschutz, 1937, **13**, 409—417).—On sandstones the crusts are rich in $CaSO_4$, formed by action of atm. SO_3 on Ca salts leached from the stone. Snow facilitates the process by collecting

SO_3 over a period, then passing into the stone when it melts. Since the *d* and thermal expansion of $CaSO_4$ differ from those of the stone, the surface crust is unstable. The outer layer found on granite is practically free from salts and is formed by physical processes (frost-cracking etc.). G. H. C.

X-Ray study of tricalcium silicate. W. JANDER and J. WUHRER (Zement, 1938, 27, 73—76, 86—88).—In order to study small deformations of the lattices, the technique of Straumanis and Ievinš (A., 1936, 181, 273) was used. On heating 1 mol. of γ-$2CaO,SiO_2$ (I) with 0·2 mol. of $CaCO_3$ at 1380°, no CaO was detectable after 15 min., but (I) was visible. After longer periods only β-$2CaO,SiO_2$ (II) was observed. $3CaO,SiO_2$ (III) was never found, and it is believed that it dissolved in and stabilised the (II). With 1 mol. of (I) + 0·5 mol. of $CaCO_3$, (III) was observed in ½ hr., but its rings were perceptibly smaller than for the pure substance, and with a 1 : 1 mixture the rings were small after short periods of heating but became normal after a longer time. (III) can probably take $2CaO,SiO_2$ into solid solution; at temp. < the eutectic these reactions may proceed by this means. On heating 9 mols. of $CaCO_3$ with 1 mol. of kaolin at 1350°, $2CaO,SiO_2$ was the only compound appearing after ½ hr.; CaO did not disappear before 2½ hr. The lines of $3CaO,Al_2O_3$ (IV) appeared early but faded somewhat as the heating was prolonged. In a mixture of (I) + CaO + Al_2O_3, (IV) was formed rapidly, before $2CaO,SiO_2$ had disappeared, but it faded as the lines of (III) grew in intensity. It is probable that (IV) dissolves in solid (III) but not in $2CaO,SiO_2$. G. H. C.

Utilisation of by-product gypsum as plaster. I. S. NAGAI (J. Soc. Chem. Ind. Japan, 1938, 41, 7—8B).—$CaSO_4$ is obtained as a by-product in the manufacture of HF from CaF_2, of H_3PO_4 from $Ca_3(PO_4)_2$, of chromate and dichromate from chrome ore, and in the dyestuff industry. Preliminary burning tests on these and natural products showed that the best method was to calcine at 800° with 2% of alum, or to use 2% alum solution for gauging. T. W. P.

Utilisation of by-product gypsum as plaster. II. S. NAGAI (J. Soc. Chem. Ind. Japan, 1938, 41, 30B; cf. preceding abstract).—Unsuccessful attempts were made to convert $CaSO_4$ (from production of HF from CaF_2) into $CaSO_4,0·5H_2O$ (I) by treatment with dil. solutions of various sulphates. $CaSO_4$ derived from the decomp. of phosphate rock and calcined at 400° for 1 hr. was converted into (I) by treatment for 1—2 days with a solution of 5—15% of H_2SO_4 + 0·5—1% of $KHSO_4$ or alum. Physical tests on various commercial plasters are described. J. A. S.

Setting of calcium sulphate plasters. J. S. DUNN (Chem. & Ind., 1938, 144—148).—$CaSO_4,0·5H_2O$ probably does not exist as a sp. compound, but there may be a zeolitic series with $3CaSO_4,2H_2O$ (subhydrate) and $CaSO_4$ (sol. anhydrite) as end members. Crystallographic, solubility, and v.-p. data are given for $CaSO_4,2H_2O$, $3CaSO_4,2H_2O$, and $CaSO_4$. The rate of hydration of subhydrate follows the equation $dx/dt = K(a - x)x$ (where *a* is the initial amount of plaster, and the amount changed in time *t* is *x*). The K salts of citric, malic, succinic, and acetic acids retard setting of subhydrate by retarding nucleus formation and modifying the habit of $CaSO_4,2H_2O$ formation; borax retards by reducing the max. [$CaSO_4$]; keratin retards by a combination of both of these. The setting of anhydrite with accelerators follows a unimol. law. Two-component catalysts act specifically in promoting growth of different crystal faces. The mechanism of the reaction is discussed. T. W. P.

Strength, water absorption, and resistance to freezing and thawing of sand-lime brick. J. W. MCBURNEY and A. R. EBERLE (J. Res. Nat. Bur. Stand., 1938, 20, 67—76).—The compressive and transverse strengths, H_2O absorption, and penetrability have been determined for various specimens of sand-lime bricks, both before and after 50 cycles of freezing and thawing. It is concluded that resistance to this treatment can be estimated by the strength when the bricks are sound, of compact structure, reasonably uniform in shape, and free from cracks, warpage, large pebbles, balls of clay, or particles of CaO. J. W. S.

Problems connected with porous building materials. D. R. G. BONNELL (Chem. and Ind., 1938, 195—198).—Attention is drawn to the effect of the shape of the pore space on the movement of moisture in building materials. The results of freezing of, crystallisation of salts from, and linear variations in relation to, the moisture contained in the pores are discussed, with illustrations. F. J. B.

Rendering slippery asphalt road surfaces non-skid. H. ROSENBAUM (Bitumen, 1937, 7, 210—211; Road Abs., 1938, 5, No. 105).—Three methods are described: covering with a non-skid mastic; surface-dressing with bitumen emulsion and basalt chippings on a cleaned surface; and surface-dressing with hot bitumen with a light dressing of bitumen-coated chippings. The special features of each are outlined. T. W. P.

Chemistry of wood. R. ESCOURROU (Bull. Inst. Pin, 1938, 18—22).—A lecture.

Water- and wax-stains [for wood]. F. OHL (Seifens.-Ztg., 1938, 65, 48—49, 65—66).—The use of wetting agents in simple aq. dye solutions and the composition of emulsion wax stains are briefly discussed. E. L.

Electrical determination of moisture in wood. P. M. PFLIER (Siemens Z., 1937, 17, 541—545).—The method is based on the fact that the ϵ of wood decreases and its resistivity increases with increasing H_2O content. An improved type of apparatus is described. R. B. C.

Heat transmission through walls.—See I. **Electrical pptn. of gases.**—See XI. **Painting cement and plaster. Synthetic plastics in cement industry. Paint for roads. Laminated wood veneer.**—See XIII.

See also A., I, 197, **Celite. Systems $3CaO,Al_2O_3$–$2CaO,Fe_2O_3$ and $NaAlSiO_4$–FeO–SiO_2.** 207, **β-Meta-alite.**

PATENTS.

Preparation of porous plates from cement and fibrous material on board-making machines. G. SCHLESS (B.P. 479,273, 30.7.37. Ger., 22.8. and 24.10.36).—A raising agent, *e.g.*, Al powder, is sieved or blown on to the felt band prior to the forming roller, preferably at intervals so that alternate layers of dense and porous materials are formed. B. M. V.

Production of aërated cementitious compositions and articles. C. G. F. CAVADINO, and GYPROC PRODUCTS, LTD. (B.P. 480,113, 18.8.36).—O_2 is evolved in the mortar to be aërated. Methods claimed are: (*a*) addition first of BaO_2 and MnO_2 to the cement, and then CrO_3 in dil. HCl, with stirring; (*b*) making solutions of BaO_2 in dil. HCl and of CrO_3 and $MnSO_4$ in dil. HCl and adding these separately to the mortar. T. W. P.

Waterproofing composition [for concrete etc.]. E. B. PECK, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,058,821, 27.10.36. Appl., 27.12.33).—The composition consists of a H_2O-sol. sulphonic compound capable of forming insol. reaction products with the surface to be treated. The compounds are derived from petroleum and may be the acid or the NH_4 salt. They are brushed on to cement or concrete surfaces to waterproof them. T. W. P.

Treatment of organic fibrous materials for manufacture of light-weight concrete. W. LISCHER and E. SPERLE (B.P. 480,740, 21.7.37).—The fibre particles are coated with loam and clay, CaO is added, and the mixture made up into concrete with cement, or cement and sand. Various methods of mixing are claimed. Addition of the loam reduces the amount of cement necessary for binding. T. W. P.

Manufacture of porous building materials. J. I. SKOUGAARD (B.P. 480,154, 14.5.37).—A method of prep. is claimed in which cement, one or more H_2O-absorbing materials, sand or gravel or other inert filler, and excess of H_2O are mixed, stirred, and moulded, and an insol. soap is introduced into the mortar. Accelerators (*e.g.*, $CaCl_2$) may also be added. The products have a low *d* and are highly waterproof. T. W. P.

Preparation of porous building materials. NAT. GYPSUM CO. (B.P. 478,832, 21.9.36. U.S., 20.9.35).—In the manufacture of bloated plaster board, plaster mixed with H_2O (and fibrous matter, if desired) is moved in a thin layer below a stream of aq. H_2O_2 issuing under a const. head through a predetermined metering orifice, the exit jet being oscillated. B. M. V.

Manufacture of artificial slabs, insulating layers, panels, and sheets for building and other constructional purposes and the like. J. C. VAN DER LINDEN, jun. (B.P. 478,772, 25.1.37).—Apparatus for soaking and draining fibres and feeding them to a concrete mixer is described. B. M. V.

Wall-plaster composition. G. WITTY, Assr. to S. N. EBEN, R. J. SCANLAN, and J. M. MUNDY (U.S.P. 2,070,036, 9.2.37. Appl., 28.4.36).—A plaster is composed of alkali waste 100, blast-furnace slag 50, calcined dolomite 25, $CaSO_4$ 10, felspar 7, vegetable fibre 3, K_2SO_4 3, and $Al_2(SO_4)_3$ 2 pts. by wt., the whole being mixed dry and ground to powder. B. M. V.

Core compositions for plaster board. G. D. KING, Assr. to UNITED STATES GYPSUM CO. (U.S.P. 2,070,551, 9.2.37. Appl., 21.9.32).—The plaster ($CaSO_4$) is bonded to the paper cover sheets by incorporation of karaya gum (2—8 lb. per 1000 sq. ft. of ⅜-in. board). After manufacture in the plastic aq. state the board is dried at a temp. normally sufficient to produce partial dehydration, but the film of gum around the gypsum crystals inhibits such dehydration. B. M. V.

Coloured [roofing] granule. C. E. HILLERS, Assr. to BLUE RIDGE SLATE CORP. (U.S.P. 2,070,359, 9.2.37. Appl., 21.3.35).—Granules of refractory material are coated with powdered cryolite, aq. adhesive (casein), and colouring agent (Cr_2O_3) and heated to 870—925°. A boric flux may be present. B. M. V.

Production of a floor covering. J. C. EMHARDT, Assr. to S. BLUMENTHAL & CO., INC. (U.S.P. 2,069,753, 9.2.37. Appl., 2.2.34. Can., 13.1.33).—A pile fabric is treated on the lower side with a vulcanisable mixture of latex (conc. latex 133 pts., S 2, ZnO 7, chalk 30, together with antioxidant, accelerator, stabiliser, and a little added H_2O) and the whole is heated (120°/¾ hr.) to boil out the H_2O and to vulcanise. B. M. V.

Production of mortar-bound road coverings. K. HALBACH (B.P. 479,574, 29.4.37. Ger., 29.4.36. Addn. to B.P. 460,279; B., 1937, 350).—The temporary layer is composed of webs of cardboard, fabric, sponge rubber, or the like. Slow-setting cements may be used. B. M. V.

Production of laminated structures from wood veneers. HALILA, LTD., and F. W. JONES, jun. (B.P. 479,901, 6.8.36).—Each lamina is coated, at $\not>50°$, with liquid or syrup of a phenol–CH_2O primary condensation product having its p_H adjusted so that it will set at room temp. to the *B*-form; the assembled laminæ are pressed and heated [at <150 (60—80) lb. per sq. in./90—105° (95°)] to harden to the *C*-form. *E.g.*, equal wts. of PhOH and 40% CH_2O are adjusted with alkali to p_H 7—9 and distilled at 105—110° for 1 hr. under partial vac. to remove about 30% of the H_2O, and the p_H is readjusted to 7—0·5. The η may be reduced by Cellosolve or the like. B. M. V.

X.—METALS; METALLURGY, INCLUDING ELECTROMETALLURGY.

Experience with balanced-blast cupola. W. L. ROUECHE (Iron Age, 1937, **140**, No. 23, 43—46).—Data show that the advantages of balanced blast include higher tapping temp., increase in melting rate, and economy in fuel. R. B. C.

Condensation cleaning of blast-furnace gas. R. R. HARMON (Steel, 1937, **101**, No. 8, 62—63, 65, 76).—The process is described and data are given. R. B. C.

Use of cyclones for cleaning blast-furnace gas. C. POPP (Stahl u. Eisen, 1938, **58**, 224—230).—A descriptive discussion. Separation improves with

increase in gas velocity and decrease in the radius of the cyclone. The pressure loss increases with the gas vol., and the efficiency with the dust content of the gas. When cyclones are well constructed the dust has no detrimental effect on the walls. They are best used in connexion with a dust catcher. The gas flow should be minimised and to this end the no. of cyclones in operation should be determined by the vol. of the gas flow. Latest developments aim at maintaining the dust pptd. separate from the space within which the gas flows. Any irregularity in the surface of the cyclone gives rise to disturbing secondary eddies. C. M. A.

Conditions for increased use of blast-furnace gas in ironworks. A. Schack (Stahl u. Eisen, 1938, **58**, 157—165).—The smelting of poor native ores will increase the output of blast-furnace gas in Germany and directions in which it can be utilised are reviewed, the most advantageous being "internal" applications the requirements of which are related to rate of gas production, such as blast heating, rolling mills, etc. Preheating the air, or air and gas, not only economises fuel, but by raising the flame temp. extends the applicability for high-temp. purposes, and extensive data on this subject are presented. The merits of recuperators and regenerators, and of aërated and non-aërated burners, are discussed. A. R. Pe.

Improvement of open-hearth furnace efficiency. A. Smithson (Metallurgia, 1938, **17**, 111—115).—Systems of control are technically discussed, with particular reference to the control of reversals, roof temp., furnace pressure, and combustion. Each system of control increases overall efficiency by maintaining the best condition relating to its particular function. Instruments available for checking draught and pressure conditions throughout the furnace system, providing valuable readings which facilitate considerably the operation of the furnace, are also discussed. P. G. McC.

Automatic control eliminates danger of burning out open-hearth [furnace] roofs. A. V. Leun (Steel, 1937, **101**, No. 7, 61—63).—The mounting and calibration of the pyrometers used for this purpose are discussed. R. B. C.

Steel-plant experience with metal-encased basic brick. H. S. Robertson (Steel, 1937, **101**, No. 15, 99—102).—Bricks made of magnesite–chrome refractory encased on two or three sides with mild steel give satisfactory service in open-hearth and electric furnace practice. R. B. C.

Carbon dioxide used in cartridge for removal of slag. C. Cavanagh (Blast Furn. Steel Plant, 1937, **25**, 1099—1100).—The use of the Cardox CO_2 cartridge for assisting the removal of slag from open-hearth slag pockets is described. R. B. C.

Occurrence of slag inclusions in basic electric steel and their removal. F. K. Buchholz, A. Ziegler, and E. Voos (Stahl u. Eisen, 1938, **58**, 231—235).—The possibility of eliminating macroscopic oxide and silicate inclusions >0·5 mm. long is examined. These inclusions, determined by the Campbell–Comstock etching process, consist mainly of Fe, Mn, and Si. It was found that by moving the transformer nearer and shortening the low-tension leads from 26 to 5 m., current was saved, the voltage of the electrodes was increased, the slag rendered more liquid, and the amount of inclusions present greatly diminished. 200 melts of unalloyed steel were examined and the slag inclusions compared. High-voltage arc-heating yielded more satisfactory results than low-voltage. Inclusions depend also on the rate and duration of refining, the final C content before slag-drawing, satisfactory boiling, and the quantity of ore used. Optimum conditions must be determined for each works on the basis of furnace size, the nature of the charge, and the quality of steel produced. C. M. A.

Basic open-hearth slags in the scrap carburising process [of making steel]. E. Widawski (Stahl u. Eisen, 1937, **57**, 781—789).—From a no. of tests the results of which are shown in tables and graphs it appears that the best utilisation of Mn in this process is obtained when 60—90 kg. of slag are made per ton of steel and when the $CaO : SiO_2$ ratio in the slag is 2 : 1; further increase in basicity raises the amount of Mn oxidised and deleteriously affects the quality of the steel. A. R. P.

[American] developments in the iron and steel industry during 1937. W. H. Burr (Iron Steel Eng., 1938, **15**, No. 1, 46—53).—A review. R. B. C.

Progress of iron ore dressing [in Germany]. W. Luyken (Berg u. Hüttenmänn. Jahrb., 1937, **85**, 229—233).—A magnetising roasting process involving initial partial reduction of the ore at 500—600° to the ferrous condition followed by oxidation at 500° to give γ-Fe_2O_3 is described. Data obtained for low-grade Fe ores are given. R. B. C.

Determination of ferrous oxide in chromite. A. V. Schein (Zavod. Lab., 1937, **6**, 1199—1205).—Methods depending on fusion with non-oxidising fluxes, followed by titration of Fe^{II} in the extract of the melt, did not give trustworthy results. 0·25 g. of chromite ore is dissolved at 360—380° in 20 ml. of H_3PO_4 and 10 ml. of H_2SO_4 containing 0·07—0·08 g. of V_2O_5, 100 ml. of H_2O are added to the solution, followed by 5 drops of aq. $NHPh{\cdot}C_6H_4{\cdot}SO_3Na$, excess of V^V in the solution is titrated with 0·1N-$FeSO_4$, and the result is subtracted from that of titration of a similar solution not containing Fe. The Fe^{II} content of the chromite is calc. from the difference (1 ml. of 0·1N-$FeSO_4$ ≡ 7·184 mg. of Fe). R. T.

Foundry work on high-chromium–iron castings. J. Sissener (Met. Prog., 1937, **52**, 521—527).—The production and chemical and mechanical properties of castings containing Cr 28—30, Ni 2·5, C 0·7, Si 0·7 (max.), and Mo 0·3—1·0% with Ti or N_2 as grain-refining agent are described. Notes on melting, casting, heat-treatment, and pickling practice are given. R. B. C.

Standard classification of graphite inclusions in grey cast iron. N. F. Bolchovitinov (Zavod. Lab., 1937, **6**, 1482—1484).—United States standards are described. R. T.

Composition and microstructure of ancient iron castings. M. L. PINEL, T. T. READ, and T. A. WRIGHT (Amer. Inst. Min. Met. Eng. Tech. Publ. 882, 1938, 20 pp.; Met. Tech., 1938, 5, No. 1).—Various specimens of cast Fe made in China prior to 1100 A.D. are described. R. B. C.

Hardenability of cast iron. D. W. MURPHY and W. P. WOOD (Trans. Amer. Found. Assoc., 1937, 45, 571—598).—Addition of 0·2—0·3% of Al to cast Fe causes shallow-hardening; smaller or greater additions confer deep-hardening properties. Melting practice before deoxidising must be controlled if the reduction of hardening resulting from a given Al addition is to be a max. Al does not affect the amount or distribution of graphite; Al-treated Fe, however, contains more pearlite in fine form than does untreated Fe. Shallow-hardening Fe is characterised by a finer network structure than deep-hardening Fe. The mechanical properties of the former are discussed. R. B. C.

Influence of composition and section size on strength–hardness ratio in cast iron. A. L. BOEGEHOLD (Trans. Amer. Found. Assoc., 1937, 45, 599—625).—The effects of C, Si, and cooling rate on the structure, hardness, and hardness ratio of cast Fe are analysed. R. B. C.

Deterioration of [cast-iron travelling] grates [of boiler furnaces]. A. R. MAYER and R. HARTMANN (Wärme, 1938, 61, 46—49).—The causes of deterioration and methods proposed for its prevention, *e.g.*, cooling with H_2O, and improved fire-bar design, are discussed. The life of the bars is prolonged by keeping the temp. as low as possible. Special care is necessary when firing fine coal of low volatile content. R. B. C.

Direct production of steels from ores. V. ŠTEINER (Chem. Listy, 1937, 31, 420—425).—Existing processes are reviewed. R. T.

Significance of chemical equilibrium in the production of steel of low slag content and uniform composition. C. BENEDICKS (Metallwirts., 1938, 17, 59—60).—Heterogeneous equilibrium should be attained in the steel before pouring; this may be effected by control of the composition of the metal and slag. The equilibrium between Fe, Mn, and O_2 and the reaction between the melt and the furnace lining are discussed as examples. C. E. H.

Hydrogen brittleness of carbon steels as a function of the quantity of hydrogen absorbed. P. BARDENHEUER and H. PLOUM (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1937, 19, 299—303).—When steel wire with 0·07—0·86% C is cathodically charged with H and then broken by bending, the no. of bends before fracture occurs decreases and the depth of the ring-shaped "flocculated" zone increases with increase in the time of treatment and in the amount of H absorbed. The changes in mechanical properties produced by H absorption gradually but never completely disappear during storage at room temp., owing to diffusion outwards of the H; even complete removal of the H does not restore the original properties. Heating in H_2 at 400—1100° also results in considerable H absorption especially at temp. > the A3 point; subsequent quenching of the steels with >0·6% C frequently results in cracking and always in severe embrittlement. A. R. P.

Degree of fatigue of carbon steels under reversed bendings. F. ÔSHIBA (Sci. Rep. Tôhoku, 1937, 26, 323—340; cf. B., 1935, 359).—Studies by Honda's method indicate that the degree of fatigue (x) of cylindrical specimens of uniform diameter, during reversed bendings under const. stress (σ), increases at a diminishing rate with increasing no. of stress repetitions (n). The final val at the instant of fracture decreases with decreasing σ. The endurance limit may be determined from the fact that x becomes almost independent of n when σ is < this limit. In notched specimens x increases slowly at first with increasing n; later it increases rapidly and finally slowly again. J. W. S.

Steel strip for spiral springs. H. POELLEIN (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1937, 19, 247—272).—Steel springs for clockwork devices usually contain C 1·05—1·1, Si 0·15—0·3, and Mn 0·3—0·5%; for gramophones the springs contain C 0·7, Si 1·8, and Mn 0·75 or C 0·6, Mn 0·4, Si 1·5, and Cr 0·3%. The best springs are made from Swedish charcoal Fe. The results of tests made on 21 steels prepared from Swedish pig Fe, Fe sponge, scrap Fe, German pig Fe, etc. in various proportions, melted in arc, induction, and open-hearth furnaces, are described. The structure and fracture after various heat- and mechanical treatments are illustrated and the properties of springs prepared from the test steels are given in 5 pp. of tables. The results show that springs = those prepared from materials of Swedish origin can be made from a high-scrap charge in the Héroult furnace if the refining period is sufficiently prolonged and also from steels with a high Si and Mn content. A. R. P.

Effects of torsional overstrain on physical properties of some typical spring steels, and its influence on shear stresses in helical springs. L. E. ADAMS (Iron and Steel Inst. Carnegie Schol. Mem., 1937, 26, 1—55).—An experimental and theoretical investigation of the problem, relating the results to performance of springs in service. S. J. K.

Flexure of mild steel stressed beyond the elastic limit and the deflexion of cast irons. L. LELOUP (Rev. Univ. Min., 1937, 13, 369—380).—Mathematical. R. B. C.

Steel and iron in shipbuilding and marine engineering. J. W. DONALDSON (Iron Steel Ind., 1937, 11, No. 3, 85—90).—The types used in marine boiler, reciprocating engine, and turbine construction are discussed. R. B. C.

Research and control in steel and malleable-iron foundries. K. ROESCH (Giesserei, 1937, 24, 668—672).—The problems involved are discussed. R. B. C.

Steel castings. W. M. SHEEHAN (Met. Prog., 1938, 33, 151—156).—Developments in the use of steel castings for parts of railway rolling stock are discussed. R. B. C.

Nickel-steel castings in railroad rolling stock. T. N. ARMSTRONG (Met. Prog., 1938, 33, 163—166).—The compositions of materials used for locomotive frame castings, *e.g.*, steel containing V 0·10, Ni 1·50, and C 0·25%, and their heat-treatment, are discussed. R. B. C.

Historical development of high-speed [steel]. H. C. BIGGE (Met. Prog., 1937, 32, 455—461).—A review. R. B. C.

High-speed steels. E. HOUDREMONT and H. SCHRADER (Tech. Mitt. Krupp, 1937, 5, 227—239).—The development of steels in which W is replaced wholly or partly by cheaper and more readily available elements, *e.g.*, V or Mo, is discussed. Data are given on the cutting properties of these steels in relation to their composition, and on their sensitivity to overheating and decarburisation. R. B. C.

Heat-resisting steels. W. H. HATFIELD (J. Inst. Fuel, 1938, 11, 245—304).—The resistance to oxidation or scaling, the mechanical properties, and the microstructures, at elevated temp., of 14 steels are described. Factors determining design for high-temp. service are considered. Appendices contain detailed mechanical properties of the selected steels and an extensive bibliography of heat-resisting steels with abstracts. S. J. K.

Relationship between the microstructure and the adherence of scale deposit [for steel]. R. GRIFFITHS (Iron and Steel Inst. Carnegie Schol. Mem., 1937, 26, 165—174).—The conditions under which self-descaling of steel can occur, and the reasons for its so doing, have been examined. In order to examine the microstructures produced under certain conditions of oxidation a special technique is described of sectioning specimens of steel coated with scale, thereby permitting an enlarged view of the details to be observed. Photomicrographs indicate that the composition and structure of the inner layer of the scale, consisting of the ferrous phase, control to a large extent the adherence of the scale to the steel. The outer layers of so-called magnetite and Fe_2O_3 in turn affect the composition of the inner ferrous layer, and it is shown that in their absence a complete self-descaling type of scale is obtained. The liberation of gases from the steel during scaling causes the formation of a porous layer in the scale, and affects the reaction between the steel and O_2, which is the ultimate factor controlling the adherence of scale to steel. P. G. McC.

Influence of carbon on the scaling of chromium steels. W. OERTEL and W. LANDT (Stahl u. Eisen, 1937, 57, 764—766).—With 10 and 20% Cr steel the rate of scaling is at a min. at >800° when the C content is about 1%; this min. is barely noticeable with 10% Cr, but is well-marked with 20% Cr, the rate of O absorption in this case falling at 1000° from 45 g./sq. m./hr. with 0·2% C to 1 g./sq. m./hr. with 1% C. With 30% Cr steel the rate of oxidation is a min. with 0·2% C, but is still very low with up to 1·5% C. An austenitic structure is the most resistant to oxidation. A. R. P.

Sampling conditions for determination of flakes and porosity in [steel-]smelting control. M. I. VINOGRAD (Zavod. Lab., 1937, 6, 1465—1467).—Conditions of sampling are specified. R. T.

Effects of small additions of vanadium to eutectoid steel. J. G. ZIMMERMAN, R. H. ABORN, and E. C. BAIN (Trans. Amer. Soc. Met., 1937, 25, 755—787).—The heat-treatment of steels of approx. eutectoid composition and containing 0·25% of V was studied. V is preferentially carbide-forming but ferrite-sol. when present in excess of that combined with the C present. The carbides of V are relatively insol. and highly stable at ordinary heat-treating temp., but dissolve slowly at high temp. At temp. at which they remain undissolved the steel is fine-grained and shallow-hardening; complete dissolution, however, gives a coarse-grained, deep-hardening steel. V steel softens during tempering less rapidly than does plain C steel. R. B. C.

Alloy steels and ferro-alloys for 1937. J. C. VIGNOS (Blast Furn. Steel Plant, 1938, 26, 61—63; Heat Treat. Forg., 1938, 24, 26—27).—Developments are reviewed. R. B. C.

Volatilisation of manganese from iron alloys containing manganese. W. BAUKLOH and H. UEHLINGER (Metallwirts., 1938, 17, 85—87).—An appreciable loss of Mn occurs when alloys containing 1·39—21·9% Mn are heated in a vac. at $\nless$800°. An atm. of H_2 reduces the amount of volatilisation. The presence of C in the alloys reduces the loss of Mn at 800°, but not appreciably at higher temp. C. E. H.

Crucible tool-steel [production]. H. C. BIGGE (Met. Prog., 1937, 32, 773—775).—The technique is described and English and American developments are reviewed. R. B. C.

Apparatus for volumetric determination of carbon in ferrochromium and other alloys, in connexion with Stachanov methods. P. I. DOLINSKI (Zavod. Lab., 1937, 6, 1277—1279).—Apparatus is described. R. T.

Determination of aluminium oxide in steel. E. I. FOGELSON (Zavod. Lab., 1937, 6, 1276).—The steel is dissolved according to Kinzel *et al.* (B., 1934, 629), the residue collected, washed, and fused with Dittmar's mixture or with $K_2S_2O_8$, the extract of the melt is electrolysed at a Hg cathode, and $Al(OH)_3$ pptd. and determined by the usual methods. R. T.

Determination of manganese in steel and cast iron by the persulphate–arsenite method. B. A. GENEROZOV (Zavod. Lab., 1937, 6, 1431—1439).—The method of Sandell *et al.* (B., 1935, 854) is preferred to that of Bright *et al.* (B., 1929, 1017), and this to that of Smith (A., 1905, ii, 66). R. T.

Determination of manganese in special steels containing cobalt and chromium by photometric titration. S. HIRANO (J. Soc. Chem. Ind. Japan, 1937, 40, 412—413B).—Mn steel is dissolved in H_2SO_4 (1 : 4), Fe^{II} oxidised by H_2O_2, excess of which is removed by boiling, and org. impurities are decomposed by 0·5—1·0 g. of $(NH_4)_2S_2O_8$. In presence of a large excess of H_2SO_4 and H_3PO_4, *e.g.*, 50—60 c.c. of conc. H_2SO_4 and 10—30 c.c. of 90% H_3PO_4 per 100 c.c., Mn is quantitatively oxidised by

0·33N-$KBrO_3$, the end-point being determined by photometric titration. The equivalence of the $KBrO_3$ to Mn is determined empirically by analysing a standard Mn steel. HCl and HNO_3 must be removed by evaporation with H_2SO_4. If Cr is present excess of $(NH_4)_2S_2O_8$ is removed by boiling with 1—2 drops of 3% H_2O_2. Co, Cr, W, and Mo do not interfere. I. C. R.

Photometric determination of molybdenum in steel. K. DIETRICH and K. SCHMITT (Metallwirts., 1938, 17, 88—89).—A solution of the steel in HCl + H_3PO_4 is boiled with $KClO_3$, neutralised, treated with a definite quantity of NaOH, and filtered. To an aliquot part of the filtrate KCNS is added and the Mo reduced with K_2SnCl_4 and determined photometrically. Data for the latter operation are given. C. E. H.

Rapid potentiometric determination of vanadium in alloy steels, cast iron, ferrous alloys, and slags. N. J. CHLOPIN and C. A. PINSKAJA (Zavod. Lab., 1937, 6, 1272—1275).—1 g. of Fe or steel is dissolved in 40 ml. of 20% H_2SO_4 (30 ml. of 50% H_3PO_4 are added if W is present), and the solution is boiled with 3 ml. of HNO_3, to complete elimination of oxides of N, and 5 ml. of 17% H_3PO_4 are added, at $\not>26°$. Excess of 0·1N-$KMnO_4$ is added, followed by 1 drop of osmic acid, and aq. Na_3AsO_3 (2·5 g. of As_2O_3 per litre) is added to remove excess of $KMnO_4$. V^V in the solution is then electro-titrated with standard $FeSO_4$ [7·9 g. of $FeSO_4,(NH_4)_2SO_4,6H_2O$ per litre]. 1 g. of slag is dissolved in 40 ml. of 20% H_2SO_4 and 10 ml. of HF, the solution is boiled as above with HNO_3, 35 ml. of 5% H_3BO_3 are added, and V is titrated as above. R. T.

Control of quality of steel from its microstructure. I. S. GAEV (Zavod. Lab., 1937, 6, 1224—1232).—The tendency to growth of granules in steels may be tested by examining the structure of the surface of fracture of samples annealed at different temp. Tendency to graphitisation is tested similarly in steels cooled from 900° to 600° during 12 hr. The microstructure of certain steels depends on the Mn : Si ratio in the steel. R. T.

Testing of fatigue of steel, and determination of its limit, by the magnetic method. S. J. SIGOLAEV (Zavod. Lab., 1937, 6, 1243—1246).—Apparatus for determining variations in magnetic inductance of steel subjected to fatigue is described. The fatigue–inductance curves pass through a min., followed by a max.; for this reason the tests should be done only on previously untested specimens of metals. The performance of the test requires only 2—3 hr., and 1—2 samples of steel. R. T.

Exposure chart for radiography of steel. H. R. ISENBURGER (Met. Prog., 1937, 32, 498).—Diagrams for estimating the correct exposure time required in the industrial radiography of steel, and examples of their use, are given. R. B. C.

Effect of variations in diamond indentors used in Vickers' hardness-testing machine [for steel]. F. B. FULLER (Trans. Amer. Soc. Met., 1937, 25, 1198—1206).—Considerable discrepancies in the hardness no. for steel were found when using diamond indentors not supplied with the machine. Recommendations for a more rigid specification for the shape and mounting of the diamond are given. R. B. C.

Work-sensitivity [of steel]. S. L. CASE (Met. Prog., 1937, 32, 669—674).—Factors governing the susceptibility of steel containing 0·20—0·61% C to cold-working embrittlement are discussed. A standard work-brittleness test which has proved useful for measuring ageing in steel is described. R. B. C.

Measurement of heat in the production of metal grindings. G. KRITZLER (Giesserei, 1938, 25, 2—6).—The temp. of steel surfaces in process of grinding were found by extrapolating the readings of thermocouple thermometers inserted at different points in the specimens. Grinding pressures of 2·5, 5, and 10 kg. per sq. cm. were applied for time periods up to 3·3 min., and surface temp. of 600—1200° were attained. No cooling device was used. The effect of grinding on the surface structure of various steels is illustrated by photomicrographs. D. BE.

Selection of the proper steel. A. E. FOCKE (Heat Treat. Forg., 1937, 23, 461—464, 467).—Selection on the basis of specifications of the Society of Automotive Engineers is discussed. R. B. C.

Heat-treatment and metallurgical control [of steel]. O. N. PETERSON (Met. Prog., 1937, 32, 337—345).—Etching, hardness, and other tests used to supplement chemical analyses in the production of steel parts used in automobiles, *e.g.*, rods and springs, and the heat-treatment of the various steels employed are discussed. R. B. C.

Behaviour of steels at high temperatures. O. LEIHENER and P. GRÜN (Korros. u. Metallschutz, 1937, 13, 354—365).—A review of published work. E. S. H.

Influence of heat-treatment of 18 : 8 steel on resistance to pitting. S. BRENNERT (Korros. u. Metallschutz, 1937, 13, 379—380).—Treatment at 500—900° reduces resistance to pitting in 0·1N-NaCl at 25°. Resistance to pitting can be determined by the highest potential at which the steel can be anodically polarised without attack. E. S. H.

Effect of titanium on hardness and macrostructure of heat-treated 18% chromium-steel ingots. R. E. BANNON (Trans. Amer. Soc. Met., 1937, 25, 737—754).—Addition of Ti to the steel causes a refinement of grain structure and a lessening of the tendency towards ingotism, which is eliminated when >1·11% of Ti is present. Addition of 1·97% of Ti to steel containing 0·20—0·25% of C eliminates both air-hardening and hardenability; H_2O-quenching from 1150°, however, may cause slight hardening. Evidence was obtained of the solubility of the Ti constituent in the steel at 1370°, but attempts to harden the steel by its pptn. were unsuccessful. R. B. C.

Conveyor-type scale-free [steel-]hardening furnace. A. R. RYAN (Gen. Elect. Rev., 1937, 40, 536—538).—The steel is passed through a refractory-lined, electrically-heated chamber and quenched in an oil-bath. Avoidance of scale is

obtained by use of a protective gas, *e.g.*, town's gas or C_4H_{10}, in the furnace. R. B. C.

Flame-hardening [of steel]. ANON. (Steel, 1937, **101**, No. 13, 34—36).—The technique is described. R. B. C.

Selective hardening of [steel] with oxy-acetylene flame. R. L. ROLF (Steel, 1937, **101**, No. 18, 48—51).—The technique adopted for gears, nuts, etc. is described. R. B. C.

Electrode salt bath for hardening high-speed steel. A. HULTGREN (Trans. Amer. Soc. Met., 1937, **25**, 1166—1176).—Factors which cause decarburisation, oxidation, and burning of the steel are discussed. Data on the use of SiO_2 in the bath to avoid decarburisation are given. Photomicrographs show the effect of heating Mo–W steels in $BaCl_2$ with and without added SiO_2. Immersed-electrode furnaces give the best results; if incorrectly designed local overheating and fusion of the steel occur. R. B. C.

Chapmanising [of steel]. R. L. ROLF (Steel, 1938, **102**, No. 2, 48—51).—The technique adopted by the Chapman Valve Manufg. Co., Mass., for the N_2-hardening of low-C steel is described. The metal is treated under pressure with "active" N_2 obtained by decomp. of NH_3. R. B. C.

Short- and long-term tensile strength of weldless and butt-welded chromium–molybdenum steel tubes under varying mean stresses. F. BOLLENRATH and H. CORNELIUS (Stahl u. Eisen, 1938, **58**, 241—245).—The variation in the intensity and frequency of stresses sustained by aëronautical material necessitates the determination of both long- and short-term tensile strength. The latter means the capacity of the metal to support a limited proportion of stress between the max., based on its long-term tensile strength, and the breaking point. Tests were carried out on steel tubes (C 0·25, Cr 1, Mo 0·25%) of 28 mm. diameter and 1 mm. wall thickness to determine the effect of welding and varying heat-treatment on tensile strain and compressive stress, and on the deformation resultant on stresses above the max. indicated by the long-term strength. Test results show a downward sweep in the curves of tensile strain as the load–frequency coeff. changes between 10^4 and 10^3. Results varied with the limits of stress, the type and position of fracture depending on the heat-treatment. Though quenching had little effect on the initial tensile or compressive strengths of the butt-welded tubes, its effect was more marked on the bending strength. When mean stress is high the short-term tensile strength is raised for limits of load-frequency change of 10^3—10^4 per min., and when the mean stress is >45 kg./sq. mm. for frequencies up to 10^5, measured on a pulsator, by quenching after butt-welding. C. M. A.

[Steel] piping for very high [steam] pressures. R. BÜCHELE (Wärme, 1938, **61**, 61—65).—Experience in the construction and maintenance of piping for high pressures has resulted in the development of a series of welded and flanged joints which are described in detail. The layout of the piping in a steam power station is discussed. R. B. C.

Destruction of metallic constructional materials by water impact. M. (FRH.) VON SCHWARZ and W. MANTEL (Korros. u. Metallschutz, 1937, **13**, 375—379).—The resistance of various bronzes, brasses, and steels to impingement attack is compared. E. S. H.

Metallurgical progress and the steam engineer. L. SANDERSON (Steam Eng., 1938, **7**, 204—205, 208).—Recent developments in the production of special types of Fe and steel for boilers and turbines are reviewed. R. B. C.

Hardened blade edges for erosion protection in turbine blades. H. ZSCHOKKE (Korros. u. Metallschutz, 1937, **13**, 386—392).—Tests on the hardened steel (G.P. 383,250) show its superior resistance to erosion in comparison with 14 other stainless steels. E. S. H.

Rate of atmospheric corrosion of unalloyed steels. K. DAEVES and K. TRAPP (Stahl u. Eisen, 1938, **58**, 245—248).—Test results on atm. corrosion show surprising agreement. The rate of corrosion in industrial atm. of 0·2% Cu steel is 0·075 mm. per year (or 600 g./sq. m./per year), *i.e.*, almost four times the rate in rural atm., whilst that in urban atm. gives intermediate vals. The yearly rate of corrosion is const. in industrial and diminishes in rural atm. The rate of corrosion falls rapidly as the Cu content rises up to 0·15%, and thereafter the effect of further addition of Cu is slight. If the Cu content is >0·15% and the P >0·06% the joint effect is a further considerable decrease in the rate of corrosion. If the Cu content of all non-galvanised steel (rails etc.) in Germany were raised to a min. of 0·15% the reduction of the annual loss by corrosion and simultaneous increase in the scrap accruing would amount to 20,000 tons. C. M. A.

New rust-, acid-, and heat-resisting steels and their applications. H. HOUGARDY and G. RIEDRICH (Metallwirts., 1937, **16**, 1329—1342).—A review. C. E. H.

Corrosion of iron–chromium–aluminium alloys. W. BAUMANN (Metallwirts., 1937, **16**, 1267—1269).—Alloys containing Cr 20—30, Al 3—6, and Co 0—2% were tested in the form of wire in contact with asbestos moistened with H_2O or 1% solutions of NaCl or Na_2CO_3. In tests with H_2O and aq. NaCl, one variety of asbestos caused considerably more corrosion than another; this was traced to its content of MgO. The wires were not affected by the Na_2CO_3 solution. C. E. H.

Rust-free and corrosion-resistant steels. R. SCHÄFER (Korros. u. Metallschutz, 1937, **13**, 337—353).—A general review of compositions, structure, mechanical properties, corrosion-resistance, and applications. E. S. H.

Corrosion-resistant steels for turbine blades. J. H. G. MONYPENNY (Korros. u. Metallschutz, 1937, **13**, 365—375).—The required mechanical and corrosion-resistant properties are discussed and related to experience with Cr- and Ni–Cr-steels. E. S. H.

Corrosion problems in steam-turbine construction, with special reference to rustless and

corrosion-resistant steels. F. LÜBEN (Korros. u. Metallschutz, 1937, 13, 383—386).—A review. E. S. H.

Defects in condenser tubes [for steam turbines]. H. ZABEL (Korros. u. Metallschutz, 1937, 13, 392—394).—A review. E. S. H.

Accelerated method of determining corrosivity of iron and steel. E. I. GUROVITSCH (Zavod. Lab., 1937, 6, 1232—1237).—The no. of centres of corrosion forming on a polished Fe surface exposed to damp I vapour varies parallel with temp. and [I] and inversely with pressure and [H_2O], and is characteristic, under const. conditions, of a given steel. A method of determining corrosivity is derived therefrom. R. T.

Clean pickling of steel. W. HEIMBERGER (Oberflächentech., 1938, 15, 43—44).—The formation of an adherent non-metallic film on steel during pickling may be avoided by addition of a colloid (composition not stated) to the HCl or H_2SO_4 solution. This is the "Feracid" process. C. E. H.

Tinning of steel sheet. F. PETER (Stahl u. Eisen, 1938, 58, 165—169).—The prep. of the sheet, the temp. and composition of the flux and Sn bath, and other conditions for obtaining a thin and uniform coating are discussed and diagrams of plant given. A. R. PE.

Nickel dip treatment of enamelling iron. J. PETTYJOHN (Metal Clean. Finish., 1937, 9, 995—998, 1012).—Coating enamelling Fe with a thin film of Ni by immersion in an acid Ni solution has the following advantages: the H_2 evolved cleans the surface of the work, adhesion of the fired groundcoat and its uniformity of colour are improved, and rusting in storage is prevented. The operation and control of the Ni bath are discussed. J. W. C.

Oven for baking [enamel] finish on automobile frames. ANON. (Indust. Heating, 1937, 7, 890—892, 914).—A gas-heated oven is described. R. B. C.

Testing the thickness of non-ferromagnetic coatings (metallic and non-metallic) on iron and steel without damaging the coating. B. G. LAZAREV and M. M. NOSKOV (Zavod. Lab., 1937, 6, 1462—1465).—The force required to detach a magnet from the surface is $\propto$ the thickness of the coating; a method for measurement of this thickness, based on this principle, is described. R. T.

Steel-mill lubrication. H. N. BASSETT (Metallurgia, 1938, 17, 123—124).—A discussion in the light of modern practice. P. G. McC.

Lubrication of pinions and roll-neck bearings in steel plant. J. F. PELLY (Iron Age, 1937, 140, No. 25, 40—47, No. 26, 34—39).—Various lubricants and lubricating systems are compared. R. B. C.

Formation of metallic nitrides in the welding of steel. A. PORTEVIN and D. SÉFÉRIAN (Proc. XII Internat. Congr. Acetylene, 1936, 3, 690—703).—The following main factors are distinguished as influencing the absorption of N_2 by Fe: (1) the process of fusion, whether by blowpipe or arc, and in the latter case the conditions of excitation of the arc; (2) nature of the atm.; (3) nature and quantity of the elements present with the Fe in the form of alloys or in a free state in the covering, which may exert an effect during fusion and crystallisation. From an experimental study on Armco Fe it was disclosed that only a very slight absorption occurs in the oxy-acetylene flame (0·02—0·03% N), whilst a much greater absorption occurs on fusion in the arc (0·15—0·20% N), influenced particularly by the conditions of excitation, the nature of the atm., and especially the thickness of the covering. In the case of (3) it was shown that C, Mn, and Si tend to reduce N absorption, whilst Cr and Al tend to increase it when they melt, yielding the corresponding nitrides. A photomicrographical study indicates the form in which the N is present under the various conditions. P. G. McC.

Corrosion of various constructional steels. Welding rods and electrodes for corrosion-resisting joints. J. BRILLIÉ, A. LEROY, and A. ROUX (Proc. XII Internat. Congr. Acetylene, 1936, 3, 725—746).—The influence of welding rods and electrodes on the corrosion of welded joints has been investigated. Four types of plate were considered: Martin C steels at 40 and 50 kg./sq. mm., Cu steel, and Cr–Cu steel. The connexions were welded both by oxy-acetylene and by the arc, using very different qualities of welding rods and electrodes. The corrosion tests were made under conditions and using reagents approximating to those which may arise in practice for constructional steels. Certain conclusions were drawn from the experiments as a whole, some of these relating to the general problem of corrosion in welds and others making it possible to select, for each type of constructional steel considered, a welding rod or an electrode which will produce a homogeneous joint from the viewpoint of corrosion-resistance. P. G. McC.

Corrosion of welded joints. A. LEROY (Proc. XII Internat. Congr. Acetylene, 1936, 3, 606—612).—Two practical cases of corrosion were investigated, the one concerned with the corrosion of mild-steel cylinders which had been oxy-acetylene welded and were used for transporting Cl_2, and the other with the corrosion of arc-welded 18 : 8 rustless steel tanks made to hold conc. HNO_3. P. G. McC.

Analytical study of the chemical heterogeneity of welds. A. M. PORTEVIN and A. LEROY (Proc. XII Internat. Congr. Acetylene, 1936, 3, 595—599).—The origin of chemical heterogeneity in welds is discussed and by means of a special analytical technique the distribution of the elements in the weld has been determined. This new technique allows the further possibility of following very closely the physico-chemical evolution of the elements within alloys, not only during welding operations but also, in a general way, during many of those metallurgical operations that are conducive to chemical heterogeneity (cf. B., 1937, 45). P. G. McC.

Developments in powder metallurgy. I. The present position. II. Casting versus powder methods. W. D. JONES. **III. Shrinkage.** W. D. JONES and E. J. GROOM (Metal Ind., [London], 1938, 52, 75—76, 97—99, 131—133).—I.

Methods of production now in use for the manufacture of small metal articles from metal powder are reviewed and their limitations discussed.

II. The sintered product has sp. grain-growth properties which may be altered by varying the surface impurities present. The formation of oxide films may be modified by presence of a constituent which melts at the temp. used, or by the adoption of deoxidising technique. The use of high pressures at low temp. gives unusually hard products. When the cold-pressed powder is heated a vol. change, usually shrinkage, occurs.

III. This shrinkage as a rule decreases with increase in particle size or the cold pressure, but very high pressures may lead to expansion. Shrinkage is frequently lessened also by prior cold-work on the powder and is modified by adding volatile substances, *e.g.*, tallow, resin, etc. Explanations of these phenomena are offered. The need for the development of a continuous process is pointed out. S. J. K.

Metal spraying: processes and some characteristics of the deposits. E. C. Rollason (Metal Clean. Finish., 1937, **9**, 923—926).—The thermal dilatation and hardness-spraying distance curves of a no. of sprayed metals are compared. Applications of sprayed coatings include the use of Zn and Al as corrosion-resistant coverings on Fe and steel, and of Ni and Fe for the repair and building up of worn parts. J. W. C.

Metal types and basic forms of binary systems. E. Kothny (Metallwirts., 1938, **17**, 207—211).—A survey of the various types of changes and structures which may occur in binary alloy systems is presented in tabular form. A further table indicates the phenomena of practical importance which are observed during the melting and solidification of the different types of alloys. C. E. H.

Influence of trace elements on characteristics and properties of metals. S. Tour (Iron Age, 1938, **141**, No. 1, 137—144).—The effect of impurities in Pb, Zn, Cu, Ni, Al, and their alloys is discussed. R. B. C.

Hardening of alloys by recrystallisation. L. Guillet (Chem. Listy, 1938, **32**, 91—96).—A lecture. R. T.

Temperature coefficient of hardness of eutectic alloys. V. P. Shischokin and I. D. Zaporoshec (Ann. Sect. Anal. Phys. Chim., 1938, **10**, 161—186).—The temp. coeff. of hardness of a no. of binary and ternary alloys tends to a max. as the composition approaches that of the eutectic; this effect is more marked for annealed than for tempered alloys. The theoretical aspects of the phenomenon are discussed. R. T.

"Yielding" phenomena and distortion in iron, steel, aluminium alloy, and other metals under stress. E. W. Fell (Iron and Steel Inst. Carnegie Schol. Mem., 1937, **26**, 123—163).—The phenomena associated with the development of "Hartmann lines" were investigated and, in the case of Fe, an *X*-ray study is made of the lattice distortion. The results are discussed and a theoretical interpretation is advanced. S. J. K.

True stress-strain curves for polycrystalline [metallic] material. R. K. Haskell (J. Appl. Physics, 1938, **9**, 30—33).—A discussion. H. J. E.

Deformation and fracture of metals. H. J. Gough and W. A. Wood (J. Inst. Civ. Eng., 1938, 249—284).—The application of *X*-rays to the elucidation of crystal structure is summarised. The study of annealed mild steel subjected to static and fatigue loading showed that the crystals become converted into a mass of "crystallites" about 10^{-4}—10^{-5} cm. size. Further investigation on previously cold-worked material showed that at the point of failure these "crystallites" are in a state of severe internal strain. S. J. K.

Strength of metals and of highly polymeric [organic] materials. E. Broda (Metallwirts., 1938, **17**, 60—64).—The properties of the two classes of materials are discussed in relation to structure. C. E. H.

Applications of artificial resin in the Kupferschiefer mining district [of Germany]. G. Schulze (Glückauf, 1938, **74**, 45—47).—This material is being successfully substituted for white metal in waggon axle boxes and for the metal lining of stuffing boxes of mining equipment, *e.g.*, wire-rope winches. R. B. C.

Application of *X*-ray diffraction to study of fatigue of metals. C. S. Barrett (Trans. Amer. Soc. Met., 1937, **25**, 1115—1148).—Experiments carried out on Al alloys, Cu, and various steels showed that changes in diffraction patterns occurred during stressing both above and below the endurance limit. A practical test based on the appearance of spot patterns (asterism) is preferable to one based on the width of the diffraction lines, owing to the greater sensitivity of the former. *X*-Ray diffraction is not a convenient method for investigating stress concns. as the vol. of the material at max. stress is small and is frequently located in the cold-worked surface layers, which must be removed by etching before *X*-raying. R. B. C.

Determination of plasticity of metals. L. I Kukanov (Zavod. Lab., 1937, **6**, 1475—1481).—Known methods are discussed. R. T.

Determination of kinetics of dissolution of metals, by measuring the volume of gas evolved. A. V. Soloviev (Zavod. Lab., 1937, **6**, 1240—1243).—The rate of dissolution of steels in HCl is measured by determining the rate of evolution of H_2, in a special apparatus. The corrosivity of metals may thus be tested. R. T.

Electron diffraction as an aid in the examination of metallic surfaces. T. Schoon (Metallwirts., 1938, **17**, 203—207).—The experimental technique is described and recent work reviewed. C. E. H.

Graphic interpretation of the results of the Jovignot test [for thin sheets of metal]. P. Tongas (Rev. Mét., 1937, **34**, 702—703). S. J. K.

Cooling curves and the laws of radiation. C. Handford (Nature, 1938, **141**, 368).—A method of treating the radiation between a body and a surround-

ing enclosure which has been applied to the study of heating- and cooling-curve techniques used in metallurgy is described. L. S. T.

New method of [ore]dressing. E. BIERBRAUER (Berg u. Hüttenmänn. Jahrb., 1937, **85**, 204—208).—The Pick process for separating coarsely pulverised-ore mixtures is based on the property possessed by certain ores of selectively adhering to petroleum pitch. The applications of the process are discussed. R. B. C.

Surface properties as foundations of the separation and dressing processes [for ores]. E. BLÜMEL (Metall u. Erz, 1938, **35**, 142—144).—A review. E. S. H.

Principles of flotation. VI. Influence of temperature on effect of copper sulphate, alkalis, and sodium cyanide on adsorption of xanthates at mineral surfaces. I. W. WARK and A. B. COX (Min. Tech., 1938, **2**, Tech. Publ. 876, 12 pp.; cf. B., 1937, **49**, 687).—The adsorption of a xanthate film at surfaces of galena, pyrite, arsenopyrite, chalcopyrite, and sphalerite was indicated by the development of a definite air–H_2O–mineral contact angle. The influence of temp. on the amount of depressant (NaCN or alkali) necessary to prevent contact, although slight in absence of $CuSO_4$, was relatively great for pyrite and arsenopyrite in presence of $CuSO_4$. Temp. and xanthate concns. most favourable to flotation of one mineral from at least one other are given. A. K. G. T.

Reducing the amount of [ore] samples. K. L. POSHARITZKI (Zavod. Lab., 1937, **6**, 931—936, 1178—1184).—Methods of sampling ores are discussed. R. T.

Low-frequency induction [metal-melting] furnace. ANON. (Found. Tr. J., 1937, **57**, 501—503).—The construction of the Russ furnace is described. R. B. C.

Fast metal melting with gas-immersion [heating]. J. B. NEALEY (Iron Age, 1937, **140**, No. 26, 40—42).—The principles of the process and its application to the melting of printing metal, Pb, and Sn are described. R. B. C.

Temperature measurement in copper foundries. B. F. ZOBNIK (Zavod. Lab., 1937, **6**, 1486—1488).—Of a no. of protective sheaths for thermocouples used for measuring the temp. of molten bronze, the most satisfactory were those made by boring a hole in low-C Fe rods. R. T.

Deformation of β-brass. A. B. GRENINGER (Amer. Inst. Min. Met. Eng. Tech. Publ. 892, 1938, 8 pp.; Met. Tech., 1938, **5**, No. 2).—Polished specimens subjected to light deformation show slip lines and deformation bands. The latter appear to represent composite slip movement having directional components differing from those of pure slip. Slip is on [110]; the broad corrugations are inclined at angles of a few degrees to [110]. R. B. C.

Physical and mechanical properties of nickel brasses. M. COOK (J. Inst. Metals, 1938, **62**, Advance copy, 641—651).—The mechanical properties of alloys of Cu 60—25, Ni 5—30, and Zn 30—55% in the form of chill-castings and hot-forged bars are tabulated and characteristic microstructures are shown. The machinability and hot-stamping properties of extruded rods of Ni brasses with 45% Cu and 10, 12·5, and 15% Ni have also been determined as well as the effect thereon of small additions of Pb, P, Si, and Mn. The 10% Ni alloy, especially when deoxidised with Cu–Mn, is the most easily machined and can be satisfactorily stamped at 600—850°; addition of Pb improves the machinability but is deleterious in hot-stamping and also reduces the strength and elongation. Si and P increase the strength but reduce the elongation. A. R. P.

Determination of small quantities of cerium in copper welding wires. E. PACHE (Chem.-Ztg., 1938, **62**, 102).—10 g. of the alloy are dissolved in aqua regia and the N oxides expelled by heating. 1 c.c. of 10% aq. $FeCl_3$ is added, followed by NH_3 in excess. The pptd. Fe, Ce, and Sb hydroxides are washed with very dil. NH_3 and dissolved in dil. HCl. Residual Cu and the Sb are pptd. by H_2S, and the filtrate is boiled to expel H_2S. A few drops of H_2O_2 are added and S is filtered off. The filtrate is made faintly ammoniacal, heated, and treated with 5 g. of solid $H_2C_2O_4$, which dissolves the Fe and Ce. The Ce is pptd. on boiling, then filtered, washed with 1% aq. $H_2C_2O_4$, and weighed as CeO_2. L. S. T.

Rapid determination of zinc in zinc–copper sulphide ores and their concentrates. B. N. RANSKI (Zavod. Lab., 1937, **6**, 1271—1272).—2—4 g. of material are boiled for 15 min. with 40 ml. of 50% HCl, the solution is saturated with H_2S to ppt. Cu, the vol. is made up to 100 ml., the solution filtered, 2—3 drops of H_2O_2 and excess of aq. NH_3 are added to 50 ml. of filtrate, and the solution is boiled and filtered. The filtrate + washings are made acid with H_2SO_4, 2 drops of $NHPh_2$ solution are added, and Zn in the solution is titrated with standard $K_4Fe(CN)_6$ containing $K_3Fe(CN)_6$. Alternatively, Cu is pptd. as Cu_2C_2 by saturating the reduced ammoniacal solution with C_2H_2. R. T.

Continuous reduction of zinc minerals in vertical crucibles and refining of zinc by fractional distillation. E. PROST (Rev. univ. Min., 1937, **13**, 380—390).—A review, with particular reference to the work of the New Jersey Zinc Co. R. B. C.

Discovery of thermal metallurgy of zinc in Belgium at the beginning of the 19th century. O. DONY-HÉNAULT (Bull. Acad. roy. Belg., 1938, [v], **24**, 84—87).

Casting properties of zinc alloys. A. BURKHARDT, F. HUTH, and E. KOOPS (Z. Metallk., 1937, **29**, 380—388).—Max. fluidity of Al–Zn alloys occurs with 4% Al; addition of Cu or Mg considerably reduces the fluidity. With 4% Al and 0·1% Mg max. fluidity is obtained on addition of 2·7% of Cu. Mg enormously increases the hot-brittleness of Al–Zn alloys, but its effect is considerably reduced by addition of 2% of Cu. Max. tensile strength and impact resistance of Zn-base die-casting alloys are obtained by casting at $<450°$ into moulds preheated to 150—200°; the moulds used should have long, wide risers. A. R. P.

Dilatometer and method of thermal analysis of alloys as applied to zinc–magnesium alloys and pure zinc. H. SIEGLERSCHMIDT (Metallwirts., 1938, **17**, 155—161).—A sensitive quartz apparatus, by means of which dilatation of specimens can be examined in a vac., is described. It has been applied to the determination of the solid solubility of Zn in Mg at different temp., and the coeff. of expansion of Zn between room temp. and the m.p. C. E. H.

Factors determining the quality of dental amalgams. H. CHOULANT (Angew. Chem., 1938, **51**, 115—119).—Phase diagrams of Zn–Ag and Zn–Hg–Ag alloys are recorded. Ease of moulding, absence of vol. changes during setting, and other mechanical properties, together with the effects of ageing, are considered in relation to the composition of the alloys. A. G. P.

Mirror constituents in copper–lead alloys. H. OSBORG (Met. Prog., 1938, **33**, 43—48, 94).—Owing to the tendency of Pb to segregate during the casting of Cu–Pb, small amounts of Sn, Mn, Ni, S, P, Si, Li, etc. are added to give uniform microstructure. Suitable amounts of additions and the precautions necessary, and their effect on strength, grain size, hardness, etc., are discussed. R. B. C.

Mechanical properties of lead water-pipes. B. JONES (Engineering, 1938, **145**, 285—287).—The failure of Pb under low stress (by creep) is determined by the crystal structure. A coarse-grained Pb flows less, but may then fail by intercryst. cracking. Failure by creep due to fineness of structure is very rare, but transverse cracking, usually associated with a coarse structure, is common. Zones of coarse structure are liable to be produced when the extruded pipe is coiled at > a certain temp. Resistance of Pb to high stresses may be improved by additions of Sb, Sn, Cd, Te, etc., but it is important in all cases to retain ease of working where possible. The resistance of Pb to fluctuating stress is not so clearly related to crystal structure, but may be improved by alloying, *e.g.*, by addition of 0·06% of Cu. S. J. K

Lead–calcium alloys for storage batteries. J. Z. BRIGGS (Met. & Alloys, 1938, **9**, 49—50).—Published information is summarised (cf. B., 1935, 1001). P. G. McC.

"Frostiness" in plumbers' solder. F. A. RIVETT (Tech. Publ. Internat. Tin Res. & Dev. Counc., 1938, **A**, No. 73, 11 pp.).—"Frostiness" is often associated with inferior grades of solder, but it has been shown that a similar appearance can be produced on the surface of good-quality solder by casting in an overheated mould. Fine- and coarse-grained solders (Sn 28, Sb 1·5%, Pb balance) have been obtained by melting at 490° and pouring into moulds cooled in H_2O and heated at 175°, respectively. The solders of fine or coarse structure give equally satisfactory wiped joints. E. S. H.

Determination of lead in solders. J. GANGL and C. BRECHER (Österr. Chem.-Ztg., 1938, **41**, 9—12).—The solder is dissolved in Br + HBr. NaOH is added, and then 20% aq. Na_2S. The pptd. PbS is collected and dissolved in HNO_3, Pb being finally pptd. as $PbSO_4$; pptn. of Pb as $PbMoO_4$ or PbC_2O_4 or acidimetric methods are not applicable to solders. The % of Pb may be calc. from the *d* of the solder, as determined by a rapid pyknometric method. J. S. A.

Rapid determination of antimony in lead–antimony alloys. L. D. MININA (Zavod. Lab., 1937, **6**, 1279).—Stanford and Adamson's method (B., 1937, 354) is recommended. R. T.

Determination of arsenic in metallurgical agglomerates. N. M. MILOSLAVSKI, L. A. LIUBIMOVA, and L. A. BELOGORSKAJA (Zavod. Lab., 1937, **6**, 1184—1187).—5 g. of agglomerate are heated for 1 hr. at 800° with 2 : 1 : 0·3 MgO–Na_2CO_3–KNO_3 mixture, and the product is boiled for 30 min. with a mixture of 100 ml. of Bettendorf's reagent and 50 ml. of conc. HCl. The ppt. of SiO_2 and As is collected, washed, and shaken with 50 ml. of N/60 I in KI, excess of which is titrated, and the As content is calc. therefrom. R. T.

Hot-tinning of fabricated articles. E. J. DANIELS (Tech. Publ. Internat. Tin Res. & Dev. Counc., 1938, **B**, No. 7, 12 pp.).—A review of current practice in the tinning of Cu tubes, steel hollow-ware, milk churns, Cu wire, steel wire, cast Fe, brass, and bronze. E. S. H.

Corrosion of tin. I. Potential measurements of high-purity tin in carbonate solutions. G. DERGE (Amer. Inst. Min. Met. Eng. Tech. Publ. 913, 1938, 5 pp.; Met. Tech., 1938, **5**, No. 2).—Potential–time curves have been determined for uniformly prepared surfaces of Chempur Sn in aq. $NaHCO_3$ and Na_2CO_3. The tendency to corrosion, as measured by potential vals., increases with increasing alkalinity. Oxide films produced by annealing in air prevent electrochemical activation. The behaviour of the material is uninfluenced by Cl′ when present in $\not>$0·001M concn. R. B. C.

Bearing metals and materials. H. N. BASSETT (Metal Ind., [London], 1938, **52**, 25—32).—High-pressure lubrication (100—200 atm.) and the use of H_2O–oil emulsions have been developed. An intermediate bonding alloy, *e.g.*, Cu–Pb, obviates cracking. Experimental work on wear and the development of new bearing materials are summarised. S. J. K.

Dynamic tests on bearing metals and bearings. A. THUM and R. STROHAUER (Z. Ver. deut. Ing., 1937, **81**, 1245—1248).—Fatigue is regarded as the cause of the crumbling of heavily loaded white metal bearings. Machines designed for the compression-impact fatigue testing of a bearing metal and for the non-impact fatigue testing of a mounted bearing are described. Results are given for 4 white metals, *e.g.*, Sn 86·5, Sb 7·5, and Cu 6%. Careful finishing and mounting of the bearings and a low working temp. are important factors affecting the life of completely mounted bearings. R. B. C.

Improvements in pistons for vehicle engines. E. KOCH (Z. Ver. deut. Ing., 1937, **81**, 1458—1460).—Photomicrographs showing wear of pistons before and after electric oxidation (Eloxieren) or tinning are given. An untreated piston becomes strongly

corroded and pitted in service. An electrically oxidised surface is liable to seize on account of the erosive action of the oxide on the Fe cylinder wall. Early stabilisation of a smooth surface highly resistant to wear is obtained with a relatively thin layer of Sn. R. B. C.

Use of nickel in precision high-speed machine tools. W. R. GORHAM (Japan Nickel Rev., 1938, 6, 77—82).—Requirements for materials used in this field are discussed. S. J. K.

Materials for precision machinery. K. FRANZ (Z. Ver. deut. Ing., 1937, 81, 1449—1452).—The types of metals and alloys used in Germany for cutting purposes, permanent magnets, etc. are reviewed. The compositions of various magnet steels are given. R. B. C.

Materials for precision machinery. C. FUJII (Japan Nickel Rev., 1938, 6, 53—76).—Suitable materials (cast irons, steels) are specified and photomicrographs included. Analyses are tabulated. S. J. K.

Nickel alloys in machine tools. H. OKUDA (Japan Nickel Rev., 1938, 6, 83—105).—A review of the alloys used. S. J. K.

Nickel alloys in Japanese machine tools. T. MATSUDA (Japan Nickel Rev., 1938, 6, 12—20).—The application of Ni-alloy steels and Ni-cast Fe to machine-tool manufacture is reviewed. S. J. K.

Applications of nickel-alloy steels and -cast irons in the tool and die field. J. W. SANDS (Japan Nickel Rev., 1938, 6, 21—24).—A summary. S. J. K.

Nickel-containing hard alloys for tools. T. KASE (Japan Nickel Rev., 1938, 6, 25—52).—The use of Ni in alloys for surface treatment, by case-hardening or plating, where strength is the major consideration, and also for those hard alloys where hardness is paramount, is reviewed. Specifications and photomicrographs are included. S. J. K.

Short-time high-temperature tensile tests of wrought nickel-chromium [resistor] alloys. K. E. QUIER (Met. & Alloys, 1938, 9, 40—44).—Two commercial resistor alloys, (*A*) Ni 80, Cr 20% and (*B*) Ni 60, Cr 16, Fe 24%, were tested up to 980° and 870°, respectively, having been hot-rolled and annealed. *A* showed a marked brittle range, 480—700°, which was less noticeable in *B*; *A* was also weaker than *B* below 620°, but stronger and increasingly so above that temp. The fractures are illustrated. S. J. K.

Permanent-magnet material. ANON. (Steel, 1937, 101, No. 26, 38—40, 60).—The manufacture, magnetic properties, and applications of Alnico alloy (Fe 63, Al 12, Ni 20, Co 5%) are described. R. B. C.

Properties of platinum metals. II. Tensile strengths of platinum, palladium, and several of their commercial alloys at elevated temperatures, with notes on high-temperature corrosion-resistance of platinum. E. M. WISE and J. T. EASH (Amer. Inst. Min. Met. Eng. Tech. Publ. 899, 1938, 11 pp.; Met. Tech., 1938, 5, No. 2).—Data for Pt, Pt containing Ir (5%), Rh (10%), or Ni (5%), Pd, and Pd containing Rh 1% + Ru 4% show that, in general, the tensile strength at 1100° is < that at room temp. The effect of alternate oxidation and reduction on the properties of the alloys is discussed. Data on the resistance of Pt to SO_2 and H_2S at 1100° are given. R. B. C.

Determination of degree of fineness of platinum alloys for jewellery. H. HOLZER and E. ZAUSSINGER (Z. anal. Chem., 1938, 111, 321—337).—Methods are described for determining Ir, Rh, Pd, Au, Cu, Fe, and Ni when alloyed with Pt for jewellery. R. S. B.

Status of welding in 1937. L. C. BIBBER and E. GAMMETER (Met. Prog., 1937, 32, 551—553, 556—558, 560).—Developments in welding processes and welding techniques are reviewed. R. B. C.

[American] developments in welding during 1937. G. A. HUGHES (Iron Steel Eng., 1938, 15, No. 1, 41—45).—A review. R. B. C.

Resistance-welding fabrication. J. M. COOPER (Mech. Eng., 1938, 60, 135—139).—Recent developments in the technique of spot, seam, projection, and butt flash methods of welding are reviewed. R. B. C.

Welding of thick-walled steam-boiler drums. E. BLOCK (Arch. Wärmewirts., 1938, 19, 43—47).—Recent advances in technique are reviewed. R. B. C.

Welding of copper and copper alloys. H. CORNELIUS (Z. Ver. deut. Ing., 1937, 81, 1375—1380).—Data in the literature are summarised. R. B. C.

Welding economies and application. E. W. P. SMITH (Iron Steel Eng., 1937, 14, No. 9, 58—60).—Mechanical stress in welds, their influence on design, and arc-welding costs are discussed. R. B. C.

Shrinkages and contraction stresses in fusion-welding. S. A. ESKILSON (Proc. XII Int. Congr. Acetylene, 1936, 2, 267—309).—Investigations of various types of shrinkage are described showing that shrinkage is less with gas- than with arc-welding. The use of special joint tools to avoid transverse bending shrinkage is described. S. J. K.

Influence of welding methods on mechanical properties of welds. Y. MERCIER (Proc. XII Int. Congr. Acetylene, 1936, 2, 327—340).—Experiments in butt-welding of sheets are described. These prove that suitable heat-treatment improves the mechanical properties of the weld, especially the impact val. S. J. K.

Metallurgy, properties, and control of welds. A. M. PORTEVIN [with (MLLE.) L. BLOCH-SÉE and D. SÉFÉRIAN] (Proc. XII Int. Congr. Acetylene, 1936, 1, 197—217).—Existing knowledge of physical, chemical, and physicochemical properties of weld metal is summarised. Conditions of weldability and control and testing of welds are discussed. S. J. K

Creep limit of oxy-acetylene welds. C. F. KEEL (Proc. XII Int. Congr. Acetylene, 1936, 2, 499—503).—Butt welds have a creep strength about 70—75% of that of cast steel. S. J. K.

Widmanstätten structures in welds. N. T. Belaiew and D. Séférian (Rev. Mét., 1937, 34, 690—701).—Widmanstätten structures develop in all cases, especially with O_2–C_2H_2 welding. The structures observed are classified according to the spacing of the lamellæ: <0·25 μ. "sorbitic Widmanstätten," >0·25 μ. "pearlitic Widmanstätten." The former, which is the less stable and the more easily eliminated by suitable heat-treatment, is favoured by increasing C or by adding alloying elements to the steel. The formation of these structures is a cause of brittleness in welds. S. J. K.

Detection of faulty jointing in welded seams by means of *X*-rays. M. Widemann (Z. Ver. deut. Ing., 1937, 81, 1403—1406).—The technique is described and practical data obtained when investigating welded seams in steel are discussed in relation to the min. dimensions of fissures or oxide films which can be detected. R. B. C.

***X*-Ray testing of welds.** R. Berthold (Proc. XII Int. Congr. Acetylene, 1936, 2, 552—560).—*X*-Ray testing has now established itself as a valuable adjunct to mechanical tests. S. J. K.

Design of welded vessels for the chemical industry with reference to the use of clad materials. C. Hase (Metallwirts., 1938, 17, 123—131).—Structural details of plant made from steel clad with Cu, Ni, and stainless steels are discussed. C. E. H.

Behaviour of coke in foundry shaft furnaces. G. Speckhardt (Giesserei, 1938, 25, 55—58).—An attempt is made to apply data obtained from investigations on the reactivity of coke to foundry-furnace practice. Particular attention is given to physical conditions, *e.g.*, coke size and type of furnace. The use of the max. heat content of the coke for melting depends on the selection of coke size and strength suited to the particular type of furnace. R. B. C.

Recent developments in non-ferrous foundry practice. F. Hudson (Found. Tr. J., 1938, 58, 33—35).—A review. R. B. C.

Progress in non-ferrous castings. F. Hudson (Metal Ind. [London], 1938, 52, 101—104, 127—130, 151—156).—Addition of Ni to bronze is beneficial. Thus with 4—8% Ni, the amount varying with the composition of the bronze, the alloys are susceptible to temper-hardening and give excellent results in absence of Pb; with 10—20% Ni they are resistant to corrosion by H_2O and with >20% they may be used at elevated temp. Such alloys may be further hardened by adding Si etc. For high-tensile brass the importance of resistance to fatigue and corrosion is stressed. The grain growth of large sections may well be obviated by adding Ni and Al. The requirements of bearing metals are discussed with special reference to Pb–Cu alloys containing Sn and Ni, and the likely development of the use of leaded bronzes. Detailed compositions of alloys and some photomicrographs are given. S. J. K.

Research and development work in field of non-ferrous metals. Anon. (Found. Tr. J., 1938, 58, 49—57).—A review. R. B. C.

Oil fuel in the foundry. A. J. G. Smith (Petroleum Times, 1938, 39, 15—16).—An oil-fired oven for drying cores is diagrammatically described. R. B. C.

Naturally-bonded or synthetic moulding sands. A. Tipper (Found. Tr. J., 1937, 57, 492—494).—Factors governing the choice of moulding sands, *e.g.*, constitution, grain-size distribution, and appearance, are discussed. The compositions and grading of natural and synthetic sands are tabulated. R. B. C.

Synthetic moulding sands. H. Reininger and H. Jensch (Giesserei, 1937, 24, 613—623, 649—654).—The structure and properties of natural moulding sands, their deterioration in use and reclamation by addition of fresh sand, the principles governing the production of synthetic sands, and the function of bonding materials are discussed. The properties of synthetic sands for Fe foundries obtained by the Geko process are compared with those of natural sands. R. B. C.

Correlation of physical and chemical properties of clays with durability of moulding sands. C. E. Schubert (Trans. Amer. Found. Assoc., 1937, 45, 661—690).—The mould test, the oven test, and the hydration and rehydration tests for determining the durabilities of moulding sands were compared. The tests and equipment used are described and results obtained for green permeability and compression, dry permeability and compression, clay content, and fineness tests are given. The constituents of the clays were determined petrographically and their effects studied. None of the tests gives an indication of the life of a sand, the most economical method of treating which is to add bond after a no. of heats rather than to hold its strength const. by frequent addition of bond. Durability depended on the physical and chemical properties of minerals in the bond. R. B. C.

Testing of moulding sands. N. D. Ridsdale (Found. Tr. J. 1938, 58, 81).—Apparatus for determining their physical properties and composition is described. R. B. C.

Rapid determination of dampness of earths for moulds. A. V. Kugel (Zavod. Lab., 1937, 6, 1281—1282).—2 g. of earth are mixed with 3—6 g. of CaC_2, and the H_2O content of the earth is derived from the vol. of C_2H_2 evolved. R. T.

Core hardness. H. W. Dietert and E. Woodliff (Trans. Amer. Found. Assoc., 1937, 45, 545—562).—A scratch test developed for determining the quality, defined as hardness, of a baked core for use in a mould is described. The usefulness of the test is discussed in relation to factors affecting the quality of a core. Data are given showing the effect of varying baking time, H_2O content, time of keeping before baking, cooling rate, sand : oil ratio, and grain size on core hardness. R. B. C.

Action of sulphuric acid on metals and alloys. R. Müller (Korros. u. Metallschutz, 1938, 14, 28—34).—The ease of corrosion of various metals and Ni alloys by H_2SO_4 has been studied. The corrosive action is conditioned by the p_H, O_2 content, and temp.

of the solution, the relative movement between the solution and metal, and the extent of film formation at the surface. Local galvanic and concn.-cell corrosion and other special problems are discussed in detail. J. W. S.

Action of sulphuric acid and of sulphur dioxide on special metals and alloys of Soviet origin. I. J. KLINOV (J. Appl. Chem. Russ., 1937, 10, 1980—1992).—The corrosivity of a no. of alloy steels and non-ferrous alloys is determined. R. T.

Corrosion of some alloys by solutions of ammonium salts in liquid ammonia. L. F. AUDRIETH and T. E. FRANKS (Met. & Alloys, 1938, 9, 51—52).—Information concerning the corrosion of metals by such solutions is summarised and the data obtained by the authors for various Fe and Cu alloys are tabulated and discussed. It is stated that NH_4 salts act as acids when dissolved in liquid NH_3. P. G. McC.

Alloys for corrosion-resistance. J. O. HITCHCOCK (Metal Ind. [London], 1938, 52, 37—42).—Alloys of Cu, Ni, Al, and Pb are considered and their composition and mechanical properties tabulated. The manner in which improvements in actual corrosion-resistance have progressed side by side with the modification of the other properties of established alloys to render them more suitable for corrosion-resisting service is indicated. P. G. McC.

Corrosion fatigue. A. THUM and H. OCHS (Korros. u. Metallschutz, 1937, 13, 380—383).—A review. E. S. H.

Corrosion tests. W. O. KROENIG (Korros. u. Metallschutz, 1938, 14, 53—62).—A review of available apparatus and procedure. E. S. H.

Relation of corrosion and local current. W. J. MÜLLER (Korros. u. Metallschutz, 1938, 14, 49—53).—A lecture. E. S. H.

New aspects of causes of corrosion. T. SAMSON (Zellstoff u. Papier, 1938, 18, 113—116).—The mechanism of the corrosion of metals is discussed and factors producing differences in potential at the liquid–metal interface are given. Some corrosion phenomena in the sulphate-pulp industry are explained. D. A. C.

Cupro-berylliums—their significance and future in the non-ferrous foundry. J. LAISSUS and L. PERSOZ (Found. Tr. J., 1937, 57, 279—281, 300—301).—The production of Cu–Be containing up to 3% of Be is described. Sand-casting of these alloys presents no difficulties. The physical properties, *e.g.*, yield point and Brinell hardness, of Cu containing Be 1·79 and 2·19% as cast, and after heat-treatment for 3 hr. at 300°, are tabulated. R. B. C.

Recent progress in the application of magnesium alloys. D. B. WINTER (Metallurgia, 1938, 17, 119—121).—The uses and possible applications of elektron alloys are described. P. G. McC.

Application of magnesium and magnesium alloys in electrotechnics. W. STEIN (Metallwirts., 1938, 17, 37—40).—A review. C. E. H.

Strain–corrosion investigations with cast magnalium samples in various media. R. STERNER-RAINER (Korros. u. Metallschutz, 1938, 14, 13—17).—The attack on cast and homogenised samples of Mg–Al alloy (10% Mg), subjected to a bending strain, has been studied in 1% HCl, NaCl + H_2O_2, 5% H_3PO_4, 5% $H_2C_2O_4$, 0·1N-KOH + 3% NaCl, synthetic sea-H_2O, 20% AcOH, 15% tartaric acid, and saturated alum. The cast forms are the more readily attacked. The mechanical properties of such alloys can be used as an index of their resistance to corrosion. J. W. S.

Surface protection of electron metal. Protection against corrosion of very strong magnesium alloys. H. GIEHMANN (Korros. u. Metallschutz, 1938, 14, 9—13).—Very strong electron metal (A.Z.M. alloy) is best protected against corrosion by a good paint, preferably applied after treatment in chromate solution, which improves the adherence of the paint. Electrochemical methods for producing protective films have been unsuccessful. The paint-protected metal withstands inland climate completely, but sea air causes local corrosion. Both A.Z.M. and the less strong A.M. 503 are insensitive to corrosion through strain. Junctions with heavy metals must be thoroughly coated with paint. Corrosion through contact with glycol etc. can be reduced by addition of alkali fluoride. J. W. S.

Raw materials and aluminium production. W. ASHCROFT (Metallurgia, 1938, 17, 126—128).—A brief review. P. G. McC.

Aluminium and its applications. ANON. (Metallurgia, 1938, 17, 155—158).—A review of British progress indicating the applications of Al in the aircraft, motor transport, railway, shipbuilding, and architectural industries. P. G. McC.

American progress in the utilisation of aluminium and its alloys. R. J. ANDERSON (Metallurgia, 1938, 17, 143—146).—Most important advances have been made in the development of new alloys, methods of fabrication, new equipment for processing, heat-treatment, welding, structural design, and surface finishes. The composition and properties of the new alloys are considered, and some fields in which conspicuous progress has been made are described. P. G. McC.

Recent developments in the metallurgy of aluminium and its alloys. G. A. ANDERSON (Metallurgia, 1938, 17, 129—133).—The materials of general interest to engineers are classified: (1) pure Al, (2) wrought alloys, (3) heat-treated wrought alloys, (4) cast alloys, and (5) heat-treated cast alloys. These are considered in a series of tables in order of ascending mechanical properties. Finally, alloys for sp. purposes and the principles of powder metallurgy are briefly reviewed. P. G. McC.

Aluminium die casting. A. STREET (Metallurgia, 1938, 17, 140—142).—Methods of gravity and pressure die casting are considered. The pressure die casting of Al–Si alloys is discussed, reference also being made to the progress in casting the pure metal and to the special advantages which the pure metal has in "slush" die casting. P. G. McC.

Aluminium industry in France. H. D'AUVIGNY (Metallurgia, 1938, 17, 147—150). P. G. McC.

Development of the aluminium industry in Switzerland. A. von Zeerleder (Metallurgia, 1938, 17, 151—154).—A review of the progress made by the Aluminium-Ind. A.-G. The gradual progress in furnace design is outlined. The special refining process used by this firm for producing high-purity Al is described, the composition and properties of alloys developed in their own laboratories are tabulated, and the special applications of Al in Switzerland are summarised. P. G. McC.

Progress and trends in the Norwegian aluminium industry. J. Mürer (Metallurgia, 1938, 17, 159—162).—A review of Norwegian applications with special reference to the canning industry and the manufacture of dairy appliances. P. G. McC.

Effect of notches on the tensile strength of aluminium-magnesium alloys with different structures. H. Vosskühler (Metallwirts., 1938, 17, 31—34).—The effect of the size and shape of the notches has been investigated in the case of a forged alloy containing 9% Mg. For forged material the notch-sensitivity is approx. the same after homogenising at 350—400° as when not annealed or annealed at temp. $>150°$. Annealing at approx. 250° causes considerable pptn. of Al_3Mg_2 and the presence of notches reduces the tensile strength considerably. The same alloy in the cast condition is not adversely affected by notches except when annealed at 200—250°. C. E. H.

Stress figures on aluminium-copper-magnesium alloys. E. Ruppel (Metallwirts., 1937, 16, 1307—1308).—Markings resembling the well-known stress lines on steel may appear on slightly cold-worked and annealed Al-Cu-Mg alloys. They are caused by the promotion of the pptn. of $CuAl_2$ particles in certain positions due to the deformation. C. E. H.

Deformability and shear strength of aluminium-alloy rivets which are hammered without preliminary heat-treatment. M. Hansen and E. von Rajakovics (Metallwirts., 1938, 17, 187—189).—An Al-Cu-Mg alloy of the duralumin type may be hammered without the necessity for annealing immediately beforehand. Its mechanical properties with and without a protective oxide film have been determined. A similar shear strength and deformability are shown by Al-Mg alloys containing 3 and 5% Mg, and by an Al-Mn alloy. C. E. H.

Ageing of magnesium-copper-aluminium alloys at elevated temperatures. P. Brenner and H. Kostron (Z. Metallk., 1937, 29, 374—379).—Preliminary ageing of Duralumin (Cu 3·5—4·7, Mn 0·3—1·5, Mg 0·4—1·5, Si 0·1—0·9, Fe $<0·5$%) at room temp. has little effect on the mechanical properties obtained on subsequent ageing at 150°, but the rate of hardening is doubled for every 10° increase in ageing temp. between 150° and 175°. Cold-work before hot-ageing enormously increases the rate of hardening, but intensifies the hardening effects only in alloys with a high content of Mn and Mg. A. R. P.

Recrystallisation phenomena in a temper-hardening high-strength aluminium forging alloy. W. Stenzel (Metallwirts., 1938, 17, 184—185).—Trouble has been experienced from the cracking of Al-alloy rivets during hammering, on account of regions of large grain size. This has been overcome by making the rivets from cold-drawn instead of from soft-annealed wire. C. E. H.

Influence of cold-work and subsequent age-hardening on strength and structure of pressed bars of duralumin. K. L. Dreyer (Metallwirts., 1938, 17, 185—187).—Al-Cu-Mg alloys forged in the press before heat-treatment are often considerably stronger and less ductile than the same alloys fabricated into wire or sheet. It is shown that the effect is due to the small reduction in section in the press, greater reduction producing a lower final strength. The duration of annealing in the subsequent heat-treatment has little effect. C. E. H.

Forgeable aluminium bronzes. M. Hansen (Metallwirts., 1938, 17, 189—190).—The effects of different forging temp. and heat-treatments on the mechanical properties of alloys containing Al 8·7—11·8 and Fe 1—1·7% have been determined. C. E. H.

Testing of corrosivity of oxidised aluminium alloys. A. N. Tumanov (Zavod. Lab., 1937, 6, 1237—1240).—A drop of 3% $K_2Cr_2O_7$ in 50% HCl is placed on the oxidised Al surface, and the length of time elapsing before the drop becomes green is noted. Anodal passivation in a H_2SO_4 bath is satisfactory when this time is <10 min., or <8 min. in an aq. CrO_3 bath. R. T.

Determination of sodium in aluminium and aluminium-silicon alloys. G. B. Brook, G. H. Stott, and A. C. Coates (Analyst, 1938, 63, 32—36).—Scheuer's method (B., 1933, 871), in which the metal is kept in a molten condition at 900°, so that Na is oxidised at the surface and, after cooling, is determined by dissolving in hot H_2O and titrating, is developed and improved. The results agree to within 0·001% with Al, and to within 0·003% with Al-Si alloys, and are identical with those obtained with the usual HNO_3 method, which is much more time-consuming. E. C. S.

Determination of small amounts of potassium in metallic aluminium and magnesium. E. I. Nikitina (Zavod. Lab., 1937, 6, 1206—1208).—A solution of 0·3—0·5 g. of alloy in HCl is evaporated to dryness, the residue dissolved in dil. aq. AcOH, the solution filtered from any SiO_2 which may separate, and AcOH 1, EtOH 0·2, saturated aq. NaCl 5, 50% $NaNO_2$ 5, and 25% $Co(NO_3)_2$ 5 ml. are added. The ppt. of $K_2NaCo(NO_2)_6,H_2O$ is collected after 24 hr., dried at 110°, and weighed. R. T.

Determination of aluminium oxide in aluminium. J. A. Klatschko and E. E. Gurevitsch (Zavod. Lab., 1937, 6, 1187—1195).—0·05—0·1 g. of Al is dissolved in 5—6 ml. of 50% HCl, the solution is centrifuged in a special tube, and the height of the column of $Al_2O_3 + SiO_2$ formed is read; the $Al_2O_3 + SiO_2$ content is calc. therefrom. Determination of the SiO_2 content by heating the ppt. with HF and weighing the residue leads to low results, owing to formation of a complex, $Al_2O_3,3HF$, from

which HF is eliminated only after prolonged heating at 900—1000°. R. T.

Determination of gases in aluminium by the method of hot vacuum extraction. K. A. VASILIEV and S. G. GETZOVA (Zavod. Lab., 1937, 6, 1195—1199).—The sample is degassed in vac. (0·003—0·006 mm.) at 850°, and the gas analysed by the usual methods. R. T.

Determination of magnesium in presence of metals of the third and fourth groups, with special reference to analysis of aluminium alloys. I. UBALDINI and U. PELAGATTI (Chim. e l'Ind., 1938, 20, 73—75).—Small amounts of Mg in presence of Al can be pptd. directly as $MgNH_4PO_4$ if tartaric acid or NH_4 citrate is added to the solution and if the amount of Al is not too large. The pptn. of Mg in presence of Mn can also be carried out directly after oxidation of the Mn with H_2O_2 and addition of NH_4 citrate. In the determination of Mg in Al alloys containing <1% Mg the Al must first be separated by means of NaOH. O. J. W.

Determination of antimony in aluminium alloys. E. PACHE (Chem.-Ztg., 1938, 62, 149).—When Pb and Cu (2%) are present, 1 g. of the alloy in 30 c.c. of dil. HCl is oxidised with 5 c.c. of 3% H_2O_2, diluted with 50 c.c. of H_2O, treated with 20 c.c. of 20% Na_2SO_3 until no more SO_2 is evolved, diluted with 100 c.c. of H_2O, and titrated with 0·1N-$KBrO_3$ in presence of Me-orange. When Pb and Mn are present, the solution is reduced with Na_2SO_3 as above, diluted with 200 c.c. of H_2O and 40 c.c. of aq. $MnSO_4$, and titrated with 0·1N-$KMnO_4$; alternatively, 1 g. of the alloy is dissolved in 10% NaOH, diluted with 30 c.c. of H_2O, acidified with conc. H_2SO_4, treated with 20 c.c. of HCl, and finally diluted and titrated with $KMnO_4$ as above. F. O. H.

Films on aluminium. A. QUARTAROLI and O. BELFIORI (Korros. u. Metallschutz, 1938, 14, 7—9).—After pure Al has been immersed for 1 hr. in 0·0006M-$HgCl_2$, washed with H_2O, and dried, no detectable increase of wt. occurs, but when the sample so treated is immersed in N-HCl at 15° it reacts vigorously for 25—40 min., after which reaction almost ceases and does not recur when the HCl is renewed. Rinsing in HNO_3 after immersion in $HgCl_2$ destroys this effect, but if the rinse in HNO_3 is succeeded by treatment with aq. NaOH vigorous action occurs when the sample is treated with HCl. It is concluded that the HNO_3 tends to cover the Hg deposited with an oxide film, this being removed by NaOH. Newly formed oxide films on Al cover the surface better than does an old film, but absorb $Hg^{\cdot\cdot}$ more easily. Hence in the case of Al covered with an old film attack by $Hg^{\cdot\cdot}$ is more localised than with a new film. It is suggested that the method can be applied to the testing of the efficiency of protective films on Al. J. W. S.

Use of oxide films on aluminium and its alloys. I. E. G. WEST (Metallurgia, 1938, 17, 137—139).—Three electrolytic methods and a chemical process for producing protective oxide films are described. The underlying principles and limitations of each process are considered and discussed. P. G. McC.

Use of oxide films on aluminium and its alloys. II. E. G. WEST (Metallurgia, 1938, 17, 197—199; cf. preceding abstract).—The properties of and the operations of colouring and sealing (*i.e.*, filling up the pores, *e.g.*, with lanoline) anodic films are described. Methods of testing films are summarised and the range of alloys which may be treated are indicated. Commercial applications are also described. S. J. K.

Testing of Eloxal coatings [on aluminium]. W. BAUMANN (Metallwirts., 1938, 17, 236—238).—The specimen is made cathodic in 3—5% $BaCl_2$ solution, a Cu sheet being the anode, and current is supplied by a battery. The vol. of H_2 evolved from the Al is a measure of the continuity of the oxide film. After 45 min. anodic oxidation, Al gave a negligible amount of H_2 in this test. A porosity test may be carried out by interposing a piece of filter-paper soaked in $BaCl_2$ + phenolphthalein between the Al and a Cu sheet, which are made cathodic and anodic, respectively. Red spots indicate pores in the oxide film. C. E. H.

Influence of metallic impurities on velocity of dissolution of aluminium in hydrochloric acid. M. STRAUMANIS [with J. BORMANIS] (Korros. u. Metallschutz, 1938, 14, 1—7).—Only about 16 c.c. of H_2 are evolved in 24 hr. from a plate of 99·998% Al, 1·8 cm. in diameter, immersed in 2N-HCl at room temp. In 5N- and 10N-HCl dissolution is more rapid, but in conc. HCl (*d* 1·19) the rate is greater initially but decreases rapidly, probably owing to the formation of protective films of salts. Dissolution of Al in 2N-HCl is accelerated greatly by traces of Pt, Fe, and Cu in the solution, and to a smaller extent by Ni, Au, and Hg. Cd and Si have no effect. The presence of 0·06 μg. of $Pt^{\cdot\cdot}$ per 10 c.c. is sufficient to accelerate the dissolution in 5N-HCl. Traces (<0·01 wt.-%) of Fe or Cu in the Al do not affect the dissolution appreciably, but greater amounts cause acceleration of the action, Fe having the greater effect. On the contrary, Cd and Si retard dissolution. The facts may be explained qualitatively on the theory of local currents. J. W. S.

Carrying out the Mylius oxidic [hydrogen peroxide-]sodium chloride test [for resistance to corrosion of aluminium and its alloys]. H. RÖHRIG and K. GEIER (Korros. u. Metallschutz, 1938, 14, 17—18; cf. B., 1925, 552; 1921, 150A).—Results obtained by this test may be falsified through dissolution of Al alloys in the HNO_3 used in removing the corrosion product formed by the action of NaCl and H_2O_2. Even for pure Al the temp. of the HNO_3 should be ≯20°. J. W. S.

Alloys of the light metals. C. H. DESCH (J.S.C.I., 1938, 57, 69—75).—The light alloys having Al or Mg as their base are reviewed, with special reference to their uses in chemical industry. Be, with the advantages of low *d* and high m.p., has so far proved inapplicable for this purpose. The effect of heat-treatment on strength and on resistance to intercryst. attack is considered.

High-strength light alloys. E. R. GADD (Metal Ind., [London], 1938, 52, 5—10).—A review of im-

proved alloys and production methods. Heavy presses and drop-stamping machines have been introduced, die-stamping has been developed, and sand-casting improved. The uses and limitations of various Mg, Al, and Be alloys in aircraft are discussed. S. J. K.

Service failure of light alloys. E. Wood (Metal Ind. [London], 1938, 52, 121—125).—The characteristic features of various types of failure are illustrated. The technique of analysis of such failures is outlined and different kinds of stress-raisers are considered. Mg alloys are discussed and emphasis is laid on the importance of correct practice and design. P. G. McC.

X-Ray study of the macrostructure of light-metal articles. M. Widemann (Metallwirts., 1938, 17, 109—115).—The practical application of the method to the detection of small defects and slight differences of structure is discussed. C. E. H.

Welding of light alloys containing magnesium. F. Eggelsmann (Proc. XII Internat. Congr. Acetylene, 1936, 3, 792—798).—The gas-welding of an alloy (Si 0·90, Mn 0·50, Mg 1·0%, Al the remainder) used to replace Cu in certain work was investigated. No difficulties were encountered when a suitable flux was used. Tests on the quality of the welded joints are included. P. G. McC.

Evaluation of welds in light metals by means of the tensile test. W. Feldmann (Metallwirts., 1937, 16, 1299—1306).—A study has been made of the tensile properties and position and type of fracture of sheet-metal specimens welded by the O_2–C_2H_2 process. Al and Al–Mn, Al–Mg–Mn, Al–Mg, Al–Cu–Mg, and Al–Mg–Si alloys have been investigated. C. E. H.

Rapid corrosion tests under mechanical stress. P. Brenner and W. Roth (Metallwirts., 1937, 16, 1295—1299).—The specimens are immersed in a tank of liquid while being bent by wts. suspended from levers attached to them. Results of tests on Al–Mg and Al–Cu–Mg alloys in NaCl + HCl solutions and artificial sea-H_2O agree well with those obtained in the D.V.L. stirring apparatus. C. E. H.

Determination of tartrate in cyanide copper-plating solutions. L. Weisberg (Metal Ind., N.Y., 1937, 35, 615—616).—Boiling with HCl to eliminate CN′, treatment with Zn to ppt. Cu, and then titration of the tartrate near the b.p. with $KMnO_4$ in presence of H_2SO_4 and $MnSO_4$, with the intermediate addition of a known amount of $H_2C_2O_4$, provides a rapid method for routine control of the plating solutions. L. S. T.

Rochelle salt–copper cyanide plating bath. II. Effect of current density and p_H on anode behaviour. A. K. Graham and H. J. Read (Metal Ind., N.Y., 1937, 35, 617—621; cf. B., 1938, 70).—Data showing the variation of the anode polarisation with the anode c.d. at five p_H vals. in the range 10·7—13·3, and the effect of variation in bath composition, are recorded graphically. High c.d. vals. can only be used successfully in this plating bath provided the anode c.d. is controlled below certain limiting vals. High [CO_3''] increases the permissible anode c.d. L. S. T.

Alkaline plating baths containing organic amines. II. Copper plating from solutions containing ethylenediamine. C. J. Brockman and J. H. Mote (Trans. Electrochem. Soc., 1938, 73, Preprint 13, 197—200; cf. B., 1937, 797).—Bright, adherent deposits of Cu on Fe can be obtained from a bath containing 50 g. of $CuSO_4$ per litre and sufficient $C_2H_4(NH_2)_2$ to produce a clear blue coloration, and operated at a c.d. of 0·4—3·2 amp./sq. dm. and at 20—65°. J. W. C.

Alkaline plating baths containing the ethanolamines. VI. Copper plating from monoethanolamine solutions. C. J. Brockman and C. P. Tebeau (Trans. Electrochem. Soc., 1938, 73, Preprint 16, 229—233).—The bath recommended contains $CuSO_4$ 76—149 g., $Na_2C_2O_4$ 25—50 g., and $NH_2{\cdot}C_2H_4{\cdot}OH$ 77—151 c.c. per litre, and is operated at a c.d. of 3·1—11·6 amp./sq. dm. and at 20—30°. The deposits are very bright and firmly adherent, but the throwing power of the electrolyte is inferior to that of the solutions previously investigated containing, respectively, $NH(C_2H_4{\cdot}OH)_2$ and $N(C_2H_4{\cdot}OH)_3$. (Cf. B., 1937, 797.) J. W. C.

Causes of porosity in electrodeposited coatings, especially of nickel on steel. A. W. Hothersall and R. A. F. Hammond (Trans. Electrochem. Soc., 1938, 73, Preprint 12, 171—196).—A comprehensive analysis is made of the possible causes. A specialised technique involving the use of high-purity electrolytic Fe cathodes, Pt anodes contained in alundum thimbles, and an electrolyte entirely free from suspended impurities has enabled non-porous Ni deposits <0·0001 in. thick to be prepared. Information is appended on the effects on porosity of cathodic discharge of H_2, of suspended impurities and contaminants in the solution, of the technique employed in the prep. of the cathode, and of cathodic surface imperfections both physical and chemical. Methods of testing the porosity of Ni coatings on Fe are discussed. J. W. C.

Cathodic excrescences in the electrolytic refining of tin. O. Scarpa (Atti R. Accad. Lincei, 1937, [vi], 26, 362—365).—The conditions are described under which different types of Sn deposits are formed. As in the case of Cu (cf. B., 1938, 177) the formation of single crystals was never observed, but under certain conditions cryst. deposits with a high degree of orientation are formed. O. J. W.

Electrolytic removal of paint and varnish from tinned surfaces. C. C. Downie (Metal Clean. Finish., 1937, 9, 1018—1022).—Disused tinned canisters are anodically treated in a filtered alkaline bath containing NaCl and NaOH, the actual composition depending on the nature of the paint to be removed. Stripping is generally complete in 5 min. and can be effected without impairment of the tinned surface. J. W. C.

Structure and hardness of electrolytic chromium. M. Cymboliste (Trans. Electrochem. Soc., 1938, 73, Preprint 9, 137—147).—The microstructures of Cr deposits ranging in hardness from 400 to 1200 Brinell are compared, and the effects of

variation in the depositing conditions discussed. (Cf. B., 1937, 797, 1069; 1938, 394.) J. W. C.

Electrodeposition of manganese from aqueous solutions. III. Survey of several electrolytes. W. E. BRADT and L. R. TAYLOR (Trans. Electrochem. Soc., 1938, 73, Preprint 17, 235—243; cf. B., 1937, 798).—Of the solutions examined, the best results were obtained from baths containing, respectively, Mn benzoate, Na Mn citrate, and a mixture of Mn lactate and Na citrate. J. W. C.

Ageing of electroplating baths. A. POLLACK (Oberflächentech., 1938, 15, 41—43).—Most plating baths give better results after use or preliminary passage of a high current than when freshly prepared. The nature of the changes occurring in Cr, Ni, Ag, Cu, brass, and Cd baths during this ageing period is described. C. E. H.

Electrolytic coating of aluminium with other metals. F. MARKHOFF (Korros. u. Metallschutz, 1938, 14, 18—28).—A review of recent patents. J. W. S.

Selection of electrodeposits. C. F. FRANCIS-CARTER (Metal Ind. [London], 1938, 52, 43—48).—A review of the properties and applications of coatings. P. G. McC.

Electroplating of copper with platinum or palladium. O. E. ZVJAGINTZEV, L. K. AMOSOVA, A. V. VOROBIEVA, and N. M. CHANANOV (J. Appl. Chem. Russ., 1937, 10, 1969—1979).—Directions for covering Cu with thin layers of Pt or Pd by known methods are given. R. T.

Non-tarnishable [metal] finishes. E. A. OLLARD (Metal Clean. Finish., 1937, 9, 929—934).—A dissertation on the properties, uses, and future potentialities of electrodeposited Cr and Rh. J. W. C.

Testing and stripping of electrodeposits (rhodium, palladium, and platinum). B. EGEBERG and N. E. PROMISEL (Metal Clean. Finish., 1937, 9, 919—922, 1003—1006, 1028).—The wt. of metal in a given deposit may be computed by stripping the plate, using cold conc. HNO_3 (with or without addition of HCl) in the case of Pd and aqua regia for Pt, and determining the precious metal in the solution. As the stripping reagents attack the basis metal microscopical examination may be preferable. There is no known method of stripping Rh. Methods of determining the hardness, abrasion-resistance, and porosity of the individual plates are discussed with particular reference to the examination of Rh-plated silverware. J. W. C.

Health hazards in the plating industry. F. N. CARLSON (Metal Ind., N.Y., 1937, 35, 610—614).—Causes of injury and their prevention are discussed. L. S. T.

Fractures in superheater tubes. Wetting [and froth flotation]. Grinding tests [on magnetite]. —See I. **Heating tubes in petroleum refineries.** —See II. **Dyeing anodised Al.**—See VI. **Enamelling Fe. Ceramic material–metal joints. Refractories.**—See VIII. **Corrosion and protection of cement etc.**—See IX. **Electric furnaces for metal industries. Magnetic testing. Selective electrostatic separation. Electrical pptn. of gases.**—See XI. **Bronze media. Paint and corrosion-resistance.**—See XIII. **Steels for use in sugar industry.**—See XVII. **Ag from fixing-salt solutions.**—See XXI. **Waste pickling liquors.**—See XXIII.

See also A., I, 183, **α–γ Transformation of Fe and its alloys.** 187, **Systems Mg–Cd, Al–Mg, Au–Hg, Ga–In, Ag–Cd, Cu–Cd, and Cr–CrAs. Solid solubility at low temp. of Si or Cu in Al, and of Al in Mg. Silicides.** 188, **Crystal structure and ferromagnetism of alloys. Pptn. in alloys. Eutectic alloys. Superlattices in alloys.** 201, **Passivity of Fe and steel in aq. HNO_3.** 205, **Electrodeposition of Cu.**

PATENTS.

Charging of blast furnaces or other similar structures. H. A. BRASSERT & CO., LTD. From H. A. BRASSERT & CO. (B.P. 476,868, 10.6.36).—Claim is made for a distributor by means of which the charge can be fed to any desired part of the furnace. F. M. L.

Treatment of ores containing iron. T. F. BAILY (U.S.P. 2,066,665, 5.1.37. Appl., 18.7.34).—Fine Fe ore and appropriate fluxes are allowed to fall down a shaft furnace up which passes a current of hot $CO + H_2 + N_2$ (at 400°), which reduces the Fe_2O_3 to Fe. Fine coal is fed into the base of the shaft to provide heat for melting the reduced charge and hot gases for the reduction, and air is admitted above the reduction zone to burn the excess gas and thus preheat the charge. A. R. P.

Apparatus for continuous melting of ferrous metals. H. V. J. and H. M. O. GERNELLE (B.P. 478,819, 28.7.36. Fr., 30.7.35).—Air is supplied to the blast furnace by two independently regulated rows of tuyères giving two combustion zones, so that in the lower zone the coke is burned to CO while in the upper the CO and part of the coke are burned to CO_2. F. M. L.

Production of iron. HOCHOFENWERK LÜBECK A.-G. (B.P. 477,935, 14.11.36. Ger., 6.2.36).—In the production of pig Fe, containing >0·6% Ti, the fluxes are adjusted to give slag containing $CaAl_2O_4$ > 50%, with a slag : metal ratio of 1 : 1—3; *e.g.*, the fluxes consist of a mixture of SiO_2 4—25, CaO 35—55, and bauxite (with 3—5% of TiO_2) 30—60%. F. M. L.

Manufacture of iron or steel. SOC. D'ELECTRO-CHIM., D'ELECTRO-MÉTALL., ET DES ACIÉRIES ELECTR. D'UGINE (B.P. 478,562, 14.4.36. Fr., 16.4.35).—Pig Fe or Bessemer steel (containing, *e.g.*, 0·12% P) is dephosphorised by pouring the molten metal from a height into a ladle containing molten slag (at 1300°) consisting of SiO_2 20, FeO 25, MnO 11, CaO 41, Al_2O_3 1, and MgO 2%; a vigorous seething action occurs with evolution of CO, and the treated metal contains 0·022% P. L. C. M.

Manufacture of iron, steel, and ferrous alloys from pig iron. G. W. WILLIS (B.P. 476,800, 15.4.36).—Pig Fe to which, *e.g.*, Mn and Cr have been added is heated at 1600—2000° and treated firstly

with Na_2SO_4 and then with limestone to reduce the C content to that desired in the steel. F. M. L.

Desulphurisation of pig iron. METALLFRAX A.-G., Assees. of R. P. HEUER (B.P. 477,083, 18.3.36. U.S., 9.5.35).—Pig Fe is tapped from the blast furnace into a desulphurising vessel in which it is treated with a basic slag which is fluid at 1200—1400° and contains CaO $\not>$55 (30—55), CaF_2 20—50, SiO_2 5—25%. F. M. L.

Production of cast iron in a cupola furnace. E. PIWOWARSKY (B.P. 478,198, 9.7.36).—By preheating the air to 400—700° the coke consumption can be reduced to $\not>$8 (1—3)% of the Fe melted. F. M. L.

Production of iron and steel. NEUNKIRCHER EISENWERKE A.-G. VORM. GEBR. STUMM, and J. HAAG (B.P. 478,951, 24.6.36).—Refined metal low in C is recarburised by tapping it from the converter into a transport ladle containing molten pig Fe, and then treating the mixture in an open-hearth or electric furnace. F. M. L.

Production of free-cutting steel. NEUNKIRCHER EISENWERK A.-G. VORM. GEBR. STUMM (B.P. 477,294, 23.6.36. Ger., 24.6.35).—A deoxidiser (Mn powder) is stirred into molten, thinly fluid S and the mixture allowed to cool; it is added in a desired amount to the molten steel bath. F. M. L.

Annealing of alloy steel. W. W. TRIGGS. From GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. (B.P. 476,667, 4.3.36).—High resistance to plastic deformation in a steel containing C 0·1—0·25, Mn 0·5—1·5 (1—1·5), Cu 0·35—0·5, Mo 0·1—1, and Si $\not>$0·5%, which has been hot-worked and cooled, is obtained by heating at 400—700° and cooling in air. F. M. L.

Annealing of corrosion-resistant chromium-steel [strip]. A. H. STEVENS. From SUPERIOR STEEL CORP. (B.P. 477,041, 19.6.36).—The strip is coated with kerosene, passed through the usual annealing process, cooled in an inert atm., and finally pickled in dil. H_2SO_4, in which the scale is readily sol. F. M. L.

(A) Surface-hardening of metal end-journals, *e.g.*, roller necks. (B) Hardening iron alloys by quenching. I. G. FARBENIND. A.-G. (B.P. 476,938 and 476,946, [A] 17.6.36, [B] 18.6.36. Ger., [A] 20.6.35, [B] 19.6.35).—(A) Uniform depth of hardening is obtained by pressing a H_2O-cooled abutment, of high-conductivity material, against the end face of the journal. (B) The hardening effect of quenching in H_2O or CCl_4 is moderated by introducing therein finely distributed gas (air) bubbles in presence of a frothing agent, *e.g.*, soap. F. M. L.

Hardening of metal [steel] surfaces. A. HERBERT, LTD., A. H. LLOYD, and H. H. BEENY (B.P. 477,277, 20.6.36).—The surface of elongated articles *e.g.*, lathe-bed rails, is traversed by a device carrying a series of burners and H_2O-jets so arranged that every part of the metal is, in turn, heated to above the hardening temp. and then immediately quenched. F. M. L.

Hardening of metal [steel] parts by means of the electric current. P. MOURAVIEFF and B. MESTER (B.P. 476,910, 2.12.36).—The steel is treated cathodically in a saturated cyanide solution with a current of 1 amp./sq. cm. at 150—200 v., using a large anode surface so that sparking occurs between the electrodes. F. M. L.

Case-hardening of iron or steel articles. BAYLISS, WILEY, & CO., LTD., and C. T. BAYLISS (B.P. 476,998, 17.6.36).—In the continuous process claimed, the articles are passed through a heating furnace, being treated with carburising material at a given point and then ejected from the furnace into H_2O. F. M. L.

Welding of non-austenitic iron and steel alloys, and of iron and steel. GEBR. BÖHLER & CO. A.-G. (B.P. 478,623, 21.4.37. Austr., 25.4.36).—The use of welding wires of austenitic alloys containing C $\not>$0·35 (0·18), Mn 13—26 (15), and Cr 3—15 (6), with or without Ni $\not>$4 (4) and/or Co $\not>$8 (5) and/or one or more of the metals W, Mo, Cu, V, Ti, and Ta $\not>$3% in all, is claimed. L. C. M.

Pickling metal, particularly ferrous metal. TIMKEN ROLLER BEARING CO., Assees. of C. H. MCCOLLAM, D. L. WARRICK, and J. M. GOTSHALL (B.P. 477,425, 26.8.36. U.S., 3.9.35).—Claim is made for the use, as an inhibitor in the H_2SO_4 pickling bath, of a product made by sulphonating a mixture of a phenol, *e.g.*, creosote, and a mustard oil or a substituted $CS(NH_2)_2$. F. M. L.

Production of phosphate coatings on ferrous surfaces. PYRENE CO., LTD., and W. J. CLIFFORD (B.P. 477,910, 9.7.36).—The $Fe_3(PO_4)_2$ film formed in the parkerising process is oxidised in ZnH_2PO_4 baths by H_2O_2, or in MnH_2PO_4 baths by $KMnO_4$. F. M. L.

Permanent magnets and steels for production thereof. H. C. HEIDE. From DEUTS. EDELSTAHLWERKE A.-G. (B.P. 476,994, 11.6.36).—The steels contain C 0·7—1·25 (0·9—1·05), Cr 2·5—4·9 (3—4), Co 1·5—3·5 (1·8—2·5), W 0·2—2·5, Mn $\not>$0·4, and Si 0·25—0·8%. F. M. L.

Manufacture of permanent magnets. SIEMENS & HALSKE A.-G. (B.P. 476,702, 5.8.36. Ger., 7.8.35).—The use of steels containing Co 30—36 (35), Ni 16—25 (18), Ti 6—12 (8), and Al 6% quenched from 1000° and reheated at 500—750° is claimed. F. M. L.

Manufacture of magnetic alloys. HERAEUS-VACUUMSCHMELZE A.-G. (B.P. 478,625, 28.6.37. Ger., 27.6.36).—High-μ Fe alloys [containing Ni + Co 30—80 (30—50), Cu $\not>$13 (4·5—6), Mo + W + Cr $\not>$8 (2—5), V + Ti + Si $\not>$3 ($\not<$0·3), and Mn $\not>$ 2 ($\not<$0·2)%] are prepared by melting the alloy at 2—10 mm. Hg pressure and adding, before casting, 0·005—0·3 wt.-% of alkaline- and/or rare-earth metal, *e.g.*, Ce. L. C. M.

Nickel-iron alloys for springs. R. STRAUMANN (B.P. 477,729, 3.12.36. Ger., 13.12.35).—Al-free alloys with a low thermo-elastic coeff. contain Ni 25—40 (30—38), Be 0·5—2, Mo, Cr, or W 5—12, Ti 0·6—2, and Si + Mn 1%. F. M. L.

Improving the machining qualities of (A) iron-nickel-aluminium alloys, (B) iron-nickel-aluminium-copper alloys. R. BOSCH A.-G. (B.P.

478,126—7, [A, B] 10.7.36. Ger., [A] 22.7.35, [B] 9.9.35).—Fe alloys containing (A) Ni 7—40 (20—30) and Al 5—20 (10—15)% are maintained at >700° (850—950°) for 0·25—48 (2) hr. and then cooled at < 5° (1°)/min. between the α–γ transformation point and 500°; and (B) Ni 7—35 (10—30), Al 5—20 (10—15), Cu 0·01—40 (1—20)%, and Co, Cr, Mn, Mo, Si, U, Ti, V, W $\not>$5% in all, are maintained at 750—900° for 0·25—2 hr. and cooled at <10° (1—2°)/min. between the limits described in (A). F. M. L.

Ore dressing and the like. A. J. J. FIFER (B.P. 478,895, 6.8. and 27.8.36).—A system of valves on the separation chamber for the sink-and-float method of concn. of minerals is so arranged that concentrates can be withdrawn without causing currents in the liquid. F. M. L.

Wet concentration of minerals and ores. A. FRANCE (B.P. 479,123, 27.6.36).—An arrangement of sluice boxes is claimed for use in the recovery of Au or cassiterite from ore mixtures. F. M. L.

Apparatus for treatment of ores by amalgamation. ANGLO-FRENCH SECURITIES CORP., LTD., and M. MOLLA (B.P. 479,449, 5.8.36. Fr., 23.8.35).—Modifications are claimed in apparatus of the type comprising a Hg bath and a movable body, having an amalgamated surface, arranged to descend into the Hg bath and remove amalgamated particles. F. M. L.

Casting of metals. AMER. METAL CO., LTD. (B.P. 477,720, 14.10.36. U.S., 19.10.35).—Molten deoxidised metal (Cu) is passed through a chamber containing a reducing atm. and cast into a mould in vac. F. M. L.

Casting of non-ferrous alloys. FACHANSTALT F. NEUZEITLICHES GIESSEREIWESEN DIPL.-ING. DR. ING. L. WEISS G.M.B.H. (B.P. 479,406, 19.5.37. Denm., 17.10.36).—A metal mould is first coated with a paste of water-glass, talc, and $CaCl_2$, which is allowed to dry; this is then heated to red heat and a thick oil, fat, tallow, or an alkali or alkaline-earth metal is introduced which explodes, expelling the air. The molten metal (Cu–Zn or Cu–Ni alloys) is cast into the mould to give smooth castings. F. M. L.

Manufacture of fabricated structures from copper-base alloys. A. H. STEVENS. From AMER. BRASS CO. (B.P. 476,894, 20.6.36).—In welding Cu alloys containing Si 0·35—10 (3·5), Mn 0·5—3, and Sn and/or Fe $\not>$3% the welding rod used has a similar composition. F. M. L.

[Copper] alloy [for electrodes of machine welders]. R. S. ARCHER, Assr. to A. O. SMITH CORP. (U.S.P. 2,066,512, 5.1.37. Appl., 17.10.34).—The alloy contains P $\not>$1·67 (0·45) and Fe $\not>$5 (2·45)%. A. R. P.

Roasting of ores, especially zinc sulphide ores containing lead and/or cadmium. S. ROBSON, T. B. GYLES, and NAT. SMELTING CO., LTD. (B.P. 478,642, 21.5.36).—In the blast-roasting of ZnS ores, using a travelling grate, in order to separate the upper portion of the calcine (which generally is lower in Pb and Cd and suitable for Zn distillation) from the bottom layer (higher in Pb and Cd), the charge is fed upon the grate in three layers, the intermediate one being of inert material or fines from previous roasting. After furnacing, the upper layer is readily separated by a scoop from the moving grate. L. C. M.

Composite bodies of zinc and aluminium. REYNOLDS METALS CO. (B.P. 478,457, 23.12.36. U.S., 28.1.36).—Laminated billets of Zn sheathed with Al, which may be rolled into sheet and strip, are produced by forming a film of Al–Zn alloy on the surface of the Al envelope by fluxing with $ZnCl_2$ and wire-brushing with molten Zn; the oxide film is thus removed and a firm union ensured when the envelope is filled with molten Zn. L. C. M.

Galvanising and other baths. J. G. MCKEAN (B.P. 479,228, 30.11.36).—The baths are heated by passing hot flue gases through submerged pipes. F. M. L.

Manufacture of [loam] foundry cores. CRONITE FOUNDRY CO., LTD., and S. W. G. SNOOK (B.P. 478,082, 2.10.36).—Loam and a binding agent (straw) are applied to a support which is automatically rotated and then dried by steam. F. M. L.

Coating of metal surfaces. C. C. WAKEFIELD & CO., LTD., and G. I. FINCH (B.P. 477,295, 24.6.36).—An amorphous, vitreous surface is produced on bearings by hammering or burnishing and then a hard metal (m.p. >1200°, alloyable with the bearing metal) is applied as a coating by flashing, dipping, or electrodeposition, the whole being finally burnished. F. M. L.

Prevention of corrosion of metals in contact with ethylene glycol and other media for cooling internal-combustion engines, or prevention of ice formation on aircraft parts. H. SUTTON and J. W. W. WILLSTROP (B.P. 479,346, 30.7.36).—Cu- or Al-rich alloys, steels, Ni, Cd, solders, etc. are unattacked by $C_2H_4(OH)_2$ containing $N(C_2H_4{\cdot}OH)_3$ 2, and H_3PO_4 1% together with sufficient of a base to give p_H 7·6—8 when the mixture is diluted with 8 vols. of H_2O. F. M. L.

Surface-hardening of [metal] articles. F. S. DENNEEN and W. C. DUNN (B.P. 478,109, 29.10.36).—Progressive surface-hardening of articles having enlarged parts is effected by induction heating followed by immediate quenching (cf. B.P. 446,495; B., 1936, 1161). F. M. L.

Cleaning plant, particularly for cleaning articles of metal. SIEMENS & HALSKE A.-G. (B.P. 478,936, 1.6.37).—The articles are placed in a cylindrical basket and that upon rollers inclined so that the articles are tumbled while submerged in cleaning liquid. The rollers and basket may be tilted to lift and discharge the articles. B. M. V.

Removal of scale from rolled metal, more particularly from billets or blooms. SCHLOEMANN A.-G. (B.P. 478,099, 6.4.37. Ger., 22.4.36).—The metal is passed through rolls on the surface of which are oblique grooves or corrugations which tend to deflect the path of the metal; this is prevented by a guide, so that slipping occurs and the scale is broken. F. M. L.

Fusing metals, ores, and the like, and compositions therefor. C. MILNES and G. A. QUAYLE (B.P. 477,107, 26.9.36).—Addition of Y, Ba, Nd, Pr, and V to a Thermit charge covering a loosely packed material, *e.g.*, Fe, in a destructible (Al) container enables the temp. given by the Thermit to be controlled. F. M. L.

Treatment of extruded metals [lead]. STANDARD TELEPHONES & CABLES, LTD., Assees. of A. J. N. DUCLOS (B.P. 477,813, 11.6.37. U.S., 7.11.36. Addn. to B.P. 433,553; B., 1936, 956).—In the extrusion of Pb cable sheaths, the die has passages terminating in outlet ports to direct steam over the surface of the product, the ports being automatically and selectively closed when the tube is forced off-centre by non-uniform cooling. F. M. L.

Manufacture of lead alloys [for cable sheaths]. GOODLASS WALL & LEAD INDUSTRIES, LTD., and B. JONES (B.P. 479,215, 8.10.36).—The alloys contain Te 0·001—0·25 and Cu 0·03—1%; they retain their fine-grained structure even after fusion-welding. F. M. L.

Soldering compositions [fluxes]. J. BARNETT (B.P. 476,697, 19.6.36 and 4.5.37).—Finely-divided flux, *e.g.*, NH_4Cl, $ZnCl_2$, is dispersed in rosin and the molten mixture filled into hollow tubes of solder. F. M. L.

(A) Sintered hard metal alloys. (B) Manufacture of shaped bodies of hard material. P. MARTH (B.P. 478,025—6, 30.11.36).—(A) Claim is made for sintered alloys of a lower carbide of W, Mo, Ti, V, Zr, Ce, Si, B, Al, Be, or Cr, with a binder metal, *e.g.*, W_2C 65, Co 35%. (B) The alloys are heated in a mould until the binder metal melts. F. M. L.

Sintered hard metal alloys. F. KRUPP A.-G. (B.P. 478,534, 2.11.36. Ger., 2.12.35. Addn. to B.P. 465,323; B., 1937, 934).—The V_4C_3 may be replaced by V boride and/or nitride, and/or the TiC by nitride; *e.g.*, an alloy of WC with Co 5·5, TiC 10, Ti nitride 4, and V nitride 1·5% is claimed. L. C. M.

Manufacture of sintered hard metallic alloys. W. H. HATFIELD and H. BURDEN (B.P. 477,181, 2.9.36).—Powder mixtures of W, Ta, Ti, Mo, Cr, or V carbide with Fe, Co, or Ni are briquetted and the product is sintered at 1400—1700° and rapidly cooled in an inert atm. in a H_2O-cooled chamber. F. M. L.

Preparation of moulded articles of a hard and difficultly fusible alloy. FEDAM SOC. ANON. (B.P. 477,572, 1.2.37. Switz., 31.1.36).—A powder mixture of carbides of Ti, Zr, Ce, Th, Cr, Mo, W, U, 80—95, Sn- or Ba-bronze (Cu $\not<$50%) 0·1—5, and Fe, Co, or Ni $\not>$15% is heated in a C mould in an inert atm. until the bronze melts; the mass is finally compressed while cooling. F. M. L.

Production of metallic titanium. DEUTS. GOLD- U. SILBER-SCHEIDEANSTALT VORM. ROESSLER (B.P. 479,014, 8.9.37. Ger., 10.9.36).—$TiCl_4$ vapour is bubbled through fused KCl covered with alkali metal; the process is carried out in H_2 at 700—900°. F. M. L.

Purification of impure noble metals [silver]. DISTILLERS CO., LTD., and H. LANGWELL (B.P. 477,522, 26.6.36).—Finely-divided Ag is heated at 400° for 2 hr. to allow the impurities to diffuse to the surface of the particles and there oxidise so that they can be subsequently dissolved by treatment with an appropriate solvent which does not attack the Ag. F. M. L.

Recovery of precious-metal values from ores. MERRILL CO., L. D. MILLS, T. B. CROWE, and J. C. HAUN (B.P. 477,099, 23.7.36).—Pregnant solution from the cyanide-leaching of Ag and Au ores is deaërated by vac. treatment followed by addition of $Na_2S_2O_4$, and is treated with Zn to ppt. Ag and Au; the ppt. is separated from the solution by flotation with $CuSO_4$ and a xanthate. F. M. L.

Production of metallic surface layers. W. C. HERAEUS GES. M.B.H. (B.P. 478,916, 26.2.37. Ger., 10.12.36).—Rh strip is electrically heated at 1800°/0·001 mm. and the resulting vapour condensed on articles, *e.g.*, mirrors and optical measuring instruments, placed in the vicinity, the surface being finally polished. F. M. L.

(A) Casting, and (B) purification, of magnesium. (A) F. HANSGIRG, (B) G. SCHICHTEL, Assrs. to AMER. MAGNESIUM METALS CORP. (U.S.P. 2,066,564 and 2,066,579, 5.1.37. Appl., [A] 21.11.34, [B] 13.1.34. Austr., [A] 25.4.34, [B] 30.3.33).—(A) 2—10% of Sb_2S_5, Sb_2S_3, or Bi_2S_3 is mixed with the mould material for casting Mg. (B) C and Fe are removed from Mg by melting the metal under a mixture of $FeCl_3$ 30, $ZnCl_2$ 30, $MgCl_2$ 30, and MgF_2 10%. A. R. P.

Magnesium-base alloys. HIGH DUTY ALLOYS, LTD., and W. E. PRYTHERCH (B.P. 477,721, 16.10. and 31.12.36).—Alloys containing Al 2—12 (4), Sn 4—12 (6), Ag 0·5—12 (1), Mn $\not>$2 (0·2)%, and one or more of the metals Zn (1), Sb (0·3), As, Bi, Cd and/or Pb $\not>$3% of each, are heated at 450° for 20 hr., quenched, and reheated at 130—350° (250°) for 15 hr. F. M. L.

[Fused salt bath for] heat-treatment of light-metal alloys containing magnesium. I. G. FARBENIND. A.-G. (B.P. 477,836, 1.7.36. Ger., 28.8.35. Addn. to B.P. 448,944; B., 1937, 53).—The bath consists of mixtures of alkali chromates and dichromates such that the $[Cr_2O_7'']:[CrO_4'']$ ratio is $\not<$ the equilibrium val. at the operating temp. of the bath. A suitable mixture is composed of $Na_2Cr_2O_7$ 30, $K_2Cr_2O_7$ 10, Na_2CrO_4 3 pts., and K_2CrO_4 1 pt. and is worked at 350—575°. F. M. L.

Preparation of aluminium granules. G. BENDA-LUTZ WERKE GES.M.B.H. (B.P. 477,756, 6.7.37. Austr., 5.8.36).—Al foil is fed into a beating mill and there torn to flakes, the pieces so formed being shaped into granules by the rotating hammers. F. M. L.

Metallic [aluminium] pigment pastes. METALS DISINTEGRATING CO., INC. (B.P. 477,451, 30.6.36. Ger., 16.5.36).—Al is ground in a ball mill with a thinner, *e.g.*, Varnolene, and a leafing agent, *e.g.*, stearic acid; the product is filtered off to give a relatively dry cake, and this is mixed with more thinner and leafing agent for storing. F. M. L.

Aluminium alloy. T. F. BRADBURY (B.P. 476,930, 16.6.36).—The alloy contains Cu 1·1—5·5 (2·7), Zn 1—6·8 (6·2), Mg 1·6—5 (2·2), Fe 0·02—3 (0·2), Si 0·05—1 (0·2)%, and optionally $\not>$4% (in all) of Ni $\not>$3·5, Mn 2, Sb 3, Co 2·5, or Ti 1%, and $\not>$2% (in all) of Cr, Ag, Mo, Be, Pb, W, V, B, Zr, Ce, Th, and Li. F. M. L.

Aluminium alloy. H. C. HALL, and ROLLS-ROYCE, LTD. (B.P. 477,278, 20.6.36. Addn. to B.P. 350,110; B., 1931, 764).—The alloys contain Fe 1·5—3 (1·7), Mg 0·7—1·74 (1·5), Cu 2·5—6 (5·2), Ni <0·2, Si 1·3 (0·65), B 1 (0·6), and Mn and at least one of the metals Cr, Co, Mo, W, V, 0·2—2% (in all). F. M. L.

Aluminium alloys. VEREIN. DEUTS. METALLWERKE A.-G. (B.P. 478,659, 22.7.36. Ger., 24.1.36).—Machinable, corrosion-resistant alloys containing Mg 0·3—3 (1), Cu 0·1—6 (4—5), Si 0·4—1 (0·6), Mn 0·4—1·5, Pb (part or all of which may be replaced by one or more of the metals As, Sb, Bi, Cd, or Sn 0·01—1) 0·1—3 (1·5), Fe 0·4—5 (0·5), and Zn 0·1—12 (0·3), with or without Ni or Co 0·1—3 and/or Cr 0·1—1%, are claimed. L. C. M.

Aluminium-base alloys. BRIT. ALUMINIUM CO., LTD., and J. H. DICKIN (B.P. 478,125, 8.7.36).—Claim is made for Al alloys containing Cu $\not>$12, Mg $\not>$0·5, Sn $\not>$2, and Sb 0·1—5%. The Sb is added as a hardener alloy prepared by prolonged heating of Sb with Al at 920°. F. M. L.

Thermal treatment of light metals and light-metal alloys. K. BONATH and C. ALBRECHT, Assrs. to DEUTS. GOLD- U. SILBER-SCHEIDEANST. VORM. ROESSLER (U.S.P. 2,066,454, 5.1.37. Appl., 31.10.35. Ger., 31.10.34).—A salt bath for annealing Al and its alloys consists of KCl 25—45, NaCl 15—25, $CaCl_2$ 10—50, $BaCl_2$ 10—20, $SrCl_2$ 5—20, and $BaCO_3$ 1—25%, the $BaCO_3$ being added to provide a protective alkalinity. A. R. P.

Removal of scale-like deposits from vessels made of aluminium or aluminium alloys. M. LANDAUER and K. LOCHMÜLLER (B.P. 478,209, 13.7.36. Ger., 25.7.35).—The surface is cleaned with a pasty mixture of kieselguhr or clay, urea, $(NH_4)_2SO_4$, an oxidising agent, *e.g.*, $(NH_4)_2S_2O_8$, a polyhydric alcohol, *e.g.*, glycerol, and H_2SO_4. F. M. L.

Colouring of metal surfaces. W. K. WILSON, F. M. THOMAS, and DE HAVILLAND AIRCRAFT CO., LTD. (B.P. 477,286, 20.6.36).—Duralumin air-screws are polished, degreased, burnished with 40-mesh Fe shot, and anodically oxidised; the oxide film is finally immersed for 15 min. at 80—90° in 0·5% aq. Nigrosine-black containing 0·1% of AcOH, to produce a matt black finish. F. M. L.

Electric muffle furnaces particularly for brazing tool tips to tool shanks. FIRTH-STERLING STEEL CO., Assees. of E. B. WELCH (B.P. 479,344, 28.7.36. U.S., 22.6.36).—The furnace comprises a muffle lining of heat-resisting metal closed at one end by a plate carrying a tube for introduction of inert gas and disposed in a chamber containing heating elements so arranged as to localise the heat around the junction of the shank and tip of the tool. F. M. L.

[Ferrous metal] welding electrodes. T. C. R. SHEPHERD, and METROPOLITAN-VICKERS ELECTRICAL CO., LTD. (B.P. 479,376, 19.10.36).—The core is first spirally wound with insulated Fe wire or tape and then coated with a flux containing TiO_2, clay, SiO_2, felspar, and Fe-Mn, -Ti, -Mo, or -V to give the necessary weld metal; *e.g.*, for welding Cu-bearing steels the flux contains ilmenite 32, TiO_2 24, felspar 5·5, clay 10·5, Fe-Mn 12 pts., bonded with Na_2SiO_3 and starch. F. M. L.

Nickel anodes. MOND NICKEL CO., LTD. (B.P. 479,004, 14.7.37).—Improved Ni anodes contain C 0·05—2%, Mg, Ti, and Si 0·05—1% of each, Co $\not>$0·5%, and Fe, Cu, and Mn $\not>$0·25% of each. A preferred alloy for a cast anode contains C 1, Mg 0·28, Ti 0·25, Si 0·53, Co 0·35, Fe 0·14, Cu 0·1, and Mn 0·12%, and for a rolled anode C 0·3, Mg 0·31, Ti 0·25, Si 0·53, Co 0·35, Fe 0·14, Cu 0·08, and Mn 0·12%. F. M. L.

Electrolytic refining of chromium and ferro-chromium and production of chromic acid. E. LIEBREICH (B.P. 477,381, 23.3.36. Ger., 21.3.35).—CrO_3 is produced, with or without deposition of Cr, by electrolysis (impure Cr anode) of a solution containing H_2SO_4 and a (K, a Na, or an NH_4) chromate in such a way that the charge on the cation is > that on the SO_4''. F. M. L.

Electrolytic production of magnesium. MAGNESIUM METAL & ALLOYS, LTD. (B.P. 478,276, 17.7.36. Ger., 20.7.35).—A molten mixture of alkali chlorides with <30 (<20)% of $MgCl_2$ is circulated through a series of cells in such a way that the level in each is kept const. The spent electrolyte is enriched in $MgCl_2$ and recirculated after removal of impurities (MgO) by settling. F. M. L.

(A) Apparatus for electroplating metallic articles. (B) Means for conveying metallic articles through apparatus for electroplating. BRIGHTSIDE PLATING CO., LTD., and J. KRONSBEIN (B.P. 477,094 and 477,905, 9.7.36).—The articles are (A) carried through the bath on a rotating disc which can be moved laterally so as to adjust the working conditions; (B) suspended from a carrier bar which is moved by a conveyor system and alternately lowered and raised to bring the articles into and out of a sequence of tanks, *e.g.*, cleaner, wash, acid-etching, and plating tanks. F. M. L.

Chromium-plating of aluminium and aluminium alloys. DR. FINCKH GES.M.B.H. (B.P. 476,720, 1.4.37. Ger., 7.4.36).—The articles are first thinly coated with Fe by pickling at 92—95° in a bath containing $FeCl_3$ and HCl, and then plated first with 0·02—0·036 mm. of Ni and/or Cu and finally with 0·01—0·2 mm. of Cr. F. M. L.

Bath for anodic treatment of aluminium. R. W. BUZZARD (U.S.P. 2,066,327, 5.1.37. Appl., 28.5.34).—The bath contains CrO_3 5 and $Cr(OAc)_3$ 5—11 wt.-%; the articles are treated therein at 30—40 v. for 30—60 min. at 30—40°. A. R. P.

Gold-plating chromium-alloy steel articles, such as pen nibs. A. H. STEVENS. From C. HOWARD HUNT PEN CO. (B.P. 478,444, 21.8.36).—Prior to Au-plating (with or without an intermediate

deposit of Rh or Pt), the oxide film is removed from the Cr-steel surface by cathodic etching in dil. HCl. L. C. M.

Electrodeposition of tantalum and tantalum alloys. H. H. ARMSTRONG and A. B. MENEFEE (B.P. 477,519, 24.6.36. U.S., 24.6.35).—The electrolyte contains a double fluoride of Ta and an alkali metal together with tartaric acid and, if alloys are desired, $NiCl_2$ and/or a W fluoride. F. M. L.

Electrodeposition of tungsten and its alloys. H. H. ARMSTRONG and A. B. MENEFEE (B.P. 478,640, 18.5.36. U.S., 18.5.35).—An electrolyte of aq. $NaHF_2$ (p_H 4) is employed, with an anode of compressed discrete W, W alloy, and/or WC or alloying metal carbide; alternatively, a perforated container packed with such a compressed mixture may be used. L. C. M.

Testing the thickness of metal coatings. W. M. BURDEN and S. G. CLARKE (B.P. 476,876, 13.6.36).—The thickness is measured by the time taken for a jet of corroding liquid, at const. head, impinging on the surface to penetrate the coating. A suitable solution for Cu or Ni coatings is $FeCl_3$ 150, $CuSO_4,5H_2O$ 100, and AcOH 200 g./l., and for Cd or Zn coatings NH_4NO_3 17·5 g. and N-HCl 17·5 c.c./l. F. M. L.

Method of and furnace for [internal] coating of [steel] pipes with metal [copper]. M. BRAUN (B.P. 478,938, 4.6.37. Ger., 18.6. and 21.7.36).

Hg boiler. Furnace for enamelled Fe. Ore-reducing machines.—See I. **Enamelling tanks etc. Ceramic body-metal joints.**—See VIII. **[Casting] accumulator plates. Electrical contact.**—See XI.

XI.—ELECTROTECHNICS.

Modern electric furnaces for the aluminium and light metal industries. G. C. CASTLE (Metallurgia, 1938, 17, 191—192).—Types of furnaces used and their advantages are summarised. S. J. K.

Low-frequency induction melting furnaces for light metals. F. ESSMANN (Metallwirts., 1938, 17, 234—236).—The characteristics of this type of furnace are described, and operating costs given for a typical furnace used for melting Al alloys. C. E. H.

Electrical properties of solids. II. System polyvinyl chloride–tricresyl [tritolyl] phosphate. III. Thermal breakdown of plasticised polyvinyl chloride. R. M. FUOSS (J. Amer. Chem. Soc., 1938, 60, 451—456, 456—460; cf. A., 1937, I, 582).—II. The conductance of the plastic [containing 40% of $(C_6H_4Me)_3PO_4$] is composed of (*a*) an electrolytic conductance and (*b*) a pure a.-c. response which is practically independent of frequency over the range $(15 - 3) \times 10^6$ cycles; (*a*) varies exponentially with reciprocal temp.; (*b*) varies little with temp. The ϵ is approx. a linear function of log frequency over a fairly wide frequency range, and at >60 cycles increases with rising temp.

III. The variation of conductance with voltage has been determined for the plastic, and the results are discussed theoretically. The resistance decreases approx. as a linear function of the square of the applied voltage. The max. voltage V_B at which a steady state is possible, with a const. surface temp. T_0, is given by $V_B^2 = 8\alpha\rho_0 T_0^2/\beta$, where α is the thermal conductivity, ρ_0 the sp. resistivity at T_0, and β a measure of the rate of change of ρ with T. At voltages > this crit. val. electrical failure occurs, and at lower voltages thermal failure may occur. E. S. H.

Industrial possibilities of electro-organic reduction. S. SWANN, jun. (Ind. Eng. Chem., 1937, 29, 1339—1341).—A review. H. A. P.

(A) Most suitable diaphragms and working conditions for electrodialysis. (B) Purification of nickel hydroxide by electrodialysis. (C) Purification of nickel hydroxide precipitate by electrofiltration. S. OKA (J. Soc. Chem. Ind. Japan, 1937, 40, 393B, 393—394B, 394B).—(A) For the anodic diaphragm of a 3-compartment electrodialysis cell a membrane of amphoteric material, *e.g.*, chromated gelatin, is preferred. The optimum current efficiency is attained when the anodic and cathodic diaphragms have large positive and negative charges, respectively. With both, the porosity of the membrane, the c.d., and the concn. of the solution in the electrode compartment should be small.

(B) In the electrodialysis of $Ni(OH)_2$ (I) 19 membranes were tested. The above results were, in general, confirmed. Current efficiency is, however, low, and the purification of materials from large amounts of electrolyte by this method is not practicable, although the process is suitable for the removal of traces of impurities left after other treatments.

(C) The suspension of (I) is filtered through filter-paper supported on a perforated Pb plate, washed, and electrolysed for 10—30 min. (at 8—32 v.), the Pb being the positive and a Cu gauze covered with parchment paper the negative pole. The method of pptn. of (I) is important, and preferably 2N-NaOH–Na_2CO_3 (9 : 1—3 : 1 equivs.) (25 vols.) is added to 2N-$NiSO_4$ (22·5 vols.) and the mixture boiled. The process is more rapid and requires much less H_2O than washing alone. I. C. R.

Transient voltages at the beginning of discharge of a storage cell and their relation to the actual and "transfer" resistance of the positive plate. T. S. COLE (Trans. Electrochem. Soc., 1938. 73, Preprint 7, 83—111).—On open circuit large differences in acid concn. persist from the centre to the surface of the active positive paste, the corresponding potential variations causing an increased rate of current flow from localised and restricted areas when the cell is initially discharged. An explanation of the transient voltage–time curves, based on the laws of electrical networks, is advanced. J. W. C.

Constituents of the Leclanché cell. II. Rôle of soot. Z. HERRMANN [with E. HAHN] (Monatsh., 1938, 71, 175—185; cf. B., 1937, 936).—Soot causes an increase in the internal resistance of the cell. It may be replaced by graphite, provided grinding of the mixture is sufficient. Soot derived from C_2H_2 is better than that from rubber, and the latter is better than active C, as a constituent of the depolarising mixture. The soot does not act as a carrier of O_2,

nor is its action entirely one of increasing the porosity of the mixture. The soot particles serve to increase the degree of contact between the MnO_2 and the graphite. Soot particles of moderate size give the best results. H. J. E.

Applications of electrical precipitation to industrial effluent gases. H. J. BUSH (Inst. Chem. Eng., Feb. 18, 1938, 10 pp.).—A brief survey is made of the development of the art of electrical pptn., and sp. examples are given of the application to cement works, power stations, metallurgical works (either for recovery of valuable fume or cleaning gas for subsequent use), etc. The advantages arising from the capacity to remove even the finest dust, the low resistance to the flow of gas through the plant, and the small consumption of electricity are pointed out. F. J. B.

Electrical dust precipitation. J. WUYCKENS (Mém. Univ. Bruxelles, 1937, 95 pp.).—Details are given of a laboratory investigation relating to the electrical pptn. of dust from a stream of air. Apparatus comprising a device for uniform and regular distribution of dust in the air stream, a small Cottrell type of precipitator, and an oil filter for removing dust from the effluent stream of air is described. Amongst factors studied are: effect of dust concn. on the efficiency of pptn. (no change of efficiency was found for concns. up to 5 g./cu.m.); effect of e.m.f. employed within the range 7300—12,000 v.; effect of the velocity of the air stream, and the relation between e.m.f. and current in the discharge. A high degree of purification is more readily obtained by a reduction of velocity of the stream than by an increase of e.m.f. The scale effect controlling the possibility of applying laboratory results to large-scale plant is discussed. J. S. G. T.

Selective electrostatic separation. H. B. JOHNSON (Min. Tech., 1938, 2, Tech. Publ. 877, 11 pp.).—The relative electrostatic conductivity, or susceptibility to a static charge or field, of 90 minerals of particle size <16- and >150-mesh was investigated. The majority of silicates, carbonates, and oxides tested were found to be susceptible to an interchange of the polarity of the electrodes and were designated as electrostatically "reversible." All the native elements, except S, were irreversible. The separation of anthracite from bituminous coal is given as an example of the possibility of selective separation methods depending on the property of reversibility. A. K. G. T.

Insulation resistance of ceramic materials at temperatures up to 900°. G. PFESTORF and E. F. RICHTER (Physikal. Z., 1938, 39, 141—150).—Certain ceramic materials show a hysteresis loop in the temp.-resistance curve, which is connected with electrolytic conduction. The effect of the electrodes on the conduction is examined with electrodes which could provide ions (Ni, Pt, Ag) in the material (porcelain) and those which could not (graphite). Actually Ni and Pt did not provide ions, but they were detected with Ag and in this case a loopless curve was obtained. There is a close connexion between the migration of alkali ions in porcelain and the existence of the temp.-resistance loops. A. J. M.

Results, new possibilities, and limits of the magnetic testing of materials. W. SCHIRP (Stahl u. Eisen, 1938, 58, 235—240).—Magnetic processes for detecting fundamental faults in material and also irregularities arising from cold-deformation, non-uniform heat-treatment, etc., by d.c. and a.c., with separate and coupled excitation, are described. D.c. and separate excitation penetrate the material and enable the deeper-lying faults to be detected, whilst a.c. and coupled excitation are better adapted to the determination of surface failures and involve less costly apparatus. A new instrument (described) determines faults in ferrous and non-ferrous tubes and bars by means of an eddy current. C. M. A.

Edge correction in the determination of dielectric constant [of sheet insulating materials]. H. L. CURTIS and A. H. SCOTT (Proc. Amer. Soc. Test. Mat., 1936, 36, II, 815—829).—Determination of edge correction in measurement of dielectric constant. A. H. SCOTT (*Ibid.*, 1937, 37, II, 655—660).

Determining H_2O in gases.—See I. **Radiography of coal. Electrical equipment of coke-oven etc. works.**—See II. **Purifying cellulose and its derivatives. Impregnated paper.**—See V. **Bleaching. Applications of fluorescence.**—See VI. **Glass analysis. Ceramic material–metal etc. joints. Refractories for induction furnaces.**—See VIII. **Determining moisture in wood.**—See IX. **Determining Al_2O_3 in steel, and V in alloy steels etc. Testing fatigue of steel. Radiography of steel. Hardening high-speed steel. Nickel-dipping Fe. *X*-Ray diffraction study of fatigue of metals. Examining metal surfaces. Metal-melting furnace. Storage-battery alloys. Materials for precision machinery. Ni–Cr resistance alloys. Permanent magnets. Welds and welding. Detecting faulty jointing. Mg and its alloys. Oxide films on Al. Eloxal coatings on Al. *X*-Ray study of light metals. Cu-plating. Refining Sn. Removing paint etc. from tinned surfaces. Cr- and Mn-plate. Ageing of plating baths. Coating Al with other metals. Selection of electrodeposits. Porosity of electrodeposits. Pt- and Pd-coated Cu. Metal finishes. Testing and stripping electrodeposits. Plating and health.**—See X. **p_H measurements in soap etc. industry. Catalytic hydrogenation of soya-bean oil.**—See XII. **Phenolic mouldings. Synthetic resins in electrical field. Polystyrene resins. White-Pb. Al and bronze finishes.**—See XIII. **Synthetic rubber.**—See XIV. **Determining soil-p_H.**—See XVI. **Determining creatine.**—See XIX. **Working up fixing-salt solutions.**—See XXI. **H_2O purification.**—See XXIII.

See also A., I, 188, **Ferromagnetism of alloys.** 205, **Electrolysis with flowing liquid, and of molten salts. Electrodeposition of Cu.** 214, **Home-made electric furnace. Induction heaters for calorimetry.** 215, **Pb intensifying screens for *X*-ray work.** 218, **Identification of gems.**

PATENTS.

Generating heat electrically. T. HAMILTON-ADAMS (B.P. 479,535, 28.8.36).—The fluid to be heated flows over baffles of magnetic material in a container and these are heated by magnetic induction from two oppositely-wound coils around the container, each coil in turn receiving current from a Hg-arc rectifier with two anodes, the arcs being alternately extinguished by any suitable means. B. M. V.

Automatic control of temperature. A. CALLENDER, A. B. STEVENSON, T. C. ALCOCK, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 479,836, 5.6.36 and 29.4.37).—The compensating effect is varied in accordance with three variables, viz., $\int\theta dt$, θ, and $d\theta/dt$, θ being the deviation of temp. from the desired const. figure and t time. The means described include a resistance thermometer with a compensating resistance in one of the bridge arms which is adjusted by various devices. B. M. V.

Treatment of material with ozone and ultra-violet rays. H. J. NICHOLLS, Assr. to SUNLITE CO., INC. (U.S.P. 2,070,307, 9.2.37. Appl., 21.12.31).—The ultra-violet rays are produced by the silent discharge (" electrostatic corona ") which produces the O_3. The material (assumed to have insulating properties) is passed between grid electrodes interleaved like a condenser and inclined to promote flow at a suitable rate by gravity. B. M. V.

Device for radioactive impregnation of materials. E. ROSENBERG and P. HAPPEL (U.S.P. 2,069,850, 9.2.37. Appl., 17.4.36. Ger., 21.3.35).—A cylinder is provided with a piston and two end closures; at the forward end a cock is provided to admit the material to be treated, and at the backward end is a chamber in which Rn is produced. This chamber and the piston are provided with valves which are simultaneously opened when the piston is drawn back, producing a vac. in front of it. After filling the evacuated space with Rn the piston is moved forward a little to close the automatic valves and the material to be treated is admitted through the cock in the front end. B. M. V.

Manufacture of screens affording protection against scattered *X*-rays. AKTIEB. LINHAM (B.P. 479,404, 3.5.37. Swed., 5.5.36).—A grid of Pb strips having their widths perpendicular to the plane of the grid is formed by coating Pb sheet on both sides with paper or other material transparent to the *X*-rays, cutting strips of the composite material, and assembling them in contact. If adhesive is used it must be totally absorbed by the paper. B. M. V.

Devices for measuring and/or indicating the diffusion of light in, or the turbidity of, fluids and other transparent media. GAS ACCUMULATOR CO. (UNITED KINGDOM), LTD., Assees. of SVENSKA AKTIEB. GASACCUMULATOR (B.P. 479,662, 12.7.37. Swed., 11.7.36).—Light from a source is passed through the turbid medium and a condensing lens and is allowed to fall on two photo-electric surfaces (*A*, *B*) in succession. *A* is situated at the focus of the condensing lens and if there is no turbidity all the light will pass through a small aperture in the centre of *A* and will entirely reach *B* and be recorded by *B* alone. If diffusion takes place, however, *A* will be affected and *B* will operate to a reduced extent. B. M. V.

Incandescence image-screen for cathode-ray tubes. FARNSWORTH TELEVISION, INC. (B.P. 479,318, 2.3.37. U.S., 9.3.36).—The screen is composed of a no. of helical coils of fine refractory wire, *e.g.*, of W, diameter 0·00025—0·001 in., and wound to 1200 turns per in. The final reduction of diameter may be effected by etching after construction. B. M. V.

Cathode-ray tubes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 473,173, 22.1.37. Ger., 25.1.36).—Tubes with a luminescent screen and having the electrodes made of Cr–Fe or Cr-steel alloy are claimed. J. S. G. T.

Electric-discharge tubes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 479,190, 9.10.37. Ger., 12.10.36).—A secondary emission electrode is prepared outside the tube by causing vapour of active metal to deposit on a core body which itself may be heated and/or maintained at a suitable electrical potential. B. M. V.

Electron-discharge device. MARCONI'S WIRELESS TELEGRAPH CO., LTD., and G. B. BANKS (B.P. 478,001, 13.7.36).—A radioactive, electron-emitting material, *e.g.*, a U salt, is used as a primary electron source in a device of the electron-multiplier type. F. M. L.

Galvanic elements. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 479,462 and 479,502, 6.8.36).—(A) For a Zn–MnO_2 dry cell use of a cellulose alkyl ether as thickening agent for the electrolyte is claimed. (B) An electrode which comprises a compressed body is coated with a film capable of swelling in H_2O and composed of polyvinyl (chloro)acetate or polymerised Me acrylate. Sol. grains (salts or starch) may be incorporated in the film. B. M. V.

Manufacture of asphaltic storage-battery cases. E. R. DILLEHAY, Assr. to RICHARDSON CO. (U.S.P. 2,065,459, 5.1.37. Appl., 6.12.34).—A 1 : 1 mixture of hard-blown asphalt and rubber is made on hot rubber-grinding rolls; 10% of this mixture is used as a binder, together with bituminous asphalt, in making battery cases from fibres and fillers. A. R. P.

Apparatus for production of accumulator plates. L. N. ASCARI (B.P. 479,517, 2.6.36).—An alloy which is subsequently to be converted into active paste is cast around an incorrodible grid in a continuously rotating apparatus, the cooling of the mould being sufficiently rapid to prevent melting of grid from the heat of the alloy. B. M. V.

Separators for electric accumulators and the like. CHLORIDE ELECTRICAL STORAGE CO., LTD. (B.P. 479,390, 2.2.37. U.S., 7.3.36).—An emulsion of a binder (binder discontinuous) is mixed with such a proportion of finely-divided inert filler that only the points of the filler particles will adhere to each other; a portion of the continuous phase is then removed by drying, the article pressed, and the binder vulcanised or otherwise caused to set. B. M. V.

Photo-voltaic cells. ELECTRICAL RESEARCH PRODUCTS, INC. (B.P. 479,825, 25.6.37. U.S., 25.6.36). —The active elements are contiguous layers of Tl and Tl_2S; the latter may be formed *in situ* and is provided with a transparent coating, preferably of sputtered Au or Pt. B. M. V.

Apparatus for electrical precipitation of suspended particles from gases. LODGE-COTTRELL, LTD., and L. LODGE (B.P. 479,164, 1.3.37).—Collecting electrodes of irrigated wood are described. B. M. V.

Electrolytic condensers. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 479,401, 13.4.37. U.S., 14.4.36).—Al or other suitable material is coated with a resinous film, *e.g.*, by electrolysis of an alkaline aq. solution of shellac, the film is then set, *e.g.*, by baking, but not to such an extent as to be impervious to electrolyte, and an insulating film is formed on the Al under the resin, *e.g.*, by anodic treatment. B. M. V.

Electrical devices for determining the degree of vacuum in vacuum insulations. AKTIEB. TERMISK ISOLATION, Assees. of PLATEN-MUNTERS REFRIGERATING SYSTEM AKTIEB. (B.P. 479,184, 16.6.37. Ger., 22.6.36).—An electrical vac. tube permanently in communication with the vac. space is utilised. B. M. V.

Electrical contact. C. B. GWYN, jun., Assr. to P. R. MALLORY & CO., INC. (U.S.P. 2,070,271, 9.2.37. Appl., 31.1.35).—Alloys containing Pt or Pd 60—85 (Pd 72), Ag or Cu 10—35 (Ag 26), and Ni, Co, or Fe 0·5—5·0 (Ni 2)% are claimed. B. M. V.

Electrical contact for [copper oxide] rectifiers. L. F. SLEZAK, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. CO. (U.S.P. 2,070,321, 9.2.37. Appl., 30.3.34).—In order to obtain electrical contact the Cu_2O valve surface is coated with finely-powdered C and that with aq. colloidal Ag paint. B. M. V.

Distillation control.—See I. **C_2H_2. Treating crude oil emulsions.**—See II. **Kilns. Spark-plugs. Ceramic body-metal joints.**—See VIII. **Hardening steel. Permanent magnets. Magnetic alloys. Cu alloy for welders. Coating metal surfaces. Extruded Pb. Pb-cable alloys. Colouring metal surfaces. Furnace for brazing tool tips. Welding electrodes. Ni anodes. Refining Cr and Fe-Cr. Mg. Electroplating apparatus. Cr-plating Al and its alloys. Anodic treatment of Al. Au-plating Cr-alloy steel. Ta and Ta alloys by electrodeposition. W and its alloys by electrodeposition. Testing thickness of coatings.**—See X. **Vulcanisation of rubber.**—See XIV.

XII.—FATS; OILS; WAXES.

Occurrence of traces of hexadecenoic (palmitoleic) acid in vegetable fats. T. P. HILDITCH and H. JASPERSON (J.S.C.I., 1938, 57, 84—87).—Cottonseed and palm oils contain $\not>1\%$ of a hexadecenoic acid (I), whilst soya-bean oil appears to contain about twice this quantity; still smaller proportions of a tetradecenoic acid may also be present in soya-bean and cottonseed oils. Thus (I) would appear to occur in all classes of natural fats, becoming a major component only in fats from aquatic flora and fauna (cf. B., 1938, 79). The proportion of (I) in seed and fruit-coat fats seems to be approx. const. at $\not>$ about 1%, and has no apparent relation either to the amount of palmitic acid, or of that of oleic and linoleic acids, which is concurrently present.

Which sterols are present in wool fat? P. MOHS (Fette u. Seifen, 1938, 45, 152—154; cf. Gänssle, B., 1938, 183).—The literature is critically reviewed. The author has found 9% of saturated sterols [dihydrocholesterol (I)] among those pptd. by digitonin (cf. Schönheimer and von Behring, A., 1930, 1616), and confirms the view that Lifschütz's "metacholesterol" is nothing but impure cholesterol (II). (I) and (II) are considered as the only true sterols proved to be present, agnosterol and lanosterol being regarded as triterpene derivatives (cf. Schulze, A., 1936, 340). The individual nature of "oxycholesterol" is doubted. E. L.

Possible pharmaceutical application of fat extracted from waste cacao products. K. H. BAUER and L. SEBER (Pharm. Zentr., 1938, 79, 199—201).—Consts. of fats extracted from the waste products and residues are given. The use of these fats for the manufacture of suppositories is not recommended. E. H. S.

Control of de-fatting [of plant or animal material] by measuring the surface activity of the extract. A. G. KULMAN and A. I. GERSCHZON (J. Appl. Chem. Russ., 1937, 10, 2072—2081).—Extraction of fats in a modified Soxhlet apparatus is complete when the γ of the solvent attains a const. max. val., indicating absence of fat. R. T.

Setting phenomena in fat-cooling. T. HINKO (Öle, Fette, Wachse, 1937, 2, No. 7, 1—2).—The importance of the rate and conditions of cooling and its effect on the crystallisation of fats are briefly considered. E. L.

Simplified method of separation of *iso*-acids from hardened fat. E. D. OLSCHEVSKAJA and G. V. PIGULEVSKI (Maslob. Shir. Delo, 1937, No. 6, 27).—$Hg(OAc)_2$ is added to a solution of the fatty acids in MeOH, when a ppt. of Hg salts of saturated acids is obtained, whilst Hg *iso*oleate remains in solution. R. T.

Causes of spontaneous inflammation and explosion of hot hardened fat during transference to vats. V. M. SMIRNOV (Maslob. Shir. Delo, 1937, No. 6, 15—16).—Spontaneous inflammation, followed by explosion of H_2-air mixture, is ascribed to evolution of PH_3 from the oil; the use of oils of low P content is advocated. R. T.

Regeneration of copper-nickel catalyst [from hardening of fats]. A. LAPTEV and A. ZOLOTAREVA (Maslob. Shir. Delo, 1937, No. 6, 16—18).—Residual Ni catalyst in hardened fat is allowed to settle for 12 hr. at 100°; 10—20% of the catalyst remains, depending on the particle size. Practically the whole of the remaining catalyst is removed by heating with a 75% excess of 10% H_2SO_4, for 1—1·5 hr. Addition of sulphonic acids accelerates the process, but raises the acidity of the fat and imparts a faint yellow colour

to it. Cu cannot be extracted in the same way as Ni, owing to its insolubility in 10% H_2SO_4, ≯6—12% being thus removed. Aëration of the emulsion somewhat raises extraction (30%), without lowering the quality of the fat. Electrolytic oxidation of Cu to CuO raises its solubility in H_2SO_4 (50% extraction), but oxidation of fat also occurs. The best results were given by heating with 100% excess of 10% H_2SO_4 containing 10% of HNO_3, in presence of 0·4% of sulphonic acids, when only undeterminable traces of Ni and 0·05—0·1 p.p.m. of Cu remain in the fat. R. T.

Experimental soap making. D. C. Evans (J. Chem. Educ., 1937, **14**, 534—536).—Laboratory preps. are described. L. S. T.

Whale products [oils] in the manufacture of soap and sulphonated oils. K. Lindner (Fette u. Seifen, 1938, **45**, 76—81).—The deodorisation, polymerisation, and hydrogenation of whale oils and the use of the products in the manufacture of soap and sulphonated oils are discussed. E. L.

Physico-chemical soap analysis. H. Flammer (Fette u. Seifen, 1938, **45**, 133—137).—The significance and the measurement of γ, p_H, and foaming properties are discussed. E. L.

Heat of compressive swelling of soaps. H. Zilske (Seifens.-Ztg., 1938, **65**, 17—19, 38—39, 56—57).—Heating up due to compressive swelling (which leads to a musty odour, and may ultimately cause charring of stored soap powders and flakes) is favoured by subjection of the swelling (H_2O-absorbing) soap to pressure, *e.g.*, by overlying soap; by intimate mixing of very finely-divided, wet and dry soap; and by too high a storage temp. Accordingly, freshly-made soap flakes should be cooled in thin layers under free ventilation before packing, and mixing of flakes of different H_2O content in silos should be avoided. E. L.

Cracking of toilet soaps. J. M. Vallance (Soap, 1938, **14**, No. 2, 26—29, 69, 71, 73).—The various theories concerning the causes of the cracking of milled soaps are critically examined, with especial reference to Sadgopal's theory; besides the need for proper technique in the soap-pan and in drying, a careful balance between "soft" oils and high-titre fats in the fat charge and the maintenance of even temp. during the final processes (chipping etc.) are most important if cracking is to be avoided. Superfatting agents may have a useful plasticising effect. E. L.

Preparation of higher fatty alcohols by hydrogenation of copper soaps under pressure. S. Ueno and R. Komatsu (J. Soc. Chem. Ind. Japan, 1938, **41**, 62—63B).—The Cu soaps were obtained by adding aq. Cu acetate to a coconut oil soap solution. These soaps were dried and then reduced in an autoclave, the initial H_2 pressure being varied for each experiment. Results show that as the pressure is decreased from 70 to 30 atm. the sap. val. of the product rises, suggesting that waxy esters are produced during hydrogenation. The product obtained by hydrogenation at 100 atm. was fractionally distilled under reduced pressure. The distillates obtained were clear, oily liquids consisting mainly of higher fatty alcohols. Results show that the direct hydrogenation of the Cu soap at <100 atm. yields a product containing approx. 70% of higher alcohols. W. J. B.

Small-scale extraction [expression] of palm oil. J. N. Milsum and C. D. V. Georgi (Malay. Agric. J., 1938, **26**, 53—58).—A hand-operated, wooden cage-press is described. By careful sterilising and processing (technique described) about 70—75% of the total oil in the fruit and nuts equal in quality to the corresponding estate products can be obtained. E. L.

Polymerisation of tung oil. I. M. Tatimori (Bull. Chem. Soc. Japan, 1938, **13**, 142—151).—Polymerisation of tung oil at 206—245° has been followed by measurements of its d, I val., relative η, and n_D^{20}. The reaction follows a second-order equation and has a heat of activation of about 24,000 g.-cal. J. W. S.

Gelation of tung oil. I. Effects of various fatty oils. M. Tatimori (J. Soc. Chem. Ind. Japan, 1938, **41**, 39—41B).—The fatty oils were added in various concns. to tung oil and the gelation time (t) under different conditions was noted. Preliminary tests showed that t is affected by the temp. of the experiment, the size of the test-tube used, and the kind of tung oil. When fatty oils were added the t of the tung oil was prolonged in every case. $1/t$ and the % of fatty oil added were in linear relationship, under the same experimental conditions. The amount of substance to be added to make the t of the mixture infinitely long is fixed, irrespective of the size of the test-tube used. Vals. for this figure for various oils at 290° and 292° are given. W. J. B.

Influence of gossypol on unaccounted-for losses of oil during production. V. Rjadovoi (Maslob. Shir. Delo, 1937, No. 6, 25—26).—Discrepancies between the oil content of ground cottonseed, as determined by extraction with light petroleum (I), and the yield of oil [expressed oil + oil extracted from the cake with (I)] are due to the solubility of gossypol in (I) before, and its insolubility after, pressing. R. T.

Effect of a high-tension electrical discharge on contact catalytic reactions. III. Change of the fatty acids in the hydrogenation of soya-bean oil. I. Seto and M. Ozaki (J. Soc. Chem. Ind. Japan, 1937, **40**, 418—419B; cf. A., 1937, I, 470).—Fall of I val. during catalytic hydrogenation of the oil is much more rapid when a high-tension discharge is applied. Changes in the acids present occur in the same order, and to the same extent, whether the discharge is applied or not, and there is no indication of polymerisation. I. C. R.

Andá-assú oil. M. Silva (Bol. Inf. Inst. Nac. Tech., 1937, **2**, No. 5, 6 pp.).—Kernels of *Joahnnesia princeps* (Veloso) give at 90° a 50% yield of oil having d^{15} 0·9263, n^{15} 1·4749, acid val. 2·3, sap. val. 192·7, I val. (Hanus) 138·03. The oil is suitable for use in varnish and soap manufacture. F. R. G.

Fats. XLV. Determination of the "hydro-iodine" value and its application in the analysis of essang oil. XLVI. Calculation of the composition of fats with the aid of their analytical constants. H. P. KAUFMANN and J. BALTES. **XLVII. Determination of the hydroxyl values with acetyl chloride and pyridine.** H. P. KAUFMANN and S. FUNKE. **XLVIII. Meso- and micro-methods for analysis of fats. (I) Iodine value and diene value.** H. P. KAUFMANN and L. HARTWEG (Ber., 1937, 70, [*B*], 2537—2544, 2545—2549, 2549—2554, 2554—2559; cf. B., 1938, 196).—XLV. The "hydro-iodine" val. is defined as the no. of parts of H, calc. as the equiv. amount of I, which are absorbed by 100 pts. of the fat. This is determined by direct observation of the vol. of H_2 absorbed by a known wt. of the fat dissolved in AcOH in presence of Pt–SiO_2. The time required is usually 1—2 hr. and the results are accurate to within about 1%. Pt–$BaSO_4$ is possibly a more efficient catalyst. Mucous matter and other constituents of the unsaponifiable matter frequently act as catalyst poisons and must be removed by treatment of the oil with fuller's earth. Essang oil (cf. B., 1936, 607), from *Ricinodendron africanum*, contains elæostearic acid (45·1), linoleic acid (15·1), oleic acid (28·0), saturated acids (6·4), unsaponifiable matter (0·9), and glyceryl residue (4·5%).

XLVI. After a preliminary qual. analysis the composition of fats can be calc. from the following equations in which a = hydro-iodine val., b = I val., c = partial I val. (determined by use of Br in CCl_4 in the dark), d = CNS val., and e = diene val. E, Li, Le, L, O, S, U, and Gl are used for elæostearic, licanic, linolenic, linoleic, oleic, and saturated acids, unsaponifiable matter, and glyceryl residue, respectively. For fats containing L, O, and S: if b, d, and U are determined, $L = 1{\cdot}004(b - d)$; $O = 1{\cdot}113(2d - b)$; $S = 100 - U - Gl - L - O$, and if a, d, and U are determined, $L = 1{\cdot}104(a - d)$; $O = 1{\cdot}113(2d - a)$; $G = 100 - U - Gl - L - O$. For fats containing Le, L, O, and S: if b, d, S, and U are determined, $Le = -(100 - U - Gl - S) + 1{\cdot}104d$, $L = (100 - U - Gl - G) - 1{\cdot}104(2d - b)$, and $O = (100 - U - Gl - G) - 1{\cdot}104(b - d)$; if a is determined in place of b, d is substituted therefor in the equations. For fats containing E, L, O, and S: if c, d, e, and U are determined, $E = 1{\cdot}095e$; $L = 1{\cdot}104(c - d - e)$; $O = 1{\cdot}113(2d - c)$, and $S = 100 - U - Gl - E - L - O$. If a is determined in place of c these equations become: $E = 1{\cdot}095e$; $L = 1{\cdot}104(a - d - 2e)$; $O = 1{\cdot}113(2d + e - a)$, and $G = 100 - U - Gl - E - L - O$. For fats containing Li, L, O, and S: if the determinations include a, d, e, and U, $Li = 1{\cdot}151e$; $L = 1{\cdot}104(a - d - 2e)$; $O = 1{\cdot}113(2d + e - a)$, and $S = 100 - U - Gl - Li - L - O$. If the fat contains E, Le, L, O, and S and c, d, e, S, and U are determined: $E = 1{\cdot}095e$; $Le = -(100 - E - U - Gl - S) + 1{\cdot}104(d - e)$; $L = (100 - E - U - Gl - S) - 1{\cdot}104(2d - c)$; $O = (100 - E - U - Gl - S) - 1{\cdot}104(c - d - e)$, or if a, d, e, S, and U are determined, $E = 1{\cdot}095e$; $Le = -(100 - E - U - Gl - S) + 1{\cdot}104(d - e)$; $L = (100 - E - U - Gl - S) - 1{\cdot}104(2d + e - a)$; $O = (100 - E - U - Gl - S) - 1{\cdot}104(a - d - 2e)$. For fats containing Li, Le, L, O, and S: if the determinations include a, d, e, S, and U, $Li = 1{\cdot}151e$; $Le = -(100 - Li - U - Gl - S) + 1{\cdot}104(d - e)$; $L = (100 - Li - U - Gl - S) - 1{\cdot}104(2d + e - a)$; $O = (100 - Li - U - Gl - S) - 1{\cdot}104(a - d - 2e)$. If the fat contains Li, E, Le, L, O, and S and a, d, e, S, and U are determined: $Li + E = 1{\cdot}122e$; $Le = -(100 - Li - E - U - Gl - S) + 1{\cdot}104(d - e)$; $L = (100 - Li - E - U - Gl - S) - 1{\cdot}104(2d + e - a)$; $O = (100 - Li - E - U - Gl - S) - 1{\cdot}104(a - d - 2e)$. The above equations are valid only for fats, but can be applied to mixtures of fatty acids if suitable vals. are introduced, whereby U and Gl are omitted. They can be applied only to fats derived exclusively from fatty acids of the C_{18} series. The presence of lower saturated fatty acids in considerable amount also introduces errors since these are not determined by Bertram's method. Within these limitations the glyceryl content may be regarded as 4·5%.

XLVII. The substance under investigation is weighed into a round-bottomed flask, the amount being such that at least 100% excess of AcCl is ultimately present. The sample is dissolved in 5 c.c. of anhyd. C_5H_5N and treated with 5 c.c. of 1—1·5M-AcCl from a "Derona" burette the top of which dips just below the surface of the solution. The flask is closed with a rubber stopper and heated for 5 min., with continuous shaking, at 65—70°. The mixture is cooled and 10 c.c. of H_2O are added, after which it is heated to boiling under reflux for 5 min. After being cooled it is titrated with 0·5N-KOH–EtOH in presence of phenolphthalein. A blank experiment is necessary. OH val. = [(blank − main) × 28·055]/(wt. of substance) + acid val. The new method is very rapid and gives more accurate results than those obtained by the filtration and distillation method and double hydrolysis. The OH vals. of OH-acids can be determined if estolides are absent.

XLVIII. The term "meso" is used in place of semi-micro. For the micro-determination of the I val. 0·01—0·015 g. of the fat is dissolved in 2 c.c. of $CHCl_3$ and treated from a Derona burette with 5 c.c. of 0·1N-Br in MeOH saturated with NaBr. After 15 min. as a max. 3 c.c. of 10% KI are added and the liberated I is titrated with 0·05N-$Na_2S_2O_3$. A blank experiment is necessary. During the short time required there is no action by diffused daylight. There is little tendency towards substitution by Br, so that accurate results are obtained with cholesterol and castor oil. For the determination of the diene val. 0·01 g. of the substance is heated at 100—130° with 10 c.c. of 0·2N-maleic anhydride in PhMe in a sealed tube. After about 2 hr. the tube is opened and the experiment finished as in the macro-method.

H. W.

Extraction of oilseeds. V. MERZ (Öle, Fette, Wachse, 1936, 1, No. 15, 3—5).—Some of the advantages of the older and simpler types of stationary extraction plant are briefly indicated; a new system of continuous extraction, avoiding the disadvantages of existent systems, is mentioned (without details).

E. L.

Composition of the oil phase of seeds. A. M. GOLDOVSKI and M. I. LISCHKEVITSCH (Maslob. Shir.

Delo, 1937, No. 6, 7—8).—The phosphatide and unsaponifiable matter contents of oil expressed from whole sunflower-seed kernels were, respectively, 0·041 and 0·7%, as compared with 0·051 and 0·86% for cottonseed and 0·037 and 0·48% for groundnuts; the corresponding vals. for the oil expressed from ground kernels were 0·049 and 0·75, 0·064 and 0·8, and 0·028 and 0·45%, and for the oil extracted with light petroleum 0·311 and 0·95, 0·426 and 1·15, and 0·25 and 0·66%. The sterol content of sunflower-seed oil obtained in the above three ways is 0·3, 0·3, and 0·52%, respectively. It is concluded that phosphatides are present chiefly in the aq., unsaponifiable matter in the oily phases, and sterols equally in both the aq. and the oily phases. R. T.

Phosphorus-containing constituents of certain oleaginous seeds. M. I. Lischkevitsch (Maslob. Shir. Delo, 1937, No. 6, 9—10).—The total and phosphatide P_2O_5 and phytin contents of a no. of seeds were: soya 1·53—1·69, 0·0813—0·1403, 1·37—1·39; cotton 1·84—2·28, 0·1098—0·1540, 2·17—2·64; flax 1·47—1·73, 0·0385—0·0633, 1·47—1·72; sunflower 1·70, 0·00744, 2·01; and groundnut 1·05, 0·0388, 1·13%, respectively. R. T.

Elementary composition of linseed oil. F. Fritz (Öle, Fette, Wachse, 1937, **2**, No. 7, 5—6).—It is pointed out as remarkable that of 24 combustion analyses of linseed oil reported in the literature, 19 record figures for % C (74·4—77·58, of which 15 are < 77·0) considerably < the theoretical figure of 77·8—77·9%, which can be calc. from the known composition of the oil. The remaining 5 reported figures range from 78·09 to 78·86. E. L.

Influence of various turpentine oils on the velocity of oxidation of linseed oil. H. C. Cohen (Verfkroniek, 1938, **11**, 27—29).—The rate of absorption of O_2 by linseed oil is increased by the addition of turpentine oil, the magnitude of the effect depending on the peroxide content of the latter. Gum turpentine and wood turpentine gave similar results when of similar peroxide content. D. R. D.

Sunflower-seed husks, and their influence on the quality of the seed oil. A. Skipin and G. Pavlov (Maslob. Shir. Delo, 1937, No. 6, 5—7).—The husks contain up to 11% of fat, m.p. 46·5—47·5°, containing N 0·12—0·2 and P_2O_5 0·055—0·065%, with 2% of unsaponifiable matter; protein is absent. The fat dissolves in sunflower-seed oil at 48°, separating at 25° as a white, flocculent ppt. R. T.

Improvement of quality of sunflower-seed oil. A. Tschernuchin and I. Engel (Maslob. Shir. Delo, 1937, No. 6, 13—14).—The oil is deodorised by passing in steam at 150—170° for 45 min. R. T.

Fat chemistry. LIII. Development of new German oil resources. III. Lime-tree seed oil. H. P. Kaufmann and H. Fiedler. LIV. Composition of Tsubaki oil. H. P. Kaufmann and J. Baltes (Fette u. Seifen, 1938, **45**, 149—151, 152; cf. B., 1938, 185).—LIII. The relevant literature is reviewed. Fruits of *Tilia parvifolia* contained 17—28% of seeds from which 13—23% of oil could be obtained having I vals. of 119—126 according to the time of harvesting. One sample of the light petroleum-extracted oil had acid val. 9·34, sap. val. 181·8, I val. 125·5, SCN val. 77·7, OH val. 9·88, unsaponifiable matter 1·8%. The fatty acids consisted of 13·7% of saturated acids and 86·3% of unsaturated acids (I val. 114·1, chiefly oleic and linoleic acids; linolenic acid was absent). The extracted fruit meal contained H_2O 12·65, crude fibre 72—74, N 2·1, and ash 0·51%. As all wind-fallen fruits and 40% of picked ripe fruits contain no seeds, and the yield of oil on the fruits (which it is impracticable to shell) and the val. of the meal are so low, the collection of these fruits for practical oil production cannot be recommended.

LIV. The oil (66·7%) extracted by light petroleum from kernels of Japanese *Camellia japonica*, L., had acid val. 1·05, sap. val. 197·2, I val. 78·0, SCN val. 76·1, unsaponifiable matter 0·2%, saturated acids (Bertram) 11·0%, OH and polybromide vals. nil. From these figures the oil is calc. to contain 82·6% of oleic and 2·1% of linoleic acid, both of these acids being identified qualitatively by elaidinisation and bromination tests, respectively. The oil is a convenient raw material for the prep. of oleic acid. E. L.

Suitability of vegetable oils for manufacture of lubricating greases. E. Galle and W. Friedl (Öle, Fette, Wachse, 1937, **2**, No. 12, 3 pp.).—Results of experiments show that rape, castor, and soya-bean oils are unsuitable for use, either as the oil or the soap constituent, in greases. E. L.

Effect of presence of water on bleaching [of oils] by bleaching earths. A. Berczeller and E. Erdheim (Öle, Fette, Wachse, 1936, **1**, No. 15, 1—3).—With many oils (but not with a sample of hempseed oil) addition of H_2O to the oil–earth mixture (cf. B., 1936, 1214) improved the bleaching action of the latter; the optimum amount of H_2O (ranging from 30 to 100%, calc. on the earth used, the latter being 2—8% of the oil) depended on the kind of oil. In general, the improvement in the bleaching due to the H_2O was more marked in the case of the more active bleaching earths than with the poorer ones. The acid val. of the oils was not increased by the bleaching treatment either with or without H_2O; in the case of wet soya-bean oil the acid val. fell during bleaching. E. L.

Processing of whales. P. L. Fauth (Fette u. Seifen, 1938, **45**, 58—60).—By thorough disintegration of the tissues (blubber, bones, or flesh) prior to rendering, high-grade oils can be rapidly recovered without prolonged boiling at high pressures and temp. *E.g.*, properly comminuted lean flesh needs only 4 min. treatment with H_2O at 95°, followed by pressing and drying to yield oil and meat meal. Further such rational working permits the recovery of valuable by-products, *e.g.* blubber fibre, to be used in gelatin etc. manufacture, bone residue for glue and meal manufacture, etc. The endocrine glands and whalebone can be utilised, and full-scale trials are in progress for the recovery of the dried blood, of the stomach and intestines, of the liver for vitamin extraction, and of the fresh meat for human consumption. E. L.

Blubber oils of sei, fin, and humpback whales. Y. TOYAMA and K. UOZAKI (J. Soc. Chem. Ind. Japan, 1937, 40, 398—402B).—The oils were extracted by heating the cut-up blubber, and separated by decantation followed by hot filtration. The characteristics of the oils and descriptions of the whales are given in detail. The effect of heat on the properties of the blubber oils was tested by extracting the oil from one specimen of blubber and then strongly reheating the blubber, when a further quantity of oil was obtained. No appreciable difference was found between the two samples. However, when a blubber, after the oil had been extracted once, was extracted with Et_2O, the two samples were not similar in every case. Comparison of the oils from whales from different districts, according to the sex and species, showed that no marked relationship could be detected. Oils having the lower I val. generally had the higher η. Differences in I val. and % of Et_2O-insol. bromide were observed in the oils from different blubbers of the same whale, but no general relationship could be given. Fin oils generally had the higher sap. val., and sei oils the higher % of unsaponifiable matter. W. J. B.

Antarctic whale oils. Y. TOYAMA and K. UOZAKI (J. Soc. Chem. Ind. Japan, 1937, 40, 462—464B).—The characteristics of samples of commercially-produced oils from the blubber and/or bones of Antarctic blue whales (12 samples, d_4^{20} 0·9123—0·9199, n_D^{20} 1·4715—1·4737, sap. val. 193·1—195·6, I val. 104·3—122·5) and mixed blue- and fin-whale oils (19 samples; characteristics, respectively, 0·9123—0·9220, 1·4712—1·4739, 193·2—195·7, 103·0—124·1) are detailed. The average I val. (114·5) of the Antarctic oils is $\leqslant$ that of the oils from Japanese sei, fin, or humpback whales (140·1, 138·5, and 135·2, respectively; see above). The yields (6·3—22·9%) and characteristics of the flesh oils from 6 parts of the body of one female fin whale are detailed (I val. 103·8 for the oil from the ventral ridgy flesh; 134·3—144·8 for oils from other parts). E. L.

Whale products [oils] for lighting and in stearine manufacture. G. VON KRUGER (Fette u. Seifen, 1938, 45, 81—84).—The uses of train (? sperm) oil as lamp oil, of spermaceti for candles, and of whale stearin (pressed fish tallow) and hydrogenated whale oils for the production of candle stearines are reviewed. E. L.

Significance of whale oil in paint technology. H. PAWELZIK (Fette u. Seifen, 1938, 45, 84—86).—Possible methods (polymerisation, dehydrogenation, etc.) for improving the properties of whale oil as a paint oil are reviewed. E. L.

Whale oil and linoleum manufacture. F. FRITZ (Fette u. Seifen, 1938, 45, 88—90).—Requisite modifications of the ordinary blowing processes so that oxidised whale oil may be used in conjunction with linoxyn in the manufacture of linoleum cement are described. The marine oils lose their fishy odour on oxidation. E. L.

Applications of whale oil in the leather industry. F. STATHER (Fette u. Seifen, 1938, 45, 86—87).—A lecture. E. L.

Fat chemistry. LII. Whale products in pharmacy, with especial reference to [hydrogenated] whale fats. H. P. KAUFMANN (Fette u. Seifen, 1938, 45, 94—104).—The chemistry of sperm-whale blubber and head oils and the chemistry and pharmaceutical uses of spermaceti and cetyl alcohol are reviewed at length, and the possible application of "whale fat," *i.e.*, hydrogenated whale oil, in medicine and especially in pharmacy as a component of salves etc. is discussed. E. L.

Whale organs as raw material for recovery of hormones and vitamins. C. BOMSKOV and F. UNGER (Fette u. Seifen, 1938, 45, 90—94).—The preservation and utilisation of the hypophysis and corpus luteum as sources of hormones, and of the liver as a source of vitamin-*A*, are particularly discussed. E. L.

Chemistry of whale oil and its standardisation. A. SCHWIEGER (Fette u. Seifen, 1938, 45, 64—73).—Information from the literature concerning the analytical characteristics, composition, and biochemistry of the various whale oils (including sperm and bottlenose oils and whale-milk fat) is collated, and tests for the detection of whale oil, and standards of quality, are discussed. E. L.

Distillation of bottlenose oil under reduced pressure. M. TSUJIMOTO and H. KOYANAGI (J. Soc. Chem. Ind. Japan, 1938, 41, 41—43B).—Distillation of the oil at 260—315°/2 mm. gave 71% of the original oil as a distillate which was richer in unsaponifiable matter and poorer in triglycerides than the oil. This distillate, on being fractionally distilled, yielded six fractions and a residue. Examination of each fraction showed that the chief one (b.p. 290—310°) probably consisted of oleyl oleate (I) and an appreciable amount of cetyl oleate. The lower- and higher-boiling fractions contained C_{16} and C_{20} acids, respectively, the latter in a fairly large amount. The lowest-boiling fraction yielded a hydrocarbon, which was produced by decomp. of the oil on distillation. An attempt to isolate (I) by crystallisation from $COMe_2$ at −10°, followed by distillation of the sol. esters and collection of the fraction b.p. 300—310°, gave an impure yield. W. J. B.

Preparation of high mol. wt. alcohols (spermaceti) by hydrogenation of cachalot oil. T. A. BELOVA (Maslob. Shir. Delo, 1937, No. 6, 21—22).—The fat is hydrolysed at 100° with 15% KOH in EtOH, the hydrolysate diluted with EtOH, and excess of 25% $BaCl_2$ added. The EtOH is distilled off and the residue dried at 100° and extracted with EtOH. The filtered extract is heated at 100° to remove EtOH, glycerol is poured off from the residue, and the upper layer of high mol. wt. alcohols is collected. R. T.

Spermaceti and cetyl alcohol in cosmetics. B. FILMER (Fette u. Seifen, 1938, 45, 105—106).—A brief lecture illustrated by a few typical formulæ. E. L.

Hardening [hydrogenation] of whale oil and the use of hardened whale oil in the manufacture of margarine. W. NORMANN (Fette u. Seifen, 1938, 45, 73—76).—The history of the commercial hydro-

genation of whale oil is reviewed and certain points of interest in connexion with the chemistry of the process and the products are discussed. E. L.

Vitamin-*A* and -*D* contents of cod-liver oil. E. Becker (Mezög. Kutat., 1937, **10**, 247—254).—The I val. of the oil is not alone indicative of the vitamin content. The -*A* ($SbCl_3$ test) and -*D* (biological assay) contents of oils varied widely. A. G. P.

Drying property of fish oils. I. Polymerisation of sardine oil and the drying property. M. Takano (J. Soc. Chem. Ind. Japan, 1937, **40**, 429—430B).—Chilled (winter) sardine oil was polymerised to various degrees and each sample examined. The yield of Et_2O-insol. bromide decreased with decrease in I val. of the sample, and was almost absent at I val. 112·2. The yield of light petroleum-insol. bromide, however, increased to a max. and then decreased. It follows that the highly unsaturated fatty acid polymerises stepwise with the lowering of its unsaturation. Pb salt–EtOH separation of the fatty acids showed that some polymerised acids, together with solid acids, formed an insol. Pb salt. Calculation of the yield and I val. of this polymerised acid suggested that a highly polymerised acid with only one double linking existed. Oil films, on glass, of the winter oil and the polymerised oils were prepared, and the drying power and O_2 absorption examined. The winter oil had greater O_2 absorption than had linseed oil, but very slow drying properties. Slight polymerisation increased the drying properties, but they were still $<$ those of linseed oil. If polymerisation was carried out so that the highly unsaturated acids were completely eliminated, the drying property of the oil was almost entirely lost. W. J. B.

Drying property of fish oils. II. Partial hydrogenation of sardine oil and the drying property. III. Drying film of the polymerised and [of the] partly hydrogenated sardine oil[s]. M. Takano (J. Soc. Chem. Ind. Japan, 1937, **40**, 473B, 473—475B; cf. A., 1936, 189, and preceding abstract).—II. Partly hydrogenated sardine winter oils show progressively smaller O_2 absorptions in drying tests as the I vals. are less; the drying property (drying time) remains much the same so long as these oils still contain some acids yielding Et_2O-insol. bromides, but is practically lost when these disappear. These hydrogenated oils, in general, show rather smaller O_2 absorptions than polymerised oils of the same I val. (cf. *loc. cit.*).

III. An exposed film of sardine winter oil increases in wt. more suddenly at first and decreases more slowly after the max. than a film of linseed oil. The hydrogenated and polymerised oils show intermediate behaviours. The sardine oil coagulates more rapidly than linseed oil, but takes longer to dry through the tacky stage. The crinkling and cracking of the various films on ageing (which is least with the hydrogenated oil) are illustrated by photographs. E. L.

Quality of Japanese fish oils from the viewpoint of the hardened oil industry. VI. Quality of sardine and herring oils. S. Ueno and G. Inagaki (J. Soc. Chem. Ind. Japan, 1937, **40**, 476—478B; cf. B., 1936, 242).—The colour and chief analytical characteristics of 196 samples of commercial sardine oils [acid vals. 0·7—26·4 (mostly 2—5), sap. vals. 181·8—197·4 (189—193), I vals. (Wijs) 156·2—190·2 (176—186)] and of 27 samples of herring (including small-herring) oils [acid vals. 1·3—60, sap. vals. 175·2—190·1 (183—187), I vals. 95—121 (103)] produced during 1935—7 are detailed, showing that the quality of the sardine oils has, on the whole, improved over recent years; the herring oils do not show much improvement in quality. E. L.

Carotene in fats and oils. S. H. Bertram (Öle, Fette, Wachse, 1937, 2, No. 8, 1—2).—Carotene (I) has been detected in crude palm, linseed, soya-bean (from various sources), rape, mustard, cottonseed, and egg oils, beef tallow, and butter fat by mixing 15 c.c. of the oil with 7·5 c.c. of light petroleum (b.p. 40—60°) and 2 c.c. of pure $C_5H_{11}\cdot OH$, and shaking well for 2 min. with 1 c.c. of H_2SO_4 (*d* 1·53) and allowing to settle; if (I) is present, the acid layer shows a permanent blue colour (the vegetable pigment orlean gives only a fugitive blue). (I) was absent from lard, coconut, palm-kernel, and sesamé oils, and also from arachis oils, samples from China, Bombay, Africa, etc. being tested. The test enables the adulteration of arachis oil with $\nless 5\%$ of soya-bean oil to be detected approx. quantitatively. Laboratory-extracted arachis oils from Chinese (Manchukuo ?) seed showed small hexabromide vals. (0·2—0·6). E. L.

Determination of the iodine value from the refractive index. V. Illarionov and M. Tortschinski (Maslob. Shir. Delo, 1937, No. 6, 23—25).—The I val. $= (K - n_D)/0{\cdot}000118$, where $K = 1{\cdot}4595$ at 20° and 1·4517 at 40°. R. T.

p_H measurements in the oil, soap, and cosmetic industries. A. Kersten (Öle, Fette, Wachse, 1937, 2, No. 11, 14—19).—Various types of colorimetric and electro-potentiometric instruments (including the Jonograph, Jonometer, and Lyoskop) suitable for rough or accurate laboratory work, or for factory use, are described. E. L.

Decolorisation of glycerin with bleaching earths. E. Erdheim (Öle, Fette, Wachse, 1937, 2, No. 8, 2—3).—36—62% decolorisation of Twitchell crude glycerin (I) could be effected by treatment with (up to 8% of) various bleaching earths, but the bleaching was insufficient for commercial purposes, even when active C was added to the earths. Different active carbons (applied alone) showed enormous differences in bleaching power for the crude (I). E. L.

Detection and colorimetric determination of glycerin, particularly in admixture with water-soluble substances, and at great dilution. F. Schütz (Papier-Fabr., 1938, **36**, 55—56).—The solution containing glycerin (I) is mixed with a 1% solution of anthrone (II) in conc. H_2SO_4. On heating to 120° a yellow colour is produced which turns red and reaches its max. intensity at 170—175°, when it may be compared with known standards. At the same time there is a reddish-yellow fluorescence which

is sp. for (I). The (II) is produced by reduction (Zn–HCl) of anthraquinone. The limit of sensitivity in aq. solutions is 0·5 pt. per 10^5 pts., and the method is not disturbed by the presence of reducing agents. D. A. C.

Oiliness of liquids. Testing lubricating oils. Lubricating greases. See II. **Determining ligninsulphonic acid.**—See V. **Use of oils, soaps, emulsifiers, etc. in textile industry. Rancidity of textile-finishing oils.**—See VI. **Bentonites.**—See VII. **Wax stains for wood.**—See IX. **Steel-mill lubrication.**—See X. **Fats and sterols in cereals. Determining fat in maize milling.**—See XIX. **Egg extract.**—See XX.

Erratum.—In "B" abstracts, 1937, page 1079, col. 2, line 9 from bottom, *for* 336 *read* 366.

See also A., I, 191, **Properties of detergent solutions.** 193, **Systems soaps–cresol–H_2O.** II, 138, **Phytosterol in wheat-germ oil.** III, 313—8, **Vitamins.** 358, **Constituents of gourd seeds. Fruit of *Sambucus calicarpa*. Lovage and celery oils. Unsaponifiable matter of wheat-germ oil, and (359) of lettuce oil.** 359, **Sterols in cottonseed oil.**

PATENTS.

Manufacture of soap. A. WELTER (B.P. 473,220, 18.9.36. Ger., 4.6.36. Cf. B.P. 202,710 and 254,775; B., 1923, 1032A; 1927, 946).—Fatty acids are melted and mixed with twice the theoretical equiv. of calcined Na_2CO_3 (K_2CO_3), and as soon as the mix becomes homogeneous 2—50% (calc. on the fatty acids) of H_2O or of a solution of compatible salts (borax, bleaching agents, etc.) is added. Saponification is rapidly completed and the product can be moulded into cakes, shreds, etc. directly. E. L.

Recovery of alkylolamines from alkylolamine soaps or substances containing these. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 473,225, 8.1.37. Holl., 26.2.36).—The formation of amides during vac.-distillation for recovery of alkylolamines (I) from, *e.g.*, the extract obtained in the deacidification of oils etc. by means of (I) is minimised by bringing the crude soaps rapidly to a distillation temp. of >150° (>250°) by, *e.g.*, introducing the extract at a suitable zone in the distillation column. Little or no H_2O should be present, and steam is not required for the distillation. E. L.

Manufacture of soap particles. H. J. NICHOLLS, Assr. to SUNLITE CO., INC. (U.S.P. 2,070,308, 9.2.37. Appl., 18.1.33).—Soap is mechanically subdivided in presence of O_3. B. M. V.

Washing and cleansing agents. HENKEL & CO. G.M.B.H. (B.P. 480,231, 14.6.37. Ger., 8.8.36).—Soaps of hard fats or fatty acids are mixed with H_2O-sol. salts R·Ar·O·R′·CO_2H, where R = an aliphatic or *cyclo*aliphatic radical containing $\nless C_4$, Ar = an aromatic radical, and R′ = an org. radical. In an example, a powder is made by spray-drying a solution of a Na soap from hardened whale oil (35), Na *p-n*-octylphenoxyacetate (15), and Na_2CO_3 (50). Peroxides, per-salts, solvents, etc. may be added and the compositions are suitable for both household and industrial use. K. H. S.

Atomising melted products. High-vac. distillation.—See I. **Cleansing etc. agents.**—See III.

XIII.—PLASTICS; RESINS; PAINTS; COATING COMPOSITIONS.

Plastics. S. RANGANATHAN and H. K. SEN (Proc. Inst. Chem. India, 1937, 9, 157—183).—A general review.

Lignin plastics. R. M. BOEHM (Mod. Plastics, 1937, 15, No. 2, 26—27, 56).—Are view of their prep. and properties. F. McK.

Ethylcellulose—a new plastic. D. A. GIBB (Mod. Plastics, 1937, 15, No. 2, 23, 112—113).—A short review of properties. F. McK.

Cellulose acetate plastics. B. ANDERSEN (Mod. Plastics, 1937, 15, No. 2, 20—21, 69—70, 72).—The chief properties of such plastics are enumerated; curves show the % elongation with load, and influence of plasticiser content on physical properties. Industrial applications and injection-moulding possibilities are outlined. F. McK.

Porous cellulose acetate plastics. J. F. BENJAMIN (Rev. Gén. Mat. Plast., 1937, 13, 321—323s).—Four methods of prep. are reviewed. The product has *d* 0·09 and is suitable for the manufacture of lifebelts. F. McK.

Laminated woven veneer. E. MAIN (Mod. Plastics, 1938, 15, No. 5, 38—39, 66, 68).—The manufacture and applications of a laminated material made from transparent cellulose acetate sheet and wood veneer are described. F. McK.

Chlorinated rubber in plastics. J. DAUBIGNY (Rev. Gén. Mat. Plast., 1938, 14, 17—20).—Methods of prep., physical and chemical properties, suitable plasticisers, and processes for the manufacture of moulding compositions from chlorinated rubber are reviewed. F. McK.

Casein plastics. C. S. LAWRENCE (Mod. Plastics, 1937, 15, No. 2, 16).—A review. Applications are discussed. F. McK.

Phenolic-asbestos for industrial equipment. W. H. ADAMS (Mod. Plastics, 1937, 15, No. 2, 35, 118, 120).—Recent developments and applications of the corrosion-resistant phenolic resin material (Haveg) are reviewed. F. McK.

Transparent phenolic moulding materials. D. MASSON (Mod. Plastics, 1937, 15, No. 2, 38—39, 64).—Physical, chemical, and electrical properties are tabulated and general characteristics such as appearance, strength, and moulding properties examined. F. McK.

Fillers in thermosetting moulding materials. V. MEHARG (Mod. Plastics, 1937, 15, No. 2, 46—49, 52, 54).—The use of org., C, and mineral fillers and their influence on the properties of moulding compositions are reviewed. F. McK.

Preheating thermosetting moulding materials. D. M. BUCHANAN (Mod. Plastics, 1938, **15**, No. 5, 45—46, 60, 62).—Advantages and disadvantages of preheating are reviewed. F. McK.

Developments in plastics-moulding equipment. L. F. RAHM (Mech. Eng., 1938, **60**, 117—122).—An illustrated review. R. B. C.

Selecting plastics by properties. F. S. BACON (Mod. Plastics, 1938, **15**, No. 6, 41—42, 46).—Properties to be considered include (1) strength, hardness, and flexibility, (2) colour characteristics and brilliance, (3) stability to light, weather, and solvents, (4) temp. characteristics, (5) electrical properties, (6) moulding and machining characteristics, (7) cost of resin, (8) nature and cost of filler. The above are reviewed. F. McK.

Etching plastics with a sand blast. N. DE JARME (Rev. Gén. Mat. Plast., 1937, **13**, 285—286s).—A description, with illustrations, of various types of apparatus. F. McK.

Applications of synthetic plastics in the cement industry. O. ACHILLES (Zement, 1938, **27**, 18—22).—Uses of plastics for bearings and gears are described. G. H. C.

Plastics and National Socialism. T. H. GANT (Chem. and Ind., 1938, 263—266).—Düsseldorf exhibits demonstrating Germany's production of plastics, particularly artificial rubber ("Buna"), artificial wool ("Flox"), and synthetic resin plastics, from national raw materials are described and illustrated by a flowsheet. Examples in which synthetic resins are used to replace metals are indicated. J. W. CR.

Occurrence of amber in Bahia sand. S. F. ABREU (Bol. Inf. Inst. Nac. Tech., 1937, **2**, No. 4, 8 pp.).—Resinous material from sand at Reconcavo (Bahia) has the composition $C_{28}H_{44}O_3S$. The *d*, ash, sap. val., acidity, and solubility in org. liquids are recorded. F. R. G.

Natural copals. ANON. (Farve og Lak, 1938, No. 10, 18—22).—A review of the mode of occurrence, geographical distribution, and uses of the different types of copal. D. R. D.

Recent developments in resin technology. A. SKETT (Amer. Paint J., 1938, **22**, No. 16, 16—18, 40—42).—The researches of the American Gum Importers' Association are reviewed. Wt. losses during running of copals may be reduced without detriment to the resulting varnish by the use of a reflux condenser. Non-frosting tung oil varnishes may be prepared by adding 2·5—5% of glycerol to the oil before adding it to the run resin. Oil-sol. alkyd resins may be obtained by refluxing together glycerol, o-$C_6H_4(CO_2H)_2$, fatty acids, and an excess of unrun Congo or Manila Loba copal or Batavia dammar. D. R. D.

Rubber-like resins. J. C. PATRICK (Mod. Plastics, 1937, **15**, No. 2, 36, 80).—A historical review of the development of butadiene, chlorobutadiene, and polysulphide synthetic rubbers and their applications. F. McK.

Vinyl resins, including polystyrene. G. C. MILLER (Mod. Plastics, 1937, **15**, No. 2, 43—45, 106, 108, 110—111).—A review of the prep. and properties of polystyrene, polyvinyl chloride and acetate, vinyl acetate–aldehyde resins, and vinyl acetate–vinyl chloride co-polymerides, with particular reference to the last-named. F. McK.

Properties and applications of polystyrene resins. H. P. STAUDINGER and H. M. STANLEY (Chem. and Ind., 1938, 141—144).—The physical properties of polystyrene resins vary, but chemical properties do not appreciably vary with the mean mol. wt. (readily determined from measurement of η in dil. C_6H_6 solution). Electrical properties are more dependent on the purity of the resin and the absence of unchanged monomeride. Typical properties are tabulated. Methods of working up the resins include "wet forming" (for films, tapes, etc.) in which an auxiliary solvent is employed, and "dry forming" by moulding under heat and pressure (*e.g.*, by injection, extrusion, or compression moulding). Possible fields of application are suggested in which the excellent electrical properties and stability to light, moisture, and many chemicals are utilised. J. W. CR.

Rôle of p_H in the manufacture of urea resins. M. DÉRIBÉRÉ (Rev. Gén. Mat. Plast., 1937, **13**, 293—296).—A review of the literature. F. McK.

Introduction of sulphur into urea–formaldehyde resins. P. BERRIER (Rev. Gén. Mat. Plast., 1937, **13**, 296—298).—A brief review of literature on the improvement of properties of urea-resin moulding compositions by addition of S or compounds of S, *e.g.*, H_2S, polysulphides, hyposulphites. F. McK.

Methyl methacrylate resin. A. F. RANDOLPH (Mod. Plastics, 1937, **15**, No. 2, 28—29, 60).—Properties, moulding characteristics, and methods of manipulation are outlined. F. McK.

Alkyd resins. C. S. FERGUSON (Mod. Plastics, 1937, **15**, No. 2, 14—15).—The varied applications of baking and air-drying alkyd-resin finishes are outlined; advantage is taken of their durability and high gloss retention, heat- and oil-resistance, excellent adhesion, and flexibility. F. McK.

Impact-resistance of artificial resin films. T. MÖLLER, H. KÖLLN, and H. E. SCHEIBER (Farbe u. Lack, 1938, 90—93).—Photomicrographs show the increased resistance developed in alkyd resin films by stoving and thorough drying. S. M.

Phenol–formaldehyde resins. IV. Viscosity of alkaline solutions. O. SUGITA and S. TSURATA (J. Soc. Chem. Ind. Japan, 1937, **40**, 419—422B; cf. B., 1937, 809).—The relative η of solutions of PhOH–CH_2O resin (prepared from 1 mol. of each, using NaOH as solvent) in various amounts of aq. NaOH, KOH, or LiOH of different concns. shows a discontinuity when about 7·4 millimols. of alkali are present per g. of resin. Salt formation is assumed. No discontinuity of *d* occurs. The temp. coeff. is small and micelles are thus not formed. R. S. C.

Factors influencing the solubility in oils of phenol–formaldehyde resins. P. TRÉVY (Rev. Gén. Mat. Plast., 1938, **14**, 11—15).—Resins of improved solubility suitable for the prep. of var-

nishes may be obtained by condensing CH_2O with (1) β-$C_{10}H_7$·OH, (2) C_6H_4Ph·OH, (3) alkylated phenols, (4) xylenols, and (5) diphenylpropane resins. The literature is reviewed. F. McK.

Cast phenolic resins. D. K. BANCROFT (Mod. Plastics, 1937, **15**, No. 2, 17—19, 57).—The prep., properties, and applications of cast phenolic resins are examined and methods of casting rods etc. are illustrated. F. McK.

Coumarone–indene, a thermoplastic resin. J. A. KENNEY (Mod. Plastics, 1937, **15**, No. 2, 22, 114—115).—A review of the uses of coumarone–indene resins with particular reference to their application in the manufacture of floor tiles and insulating materials. F. McK.

Present status of synthetic resins in the electrical field. L. E. BARRINGER (Gen. Elect. Rev., 1937, **40**, 554—557).—A review. R. B. C.

Synthetic resins in the paint and varnish industry. M. J. SCHOEN (Verfkroniek, 1938, **11**, 7—11).—A lecture, in which the properties and uses of the different types of phenolic and alkyd resins are reviewed. D. R. D.

Synthetic resins and lacquers. F. ZIMMER (Farben-Ztg., 1938, **43**, 209—210).—The various types of synthetic resins available are summarised, and notes are given on the general properties of lacquers made therefrom. S. S. W.

Finely-dispersed barytes. H. WAGNER (Farben-Ztg., 1938, **43**, 361—364).—The properties (tabulated) of finely-ground barytes show a compromise between those of barytes and blanc fixe, respectively, special advantages being wettability, absence of settling to a hard sediment when used as a paint extender, and definite pigment properties when used in glue and aq. emulsion vehicles. S. S. W.

Increasing the opacity of pigments by addition of barytes. K. WÜRTH (Farben-Ztg., 1938, **43**, 279).—Films containing barytes are thicker than those free from barytes having the same hiding power, and the lower layer acts like a sheet of glass inserted between the surface and the film. The optical effect of increased opacity is thus produced. S. M.

Electrolytic production of white-lead. A. DÉVAI (Farben-Chem., 1938, **9**, 103—105).—Some process difficulties are discussed. Electrolytic white-Pb had greater bulking val., opacity, light-resistance, and reflexion than a chamber-process product. The particles were round, showed greater tendency for agglomeration, were more easily wetted with oil, and more easily produced a colloidal system. These differences are advantageous for paint manufacture. (Cf. B., 1938, 189.) S. M.

Technological experiments with whites. II. Electrolytic manufacture of white-lead. J. MILBAUER (Chem. Obzor, 1937, **12**, 177—180).—Equipment for the manufacture of white-Pb by a commuted electric current (cf. B.P. 314,987; B., 1930, 1164) is described. Of concns. 0·02, 0·1, and 0·5% $NaHCO_3$ solution tried, 0·1% gave the best result and 0·5% the worst, due to conversion of electrical energy into heat and the admixture of Pb in the product. The product obtained is almost neutral $PbCO_3$ with only traces of $Pb(OH)_2$. The formation of hydroxycarbonate is improved by substituting air (containing CO_2) for CO_2 for transporting the electrolysed liquor, using as an electrolyte a 0·2% solution of Na_2CO_3 and NaOH in the proportion 14 : 3, and electrolysing with 5-min. changes of the current until the Na_2CO_3 is completely removed. Addition of colloids or of foamy materials, especially Igepon-*T* in small quantity, has a very favourable effect on the tint and covering power of the pigment. F. R.

Aluminium naphthenate. C. J. ALLDRED (Paint Tech., 1937, **11**, 373—374).—The uses of Al naphthenate are reviewed. It may be applied as a solution in BuOH and white spirit for sealing wood before painting. It inhibits the hard settling of pigments in paints, reduces the η of alkyd resin varnishes, and improves the H_2O-resistance of spar varnishes. It has been used as a rubber substitute. D. R. D.

Bronze media. E. STOCK (Farben-Ztg., 1938, **43**, 333).—A general account of the properties and requirements of bronze media and metal-powder lacquers made therefrom is given, and typical formulæ (non-greening bronze media, heat-resisting Al paints) are discussed. S. S. W.

Poisonous and non-poisonous pigments. A. BEYTHIEN (Farben-Chem., 1938, **9**, 77—79, 84; cf. B., 1937, 1237).—Commercial names for pigments containing Co, Mo, Ni, Se, Ti, Bi, W, Al, Ca, Fe, C, Mg, and Mn are listed and occasional notes given on legal restrictions to their use. S. M.

Pigment grinding and air-separation. W. KLENK (Farben-Ztg., 1938, **43**, 334—335).—The general principles of separation of pigment particles by differences in shape, size, and *d* by means of an air current are enunciated, and mechanical details of the air-separation process are briefly discussed. S. S. W.

Morphology of pigments. VIII. *X*-Ray study of minium. IX. Dispersion of Prussian-blue. A. V. PAMFILOV and A. S. SHUKOV. **X. *X*-Ray characterisation of white pigments.** E. G. IVANTSCHEVA and K. M. KOMISSAROVA (J. Gen. Chem. Russ., 1937, **7**, 2513—2517, 2654—2657, 2848—2851; cf. B., 1938, 82).—VIII. All samples of Pb_3O_4 examined were of the tetragonal system (*a* 4·57, *c* 6·22 A.). *X*-Ray detection of rhombic in tetragonal PbO, or the reverse, is possible only when the product contains > 10% of polymorph, whilst PbO_2 or Pb_3O_4 in PbO is detectable röntgenographically when their concn. is > 15%.

IX. The mean diameter of particles of Prussian-blue suspended in aq. $H_2C_2O_4$, linseed oil, or glycerol is 0·2 μ.

X. The *X*-ray diagrams of commercial samples of white-Pb correspond with that of $PbCO_3$. Those of ZnO are identical, irrespective of the source and method of prep. Lithopones give diagrams identical with that of $BaSO_4$, irrespective of the ZnS content; ZnS lines are absent. R. T.

Wetting and dispersion [of pigments]. R. F. BOWLES (J. Oil Col. Chem. Assoc., 1938, **21**, 23—41).—

Stress–strain curves for various C-black dispersions were obtained by applying gradually increasing tension to a paddle immersed in the medium. Initial elastic behaviour is followed by plastic flow until, with sufficient "liquefying stress" (L), the system behaves like a liquid. L is a measure of the force required to destroy any gel structure. Although development of such structure may prevent sedimentation, L must be low even after storage for ease of working. In non-polar mineral oil L reached a max. after a few days; in lithographic oils L was greater and continued to increase after one year. L increased also with the η of the medium and the proportion of pigment; with $< 5\%$ of C, however, L was independent of η, probably because the particles are too far apart to exert a mutual effect. In mineral oil blanc fixe behaved similarly, provided that the proportion of pigment was large. In spite of their known wetting action, addition of blown oil and fatty acids to lithographic oils increased L; hence thixotropy is not concomitant with insufficient wetting. Prolonged storage may induce wetting of the dispersed particles, in which case a structure does not develop after re-milling; with mineral oils no such wetting ensues and the original structure re-forms after re-milling. It is concluded that wetting is not essential for the production of uniform dispersions and an attempt is made to explain thixotropic phenomena on an electromechanical basis independently of wetting action. S. M.

Genuineness of [claims for] glue-, chalk-, and cement-bound pigments. E. Kunze (Farbe u. Lack, 1938, 137—138, 149—151).—A pigment should not be described as "CaO-resistant" unless it withstands the action of a new CaO-containing surface; it need not be resistant to cement. Dyes and pigments which are suitable for glue, chalk, and cement media are listed, together with their light-resistance. The advisability of wetting dry pigments with oils and other liquids to develop their colour, to reduce dust, etc. is discussed. S. M.

High-gloss [printing] inks. R. C. Chandler (Amer. Ink Maker, 1937, **15**, No. 9, 39—41, 77).—The formulation, manufacture, and gloss measurement of these inks are described. D. R. D.

Possibility of replacing American asphaltites used in printing inks by German petroleum pitches. Forschungsinst. f. das Graphische Gewerbe Tech. Hochschule Berlin (Farben-Ztg., 1938, **43**, 302—305).—Substitutes for gilsonite, Utah asphalt, etc. are considered to be available in petroleum pitches prepared in Germany, largely from foreign raw oil, subjected to normal distillation and subsequent hardening treatment (air-blowing, vac. distillation). Support is given to this view by the chemical and physical properties of the two types of product which are detailed [solubilities, η, evaporation and drying rates from solution (in thin films)]. S. S. W.

Genuine balsam-turpentine oil (gum turpentine). Piestinger Harzgenossenschaft (Öle, Fette, Wachse, 1937, **2**, No. 8, 3—4).—Turpentine, as a reactive substance, plays a part in the complicated drying processes of paints, and cannot be replaced by petroleum thinners without impairing paint (etc.) quality. E. L.

Oil of nhamuhy (*Nectandra Elæphora*). J. L. Rangel (Bol. Inf. Inst. Nac. Tech., 1937, **2**, No. 7, 11 pp.).—This oil resembles turpentine and could be used as a fuel; the tree grows in the Upper Amazon but could probably be planted in more accessible regions. The oil has b.p. 156—274° (39% distilling at $<179°$, 43% at 180—230°, and 17% at $>230°$), d^{15} 0·919, n^{20} 1·475, $[\alpha]^{26}$ +20·6°, and flash point 56°. The solvent properties of the oils are similar to those of turpentine. Nitrocellulose is sol. in the oil. F. R. G.

Action of anhydrous ferric chloride on pinene. E. V. Zmatschinski, S. A. Maron, and S. G. Schmuilovitsch (J. Appl. Chem. Russ., 1937, **10**, 2029—2036).—*d*-α-Pinene and $FeCl_3$ interact energetically at room temp., with evolution of heat. The products are $FeCl_2$, resins, liquid hydrocarbons, and Cl-compounds; a tricyclic diterpene and bornyl chloride were isolated. The industrial applications of the products (chiefly as lacquer substitutes) are discussed. R. T.

[Paint industry of] 1937 reviewed. Anon. (Oil and Colour Tr. J., 1938, **93**, 63—84).—The economic and technical aspects of the paint and allied industries are examined. D. R. D.

A paint-man's camera. K. J. Keating (Amer. Paint J., 1938, **22**, No. 20, 20—32).—Advice on the use of photography in the paint industry is given. D. R. D.

Pigment-binding media from inorganic materials. H. Wentzel (Farben-Chem., 1938, **9**, 45—46).—Patented developments of the Parker rust-prevention process are described in which H_3PO_4 or its salts with NH_3 and amines are heated with inorg. pigments, *e.g.*, MnO_2, TiO_2. The films may be produced on various metals, wood, and stone; they withstand red heat and are weather-resistant without a coat of paint. They lack elasticity, however, and H_2 may be evolved from a metal surface during processing. Use of Na silicate, $Si(OEt)_4$, and Al bronze are reviewed. S. M.

Introducing cobalt driers into paint. Anon. (Paint Manuf., 1938, **8**, 31).—Co linoleate should be dissolved in the heated oil and not added as a solution in white spirit to the cold oil. D. R. D.

Centre line paint formulation [for roads]. A. L. Zinser (Amer. Paint J., 1938, **22**, No. 17, 26—27, 54—59).—The factors affecting the durability of road paints are discussed. The paint should be porous in order to prevent blistering, and a paint containing 40 vol.-% of pigment (containing lithopone 52, ZnO 40, and diatomaceous SiO_2 8%) and 60 vol.-% of long-oil phenolic resin varnish has been found suitable. D. R. D.

Plastic paints. W. E. Evans (Paint Manuf., 1938, **8**, 14—15).—A review of their formulation and use. D. R. D.

Chlorinated rubber paints and varnishes. A. Jones (Paint Manuf., 1938, **8**, 16—18).—The properties of these paints are reviewed. D. R. D.

Rust-preventive paints. E. STOCK (Farben-Ztg., 1938, 43, 241—244).—The results of a series of H_2O- and sea-H_2O-immersion tests on various one- and two-coat paint systems based on Pb_3O_4, Fe_2O_3, Fe_3O_4, white-Pb, etc. are reported in the form of descriptions of the condition of the outer- and under-sides of the paint films after removal from the metal. No general conclusions are drawn. S. S. W.

Influence of quality of [paint] raw materials on corrosion-resistance. J. D'ANS (Farben-Ztg., 1938, 43, 210—211, 245—246).—Problems of rust-preventive painting, arising from the nature and condition of surface to be painted, types of pigments and vehicles used, etc., are discussed in general terms. S. S. W.

Testing of paints. O. MERZ (Farben-Ztg., 1938, 43, 365—366).—Trieb's views (cf. B., 1938, 190) are amplified. S. S. W.

Painting cement [and plaster]. J. LAWRANCE (J. Dec. Art, 1938, 58, No. 685, 24—26).—The causes of paint failures on cement and plaster and the methods of avoiding these by chemical pretreatment of the surface and by the use of special paints are discussed. D. R. D.

Solvent power of solvents for stand oils. H. WOLFF and W. TOELDTE (Farben-Chem., 1938, 9, 47—52).—An equation is developed to relate degree of solvation to the η of solute, solvent, and solution and to the mol. wts. of the components (cf. Lederer, A., 1934, 953). When the mol. wt. of the solute is unknown a comparative evaluation for various solvents can be obtained. With a high-η linseed stand oil in light petroleum solvation was const. with variable concn., but decreased in other solvents with increase in the concn. A less polymerised tung stand oil gave const. solvation in both light petroleum and turpentine. The apparent degree of solvation varied with the solvent power of the liquid and generally decreased in the order CCl_4, PhMe, turpentine, light petroleum; it increased with the extent of polymerisation of the dispersed oils. Good solvent power, however, is not always associated with low η and cannot be measured from the η of the solutions. S. M.

Substitution of components of nitro-[cellulose] lacquers [solvents for non-solvents]. J. SCHEIBER and E. SÜRING (Farbe u. Lack, 1938, 113—115, 124—125).—Tabulated data show variations in η of three nitro-cellulose–BuOAc lacquers produced by gradual addition of four non-solvents: BuOH, PhMe, benzine, CCl_4. Although BuOH improves the flow of the spread films, η increases were marked when >20% of the BuOAc was replaced by BuOH; improved solvent action is therefore limited, but plastic flow was absent with 50% substitution. Even small proportions of PhMe increased the η of the lacquer, but the increase is tolerable up to 50% of PhMe and plastic flow is again absent. Hence PhMe is a satisfactory diluent. Benzine also produced increase in η; with >20% the increase is large, pptn. may take place, and plastic flow develops. Benzine may therefore cause such defects as orange-peeling and loss of gloss. CCl_4 is more tolerable than benzine. Various common plasticisers had much the same effect on η, but synthetic resins varied considerably in their action. S. M.

Aeroplane fabric finishes. P. H. FAUCETT (Drugs, Oils, and Paints, 1937, 52, 485—488).—A simple apparatus for measuring the tautness of doped fabrics is described and data are quoted for various lacquers. Satisfactory results were obtained when film scrap was used in place of fresh cellulose nitrate in the lacquers. D. R. D.

Electrical aspects of aluminium and bronze finishes. E. E. HALLS (Oil and Colour Tr. J., 1938, 93, 39—43).—The breakdown voltage of Al paints varies considerably (from 0·5 to 2000 v.) with the Al content, composition of the medium, presence of primers or varnish top-coats, and the nature of the base painted. In general, cellulose media give the highest vals. Spot-welding may be effected through Al paints. In order to obtain electrically conducting paints, bronze powder should be used rather than Al, and should be washed with $COMe_2$ and then either reduced in coal gas or H_2 or washed with dil. H_2SO_4 and dried, immediately before incorporation in the min. permissible proportion of medium. D. R. D.

Testing finishing materials. G. PHILLIPS (Ind. Finishing, 1937, 14, No. 1, 18—19).—Methods of testing resistance to salt H_2O, durability, and abrasion-resistance are described. D. R. D.

Testing finishing materials. R. J. FAIRBURN (Ind. Finishing, 1937, 14, No. 1, 19—21).—Tests for resistance to salt H_2O, alkali, light, etc., and for toughness, adhesion, and flexibility, are briefly reviewed. D. R. D.

Vinyl acetate from paraldehyde. Org. solvents.—See III. **Stable cellulose acetate. Polystyrene threads.**—See V. **ZnO.**—See VII. **Safety glass.**—See VIII. **Applications of artificial resin in mining. Baking finishes on automobile frames. Surface protection of electron metal. Removing paint etc. from tinned surfaces. Strength of org. polymerides.**—See X. **Electrical properties of [resinous] solids.**—See XI. **Andá-assú oil. Whale oil in paint, linoleum, etc. Linseed oil.**—See XII. **Rubber pigments. Rubber–asbestos.**—See XIV.

See also A., I, 189, **Solubility of cellulose esters.**

PATENTS.

Manufacture of artificial materials from halogenated hydrocarbons. I. G. FARBENIND. A.-G. (B.P. 477,532, 1.7.36. Ger., 17.7.35).—Mixtures of $CH_2{:}CHCl$ containing 20—80% of $CH_2{:}CCl_2$ are polymerised in aq. emulsion to yield products which may be subsequently further chlorinated and possess desirable chemical and electrical properties of polyvinyl chloride without requiring additional softening agents. The polymerisation with H_2O_2 in aq. $(NH_4)_2HPO_4$ is described. A. H. C.

Thermoplastic films. L. MELLERSH-JACKSON. From CONSOLIDATED PAPER CORP., LTD. (B.P. 481,333, 31.3.37).—Continuous films of substantially const. dimensions are prepared by passing heated

thermoplastic material, preferably of polyvinyl acetate having $\eta < 2$ centipoises and plasticised, *e.g.*, with Bu_2 phthalate, through a shaped orifice and subjecting the film obtained to the simultaneous action of a longitudinal pull and to streams of cooling fluid (*e.g.*, compressed air or fine H_2O spray). The films are suitable for adhesive purposes. J. W. Cr.

Manufacture and use of plastic masses, paints, lacquers, coatings, and the like composed of aqueous dispersions of linoxyn. Soc. Ital. Pirelli (B.P. 472,738, 1.2.37. It., 31.1.36).—To an aq. dispersion of linoxyn (I) is added a material which while chemically inert to (I) renders the dispersion heat-sensitive, *i.e.*, stable to coagulation at normal but not raised temp. Preferably this added material is formed *in situ* by interaction of the protective colloid (*e.g.*, casein, albumin) and a salifying agent (*e.g.*, sol. salt of an alkaline-earth metal). Solid products are obtained by heating until coagulation is complete and then drying the coagulum. J. W. Cr.

Production of sound records. G. Kögel (U.S.P. 2,068,919, 26.1.37. Appl., 27.3.36. Ger., 24.11.34).—Colloids capable of being tanned are mixed with substances which after exposure to light can bring about tanning, *e.g.*, nitronaphthalenesulphonic acids, xanthone dyes, and diazo compounds of high mol. wt. containing < 3 carbocyclic rings. Among examples, gelatin (100) dissolved in H_2O (500) is mixed with a solution of the Mg salt of 1 : 8-$NO_2 \cdot C_{10}H_6 \cdot SO_3H$ (20) in H_2O (300 pts.) or with the $ZnCl_2$ salt of the diazo compound of *N*-1 : 2 : 3 : 4-tetrahydro-6-naphthyl-*N*-methyl-*p*-phenylenediamine. Al plates are coated with the product and after the impression has been received the latter is fixed by exposure to light. A mixture of eosin and thiosinamine is used similarly. K. H. S.

Removal of colloids from lithographic printing surfaces. R. F. Reed, P. W. Dorst, and A. George, Assrs. to Lithographic Tech. Foundation, Inc. (U.S.P. 2,062,273, 24.11.36. Appl., 28.11.33).—Hardened dichromated colloid films containing glue are removed from lithographic surfaces (other than Al or other metal attacked by alkali) by treatment with an aq. solution of an alkaline-earth hydroxide (0·1 g. per 100 c.c. to saturation), with or without an alkaline-earth salt (1—15 g./100 c.c.), *e.g.*, $Ca(OH)_2$ 2, $CaCl_2$ 5 g. in 100 c.c. The hydroxide may also be prepared by interaction of, *e.g.*, $CaCl_2$ with aq. NaOH. The solutions are not corrosive to the skin and do not attack fatty inks. J. L.

Engraving or etching. L. T. Gmach (B.P. 478,976, 6.10.36).—The surface of sheets of cellulose nitrate or acetate is softened by, *e.g.*, aq. KOH and the design then printed on it. It is now sprinkled with, *e.g.*, asphalt or rosin, this is then made to combine with the printing ink by heat and treatment with hydrocarbon vapours, and the surface is finally etched. F. M. L.

Production of crystalline products by condensing urea and formaldehyde. N. Fuchs, Assr. to Plaskon Co., Inc. (U.S.P. 2,062,171, 24.11.36. Appl., 7.11.32).—Urea alone or mixed with $CS(NH_2)_2$ is heated (*e.g.*, for ¼—2 hr. at 60—100°) with aq. CH_2O in the proportion of approx. 1 mol. of urea to 1·5 mols. of CH_2O, in presence of a small amount (*e.g.*, 0·1—1% on the urea) of alkali or alkaline-earth nitrite which by interacting with HCO_2H of commercial CH_2O and reducing acidity renders the condensation more controllable. The cryst. products obtained are filtered off, dried, and used for moulding purposes, in admixture with fillers if desired. J. W. Cr.

Production of particularly stable [alkyd] condensation products. K. Sändig, Assr. to Resinous Products & Chem. Co., Inc. (U.S.P. 2,061,635, 24.11.36. Appl., 29.11.32. Ger., 7.12.31).—Alkyd resin is purified by dissolving with heat in an alcoholic solvent (*e.g.*, EtOH) in excess of that quantity which is miscible with the resin in the cold, cooling the solution until separation into 2 layers occurs, and recovering from the lower layer the resinous material, now free from uncombined raw materials and reaction products of low mol. wt. The treated resin hardens more rapidly and is more H_2O-resistant and less acidic. J. W. Cr.

Manufacture of titanium pigments. Brit. Titan Products Co., Ltd., R. W. Ancrum, and A. G. Oppegaard (B.P. 479,072, 7.8.36).—TiO_2 paints with high fastness to light and giving films of high durability are obtained by incorporating 0·1—20% of $Sb^{\cdots}$ in the TiO_2 and calcining the mixture. F. M. L.

Coloured titanium dioxide pigments. R. M. McKinney and C. E. Smith, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,062,137, 24.11.36. Appl., 11.1.35).—Uncalcined TiO_2 is heated at $< 800°$ with small proportions of a V or Cr compound; compounds of Fe, Co, Ni, Mn, and Cu are also stated to be suitable, but are not claimed. Leaded ZnO and the usual fillers may be added in preparing paints. Examples are given. S. M.

(A) **Manufacture of (A, B) rutile pigments.** P. Kubelka and J. Srbek, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,062,133—4, 24.11.36. Appl., [A] 20.3.32, [B] 8.9.33. Ger., [A, B] 20.3.31. Cf. U.S.P. 1,758,528; B., 1931, 200).—$TiCl_4$ solution (I) is hydrolysed at 100° in presence of TiO_2 seed which is separately prepared by pptn. at about 80° from a Ti salt solution (II) ($p_H < 3·5$) and is heated in (II) until it becomes insol. in (I). The calcined product has rutile form, high strength and spectral reflectance; its particles are fine (diameter 0·1—0·6 μ.) and uniform. S. M.

Printing ink. E. J. Kelly (U.S.P. 2,070,278, 9.2.37. Appl., 20.5.35).—The ink comprises colouring matter (a dye sol. in spirit or oil), 3—18% of a cellulose ester (η 0·25—40 sec.), 1—50% of a resin (alkyd or oleo-ester), and 40—90% of esters and/or ethers of an ethylene glycol. B. M. V.

Manufacture of lacquers, films, foils, threads, moulded articles, plastic masses, and the like. Deuts. Hydrierwerke A.-G. (B.P. 472,968, 30.3.36. Ger., 28.3.35).—The resin alcohols (I) obtained by the reduction (*e.g.*, catalytic, high-pressure) of natural resins, resin acid mixtures, or technical

derivative mixtures (excluding abietinol and derivatives) are used as solvent, softening, gelatinising, or swelling agents in products having as base one or more of the following products: cellulose derivatives, albuminous or asphalt materials, natural or artificial resins, waxes, and caoutchouc. Advantageous properties claimed for (I) are light-resistance, absence of colour, and consistent quality. J. W. CR.

Cellulose derivative compositions. E. F. IZARD, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,061,732, 24.11.36. Appl., 10.11.33).—Cellulose derivatives are dissolved in an azeotropic mixture of H_2O and the Me_2 ether of ethylene glycol. *E.g.*, clear solutions of the acetate (51% OAc content) can be obtained (but not with anhyd. solvent). Alternatively, cellulose nitrate and the ethers can be dissolved in an azeotropic mixture of H_2O and the Me_2 ether of propylene glycol. J. W. CR.

[Hydraulic press for] manufacture of large-sized moulded plastics. J. SHAW & SONS, LTD., and J. B. SHAW (B.P. 481,763, 11.11.36).

Decoration of moulded articles [of synthetic resins]. R. HAYKIN (B.P. 481,358, 7.8.36).

Lubricating resinous bearings.—See II. **Oxidised "hydroformed solvent."**—See III. **Water-insol. dyes. Phthalocyanines.**—See IV. **Grinding etc. tools.**—See VIII. **Laminated wood veneers.**—See IX. **Al pigment pastes.**—See X. **Adhesive films etc.**—See XV. **Tree wound dressing.**—See XVI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Secondary rubber-yielding plants of the Caucasus region and of Central Asia. J. LEGROS (Internat. Rev. Agric., 1937, **28**, 468—481T).—Of >130 plants studied by Russian investigators as possible alternatives to the *Hevea* tree for production of rubber and capable of growth in a temperate or cold climate, the most promising are *Parthenium argentatum* (Guayule), *Eucommia ulmoides*, Solidago, Chondrilla, *Apocynum venetum* (Kendir), *Asclepias cornuti* (Vatocnik), and certain plants of the Scorzonera (Tau-sagiz) and Taraxacum (Kok- and Krym-sagiz) genera. Details are given of the morphology, cultivation, rubber content, diseases, and pests of these. *Eucommia* yields gutta. D. F. T.

Influence of temperature on crystallisation of caoutchouc. H. DOSTAL (Österr. Chem.-Ztg., 1938, **41**, 20).—The supercooling, due to the increase in free surface energy as calc. for the crystallisation of a unit cell of caoutchouc from a modified Rayleigh formula, accords with the observed vals. J. S. A.

New transformation product of caoutchouc. O. KRATKY, H. PHILIPP, K. W. POSNANSKY, and F. SCHOSZBERGER (Naturwiss., 1938, **26**, 123).—Caoutchouc reduces $AgNO_3$, the reaction being due to impurities. Rubber films were placed in a solution of $AgNO_3$ in $COMe_2$–H_2O and dried. The films were then examined by *X*-ray analysis. Instead of the diffuse rings given by unstretched rubber, the *X*-ray diagram of the product shows a series of dark rings which could not be ascribed to inorg. Ag compounds. On stretching, the rings break up into spots, but the diagram differs from that for stretched rubber. The diagrams are due either to a new modification of rubber or to a chemical transformation product. A. J. M.

Dye and lake pigments for rubber. H. JONES (Trans. Inst. Rubber Ind., 1937, **13**, 298—316).—The org. colours used in rubber are described and classified and methods of testing, preferably in rubber, are indicated. Reference is made to auxiliary chemicals such as dispersing and wetting agents, latex stabilisers, and co-pptn. agents which are used in the application or prep. of the colours. An account is given of the use of pigment pastes, *e.g.*, in latex or in factice for colouring rubber, and photographs are reproduced showing the increased depth of shade obtainable with increased grinding or the appropriate use of "paste" materials or auxiliary agents. D. F. T.

Rubber and asbestos. G. F. PAYNE (Trans. Inst. Rubber Ind., 1937, **13**, 317—343).—The production of asbestos fibre is described and also its use for the manufacture of compressed asbestos-fibre jointing by mixing with a dough of solvent and compounded rubber and then calendering. An account is given of the properties desired in such jointing for various purposes, especial reference being made to ageing at 70°, 150°, and 215°, to the effect of aq. HCl, H_2SO_4, HNO_3, and AcOH of 10—40% concn., and to its resistance to oil and petrol. The method of manufacture of joint-rings and packings, rubber-bonded brake linings, and asbestos-covered rubber conveyor belting is described. D. F. T.

Formation of factice-like masses from fatty acids containing sulphur. J. BALTES (Kautschuk, 1938, **14**, 45—48; cf. Salchow, B., 1937, 949).—The earlier work (*loc. cit.*) is criticised adversely. The 9 : 10-dithiocyanostearic acid, obtained from elaidic acid and nascent thiocyanogen, when treated with alcoholic KOH gives a "dithianelaidic acid." In presence of an alkali carbonate, I removes the H atoms from the 4 central CH groups and the mols. condense to give a factice-like mass which still retains a "dithian" structure. (Cf. B., 1938, 196.) D. F. T.

Influences of copper on rubber. I, II. Influence of copper compounds on vulcanisation of (I) smoked sheet, (II) pale crêpe. III. Comparison of deterioration. T. ŌKITA (J. Soc. Chem. Ind. Japan, 1938, **41**, 23—25B).—I. CuO, Cu_2O, and CuS up to 2% of Cu on a mixture of smoked sheet rubber and S (100 : 8) retard vulcanisation, but with greater proportions vulcanisation is accelerated. Cu_2S has little effect, but $CuCl_2$, $CuSO_4$, CuI_2, and Cu_2I_2 greatly retard vulcanisation, even at 0·2% of Cu, and depress the tensile strength, the products also tending to be porous.

II. The effects with pale crêpe rubber are similar to the above.

III. Bomb-ageing in O_2 at 60° causes rapid deterioration with all the mixtures containing Cu compounds except Cu_2S, and the $COMe_2$ extracts simultaneously increase. The results of heating in CO_2 at 100° are markedly different from those of

bomb-ageing, and tend to fall in the inverse order, the pale-crêpe mixture containing Cu_2S or Cu stearate showing marked deterioration. D. F. T.

Rapid detection of accelerators [of vulcanisation of rubber]. E. P. SLEPUSCHKINA (Caoutchouc and Rubber, U.S.S.R., 1937, No. 3, 48—51; India-Rubber J., 1938, **95**, 290—291).—A scheme of detection for mercaptobenzthiazole (I), diphenylguanidine (II), tetramethylthiuram disulphide (III), A19 (CH_2O–MeCHO–NH_2Ph condensation product), and K-1 ($2NH_2Ph$–3MeCHO condensation product) is based on the following reactions applied to the aq. extract of the accelerator, to the aq. solution of the dried $COMe_2$ extract of the rubber, or to the aq. HCl (0·5N) extract of the rubber. The aq extract of the accelerator after being shaken with a C_6H_6 solution of Co oleate may give a violet (II), emerald-green (I), or deep green "ring" (III); with 1% aq. picric acid a yellow ppt. may be obtained (II). With aq. NaOCl + PhOH (3% solution) extracts of A19 or K-1 give a bright blue colour. An aq. NH_3 solution of (I) gives a flocculent ppt. with aq. $AgNO_3$ D. F. T.

Determination of the comparative hysteresis of rubber by an oscillatory method. ANON. (Kautschuk, 1938, **14**, 31—33; From "Die Dämpfung als Qualitätsmass f. Gummi," B. STEINBORN [Mitt. des Wöhler-Inst., 1937, No. 31]).—Results are quoted for a method of examination of the degree of resilience of rubber (natural and synthetic) by maintaining in oscillation a vertically suspended rubber cylinder with a load at its lower end and measuring the relative magnitude of the amplitude of the vibration applied at the top of the cylinder and of the corresponding amplitude induced at the lower end; the internal heat development is measured by a thermocouple. The results are given mathematical treatment and are brought into comparison with the commoner physical characteristics. D. F. T.

Estimation of notch-tensile strength with vulcanised rubber. D. J. VAN WIJK (Kautschuk, 1938, **14**, 2—5, 26—29).—Experiments demonstrate the val. of tensile measurements (rate of extension 50 cm./min.) with the customary rings or test-pieces the surface of which has been cut so as to make a notch 1 mm. deep on all sides of a cross-section at right-angles to the length of the test-piece. The optimum notch-tensile behaviour is generally observed at a degree of vulcanisation < that for the usual tensile optimum, and this probably provides a simple method for determination of the time of vulcanisation for the "technical optimum." The proportions of C black and ZnO (30 and 20 vols.-%, respectively) giving the highest notch-tensile figures are > those giving the max. tensile results of the ordinary type. Clay and whiting markedly depress the notch-tensile qualities of rubber. The notch test is of practical val. for mechanical rubber goods such as conveyor belts, and the results for specimens cut along and across the belt can reveal differences which are not shown by the ordinary tensile tests. The method described earlier for making tensile tests at higher rates of extension by means of a blow from a pendulum hammer is found to give results very similar to those obtained with the described method of notch-tensile measurements. D. F. T.

Synthetic rubber. F. MUHLERT (Chaleur et Ind., 1937, **18**, 469—472).—Methods of production are reviewed. R. B. C.

Synthetic rubber. H. ROELIG (Z. Ver. deut. Ing., 1938, **82**, 139—142).—Its mechanical and electrical properties are summarised. R. B. C.

Antioxidants [for rubber] and problems connected with their use in the factory. M. JONES (Trans. Inst. Rubber Ind., 1937, **13**, 281—297).—Various practical aspects of the use of antioxidants are considered and experimental results quoted in support of the views expressed. The solubility in rubber is of importance in connexion with the degree of tendency to blooming, the latter also being influenced by the state of division of the antioxidant. Some antioxidants markedly affect the rate of vulcanisation. The oven method of testing (70°) is likely to give more useful information than the more rapid O_2- or air-bomb method. The optimum concn. of antioxidant for protection against flex-cracking may be quite different from that for protection against ageing, and there is no well-defined relation between the two types of effect. Possible sources of error in the technique and interpretation of antioxidant tests are indicated. D. F. T.

Brittleness of ebonite. R. ARIANO (Gomma, 1937, **1**, 6—10; India-Rubber J., 1938, **95**, 327—330).—Measurements of the "resilience" or fracture-resistance of a bar of ebonite by an impact from a pendulum-type machine show that it is influenced chiefly by the moment of inertia of the cross-section of the specimen, but is also affected by its form. With thorough vulcanisation the state of "cure" is immaterial. Notching of the test-piece is not of great importance, but the shape of the notch influences the resilience in ebonites free from fillers. D. F. T.

Properties of high-mol. wt. compounds.—See I. **C black.**—See II. **Rubber-impregnated textiles.**—See VI. **ZnO.**—See VII. **Plastics. Chlorinated rubber in plastics. Rubber-like resins. Al naphthenate. Chlorinated rubber paints etc.**—See XIII.

See also A, II, 150, **Constituents of natural rubber.**

PATENTS.

Creaming of rubber latex. CALIFORNIA FRUIT GROWERS EXCHANGE (B.P. 472,912, 1.4.36. U.S., 1.4.35).—A sol. (fibrous) alkali (Na) pectate is used as creaming agent. D. F. T.

Manufacture of rubber thread [from latex]. C. L. BEAL, Assr. to AMER. ANODE, INC. (U.S.P. 2,061,749, 24.11.36. Appl., 11.10.33).—A sheet of coagulum containing H_2O is incompletely dried so that it remains easily deformable and is then progressively sheared along parallel lines to produce strips with substantially rounded edges. Apparatus is described. D. F. T.

Rubber yarns or threads and fabrics made therewith. T. L. SHEPHERD (B.P. 473,021, 28.2.36).—A substantially inextensible thread is formed from

rubber containing a sufficient proportion of an extensibility-reducing agent (I), and is covered with a braiding or helical winding of textile or artificial silk thread so tightly as to form indentations and prevent subsequent slipping, but not to weaken the rubber core. (I) may be removed after the yarn has been incorporated in a fabric. D. F. T.

Production of rubber articles from aqueous dispersions of rubber. INTERNAT. LATEX PROCESSES, LTD. (B.P. 472,990, 3.4.36. U.S., 19.7.35).—The liquid associated with or introduced into a coagulated rubber article is controlled by stretching the coagulum in presence of the liquid (for further coagulation, washing, introduction of accelerator, etc.) and thereafter allowing the article to contract to its original size. Apparatus is described. D. F. T.

Manufacture of cellular rubber. FIRESTONE TYRE & RUBBER CO., LTD., Assees. of H. W. GREENUP (B.P. 473,039, 6.11.36. U.S., 20.11.35).—An aq. dispersion of rubber is formed into a froth without the use of a foam-stabilising agent and then coagulated to an irreversible gel. Vulcanising agents may be added before or after frothing. ZnO may be employed as activator, and $(NH_4)_2SO_4$ incorporated with the froth as coagulant. D. F. T.

Manufacture of sponge rubber. H. R. MINOR (B.P. 472,646, 26.3.36. U.S., 17.1.36).—A batch of rubber mixing in a closed container is submitted to CO_2 under pressure so that the rubber is impregnated with gas. At a predetermined pressure the admission of gas is discontinued and heat applied. The gas pressure is then reduced, thereby permitting expansion of the rubber under the action of the gas imprisoned therein and heat is applied to effect vulcanisation. Apparatus is described. D. F. T.

Production of gas-expanded rubber. F. W. PEEL (B.P. 473,297, 9.4.36).—Rubber dough at atm. pressure is rendered plastic and simultaneously partly vulcanised by heat preparatory to being subjected to a neutral gas at high pressure. The expanded mass obtained on release of the pressure is again heated to effect further expansion and to complete vulcanisation. The dough may contain two accelerators (*e.g.*, piperidine pentamethylenedithiocarbamate and diphenylguanidine), one for each stage of the vulcanisation. D. F. T.

Manufacture of antifreeze rubber belt compound. J. ROCKOFF, Assr. to DAYTON RUBBER MFG. CO. (U.S.P. 2,061,674, 24.11.36. Appl., 12.2.34).—A composition retaining its pliability at low temp. is produced by mixing with rubber an antifreezing softening oil which has been treated at substantially below $-17{\cdot}8°$ ($-34°$) to remove ingredients which would otherwise lead to hardening at low temp. D. F. T.

Vulcanisation of rubber. R. A. DUFOUR and H. A. LEDUC (B.P. 472,671, 13.7.36. Luxemb., 15.7., 29.10., and 4.12.35, and 28.1.36).—The heating for vulcanisation is effected by making the rubber serve as a dielectric between the electrodes of an electric condenser to which is applied a high-frequency a.c. Apparatus is claimed. D. F. T.

Manufacture of ebonite and products thereof. RES. ASSOC. OF BRIT. RUBBER MANUFRS., B. D. PORRITT, J. R. SCOTT, and W. H. WILLOTT (B.P. 473,287, 7.4.36).—Granular raw rubber is mixed with $<20\%$ of S etc. without mastication and then heated under vulcanising conditions. If the mixture is enclosed in a mould under pressure the products are of moulded ebonite; otherwise the products are porous masses suitable for grinding to ebonite dust. D. F. T.

Composition fuel [for vulcanisers].—See II. **Elastic yarn. Alloprene-rayon.**—See V. **Floor covering.**—See IX.

XV.—LEATHER; GLUE.

The unhairing problem—depilatory action of thiol (SH) compounds. H. G. TURLEY and W. WINDUS (Stiasny Festschr., 1937, 396—406).—All types of simple primary, *sec.*, and *tert.* aliphatic thiols accelerate unhairing in alkaline solution but the extent varies with the structure of the mol. and solubility under experimental conditions. Cysteine, glutathione, and $SH{\cdot}[CH_2]_2{\cdot}O{\cdot}[CH_2]_2{\cdot}OBu$ give rapid hair-loosening with no hair damage. Methyl*iso*thiourea sulphate and benzyl*iso*thiourea hydrochloride accelerate unhairing due to hydrolysis to thiols. The action of thiols is purely chemical, decreasing and finally disappearing as the compound is aliphatic, alicyclic, or aromatic. Ease of oxidation of thiols to disulphides plays an important rôle in the mechanism of unhairing. Thiols are much more active than amines. Aromatic thiols are an exception to the Marriott–Merrill theory. A satisfactory theory of unhairing must explain the mechanism of the action of such different materials as metal sulphides and cyanides, Sn^{II} salts, amines, and mercaptans, and also the inactivity of aromatic amines, thiols, sulphites, and thiosulphates. Excellent calf shoe leather has been made from $Bu^{a}SH$ and CaO. D. B.

Progress in fat-liquoring, 1929—1937. W. SCHINDLER (Collegium, 1938, 1—40).

Synthetic tanning materials from phenolsulphonic acids and formaldehyde. H. SCHÜTTE (Stiasny Festschr., 1937, 370—380).—Synthetic tans are sol., cryst. or amorphous aromatic sulphonic acids of high mol. wt., which may or may not contain OH, and which ppt. glue or gelatin solutions. Those containing no SO_3H are made from dihydric phenols or by the action of HNO_3 on wood charcoal etc. Neradol D consists of a highly complex mixture of tanning sulphonic acids. The isomerides from crude cresol give 10 isomeric dihydroxyditolylmethanedisulphonic acids with CH_2O. The condensation of p-$C_6H_4Me{\cdot}SO_3H$ (I) with CH_2O gives $3:3'{\cdot}CH_2[C_6H_2Me(OH){\cdot}SO_3H{\text{-}}1:4:5]_2$ and compounds of the type $C_6H_2Me(OH)(SO_3H){\cdot}[CH_2{\cdot}C_6H_2Me(OH)]_n{\cdot}CH_2{\cdot}C_6H_2Me(OH){\cdot}SO_3H$, where $n = 1 - 3$ (cf. Koebner, B., 1933, 514). D. B.

New type synthetic tannins with filling properties; their behaviour and characteristics. G. OTTO (Gerber, 1938, 64, 12—14).—Synthetic

tannins are grouped thus: auxiliary, combination, and substitute tannins. The following figures have been determined for them, respectively: p_H of analytical solution 2—2·4, 2·4—3·1, 3·1—3·8; flocculation with ⅓-saturated aq. NaCl (%) 0, 20, 60; yield of leather 150, 180, 200; degree of tannage 20, 40, 60; tannin required (%) 2—5, 5—15, unlimited; nature of combination with collagen: principal valency, principal and residual valencies, mainly residual valency. Combination synthetic tannins are typified by Tanigans SNA and US, the substitute tannins by Tanigans extra-A, -B, -D, supra-LL and -DLN. The auxiliary tannins contain SO_3H and phenolic groups, the combination synthetic tannins contain also CO_2H groups, whilst the substitute synthetic tannins contain phenolic and NH-groups together with strongly negatively-charged, substituted C atoms, which carry a dissociable H. D. W.

Grinding of tanning materials for extract manufacture and method of determining the degree of fineness obtained. J. A. Sagoschen (Gerber, 1938, **64**, 1—6).—A series of nine boxes is arranged one above the other. The top eight boxes are fitted with wire-mesh bottoms of sizes 1—20 mm., respectively. These are used to determine the respective amounts of material of different sizes, and they can be applied to the study of the effect on the grinding of different types of cutters, variations in the speed of the grinding mechanism, etc. The degree of fineness is increased by increasing the speed of the machine or diminishing the % of H_2O in the material to be ground. Material ground in a disintegrator fitted with a 20-mm. grating yielded only 1% of 20-mm. size and 4% of 16-mm., the bulk being 5—12-mm. size; corresponding figures using a 15- and a 10-mm. grating yielded, respectively, 5% of 12-mm. (bulk 2—8-mm.) and 8% of 8-mm. (bulk 2—5-mm. size). D. W.

Analysis of a 250-years old leather sole. L. Pollak (Gerber, 1938, **64**, 6—7).—A leather sole (1685) contained (%): H_2O 15·3, fat 0·25, ash (CaO 1·0, Al_2O_3 0·22, Fe_2O_3 0·36, MgO 0·79), H_2O-sol. matter 1·4, hide substance 56·48, combined tans 23·93; the degree of tannage was 42·4, and the p_H of the aq. extract before dilution was 4·72 [after dilution (1 : 10) 4·72]. The MgO corresponds with the high figure of 4·83% of $MgSO_4,7H_2O$. The tanning material showed tests for fiset wood. The leather was probably pretanned with alum and retanned with vegetable tannins. D. W.

Use of katadynised water as fungicide for glue and gelatin. M. Remenec and B. Slavin (Chem. Obzor, 1937, **12**, 249—252).—Addition of katadynised H_2O (I) or of sufficient SO_2 to preserve glue solutions does not prevent the growth of added micro-organisms. Glue solution requires at least 10% of (I) or saturation with SO_2 to p_H 5·3 to sterilise it. The use of (I) does not alter the physico- or photo-chemical properties of gelatin. The less is the concn. of the glue solution, the less is the amount of (I) [min. amount 10% of (I)] required for preservation. Neutralised and washed ossein is sterilised by 10% of (I). F. R.

Properties of high mol. wt. compounds.—See I. **Dyeing tannins.**—See VI. **[Gelatin from] whale processing. Whale oil for leather.**—See XII. **Barytes.**—See XIII. **Converting collagen into gelatin. Determining tannins in cacao beans.**—See XIX.

See also A., I, 209, **Olation of basic Cr, Al, and Fe chloride solutions.**

Patents.

Pickling of hides in the process of tanning. J. Bleeck (B.P. 480,895, 11.11.36).—An aq. mixture of anhyd. Na_2SO_4 (60—65), kaolin (25—30), Na_2SiF_6 (7—10), and NaCl (3—5%) is claimed for use in pickling. D. W.

Production of leather. G. R. Pensel (B.P. 473,200, 7.4.36. U.S., 13.4.35).—Pelts are Al- or Cr-tanned at a p_H val. < normal, subsequently treated with an aq. Na salt of HCO_2H, AcOH, $H_2C_2O_4$, or lactic, citric, or tartaric acid at p_H 4·5—5·5, and the tannage is completed with CH_2O. D. W.

Films or sheets for adhesive purposes. A. Arnot (B.P. 479,426, 29.4.36).—Heat-hardenable synthetic resin (cf. B.P. 333,194, 225,953, and 290,327; B., 1930, 1062; 1925, 108; 1928, 532) is coated on or imbibed in a carrier which initially is robust but later becomes disintegrated, dissolved, or dispersed in the adhesive when the complete article is subjected to heat and pressure. B. M. V.

Starch-containing pastes.—See XVII.

XVI.—AGRICULTURE.

Soil conservation in tropical Africa. L. D. Stamp (Nature, 1938, **141**, 268—270). L. S. T.

Chemical and physical studies of certain Hawaiian soil profiles. G. J. Hough and H. G. Byers (U.S. Dept. Agric. Tech. Bull., 1937, No. 584, 26 pp.).—Analytical data and profile characteristics are described. The peculiar nature of the colloids in soils developed from lava under semi-tropical conditions is discussed. A. G. P.

Chemical mechanism of exchangeable cations [in soil]. R. Chaminade and G. Drouineau (Ann. Agron., 1936, **6**, 677—690).—A known amount of a salt of Ca, Mg, K, Na, or NH_4 was placed in contact with the moist soil for some days. The soil was then leached with N-NH_4OAc or N-KCl to remove excess of salts and exchangeable bases. Mg, K, and NH_4 were absorbed in exchangeable and non-exchangeable forms ("retrogradation"), but Ca and Na only as exchangeable cations. On grinding a soil more NH_4, Na, K, and Mg become exchangeable, part of these bases being inside the crystal lattice of the colloids. Ca is situated only on the outside of the micelle and is wholly exchangeable. The mechanism of "retrogradation" is explained. A. W. M.

Reaction and exchange capacity of the soil of Hiraodai, a plateau of Palæozoic limestone, in North Kyushu. R. Kawashima (Bull. Agric. Chem. Soc. Japan, 1937, **13**, 1231—1234).—Data are given

for exchange acidity and capacity, hydrolytic acidity, and p_H for seven types of the soil. All are more or less acidic, and with one exception are extremely poor in Ca. J. N. A.

Relation of exchangeable cations to "active" aluminium in soil. F. MENCHIKOVSKY and M. PUFFELES (Soil Sci., 1938, 45, 25—28).—The position in the Hofmeister series and the valency of adsorbed cations in the soil complex are related to the amount of "active" Al present, thus affecting the stability of the complex. The state of saturation of soil with bases influences weathering phenomena and as a result toxic Al appears. K and Ca diminish, whereas Li and Mg increase, active Al toxicity. The latter is max. in H-soils. A. G. P.

Measurement of surface areas of soils and soil colloids by use of low-temperature van der Waals adsorption isotherms. P. H. EMMETT, S. BRUNAUER, and K. S. LOVE (Soil Sci., 1938, 45, 57—65).—The method described previously (A., 1935, 1329) is applied to soils. Adsorption isotherms for N_2 and A at —183° and for N_2, O_2, and CO_2 at 0° for a soil and for its separated colloid are given. A. G. P.

Temperature of soil. L. EBLÉ (Ann. Agron., 1936, 6, 659—676).—Several factors influencing the accuracy of soil-temp. readings are reviewed. A. W. M.

Soil-water and its relation to plants. S. HENIN (Ann. Agron., 1936, 6, 723—741).—A review. A. W. M.

Rainfall, soil humidity, and climate from the viewpoint of agronomy. H. GESLIN and J. SERVY (Ann. Agron., 1937, 7, 85—101).—Formulæ are deduced for determining the humidity of the soil and the influence of climatic conditions. A. W. M.

Determination of the p_H of soils by means of antimony and glass electrodes. K. BORATYŃSKI (Rocz. Nauk Roln. Leśn., 1937, 43, 213—229).—The p_H vals. of 1 : 1 soil–N-KCl suspensions, as measured by using a glass electrode, differ by 0·02—0·04 from the results obtained with a quinhydrone electrode, and by 0·01—0·31 from those with an Sb electrode (allowing for salt error). Readings should be made not longer than 20 sec. after addition of quinhydrone, as the potentials tend to drift to higher vals. R. T.

Determination of total nitrogen in small quantities of agricultural products. H. ROTH (Angew. Chem., 1938, 51, 120—121).—A small-scale Kjeldahl apparatus capable of dealing with 0·4-g. samples is described. A. G. P.

Determination of organic phosphorus in soils. S. R. DICKMAN and E. E. DE TURK (Soil Sci., 1938, 45, 29—39).—The method is based on decomp. of org. P by H_2O_2 and subsequent extraction with 0·2N-H_2SO_4. A. G. P.

Determination of readily-soluble phosphoric acid in soil. ANON. (Int. Sugar J., 1937, 39, 436).—30 g. of air-dried soil are passed through a 2-mm. sieve, then placed in a 100-c.c. flask, and mixed with 75 c.c. of the appropriate solvent (Dirks' method), according to the p_H val., being shaken for 1 hr. The P_2O_5 is determined in 30 c.c. of the filtrate, using Wrangell's method (cf. B., 1936, 841), and the intensity of the blue solution matched in a Hellige comparator, using disc No. 3060/84E. A test no. of 0—6 indicates that P fertiliser is urgently needed, of 6—10 that it is rather desirable, and of >10 that it is probably unnecessary. J. P. O.

Chemical methods of determining phosphorus availability in soils. V. SADASIVAN and A. SREENIVASAN (J. Indian Inst. Sci., 1937, 20, A, 67—81).—In a light clay paddy soil, >80% of added superphosphate was converted into H_2O-insol. forms. The amount of PO_4''' extracted from soil by acid solutions varied with the nature of the soil, the vol. of extractant used, the period of contact, and the amount of PO_4''' in the soil. Among extractants examined, H_2SO_4 and citric acid removed the largest amounts of P. In many cases extracted P may be re-fixed by the soil when left in contact with the extractant for $>\frac{1}{2}$ hr. The extent of the re-fixation varies with the nature of the solvent and increases with temp. and time of contact. Acid-extractable P in alkaline is > than in acid soils. Weak acids extract relatively more P from soils receiving insol. P than from those treated with sol. P fertilisers. A. G. P.

Solubility of soil phosphate in water, citric acid, and aqua regia. O. DE VRIES, C. W. G. HETTERSCHIJ, and F. V. D. PAAUW (Bodenk. Pflanzenernähr., 1938, 6, 144—154).—Relations between the H_2O-sol. P, 1% citric acid-sol. P, and total P, and the p_H of several soil types, are examined. A. G. P.

Silicate-solubility of [soil] phosphate. F. C. KÜPPER (Bodenk. Pflanzenernähr., 1938, 6, 154—186).—The amount of PO_4''' extracted from soil by shaking with aq. K_2SiO_3 (I) (0·5 and 2·0%) increased with the period of shaking, was greater with the 2% than with the 0·5% solution, and increased with diminution of the p_H of the extracting solution. The latter effect was more marked with the more conc. solutions of (I). At higher temp. the silicate-sol. P became < the H_2O-sol. P. In percolation tests aq. (I) removed more P from surface soils than did H_2O, but the P was reabsorbed in the lower soil strata. Addition to soil of (I) increased the utilisation of fertiliser P > did the customary K salts. A. G. P.

Determination of total sulphates in soils and irrigation water. A. N. PURI and A. G. ASGHAR (Soil Sci., 1938, 45, 41—45).—The method is based on the double decomp. of sol. SO_4'' and $BaCO_3$ and titration of the Na_2CO_3 formed. The reaction is incomplete unless Na_2CO_3 is removed in successive stages. The solution is boiled with $BaCO_3$ and the mixture titrated with HCl (thymolphthalein). When the blue colour is discharged the solution is again boiled and the titration continued, the process being repeated to a final end-point. Any HCO_3' remaining in the filtered solution is titrated to Me-orange, the combined acid titrations being equiv. to the SO_4'' present. Ca salts must be removed by pretreatment with $(NH_4)_2CO_3$, excess of which is removed by evaporating the filtered solution to half its vol. If the solution is again boiled with standard NaOH and

titrated with acid (thymolphthalein), the difference in NaOH vals. = the Ca present. Mg salts do not interfere with the determination of SO_4''. Use of aq. $(NH_4)_2CO_3$ in determining total sol. salts in alkali soils is suggested. A. G. P.

Absorption of boron by soils. E. V. Bobko, T. V. Matveena, T. D. Doubachova, and A. I. Philippov (Ann. Agron., 1936, **6**, 691—701).—B is not absorbed by soil or $CaCO_3$. Poor yields of white mustard due to deficiency of available N following carbohydrate additions can be partly remedied by application of 1 mg. of B per kg. of soil. B is considered to be fixed biologically. A. W. M.

Effects of certain liming materials on leachings from Frederick silt loam soil. W. B. Ellett and H. H. Hill (Virginia [Blacksburg] Agric. Exp. Sta. Tech. Bull., 1937, No. 61, 19 pp.).—In lysimeter experiments, addition to soil of CaO or org. matter slightly increased the amount of H_2O percolating through the soil. Leaching losses of Ca from limed soils were increased by incorporation of org. matter. Applications of Mg (dolomite) diminished losses of Ca in drainage H_2O. The amount of CO_3'' appearing in drainage was consistently small. The amount of leached NO_3' was not appreciably affected by liming, but was markedly increased by CaO + org. matter. Fixation of S by soil increased with depth. In many cases leaching losses of S were < the amount received in rain. A. G. P.

New pipette for soil analysis. A. Neuberger (Tonind.-Ztg., 1938, **62**, 190—191).—A modification of Kohn's apparatus is described in which the pipette is carried in guides from a metal stand. The whole system is lowered until the pipette tip touches the liquid; the pipette is moved in the guides until it reaches a stop which is set for the correct depth of immersion. After sucking up the sample and delivering it into a weighing bottle, the apparatus is washed with H_2O from a reservoir to which it is permanently connected by a rubber tube. G. H. C.

Determination of nitrate-nitrogen in fertilisers. T. Arnd and H. Segeberg (Bodenk. Pflanzenernähr., 1938, **6**, 195—209).—Arnd's method (A., 1936, 442) gives satisfactory results with fertilisers and is unaffected by presence of NaCl. Comparative data, using Zn couples with Pt, Pd, Au, and Ag, are given and the possible reduction of org. N compounds is discussed. A. G. P.

Determination of calcium in artificial fertilisers, soils, and plant ash. F. Kamiński (Rocz. Nauk Roln. Leśn., 1937, **43**, 241—245).—Known methods are discussed. R. T.

Sludges contained in Polish potassium salt fertilisers. A. Musierowicz (Rocz. Nauk Roln. Leśn., 1937, **43**, 267—270).—Sludge inclusions in K salts have a particle size of $\not< 0{\cdot}0002$ mm.; the exchange-adsorption capacity varies from 3·83 to 4·62 mg.-equivs. per 100 g. of sludge. The sludge only slightly affects the fertilising action of the salts. R. T.

Calcium, magnesium, sulphur, and chlorine contents of fertilisers. A. L. Mehring and F. O. Lundstrom (Amer. Fertiliser, 1938, **88**, No. 2, 5—10).—Max., min., and average content of CaO, MgO, SO_3, and Cl in 171 manures and artificial fertilisers are recorded. A. W. M.

Selenium as a stimulating and possibly essential element for certain plants. S. F. Trelease and H. M. Trelease (Science, 1938, **87**, 70—71).—Se, as Na_2SeO_3, has a marked stimulating effect on the growth of *Astragalus racemosus*. It may be essential for the development of this and other species of Se-indicator plants, and appears to be unique among the essential elements in being required by only a few species of the higher plants, in the Leguminosæ, the Compositæ, and the Cruciferæ. L. S. T.

Design of agronomic experiments for plots differentiated in fertility by past treatments. H. C. Forester (Iowa Agric. Exp. Sta. Res. Bull., 1937, No. 226, 139—172).—Statistical. A. G. P.

Liberation of plant nutrients from soil as affected by lucerne. H. H. Hill (Virginia [Blacksburg] Agric. Exp. Sta. Tech. Bull., 1937, No. 60, 19 pp.).—In lysimeter trials incorporation of lucerne with soil or its use as a mulch increased the average H_2O content of soil and stimulated nitrification. No evidence of temporary depression of NO_3' formation was found even when mature plants were used. A slight and temporary decrease of soil-p_H followed the application of plant material. The total amount of leachings was greater in the mulched soils; evaporation was greatest from untreated controls. Incorporation of immature lucerne produced less NO_3' and more $Ca^{\cdot\cdot}$ in the leachings than did that of mature lucerne. All treatments with lucerne increased the leaching loss of Ca, Mg, NO_3', and, to a smaller extent, of K and S. A. G. P.

Trace elements and their importance in plant growth. O. Engels (Chem.-Ztg., 1938, **62**, 165—167).—The significance of B, Cu, Mn, I, and Mg in crop production is briefly reviewed. A. G. P.

Trace elements and their effects on plant growth, with special reference to copper. T. Arnd and W. Hoffmann (J. Landw., 1937, **129**, 71—99).—Cu-deficiency diseases are discussed. The probability that within the plant Cu acts as an oxidation catalyst is considered. The physiological activities of trace elements, notably Fe, Mn, and Cu, in the plant system are discussed in relation to the position of these elements in the periodic classification. A. G. P.

Aërial fertilisation [of plants] with carbon dioxide. A. A. Richter and O. K. Elpidina (Compt. rend. Acad. Sci. U.R.S.S., 1938, **18**, 59—62).—Treatment of growing plants with CO_2 is most effective when accompanied by spraying with H_2O, thus facilitating temporary storage of CO_2 in soil and on aërial parts of plants. A. G. P.

Influence of soil reaction on yields of crops, especially of sugar beet. E. Modrow (Deut. Zuckerind., 1938, **63**, 27—28).—Data showing the average yields of crops in soils of different p_H are discussed. A. G. P.

Nitrogen studies [with sugar cane] at Maui [Hawaii]. A. D. Waterhouse (Int. Sugar J., 1938,

40, 112—113).—On a field, the soil of which contained adequate supplies of available PO_4''' and $K^{\cdot}$, samples were taken for analysis at the beginning of the crop before addition of N fertiliser, then again after this addition, and continuously at 1-month intervals during the growth of the cane. No effect was observable after the first month, but after the 2nd and 3rd additions of N there was a considerable delay in the conversion of the $(NH_4)_2SO_4$ into NO_3'; nitrification eventually set in, and reached a peak about 2 months later. The N in the juice of the cane increased as the N in the soil decreased. R.C.M. (rapid chemical methods) were used in these experiments. J. P. O.

Mulching sugar cane. S. J. SAINT (Agric. J., Barbados, 1937, 6, 1; Int. Sugar J., 1938, 40, 93).—"Sour grass" (*Andropogon pertusus*) was grown as a mulch in cane cultivation to check surface evaporation, and experiments made on the application of artificial dressing to this grass for the purpose of increasing its density. A combination of $(NH_4)_2SO_4$ (45 lb./acre), phosphate (P_2O_5 18), and potash (K_2O 67) gave the greatest increase in the growth of the grass. Vac.-pan molasses (2 tons/acre) gave only a slight increase. J. P. O.

Harvesting and artificial drying of sugar-beet leaves. CRONEMEYER (Deut. Zuckerind., 1938, 63, 25—26).—Practical methods are described. A. G. P.

Utilisation of the organic nitrogen of humus substances by plants. Z. STAIKOFF (Bodenk. Pflanzenernähr., 1938, 6, 186—195).—The org. N of lignite and peat was not directly utilisable by plants, at least during the season of application. It was extraordinarily resistant to decomp. by soil micro-organisms. A. G. P.

Influence of chemical fertilisers on production of physiologically active principles [in plants]. M. JAVILLIER and O. GAUDIN (Chim. et Ind., 1938, 39, 211—224).—Recent investigations of the effect of manuring on the alkaloid, glucoside, essential oil, and vitamin contents of plants are reviewed. Manures tend to affect the total yield rather than the % of these constituents in the plant. A. G. P.

Effect of nitrogen manuring and liming on winter rape. K. SCHMALFUSS (Bodenk. Pflanzenernähr., 1938, 6, 254—258).—With increasing applications of N fertilisers the N content of rape plants increased and the oil yield diminished. Increasing applications of CaO produced the reverse changes. Liming lowered the I val. of the oil. A. G. P.

(A) Influence of certain sulphate-hydrated lime mixtures on transpiration [in plants]. (B) Influence of various sulphur-containing fungicides on transpiration. J. D. WILSON and H. A. RUNNELS (Ohio Agric. Exp. Sta. Bimo. Bull., 1935, 10, No. 175, 143—146, 146—148).—(A) Suspensions containing mixtures of $CuSO_4$, $NiSO_4$, $MnSO_4$, $ZnSO_4$, $(NH_4)_2SO_4$, or K_2SO_4 with $Ca(OH)_2$ increased transpiration, in the (descending) order named. The rate of settling of the suspensions was in the reverse order.

(B) Of numerous S preps. examined, only liquid CaO–S and Kolofog dust (containing much bentonite) caused very marked increase in transpiration rates of *Coleus* plants, and this effect was $\not>50\%$ of that of Bordeaux mixture. A. G. P.

Application of growth-substances to increase the rooting capacity of cuttings of woody species and shrubs. D. A. KOMISSAROV (Compt. rend. Acad. Sci. U.R.S.S., 1938, 18, 63—68).—Stimulation of rooting by indolyl- (I), phenyl-, and naphthylacetic acid and by phenylpropionic acid is demonstrated. Maize-auxin and (I) after absorption by cuttings cannot be re-extracted in their initially active forms. (Cf. A., 1935, 1548.) A. G. P.

Utility of the Winkel and Maas method for determining potassium in potash fertilisers, soil extracts, and in plant ash obtained in Neubauer tests. L. SCHMITT and M. OTT (Bodenk. Pflanzenernähr., 1938, 6, 124—133).—For fertilisers the hexanitrodiphenylamine method (A., 1937, I, 45) yields results agreeing with those of the $HClO_4$ method, provided the ppt. is washed only once with the ice-cold solution. With plant ashes vals. obtained were 4·7% < those given by the $HClO_4$ method. For soil extracts the method was unsatisfactory. A. G. P.

Determination of potassium in Neubauer [seedling] ash by the Winkel and Maas hexanitrodiphenylamine method. O. HOFFMANN (Bodenk. Pflanzenernähr., 1938, 6, 133—136).—The method gives vals. averaging 5·5% < those given by the $HClO_4$ method. A. G. P.

Determination of potassium [in plant ash] with hexanitrodiphenylamine (dipicrylamine) according to Winkel and Maas. R. THUN and O. WENZEL (Bodenk. Pflanzenernähr., 1938, 6, 136—139).—The method yields results for K in plant ash which were <, and in fertilisers generally the same as, those given by the $HClO_4$ method. A. G. P.

Suitability of the dipicrylamine method for determining potassium in the [Neubauer] seedling method and in plant ashes. F. GIESECKE and L. SCHULTE (Bodenk. Pflanzenernähr., 1938, 6, 139—144).—The method is generally unsatisfactory for determining K in plant ashes. A. G. P.

Rapid method for determining the permanent wilting point [of plants] and for indicating under field conditions the relation of soil moisture thereto. G. J. BOUYOUCOS (Soil Sci., 1938, 45, 47—55).—At the wilting point the H_2O film surrounding the soil particles becomes too thin to permit cohesion. Soils containing < the wilting-point moisture do not form a coherent mass nor adhere to a metal surface. Observations are made by lightly pressing the soil sample with a metal spatula blade. A. G. P.

[Report of] Department of Agriculture. V. R. S. VICKERS, N. L. TINLEY, and D. M. BRYANT (J. South-East. Agric. Coll., Wye, 1938, No. 41, 38—50).—Effects of manurial treatments and cultural methods on yields of various crops are recorded. A. G. P.

[Report of] Department of Advisory Chemistry. W. GOODWIN (J. South-East. Agric. Coll., Wye,

1938, No. 41, 25—29).—The satisfactory use of Bordeaux mixture–cottonseed oil for hop-washing is recorded.

Injection of Fe^{III} citrate corr. CaO-induced chlorosis in pear trees.

Failure of mushroom spawn to "run" is primarily due to deficiency of Ca. "Greasiness" in mushroom composts is related to the ratio exchangeable Ca : other exchangeable bases present. A. G. P.

The right material for tree wound dressing. H. L. Jacobs (Amer. Paint and Oil Dealer, 1938, 30, No. 6, 20—24).—Wounds in trees are best painted with an aq. asphalt emulsion or, where cold weather may cause freezing of the emulsion, a paint containing asphalt dissolved in a vegetable oil or a volatile mineral solvent with fibrous material added. A solution of orange shellac in EtOH may be used for "first-aid" temporary dressing. Creosote is too toxic to the tree itself. Oil paints sink into the wood too much and trouble with shrinking and cracking after drying is experienced. D. R. D.

Effect of manures on size of main-crop potatoes. H. V. Garner (J. Min. Agric., 1938, 44, 1189—1194).—Manurial treatments producing increased total yields tend, in general, to increase the proportion of ware potatoes. The proportion of large potatoes was increased notably by K, to a smaller extent by N, and less consistently by P. $(NH_4)_2SO_4$ was more effective than dung, the latter tending to diminish the effective action of K. A. G. P.

Influence of various soil factors on potato scab caused by *Actinomyces scabies*. R. W. Goss (Nebraska Agric. Exp. Sta. Res. Bull., 1937, No. 93, 40 pp.).—The severity of scab infestation in inoculated soils increased with the amount of the inoculum and was conditioned by competition with other organisms. In general, moderate to high soil-H_2O contents favoured, and lack of aëration during the period preceding tuber formation diminished, the development of scab. A. G. P.

Status of potato wart control in Pennsylvania. R. H. Bell (J. Econ. Entom., 1937, 30, 606—610).—In infested soils wart disease does not develop if the soil temp. is $>21\cdot1°$ for any considerable period during the active growth season. NH_4CNS gave promising results in sterilising soils carrying the disease. A. G. P.

Fertility value of cultivated land as influenced by crop residue and season. B. N. Singh, S. N. Singh, and P. P. Gupta (Soil Sci., 1938, 45, 3—12).—Leguminous crop residues increase the proportion of available N in soils (notably in the stratum in which the roots were feeding) to a much greater extent than non-leguminous residues. The amount of available N formed decreases with increasing depth below the surface, is low in spring and during autumn rains, and high in summer. A. G. P.

Nitrogen cycle in grassland soils, with special reference to the Rothamsted Park grass experiment. H. L. Richardson (J. Agric. Sci., 1938, 28, 73—121).—The fresh soils examined always contained more $NH_4^{\cdot}$- than NO_3'-N, the actual amounts present being low and indicative of an equilibrium stage in the N cycle. In most cases manurial treatment had little influence on the $NH_4^{\cdot}$–NO_3' balance, but liming tended to increase $NH_4^{\cdot}$ at the expense of NO_3'. The equilibrium levels were higher in old than in newly grassed land. "Mineralisable N" (determined by incubation of soil under standard conditions) exhibited seasonal variations, opposite in character to those in temp. even in very acid soils on which a grass mat had formed. A temporary increase occurred during a dry summer, especially in the more acid soils. Formation of NO_3' and NH_3 on incubation varied with previous manurial treatment, soils of p_H <6·0 yielding relatively larger amounts of NH_3, and those of higher p_H giving chiefly NO_3'. $(NH_4)_2SO_4$ and $NaNO_3$ added to the soils disappeared rapidly, and on acid soils in which nitrification was poor NH_3 was taken up directly by the herbage. The total N of arable soil increased steadily after laying down to grass, vals. reaching half-way to the equilibrium stage in 25 years. Liming increased both total N and total C in soils. Soils receiving farmyard manure every fourth year contained less N and C than unmanured controls. Worm casts were most numerous in soils receiving org. manures, were more prevalent in limed than in unlimed plots, and were absent in very acid soils. On the latter mat formation was probably due to the effect of acidity on the worms rather than on microbiological activity. A. G. P.

Aspects of potash manuring of pastures. J. W. Woodcock (New Zealand J. Agric., 1936, 53, 193—199).—Response of pasture soils to K was usually confined to light sandy types in high-rainfall areas, soils derived from andesite and basalt showing more consistent effects than those from rhyolite. The action of K was largely due to its beneficial action on the growth of white clover. A. G. P.

West Virginia pastures: type of vegetation, carrying capacity, and soil properties. W. H. Pierre, J. H. Longwell, R. R. Robinson, G. M. Browning, I. McKeever, and R. F. Copple (W. Va. Agric. Exp. Sta. Bull., 1937, No. 280, 55 pp.).—Type of vegetation is an important factor controlling carrying capacity of pastures. Poor pastures examined were, in general, on soils of notable acidity and containing low available PO_4''' contents. A. G. P.

Control of hairy chinch bug infesting turf on Long Island. G. F. MacLeod and K. E. Maxwell (J. Econ. Entom., 1937, 30, 432—437).—Applications of insecticide should be made when nearly all eggs are hatched, but before the young bugs cause appreciable injury. Tobacco (1% of nicotine) or cubé (1% of rotenone) dusts were more effective than nicotine sulphate–soap sprays, which caused some scorching. A. G. P.

[ββ′-]Dichloroethyl ether as a control for sod webworms in lawns. M. W. Stone and J. C. Elmore (J. Econ. Entom., 1937, 30, 213).—Watering the surface with a solution of 10 c.c. of the ether in 1 gal. of H_2O at the rate of 1 gal. per sq. yard gave 100% kill without injury to grass. CS_2 emulsion (4·5 oz. per 10 gals.) applied at the same rate showed much inferior results. A. G. P.

Nitrogen and phosphorus changes in the decomposition [in soil] of rye and clover at different stages of growth. J. L. LOCKETT (Soil Sci., 1938, **45**, 13—24).—The rate of decomp. of plant materials in soil decreases with advancing age of the plants. The initial stage of decomp. of clover of all ages was more rapid than that of rye, but during later stages the loss of org. matter was the greater in the case of rye. The loss of org. matter was mainly due to cellulose, hemicellulose, and H_2O-sol. constituents. In young-plant composts lignin and protein complexes comprised most of the residual org. matter, whereas that in mature-plant composts consisted chiefly of cellulose, hemicellulose, and lignin. NO_3' was formed more rapidly from clover than from rye of the same age. NH_3 was produced more rapidly from rye, but was nitrified more slowly. In both cases young plants yielded NO_3' more readily than did mature plants. When decomp. is rapid NH_3 may be lost by volatilisation. During the decomp. inorg. P is converted into org. P, through assimilation by micro-organisms, such org. P subsequently becoming available as the bacterial cells decompose. A. G. P.

Correlation between yield and protein content of wheat and barley in relation to breeding. K. W. NEATBY and A. G. MCCALLA (Canad. J. Res., 1938, **16**, **C**, 1—15).—Wheat and barley bred for high yields show a strong constitutional tendency toward low protein contents; varieties giving moderately high yields of high protein content are obtainable, but the production of high-yield–high-protein wheats is improbable. A. G. P.

Effect of continuous and discontinuous water supply on the photosynthetic process in, and yield of, summer wheat. N. S. PETINOV (Compt. rend. Acad. Sci. U.R.S.S., 1938, **18**, 69—72).—Exposure of the plants to alternating periods of drought and optimum H_2O supply produced no beneficial effect on photosynthesis or yield by comparison with plants grown with sustained optimum supply of H_2O. Early and frequent periods of wilting caused the greatest reduction in grain yields. The bearing of these facts on irrigation practice is discussed. A. G. P.

Significance of mineral elements in the yarovisation process. G. ABOLINA (Compt. rend. Acad. Sci. U.R.S.S., 1938, **18**, 199—202).—Yarovisation of wheat for 52 days in nutrient solutions, especially those containing K, accelerated the subsequent development and ripening of the plants. Seeds similarly treated but yarovised for only 35 days showed a much smaller response. A. G. P.

Effect of phosphate deficiencies on infection of wheat by *Fusarium culmorum*. F. J. GREANEY (Canad. J. Res., 1938, **16**, **C**, 27—37).—P deficiency diminished root development and dry-matter yields of wheat, but did not affect susceptibility to the root-rot fungus. A. G. P.

Bunt, or stinking smut, of wheat and its control. R. W. LEUKEL (U.S. Dept. Agric. Tech. Bull., 1937, No. 582, 47 pp.).—Infection of wheat by bunt was diminished by soil temp. $<5°$ and $>20°$ and by high soil-H_2O content, and was less in sandy than in clay soils. Liming acid sandy soils increased infection. Basic Cu sulphate and carbonate containing $\nless 50\%$ Cu and used at customary rates as a seed dressing gave effective results. Other Cu preps. were less effective and CH_2O, $C_{10}H_8$, I, and S had little action. Cu carbonate (I) was more effective in unlimed than in limed sandy soils. Storage of seed treated with (I) or Ceresan for 5 weeks did not lower the fungicidal activity of the dusts, and storage for 1 year did not affect the viability of the seed. A. G. P.

Certain copper compounds as bunt fungicides. O. A. NELSON and R. W. LEUKEL (U.S. Dept. Agric. Circ., 1937, No. 452, 8 pp.).—Among Cu preps., basic Cu sulphate, high-grade Cu carbonate, and $CuSO_4$–NH_2Ph were the most suitable fungicides. A dusting prep. containing 5% of HgEt phosphate produced results equal to those of any Cu prep. A. G. P.

Response of oat varieties to different fertility levels. C. A. LAMB and R. M. SALTER (J. Agric. Res., 1937, **55**, 785—793).—Differences in yields over a 3-year period, due to climate, variety, and level of soil fertility, were highly significant. The variety–season interaction was of high, but the variety–fertility level interaction was of doubtful, significance. A. G. P.

Influence of reaction and lime status of soils on flax yields. E. VON BOGUSLAWSKI (Bodenk. Pflanzenernähr., 1938, **6**, 209—231).—Acidity lowered the yields of fibre and oil from flax. Heavy liming adversely affected yields of flax varieties grown for fibre, but had little effect on those grown for oil. The optimum p_H for the former varieties was 5·5—6·3 and for the latter 6·3—7·5. Excessive liming restricted the intake and utilisation of other nutrients, notably K, by the plants. Light liming facilitated the utilisation of other nutrients by oil varieties. A. G. P.

[Soil-]reaction requirements of fibre- and oil-varieties of flax in comparison with barley. E. E. MORGENROTH (Bodenk. Pflanzenernähr., 1938, **6**, 232—254).—The tendency of the reaction of acid soils to change towards neutrality as a result of the growth of plants therein was very marked in the case of barley, less with fibre varieties of flax, and still less with oil varieties. Corresponding changes in alkaline soils were less clearly defined. Optimum reactions for growth were: barley 8·2, fibre flax 6·6, oil flax 4·8. In H_2O-cultures the optima for barley and fibre flax were 6·5 and 4·5, respectively. The supply of nutrients was more important than p_H in controlling yields. Injurious acidity affected the grain yields more than the straw yields in all species examined, whereas high alkalinity lowered the yield of straw to a greater extent than that of grain in both types of flax. The grain/straw ratio tended to be narrower with increasing p_H. Unsuitable reaction conditions affect flax up to the flowering period more than they do barley up to the earing stage. Subsequently the position is reversed. The effect of reaction on flax fibre yields was influenced by cultural conditions (soil or H_2O) and by the stage of growth at which injurious conditions developed. A. G. P.

Effect of potassium fertilisers on growth of flax. W. STANISZKIS (Rocz. Nauk Roln. Leśn., 1937, **43**, 302—306).—Addition of K salts to the soil increases the yield of flax and the height of the straw, to an extent varying according to the type and amount of fertiliser used, and to the season. R. T.

(A) Control of cotton flea-hopper at Port Lavaca, Tex. (B) Large-scale dusting experiments. K. P. EWING and R. L. MCGARR (J. Econ. Entom., 1937, **30**, 125—130, 130—134).—(A) Paris-green–S mixtures gave best control. Pyrethrum (0·5% of pyrethrins) was moderately effective and its toxicity was increased by admixture with S. Derris preps. and phenothiazine were much less satisfactory.

(B) Two to four applications of S dusts (average 62 lb. per acre) markedly increased the yields of cotton. A. G. P.

Calcium and addition of calcium salts to the soil in cultivation of yellow lupin. A. BYCZKOWSKI (Rocz. Nauk Roln. Leśn., 1937, **43**, 230—234).—Assimilation by lupin of Na and Ca is raised, and of K and Mg lowered, by addition of 0·2—0·7 g. of $CaCO_3$ per kg. of soil; $CaSO_4$ has a similar but smaller effect. The result is ascribed largely to alkalisation of the soil since analogous results were obtained when equiv. amounts of Na_2CO_3 were added to the soil. R. T.

Chlorosis of *Hydrangea hortensis*. G. H. POESCH (Ohio Agric. Exp. Sta. Bimo. Bull., 1935, **10**, No. 175, 142—143).—The chlorosis was corr. by treatment of soil with $FeSO_4$, and less successfully with $Fe_2(SO_4)_3$; $ZnSO_4$ or $MnSO_4$ was ineffective. A. G. P.

Iris thrips and its control by hot water: other treatments. F. F. SMITH and G. L. UTTER (U.S. Dept. Agric. Circ., 1937, No. 445, 12 pp.).—Treatment of lifted plants with H_2O at 43·3° was effective. Fumigation with nicotine and also spraying with derris–sulphonated castor oil gave promising results. A. G. P.

Cotoneaster webworm, *Cremona cotoneaster*, Busch. J. R. ROAF, R. E. DIMICK, and D. C. MOTE (J. Econ. Entom., 1937, **30**, 134—136).—Pb arsenate, nicotine sulphate, or derris gave good control provided applications were made in late summer or early autumn, *i.e.*, after all eggs had hatched. A. G. P.

Control of tobacco blue mould (downy mildew) and tobacco flea-beetle. S. A. WINGARD and R. G. HENDERSON (Virginia [Blacksburg] Agric. Exp. Sta. Bull., 1937, No. 313, 14 pp.).—Satisfactory control measures for seed beds include spraying with Cu_2O–lethane spreader–cottonseed oil emulsion, fumigation with C_6H_6 for blue mould, and dusting with Paris-green–Pb arsenate or derris for the flea-beetle. A. G. P.

[Report of] Department of Entomology. S. G. JARY and M. D. AUSTIN (J. South-East. Agric. Coll., Wye, 1938, No. 41, 9—14).—The occurrence of various pests on fruit, hops, and farm crops is noted.

"Meta fuel"–bran traps were successful in controlling slugs.

Org. thiocyanates (dodecyl) gave promising results in control of the hop–damson aphis, red spider on carnation, and, incorporated with petroleum–tar oil emulsions, for dormant spraying of fruit trees. A. G. P.

White coating on foliage, a repellent for potato leaf-hopper. E. I. MCDANIEL (J. Econ. Entom., 1937, **30**, 454—457).—Coatings of talc, CaO, etc. were repellent to the insects. A. G. P.

Control of the onion fly. D. W. WRIGHT (J. Min. Agric., 1938, **44**, 1081—1087).—The life history of the fly is recorded. Effective control of larvæ is obtained by treating the seed with an equal wt. of Hg_2Cl_2 after preliminary stirring of the seed with an adhesive paste. Deterrents and poison baits were less effective. A. G. P.

Pea-aphid control in Maryland. C. GRAHAM (J. Econ. Entom., 1937, **30**, 439—443).—Nicotine–soap and derris–spreader preps. gave good protection and markedly increased the yield of peas. Applications should be made when aphids first appear and, if the interval is considerable, again when flowering begins. A. G. P.

***Homaledra sabalella*, Chambers, the major pest of palms in Florida.** J. T. CREIGHTON (J. Econ. Entom., 1937, **30**, 590—595).—The life history and habits of the insect are recorded. Among insecticides examined Pb arsenate gives effective control, but unless mixed with malachite-green it discolours the foliage. Rosin–fish oil soap is a satisfactory sticker for As sprays. Pyrethrum sprays and oil emulsions were toxic to larvæ, but their penetration of plant tissues was poor. A. G. P.

Apple-scab spraying experiments in the Wisbech area. IV. W. F. CHEAL (J. Min. Agric., 1938, **44**, 1184—1188; cf. B., 1935, 472).—Field trials recorded emphasise the val. of pre-blossom spraying (CaO–S) for scab control. A. G. P.

Variability in lead residues on apples. M. H. HALLER, C. C. CASSIL, and E. GOULD (J. Econ. Entom., 1937, **30**, 174—179).—Variations in experimental results and their significance are examined. A. G. P.

Control of oyster-shell scab on apple by means of tar oils, tar–lubricating oils, and lubricating oils containing dinitro-*o*-*cyclo*hexylphenol. F. Z. HARTZELL and J. B. MOORE (J. Econ. Entom., 1937, **30**, 651—655).—Coal-tar oil emulsions containing $<$4·5% of tar oils are of val. in the control of oyster scale. Their efficiency is increased by addition of 1% of lubricating oil and still further increased by dissolution of dinitro-*o*-*cyclo*hexylphenol (4%) in the lubricating oil. If the oils are thoroughly emulsified no injury to foliage results from applications made prior to the "green-tip" stage. A. G. P.

Determination of mineral oil deposited on orange leaves immediately after spraying. V. J. TIHENKO and G. S. HENSHILL (J. Econ. Entom., 1937, **30**, 355—360).—Oil is washed from sprayed leaves (before drying) with $COMe_2$, H_2O and solvent being subsequently evaporated. The residual oil is dissolved in light petroleum, the solution filtered and transferred to a 50-c.c. Babcock bottle in which the

petroleum is removed by evaporation, the residue is sulphonated with 98·6% H_2SO_4, and the vol. of residual oil ascertained. A "blank" sulphonation test of the original oil is necessary. A. G. P.

Summer oil emulsions on peach. S. W. FROST (J. Econ. Entom., 1937, 30, 658—663).—Incorporation of oil emulsions with wettable S preps. tends to cause aggregation of the S particles and clogging of machines. Bentonite–S preps. mix well with oil emulsions. Preps. containing much $Ca(OH)_2$ settle rapidly when mixed with oil emulsions. All forms of S sprays mix well with soaps. With selected forms of S serious injury to peach by S–oil emulsions may be avoided. A. G. P.

Spraying trials against red-spider mite (*Oligonychus ulmi*) on damsons in Westmorland. R. A. H. GRAY and H. E. BROOKS (J. Roy. Hort. Soc., 1938, 63, 77—80).—Summer spraying (2% refined white oil emulsion or CaO–S with spreader) was somewhat more effective than winter spraying with petroleum or petroleum–tar oil emulsions. A. G. P.

Field cricket as a pest of strawberries and its control. W. A. THOMAS and L. B. REED (J. Econ. Entom., 1937, 30, 137—140).—Poison baits containing Ca arsenate, Na_2SiF_6, or $BaSiF_6$ were more effective than other baits examined. A. G. P.

Dusting to control strawberry weevil in Virginia. L. D. ANDERSON and H. G. WALKER (J. Econ. Entom., 1937, 30, 437—438).—Best results were obtained with S–Pb arsenate preps. CaO–Pb arsenate gave better protection and yield increases than S–derris or S–Ca arsenate. The latter caused marked foliage injury. A. G. P.

Control of *Rhagoletis pomonella* in cultivated blueberry fields. C. S. BECKWITH and C. A. DOEHLERT (J. Econ. Entom., 1937, 30, 294—297).—Adult insects are killed by dusting with derris (5% rotenone) at the rate of 10—15 lb. per acre. A. G. P.

***Lineodes integra*, Zell., a potential pest of greenhouse tomatoes.** C. C. COMPTON (J. Econ. Entom., 1937, 30, 451—454).—Application of S–Pb arsenate dusts was somewhat more satisfactory than that of pyrethrum sprays. A. G. P.

Semi-commercial manufacture of nicotine–peat [insecticide]. L. N. MARKWOOD (J. Econ. Entom., 1937, 30, 648—651).—Reed peat is screened, dried to a H_2O content of 10%, soaked in 2% HCl, washed free from sol. matter, and treated with nicotine in presence of H_2O. The product is finally dried and ground, and contains 10% of nicotine of which 88% is insol. A. G. P.

Nicotine in oil: promising insecticide for horticultural purposes. P. O. RICHTER and R. K. CALFEE (J. Econ. Entom., 1937, 30, 166—174).—The prep., insecticidal and phytocidal properties of atomised oil–nicotine sprays are recorded. A suitable atomiser is described. A. G. P.

Effects of nicotine fumigation at short exposure and assumed high concentration. J. F. ALTERSLUND and C. C. COMPTON (J. Econ. Entom., 1937, 30, 571—575).—In field and greenhouse trials the superiority of short exposures to high concns. of nicotine vapour over customary methods was demonstrated. A. G. P.

Effect of different spreaders on thrips control by nicotine. C. O. EDDY and S. S. SHARP (J. Econ. Entom., 1937, 30, 427—430).—Failure of spray preps. containing nicotine sulphate to kill *Frankliniella fusca* is ascribed to deficiency in spreaders and can be corr. by the addition of KOH. Karaya gum markedly increases the efficiency of nicotine sprays. A. G. P.

Karaya gum in nicotine sprays. C. O. EDDY and C. M. MEADOWS (J. Econ. Entom., 1937, 30, 430—432).—The efficiency of nicotine sulphate–soap sprays against aphids was increased by addition of karaya gum (1 : 500); the min. effective concn. of nicotine required was lowered to $\frac{1}{3}$—$\frac{1}{6}$ according to the nature of the soap used. A. G. P.

Laboratory apparatus for fumigation with low concentrations of nicotine. H. H. RICHARDSON and R. L. BUSBEY (J. Econ. Entom., 1937, 30, 576—582).—Appropriate apparatus is described. In tests with aphids fumigations at low and at high R.H. were equally effective. Differences in resistance of different species to nicotine are determined. A. G. P.

Calcium arsenate [insecticide]. H. WATERS and E. WITMAN (J. Econ. Entom., 1937, 30, 204—210).—Ca arsenate (I) of low H_2O-sol. As content is obtained by spraying H_3AsO_4 into rapidly agitated aq. $Ca(OH)_2$. Imperfect stirring leads to increased H_2O-solubility. Slow addition of dil. solutions of H_3AsO_4 (free from As_2O_3) is essential and CaO must be slaked 3—4 hr. before use. Toxicity of such preps. to plants is determined rapidly with cranberry bean plants grown under controlled greenhouse conditions. The toxicity of (I) preps. is substantially the same irrespective of the H_2O-sol. As contents (within commercial limits). A. G. P.

Calcium arsenate to control codling moth. B. F. DRIGGERS (J. Econ. Entom., 1937, 30, 314—319).—Ca arsenate was inferior to Pb arsenate (wt. for wt.) when used in a spray programme including 3 applications of summer oil, even when the As deposit was the same in both cases. The physical properties of the two materials are probably important factors in their relative efficiencies. A. G. P.

Stickers used with calcium and zinc arsenate [sprays]. F. SHERMANN (J. Econ. Entom., 1937, 30, 398—399).—The efficiency of Ca and Zn arsenates used with suitable stickers approximates to that of Pb arsenate. A. G. P.

Zinc oxide–zinc acetate mixture as a safener for arsenical sprays. R. H. ROBINSON and L. CHILDS (J. Econ. Entom., 1937, 30, 561—562).—Addition of ZnO–$Zn(OAc)_2$ (4 : 1) to the sprays prevented the formation of H_2O-sol. As normally occurring when the sprays were prepared with H_2O from certain supplies. Prevention of calyx injury by Ca arsenate preps. by additions of ZnO was more effective than that by admixture of $ZnSO_4$–$Ca(OH)_2$. A. G. P.

Homologues of Paris-green. III. Members of the oleic and linoleic acid series. F. E. DEARBORN (J. Econ. Entom., 1937, 30, 140—143; cf. B., 1937, 711).—Crotonic, oleic, erucic, and linoleic acids form homologous complexes, the ratio $CuO : As_2O_3$ being approx. 4 : 3. A. G. P.

Effect of different soaps on formation of soluble arsenic from lead arsenate in soft and hard waters. J. M. GINSBURG (J. Econ. Entom., 1937, 30, 583—590).—In Pb arsenate (I) sprays made with soft H_2O the increase in sol. As content following addition of soaps is $\propto$ the amount of soap used. Hard H_2O increases the solubility of As from (I), the effect being restricted by addition of sol. soaps and of certain insol. metallic soaps, notably Al palmitate, Ca oleate, and certain Zn soaps. The action of hard H_2O in increasing the sol. As is very largely due to its CO_3'' and HCO_3' contents. A. G. P.

Effect of ferric oxide on acid lead arsenate as a stomach poison and repellent for Japanese beetle. W. E. FLEMING and F. E. BAKER (J. Econ. Entom., 1937, 30, 562).—Addition of Fe_2O_3 to Pb arsenate sprays for the purpose of minimising As injury to foliage reduced the insecticidal val. and repellent properties of the spray. A. G. P.

Adherence and rate of settling of lead arsenate dusts for autogiro and aeroplane application. C. C. HAMILTON (J. Econ. Entom., 1937, 30, 399—404).—Admixture of oil with Pb arsenate (I) improved its adherence to foliage, fish oil being the most effective. The increased rate of settling through air of (I)–oil preps. is $\propto$ the amount of oil present. Both adherence and rate of settling are further improved by incorporation of "celite" (diatomaceous earth) with the (I)–oil mixture. A. G. P.

Stickers and spreaders used in lead arsenate sprays for codling-moth control. S. W. HARMAN (J. Econ. Entom., 1937, 30, 404—407).—Among various spreaders and stickers examined, soya-bean flour (1 lb. per 100 gals. of spray) used with $Ca(OH)_2$ produced the heaviest coverage and the best control of codling moth. A. G. P.

Effect of certain codling-moth spray schedules on other orchard insects. C. R. CUTRIGHT (J. Econ. Entom., 1937, 30, 413—417).—All-season spray schedules of phenothiazine (I) did not give satisfactory control of red mite, curculio, or codling moth, but reduced the population of green-apple aphis. Oil–"ortho-nicotine" (II) controlled green-apple aphis and red mite, but not curculio or codling moth. Use of Pb arsenate as the calyx spray followed by (I) or (II) schedules gives better control of codling moth and especially of curculio than adoption of all-season schedules of (I) or (II). A. G. P.

Methyl bromide fumigation of codling-moth larvæ. (Correction.) D. L. LINDGREN (J. Econ. Entom., 1937, 30, 381; cf. B., 1938, 207).—The commercial product used contained 7% of MeBr. Complete kill of the larvæ was obtained by use of 5 lb. of fumigant per 100 cu. ft. A. G. P.

Natural cryolite for codling-moth control. I. D. DOBROSCKY (J. Econ. Entom., 1937, 30, 656—658).—Cryolite sprays markedly reduced the no. of "stings" and entries of codling moth into fruit and caused no injury at temp. $<37{\cdot}8°$. CaO, as such, or in CaO–S or Bordeaux mixture, is incompatible with natural cryolite. The removal of F spray residues is facilitated by addition of 1—2% of H_3BO_3 to the 1—2% HCl wash liquid. A. G. P.

Reactions of aphids to coloured insecticides. J. B. MOORE (J. Econ. Entom., 1937, 30, 305—309).—The attraction of *Myzus persicæ* to potato foliage sprayed with Bordeaux mixture is due to the increased intensity of light reflected from the sprayed surface. Infestation of cabbage aphid was diminished by dyeing the dusts used, black dusts being the most effective in this respect. A. G. P.

Extended insecticidal uses of coal-tar distillates. M. H. DONER (J. Econ. Entom., 1937, 30, 374).—Emulsions of the distillate may be used as cover sprays in aphid control. Plant injury by higher concns. in the emulsion is prevented by additions of CaO. Addition of the emulsion to dormant or post-dormant CaO–S preps. improves coverage and efficiency. The emulsions serve as effective spreading and adhesive agents for Pb arsenate and Bordeaux mixtures. A. G. P.

Grenz radiographs of sulphur [spray] dispersion on foliage. G. F. MCLEOD and H. F. SHERWOOD (J. Econ. Entom., 1937, 30, 395—398).—Hard *X*-rays are not absorbed by the fine S particles forming a spray deposit. The use of Grenz radiographs in examinations of the nature and persistence of S spray residues is described. A. G. P.

Contact insecticidal properties of derivatives of *cyclo*hexylamine. C. W. KEARNS and W. P. FLINT (J. Econ. Entom., 1937, 30, 158—166).—Substitution of *N*-H in *cyclo*hexylamine by alkyl produces substances of toxicity > when the substitution is by acyl, aryl, or aralkyl. The toxicity of such substances increases with the no. of C in the alkyl group, possibly as a result of improvement in penetrating properties, which more and more resemble those of petroleum oil as the series is ascended. *N*-Acyl substitution of the remaining H in *N*-amyl-*cyclo*hexylamine is associated with increased toxicity, whereas substitution by *N*-propionyl or *N*-butyryl resulted in loss of toxicity. Benz- and acet-*N*-amyl-*cyclo*hexylamide possess exceptionally high toxicities to the aphid *Myzus porosus*. A. G. P.

Control of red spider on greenhouse crops with sulphur and *cyclo*hexylamine derivatives. C. C. COMPTON and C. W. KEARNS (J. Econ. Entom., 1937, 30, 512—522).—"Selocide" (I) (8% of K NH_4 selenosulphide), NH_4 polysulphide, and a derivative of *cyclo*hexylamine (II) gave effective control and caused no foliage injury to many species. Rose was very susceptible; (I) and (II) caused least damage. A. G. P.

Pyrethrum as an insecticide for cabbage worms. H. C. HUCKETT (J. Econ. Entom., 1937, 30, 323—328).—Dusts prepared with pyrethrum of low pyrethrin content were more efficient than those with high pyrethrin vals. As a diluent clay was less satisfactory than talc, gypsum, or infusorial earth. A. G. P.

Biology and control of the juniper webworm in Maryland. G. S. LANGFORD (J. Econ. Entom., 1937, **30**, 320—323).—Pb arsenate or pyrethrum-soap sprays proved the most satisfactory. Timing the applications is an important factor. A. G. P.

ββ′-Dichloroethyl ether for wireworm control. R. E. CAMPBELL and M. W. STONE (J. Econ. Entom., 1937, **30**, 212—213).—The ether applied to soil surfaces at the rate of 5—7 c.c./1 gal./cu. ft. of soil gave 100% kill of wireworm at depths of 4 and 8 in. Drilling the solution below the surface improved the kill with smaller but not with larger dosages. A. G. P.

Control of wireworm and onion thrips by carbon disulphide carrying naphthalene or *p*-dichlorobenzene. B. B. PEPPER (J. Econ. Entom., 1937, **30**, 332—336).—Emulsions containing $\frac{1}{8}$ oz. of CS_2 with 1 g. of $C_{10}H_8$ or p-$C_6H_4Cl_2$ (per plant) gave an 80% kill of wireworm and caused no injury to plants, whereas $\frac{1}{4}$ oz. of CS_2 per plant gave a smaller % kill and damaged the plants. Efficiency of CS_2 emulsions varied with the emulsifier used. A. G. P.

Insecticide against scale insects. P. V. KARAYANNIS (B.P. 480,143, 9.8.37).—The prep. contains raw castor oil, NH_4 sulphoresinate, α- or β-$C_{10}H_7$·NH_2, 1- and 2-$C_{10}H_7$·SO_3H, cresol, NH_4, Na, or K resin soap, and aromatic substances, the p_H of the mixture being adjusted to 8·5—9·0 with NH_3. Petroleum (*d* 0·780—0·855) may also be incorporated. A. G. P.

Toxicity of phenothiazine derivatives to culicine mosquito larvæ. P. S. SCHAFFER, H. L. HALLER, and D. E. FINK (J. Econ. Entom., 1937, **30**, 361—363).—Eleven derivatives are examined. The toxicity of 6-methylphenothiazine was approx. 50% of that of phenothiazine. Other derivatives were still less toxic. A. G. P.

Analysis of commercial phenothiazine used as an insecticide. L. E. SMITH (Ind. Eng. Chem. [Anal.], 1938, **10**, 60).—Six samples of commercial phenothiazine (I) contained 1·09—1·43% of an insol., relatively non-insecticidal, green *isomeride* or *polymeride*, determined by removing the (I) by Et_2O (Soxhlet). 97·2% of (I) is recovered from Et_2O as hydrochloride by dry HCl. R. S. C.

Control of larvæ of the diamond-back moth, *Plutella maculipennis*, Curtis. H. G. WALKER and L. D. ANDERSON (J. Econ. Entom., 1937, **30**, 443—448).—Derris kills newly-hatched larvæ, but nearly full-grown larvæ were more resistant. Application of derris dusts at 7—10-day intervals gave good control. Derris–pyrethrum dusts were equally effective, but "stabilised" derris preps. were less satisfactory. A. G. P.

Control of pavement ant attacking egg plants. H. G. WALKER and L. D. ANDERSON (J. Econ. Entom., 1937, **30**, 312—314).—Among insecticides examined, halowax, "Loro" (org. thiocyanate), and $C_{10}H_8$ gave best results, $C_{10}H_8$ giving the most lasting protection but tending to retard growth if placed close to roots. A. G. P.

Tests of cattle fly sprays by the "one-half cow" method. D. MACCREARY and A. H. GODDIN (J. Econ. Entom., 1937, **30**, 478—482).—The technique of the method is critically examined. A. G. P.

Oxygen as a factor in vacuum fumigation. R. T. COTTON, G. B. WAGNER, and H. D. YOUNG (J. Econ. Entom., 1937, **30**, 560).—Evidence is advanced confirming the view that the superiority of vac. fumigation with $(CH_2)_2O$–CO_2 over that at ordinary pressures is primarily due to O_2 deficiency. A. G. P.

Non-toxicity of gossypol to certain insects. E. P. BREAKEY and H. S. OLCOTT (Science, 1938, **87**, 87).—Gossypol and dianilinogossypol are ineffective either as contact or stomach poisons to woolly aphids or Mexican bean beetles. L. S. T.

Methods and equipment for laboratory studies of insecticides. H. WATERS (J. Econ. Entom., 1937, **30**, 179—203).—Equipment for the culture of insects and plants is described. A. G. P.

Laboratory methods for biological testing of insecticides. I. Testing ovicides. W. STEER (J. Pomology, 1938, **15**, 338—355).—Appropriate technique is described. A. G. P.

Laboratory method for testing the toxicity of protective fungicides. H. B. S. MONTGOMERY and M. H. MOORE (J. Pomology, 1938, **15**, 253—266).—A definite vol. of spray liquid is placed on a glass slide, spread with a needle to cover a prescribed area, and allowed to dry. A measured vol. of a suspension of spores of *Venturia inæqualis* is placed on the spray residue, and nos. germinating after 24 hr. in a moist chamber are examined. The toxicity of Cu and S sprays is thus compared. Among org. fungicides examined, tetramethylthiuram disulphide showed notably high toxicity. A. G. P.

Ca arsenates. Determining sulphur compounds in soil air.—See VII. **Rubber-yielding plants.**—See XIV. **Sugar-juice defecation sludge.**—See XVII. **Insecticide.**—See XXIII.

See also A., I, 212, **Rapid colorimetric determination of K [in fertilisers].** II, 151, **Constituents of pyrethrum flowers.** III, 357, **Vernalisation of cereals.**

PATENTS.

[Preparation of] insecticides. RÖHM & HAAS CO. (B.P. 480,528, 20.8.36. U.S., 27.9.35).—Aliphatic polycyano-compounds useful as insecticides, fungicides, and repellents for, *e.g.*, flies, moths, animal and plant insects are prepared by the interaction of an inorg. (Na, NH_4, Ca) thiocyanate and an org. polyhalogen compound of $\nless C_4$ in which the C chain is interrupted by at least one O, S, or N and each group of C atoms contains $\ngtr$ 1 halogen, in a solvent (EtOH, $COMe_2$) if desired, at 50—150° (80—120°) and, if desired, under pressure and employing a catalyst (Cu). *E.g.*, $(CH_2Cl·CH_2)_2O$ (143), anhyd. NaSCN (240) in $COMeBu^{\beta}$ (140), and Cu (3 pts.) at 120—130° for 25 hr. give a product containing 87% of bis-(β-thiocyanoethyl) ether. The following are prepared similarly: bis-(β-thiocyanoethoxymethoxy)ethane, *bis-(β-thiocyanoethyl)sulphoxide*, m.p. about 57·5—58·5°, 2 : 3-*bis-(β-thiocyanoethoxy)dioxan*, m.p. about 89·5—90·5°, *αα-bis-(β-thiocyanoethoxy)-ethane, -butane, -heptane-*,

-methane, *-β-methylpropane*, *-γ-thiocyanopropane*, *-Δ^{β}-butene*, *bis-(γ-thiocyanopropoxy)methane*, *αα-bis-(γ-thiocyanopropoxy)-β-methylpropane*, *tris-(β-thiocyanoethyl)amine*, and *bis-(β-thiocyanoethyl)sulphide*. Of the starting materials, 2 : 3-*bis-(β-chloroethoxy)dioxan*, b.p. 175—177°/14 mm., is prepared from dichlorodioxan and OH·$[CH_2]_2$·Cl with $CaCO_3$ in boiling C_6H_6 and *αα-bis-(β-chloroethoxy)-Δ^{β}-butene* from CHMe:CH·CHO and OH·$[CH_2]_2$·Cl by shaking with $CaCl_2$ and HCO_2H for 19 hr. N. H. H.

Cell for treatment by fermentation of domestic manure. EAU ET ASSAINISSEMENT ANC. ÉTABL. C. GIBAULT (B.P. 479,635, 9.2.37. Fr., 7.10.36).—The top is open and air drawn through by simple suction under a perforated base. B. M. V.

Treating non-tobacco smoking mixtures or mixtures for giving off inhalents. T. D. KELLY (B.P. 473,299, 9.4.36).—EtOH-sol. oxides or peroxides, *e.g.*, H_2O_2, BaO_2, N_2O, are incorporated with a suitable absorbent, *e.g.*, shredded peat. E. H. S.

Spraying apparatus [for hop vines].—See I. **Liquid sprays.**—See XXII. **Fermentation [of garbage to produce fertiliser].**—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Influence of temperature of exhausted [beet] slices on their behaviour when ensilaged. J. VONDRÁK (Z. Zuckerind. Czechoslov., 1938, 62, 193—200).—In two series of experiments the unfavourable influence of a high temp. during storage of slices was shown in the formation of a yellowish and slimy acid product. There was a large contraction in vol. and a considerable loss in wt. of dry substance and mark. On the other hand, in another series of experiments slices otherwise similarly treated gave practically the same results with small losses whether the temp. were low or high. This serves as a further illustration of the complexity of the fermentation processes occurring in slice silos. J. P. O.

Composition of [sugar] juices separately extracted by various mills of a tandem. J. G. SALINAS (Int. Sugar J., 1938, 40, 77).—In the case of a tandem consisting of two crushers and five mills, it is more economical to treat the juices from the last three mills separately from the rest. They have different isoelectric points, and the elimination of their colloidal matter is easier if separately subjected to liming and heating, as compared with treating the combined mixed juice of the tandem. Resulting from the separate evaporation of the two types of juice, a high- and a low-purity syrup may be produced. This is believed to lead to the production of a uniform type of sugar, of higher filterability and of better grain structure, and finally to an appreciable reduction in the amount of final molasses produced. J. P. O.

Clarification of POJ cane juices. J. C. B. DAVIDSON (Int. Sugar J., 1938, 40, 117—118).—Provided P_2O_5 was present to the amount of 250—340 p.p.m., hot-liming produced in laboratory tests a very satisfactory clarification giving a ppt. of granular nature which settled rapidly, leaving a brilliantly clear juice above. Cold-liming, on the other hand, gave a finely-divided ppt. which settled very slowly and left a scum on top of the liquid. In the factory, hot-liming gave brilliant juices in runs from 6 to 16 hr., after which, due to the large vol. of mud in the subsiders, the juice ran dirty and cold-liming had to be resorted to. Davies' fractional liming–double heating process (B., 1936, 1119) at first gave brilliantly clarified juices until the high level in the subsiders made it apparent that the mud difficulty had here also to be solved. When the rate of mud withdrawal from the subsiders was increased and the mud level in the subsiders was lowered, the system worked very satisfactorily. J. P. O.

[Sugar-]juice clarification with decreased lime addition. N. SZENDE and R. VADAS (Z. Zuckerind. Czechoslov., 1937, 62, 28—32).—Diffusion juice at 54° was progressively prelimed according to the Dědek–Vašátko process (cf. B., 1937, 1256) in 3 portions during 25 min. After heating to 88°, it was carbonatated to 0·08 alkalinity, treated with a further 0·2% of CaO, resaturated to 0·08, filtered, heated to 88°, submitted to second carbonatation to 0·02 alkalinity, and finally sulphured. Juice so clarified had a purity only a little < that in the clarification of which 1·25% of CaO had been used. Its colour was not so good, but its Ca salts content was about the same. J. P. O.

Action of oxidising media on beet juices. V. MOCKER (Z. Zuckerind. Czechoslov., 1938, 62, 185—192).—Addition of 0·01—0·05 wt.-% of H_2O_2, Cl (using chloramine-*T*), $(NH_4)_2S_2O_8$, and NH_4BO_3 to intermediate beet juice at 62·7° Bg. heated on a boiling water-bath for 1—5 hr. caused marked colour formation. At laboratory temp., however, H_2O_2 and Cl, in the amounts stated, caused decolorisation up to 65% of the original colour present. J. P. O.

Determination of soluble silica in cane juice. J. G. DAVIES, A. C. GOMEZ, and D. BOON (Int. Sugar J., 1938, 40, 105—106).—A modification of Černý's colorimetric method (A., 1935, 949), depending on the reaction with molybdate, is described, the influence of H_3PO_4 present in the case of juice being avoided by addition of NH_4 citrate. A Duboscq colorimeter is used for matching the colours produced by sample and standard solutions. By determining total SiO_2 by a standard method, and sol. SiO_2 by that now described, the org. colloidal SiO_2 present in cane juices can be found. J. P. O.

Single-solution method of determining the purity of [beet] juice. F. R. BACHLER (Facts about Sugar, 1937, 32, 327—328; Int. Sugar J., 1938, 40, 68).—This method (cf. B., 1934, 344) is compared with the Spengler–Brendel procedure, which is stated to be unsuitable for mass analysis as it requires relatively large samples and ample time. On the other hand, the Bachler method lends itself readily to mass analysis and to the routine purity determinations of the sugar factory. Its results agree for purity among themselves by <0·1%, which high order of accuracy is attributed to the fact that the same liquid serves both for the determination of the refractometric Brix as for the polarisation. J. P. O.

Drying of [sugar-juice] defecation sludge. E. RIEGER (Deut. Zuckerind., 1938, **63**, 57—60).—Machinery for drying of sludge is described. Analyses of the product are recorded and its manurial val. is discussed. A. G. P.

Crystallisation of massecuites: some results with the Herisson apparatus in South Africa. ANON. (Int. Sugar J., 1938, **40**, 62—64).—A comparison between the results obtained with ordinary air-cooled crystallisers and Herisson coolers for 1st, 2nd, and 3rd massecuites is definitely in favour of the former apparatus. Not only was cooling much more rapid, but the final purity of the molasses was lower. In the Herisson crystalliser it was observed that the H_2O-inlet end cooled much more rapidly than the H_2O-outlet end, the two yield figures averaging 65·6 and 62·8%. J. P. O.

Conductivity method for determination of water in bagasse. G. G. RAO (Int. Sugar J., 1938, **40**, 68—69).—Further work with this method (cf. B., 1934, 1077) shows that a correction must be applied to allow for the conductivity of the residual juice of the bagasse. Where the operating conditions are not varied, and the bagasse electrolytes remain about the same, it can be determined once and for all and applied as a const. Some results with the modified method are presented, from which it is seen that the average error is now $<0·5\%$. J. P. O.

Ion antagonism in alcoholic fermentation of cane molasses. G. A. GUANZON and F. R. LOPEZ (Sugar News, 1936, **17**, 505—508; Int. Sugar J., 1938, **40**, 69—70).—Laboratory experiments using a cane-molasses wash at 18° Brix, and already containing Ca 0·58, Mg 0·14, K 0·43, and Na 3·96 g./l., showed an increase in the EtOH yield with additions of $CaSO_4$ and of $MgSO_4$ separately. Mixtures of the salts had different effects towards one another. Ca showed a strongly antagonistic action with K, as did also Mg with Na, but K and Na had none. J. P. O.

Micro-organisms causing fermentation flavours in cane syrups, especially Barbadoes molasses. H. H. HALL, L. H. JAMES, and E. K. NELSON (J. Bact., 1937, **33**, 577—585).—"Rum-flavoured" molasses contains EtOH, furfuraldehyde, MeCHO, and BuOH. *Zygosaccharomyces nussbaumeri* and *Z. major*, together with *Clostridium saccharolyticum*, are probably concerned in the fermentation process. A. G. P.

Blackstrap molasses as raw material for biochemical industries (production of compressed yeast). W. L. OWEN (Facts about Sugar, 1937, **32**, 263—264; Int. Sugar J., 1938, **40**, 118—119).—A process for producing yeast from cane molasses is outlined. Approx. the yield should be 40% of the sugars in the mash, so that from 1 gal. of average molasses 4 lb. of yeast should be obtained. Yeast may be produced from molasses for 6 cents per lb. With cheap molasses as raw material and a cheap source of N, feed-protein in the form of yeast can be produced on a competitive basis with lucerne or other protein feeds now being produced in the United States. J. P. O.

Changes in the composition of final [cane] molasses during storage. K. W. KOPFLER (Int. Sugar J., 1938, **40**, 108—109).—Samples were drawn monthly for 7 months at different heights and different distances from the outside of tanks containing 700,000 gals. of cane molasses and analysed. There was a progressive inversion of the sucrose during the 7 months (37·75—34·98), which slowed up during the 6th and 7th months. Nevertheless, the glucose did not increase *pari passu*, but, on the contrary, showed a gradual loss (11·48—10·58), due probably to interaction with NH_2-acids. This resulted in considerable colour formation, viz., from 1802 to 3549 units. The Brix declined from 89·23° to 88·02°, and the p_H fell from 5·92 to 5·23. J. P. O.

Simple lime classifier for sugar mills. C. W. WADDELL (Int. Sugar J., 1938, **40**, 64—65).—Quicklime or hydrated CaO is dumped into a tall cylindrical tank containing H_2O in a state of whirl induced by a steam coil suitably placed. After violently boiling and whirling for a few min., more H_2O is admitted to cause the level of the liquid to rise to an overflow at the top of the tank through which the fine hydrated CaO free from dirt and grit is floated, conditions having been adjusted to give a suitable *d*. J. P. O.

Use of special steels in the sugar industry. W. H. HATFIELD (Int. Sugar J., 1937, **40**, 75—77).—Special steels are described, and their analysis given, which are now in use in the cane-sugar industry for: cane-mill shafts, top-cover bolts, and king bolts where high mechanical strength is required; trash-turner plates, shredder teeth, pump spindles and sleeves, conveyor pins, where resistance to wear and abrasion is to be overcome; and groove scraper-plates, juice pumps, pump rods, strainer gauzes, filter parts, etc., where high corrosion-resistance is demanded. The mechanical properties of such steels are specified. J. P. O.

Kieselguhrs as filter aids [in sugar refineries]. J. SCHUBERT (Z. Zuckerind. Czechoslov., 1937, **62**, 62—64, 69—72).—In refining with decolorising carbons, the use of a kieselguhr filter aid is indispensable, and some improvements which are realised by means of "Hyflo-Supercel" are the following: a completely clear, brilliant filtrate; a min. vol. of cloudy runnings; a saving of 20% of C; easier sweetening-off; economy in labour owing to the longer running of the filters; the possibility of working with more conc. liquors; and economy in steam. J. P. O.

Laboratory testing of filter aids [in sugar refineries]. K. ŠANDERA and A. MIRCEV (Z. Zuckerind. Czechoslov., 1937, **62**, 65—68).—Useful information can be obtained by laboratory tests of the rates of filtration and of subsiding, and by means of analytical and microscopical examination in comparison with standard samples of materials known to give good results in practice. A small filter having a cloth area of 20 sq. cm. is described, some rates of flow obtained with it, using 5 g. of material in 300 c.c. of H_2O, being: wood meal 28 sec., refined kieselguhr 92—445 sec., diatomaceous earth 1¼—3½ hr. J. P. O.

Carrying out chemical analyses in sugar factories by uniform methods (Suppl. III, Edn. IV). J. VONDRÁK (Z. Zuckerind. Czechoslov., 1937, **62**, 54—55).—It is recommended, *inter alia*, that, in the analysis of beets and beet slices the content of harmful N be determined by the Stanek–Pavlas method; the reducing substances be determined in factory thin and thick juices by Ofner's method (B., 1937, 1114); and that the Stanek–Pavlas turbidimetric method described recently (cf. B., 1937, 1111) be employed in factory routine for the determination of Ca in clarified juice. J. P. O.

Determination of the solubility of pressed and cast refined sugars. V. K. ŠANDERA and A. MIRČEV (Z. Zuckerind. Czechoslov., 1937, **62**, 57—61; cf. B., 1937, 484, 1113).—Factors which influence the rate of dissolution of pressed and cast sugars are the mode of drying and the time of storing. Cubes cut from slabs which have been dried at low temp. are much less readily sol. (by >100%) than is the same kind of material dried at higher temp. After storing, however, this difference in solubility lessens, tending in time to disappear. Moisture originally present in the sugar does not appear to exert any influence on the solubility. J. P. O.

Determination of invert sugar using an alkaline cupric reagent without tartrate. V. B. JEVSTIGNEEV (Nauk. Zapiski, 1936, **1**, 37; Int. Sugar J., 1938, **40**, 70).—In the method described, an alkaline solution of $CuSO_4$ is used, the use of Rochelle salt as required for ordinary Fehling's solution being dispensed with and less NaOH used than ordinarily. The assay solution and the Cu^{II} reagent are boiled together for 3 min., after which the Cu_2O reduced is found volumetrically by permanganate. J. P. O.

Colour of the decomposition products of invert sugar. I. Influence of alkalinity. J. VAŠÁTKO and V. KASJANOV (Z. Zuckerind. Czechoslov., 1938, **62**, 217—221).—The colour produced in the decomp. of invert sugar by alkali changes in intensity according to the alkalinity of the solution, first increasing to a max. and later decreasing with higher alkalinity. A fairly substantial increase of colour in the decomp. of invert sugar can be obtained by adding a small amount only of alkali. J. P. O.

Dependence of the ash content [of sugar] on purity in intermediate and final products of the refinery. H. JUTTNER (Deut. Zuckerind., 1938, **63**, 45—52).—Formulæ relating the ash content with apparent purity and sucrose content are established. A. G. P.

Saccharification of wood and alcoholic fermentation of sugar. II. A. KAMAZUKA, N. YAMAKAWA, and B. ROKUSHO (J. Soc. Chem. Ind. Japan, 1938, **1**, 4—5B; cf. B., 1937, 828).—Various Manchurian conifers and hardwoods were accorded multi-stage saccharification treatments, the sugar obtained being fermented by yeast (Rasse II). The first saccharification stage governs the total yield of reducing sugar, a high first-stage yield producing a high total yield. This fraction, however, contains considerable quantities of unfermentable sugar so that the yield of EtOH is sometimes < that of the later stages. *Larix dahurica*, Turcz., gave the greatest EtOH yield (19·2%). D. A. C.

Starch. R. S. SHANE (J. Chem. Educ., 1937, **14**, 460—463).—Sources, derivatives, industrial applications, and gelatinisation of starch are discussed. L. S. T.

[Conductivity, swelling, and viscosity of] starch [and its gelatinisation]. J. DEDEK, B. JELINEK, and I. KULCICKYJ (Ann. Ferm., 1937, **3**, 257—275).—Using a described method, there is above a certain crit. temp., and associated with gelatinisation, a rapid increase in vol. which is later retarded, the starch deposit separating into an upper opaque layer and a lower limpid layer. The effects of varying cations are noted; $H^{\cdot}$ raises the crit. temp. but gives a smaller max. vol., whilst the effects of buffers depend on their p_H. The crit. temp. observed for η measurements is compared with that of swelling and with those obtained electrometrically (*ibid.*, 1936, **2**, 407). The effects of cations on the 3 types of measurement are shown, and the possibility of their interchange is investigated. The characteristic effect of $H^{\cdot}$ on the conductivity curves is associated with hydrolysis. Mechanically pulverised starch gelatinises in the cold with H_2O and, in place of the characteristic conductivity curve of native starch, gives a regular increase in conductivity with rising temp. The form of the curve appears to depend on the granule structure. I. A. P.

Converting starch for tub size [in paper-making]. E. M. WIXTED and L. G. BASSETT (Paper Trade J., 1938, **106**, TAPPI Sect., 55—57).—The conditions under which maize and tapioca starches can be converted into dispersions of low η, suitable for use in tub-sizing paper, by means of four marketed enzyme preps. are given, and their η, reducing sugar content, and adhesive strength are compared with those of a commercially available oxidised starch at present in use for tub-sizing. H. A. H.

Angico gum. H. S. SCHNEIDER (Bol. Inf. Inst. Nac. Tech., 1937, **2**, No. 6, 7 pp.).—The gum exuded by *Piptadenia* closely resembles gum arabic in η and adhesive power, which latter increases with the concn. of its aq. solution. F. R. G.

Xylose from waste plant material. Determining sugars in sulphite liquors. Bagasse pulp for paper.—See V. **Sugar cane and beet.**—See XVI. **Determining sugar. Molasses yeast. Determining carbohydrates in bread. Saccharification of rice bran. Sugar-beet by-products for livestock. Saccharine fodder. Potato utilisation.**—See XIX.

See also A., III, 343, **Prep. of *d*-ribose.** 355, **Sugar analysis in barley plants.**

PATENTS.

Purification [carbonatation] of [sugar] juices and treatment of solutions by contact with a gas. E. J. HUGEL (B.P. 464,538, 15.5.36. Fr., 15.5.35).—In a continuous carbonatation process the limed juice descends through a vertical column consisting of a succession of chambers all supplied peripherally with a mixture of CO_2 and air, the composition of

which is automatically controlled in accordance with the p_H of the juice leaving the column. The flow of juice from each chamber to the next is turbulent and entrains the gas mixture downwards. Additional gas may be supplied to the last chamber, if necessary, in amount controlled by the rate of sedimentation of solid matter. Apparatus is claimed. J. H. L.

Treatment of [sulphited] sugar juices. E. K. VENTRE, Assr. to UNITED STATES SEC. AGRIC. (U.S.P. 2,043,911, 9.6.36. Appl., 6.3.36).—Sugars, syrups, and molasses derived from processes involving sulphitation are treated with OCl′ or Cl′ to oxidise any remaining sulphites. J. H. L.

Refining of sugar. R. HADDAN. From WESTERN STATES MACHINE CO. (B.P. 466,142, 25.11.35).—Affination is effected with < the usual proportion of syrup, practically saturated and at 60—82°. The magma is reheated rapidly to this temp., by means of the apparatus described in B.P. 455,554 (B., 1937, 382), just before delivery to the centrifugals. These are of 40 in. in diameter and attain 1400—1600 r.p.m. in 50 sec. Relatively little wash-H_2O is applied, at about 73°, and as a fine mist. Apparatus is claimed. J. H. L.

Sugar-refining process. F. M. SABINE (U.S.P. 2,046,344, 7.7.36. Appl., 24.2.33).—Remelt sugars are returned to working before the first-carbonatation stage. J. H. L.

Recovery of non-sugars from saccharine materials. G. T. REICH (U.S.P. 2,022,824, 3.12.35. Appl., 14.7.32; cf. B., 1937, 382).—Molasses etc. is thinned with H_2O and treated with a mixture of EtOH and $Pr^{\beta}OH$ so as to obtain two fluid layers, aq. and alcoholic, containing the sugars and non-sugars, respectively. J. H. L.

Method of inducing crystallisation [of sugars in confectionery]. A. A. LUND, Assr. to CALIFORNIA FRUIT GROWERS EXCHANGE (U.S.P. 2,041,197, 19.5.36. Appl., 11.7.32).—In the manufacture of fondants from glucose (70—85 pts.) and sucrose (10—30 pts.) in an aq. medium, by boiling, cooling, and creaming, the last process is hastened by incorporation of ≯2 pts. of a hydrophilic colloid such as gelatin, pectin, or agar. J. H. L.

Industrial production of pure crystalline natural grape sugar (glucose, dextrose) from grapes or raisins. J. G. MARAKAS (B.P. 465,852, 22.6.36. Greece, 22.6.35, 4.7.35, and 20.5.36).—Grape juice, freed from tartaric acid, is conc. to *d* 1·40, seeded with anhyd. glucose crystals, and cooled for crystallisation. The magma is thinned with H_2O or EtOH at low temp. to dissolve fructose (I) crystals, and the glucose separated by vac.-filtration or centrifuging; or the (I) may be removed by treatment with dry steam or warm air in the centrifuges. Pptn. of (I) by CaO may also be employed. The glucose is finally recrystallised. J. H. L.

Tablets of pure dextrose. H. MEYER, Assr. to INTERNAT. PATENTS DEVELOPMENT CO. (U.S.P. 2,046,833, 7.7.36. Appl., 28.1.35. Ger., 26.5.33).—Tablets are prepared from glucose monohydrate; they dissolve much more rapidly than those made from the anhyd. sugar. J. H. L.

Manufacture of [maize] starch. A. PELTZER, jun., Assr. to MERCO CENTRIFUGAL SEPARATOR CO., LTD. (U.S.P. 2,039,605, 5.5.36. Appl., 31.7.33).—The wet "mill starch" is fed continuously to a centrifugal separator, yielding an overflow containing most of the gluten and fibre and an underflow containing starch; the underflow is frothed and passes to a stationary vessel for separation of further gluten by flotation. J. H. L.

Treatment of starch and starch-containing substances. W. SCHULZE (STÄRKE-FABR. GOLSSEN W. SCHULZE & CO.) and C. BEYER (B.P. 466,287, 13.12.35).—Products which form adhesive pastes with hot or warm (but not with cold) H_2O are prepared by mixing starch with about 2% of a solution containing 10—30% of chloral hydrate and 3—5% of HCl, and heating for 2 hr. at ≯95°. J. H. L.

Production of starch pastes. W. SECK (B.P. 464,606, 27.5.36. Ger., 31.5.35).—Starch pastes are prepared with the aid of NaOH or other agents which lower the gelatinisation temp., and their η is lowered by agitation in a disc colloid mill or the like in which the discs have a peripheral speed of ≮30 m./sec. [Stat. ref.] J. H. L.

XVIII.—FERMENTATION INDUSTRIES.

Some brewing problems investigated. A. J. C. COSBIE (Chem. and Ind., 1938, 287—291).—A review, the topics discussed including: barley—cultural considerations and N relationships; hops—resins and antiseptic val.; yeast—utilisation of NH_2-acids; bacteria—disease forms and relation to hop antiseptic. I. A. P.

Short gassing-power method [for yeast]. R. M. SANDSTEDT (Cereal Chem., 1938, **15**, 114—116).—The long time needed for a gassing-power test with small quantities of yeast is reduced by using a maltose fermentation activator. The most potent of these is made by drying "filler-free" baker's compressed yeast at a low temp. E. A. F.

Titrimetric determination of phosphoric acid in yeast. F. WAGNER (Z. Spiritusind., 1938, **61**, 60, 62).—NaOH decomp. of NH_4 phosphomolybdate in the cold gives somewhat uncertain results. The conversion factor of 0·00030887 given by Kurzweil (cf. B., 1938, 212) is too high; 0·0002842 is to be preferred, but accuracy depends on speed of working. Boiling decomp. is better, but takes much longer. Gravimetric determination gives the most satisfactory results. I. A. P.

Amylan. W. PIRATZKY and G. WIECHA (Woch. Brau., 1938, **55**, 97—100).—Amylan has been isolated by Cu-treatment of aq. extracts of barley or 3-day malt after addition of NaOH; the ppt. is decomposed with HCl. The products yield aq. solutions of high η. Acid hydrolysis gives glucose, whilst enzymes give glucose and maltose. This amylan corresponds with the α-amylan of O'Sullivan, the β-fraction of which contains material yielding furfuraldehyde. The α-amylans can be fractionated to a series wherein increasing mol. wt. (4100—67,000) is accompanied by increasing sp. η (0·197—3·020).

"Barley-gum," containing pentosan, has been isolated from barley, malt, and last runnings of wort. I. A. P.

Evaluation of malt. O. MENZEL (Woch. Brau., 1938, 55, 65—68).—Various methods for the evaluation of brewery malts are critically discussed. Valuable information as to quality is best provided by a knowledge of titratable acidity, formol titration, extract protein, malt protein, and colour, together with the usual Congress analysis. I. A. P.

Analytical determination of modification of malt. I. C. ENDERS, and F. SCHNEEBAUER [with L. AUREDNIK and A. PFAHLER] (Woch. Brau., 1938, 55, 73—78, 81—86).—Various chemical and physical methods for the assessment of malt modification are discussed, reference being made to analyses of numerous samples of barley and of pale and dark malts. The results of various methods are not necessarily in agreement, since they measure varying aspects of modification. The val. of comparison between malt properties and those of the corresponding barleys is stressed. The *d* of barley — the *d* of malt gives results for comparative modification showing a substantial measure of agreement with the average of all other methods. I. A. P.

Rapid determination of attenuation limit of wort and beer. E. SCHILD (Woch. Brau., 1938, 55, 109—112).—5 hr. fermentation for wort, 2 hr. for beer, suffices to reach the attenuation limit when 16% of fresh, active yeast is used with continued shaking in presence of 1% of Biospäne at room temp. ($\nless$18°). To assist filtration, 1—2 drops of *sec.*-octyl alcohol may be added after fermentation. The error of the method lies within the usual limits. I. A. P.

Malt economy in the experimental distillery. E. LÜHDER and B. LAMPE (Z. Spiritusind., 1938, 61, 67).—Using the method described previously (B., 1937, 1394), the amount of green malt necessary for use with potatoes was reduced by 30%, normal fermentation being achieved. I. A. P.

Composition of fusel oil obtainable by fermentation of wood-sugar worts of the Rheinau process. C. ENDERS and K. KÄRNBACH-MÜNCHEN (Z. Spiritusind., 1938, 61, 75—76).—The fusel oil contains 74% of fermentation $C_5H_{11}\cdot OH$ and 20% of $Bu^{\beta}OH$. Traces of higher and lower alcohols, fatty acids (not AcOH), esters, aldehydes and ketones, and basic substances are also present. I. A. P.

Termobacteria and acetic bacteria. H. SCHNEGG and K. WEIGAND (Z. ges. Brauw., 1938, 61, Nos. 1 and 2; Woch. Brau., 1938, 55, 69—70).—The termobacteria, which are weakly acid-producing, show varying degrees of resistance to EtOH, which in sufficient concn. may delay the onset of multiplication without necessarily causing complete inhibition. Acclimatisation of these bacteria to beer conditions is possible, but EtOH is not assimilated. Certain relatively strongly acid-producing bacteria, isolated from beer and resembling in some respects but otherwise distinct from the above, proved to be facultatively anaërobic acetic bacteria. The acid production decreased with increasing [EtOH]. I. A. P.

Does yeast race influence foam stability of beer? F. J. DE FONTENAY and A. LUND (Woch. Brau., 1938, 55, 106—109).—On the laboratory scale, beers obtained by fermenting portions of a standard wort with yeasts of various races (bottom, top, secondary) showed marked differences in foam stability (Blom and Prip), but marked variations were also found when a given yeast fermented portions of the same wort; yeast race does not therefore apparently play a decisive part in determining foam stability. Differences in η, p_H, content of sugar, N, and EtOH in the beers, and of yeast gum in the yeasts were small, and could scarcely account for the differences in foam stability. After-fermentation of a bottom-fermented beer with secondary yeast appeared to improve foam stability. I. A. P.

Over-foaming of beer. E. HELM and O. C. RICHARDT (Woch. Brau., 1938, 55, 89—94).—The nature and mechanism of over-foaming are discussed, and a method is described for its measurement. It increases with the intensity and time of shaking, but tends to fall after very prolonged shaking. Over-foaming is favoured by low storage temp. and by high shaking and opening temp. It is not a function of CO_2 content, nor increased by pasteurisation; the latter may, in fact, act in the opposite direction to shaking. Papain usually increases over-foaming, whilst pepsin decreases it. Appreciable restrictive action of pectin could not be demonstrated, nor could a relationship be established between over-foaming and foaming or turbidity characters of beers. I. A. P.

Manufacture of alcohol from Manchurian starchy materials. I—III. Amylo- and acid-hydrolysis. E. YOSHINO, W. YOKOYAMA, T. MAKIHARA, M. NAGASHIMA, and M. OKAHAYASHI (Bull. Agric. Chem. Soc. Japan, 1937, 13, 1351—1400).—The optimum conditions for hydrolysis using 0·06% HCl and 6—8 times the wt. of material are 1 hr. at 155°. Kaoliang grain and bran contain tannin and dyes which hinder the action of amylase, zymase, and other enzymes, but previous pptn. or polishing gives products which can be fermented. No increase in yield of EtOH was observed when kaoliang, expanded by heat, was again cooked, but the temp. could be lowered 20—30°. Using the amylo-process 90% yields of EtOH were obtained from maize, rice, and millet. J. N. A.

Hydrolytic cleavage of saponin during manufacture of ethyl alcohol from horse chestnuts. R. VADAS (Österr. Chem.-Ztg., 1938, 41, 52—53).—The dry matter of horse chestnuts contains starch and sugar 63% and saponin 11·9%, the last-named poisoning starch-fermenting enzymes. The saponin is sol. in EtOH and $COMe_2$ and hydrolysis with aq. HCl yields glucose, *d*-galactose, *l*-arabinose, *d*-glycuronic acid, and AcOH. To obtain a successful EtOH fermentation of the starch, the nut meal is heated at 100° with dil. HCl until amylodextrin has been broken down sufficiently to give a negative colour with aq. I–KI. The neutralised mixture is then readily fermentable by yeasts. W. L. D.

Presence of *iso*propyl alcohol in alcohol from wine. M. FLANZY and M. BANOS (Compt. rend.,

1938, 206, 218—219).—From 1 litre of oil, yielded by 300 hectolitres of wine, were obtained by fractional distillation 20 g. of $Pr^{\beta}OH$. W. O. K.

Yeast from molasses. Fermentation of molasses, and of sugar.—See XVII. **Determining sugar in diastatic activity measurements.**—See XIX.

See also A., III, 338, **Glucose oxidase.** 340, **Lipase of cows' milk.** 343, **Prep. of nucleosides (*d*-ribose) by enzymic hydrolysis. Phosphorylation of adenosine by yeast and alcoholic fermentation.**

PATENTS.

Manufacture of alcoholic beverages. K. R. BROWN, Assr. to ATLAS POWDER CO. (U.S.P. 2,061,560, 24.11.36. Appl., 24.4.34).—The palatability of beer, wine, spirits, etc. is improved by addition, alone or with glycerol, of polyhydric alcohols (with $> C_3$, *e.g.*, sorbitol) in concns. $\leqslant$ would give a saturated solution. I. A. P.

[Fermented] beverage production. H. FILE, Assr. to A. E. STALEY MANUFG. CO. (U.S.P. 2,068,738, 26.1.37. Appl., 26.10.33).—In the prep. of beer the protein content may be regulated by adding conc. maize steep liquor to the wort before or after fermentation but before filtration. Alternatively, *e.g.*, 90 pts. of maize starch may be mixed with 10 pts. of the conc. steep liquor, the mixture being gelatinised, flaked, and thereafter added to the mash. I. A. P.

Treatment of beer and ale. L. WALLERSTEIN (U.S.P. 2,062,075, 24.11.36. Appl., 10.11.34).—Activated C ($\frac{1}{2}$—5 oz.) is added to 31 gals. of fermented wort at p_H 4—5. The treatment, which selectively removes undesirable flavours and odours produced by bacterial development, occupies 5—30 min. at 0—15°, and the C is then removed by filtration or other means. Suitable C is prepared by superheated-steam treatment of charcoal or by charring wood in presence of $ZnCl_2$; 1 g. should be capable of decolorising 500—600 c.c. of 1 : 4000 methylene-blue solution. The C may be mixed with, *e.g.*, kieselguhr. I. A. P.

XIX.—FOODS.

Germ content of American wheats. C. H. BAILEY (Cereal Chem., 1938, 15, 102—106).—Samples of representative American wheats were softened in hot H_2O, the germ was removed by dissection, and the two portions were dried and weighed. Hard spring and winter wheats had a fairly uniform % of germ (mean 2·23%), soft wheats more, and durum the most (2·94%). In durum, the % of germ tends to increase with kernel size. E. A. F.

Complete removal of germ from wheat at the beginning of milling. ANON. (Mühle, 1937, 74, 901—903).—The val. of germ is emphasised. Preservation by drying under reduced pressure and flaking is recommended. The bitter taste can be removed by steam-distillation. E. A. F.

Flintiness and flouriness of wheat endosperm. V. G. ALEXANDROV and O. G. ALEXANDROVA (Compt. rend. Acad. Sci. U.R.S.S., 1938, 18, 111—114).—"Flintiness" in flour is commonly associated with a loose arrangement of starch granules with relatively large protein intercalations. Close-packing of small starch grains is usually characteristic of "flouriness." Numerous intermediate types and variations of structure occur. A. G. P.

Ageing of wheats and flours. J. BOSSHARDT (Bull. École Franç. Meun., 1937, 194—195).—Different varieties of wheat age quite differently. Extensimeter data on flour quality are therefore unreliable unless the age of the flour is known. E. A. F.

Development of the conception of "gluten wheat" in German grain market regulations. H. HAEVECKER (Mehl u. Brot, 1937, 37, No. 52, 1—3).—The legal definition of "Kleberweizen," which rests on a capacity for raising the baking quality of blends, is discussed. E. A. F.

Gluten-protein fractionation from sodium salicylate solution. II. Bread wheat-gluten fractionation. R. H. HARRIS (Cereal Chem., 1938, 15, 80—90; cf. B., 1937, 1397).—In hard red spring wheat, the first fraction of gluten pptd. by $MgSO_4$ is highly and positively correlated with loaf vol., and is much more significant than are other factors investigated (wet crude gluten, gluten protein, total protein removed by $MgSO_4$, protein dispersed by Na salicylate, crude flour protein, ash). Hard red spring wheat contains less total protein than durum, but more in the first fraction. E. A. F.

Vacuum-dried gluten. B. BLOCK (Mühle, 1937, 74, 1223—1225).—To be sufficiently rapid, without using a temp. high enough to cause decomp., gluten drying must be carried out in a vac. Ovens for this purpose are described, as also is the testing of the product for adhesive power. E. A. F.

Proteolytic enzymes in wheat flour. H. HAEVECKER (Mehl u. Brot, 1937, 37, No. 33, 1—3).—Estimation of the baking quality of a flour from its gas-forming and gas-retaining capacities may be invalidated by the action of proteolytic enzymes, which are present in considerable quantity in flour, but require activation by an activator which is found in yeast and germ and is identified with glutathione. The activator is unaffected by heat but destroyed by atm. oxidation or by bromate etc. Proteolysis may be advantageous when slight, but must not be too great. No means of determining the optimum yet exist; use of the oxidation–reduction potential is suggested. E. A. F.

Diastatic condition of grain and flour. S. HAGBERG (Z. ges. Getreidewes., 1937, 24, 227—234).—Ordinary determinations of diastatic activity do not necessarily measure diastatic changes at the temp. involved in baking. The "diastatic condition" is determined by heating a dough or suspension to baking temp. and measuring the change by (1) refractometric determination of sol. substances, (2) iodometric determination of reducing sugars, (3) viscosimetric determination of pasting capacity, (4) measurement of plastic properties, or (5) power of

colouring an I solution. (1) gives a measure of "dextrinogen amylase" activity and (3) of the pasting power of the amylopectin and of the action of the "amylophosphatase." E. A. F.

Improved method of sugar determination in diastatic activity measurements. F. C. HILDEBRAND and B. A. MCCLELLAN (Cereal Chem., 1938, **15**, 107—113).—A simpler and quicker modification of the Blish–Sandstedt method for determining diastatic activity is described. The ferrocyanide formed by reduction is titrated directly with $Ce(SO_4)_2$, with Setopaline C as indicator. With high concns. of maltose, accuracy is increased. E. A. F.

Water absorption by grain during washing. O. HALTMEIER (Mühle, 1937, **74**, 1163—1166).—H_2O absorption depends on the nature of the grain surface and its extent in relation to vol. The H_2O is taken up immediately by the surface and then absorbed slowly. Raising the temp. from 20° to 50° increased absorption appreciably only when the time was long. Different varieties of grains reach equilibrium at different H_2O contents. E. A. F.

Determination of moisture content of grain. ANON. (Mühle, 1937, **74**, 1198).—A double-walled drying oven is divided into 12 compartments, unconnected with each other, and each having ventilation direct to the outside; the temp. can be kept const. within ±0·5°. E. A. F.

Moisture determination in grain and milling products. A. TAMM (Mühle, 1937, **74**, 1480—1481).—A simple apparatus for determining H_2O in grain by distillation with lubricating oil–PhMe mixture is described. E. A. F.

Properties and utilisation of sprouted grain. H. HAEVECKER (Mehl u. Brot, 1937, **37**, No. 44, 1—3).—Besides softening the gluten, sprouting degrades the starch, increasing the sugar content and lowering the H_2O-absorption capacity. Counter-measures are: drying, mixing with sound grain, modifying the fermentation, and using salt or chemicals. E. A. F.

Carotenoids of grain. K. SCHMORL (Z. ges. Getreidewes., 1937, **24**, 202—204).—The carotene pigments, their structure, and their relation to vitamin-*A* are described. E. A. F.

Buggy wheat. R. SCHNICK (Z. ges. Getreidewes., 1937, **24**, 252).—Buggy wheat stored for a year showed remarkable changes in properties, seeming to indicate that part of the protein had been completely degraded to H_2O-sol. substances, whilst the rest was free from degrading enzymes. E. A. F.

Influence of temperature on proteolytic swelling figure degradation. K. MOHS and G. KLEMT (Z. ges. Getreidewes., 1937, **24**, 197—201).—Proteolytic degradation as measured by the gluten swelling figure increases with rising temp. Above 55° the swelling figure rises again owing to the gluten hardening effect. Buggy wheat should therefore be conditioned at a high temp. E. A. F.

Susceptibility to grain weevils of wheat varieties. E. RADULESCU (Z. ges. Getreidewes., 1937, **24**, 211—212).—Wheat varieties are attacked by insects in the inverse order of their hardness. E. A. F.

Combating pests [in grain] with poison gases. G. PETERS (Z. ges. Getreidewes., 1937, **24**, 182—185; 205—208).—A review of progress in grain fumigation. Masses of grain are effectively fumigated by using circulation or a vac.; the latter is more costly but quicker. The action of the gas is aided by removal of O_2 and by heat; high pressure is not effective. Different gases affect differently both species and stages of development; some, notably $(CH_2)_2O$, kill eggs more readily than adult insects. E. A. F.

Practical works control for rye flour and rye bread. A. SCHULERUD (Mehl u. Brot, 1937, **37**, No. 40, 1—3).—High protein content is less important in rye than in wheat, but tends to give better vol. and to retard drying. Flour is improved by storage up to a certain point, dependent on the variety and on storage conditions, especially temp. The "degree of storage" is measured by the acidity, which is due chiefly to the acids evolved by enzyme action from flour fat. (Cf. B., 1937, 280, 1119.) E. A. F.

The amylograph, an apparatus for measuring the baking quality of rye. C. W. BRABENDER, G. MUELLER, and A. KÖSTER (Z. ges. Getreidewes., 1937, **24**, 168—175).—The amylograph registers the η of a starch suspension with rising temp., thus providing a means of measuring the baking quality of rye, which depends primarily on its starch. E. A. F.

Is it advantageous to condition rye? F. BECKER (Mühle, 1938, **75**, 297—299).—Preliminary tests on the conditioning of rye showed an improvement in milling but not in baking quality. E. A. F.

Rapid fat determination in maize milling. H. MEY (Z. ges. Getreidewes., 1937, **24**, 191—192).—Milled maize is extracted with Et_2O, 5 c.c. of the solution are evaporated, and the residue is weighed. E. A. F.

Problems of soda-bread flour. D. W. KENT-JONES (Milling, 1937, **89**, 625—628).—For soda-bread, as made in Ireland, flour should be weak and of low α-amylase activity. Suitable tests are suggested. E. A. F.

Storage conditions for grain and flour. H. KÜHL (Mühle, 1937, **74**, 1425—1427).—Stored grain and especially flour must be clean, cool, and of low H_2O content. Exclusion of air reduces breathing loss and prevents mould; hence, compressed flour keeps well. E. A. F.

Determination of nitrogen in flours. B. JELINEK (Bull. École Franç. Meun., 1937, 233—234).—Modifications of the Kjeldahl method by Lundin and Ellburg (H_2O_2 and Cu catalyst) and by Jelinek and Mangold (H_2O_2 and $HgSO_4$) give more accurate results than does the original. The method of Lundin *et al.* (A., 1935, 1258) is quicker, but requires special apparatus. E. A. F.

Selenium catalyst in determination of nitrogen by Kjeldahl's method. K. NAKAJIMA and M. IKEDA (Bull. Agric. Chem. Soc. Japan, 1937, **13**, 1208—1214).—10 g. of Se or a mixture of 1 g. of

$CuSO_4$ and 9 g. of K_2SO_4 was needed for digestion of 1 g. of soya-bean flour (C_6H_6-extracted) or rape-seed cake. With Se the digestion time was about half that when $CuSO_4$ was used, and the N vals. were always slightly higher. J. N. A.

Determination of bromine in bromated flours. W. F. GEDDES and F. H. LEHBERG (Cereal Chem., 1938, **15**, 49—58).—Existing methods of determining Br in flour are criticised. The Yates method for micro-determination of Br in blood gives good results when modified by using an all-glass apparatus, with additional iodide absorber, and leaching the bromate from the flour instead of ashing directly. Recovery of $KBrO_3$ is 93—97%, and the result is not affected by the presence of ClO_3', IO_3', and S_2O_8''. E. A. F.

Detection and colorimetric determination of perborates in flour by the Cassal-Gerrans method. F. LÁSKA and B. RUND (Chem. Listy, 1937, **31**, 406—408).—The reaction (cf. B., 1903, 381) is applicable to flour, in absence of BrO_3' or ClO_3'; should these be present reduction with Zn in aq. $Ba(OH)_2$ is necessary. R. T.

Report of the 1936—37 Committee on testing biscuit and cracker flours. W. REIMAN (Cereal Chem., 1938, **15**, 35—48).—Four different flours were tested by independent workers. Analysis, test baking, η and shortometer tests give useful, but not precise, information on baking quality. E. A. F.

Action of phosphates in dough. H. KÜHL (Mehl u. Brot, 1937, **37**, No. 31, 1—3).—The action of phosphates on gluten, starch, and yeast is discussed. The effect is favourable on tough doughs, and K_2HPO_4 is the best. Neumann's observation that acid phosphates favour the conversion of starch into sol. forms is not confirmed. (Cf. B., 1937, 1115.) E. A. F.

Rôle of the acidity of the medium in panary fermentation. G. CHABOT (Bull. École Meun. Belge, 1937, **4**, 143—159).—A preliminary investigation was carried out on the p_H of doughs, factors determining it, and its influence on dough properties. Decreased p_H promotes fermentation and improves elasticity, loaf vol., flavour, and keeping qualities. E. A. F.

Comparative study of fats and sterols in cereals. Influence of milling and panification. G. HAGEMANN (Bull. École Franç. Meun., 1937, 218—221).—Wheat, barley, maize, and rice were examined for their sterol content and distribution. The sterol content is larger in the germ and outer parts of the grain, but the difference between wholemeal and ordinary flour is not very great. The sterol content of dough is increased by addition of yeast, but decreased by baking. Enrichment of bread by addition of sterols does not appear practical. E. A. F.

Alcoholic fermentation and plastic ripening of dough. R. GUILLEMET (Bull. Ecole Franç. Meun., 1937, 164—167).—Lactic acid in small quantities exerts on gluten a swelling action favourable to breadmaking, but its formation in fermenting dough with modern yeasts has not been detected. Succinic acid, which acts similarly, is formed, especially when small proportions of yeast are used. E. A. F.

Different quantities of yeast in wheat doughs. A. FORNET and F. IHLOW (Mehl u. Brot, 1938, **38**, No. 8, 1—2).—Increasing the quantity of yeast in a wheat-flour dough increases the fermentation rate and loaf vol. so long as sufficient food for the extra yeast is present. E. A. F.

New apparatus for preparing flour doughs and testing their extensibility. M. CHOPIN (Bull. École Franç. Meun., 1937, 172—179).—The alveograph is a refinement and simplification of the extensimeter. The thickness of the dough film is regulated automatically, eliminating personal error, and the temp. is controlled. The alveograph is used in conjunction with a mechanical kneader (construction described). E. A. F.

New instruments for testing the plastic properties of doughs. M. CHOPIN (Bull. École Meun. Belge, 1937, **4**, 225—243).—The Chopin extensimeter, recording and extracting kneader, and alveograph, and their application, are described. E. A. F.

Viscosity of flours and doughs—significance of viscosity determinations. H. KÜHL (Mehl u. Brot, 1937, **37**, No. 27, 2—5).—Investigations on the η of flour and dough are reviewed. They give little guide to baking quality, on account partly of the many other factors involved, partly of the lack of standardisation in the methods. E. A. F.

Conductivity of flour doughs and starch pastes. B. JELINEK (Bull. École Franç. Meun., 1937, 303—314).—The conductance (κ) of a dough increases regularly with its H_2O content; it increases with time, whilst that of starch paste remains const. Low κ appears to be associated with high baking quality. With rising temp., κ rises and then falls to a min., the latter behaviour being due to the starch. E. A. F.

Extension-resistance and elasticity of doughs. H. SAUER (Z. ges. Getreidewes., 1937, **24**, 162—168).—The interpretation of farinograms is discussed. Elasticity is a max. at a certain consistency, corresponding with the baker's optimum. At const. consistency, extension-resistance and elasticity vary with the salt content. E. A. F.

Stability and gas retention of doughs. H. P. MÜLLER (Mehl u. Brot, 1937, **37**, No. 42, 1—3).—"Agment" and other newly discovered agents improve gluten quality besides checking its degradation by proteases. The same improvement is evident in rye as in wheat. E. A. F.

Sunlight and baking quality of flour. ANON. (Mühle, 1937, **74**, 1308, 1362).—Flour in store is adversely affected by sunlight. The loss in baking quality is avoided by shading the windows. E. A. F.

Baking quality of flour as affected by certain enzyme actions. V. Further studies concerning potassium bromate and enzyme activity. J. W. READ and L. W. HAAS (Cereal Chem., 1938, **15**, 59—68; cf. B., 1937, 1397).—The effect of $KBrO_3$, $NaVO_3$, $NaHSO_3$, $K_2S_2O_8$, and soya-bean extract on gluten, proteolytic enzymes, and diastase was studied. The results contradict the theory that improvers inhibit proteolytic activity. The p_H

required to produce $HBrO_3$ from $KBrO_3$ does not occur in dough. $NaHSO_3$ does not activate proteinase, but does inhibit the activity of yeast protease. Soya-bean extract represses the activity of trypsin, pepsin, the protease of taka-diastase, and the proteinase of malt, but not that of papain or bromelin. E. A. F.

Baking qualities of *Triticum*, *Ægilops*, and of their hybrids. E. MIÈGE (Compt. rend., 1937, **205**, 1436—1437).—*Ægilops* have a gluten content $\gg$ that of *Triticum*, whilst the hybrids have an intermediate val., but nearer the former. The capacity to be "rolled" and the elasticity are $<$ in wheat, whereas the adhesiveness is nearly equal in both cases. The moistness and elasticity of the hybrids are $>$ in either parent, whereas the adhesiveness and capacity to be "rolled" are less. The yields after panification of *Ægilops* and *T. durum* are nearly equal; the amount of bread is greater and its *d* slightly less in the former case. All these factors are low for *T. vulgare*. The hybrids produce bread of an improved quality as regards the above physical properties and colour. J. L. D.

Water in the bread factory. H. KÜHL (Mehl u. Brot, 1937, **37**, No. 50, 1).—H_2O for baking must fulfil the purity requirements of drinking H_2O, but should preferably be rather hard. Properties of H_2O from various sources are reviewed. E. A. F.

Addition of water in breadmaking. C. VAVRENA (Mehl u. Brot, 1937, **37**, No. 29, 3—6).—The importance of the farinograph for determining the amount of H_2O needed for doughing is illustrated from the experience of a large English factory. In absence of such a test, the consistency may be quite unsuitable for the machines. E. A. F.

Use of milk in baking. ANON. (Mehl u. Brot, 1937, **37**, No. 38, 1—3).—Milk powder in bread dough decreases the fermentation rate at first, but increases it later, and retards H_2O absorption. Addition of malt and long kneading are desirable. E. A. F.

Use of grain and molasses yeast in the bakery. E. A. SCHMIDT (Mehl u. Brot, 1937, **37**, No. 29, 1—2; No. 30, 1—3).—The source of the yeast has more influence on the fermentation rate than has the nature of the sugar. Differences between sugars are more evident with molasses than with grain yeast. Grain yeast gives more rapid fermentation in the early stages, but ceases to act sooner. E. A. F.

Significance of improvers in German baking. A. MÜHLHAUS (Mehl u. Brot, 1937, **37**, No. 47, 1—4).—The action of bread improvers, classified as enzymic, starch, mineral, albuminous, fatty, and souring, is reviewed. E. A. F.

Panary fermentation. R. BAETSLE (Bull. École Meun. Belge, 1937, **4**, 67—96, 101—108).—The part played in panary fermentation by flour constituents, yeast, and H_2O, and the course of the process as influenced by temp. and other factors, are discussed. E. A. F.

Basic principles of uniform baking. ANON. (Mehl u. Brot, 1937, **37**, No. 48, 1; No. 49, 2; No. 50, 3).—Uniform heating demands a flat-roofed oven. The effect of the radiant heat is not measured by the air temp.; it is necessary to measure either the surface temp. of the loaf, by thermo-elements such as are used in plant physiology, or that of the roof by use of "Cyclotherm" heating. E. A. F.

"Breathing" of bread. J. SCOTT (Milling, 1937, **89**, 300).—An account, with photomicrographs, of the formation and breaking of a film on dough during baking. Structural and chemical changes run parallel. E. A. F.

Measurement of freshness and staleness in bread. ANON. (Mehl u. Brot, 1937, **37**, No. 36, 1—3).—The freshness of bread can be measured by: (1) elasticity of crumb and crust. An adaptation of Gildermeister's apparatus for measuring the elasticity of muscle is suggested; (2) moistness. The cooling effect of evaporation, which is thought to increase palatability, also affords a measure of moistness; (3) aroma. The strength (not quality) of the aroma can be measured by the area which must be exposed to match a standard strength. E. A. F.

Acidity determination as a method of control in bread manufacture. P. PELSHENKE (Mehl u. Brot, 1937, **37**, No. 39, 1—3).—In bread, acidity influences flavour. In dough, acidity and its changes greatly affect the course of panification. Acidity is a test for the degree of extraction and storage of the flour; it is determined by titration, details of which are given. Normal vals. for wheat and rye flours, doughs, and breads are given; the variations are large. E. A. F.

Wide-range volume-measuring apparatus for bread. W. H. CATHCART and L. C. COLE (Cereal Chem., 1938, **15**, 69—79).—The hour-glass method is improved by suspension of the loaf so that the packing material can reach nearly the whole surface. A more accurate apparatus for loaves of different sizes consists of a box the vol. of which is adjusted by inserting blocks. Packing errors are eliminated by weighing instead of measuring the material used. Relative advantages of different packing materials are discussed. E. A. F.

Combating rope and mould. H. KÜHL (Mehl u. Brot, 1937, **37**, No. 41, 1—3).—The claim that AcOH, applied externally to the finished loaf, checks mould was not confirmed. The effectiveness of $(CH_2)_2O$ is doubtful, and it is expensive and somewhat dangerous. Lactic acid remains the best known agent of control. E. A. F.

Approximate determination of soluble and insoluble carbohydrates in flour or bread for diabetics. J. KULMAN (Chem. Listy, 1938, **32**, 113—115).—The method of Gerber and Radenhauser gives high results for sol. carbohydrates, owing to passage into solution of protein substances and to the presence of active enzymes in the product. The following method gives trustworthy results. 2·5 g. of air-dry material are extracted with 30 c.c. of H_2O (30 min. at 20°), 50% EtOH is added to 250 c.c., the suspension is centrifuged, and insol. carbohydrates are determined in the residue by Lintner's method. 200 c.c. of centrifugate are evaporated to dryness at 100°, the residue is weighed (w_1) and ignited, and the

ash is weighed (w_2). The N content of a second 200-c.c. portion of centrifugate is determined, and the protein content (w_3) is derived therefrom. The sol. carbohydrate content is given by $w_1 - w_2 - w_3$.
R. T.

Cooling confectionery. P. S. JEWELL and J. P. HALLETT (Food Manuf., 1938, **13**, 91—93).—The val. of chilling to prevent "rope" is discussed. The val. of a refrigerator in setting and preventing yeast fermentation of pastry built up of several layers of material, previous to baking, is pointed out. Low temp. improve the setting properties of creams and enrobings and of moulded jelly and cream preps.
W. L. D.

Relation between yeast, sugar, and fat in yeast cakes. W. HOFMANN (Z. ges. Getreidewes., 1937, **24**, 178—182).—CO_2 evolution and cake vol. are reduced by increasing quantities of fat or, especially, sugar; this effect may be counteracted by increasing the quantity of yeast. E. A. F.

Detection of artificial colouring matter in farinaceous foods. F. DI STEFANO and G. ROSANOVA (Annali Chim. Appl., 1937, **27**, 571—577).—Four commercial colouring preps. were a mixture of Auramine O, Rhodamine B, and an inorg. salt. Auramine is detected by extraction with 50% EtOH at room temp. and, after removal of protein and EtOH from the extract, fixing the dye on wool to which simple tests can subsequently be applied.
F. O. H.

Action of herring oil before and after hydrogenation on yield and fat percentage of the milk of the goat. W. R. GRAHAM, jun., and P. T. COPPS (J. Dairy Sci., 1938, **21**, 45—48).—Feeding 2 oz. of untreated oil daily lowered the % of fat. The same amount of fat fed after hydrogenation had no depressing, but a slight raising, effect on the % of fat. The raw oil caused a lower food intake and sometimes refusal of food. The toxicity of the oil indicates that the grouping of the unsaturated linkings interferes with a major mechanism in the animal and not with milk secretion alone. W. L. D.

Detection of sheep's milk in cow's milk. J. KRENN (Proc. XIth World's Dairy Cong., Berlin, 1937, **1**, 446—449).—5 ml. of milk, 15 ml. of aq. $(NH_4)_2SO_4$ (*d* 1·134), and 10 ml. of Et_2O are shaken in a 50-ml. cylinder for 1 min. and then allowed to settle for 15 min. Cow's milk gives a clear serum, but addition of sheep or goat milk gives a turbid serum. Other methods of casein pptn., using Na_2SO_4 and K alum, are discussed. Similar differences in serum characteristics are obtained by using a mixture of aq. Na_2SO_4 and aq. K alum acidified slightly with H_2SO_4. W. L. D.

Modern developments in dairy bacteriology. E. L. CROSSLEY (Chem. and Ind., 1938, 319—321).—Recent progress in the bacteriology of pasteurisation, condensing, and drying of milk, aroma and flavour of butter, and cheese-ripening is described.
W. L. D.

Biennial reviews of the progress of dairy science. C. Dairy chemistry. W. L. DAVIES (J. Dairy Res., 1938, **9**, 95—120).—Progress of work on milk composition, constituents and physical chemistry, milk products, and the analysis of milk and its products is reviewed. W. L. D.

Rapid phosphomonoesterase test for control of dairy pasteurisation. H. SCHARER (J. Dairy Sci., 1938, **21**, 21—34).—The test is a modification of Kay and Graham's phosphatase test (cf. B., 1936, 120), using borate as buffer for the Na_2PhPO_4 substrate, 56% aq. basic Pb acetate as precipitant, and 2 : 6-dibromoquinonechloroimide for detecting free PhOH instead of Folin and Ciocalteu's reagent. The test is claimed to detect heating at 61° instead of the official 62°, heating for 25 instead of 30 min., and addition of 0·5% of raw to pasteurised milk.
W. L. D.

Effect of thorough can washing on bacteriological quality of milk. M. DÜGGELI (Proc. XIth World's Dairy Cong., Berlin, 1937, **1**, 426—428).—The part played by milk churns in adding to the bacterial contamination of milk is discussed. Churns were scrubbed with hot aq. Na_2CO_3 and then swilled with H_2O and steamed, the covers being replaced when dry. Counts per can ranged from 5×10^4 to 10^7. The bacterial distribution was 60—80% inert types, 3—20% mild acid-formers, and 11—15% strong acid-formers. Alkali-formers and peptonising types were <5%. W. L. D.

Types of bacterial contamination of milk which give higher counts by modified plating methods. A. BRADFIELD and H. B. ELLENBERGER (Proc. XIth World's Dairy Cong., Berlin, 1937, **2**, 475—478).—Tryptone–glucose–skim milk agar medium gives higher counts than standard medium for most types of milk contamination and is considered the more efficient. An incubation temp. of 32° is recommended. Contamination from utensils and from improper cooling of the milk is responsible for most of the increased counts obtained by the modified method. Using the new medium, good-quality milk would not be penalised and poor-quality milk would be detected more easily. W. L. D.

Influence of old- and new-type centrifugal clarifiers on bacterial count of milk. M. DÜGGELI (Proc. XIth World's Dairy Cong., Berlin, 1937, **2**, 14—19).—Clarified milk kept at 16° for 24, 36, and 48 hr. in most cases showed higher acidity than stored uncentrifuged milk. The process increased the bacterial count by an average of 70% (70 samples, range 2—554%). 12 centrifuged samples kept for 36 hr. showed an increase of 81% in count over that of kept uncentrifuged samples. Reduction in bacterial count by foam-free centrifuging is realised only in a few cases. W. L. D.

Protection of bulk milk, with special reference to bovine tuberculosis. F. A. DAVIDSON (J. Roy. San. Inst., 1937, **58**, 217—228).—Sources of infection are discussed. The val. of efficient pasteurisation is stressed and a stricter supervision of the process and control of the efficiency of pasteurisation by examination of the milk by the phosphatase test are advocated. More hygienic methods of production and handling are of val. in preventing contamination of bulk milk. W. L. D.

Improvement of quality of milk products by controlling the disposition for fermentation. C. GORINI (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 371).—An incubation test used for detecting milk in which acid-producing organisms are inhibited naturally (dysgenetic milk) is described. Such milk is produced by feeding a special range of foods to the cow. The feeding of cows on such foods enhances the keeping quality of milk intended for liquid consumption. W. L. D.

Conditions affecting the enzymic decomposition of milk fat. J. BOSCÓ (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 3—7).—Lipase action takes place in cream with prolonged storage at low temp. and may be accelerated by raising the temp., reducing acidity, and adding activators. The optimum p_H is 8·8. More acid conditions reduce its action until total inhibition occurs at p_H 4·7. The higher is the fat % of the cream, the less lactic acid is needed to reach this val., and for 50% of cream the amount = 32—40 ml. of 0·1N-lactic acid per 100 g. Lipase is destroyed by pasteurisation for 20 min. at 63°. W. L. D.

Control of the fermentability of milk. C. GORINI (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 498—500).—The influence of the food of the cow on the rate of lactic acid (I) fermentation in milk is discussed. It is claimed that some foodstuffs assist and others resist the growth of (I) organisms in the milk produced and that the food of the cow greatly influences the behaviour of milk in the processes to which it is subjected in the manufacture of products. W. L. D.

Production of natural starter cultures [in milk]. J. CSISZAR (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 74—76).—Attempts to prepare natural cultures according to Hungarian dairy conditions were unsuccessful since undesirable bacterial types submerged the growth of the desirable. Cultures, free from contaminants, containing only lactic acid bacteria were not satisfactory as among the latter were found types the undesirable fermentation products of which were noticeable besides the aroma. W. L. D.

Activity of aroma-producing bacteria in starters [in milk]. J. VAN BEYNUM (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 70—73).—Aroma bacteria in pure culture do not form the aroma-producing factors, but require the assistance of bacteria forming lactic acid. The aroma factor is formed in presence of a variety of org. compounds, including citric acid. In presence of lactic acid aroma production at higher acidities is a function of time, and at 1% acidity >13 days' incubation is necessary whereas it occurs in 48 hr. at 0·5% acidity. The metabolism of citric acid to yield Ac_2 is explained. The influence of O_2 is such as to favour the formation of Ac_2 rather than of CHAcMe·OH, which latter is formed under anaërobic conditions. W. L. D.

Statistical comparison of two methods for the bacteriological examination of milk. J. M. FRAYER (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 485—487).—By making up to 100 replicate tests on 18 milk samples and counting plates 3—6 times, more accurate averages for counts on standard agar at 37° and tryptone–glucose–skim milk agar at 32° were possible. The latter media gave more consistent but variable increase in counts as well as increased accuracy of counting, due to more luxurious growth and increased visibility. W. L. D.

Apparatus for carrying out chemical and bacteriological tests on milk on a large scale. E. MUNDINGER (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 546—551).—An apparatus working automatically and capable of filling 24—36 Gerber butyrometers with acid and with C_5H_{11}·OH simultaneously is described. For bacterial count, plugged tubes with a constriction at the top are used instead of Petri dishes. The agar and milk sample are spread evenly over the surface of the glass by rotating the tube in a horizontal position in an apparatus capable of taking up to 6 tubes. An efficient centrifuge for the examination of milk sediment is described. W. L. D.

Proposed bacterial standards for milk and ice cream. M. GRIMES (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 372—374).—Standard agar is unsuitable for ice cream which contains sugar-loving, heat-resistant organisms, and tryptone–glucose agar is preferred with incubation at 21—30° for 2—5 days. Incubation at 30° for 2 days is sufficient for max. counts. Tests for coliform organisms should be made to collect evidence on the cleanliness of the manufacturing plant and methods of distribution. A pasteurisation of 30 min. at 65° is advisable for ice-cream mix. W. L. D.

Detecting mastitis milk. M. TÖRÖK (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 303—310).—In conditions of mastitis certain large-sized mols. necessary for maintaining the osmotic pressure are replaced by ions (Cl′, Na˙) and this causes a lowering of the solids-not-fat. The osmotic pressure or depression of the f.p. (Δ) remains the same or is raised, and dilution with H_2O lowers it and the n of the $CaCl_2$ serum will be lowered. Attempts are made to correlate Δ, n, lactose content, and the lowering of Δ by adding H_2O to mastitis milk. Owing to the high Cl′ content, Δ decreases with dilution at a lower rate than in normal milk. W. L. D.

Testing for *Abortus Bang* in milk. LERCHE (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 256—260).—A culture method and animal test are used. Many cows secrete the bacteria only at irregular intervals. Absence of infection can be proved only by serological blood tests. The milk of all infected animals should be pasteurised, and graded milk should be taken only from herds free from the bacteria. W. L. D.

Reducing substance in raw milk assisting the heat-destruction of bacteria. K. DEMETER and L. EISENREICH (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 478—484).—A substance, related to peroxidase, is usually present in raw milk but is destroyed by high-temp. pasteurisation, which reduces the heat-resistance of bacteria. *B. coli* were completely destroyed at 62° in 16 min. in raw milk,

but it required 40 min. at 62° to destroy the organisms in milk preheated to 80°. The effect of this constituent in flash-pasteurisation is insignificant. The effect of the reagent varies with the heat-resistance of the organism and is strongest for certain strains of *B. coli*, *S. thermophilus*, and *Thermobact. helveticum*. The importance of this in the manufacture of hard cheese is discussed. W. L. D.

Detection and determination of neutralisers in dairy products. W. L. DAVIES (Chem. and Ind., 1938, 246—248).—Physical, indicator, and solvent methods on milk, titration methods on milk serum, and evidence from the composition of milk ash are described and discussed. W. L. D.

Mercurimetric determination of chlorine in milk. I. D. RAFFAELLI (Annali Chim. Appl., 1937, 27, 567—571).—The milk (20 c.c.) is diluted, treated with AcOH, and filtered. An aliquot of the filtrate is diluted, treated with HNO_3, and the solution titrated (Na nitroprusside) with standard $Hg(NO_3)_2$ solution. F. O. H.

Determination of the nitrogen distribution in milk. S. J. ROWLAND (J. Dairy Res., 1938, 9, 42—46).—Rapid semi-micro-methods for the determination of total, casein, albumin, globulin, proteose-peptone, and non-protein-N are described. W. L. D.

Testing and handling milk and cream. C. A. SMITH (Colorado Agric. Exp. Sta. Bull., 1936, No. 341-A, 43 pp.).—Apparatus and technique are described. A. G. P.

Protein distribution in normal and abnormal milk. S. J. ROWLAND (J. Dairy Res., 1938, 9, 47—57).—The average N distribution of normal milk is: casein 78·5, albumin 9·2, globulin 3·3, proteose-peptone 4·0, and non-protein-N 5·0% of the total N. The protein contents are: casein 2·6, albumin 0·31, globulin 0·11, proteose-peptone 0·13, and total 3·18%. Changes found for the N distribution of abnormal milk confirm the work of others and consist of more casein and less albumin, globulin, and proteose-peptone N. For the detection of subclinical mastitis the % total N (as casein-N) is used as a criterion. The val. is $<76\%$ in such milk. W. L. D.

Precipitation of proteins in milk. S. J. ROWLAND (J. Dairy Res., 1938, 9, 30—41).—Max. pptn. of casein occurs at p_H 4·6—4·8, varying with the milk sample. The proper mixture of aq. AcOH–NaOAc to give this point is 1·0 ml. of 10% aq. AcOH and 1·0 ml. of N-NaOAc, which gives 1·0—1·4% more N than the usual acetate buffer method and 2·4—3·8% more than in the A.O.A.C. method. Semi-micro-methods of determining the N in aliquot portions of the filtrate, instead of determining the N in the ppt. and filter-paper, are suggested. Total protein is pptd. with a final concn. of 12% $CCl_3{\cdot}CO_2H$ at room temp. Lower concns. give slightly less protein. Globulin, free from casein and albumin, is pptd. by saturation with $MgSO_4$ of the filtrate from the determination of casein. Acidifying the $MgSO_4$ filtrate gives albumin, whilst pptn. of total protein-proteose with $CCl_3{\cdot}CO_2H$ gives proteose-N by difference. W. L. D.

Effect of commercial sterilisation on the nutritive value of milk. I. Introduction. S. K. KON and K. M. HENRY. **II (*a*). Biological value and digestibility of the proteins (nitrogen) of milk.** K. M. HENRY and S. K. KON. **II (*b*). Effect of method of feeding dried skimmed milk on the biological value of its proteins.** K. M. HENRY, E. W. IKIN, and S. K. KON. **III. Effect on the vitamin-*A* and carotene content of milk.** A. E. GILLAM, K. M. HENRY, S. K. KON, and P. WHITE. **IV. Effect on the vitamin-*B* complex, on vitamin-B_1, and on vitamin-B_2 (flavin) of milk.** K. M. HENRY and S. K. KON (J. Dairy Res., 1938, 9, 1—5, 6—11, 12—16, 17—21, 21—29).—I. Methods of collection and processing, proximate analyses, and bacterial counts of milk samples used in the investigation are described. The milk was homogenised and sterilised at $\not>110°$.

II (*a*). The biological vals. and true digestibilities of the proteins of raw and sterilised milks were 84·3 and 79·1, and 96·4 and 95·3%, respectively. Statistical treatment of the results showed that digestibility was not affected, but the loss of 6% in biological val. could be ascribed to the effect of heat-treatment.

II (*b*). Spray-dried skimmed milk was fed alone and mixed with a basal N-free diet at a level of protein intake of 6·9%. The biological vals. of the protein for the two feeding methods were 87·2 and 90·3, respectively, the difference being not statistically significant. The results do not explain low biological vals. reported for proteins of raw liquid milk.

III. Fat samples were extracted from 11 raw and 11 sterilised samples and the -*A* and carotene contents determined. No loss in -*A* was found, whilst the colorimetric method showed a loss of only 2% of carotene by heat-treatment. No loss of -*A* or carotene occurred by storing sterilised milk for several weeks in a cool, dark place.

IV. Actively-growing male rats were fed 8 ml. a day of each milk, the ration being raised to 12 ml. when beri-beri developed in the sterilised-milk animals. The growth rate and survival of the animals on the sterilised-milk group were greatly inferior to those on raw milk, showing considerable destruction of the -*B* complex. Separate tests showed that about $\frac{1}{3}$ of the -B_1 was destroyed in the sterilisation of the milk, but that -B_2 (flavin) was unchanged. W. L. D.

Dielectric effects on milk and cream. H. FRÜHWALD (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 430—431).—The effect of passing milk between two insulated charged electrodes at potentials up to 220 v. on rennet coagulation and the churning of butter is reported. Rennet coagulation gave a firmer curd and the resulting cheese was superior. The cream thus treated is claimed to show better ripening qualities and to give butter of superior flavour and keeping quality. W. L. D.

Souring of milk and cream and its significance in dairying. O. GRATZ (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 437—439).—Practical methods of preventing souring are discussed. Pasteurisation as soon as possible after milking followed by cooling and cold storage is the most practical. The con-

tinuous process of reducing acidity by electrolysis serves to reduce milk of $\not>0{\cdot}22\%$ acidity to 0·18%. Such milk is claimed to give milk powder of which $\not>3\%$ is insol. The application of souring in the prep. of sour-milk cheese and casein is discussed. W. L. D.

Uniformity of whey drainage from cut curd. A. JANOSCHEK (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 439—441).—Drainage of whey from casein curd starts when the milk thickens, rises to a max. rate after cutting, and then diminishes. Cheese types are characterised by the rate of drainage from curd during manufacture, but both rate of drainage and H_2O content of the final curd can be varied by the cooling temp., initial forewarming temp. of the milk, and the pressure applied. W. L. D.

Whipped product with low fat but high protein content. W. SCHEIMPFLUG (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 457—460).—Addition of a protein emulsion to increase the total solids content of the product to be whipped, by addition of skim-milk powder, casein, and condensed milk, enabled milk or cream of low fat content to whip to a stiff foam with an overrun of 240%. Such preps. showed 60—70% drainage in 24 hr. Addition of protein to homogenised whipped cream also favours its whipping properties. W. L. D.

Control of cream-ripening for butter production with special regard to p_H. W. RIEDEL (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 149—152).—The relations between the potential and titratable acidities of milk, cream, and whey are discussed. It is claimed that the determination of p_H for control of ripening is the more valuable, and to avoid butter deterioration through over ripening a $p_H < 4{\cdot}6$ should not be reached. W. L. D.

Formation of diacetyl during cream-ripening and its development during the churning process. J. KRENN (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 78—80).—The Ac_2 content of different products in the making of butter was determined. Skim milk and sweet cream contained none. The starter and ripened cream contained large amounts, but the butter very little. Additional Ac_2 is formed by atm. O_2 from CHAcMe·OH during churning. H_2O used for washing the butter contained Ac_2, and aroma will be lost if butter is over-washed. Small amounts of Ac_2 form in buttermilk on keeping. W. L. D.

Methods of processing whipping cream to obtain best results. H. J. MACK (Canad. Dairy & Ice Cream J., 1938, 17, No. 1, 53—55).—Cream should be separated at 32° from milk which was previously cold, standardised to $\not<30\%$ of fat, pasteurised at 68° for 30 min. in a stainless-steel or glass-lined vat with efficient agitation, cooled quickly, and bottled. After ageing for 24 hr., the cream can be whipped at 4—7°. W. L. D.

Testing whipping cream. W. MOHR and K. BAUR (Proc XIth World's Dairy Cong., Berlin, 1937, 2, 536—540).—An electrical apparatus for whipping cream in which the no. of revolutions of the beaters is kept const. and the η of the cream can be measured at different stages in the process, is described. The resistance of the cream rises slowly to a max. and then drops suddenly. This max. point coincides with the condition of max. vol., and firmness, and min. of drainage. The same cream reproduces its whipping behaviour reasonably well. An attempt is made to define the optimum η in electrical units. W. L. D.

Thermal death-time studies of *Oospora lactis*. F. W. TANNER and J. W. HOFER (Food Res., 1937, 2, 505—513).—Of 224 cultures isolated from cream, none withstood pasteurisation in cream at 62·8° for 30 min., but all survived 30 min. at 51·7°. Of 144 of them, only 8 survived 30 min. at 57·2°. In PO_4''' solutions, one of nine cultures withstood 20 min. at 62·8°. E. C. S.

Methods of cooling cream. W. J. CAULFIELD and W. H. MARTIN (J. Dairy Sci., 1938, 21, 13—20).—Submerging, H_2O flow and spray, evaporation, and cold-room methods were used. The submerging in running H_2O was quickest. Sweet cream cooled quicker than sour. The evaporation (wet sack) method took >6 hr. and depended on temp. and R.H. Rise of temp. was less rapid in sour than in sweet cream. W. L. D.

Bacteriological quality of the ice-cream supply for a small city. M. W. YALE and R. C. HICKEY (New York State Agric. Exp. Sta., Tech. Bull., 1937, No. 248, 30 pp.).—Examination of 226 samples for total and coliform counts showed that gelatin and colouring matter may be the source of contamination, whilst the freezing equipment may be its source in some points. Dippers and scoops were the worst sources of bacteria in retailing, but were more sanitary when kept in running H_2O, especially as regards coliform count. 112 samples had an average count of 60,000 per g., and the product from 8 out of 12 manufacturers had an average count $<10^5$ per g. W. L. D.

Survival of pathogenic organisms in ice cream. G. I. WALLACE (J. Dairy Sci., 1938, 21, 35—36).—*Salmonella enteritidis* and *Br. abortus* survived storage in ice cream at −23·2° for 7 years. *M. tuberculosis hominis* and *bovis* survived for 6½ years. Other types survived for over 4 years. W. L. D.

Diacetyl content of German butter and influence of methods of manufacture. W. MOHR and J. WELLM (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 89—97).—The error in determining Ac_2 in milk, cream, and butter is ±3%, and for CHAcMe·OH (I) ±10%. Ac_2 is increased by access to air during the ripening process. The optimum temp. is 21°, but cooling down to 10° has a favourable effect in cultures of >0·5% acidity. In the churning process the Ac_2 content of buttermilk increased 2·4—4 times the amount in the original cream. The butter contained $\frac{1}{4}$—$\frac{1}{6}$ of the Ac_2 and $\frac{1}{15}$—$\frac{1}{16}$ of the (I) in the cream. The amounts of these constituents in butter varied with the fat content of the cream. Storage temp of 0° to −10° are more favourable for maintaining flavour, and storing at 10° caused the $[Ac_2]$ to increase for 4 days and decrease after 12 days. NaCl in butter has no effect on $[Ac_2]$. W. L. D.

Practical value of the limits of error in [Gerber] butyrometry. S. FILIPOVIC (Milch. Zentr., 1938, 67, 1—4, 17—21).—Attention is drawn to the accurate measurement of the reagents and milk in the Gerber fat test and a special pipette is suggested for milk. It is claimed that inaccurate results are obtained for milk containing <2·5 and >4% of fat, using the 11-mm. pipette used for milk of 3·0—3·5% fat, and, to overcome this, 3 graduations corresponding to high, normal, and low fat contents of milk are suggested. The graduations vary with the diameter of the pipette and are calc. from the difference of the vals. obtained by a gravimetric method and those read on the Gerber scale. The Gerber and Babcock results are treated mathematically. W. L. D.

Stability of vitamin-*A* in ghee. N. N. DASTUR (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 495—496).—Heat (100°) is less active than light in its destructive action on vitamin-*A* and the stability depends to a large extent on the other natural colouring matters accompanying -*A* in the fat. Rancid butter fat gives a characteristic pink colour with the $SbCl_3$–$CHCl_3$ reagent, which varies in depth with the peroxide val. of the fat. After exposing butter fat and coconut oil to strong sunlight, their unsaponifiable fractions give a ppt. with the reagent as well as a red colour. W. L. D.

Vitamin-*A* value of butter produced under drought conditions. B. L. KUNERTH and W. H. RIDDELL (J. Dairy Sci., 1938, 21, 41—44).—The -*A* content of butter from cows fed dry feed for 2·5 years was 11 international units per g., or < ¼ of that for normal butter, and the -*A* val. of the β-carotene was only 30% of the val. for ordinary samples. Following a summer drought (1936) the -*A* content dropped to half the normal val. Commercial samples produced simultaneously showed a similar decrease. W. L. D.

Influence of type of butter culture and its method of use on flavour and keeping quality of salted butter. N. E. FABRICIUS and B. W. HAMMER (Iowa Agric. Exp. Sta. Res. Bull., 1937, No. 221, 356—399).—The quality of butter is improved by addition of citric acid to milk from which the butter culture is made. Neutralisation of the fresh cream permits the use of considerable amounts of the culture (with correspondingly increased flavour) without producing an excessively acid taste. A. G. P.

Coliform organisms and coliphages in butter. I. LIPSKA (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 449—450).—*B. coli* and *B. lactis aërogenes* were isolated from butter and various strains differentiated. All strains fermented glucose at 46°. Phages studied on the butter extracts were examined for lytic action on 15 strains of *B. coli* from butter and of fæcal origin. Butter filtrates contained attenuated phages. W. L. D.

Harmful bacteria in butter from cream of high acidity. S. VON NYIREDY (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 137—140).—*B. coli* and caseolytic organisms do not propagate in sour cream of p_H <4·8, but they are viable in the p_H range 4·8—5·2. The main factor governing the viability of organisms in butter is the p_H of butter serum. In determining the relation between bacterial count and keeping quality of butter, a 12-days' growth on casein agar (3 days old) at 28° is suggested. Low p_H and low count are the best conditions for short storage. W. L. D.

Bacteriological control in butter manufacture. R. KROGH (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 405—410).—For uniformity of product, the control of H_2O, atm., acids, salt, cream, buttermilk, and the finished butter is advisable. The season of the year has a great influence on the catalase no. and the yeast and mould count of butter, spring and summer giving the lowest catalase no., and the winter months the lowest mould contamination. The progressive improvement of butter and the H_2O used in butter factories is illustrated by the decrease in the vals. obtained in these determinations for the period 1932—6. W. L. D.

New methods for isolation of aroma streptococci. K. VAS and J. CSISZÁR (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 118—121).—Curdled milk showing a positive aroma reaction is selected, and, after inoculating on litmus milk, types showing vigorous acid production are inoculated into sterile milk and those showing consistent aroma production are used for starters. In this way, only 12—20% of selected types were suitable. Propagation is best done in pasteurised milk of good hygienic quality. W. L. D.

Valuation of cream-starter cultures in routine work. W. RITTER (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 104—107).—Two tests on starters are suggested. A qual. test for Ac_2 and CHAcMe·OH by the Voges–Proskauer reaction (creatine, NaOH) on the starter itself and a test for volatile acids and Ac_2 in a steam-distillate of the starter are recommended. Occasionally increases in volatile acids and a decrease in Ac_2 are met, due to the reduction of Ac_2 to βγ-butylene glycol. W. L. D.

Grading milk for cheesemaking. G. BARR (Canad. Dairy & Ice Cream J., 1938, 17, No. 2, 26).—Milk is graded into 3 classes depending on odour, absence of sediment, and acidity. Prime-grade milk should have an acidity ≯0·20%. Fat content is also taken into account. W. L. D.

Payment for milk for cheesemaking. F. H. McDOWALL (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 413—414).—The yield of cheese per unit of fat is higher for low- than for high-fat milk. The correction of this discrepancy on the fat val. alone is not possible owing to the irregularity in the quant. relation between fat and casein. A rough determination of casein by CH_2O titration and the fat val. when combined give a truer and more reliable figure for the cheese yield. The yield of cheese (14 days old) per 100 lb. of milk is then given by: (2·08 × casein) + (1·19 × fat content). W. L. D.

Defective milk from a practical and scientific point of view. C. GORINI (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 34—38).—The cause of milk not developing acidity at the normal rate in cheese-

making (dysgenetic milk) is related to the food of the cow. The milk is unsuitable for the development of cheese bacteria and does not affect antagonistic bacteria. This type of milk is detected by measuring the increase of acidity on incubating at 38° for 24 hr. Addition of pure cultures does not eliminate the fault. Sufficient milk of normal behaviour from another source must be added in order to restore the property of acid development. W. L. D.

Lactic bacteria in relation to cheese flavour. I. I. R. Sherwood (J. Dairy Res., 1937, 8, 224—237).—Different strains of lactobacilli, when isolated from Cheddar cheese and added to milk used for cheese manufacture, caused various undesirable flavours in the ripened cheese. Addition of natural mixtures of lactobacilli from mature cheese to milk led almost always to development of an unclean, fermented flavour. In normal mature cheese, the no. of these bacteria is too small to affect the flavour. It is concluded that the lactobacilli are the most important flavour-forming factor in cheese. (Cf. B., 1938, 314.) W. L. D.

Causes of malt flavour in starters and butter. W. Stocker (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 111—114).—This taint is caused by degenerated types of *S. lactis*. Examination of 7 types showed that formation of malt aroma was associated with loss of the capacity to ferment sugars other than lactose and glucose. By culturing in favourable media in which the sugar-fermenting property was recovered, formation of malt flavour was lost. It was possible to obtain the taint by growth on casein. W. L. D.

Bacteriological control in Austrian cheese factories. L. Meyer (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 414—416).—Control of the quality of cheese milk is not attempted. Quality control of rennet and other extracts, colouring materials, NaCl, and acid is carried out for the cheese factories and standard methods of testing and media are circulated. The supply of reagents from one central laboratory is undertaken and fresh rennet supplied daily to cheese factories. W. L. D.

Pasteurisation of milk for manufacture of different types of cheese. M. Mazé (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 207—211).—Pasteurisation destroys pathogenic bacteria and those detrimental to the quality of various cheeses, with the result that more uniform products are obtained. Pasteurisation can be defined by the time–temp. combination used in the process, which also defines the resulting coagulation time with rennet, and 65—66° for 5 min. is advised. The temp. of the H_2O used for heating the milk must not exceed the pasteurisation temp. by 15°, and the milk must be cooled down to rennetting temp. (28—32°) immediately. W. L. D.

Pasteurisation of milk for Dutch cheese-making. Wilbrandt (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 230—232).—Milk should not be pasteurised for this type of cheese, but care should be taken to produce milk under clean conditions so that no contamination occurs. The natural self-active milk bacteria should be used and not destroyed, and the disadvantages of pasteurisation are eliminated. The fine shades in flavour depend on factors found in raw whole milk, and pasteurisation cannot be considered until the agents necessary for ripening and flavour development are defined and separated. W. L. D.

Use of pure cultures of propionic acid bacteria in the manufacture of Swiss Emmenthal cheese. R. Burri (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 177—179).—Holes in the cheese are due to the action of $EtCO_2H$ bacteria. In making the Swiss cheese, pure cultures of the bacteria have been added in the making. The product has become more uniform and in greater demand. W. L. D.

Bacterial putrefaction of Emmenthal cheese. E. Zollikofer (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 467—469).—The putrefaction is of the fæcal type and is due to spore-forming proteolytes working anaërobically. *B. putrificus coli* was isolated. Some aërobic and anaërobic non-spore-formers are also responsible. Serological and morphological characterisations of the bacterial types are described. W. L. D.

Rôle of bacterial cultures in Swiss cheese-making. B. Erekson and E. G. Hastings (Wisconsin Agric. Exp. Sta. Ann. Rept. 1933/4, Bull., 1935, No. 430, 85—86).—The action of *Strep. thermophilus* and of *Lactobacillus* sp. in the cheese-making process is examined. Tests of mixed-culture starters are described. Ch. Abs. (*p*)

Production of Bel-Paese cheese from pasteurised milk. H. Frühwald (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 186—189).—This butter-cheese is best made from pasteurised milk, the temp. of which, if treated by the short-time method, should be $\not>72°$. The best starter to use is a butter starter. In storage, slimy areas should be prevented from forming on the rinds and the development of a white mould is necessary for the cheese to acquire the correct taste. W. L. D.

Manufacture of Tilsiter cheese from pasteurised milk. W. Grimmer (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 191—192).—The best cheeses are made by inoculating holder-pasteurised milk (63° for 30 min.) with small nos. of lactic streptococci and lactobacilli. Addition of acidoproteolytic organisms is unnecessary since the no. of these organisms surviving pasteurisation is sufficient to ensure their development in the cheese. W. L. D.

Production of sour-milk curd and cheese from pasteurised milk. K. Drewes (Proc. XIth World's Dairy Cong., Berlin, 1937, 2, 182—185).—Pasteurised milk, heated at $\not>61$—63° for 10 min., or at $\not>71$—72° for 40 sec., or momentarily to 75°, is recommended. To prepare the milk for renneting, a starter of lactic streptococci with certain strains of lactobacilli is used, since this ensures a curd of normal acidity, texture, and ripening properties. The taste is particularly clean, but does not differ from that of cheese made from raw milk. W. L. D.

Manufacture of butter-cheese from heated milk. M. Schulz (Proc. XIth World's Dairy Cong.,

Berlin, 1937, 2, 223—225).—The use of milk momentarily heated to 70° or for a few min. at 64—66° has proved satisfactory and yields a more uniform product. W. L. D.

Use of pure bacterial cultures in dairying. V. Chemistry of bacterial ripening processes in milk and milk products. VI. Special sour milk preparations. VII. Preparation of soft cheese and curds. T. BAUMGÄRTEL (Milch. Zentr., 1938, 67, 65—69, 81—88, 97—106; cf. B., 1937, 970, 1124).—V. The specificity of micro-organisms in bringing about the desired degree of acidity in milk, and aroma and flavour in butter and cheese, is discussed. Attention is drawn to the connexion between p_H and titratable acidity and to the fact that the latter is a quantity factor depending on the buffer val. of the medium. The part played by p_H generally in the ripening of various cheese types is described.

VI. The development and special nutritive val. of sour-milk products are described. The manufacture of yoghourt is outlined. Whole milk is raised to the b.p., cooled to 40—45°, and inoculated with a pure culture. Fermentation is allowed to proceed for a few hr. at temp. $\not>45$ and $\not<30°$ until max. acidity is reached. Subsequent batches are inoculated from the previously prepared yoghourt or from pure culture. Preps. from milk fortified with lactose are described.

VII. Local curd products are enumerated and their dietetic val. is described. Raw or pasteurised skim or whole milk is mixed at 20—30° with 5% of starter and fermented to 0·7% acidity (10—15 hr.). The curd is cooked and turned into small moulds. Variations in the process necessary for the prep. of other types are described. Methods of propagation of mother-cultures and starters are given. W. L. D.

Alcohol–glycerol rennet preparations in cheese-making. J. G. DAVIS (J. Dairy Res., 1938, 9, 80—84).—Analyses and graders' reports fail to distinguish cheese made with NaCl rennet and EtOH–glycerol rennet, but the latter products show superior qualities in body and texture of curd during making and low bacterial count or sterility in preserved samples. The use of the latter is advised when NaCl rennet is suspected of causing bacterial faults in cheese, and its keeping qualities are also superior. W. L. D.

Physico-chemical data in the manufacture of Grana cheese. P. PARISI (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 452—457).—Steps in the manufacture are given in detail. The p_H, titratable acidity, and κ are given for all the steps in the process. The curves for these properties run practically parallel with each other. There is very little increase of acidity from the time of renneting up to scalding the curd. The relative increase of acidity is similar whether the cheese is working slowly or rapidly in the vat. The relation of p_H to titratable acidity for whey is different from that for milk. W. L. D.

Trends of cheese investigation in the United States. J. C. MARQUARDT (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 450).—Making a modified Münster cheese, using pyroligneous acid to give the smoky flavour and *Melilotus cœrulea* to simulate the flavour of Sap Sago cheese, has been successfully attempted. The quality of Cheddar cheese has been improved by adding sugar to the curd. W. L. D.

Extraneous matter in cheese. D. W. SPICER and W. V. PRICE (J. Dairy Sci., 1938, 21, 1—5).—Cheese is finely ground in a mincer and 100 g. are thoroughly beaten up with 200 ml. of 15% aq. Na citrate at 62° for 15 min. More citrate is added and the beating continued for 30 min. The emulsion is filtered through cottonwool pads, which are finally washed with H_2O. The colour is classified roughly into 4 classes and the sediment is examined microscopically. Grading scores for cheese can be correlated with freedom from sediment. W. L. D.

Changes in the fat in dry matter content of soft cheese. F. KIEFERLE, H. MERKLE, and H. GNUSCHKE (Proc. XIth World's Dairy Cong., Berlin, 1937, 1, 442—446).—Very rapid ripening with some leakage of H_2O causes the % fat in dry matter to increase, *e.g.*, from 48·1% in fresh cheese to 53·5% when 36 days old. Fat distribution in such cheese is not homogeneous, and large variations of % fat in dry matter occur in various batches made from milk on the same fat %. W. L. D.

Annatto as a cheese colour. M. S. CARRIE (J. Dairy Res., 1938, 9, 72—79).—The dye in cheese is mainly in combination with casein. Fat dissolves only a trace and cheese containing free fat will show a mottled appearance. Standardisation of the colour in aq. solution is unsound as the form in which the dye is present in cheese is different from that in solution. The depth of colour produced in cheese itself is claimed to provide a better standard and coloured paper standards are recommended. W. L. D.

[Examination of] milk and dairy products. COMMEE. OF FOOD AND NUTRITION SECT., AMER. PUBLIC HEALTH ASSOC. (Amer. J. Publ. Health, 1938, 28, Suppl., 66—74).—The designation of milk preps., vitamin-*D* milk, and the use of the phosphatase test for proper pasteurisation and the resazurin test for controlling hygienic quality are discussed. Ice-cream preps. and equipment and the quality of butter and cheese are described. W. L. D.

Effect of freezing on acid–base coefficient of meat. I. A. SMORODINCEV and S. P. BISTROV (Bull. Soc. Sci. Hyg. aliment., 1937, 25, 361—369).—Lean veal, 24 or 48 hr. after slaughter, was divided into a no. of 1-kg. samples which were rapidly frozen and kept at −8° or −18° for periods up to 6 months. Thereafter they were thawed, some rapidly, others slowly. Each stage of treatment caused a fall in p_H, a rise in titratable acidity, and a fall in alkalinity. The acid–base coeff. (A., 1934, 322) increased by 21% during freezing, by 51% during slow thawing, and by 160% during storage at −18° for 6 months. E. C. S.

Utilisation of whale meat. H. SCHMALFUSS and H. WERNER (Fette u. Seifen, 1938, 45, 60—63).—Various methods which have been proposed (including those of the authors; cf. B.P. 445,275 and 445,462;

B., 1036, 570, 619) for preserving or pickling whale meat (which has no fishy flavour in the fresh state) for human food, or for the manufacture of meat extract and by-product meat-meal therefrom, are discussed. E. L.

Composition and evaluation of soup preparations. R. Posega (Österr. Chem.-Ztg., 1938, **41**, 53—55).—The analyses of 10 different samples of soup cubes and powders and the N distribution in 7 samples are reported. Samples contained dry matter 87—91, NaCl 15—47, total N 2·3—4·0, creatinine 0·43—1·14, and fat 24—34%. W. L. D.

Rapid determination of the water : protein ratio in meat preparations. H. Kalshoven (Chem. Weekblad, 1938, **35**, 235—236).—In the preferred method, 5 g. of sample are heated with 40 c.c. of conc. H_2SO_4 and 10 g. of Se mixture (Na_2SO_4 950, $CuSO_4$ 15, Se 20 g.) for 25—30 min. until decolorised. The mixture is diluted to 250 c.c. and 50 c.c. are diluted to 200 c.c. and distilled with 25 c.c. of 50% NaOH, the NH_3 being collected in 25 c.c. of 0·1N-HCl and determined titrimetrically (Me-red). The significance of the H_2O : protein ratio is discussed. S. C.

Determination of creatine with the Lange photoelectric colorimeter. K. Woidich (Österr. Chem.-Ztg., 1938, **41**, 42—43).—Soup extracts etc. are evaporated down with HCl, and the residue is dissolved in H_2O. The solution is exactly neutralised with 0·5N-NaOH, and 1% aq. $KMnO_4$ containing 2·5% of NaCl is added in slight excess, the excess being destroyed with Na_2O_2. The solution is filtered from Mn oxides; 0·5N-NaOH + 0·1 c.c. of saturated aq. picric acid are added and the solution is colorimetered. Separate samples are similarly treated with 0·2 and 0·4 c.c. of picric acid, respectively, and the amount of creatine is calc. from the sum of the three measurements. J. S. A.

Acceleration by phosphate ions of the conversion of collagen into gelatin. E. C. B. Smith (J.S.C.I., 1938, **57**, 82—84).—The rate of appearance of gelatin in solution when powdered tendon collagen is heated with H_2O may be expressed by $dx/dt = k(a - x)$, as in the case of a unimol. reaction. The const. k is at a min. at the isoelectric point and is markedly increased by addition of phosphates or arsenates, but by no other salt studied. The effect is noticeable with as little as 0·01M-phosphate, and 0·2M produces a 5- to 10-fold increase in the rate of dissolution. There is no evidence of permanent combination or adsorption of phosphate.

Factors influencing development of soggy breakdown in apples. H. H. Plagge and T. J. Maney (J. Agric. Res., 1937, **55**, 739—763).—The occurrence of soggy breakdown is related to the stage of respiratory activity attained by fruit when placed in storage. The influence of stage of maturity at picking and length of pre-storage is examined with a no. of varieties. Storage at 2·2° is less favourable to the development of breakdown than is storage at lower temp. A. G. P.

Field method for determination of hydrocyanic acid in citrus fumigation. W. H. Dyson (J. S. African Chem. Inst., 1938, **21**, 13—14).—For determination of HCN in the tent atm. during fumigation 3 l. of the air are aspirated through 100 c.c. of 2% aq. NaOH. This solution is acidified by adding 25 c.c. of 10% H_2SO_4, and neutralised with excess of $NaHCO_3$, after which it is titrated rapidly with 0·01N-I ($HCN + 2I = HI + CNI$). J. W. S.

Determination of sulphur dioxide used for preservation of dried fruit. J. Hanuš and J. Voříšek (Chem. Listy, 1937, **31**, 408—413).—The SO_2 content of dried apricots (calc. on dry wt.) falls steadily during storage. 25—50% of the SO_2 content is eliminated by soaking the fruit, depending more on the vol. of H_2O used than on the duration of soaking. The loss of SO_2 taking place during cooking is inconsiderable. R. T.

Determination of pectin. G. G. Schneider and H. Bock (Angew. Chem., 1938, **51**, 94—97).—Methods hitherto used for determining pectin are valueless. Solidity of the jelly formed is largely dependent on the mean mol. wt., which is determined from the η (measurement described) of the nitrate in $COMe_2$. The nitrate, prepared by HNO_3 (d 1·54), is shown not to be degraded by conversion into the acetate. By heating for 1 hr. with 0·5% aq. lactic acid at 100° and pouring into 70% EtOH, the approx. (5% too high) content of material of high mol. wt. is determined; the exact amount (A) is given by Tollens and Lefèvre's method applied to the wet or dried ppt. A method of measuring the solidity of the jelly in 2 hr. is described (removal of substances of low mol. wt. by pptn. from H_2O by $COMe_2$). The val. of pectin juice is assessed by comparison of η, A, and the content of solid matter. R. S. C.

Ascorbic acid content of fruits and vegetables. M. Olliver (Analyst, 1938, **63**, 2—18).—There is a wide individual variation in the ascorbic acid (I) content of fruits and, in some species, of different parts of the same individual. (I) appears to increase with increasing metabolic activity. In black currants and gooseberries the concn. of (I) rises to a max. in the initial stages of development. In strawberries, however, the concn. falls at first and rises as the colour change takes place. In peas the concn. falls sharply in the initial stages of development and thereafter slowly, but the (I) content per pea actually increases continuously. Potatoes contain an approx. const. concn. of (I) independent of size and stage of development. E. C. S.

Refrigeration for fruits and vegetables [in France]. Anon. (Food Manuf., 1938, **13**, 94—96).—Vegetables are stored at 0—2°. Previous cooling from 25° to 12° is done in trucks in a special air-cooled chamber and storage at 2° is used only for long storage. The refrigerating system is "stepped down" to store other products such as eggs (—5°) and butter (—10°). W. L. D.

New and rapid dehydration process for vegetables. E. F. Hopkins (Science, 1938, **87**, 71—72).—The method depends on the ability of certain toxic vapours, *e.g.*, CCl_4, PhMe, $CHCl_3$, SO_2, and Cl_2, to increase rapidly the permeability of living tissue and finally to kill it. The juice then released from the

solid can easily be removed by cheap mechanical means at low temp., and the subsequent drying of the solid residue is rapid. Data are given for the dehydration of sweet potatoes, beans, carrots, etc., for which the method is effective. The method can be advantageously applied to perishable material or to storing fleshy plant material without loss from rotting, freezing, etc. L. S. T.

Composition of Hungarian cacao products. III. Changes in moisture content of cocoa powder in storage. L. VON T. KOVÁTS (Mezőg. Kutat., 1937, **10**, 267—274).—In moist climates cocoa powder may absorb considerable amounts of H_2O unless suitably protected. A. G. P.

Determination of tannins in cacao kernel. D. W. DUTHIE (Analyst, 1938, **63**, 27—31).—For the determination of tannins the material is extracted overnight in the cold with 40% aq. $COMe_2$. After pptn. with cinchonine sulphate as in Chapman's method (B., 1908, 135; 1909, 618) a further ppt. is obtained with Stiasny's reagent (CH_2O–HCl) for pyrocatechol tannins. Since this ppt. is less after fermentation of the beans, it probably consists of catechin and similar phenolic compounds. E. C. S.

New process for grass drying. ANON. (Fuel Econ., 1938, **14**, 82—83).—Grass is fed on to a perforated endless belt through a sealed hopper. Flue gases at 880—980° travelling concurrently with the belt are threaded through the bed of grass. The dried grass is discharged through a sealed hopper. D. K. M.

Feeding value of green and ensiled Sudan grass (*Sorghum halepense*); effects of feeding to milch cows. K. RICHTER and J. HERBST (J. Landw., 1937, **129**, 1—11).—Nutrient analyses and digestibility data indicate that Sudan grass in both forms has considerable val. When fed to cows the silage increased the total milk yield, but slightly lowered the % fat in milk and the gross fat yield. A. G. P.

Determination of copper and other trace elements by spectrographic methods in wire grasses from "salt sick" and healthy areas. L. L. RUSOFF, L. H. ROGERS, and L. W. GADDUM (J. Agric. Res., 1937, **55**, 731—738).—No differences in the Cu content of grasses from healthy and sick areas were detectable spectrographically. Al, Ba, B, Cu, Pb, Mn, Sr, Ti, and Zn occurred in all samples, Cr, Mo, Ag, and Ni were present in some, but Sb, As, Be, Bi, Cd, Co, La, Th, Sn, V, Yt, and Zr were not found in any samples examined. A. G. P.

Apple pomace silage. A. E. PERKINS and C. F. MONROE (Ohio Agric. Exp. Sta. Bimo. Bull., 1935, **10**, No. 175, 154—158).—Successful ensilage of apple pomace is described. The product contains dry matter 23, total protein 1·6, and total digestible nutrients 18·6%. A. G. P.

Digestibility of rations by cattle and sheep. E. B. FORBES, J. W. BRATZLER, A. BLACK, and W. W. BRAMAN (Pennsylvania Agric. Exp. Sta. Bull., 1937, No. 339, 30 pp.).—Digestibility, by steers, of crude protein, energy sources, dry matter, org. matter, and C was max. at the maintenance level of feeding and less at both higher and lower levels. Sheep digested the ration more effectively than did cows, except in the case of crude fibre. The relative digestibility of crude fibre by sheep and cows varied with the proportion of roughage to concentrates, a ratio of 1 : 1 being more effectively dealt with by cows and a ratio of 1 : 2 by sheep. Published average digestibility coeffs. for ruminants are somewhat too high to apply to full-fed milch cows. A. G. P.

Comparative feeding-trials of extracted rape meal and rape cake with milch cows. H. BÜNGER [with J. SCHULTZ, H. AUGUSTIN, E. SCHELPER, K. RICHTER, J. HERBST, and V. STANG] (J. Landw., 1937, **129**, 34—70).—Extracted rape meal and rape cake were equally effective feeding-stuffs. Both produced a slight increase in the % fat in milk and neither had any ill effect on the general health condition of cows. A. G. P.

Nutritive value of fish meals and fish cakes. T. TOMIYAMA and M. HANADA (J. Agric. Chem. Soc. Japan, 1937, **13**, 111—114).—Sardine and herring meals and cakes have a very high nutritive val. and promote very good growth in young rats. The sardine products are superior to those of the herring, the latter containing approx. three times as much crude fat as the former. J. N. A.

Digestibility and biological value of potato protein for pigs. E. MANGOLD and A. COLUMBUS (J. Landw., 1937, **129**, 12—27).—Feeding-trials are recorded of "potato protein–pulp flakes" (potato juice dried with pulp remaining from starch manufacture) and "potato protein flakes" (dried potato juice). The biological val. of potato protein is very high. A. G. P.

Composition and digestibility of a new potato-protein feeding-stuff (dried potato juice–pulp flakes). K. NEHRING and W. SCHRAMM (J. Landw., 1937, **129**, 28—33).—Results of feeding-trials with the material (cf. preceding abstract) are recorded. The composition of the feeding-stuff averaged: crude protein 23·8 (of which 30% is in amide form), N-free extractives 56, ash 13·7% of the dry matter. Digestibility coeffs. were high. A. G. P.

Potato utilisation. W. KRÖNER (Z. Spiritusind., 1938, **61**, 77—78).—The following points are discussed: potato storage; prep. of dried food and fodder products from potatoes and utilisation of by-products; prep. of starch syrup, starch sugar, and pure glucose; use of waste-H_2O from starch factories as source of protein. I. A. P.

[Potato-]juice utilisation. F. BECK (Z. Spiritusind., 1938, **61**, 93).—Steam and fuel utilisation is discussed in the evaporation and drying of potato sap with pulp for the prep. of fodder material. I. A. P.

Effect of inorganic acids on saccharification of rice bran. K. FUKAGAWA and S. RI (Bull. Inst. Tokyo, Phys. Chem. Res., 1938, **17**, 239—245).—With the same concn. and duration of heating, saccharification takes place more rapidly with HCl than with H_2SO_4, and max. saccharification is attained with 3% HCl. With 1% HCl saccharification in-

creases with time of heating, but with concns. >2% it reaches a max. in 2—3 hr. With H_2SO_4 max. saccharification is attained in 3 hr. whatever the concn. J. N. A.

Sugar-beet by-products for fattening livestock. H. B. OSLAND (Colorado Agric. Exp. Sta. Bull., 1933, No. 335-A, 27 pp.).—Analyses and results of feeding trials are recorded. A. G. P.

Production of saccharine fodder. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1937, 62, 17—21).—Laboratory and factory experiments are described on the prep. of different types of fodders, using raw sugar or massecuite as preserving agent, one of the mixings being composed of raw sugar 67, fermented slices 10, rock salt 2, powdered scums 1, and bran 20%. This was in good condition even after 20 months, and was readily eaten by cattle. J. P. O.

Analysis of Peruvian fodders. J. LÓPEZ GUILLÉN (Bol. Soc. Quím. Peru, 1937, 3, 127—148).—Appearance, H_2O content, ash, fats, chlorophyll, proteins, cellulose, gums, reducing sugars, starch, and % composition are recorded for lucerne, maize husks, bran, barley, olluco, and puna straw, a highly nutritious native product. F. R. G.

Deficiencies known and suspected in livestock nutrition of New Zealand. C. S. M. HOPKIRK (New Zealand J. Agric., 1936, 53, 200—204).—The effects and occurrence of deficiencies of I, P, Ca, Mg, Mn, Co, vitamins, and proteins in New Zealand pastures are briefly discussed. A. G. P.

Toxicity of bitterweed to sheep. I. B. BOUGHTON and W. T. HARDY (Texas Agric. Exp. Sta. Bull., 1937, No. 552, 15 pp.).—Toxicity of *Actinea odorata* increases with its age. The effect on sheep is cumulative and not dependent on general nutritive conditions. A. G. P.

Progress in food cold storage. J. J. PIQUÉ (Food Manuf., 1938, 13, 78—83).—Early developments are described. Chilling and freezing are discussed. The factors influencing the behaviour of foodstuffs when frozen are enumerated. Beef must be frozen rapidly at —5° to obtain small crystals in muscle. Fish also show variations in muscle structure and require different freezing methods. R.H. is important since, if too low, discoloration occurs and, if high, mould growth is induced. The storage of fruit and vegetables is described and special reference made to the effect of [CO_2] on mould growth. W. L. D.

Analysing frozen desserts and ingredients. J. H. SHRADER and COMMEE. (Amer. J. Publ. Health, 1938, 28, Suppl., 49—51).—Methods of determining milk powder, stabilisers, sugar, eggs, colouring matter, org. acids, and H_2O are suggested. Published methods of bacteriological control are also referred to. W. L. D.

Detection of formaldehyde in preserved foods. G. LA PAROLA (Annali Chim. Appl., 1937, 27, 555—560).—Preserved herrings, tunny, meat, yeast, vegetables, etc., when treated with dil. acid and distilled, give distillates containing small amounts of CH_2O. F. O. H.

Development of standard methods for microbiological examination of foods. COMMEE. OF FOOD AND NUTRITION SECT., AMER. PUBLIC HEALTH ASSOC. (Amer. J. Publ. Health, 1938, 28, Suppl., 56—65).—Culture media, colony types, and methods of incubation for the examination of micro-organisms in fermented foods are described. Media containing tomato juice are recommended for *L. acidophilus* and incubation in 10% CO_2 is discussed. The examination of frozen eggs, dried foods, and paper containers is described. W. L. D.

Paper for food packages.—See V. **Al [canning] industry.**—See X. **Fats from waste cacao products. Whale processing. Whale-oil margarine.**—See XII. **Casein plastics.**—See XIII. **Sugar-beet leaves.**—See XVI. **Yeast from molasses.**—See XVII. **Gassing power of yeast. EtOH from starchy materials.**—See XVIII. **Egg extract. Grapefruit in pharmacy.**—See XX.

See also A., I, 195, **Imbibition of H_2O by proteins.** III, 313—8, **Vitamins.** 335, **Food poisoning. Poisoning by cheese in Greece.** 340, **Lipase of cows' milk.** 346, **Production of lactic acid bacteria in milk.** 352, **Bacteriological media for milk counts.**

PATENTS.

Machines for sorting, grading, separating, and purifying seeds, grain, cereals, and like granular substances. W. W. WILLIS (B.P. 479,845, 10.8.36).—An enclosed screen having only oscillatory motion is described. B. M. V.

Treatment of vegetable matter containing protopectin. CALIFORNIA FRUIT GROWERS EXCHANGE (B.P. 472,974, 1.4.36. U.S., 1.4.35).—A pectate of an alkali metal or of NH_4 is prepared by treating a pulp of citrus, or other fruit, with a sol. salt of the metal at p_H 8—8·5 for 12 hr. at 25°. The pectate is obtained in fibrous form by pptn. with EtOH. E. B. H.

Preparation of food product. E. G. JANSEN (U.S.P. 2,069,884, 9.2.37. Appl., 20.4.35).—Whole peeled potatoes are dipped in 3% aq. NaOBz, adherent salt is washed away, and the potatoes are comminuted and placed on a screen to drain away liquid and suspended starch. The pulp does not discolour. B. M. V.

Manufacture of a food product. D. D. PEEBLES (U.S.P. 2,069,388, 2.2.37. Appl., 13.4.32).—A liquid containing lactose (I) is sprayed on a mass of fresh vegetable (*e.g.*, spinach) and the percolated liquid containing the colouring matter and vitamins from the vegetable is then spray-dried to a non-hygroscopic powder in which the (I) is cryst. B. M. V.

Preservation of organic material [lucerne and the like]. E. A. CHENAULT (U.S.P. 2,069,873, 9.2.37. Appl., 27.9.39. Renewed 23.3.36).—The lucerne etc., cut when fresh and green, is crushed to release liquid from the cells and to accelerate drying, which latter process is then effected at innocuous temp. B. M. V.

Colouring fruit. J. N. SHARMA, Assr. to FOOD MACHINERY CORP. (U.S.P. 2,068,081, 19.1.37. Appl.,

4.1.35).—An azo dye sol. in oil but insol. in H_2O and containing free OH, obtained by coupling a diazotised arylamine with a polynuclear OH-compound, *e.g.*, the dye o-$C_6H_4Me{\cdot}NH_2 \rightarrow \beta$-$C_{10}H_7{\cdot}OH$, is used to colour citrus fruit. The dye is dispersed in aq. medium and the fruit dyed for 5 min. at about 37°; the colour is fast to light. K. H. S.

Purification of extracted honey. R. E. LOTHROP and H. S. PAINE, Ded. to U.S.A. (U.S.P. 2,070,171, 9.2.37. Appl., 26.1.35).—Filter aid is freed from air by boiling H_2O and then from free H_2O by honey syrup (1 of H_2O : 4 of honey); the filter aid is then mixed with raw honey and the mixture heated and filtered. B. M. V.

Processing of coffee. J. T. MCCROSSON (B.P. 479,181, 5.6.37).—The beans are roasted in a sealed oven and the vapours collected and purified by condensation and filtration and then returned in contact with the beans. The same atm. under pressure is used when cooling and grinding the beans. B. M. V.

Drying and/or smoking ovens [for foodstuffs]. A. S. KVÆRNER BRUG, and T. BERGER (B.P. 479,131, 1.8.36).—A tunnel kiln is utilised, the goods being in containers moved one step at a time. The flow of hot gases is transversely or vertically through the goods in a no. of distinct flows, with stagnant containers between. B. M. V.

Apparatus for preserving substances of vegetable and animal origin by desiccation. J. B. VAN HEUTSZ (B.P. 479,116, 27.5.36).—A furnace for indirectly heating air by combustion, partly in one and partly in two stages, is described. Fine regulation of the temp. and humidity is effected by varying the proportions that pass through one and two stages. B. M. V.

Storage of foodstuffs. J. J. PIQUÉ (B.P. 479,233, 18.12.36).—In a cold store the humidity during the preliminary cooling of the goods is = the v.p. of H_2O in the goods. During storage the external atm. is excluded and a space between the chamber and atm. is maintained at const. temp., the internal atm. being circulated through a condenser. During defrosting, warm atm. is circulated through the chamber, and until the internal temp. is raised to the dew point of the external atm. the internal atm. is maintained at nearly 100% R.H. B. M. V.

Drum dryers for milk.—See I. **Inducing crystallisation of sugars.**—See XVII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Solution of ferric chloride easily prepared. C. O. LEE, F. J. LEBLANC, and H. BANG (J. Amer. Pharm. Assoc., 1938, 27, 40—42).—$FeCl_2$ solution (U.S.P. IX; 100 g.) is treated with H_2O_2 solution ($\nless$3%; 125 g.) and the product is conc. to 100 g. F. O. H.

Colloidal clay as a base for ointments. H. GRIFFON (J. Pharm. Chim., 1938, [viii], 27, 159—165).—Colloidal clay (*e.g.*, bentonite) appears to form a suitable base for ointments (*e.g.*, of ZnO or HgO). F. O. H.

Improved calomel ointment. E. E. VICHER, R. K. SNYDER, and E. N. GATHERCOAL (J. Amer. Pharm. Assoc., 1937, 26, 1241—1245).—Normal U.S.P. preps. of Hg_2Cl_2 contain particles 2—50 μ. in length. The prep. of Hg_2Cl_2 with a particle length of 0·8 μ. or less is described. Such a prep. yields a stable ointment of much greater antiseptic power than that of normal preps., but of approx. equal toxicity (rabbit). F. O. H.

Intravenous salicyl injection. H. STEENBRUGGEN (Pharm. Weekblad, 1938, 75, 174—176).—A salicylate prep. having the same $Na^{\cdot}$, $K^{\cdot}$, and $Ca^{\cdot\cdot}$ ratio as serum and suitable for intravenous injection is made by dissolving 4·695 g. of o-$OH{\cdot}C_6H_4{\cdot}CO_2Na$, 0·25 g. of o-$OH{\cdot}C_6H_4{\cdot}CO_2H$, 0·074 g. of K_2CO_3, and 0·037 g. of $CaCO_3$ in 100 c.c. of solution (p_H 6), which is adjusted to p_H 7·2 with 0·1N-NaOH. S. C.

Injectable liver extract. J. A. C. VAN PINXTEREN (Pharm. Weekblad, 1938, 75, 251—260).—Freshly minced liver is extracted for 24 hr. with an equal wt. of cold EtOH containing 5 c.c. of conc. HCl per kg. and then pressed, the press cake being again macerated with 60% EtOH for 12 hr. The combined extracts are evaporated in vac. at <50°, the residue being flocculated in 10 vols. of EtOH and filtered. The ppt. is redissolved in H_2O (20% on wt. of liver), the solution again flocculated with 10 vols. of EtOH at 0°, and the ppt. dissolved in H_2O (10% on wt. of liver). This process is repeated twice and the final extract, to which are added 0·8% of NaCl and 0·5% of PhOH, passed through a bacterial filter. The resultant extract is sterile and practically free from proteins and histamine (I) and can be used successfully in the treatment of pernicious anæmia by injection. (I) is a degradation product formed by extraction at high temp. and it is important that the temp. should be <50° throughout the process. S. C.

Determination of camphor in alcoholic solutions. Dinitrophenylhydrazine method. E. M. PLEIN and C. F. POE (Ind. Eng. Chem. [Anal.], 1938, 10, 78—80).—Published methods of determining camphor in EtOH by 2 : 4-$(NO_2)_2C_6H_3{\cdot}NH{\cdot}NH_2$ (I) are not quant. and the U.S.P. reagent solution of (I) is unstable. Dissolving (I) (3·75 g.) in H_2SO_4 (45 c.c.) and H_2O (45 c.c.) and diluting to 250 c.c. with H_2O gives a stable solution (*A*). The following method gives results 2—3% low after experience: spirit of camphor (2 c.c.) in EtOH (15 c.c.) and (*A*) (75 c.c.) are heated under reflux in boiling H_2O in a 150-c.c. flask for 4 hr.; after cooling, H_2O (200 c.c.) is added; after 24 hr. the ppt. is collected and dried at 100°. R. S. C.

From camphor oil to heliotropin. R. FORNÉT (Seifens.-Ztg., 1938, 65, 44—45).—Method for the isolation of the safrole, its conversion into *iso*safrole (I), and the oxidation of (I) to heliotropin (piperonal) are outlined. E. L.

Determination of thymol, phenol, terpin hydrate, and menthol in certain medicinal solutions, by surface-tension methods. M. A. IZMAILOV and O. G. SCHVARTZMAN (Ukrain. Chem. J., 1938, 13, 10—21).—The concn. of PhOH, thymol,

terpin hydrate, menthol, thiocol, or resorcinol may be determined from γ-concn. curves. R. T.

Preparation of ampoules of extract of egg (lecithin and lutein) for intramuscular and intravenous use. G. VITA and L. BRACALONI (Boll. Chim. farm., 1938, 77, 73—80, 83—86).—Tabulated data and graphs indicating the solubility of egg-yolk oil (f.p. 16—18°, d^{15} 0·918, sap. val. 199·5—200·5, I val. 69·8—70·3; contains 67·7% of oleic acid) and of lecithin in H_2O–EtOH mixtures are given and the prep. of sterile suspensions (5—5·5%) of lecithin + lutein for parenteral administration is described. F. O. H.

New enteric coating and laboratory method for its control. A. G. WORTON, G. F. KEMPF, P. L. BURRIN, and F. E. BIBBINS (J. Amer. Pharm. Assoc., 1938, 27, 21—28).—Tablets are enteric-coated by applying a mixture of stearic acid, carnauba wax, petrolatum, agar, and powdered elm bark to a primary coating of shellac and then melting the mixture to give a continuous coating. The efficacy of the coating is controlled by *in-vitro* tests in artificial gastric juice, the tests being standardised by radiographic examination of the disintegration of $BaSO_4$ tablets *in vivo*. F. O. H.

Grapefruit (*Citrus grandus*, *C. decumana*, and related species) as a pharmaceutical flavouring agent and vehicle. D. J. MASON (J. Amer. Pharm. Assoc., 1938, 27, 42—47).—The chemical and physical properties of the constituents of the fruit, the botanical classification of the plant, and the effect of storage etc. on the fruit and juice are reviewed. F. O. H.

Pumpkin kernels as anthelmintics. F. W. FREISE (Pharm. Zentr., 1938, 79, 97—99).—Seeds of the different species of *Cucurbita* vary in their activity, but in all the active principle is contained almost wholly in the germ skin. Traces are present in the seed husk. The oil (18·5—26·75%) is not active, but is effective as a coadjuvant. The germ contains 0·12—0·285% of alkaloid, an aq. solution (1 : 4000) of which is fatal to 90% of *Oxyuris* or *Ascaris* in 5 min. The dose for adults is 10—15 germs in 30—50 c.c. of H_2O. An infusion of the whole seeds is a strong diuretic. E. H. S.

Drug extraction. XIV. Extraction of podophyllum. W. J. HUSA and P. FEHDER (J. Amer. Pharm. Assoc., 1937, 26, 1246—1247; cf. B., 1937, 839).—EtOH and EtOH–H_2O (9 : 1 vols.) extract the resins from podophyllum at approx. equal rates, the latter giving a slightly higher yield of lower purity; abs. EtOH, however, is preferred for the prep. of resin of podophyllum. F. O. H.

Complex utilisation of Black Sea algæ, *Phyllophora nervosa*. A. KORENTZVIT (J. Appl. Chem. Russ., 1937, 10, 2064—2067).—The dried plants are treated with dry steam at 2·5 atm. pressure for 15—60 min. and then extracted with H_2O at 40—60°. The extract, which contains up to 0·02% of I, serves as a source of I, and the residue yields about 12% of agar, suitable for bacteriological purposes. R. T.

Influence of temperature and duration of freezing-out of agar gels from *Anfeltia plicata* on the nature of the gel. V. GRIUNER and I. GORSCHKOV (J. Appl. Chem. Russ., 1937, 10, 2054—2063).—87% of the H_2O contained in the gels freezes at −5° to −8° (4—8 hr.); when the product is allowed to thaw most of the H_2O can be poured off, and much of the remaining H_2O can be removed by centrifuging or pressing. At $>-5°$ not all the H_2O freezes, whilst at $<-8°$ the gels freeze as a whole, which results in limited separation of H_2O after thawing. The centrifuged gel, containing 88% of H_2O, dries rapidly at room temp., an air-dry product being obtained in 6—7 hr. 6—9% of the solid content of the original gel passes into the H_2O poured off, so that the process of dehydrating the gel also involves its purification. R. T.

Nicotine content of Hungarian varieties of tobacco. K. GÄRTNER and L. BODNÁR (Mezög. Kutat., 1937, 10, 236—247).—Numerous analyses are recorded. A. G. P.

Physical and chemical examination of tobacco fermented in cold and heated chambers. I. Changes in moisture and dry matter contents. L. BARTA (Mezög. Kutat., 1937, 10, 274—282).—The total loss of H_2O was similar during cool and warm fermentation and averaged 13—14% of the initial val. The period of warm fermentation was approx. half that of cold fermentation. The dry matter content of brown tobacco decreased (3%) and that of yellow varieties increased (4·3%) during fermentation by either process. A. G. P.

Determination of glycerol (or glycol) in manufactured tobacco. O. LAZAR and A. H. MEYLING (J. S. African Chem. Inst., 1938, 21, 8—10).—20 g. of the well-mixed tobacco are dried, added to 1 g. of anhyd. Na_2SO_4 and 100 c.c. of $COMe_2$, and extracted under reflux for 20 min. The extract is distilled, and the last traces of $COMe_2$ are removed by blowing air over the residue. 5 c.c. of Ac_2O and 2 g. of anhyd. NaOAc are added, and the mixture is esterified by heating under reflux for 90 min. It is then neutralised to phenolphthalein with KOH, an aliquot part is hydrolysed with a known vol. of 0·1N-KOH, and the residual alkali titrated with standard HCl. J. W. S.

Solid–liquid constituents of cigarette-paper smoke. A. WENUSCH and E. MOLINARI (Pharm. Zentr., 1938, 79, 148—151).—The disperse phase of cigarette-paper (hemp and linen fibres) smoke (about 0·005 g./cigarette, 25% of the paper) consists of org. acids, aldehydes, ketones, and polyphenols. The quantity is too small to have any physiological action. E. H. S.

Stabilisation of tinctures of quinine. H. WOJAHN (Apoth.-Ztg., 1937, 52, 1485—1488).—The ppt. separating in D.A.B. tinctures consists of oxidation products of cinchona-tannic acid and -red; 9—13% of alkaloids is present. Formation of the ppt. is inhibited by filtering the cooled prep. and filling the containers completely. Pptn. is delayed by addition of HCl, AcOH, or HCO_2H; HCO_2H is preferable as it does not cause any loss of alkaloid. An alkaloid-rich, stable prep. is obtained by extracting the bark with 42% EtOH containing 1% of HCO_2H and storing the extract in completely filled containers. F. O. H.

Stability of atropine methobromide solutions. F. REIMERS (Arch. Pharm., 1938, 276, 78—82).—Atropine methobromide is stable to storage and sterilisation in H_2O or 0·00001—0·001N-HCl, but not to sterilisation in H_2O buffered to p_H 5·5—7 nor in N-HCl. The methonitrate is stable to sterilisation in H_2O or, better, in 0·001N-HCl. R. S. C.

Cananga, patchouli, and vetiver oils. D. R. KOOLHASS and P. A. ROWAAN (Perf. & Essent. Oil Rec., 1938, 29, 53—54).—Characteristics and consts. based on available analyses are: Java cananga (steam-distilled from flowers of *C. odorata*, Baill.): d_{15}^{15} 0·908—0·925, n_D^{20} 1·495—1·506, α_D −15° to −40°, acid val. 0·5—2·0, ester val. 15—35, sol. in 3 vols. of 95% EtOH with opalescence on dilution, residue after steam-distillation <5%; colour, yellow to light brown. Achin patchouli (steam-distilled from leaves of *Pogostemon Cablin*, Benth.): d_{15}^{15} 0·950—0·990, n_D^{20} 1·506—1·516, α_D −40° to −72°, acid val. 0·5—3·0, ester val. 2—10, sol. in 10 vols. of 95% EtOH; yellow to dark brown, rather viscous. Java vetiver (steam-distilled from roots of *Andropogon zizanioides*, Urban): d_{15}^{15} 0·985—1·045, n_D^{20} 1·510—1·530, α_D +15° to +45°, acid val. 8—35, ester val. 5—25 (after acetylation 100—150), sol. in 10 vols. of 90% EtOH with slight opalescence; light to dark brown, viscous. Corrections to 15° for *d* and *n* of 0·00075 and 0·0004 per degree are recommended for these oils. T. F. W.

Composition of the essential oils of *Ocimum* sp. No. 66 and of F_1 from crossing of sp. No. 66 with *O. gratissimum*. M. A. ISKENDEROV (J. Appl. Chem. Russ., 1937, 10, 2068—2071).—The essential oils from *Ocimum* sp. No. 66 and its hybrid contain, respectively, linalool 35·5, 20·5; methylchavicol 45·6, 56·33; eugenol 8, 10·5; camphor 5, 0·5; α-terpinene 3, 3; β-caryophyllene 3·3, 6·6; and perillaldehyde 0·15%, traces. It is concluded that the chemical characters of *O.* sp. No. 66 are dominating ones, as none of the components characteristic of *O. gratissimum* is found in the oil from the hybrid. R. T.

The perfume ambergris. W. TREFF (Fette u. Seifen, 1938, 45, 106—108).—The origin, chemistry, and examination of ambergris are reviewed. E. L.

Fats from waste cacao products. Vitamins in cod-liver oil. Whale processing. Hormones and vitamins from whale. Whale oil in pharmacy.—See XII. **Physiologically active principles in plants.**—See XVI. **Analysis of bread for diabetics.**—See XIX.

See also A., II, 136, **Identification of ephedrine.** 147, **New product with odour of amber.** 151, **Constituents of pyrethrum flowers.** 157, **Piperazine derivatives.** 162, **Antimalarials. Synthetic vitamin-B_1.** 162—5, **Alkaloids.** III, 290, **Assay and prep. of adrenal cortical hormone.** 293, **Assay of gonadotropic hormones.** 297, **Extraction of androgens from urine.** 299, **Apparatus for extraction of œstrin from urine.** 308, **Prep. of active extracts from urine.** 313—8, **Vitamins.** 329, **Prep. of *p*-aminobenzoylaminomethyl-*l*-hydrocotarnine.** 338, **Prep. of colloidal solutions of 1 : 2 : 5 : 6-dibenzanthracene, retene, and similar hydrocarbons.** 347, **Purification and concn. of diphtheria toxin.** 348, **Prep. of dysenteric anatoxin.**

PATENTS.

Manufacture of sulphanilic acid amides which exert a strong bactericidal action. M. J. W. FRANCE. From F. HOFFMANN-LA ROCHE & Co. A.-G. (B.P. 480,486, 23.2.37).—The amides, salts of which are neutral in aq. solution and suitable for use as internal disinfectants, are made as follows: (*a*) *p*-NHR·C_6H_4·SO_3H (R = acyl) (I) is treated with an aromatic diamine, or with a monoacylated diamine with subsequent hydrolysis, or with a nitro-amine with reduction of the NO_2-compound formed; (*b*) (I) or its anilide is nitrated, then reduced, and if necessary acyl groups are removed; (*c*) *p*-NHR·C_6H_4·SO_2·NH_2 (R = acyl) (II) is treated with nuclear halogenated acid anilides and acyl groups are removed; (*d*) (II) is treated with C_6H_4R'·NO_2 (R′ = halogen) and NO_2-groups are reduced;
(*e*) *p*-C_6H_4R'·SO_2·NH·C_6H_4·NHR (R = H or acyl, R′ = halogen) is treated with NH_3 or NH_2Alk and acyl groups are removed;
(*f*) *p*-C_6H_4R'·SO_2·NH·C_6H_4·NO_2 (R′ = halogen) is treated with NH_3 and the NO_2 reduced. Reactions (*c*)—(*f*) are carried out in presence of Cu. The prep. of *sulphanil-4-nitroanilide*, *-4-acetamidoanilide*, *-4-aminoanilide*, m.p. 138°, *-3-nitroanilide*, m.p. 171—172°, *-3-aminoanilide*, m.p. 158—160°, *-2-aminoanilide*, m.p. 201°, *-2-nitroanilide*, m.p. 175°, and N-*methylsulphanil-4-aminoanilide*, m.p. 191—193°, is described. A. H. C.

Purification of 4-aminobenzenesulphonamide [sulphanilamide]. I. G. FARBENIND. A.-G. (B.P. 480,059, 7.4.37. Ger., 7.4.36).—*p*-NH_2·C_6H_4·SO_2·NH_2 for therapeutic purposes is purified by pptg. the free base from a crude salt in aq. solution. Salts with acids are pptd. by a mild alkali (Na_2CO_3), salts with bases by reducing the alkalinity (*e.g.*, by adding NH_4 salts). A. H. C.

Manufacture of sterol derivatives (sex hormones). I. G. FARBENIND. A.-G. (B.P. 478,583, 20.7.36. Ger., 18.7.35).—3-Hydroxybisnor*allo*cholanic acid (I) is converted by oxidation into the *keto*-compound, m.p. 244°, which is reduced by Pd–H_2 to a stereoisomeric 3-epi*acetoxybisnor*allo*cholanic acid* (II); this is converted by standard methods into compounds of the androsterone series having a greater physiological activity than those derived directly from (I). *E.g.*, the *Me* ester of (II) is treated with MgPhBr, the product (III) is dehydrated and oxidised (O_3), and the resulting ketone is subjected to the same cycle of reactions with the production of 3-epi*acetoxyœtio*allo*cholanone* (IV), m.p. 164°. Oxidation of the carbinol (III) or of its dehydration product with CrO_3–AcOH gives 3-epi*acetoxyœtio*allo*cholanic acid* (V), the Me ester (CH_2N_2) of which is also converted by the Grignard reaction, dehydration, and ozonisation into (IV). The chloride of (V) is converted successively into azide and carbimide; this is hydrolysed (60% H_2SO_4) to 17-*amino*-3-epi*hydroxyandrostane* (VI) or converted into its Ac

derivative by heating with H_2O. Interaction of (VI) with HNO_2 gives dihydroandrosterone, m.p. 221°. H. A. P.

Preparation of derivatives of ovarian follicular hormones. D. W. MacCorquodale, S. A. Thayer, and E. A. Doisy, Assrs. to St. Louis University (U.S.P. 2,069,096, 26.1.37. Appl., 9.8.33).—These hormones are oxidised before or after protection of the phenolic OH to substances containing $\nless 2$ of the rings intact. *E.g.*, the β-hormone (I) in $KOH–KNO_3–NaNO_3$ at 275° gives the acid, $C_{18}H_{22}O_5$ (cf. A., 1933, 278). The α-hormone in KOH at 275° gives the *acid*, $OH·C_{16}H_{20}·CO_2H$, m.p. 195°; the *Me ether Me ester*, m.p. 200—201°, thereof, also obtained from the Me ether of (I) by $KMnO_4$ with the *lactone*, $OMe·C_{16}H_{19}<^{CO}_{O}$, m.p. 182°, with alkaline $KMnO_4$ gives the *acid*, $OMe·C_{16}H_{17}(CO_2H)_2$, m.p. 234—235°, and with $KMnO_4$ in H_2SO_4-aq. AcOH gives the *dilactone*, $OMe·C_{15}H_{15}\left(<^{CO}_{O}\right)_2$, m.p. 243—244°. R. S. C.

[Preparation of bactericidal and anæsthetic] arylazodiaminopicolines. H. J. Schneiderwirth, Assr. to Picochrome Corp. (U.S.P. 2,068,353, 19.1.37. Appl., 24.12.35).—Diazotised arylamines are coupled with diamino-α-picolines in which one NH_2 is at 6. Examples are the *compounds*: 2 : 1 : 5-$OH·C_6H_3Me·NH_2$ → 3 : 6- (I), m.p. 143°, and → 4 : 6-diamino-α-picoline (II), m.p. 171°, *p*-$NH_2·C_6H_4·OMe$ → (I), m.p. 155°, and NH_2Ph → (II), m.p. 182°. H. A. P.

Preparation of bismuth salts of arseno-compounds. K. Streitwolf, A. Fehrle, and W. Herrmann, Assrs. to Winthrop Chem. Co., Inc. (U.S.P. 2,068,206, 19.1.37. Appl., 20.5.32. Ger., 11.6.31).—The interaction of Bi salts of strong inorg. acids with compounds: $X·As{:}As·Y·O·CH_2·CO_2Z$, in which X and Y are radicals of the C_6H_6 or benziminazole series substituted by OH, Cl, Me, or NHAc, and Z is an alkali metal, gives H_2O-sol. Bi salts which are spirochæticides and have a therapeutic index of 1 : >500. Examples are the *Bi* salts of 4-hydroxy-3 : 4′-diacetamidoarsenobenzene-6′-, 4-hydroxy-3 : 5′-diacetamidoarsenobenzene-4′-, 1′-methyl-2-hydroxymethyl-5 : 5′-arsenobenziminazole-2′-, 5 : 3′-dichloro-4-hydroxy-3 : 5′-diacetamidoarsenobenzene-4′-, 4-hydroxy-3-ω-sulphomethylamino-5′-methylarsenobenzene-4′-, 3 : 5-dihydroxyarsenobenzene-4 : 4′-di-, 3-hydroxy-4 : 4′-diacetamidoarsenobenzene-2′-, 4-(4″-acetamido-2″ : 3″-dimethyl-1″-pyrazolonyl)phenylarseno-5′-(1‴-methylbenziminazole)-2‴-, 3-acetamidophenyl-4′-(4″-βγ-dihydroxypropylamino-2″ : 3″-dimethyl)phenylpyrazolone-4-, and 3-acetamidophenylarseno-4′-(4″-ω-sulphomethylamino-2″ : 3″-dimethyl)phenylpyrazolone-4-oxyacetic acid. H. A. P.

Aromatic mercury salts of an oxygen acid of a halogen. C. N. Andersen, Assr. to Lever Bros. Co. (U.S.P. 2,067,894, 19.1.37. Appl., 18.4.35).—Org. Hg compounds useful as antiseptics and germicides and possibly as explosives are prepared from O acids of halogens, particularly of the chlorate type, by replacement of an acidic H with an HgR group in which R = aryl, particularly Ph, and in which none of the C atoms is directly linked with any element other than H, C, and Hg. *HgPh chlorate*, m.p. 192—194°, *bromate*, m.p. 165—174°, and *iodate*, sinters 228°, are claimed. R. G.

Preparation of (A) organo-mercury 1 : 2-[αβ-] aliphatic diamine sulphites, (B) organo-mercury derivatives of 1 : 2-[αβ-]aliphatic diamine thiosulphates, (C) 1 : 2-[αβ-]aliphatic diamine thiosulphates. M. S. Kharasch, Assr. to E. Lilly & Co. (U.S.P. 2,069,165—7, 26.1.37. Appl., [A, B] 23.6.34, [C] 22.4.36).—Alkyl- (C_{1-6}), phenyl-, and *cyclo*alkyl-mercuri-salts form with (A) sulphites and (B) thiosulphates of the αβ-alkylenediamines compounds of types: $R·Hg·O·SO_2·NH_3·[CH_2]_2·NH_2$ and $R·Hg·OS_2O_2·NH_3·[CH_2]_2·NH_2$, respectively, that are relatively permanently sol. in H_2O. *Ethyl-* and *phenyl-mercuric ethylenediamine sulphites* and *thiosulphates* are specifically claimed. (C) *Ethylenediamine*, m.p. 218° (decomp.), and *αβ-propylenediamine thiosulphate*, m.p. 186° (decomp.), are prepared by heating the sulphites with S in H_2O. H. A. P.

[Preparation of] hydroxymercurihalo[geno]-fluoran. E. Lyons, Assr. to Parke, Davis & Co. (U.S.P. 2,069,095, 26.1.37. Appl., 29.7.31).—Interaction of $Hg(OAc)_2$ with 12 : 15-dichloro-2 : 4 : 5 : 7-tetraiodo-3 : 6-dihydroxyfluoran ("Rose Bengal") gives the 8-*Hg·OH* derivative, which has germicidal properties. The prep. and admixture with the above of the Hg·OH derivative of the corresponding 12 : 13 : 14 : 15-Cl_4-compound ("Rose Bengal 3B"), which is more active against *Staph. aureus*, is described but not claimed. H. A. P.

Production of anti-anæmic preparations. B. D. Thornley (B.P. 473,064, 5.3.36).—Aq. or alcoholic extracts of liver etc. possessing anti-anæmic properties are treated at $p_H \ngtr 7$ with an adsorbent (fuller's earth), from which, after separation from the extract, the active material is removed by treatment with a dil. alkaline solution. E. H. S.

Treating tobacco. High-vac. distillation.—See I. **Adhesive fabrics [for bandages].**—See VI.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Ripening of photographic emulsions. II. Influence of agitation during the first ripening, followed by a second ripening at low temperature. M. Wada (J. Soc. Chem. Ind. Japan, 1937, 40, 408—410B; cf. B., 1938, 322).—The emulsion was made as before (cf. *loc. cit.*), except that it was kept at 2—3° for 20 hr. in order to effect the second ripening. When the first ripening is made at 50° and this is followed by the second ripening, the density–exposure curve is considerably shifted in the direction of the density axis by agitation, and the large grains are slightly more numerous. When the first ripening is made at 30° the curves with and without agitation approx. coincide; there is, however, considerable difference if the second ripening is not effective. R. S. B.

Ripening of photographic emulsions. III. M. WADA (J. Soc. Chem. Ind. Japan, 1938, **41**, 37—39B; cf. preceding abstract).—Ripening for 1 hr. without stirring allows insufficient time for the emulsion particles to separate according to their dimensions, and aggregation takes place in accordance with Ostwald's law for stirred emulsions.

K. W. P.

Oxidation of stock sulphite solutions [for photography]. A. G. TULL (Brit. J. Phot., 1938, **85**, 135—136).—Na_2SO_3 solution (350 g./litre) was analysed (with $Na_2S_2O_3$ and I solutions) at intervals over 6 months, using (1) an open bottle and a thin layer of paraffin over the solution, (2) a glass-stoppered bottle, and (3) an open bottle. (1) kept best, losing slightly >10% in 6 months; (2) does not keep well (loses 10% after 3 weeks); (3) loses its concn. rapidly. For prolonged storage a wash-bottle is recommended, with a third long tube (normally capped with rubber) for refilling, and a glass bead in a rubber tube on the jet, the solution being covered with paraffin.

J. L.

Reliable reducer for over-dense kine-reversal film positives. R. C. CARDINAL (Brit. J. Phot., 1938, **85**, 131—132).—Two stock solutions are prepared: (A) $KMnO_4$ 0·5 g., H_2O 1 litre, H_2SO_4 7 c.c.; (B) $(NH_4)_2S_2O_8$ 25 g., H_2O 1 litre. The proportions may be varied according to the type of film; *e.g.*, 1 : 1 for overall high density, 1 : 3 for over-dense shadows only, 3 : 1 for over-dense high-lights and poor gradation. Solution A should not be used alone. Working details are given.

J. L.

Working up of fixing-salt solutions [containing silver] from film and photographic plants. G. EGER (Metallwirts., 1937, **16**, 1265—1267).—The solution is electrolysed to deposit the Ag, made up to the correct concn. by addition of $Na_2S_2O_3$, and used again. The purity of the Ag obtained is 98%.

C. E. H.

Kodak wash-off relief process. A. E. C. COX and D. J. WELLS (Phot. J., 1938, **78**, 142—144).—Three colour-separation prints are prepared on the wash-off relief film, and bleached in a bleach-hardening bath, reliefs thus being obtained. Prints are then made by imbibition of special dyes, fixed in AcOH (both contrast and density can be controlled by varying the concn. of this bath), and pressing the films in register on to mordanted paper [fixed and washed photographic paper bathed in $Al_2(SO_4)_3$ solution]. Working details are fully described.

J. L.

Probability of estimating correct photographic exposure. J. MILBAUER (Chem. Obzor, 1937, **12**, 241—243).—The elasticities of a typical modern multilayer film and of a single-layer film applied on normal paper, for cases of under- and over-exposure, are compared with a case of normal exposure. These are $\frac{1}{4}$ and $\frac{1}{3}$ for under-exposure and 200 times and 20 times for over-exposure for a multi- and a single-layer film, respectively, in terms of the val. for normal exposure. The probabilities of estimating the correct exposures for a non-elastic film and multi- and single-layer films, using the above elasticity results, are indicated.

F. R.

Photothermometry. P. NEUBERT (Arch. Wärmewirts., 1938, **19**, 29—32).—The development of infra-red sensitisers for photographic plates enables photographs to be made of materials at <500°. From the photographs obtained the temp. distribution can be deduced. The technique is described and practical applications of the method are discussed.

R. B. C.

Size analysis.—See I. **Paint-man's camera.**—See XIII.

See also A., I, 206, **Ag photohalides and the latent image.** 214, **Applications of infra-red photography.** 215, **Pb intensifying screens for X-ray work.**

PATENTS.

Preparation of photographic emulsions. B. CLAUS (B.P. 472,639, 25.3.36. Ger., 5.4.35).—Peptisation emulsions of coarse or medium grain size and high sensitivity are prepared by pptg. Ag halide from, *e.g.*, 10% KBr + 0·4% KI solution with 10% $AgNO_3$ solution, which may also contain gelatin, washing the sedimented ppt. by decantation, and peptising a small part of it in, *e.g.*, 3% gelatin solution containing 2% of NH_3. The mixture is then heated at 50—60° and the remaining sediment added gradually during the ripening process, more NH_3 being added to replace any evaporated. Finally the gelatin concn. is made up to 9% and the emulsion further ripened if necessary. The second part of the Ag halide may also be emulsified in gelatin before being added gradually to the part containing the NH_3.

J. L.

Manufacture of photographic silver halide emulsion layers. I. G. FARBENIND. A.-G. (B.P. 479,838, 11.6.36. Ger., 16.7.35).—Ag halide emulsions which when used for multi-layer colour processes do not allow the colours to diffuse contain the colour-forming substance, *e.g.*, an amine, phenol, naphthol, amino-phenol or -naphthol, compound containing reactive CH_2, diazo compound, or leuco-dye combined with a highly polymerised carboxylic acid or derivative thereof. Such substances are polymeric protein NH_2-acids, polyglycuronic acid, polyvinylcarboxylic acid, or a polymeride of maleic, fumaric, or methylene-malonic acid alone or mixed with vinyl compounds. Among examples (8), the mixed polymeride of $CH_2{:}CHCl$ and maleic anhydride is condensed with *m*-aminophenylmethylpyrazolone (I) and the product (1 g.) ground with 5% aq. NaOH (5 c.c.), dissolved in H_2O, and added to AgBr emulsion (100 c.c.); an exposed layer of this emulsion develops to a red picture with $p\text{-}NH_2{\cdot}C_6H_4{\cdot}NMe_2$ (II). Alternatively, using the same layer, after exposure the Ag image may be bleached and converted into the *iso*-diazotate with an alkaline solution of diazotised $p\text{-}NO_2{\cdot}C_6H_4{\cdot}NH_2$; in acid solution the diazo compound couples with (I) forming a yellow image. Further, the same polymeride is condensed with $1:5\text{-}OH{\cdot}C_{10}H_6{\cdot}NH_2$ and incorporated in a AgBr emulsion; after exposure this can be developed with (II) (blue) or with an alkaline solution of tetrazotised dianisidine as above (violet).

K. H. S.

Sensitisation of photographic silver halide emulsions. KODAK, LTD., Assees. of L. G. S.

BROOKER (B.P. 479,970, 16.11.36. U.S., 16.9.36).—The use is claimed as photosensitisers of aryl-, acylaryl-, and arylalkylaminomethylene derivatives of 5- or 6-membered heterocyclic CO or CS compounds having adjacent CH_2, obtained by condensing diarylformamidines with rhodanines, hydantoins, pyrazolones, etc. Examples are: 3-*ethyl*- and 3-*phenyl*-5-*anilinomethylenerhodanine* (I), prepared by interaction of NPh:CH·NHPh with 3-alkyl- or 3-phenyl-rhodanine at 120°, (?) 3-*ethyl*-5-*anilinomethylene*-2-*thiotetrahydro-oxazol*-4-*one*, and their *Ac* derivatives [the Ac derivative of (I) has m.p. 194—196° (decomp.)]. H. A. P.

Photographic developers. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 478,345, 11.5.36).—The use as developers for black-and-white or colour prints of aromatic-heterocyclic NH_2-compounds in which NH or NH_2 attached to the aromatic nucleus (and also optionally a member of the heterocyclic nucleus) is *o*- or *p*- to the NH of the hydrogenated heterocyclic nucleus, *e.g.*, tetrahydroquinoxaline, 5-amino-2-methyldihydroindole, 6-amino-8-methoxy-1 : 2 : 3 : 4-tetrahydroquinaldine, is claimed to give fine-grained prints. H. A. P.

Production of multicolour photographic and kinematographic images and more particularly sound and picture films. B. GASPAR (B.P. 472,644, 26.3.36).—The film is composed of 4 layers arranged on one or both sides of a single support; 3 layers are dyed and sensitised to different colours, and the fourth layer contains a black, blackish, or grey dye, the emulsion being sensitised to at least one colour in respect of which one of the coloured layers is sensitive (it may be panchromatic) and may also be sensitised to the infra-red. The dye images may be produced by dye destruction either at image or non-image points, the Ag being subsequently removed, according to the arrangement of the layers; various combinations of layers and colours, with suitable methods of printing, are described. By exposure of the blackish layer to diffuse light through a variable diaphragm, the layer may be made to give increasing opacities to a max. and then again clearing, for the production of fading-in and -out effects. J. L.

Production of photographic pictures. SOC. CHEM. IND. IN BASLE (B.P. 473,115, 11.12.36. Switz., 11.12.35 and 10.12.36. Cf. B.P. 428,305; B., 1935, 607).—Negative and, preferably, also positive emulsions, prepared according to the prior patent and characterised by having parabolic characteristic curves with a max. γ in the shadows and a min. γ in the high-lights, with equal density ranges in the positive and negative material, are used for making photographs in which the final prints will show curves which are relatively straight and have greater γ in both the high-lights and shadows than in the middle tones. J. L.

Reproduction of monochromatic separated-colour partial pictures from a multicoloured original picture. B. BUBNOFF (B.P. 472,870, 28.12.35. Cf. B.P. 459,749; B., 1937, 502).—The apparatus of the prior patent is modified so that the light passing through three partial-colour records falls on to corresponding photoelectric cells which control nozzles delivering atomised pigments by means of compressed air, so that one united picture in three colours and three black-and-white pictures corresponding with the original colour-separation negatives are produced. By interposition of discs of varying transparency (optical wedges) in the path of the recording light for each picture, or by variation of the degree of amplification of the currents from the photoelectric cells, or by variation of the air pressure delivered to the colour-atomising chambers, each picture may be varied and hence corr. in intensity until the united colour picture produced is satisfactory in balance of colour. The three black-and-white records will then furnish corr. partial-colour records to be used in the prep. of printing blocks by the usual photomechanical methods. J. L.

Sensitising compounds.—See III. **Cyanine dyes.**—See IV. **Sound records. Lithographic printing surfaces.**—See XIII.

XXII.—EXPLOSIVES; MATCHES.

Combustion and detonation of solid explosives. M. PATRY (Z. ges. Schiess- u. Sprengstoffw., 1938, 33, 65—69).—The velocities of propagation of the explosion gases and of the shock wave have been determined in glass tubes (13 mm. in diameter) for 10-cm. columns of dynamite No. 1 (*d* 0·9 and 1·65), tetryl (*d* 0·55 and 0·9), $C_6H_2(NO_2)_3{\cdot}OH$ (*d* 0·7), Hg fulminate (*d* 1·5), and two Pb azide detonators, placed end to end, at varying distances (*L*) from the end of the explosive column. Both velocities decrease with increasing *L*, and for a given val. of *L* they increase with *d* of explosive and diameter of tube. They are independent of the length of column. For the first few cm. the velocity of propagation and of the gases ($\simeq$ 6200 m./sec.) is independent of experimental conditions, and therefore of the initial impulse. With explosives of low *d* it is > the velocity of detonation, but it decreases with diminishing *d* and tube diameter. (Cf. B., 1938, 461.) W. J. W.

Explosive characteristics of certain metallic picrates. J. D. HOPPER (J. Franklin Inst., 1938, 225, 219—225).—The sensitivity to explosion by heat and percussion of the picrates of NH_4, Na, Cu, Zn, Cd, Ni, Al, Cr, and Fe, and of $(NO_2)_2C_6H_3{\cdot}ONa$ is compared with that of certain standard explosives. In every case the sensitivity to percussion depends on the state of hydration, being least for the fully hydrated salts. For the anhyd. salts the order of increasing sensitivity is: Fe^{II}, Na, Al, NH_4, (picric acid), Cu = Cd = Zn, Cr (= tetryl), Fe^{III}, Ni, (Hg fulminate). A. R. PE.

Sensitiveness to shock of some explosive mixtures. T. URBANSKI (Z. ges. Schiess- u. Sprengstoffw., 1938, 33, 62—65).—Results with the falling wt. (2 kg.), calc. as min. energy (kg./cm.^{2}), for 10% of explosions and max. energy for 50% of explosions, are given for mixtures in various proportions of hexogen with tetryl, $C_6H_2(NO_2)_3{\cdot}OH$ (I), $C_6H_2Me(NO_2)_3$,

KNO_3, and KCl, tetryl and niperyth, and (I) and niperyth. The sensitiveness of a mixture of two explosives of different sensitiveness depends on the composition of the mixture and approaches the sensitiveness of the component that is present in the higher amount. Addition of about 10% of less-sensitive explosives to hexogen or niperyth increases the sensitiveness of these latter explosives. So also does addition of 5—60% of an O carrier (KNO_3) or a non-explosive substance such as KCl. 5% of hexogen or niperyth added to a substance, such as an aromatic NO_2-compound, of low sensitiveness gives a marked increase in sensitiveness. The increase is attributed to the mechanical effect of the crystals of the added substance. W. J. W.

Explosion waves and shock waves. V. Shock wave and explosion products from detonating solid explosives. W. PAYMAN and D. W. WOODHEAD (Proc. Roy. Soc., 1937, A, 163, 575—592).—The disturbance produced by the detonation of a freely suspended cartridge is recorded photographically. Three phases of the disturbance are described: (i) the detonation of the cartridge, (ii) a longer period during which the gaseous products are luminous and follow the shock wave at a gradually increasing distance; prominences due to solid particles appear in the wave-front at this stage, (iii) the prominences disappear and the wave becomes spherical and ultimately degenerates into a sound-wave. G. D. P.

Effect of shotfiring on mixtures containing firedamp. E. AUDIBERT (Rev. l'Ind. Min., 1938, No. 410, 61—80).—Investigations with arbitrarily selected explosives, but of distinct groups, showed that in firedamp mixtures, but not in contact with them, detonating explosives of the same group will ignite or not ignite the mixtures according as the quantity of heat, q, per unit vol. of the explosion gases is $>$ or $<$ a limit, h. This limit is a characteristic of the composition of the gases and not of their amount, and therefore not of the size of the explosive charge. The relation between different CH_4 mixtures and the vol. and composition of the gases is discussed. The composition of gases from a nitroglycerin, NH_4NO_3, and NH_4Cl mixture depends on a single parameter, which may be the ratio of nitroglycerin to NH_4NO_3, or the proportion, n, of free O_2 in the gases. The % vals. of n, the detonation temp., q in kg.-cal. per g.-mol., and the results of shot-firing on the firedamp mixtures are given for various explosive compositions, and a curve relating q and n shows the explosives, designated by their velocity of detonation, which do or do not ignite firedamp, when fired in a closed mortar. The mechanism of ignition is discussed. In an investigation of the safety of grisoudynamites, the effect of adding a reducing agent, such as cellulose or paraffin, to a ternary mixture of nitroglycerin, NH_4NO_3, and NaCl was studied. A composition containing nitroglycerin 14·75, NH_4NO_3 32·50, NaCl 47·75, and wood flour 5·00 had: $n = 0$, $q = 17·316$, detonation temp. 2012°, useful calorific power 35,290 g.-cal./100 g., Pb block 53. Its brisance was 70% of that of grisoudynamite-couche. Shots with paper-wrapped cartridges, fired in either open or closed mortars, 12·5—150 cm. long, failed to ignite firedamp mixtures. W. J. W.

Determination of nitroglycerin. H. SHANKSTER and T. H. WILDE (J.S.C.I., 1938, 57, 91—92).—Nitroglycerin can be rapidly determined by means of standard aq. $TiCl_3$, 6 mols. of $TiCl_3$ being required for the reduction of each $O·NO_2$. The presence of propellent stabilisers and restrainers such as centralite, $NHPh_2$, vaseline, diamyl phthalate, etc. does not interfere with the determination.

Nitrocellulose.—See V.

PATENTS.

Explosive. G. M. NORMAN and C. D. BITTING. Assrs. to HERCULES POWDER CO. (U.S.P. 2,062,011, 24.11.36. Appl., 13.9.33).—Cellulose sponge or foam (I) as a carbonaceous material for explosive compositions is prepared by mixing viscose solution, of up to 10% concn., with fibrous material, *e.g.*, cotton, hemp, or flax, and a H_2O-sol. salt, *e.g.*, Na_2SO_4. The mixture is moulded, heated with steam at 10 atm. to remove the salt, and dried. A suitable composition consists of nitroglycerin 9, nitroglycol 3, NH_4NO_3 65, $NaNO_3$ 8, and (I) in ⅛-in. pieces 15%. The cartridge count of this explosive is 574 cartridges (1¼ in. × 8 in.) per 100 lb. as compared with 478 for a similar dynamite containing balsa wood, and the detonation velocity is 1575 m./sec. W. J. W.

Wrapping for explosives. M. BRANDT, Assr. to ATLAS POWDER CO. (U.S.P. 2,061,558, 24.11.36. Appl., 1.7.33).—An outer sheet of embossed Al foil is intimately attached by a binding agent (varnish, asphalt, latex, etc.) to an inner sheet of paper so that the whole wrapper retains the resilience of the paper, the Al sheet acting as a protection against external moisture and internal exudation and also, owing to its embossed surface, against the effects of light and heat rays. W. J. W.

Track torpedo. L. A. SHERMAN, Assr. to SAFETY TORPEDO CORP. (U.S.P. 2,061,854, 24.11.36. Appl., 20.4.36).—$KClO_4$ is intimately mixed with finely-divided carbonaceous material (wood flour), a granular abrasive (sand), and a waterproofing nitrocellulose binder. W. J. W.

Charges for gas-pressure-operated blasting devices. J. TAYLOR, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 481,166, 4.9.36. Addn. to B.P. 453,210; B., 1936, 1133).—A suitable charge includes, in the gas-evolving composition, $\not>4$ wt.-% of combustible carbonaceous material, most of which is segregated from the remainder of the gas-evolving composition in a coherent form and partly in the neighbourhood of the igniter. The combustible material may take the form of a paper tube surrounding the igniter. D. M. M.

Manufacture of liquid sprays. C. IDDINGS (U.S.P. 2,070,167, 9.2.37. Appl., 23.9.32).—A main liquid is made self-propelling by admixture with a volatile propellent liquid of b.p./1 atm. $<25°$, both liquids being cooled to below that b.p. (the latter by self-evaporation) before mixing, and the mixture being stored in a sealed container. Examples claimed are:

p-$C_6H_4Cl_2$, $C_2H_4Cl_2$, CCl_4 and natural gasoline; extract of pyrethrum in light petroleum and MeCl; CCl_4, $CHCl_3$ and CCl_2F_2. B. M. V.

Match-striking composition. R. S. PULLEN, Assr. to PULLENLITE Co. (U.S.P. 2,062,191, 24.11.36. Appl., 18.7.32).—Red P is mixed with a waterproofing agent, such as a solution of nitrocellulose in $COMe_2$, $COMe_2$ being selected in preference to other org. solvents on account of the increased sensitiveness it imparts. To prevent deterioration from the action of moist air during the drying of the composition, this operation must be carried out at about 80°. W. J. W.

Hg salts.—See XX.

XXIII.—SANITATION; WATER PURIFICATION.

The air we breathe. A. F. DUFTON (J. Inst. Heat. Vent. Eng., 1937, 5, 200—223).—The effect of human respiration in enclosed spaces on air composition and odour, and the ventilation of rooms in relation to the health of the occupants, are discussed. R. B. C.

Air conditioning. E. L. JOSELIN (J. Inst. Heat. Vent. Eng., 1937, 5, 297—316).—The principles and applications of air conditioning are discussed. Air temp. and R.H. recommended for various industries are tabulated. R. B. C.

Air-conditioning practice [in industrial operations]. V. P. VICTOR (Paper Trade J., 1938, 106, TAPPI Sect., 135—143).—The main principles underlying the design of various types of air-treating systems are outlined. Basic methods and equipment, and typical installations and their performance, are described. H. A. H.

Sanitary aspects of air conditioning. C. P. YAGLOU (Amer. J. Publ. Health, 1938, 28, 143—147; cf. B., 1937, 846).—Comfort, health, and therapeutic aspects are discussed. Room temp. should be ~25° in winter and 7° below outside temp. in summer. Air movement should be $\ngtr$20 ft. per min. in winter. R.H. has little effect on comfort, but should be between 20 and 40%. W. L. D.

Pertinent information about mine gases. ANON. (U.S. Bur. Mines, 1938, Inf. Circ. 6983, 15 pp.).—A brief outline of the sources, properties, physiological effects, and methods of detection of gases likely to be present in mine air under normal operating conditions, as well as under abnormal conditions that may arise during mine fires and after explosions, is presented. The gases include CO_2, CO, H_2, CH_4, C_2H_2, SO_2, H_2S, and NO_2. H. C. M.

Poisoning by [inhalation of] carbon oxides and benzene vapour and diseases due to tar and pitch. R. BARTHE (J. Usines à Gaz, 1938, 62, 32—40).—The subjects are reviewed in the light of recent researches. A. R. PE.

German people's gas mask. F. BANGERT (Angew. Chem., 1938, 51, 209—212).—The mask includes an absorptive layer of active C intermingled with fibrous material, an arrangement which yields a reduction in size as compared with separate dust filters and adsorptive systems. Tests show that the adsorbent remains efficient until 100 l. of air containing 40 g. per cu. m. of $CCl_3{\cdot}NO_2$ have been passed through it. Methods of testing the deterioration of the filter either in use or in store are discussed. J. W. S.

Use and care of respirators. ANON. (Air Hyg. Found. Amer., 1938, Bull. 2, Pt. 2, 7 pp.).

Effect of water on production of industrial dust. H. H. WATSON (J. Ind. Hyg., 1938, 20, 155—160).—Sandstone was chiselled in various states from dry to wet, and the dust produced was sampled with a thermal precipitator, after mixing with a fan. Dry stone gave the greatest wt. of dust, but the wet stone gave a particle count 5 times as great as the dry stone; the effect of moisture was the more pronounced the higher was the H_2O content of the stone, provided there was no H_2O lying on the surface. All the particles from wet stone were <5 μ. Similar comparisons of dust produced in industrial processes showed a much smaller particle size in the wet process, but the particle counts were variable. E. M. K.

Photographic identification of atmospheric dust particles. W. D. FOSTER and H. H. SCHRENK (U.S. Bur. Mines, 1938, Rept. Invest. 3368, 10 pp.).—A method of identification, based on the measurement of optical properties and involving a study of the sample under a microscope, using dark-field illumination and oil immersion, has been worked out for determining the max. quantity of quartz in it. D. K. M.

Characteristics of the Bausch and Lomb dust counter. S. W. GURNEY, C. R. WILLIAMS, and R. R. MEIGS (J. Ind. Hyg., 1938, 20, 24—35).—The instrument is, in principle, an Owens jet dust counter with certain additions. A comparison of simultaneous samples from artificially produced and factory dust clouds, counted by the Greenburg–Smith (G.–S.) impinger and the Bausch & Lomb (B.–L.) instrument, showed a very variable (G.–S.)/(B.–L.) ratio, the variation depending primarily on the size range of the dust; the finer is the dust the greater is the ratio. In the B.–L. instrument a varying slit size affected the count; at 0·3 mm. the collecting efficiency began to decrease for low concns. of fine dust, and to increase for high concns. of coarser dusts. The mean size particle collected was the greater with the G.–S. instrument; with the B.–L. dust counter it was greater with a 0·4-mm. slit than with a 0·1-mm. slit. Reducing the speed of pull reduced the dust collected when a 0·4-mm. slit was used. E. M. K.

Resorption [absorption] capacity of the skin for cosmetic bases. C. BAUSCHINGER (Fette u. Seifen, 1938, 45, 186—189).—Methods for testing the penetrative properties of cosmetic bases (salves etc.) when applied to the skin are discussed. E. L.

Cosmetics. I. II. Pharmacology of cosmetics. H. LIESEGANG (Fette u. Seifen, 1937, 44, 500—505; 1938, 45, 189—195).—I. Preliminary. The histology, physiology, and biology of the skin are discussed with reference to the resorption of medicaments etc. applied externally.

II. Powders, pastes, salves, skin oils, etc. and the

raw materials used in their prep. (including natural fats and waxes and artificial preps. such as "Lanette-wax"), are considered. E. L.

Bath salts and fluids. S. P. JANNAWAY (Perf. & Essent. Oil Rec., 1938, 29, 80—84).—A review of the materials used, with notes on the manufacture etc. of bath preps. including salts and cubes, foam preps., oils, milks, waters, and dusting powders. T. F. W.

Germicidal efficiency of hypochlorites of high and low alkalinity. S. M. COSTIGAN (J. Bact., 1937, 34, 1—8).—Higher initial alkalinity is associated with somewhat lower efficiency. Plate counts and dilution methods show general agreement although the latter give a consistently higher estimate of the bacterial population. A. G. P.

Random sampling error as a possible answer to the apparent variations in antiseptic test data. A. R. CADE (J. Amer. Pharm. Assoc., 1937, 26, 1233—1240).—Discrepancies in results obtained by Vicher *et al.* (A., 1937, III, 397) and Reddish (B., 1936, 1182) are possibly due to random sampling errors. Data are tabulated indicating that with 1 : 80 PhOH at 37° and a standard test organism, negative results may amount to 35%. No changes affecting test results occur in 5% PhOH or test dilutions on keeping for several months. A method of determining the comparative resistance of test organisms is described. F. O. H.

New synthetic insecticide. N. TISCHLER and A. VIEHOEVER (Soap, 1938, 14, No. 2, 109—111, 113, 115, 117, 119, 121, 123).—Tests are described showing the efficacy as insecticides of arylthiocarbimides and, in particular, of the α-naphthyl derivative (I) towards houseflies, clothes-moth larvæ, carpet-beetles, etc. (I), m.p. 55·5°, is non-staining, stable, practically colourless and odourless, and amply sol. in the usual insecticide diluents, and also appears to be non-injurious to warm-blooded animals and the human skin when applied in such dilutions as would be used for insect control. Preliminary tests suggest its possible usefulness as a plant-spray insecticide. E. L.

Reducing the volume of oil necessary to kill mosquito larvæ. J. M. GINSBURG (J. Econ. Entom., 1937, 30, 328—332).—Toxicity of kerosene to the larvæ is increased 4-fold by addition of 0·1—0·4% of pyrethrin. A. G. P.

Statistical analysis of fly-mortality data. C. A. MURRAY (Soap, 1937, 13, No. 8, 88—99, 101, 103, 105).

Dosage–mortality in the Peet–Grady method [of evaluating liquid insecticides]. C. A. MURRAY (Soap, 1938, 14, No. 2, 99—103, 123, 125).—Dosage–mortality curves connecting various concns. of total pyrethrins with % of males or females killed in modified Peet–Grady tests (cf. *supra*) are presented. It is shown that such data can be satisfactorily evaluated by Bliss' statistical methods (B., 1935, 823), which will yield a consistent and accurate estimate of the toxicity or toxic content of a given sample, and such accuracy is obtainable by the use of fewer flies and fewer tests per sample than have hitherto been required for accepted standards. In comparing insecticides, the kills of male and female flies should be treated separately, as the susceptibilities of the sexes differ, and, moreover, the female susceptibilities do not increase uniformly (as is the case with the males) over the whole range of 0—80% kill. Badertscher and Sullivan's recommendation (B., 1937, 1281) to dilute insecticides to yield about 50% kill before testing is supported. E. L.

Envelope pit privy. E. L. CALDWELL (J. Infect. Dis., 1937, 61, 264—269).—The pollution from drainings from a privy, 8 ft. deep, dug in sandy soil overlying a clay bed was examined by making exploratory borings and studying the seasonal rate of flow of the ground-H_2O. Diffusion of *B. coli* through sandy soil was considerable, but the interposition of an envelope of fine-textured soil around the latrine and reaching into the ground-H_2O stopped dangerous contamination. W. L. D.

Pollution flow from pit latrines when an impervious stratum closely underlies the flow. E. L. CALDWELL (J. Infect. Dis., 1937, 61, 270—288).—Pollution streams downhill from a pit latrine and bored latrines dug in sandy soil lying on clay carrying ground-H_2O were mapped for various months. Only minor differences, depending on rate of ground-H_2O flow and latrine conditions, occurred. Bored latrines showed conditions of self-filtration sooner. On a slope of 1 in 12, *B. coli* were found 80 ft. away and gross pollution occurred at 40—60 ft. In time pollution decreased in area. W. L. D.

Oxidation of sewage by bacteria in pure culture. C. T. BUTTERFIELD (J. Bact., 1937, 34, 207—219).—Pure cultures of activated-sludge bacteria rapidly oxidised pollutional matter. Observations on the mechanism of sewage purification are discussed. A. G. P.

Chemical precipitation [in sewage purification]. N. G. DAMOOSE (Munic. Sanit., 1936, 7, 8—13).—Chemical coagulation, using $FeCl_3$, increased the removal of solids and lowered the Cl_2 requirement. CH. ABS. (*p*)

Bulking of activated sludge. W. A. LARSON (Munic. Sanit., 1936, 7, 52—54).—Activated sludge passes through a cycle of changes controlled by relative growth of bacteria and protozoa. Bulking results from disturbance of the ratio bacteria/protozoa and is largely prevented by adjustment of return solids. CH. ABS. (*p*)

Reducing [sewage-]plant odours. W. J. SCHIVEREA (Munic. Sanit., 1936, 7, 26).—30—35 p.p.m. of o-$C_6H_4Cl_2$ destroyed odour at the inlet of a sewage-disposal plant. CH. ABS. (*p*)

Biochemical oxygen demand bottle and filling tube. B. D. ARCHER (Water Works, Sewerage, 1936, 83, 102).—A ½-pint milk bottle fitted with glass stopper is adapted for the purpose. CH. ABS. (*p*)

Physiological aspects of mineral salts in public water supplies. S. S. NEGUS (J. Amer. Water Works Assoc., 1938, 30, 242—264).—The physiological effect of Cu, Al, As, Pb, Fe, Na, K, Zn, Se, B, Mn, Ra, Ag, Ba, hard waters, caustic alkalinities, F′, I′,

Cl′, SO_4'', CO_3'', total solids, and C_5H_5N from by-product NH_4 salts in drinking waters and their safe limits are discussed. The presence of inorg. salts is more important to industry than for drinking-H_2O as very few have been proved detrimental to public health at the concn. at which they normally occur in drinking-H_2O, and if excessive (except Pb and F) the taste factor would prevent ingestion. It is concluded that the Cu, caustic alkalinity, and Zn limits defined in Appendix IV, U.S. Public Health Service Water Standards, could safely be made less strict, the Pb limit maintained, and limits might be applied to F′, Ba, and Se. O. M.

[Water-]corrosion problem in Cambridge, Mass. M. C. WHIPPLE (J. New England Water Works Assoc., 1937, **51**, 376—379).—After CaO treatment of H_2O to remove CO_2 and give a p_H of about 8·4, Fe pipes showed less corrosion, but Cu pipes appear best suited to service with this H_2O. O. M.

Influence of dissolved oxygen in accelerating the corrosive action of water. F. W. GILCREAS (J. New England Water Works Assoc., 1937, **51**, 380—383).—Results show that little corrosion occurs in Long Island pipe-lines in spite of the dissolved O_2 content of the H_2O, which, according to electrochemical theory, controls the rate of corrosion. A protective Fe_2O_3 layer probably forms. Seasonal "red-H_2O" is probably due to sloughing-off of this coating, due to temp. changes. O. M.

Neutralisation of corrosive action [of waters]. R. S. WESTON (J. New England Water Works Assoc., 1937, **51**, 384—389).—Removal of CO_2 from cold H_2O by aëration or alkali (Na_2CO_3 or CaO), and from hot-H_2O systems by Na silicate, marble, and Magnodouble salt (I) ($MgO,CaCO_3$) is discussed. (I) is obtained by roasting dolomite and reacts with 3 mols. of CO_2 in the H_2O to form the mixed bicarbonates. O. M.

Treatment of natural waters to prevent and control corrosion. C. W. BORGMANN (J. Amer. Water Works Assoc., 1938, **30**, 265—272).—The three main types of corrosion, *i.e.*, the general attack where rusting continues under a porous layer of corrosion product, severe local pitting resulting in rapid failure, and the formation of a perfectly protective film from the corrosion products, are discussed together with the factors affecting them. Methods of protecting against corrosion in natural waters by adding sol. salts (*e.g.*, $CaCO_3$) and inhibitors (Na_2CrO_4, Na_2SiO_3, etc.) to maintain the surface film in perfect repair, and also substances to cause the rust layer to be less permeable to O_2, and by using stainless steel are examined. O. M.

Operating experiences with iron and iron coagulants in water treatment. M. PIRNIE (J. New England Water Works Assoc., 1937, **51**, 437—453).—Results of Fe^{III} salts as coagulants for different waters are discussed. O. M.

Pretreatment with iron salts solves [water-] clarification problem. E. L. E. ZAHM (Water Works, Sewerage, 1936, **83**, 89—90).—Addition of dry $FeSO_4$ to raw H_2O approx. 1 min. before that of $Ca(OH)_2$, soda ash, and Na aluminate gave a clear effluent having <0·5 grain of hardness per gal. CH. ABS. (*p*)

Purification of water with respect to schistosome cercariæ. G. WITENBERG and J. YOFE (Trans. R. Soc. trop. Med. Hyg., 1938, **31**, 549—570).—Clarification of H_2O by $Al_2(SO_4)_3$ and/or CaO, high pressure up to 200 atm. for 6 hr., and standard filtration of H_2O through sand do not kill the cercariæ of *Schistosoma*. p_H 11·5—11·6 kills them, especially in presence of $Al(OH)_3$ flocs, but is of no practical val. Cl in any form kills cercariæ, the rate depending on the quantity of active Cl in the treated H_2O and the form of Cl used. NH_2Cl appeared most effective. C. J. C. B.

Chlorination of water. L. T. LE G. BURLEY (Chem. and Ind., 1938, 241—242).—Modern methods of purification and sterilisation of H_2O are reviewed. O. M.

The lime-soda and lime-baryta processes of water purification. O. T. KORITNIG (Milch. Zentr., 1938, **67**, 88—91).—A review. I. C. R.

Electrolytic purification of water. G. A. ELLIOTT (J. Proc. Austral. Chem. Inst., 1938, **5**, 77—88).—The theory of the process is outlined and the construction and operating conditions of the Siemens and Billiter cells are compared. A note is appended on the base-exchange method of purification, utilising acid-functioning synthetic resins prepared from polyhydric phenols. J. W. C.

Removal of iodoform-like chlorophenol state from potable water. J. WOLBER (Gas- u. Wasserfach, 1938, **81**, 236—238).—Active C removes phenolic impurities which impart taste to H_2O on chlorination, provided contact is sufficiently prolonged and intimate. This condition is fulfilled by adding powdered C to the H_2O as it passes to the fine-sand filter, whereas filtration through granular C (B., 1932, 292) is not completely effective. A. R. PE.

Carborundum plates [for water filtration] at Grand Rapids, Michigan. H. T. CAMPION (Michigan Eng. Exp. Sta. Bull., 1936, No. 66, 25—27).—Use of the plates (0·25 in. thick) increased rates of flow without excessive deposits of $CaCO_3$. A method of cleaning the plates is devised. CH. ABS. (*p*)

"Sinterite" jointing for socketed water-pipes. II. O. HANNEMANN (Gas- u. Wasserfach, 1938, **81**, 151—156; cf. B., 1937, 1414).—The material is inferior to Pb in resistance to pressure and to axial stresses. A. R. PE.

Determination of hardness of waters containing phosphates. H. LIANDER and L. SIMONSSON (Iva, 1937, 29—31; Chem. Zentr., 1937, **108**, ii, 2411).—Experiments made on H_2O containing up to 390 mg./l. of P_2O_5 (as Na_3PO_4) showed that the quantity of soap used in Blacher's method of determining hardness increases with increasing P_2O_5 content as a result of buffer action; in Clark's method the soap consumption decreases with increasing P_2O_5 content. The corrections necessary are shown by means of a graph. No corrections are required for H_2O containing <20 mg./l. of P_2O_5. R. B. C.

Determination of nitrates in water by means of diphenylamine. S. V. BRUEVITSCH and E. S. BRUK (J. Appl. Chem. Russ., 1937, **10**, 2144—2152). —NO_3' (0·01—5 mg. of NO_3'-N/l.) may be determined by $NHPh_2$ methods. Very highly-coloured H_2O, or H_2O containing > 5 mg. of Fe/l., may be coagulated with $Al_2(SO_4)_3$–Na_2CO_3, but the [NO_3'] found for the filtrates are the actual vals. R. T.

Iodometric determination of sulphates in water. W. SKÓRECKI (Arch. Chem. Farm., 1937, **3**, 218—231).—5—10 drops of conc. HCl and 20 c.c. of standard $BaCl_2$ (2 l. of solution contain 2·5449 g. of $BaCl_2,2H_2O$ and 20 c.c. of conc. HCl) are added to 100 ml. of the H_2O, and the solution is boiled and cooled. 20 c.c. of $K_2Cr_2O_7$ solution (2·7581 g. of $K_2Cr_2O_7$ in 2 l.) and 1 drop of 10% $AlCl_3$ are added, the solution is made neutral to litmus with 10% aq. NH_3, the vol. made up to 200 c.c., and the solution filtered. 50 c.c. of 10% HCl and 2 g. of $KHCO_3$ are added to 100 c.c. of filtrate, followed by 0·2—0·5 g. of KI, and the solution is titrated after 15 min. with standard $Na_2S_2O_3$. If *a* c.c. of *m*N-$Na_2S_2O_3$ are required, the SO_4'' content of the sample is $am - p$, where p is the no. of c.c. of $Na_2S_2O_3$ used in a blank test with distilled H_2O. Should the oxidisability of the H_2O be >8 mg. of O_2 per l., org. matter should be removed by shaking with active C. If the H_2O contains >1 mg. of Fe per l. it should be eliminated by the usual procedures. R. T.

Analytical methods in agricultural chemistry. V. Determination of soluble silica in drinking and natural waters. L. URBÁNYI (Mezőg. Kutat., 1937, **10**, 229—236).—The method is based on the formation of Mo-blue by reduction of silicomolybdic acid with quinol–$NaHSO_3$. A. G. P.

Detection and colorimetric determination of aluminium in water in presence of fluorides. G. GAD and K. NAUMANN (Gas- u. Wasserfach, 1938, **81**, 164).—The hæmatoxylin method (B., 1937, 298) is not affected by F′ provided it is carried out in alkaline [$(NH_4)_2CO_3$] solution. A. R. PE.

Colorimetric determination of fluorides in water. G. GAD and K. NAUMANN (Gas- u. Wasserfach, 1938, **81**, 183—185; cf. preceding abstract).—The hæmatoxylin–$Zr(NO_3)_4$ method is accurate and modifications of it suitable for various conditions are described in detail. A. R. PE.

Serial method of determining small amounts of iron in water. A. Z. SUVOROVA and S. V. SMIRNOVA (Zavod. Lab., 1937, **6**, 1282—1283).—Mass determination of Fe in H_2O by the Stokes method is described. R. T.

Volumetric determination of small amounts of boron in natural waters. N. V. TAGEEVA (J. Appl. Chem. U.S.S.R., 1935, **8**, 528—534).—In spring and sea-waters 2 mg. of B_2O_3 may be titrated with 0·1N-alkali (to phenolphthalein) without predistillation (error 0—3%); 7 mg. of B_2O_3 may be titrated with 0·02N-alkali (phenol-red) with 0—5% error. Al_2O_3 present is removed prior to titration. With a preliminary distillation 1—15 mg. of B_2O_3 are titratable in presence of small amounts of H_2SO_4. CH. ABS. (*p*)

Modification of the "4-hour" method of determining organic matter in waste waters. M. KMÍNEK and O. M. SIMÁK (Z. Zuckerind. Czechoslov., 1937, **62**, 25—28).—Instead of determining the unused MnO_4' iodometrically, the procedure recommended is to add a solution of Mohr's salt [20 c.c. of a solution containing 13 g. of $Fe(NH_4)_2(SO_4)_2$ and 5 c.c. of conc. H_2SO_4 acid per l.] and to titrate with 0·0625N-$KMnO_4$, having previously added 10 drops of a 0·1% solution of Erioglaucin-A, which intensifies the pink coloration at the end-point. J. P. O.

Determination of phenols and acids in effluent waters from pyrogenic decomposition of fuel. M. I. LAPSCHIN and Z. V. NIKOLAEVA (Zavod. Lab., 1937, **6**, 1455—1460).—The solution is acidified and boiled, to eliminate H_2S, CO_2, and SO_2, and then steam-distilled, and the distillate is conductometrically titrated with standard NaOH, to give the phenol + volatile acid content. A second portion of distillate is titrated with standard aq. NH_3, to give the phenol content; the acid content is given by difference. R. T.

Working up waste pickling liquors. I. Review of the various methods. F. HEINRICH. **II. Importance of the pickling-water problem for water economy.** M. PRÜSS. **III. Individual methods: (*a*) Agde process.** G. AGDE. **(*b*) Sulfrian process.** A. SULFRIAN. **(*c*) Plant for recovering waste water in continuous pickling practice and with constant sulphuric acid concentration.** F. SIERP and F. FRÄNSEMEIER. **(*d*) Recovery by two crystallisations.** J. DROOFF. **(*e*) Feracid bright-pickling process.** W. HEIMBERGER (Stahl u. Eisen, 1937, **57**, 757—762, 762—764, 789—793, 813—815, 815—817, 838—839, 839—840).—I. A crit. review of the journal and patent literature.

II. Waste pickling liquor cannot be passed directly to the rivers since it deprives the H_2O of O_2 and results in the development of a large amount of colloidal Fe^{III} compounds which adsorb organisms on which the fish and other H_2O-life feed. The importance of these points in the Ruhr district of Germany is discussed.

III (*a*). In the Agde process the make-up acid is used for salting-out the $FeSO_4,7H_2O$, cooling being effected in a series of vac. coolers connected to a centrifuge for removing the acid liquor for re-use.

III (*b*). A schematic plan of the cyclic Sulfrian process is given and briefly discussed; it is a modified Agde process.

III (*c*). The [$FeSO_4$] in the acid solution is reduced by dehydrating part of the $FeSO_4,7H_2O$ crystals and returning the $FeSO_4,H_2O$ to the cold acid mother-liquor. In this way the acid concn. can be kept const. by continuous addition of wash-H_2O after removal of $FeSO_4$.

III (*d*). For pickling steel strip 18% H_2SO_4 is used and the liquor passes to the crystallisers when the [H_2SO_4] has fallen to 2% and the [$FeSO_4,7H_2O$] is 600 g./l. The liquor is cooled with agitation to 20° and the crystal sludge removed; H_2SO_4 is added to the mother-liquor to 28% and the liquor cooled with aq. $CaCl_2$ to 0° to recover more $FeSO_4,7H_2O$. The

final acid liquor is diluted to 18% with wash-H_2O.

III (*e*). In the Feracid process the pickling liquor consists of a solution of Na_2SO_4 containing only 5—10 g./l. of Fe; owing to hydrolysis of the Fe^{III} salt at the pickling temp. (70°) the solution contains about 0·1% of free acid, which is sufficient to produce a bright surface on the metal pickled. No Fe accumulates in the solution, which therefore requires no regeneration but only compensation for drag-out; all the Fe oxide removed from the metal surface is deposited in a flocculent condition at the bottom of the tank, and after washing with hot H_2O is practically chemically pure and dries to a fine-grained powder. If the metal to be pickled is covered with scale this is first removed by treatment with dil. H_2SO_4, which flakes it off, and the metal can then be immersed in the bright pickle without washing. A. R. P.

Flocculation. Analysing dusts.—See I. **Coal-washery effluent. Determining benzol in the atm.**—See II. **Refrigeration in rayon plants.**—See V. **Pb water-pipes. Plating and health.**—See X. **Spermaceti etc. in cosmetics. p_H measurements in cosmetic industry.**—See XII. **H_2O in the bread factory.**—See XIX.

See also A., I, 215, **Micro-analysis of H_2O.** III, 334, **Toxicity of some Me derivatives of C_6H_6. Latent benzol poisoning.** 335, **Food poisoning. Poisoning by cheese in Greece.** 336—7, **Industrial hygiene.**

PATENTS.

Treatment of dust-laden air, involving wetting. F. S. W. DOBBS and J. ANDERTON (B.P. 479,857, 12.8. and 2.10.36).—Dusty air from conveyor discharging points in mines or the like is collected in a hood and passed through an unobstructed duct at an early point in which, when moving at max. velocity, it is treated with a mist of wetting agent and at later points, under suitably different conditions of velocity and pressure, the wetted dust is caused to deposit on the walls of the duct. B. M. V.

Air purification. A. T. MASTERMAN (B.P. 480,176, 17.8.36).—Hypochlorite (I) solution (5 g. of active Cl per l.) is vaporised, so as to be substantially free from aq. particles, in an atomiser operated by a gas (or air) containing enough CO_2 to decompose the (I); *e.g.*, O_2 containing 5% CO_2 is claimed. B. M. V.

Filters and purifiers employed for conditioning air, *e.g.*, for respiration, or other gas by freeing it from poisonous gases and other injurious or undesired constituents. SOC. ITAL. PIRELLI (B.P. 480,507, 9.7.37. Ital., 11.7.36. Addn. to B.P. 445,457; B., 1936, 622).—The danger-indicating substance which is possessed of insulating qualities when fresh is selected to be rendered conducting by the noxious substance which the filter ought to remove from the air, and should not be affected by moisture; *e.g.*, it may comprise SiO_2 gel. B. M. V.

Composition [for use] as deodorant and for application to the human skin. W. C. MOORE (B.P. 480,379, 29.10.36).—A composition for tropical use comprises EtOH, PrOH, or similar solvent, $AlCl_3,6H_2O$ and/or $ZnCl_2$, Al or Zn stearate or the like, a wax, *e.g.*, candelilla or carnauba, and perfume. B. M. V.

Manufacture of a dentrifice. H. LA V. CROWTHER and D. E. KEECH (B.P. 472,679, 20.12.35).—Wax, *e.g.*, ceresin, is incorporated in a mixture of cleansing agent, antiseptic, and polishing material to form a tooth powder or paste. *E.g.*, a dentifrice consisting of $NaBO_3$, MgO, $NaHCO_3$, NaCl, $CaCO_3$, borax, ceresin, and a soap, with flavourings etc., is claimed. E. H. S.

[Preparation of] dentrifice. PEPSODENT CO. (B.P. 472,812, 23.12.35. U.S., 6.2.35).—Insol. $NaPO_3$ ground to particles of $\ngtr 35\ \mu$. is used either alone or mixed with flavouring and massing agents (gum tragacanth) or diluents. E. H. S.

Production of a preparation for destruction of vermin. H. HAAG (B.P. 473,769, 8.5.36).—Mixtures of allyl-mustard oil ($\ngtr 10$ pts.) and CCl_4 ($\nless 90$ pts.) are claimed for fighting vermin (gnats, ants, moths, mice, etc.). They are fireproof, non-explosive, and safe to human skin. O. M.

Comminuting solids and straining liquids. Dehumidifying air.—See I. **Combustion of waste furnace gases.**—See II. **Dialkylamino-phosphorus fluorides.**—See III. **Insecticides. Treating domestic manure.**—See XVI.

Furnace for incineration of household refuse. P. LORTON (U.S.P. 2,069,584, 2.2.37. Appl., 26.1.33. Fr., 29.1.32).—A shaft furnace of moderate height is provided with (in order downwards): a charging bell, a rotary distributor, a rotary hearth having a central conical upstanding air inlet and agitator, a clinker crusher, a screen to retain uncrushed metallic particles, and suction means to remove pulverised clinker. B. M. V.

Settlement tanks for treatment of sewage and other foul waters. ADAMS-HYDRAULICS, LTD., and R. F. COAKILL (B.P. 473,962, 22.2.36).—A tank, divided into upper and lower chambers by a conical guttered floor, over which a scraper moves rotationally, is claimed. The sewage is conveyed by pipe to the lower chamber, past a baffle, through an opening in the floor to the upper chamber; the deposited sludge is scraped to the gutter and led by conduits to catchpits. O. M.

Sanitary fermentation and dehydrating apparatus. J. B. GOLDSBOROUGH (U.S.P. 2,062,264, 24.11.36. Appl., 23.9.31).—Cells of easy-to-clean hygienic design are claimed for the conversion of garbage etc. into humus-like matter suitable for fertiliser, by fermentation in thin layers on perforated trays, means being provided for collecting and draining away all condensing H_2O to prevent rotting of the org. matter. The cells may be sealed or subjected to induced air. The heat of fermentation is utilised. O. M.