

Societies and Academies.

LONDON.

Royal Society, May 30.—O. W. Richardson and P. M. Davidson: The energy functions of the H_2 molecules. The terms in the expansion of the force function are determined for certain states by various methods and show satisfactory agreement. Negative total energies, heats of dissociation and other constants of about thirty H_2 states are tabulated. Curves are drawn for the mean kinetic energy of the electrons of certain states at various nuclear separations. An appendix contains a theorem on the mean energy of a system of particles in any condition of periodic motion, when some of the particles are fixed.—E. K. Rideal, C. P. Snow, F. I. G. Rawlins, and A. M. Taylor: Infra-red investigations of molecular structure (1).—C. P. Snow, F. I. G. Rawlins, and E. K. Rideal: Infra-red investigations of molecular structure (2). The vibration-rotation band spectrum of nitric oxide proves to be a fundamental, with its centre at 1882.9 cm^{-1} , with the fine-structure consisting of P , Q , and R branches with at least 42 rotation bands in each of the P and R branches. The molecular constants derived from the separation of the fine-structure bands (3.35 cm^{-1}) corresponds almost exactly with those obtained from electronic band spectral data. The presence of a Q branch is in accordance with the gyroscopic character of an odd-electron molecule. The facts relating to the ground state of nitric oxide, its physical magnitudes, and its electronic angular momentum about the nuclear axis, form a consistent whole.—A. Müller: The connexion between the zig-zag structure of the hydrocarbon chain and the alternations in the properties of odd and even numbered chain compounds. Starting from the fact that the CH_2 -groups are arranged in a zigzag line, it is shown that there must exist an essential difference in the structure of the odd and even numbered substances. This difference accounts for the alternations of properties.—O. W. Richardson and F. S. Robertson: The emission of soft X-rays by different elements at higher voltages.—L. P. Davies: The soft X-ray emission from various elements after oxidation. The effect of oxidation on the total soft X-ray emission from the following elements has been studied: Silicon, manganese, iron, cobalt, nickel, copper, molybdenum, palladium, and tungsten. The efficiency of the oxide seems to be the average efficiency of the oxygen and element present.—D. L. Chapman and W. K. Hall: A study of the catalysis by silver of the union of hydrogen and oxygen. The new method of Hughes and Bevan was used and the conclusions confirmed by direct measurements of the falls of pressure which occur when the gases, separately and mixed together, are brought into contact with a large surface of silver. The mechanism of the action seems to be one of alternate reduction and re-oxidation of an oxide film. The fact that a film formed at low temperature is more effective than one formed at a higher temperature suggests that some of the molecules of silver oxide in the former are in relatively unstable positions, and therefore more active chemically.—R. H. Fowler and A. H. Wilson: A detailed study of the 'radio-active decay' of, and the penetration of α -particles into, a simplified one-dimensional nucleus. The authors solve exactly for a simplified nucleus the problem of α -particle disintegration (determination of the complex characteristics of the wave-equation with the proper boundary conditions), and discuss the converse problem of the penetration of an α -particle into the nucleus from without.—G. I. Finch and D. L. Hodge: Gaseous combustion in electric discharge (3). Com-

bustion of dry detonating gas in the direct current discharge is primarily determined by the ionisation of both the constituent molecules of the gas. Electrostatic forces keep apart positively charged ions, unless such forces are counteracted by some other agency; one such agency is negatively charged metal atoms sputtered from the cathode which, by forming electrically neutral metal-gas complexes with positive ions, overcome electrostatic repulsion and thus enable combustion to proceed.—G. I. Finch and J. C. Stimson: The electrical condition of hot surfaces during the adsorption of gases (3). A hot platinum surface exhibits a charge when *in vacuo* or in contact with gases. With alternate treatment with oxygen and hydrogen at 500°C ., it will exhibit a charge in hydrogen or *in vacuo* at room temperature. Heating at 850° destroys such superactivity. The charge due to any gas can be rapidly removed by evacuation at 850° . The destruction of the superactive condition is due to a structural change in the arrangement of the surface atoms akin to sintering.—J. M. Robertson: An X-ray investigation of the structure of naphthalene and anthracene. Using the rotating crystal photographic method, the general and statistical considerations of the reflections indicate a periodic structure parallel to the c axes of the crystals. Geometrical structure factors are developed and the dimensions of the molecules calculated differ only slightly from those of Bragg's tetrahedral structure. Thus the tetrahedral properties of the carbon atom are maintained in aromatic structures.—K. Majumdar: The arc spectrum of chlorine. The spectrum has been photographed in the region $\lambda 6400\text{--}8700$. The ionisation potential is calculated as 13.1 volts.—K. R. Rao: The arc spectrum of germanium. Observations have been extended to $\lambda 1630$ and about fifty new lines have been added, most of which have been classified. The ionisation potential of Ge I is 8.09 volts approximately.—U. Nakaya: On the emission of soft X-rays by different elements, with reference to the effect of adsorbed gas. The absorption of these rays increases with the amount of the adsorbed gas molecules on the photoelectric plate, while the excitation decreased with the presence of gas molecules. Reliable data were secured by bombarding the photoelectric plate and target to red heat in the highest vacuum and afterwards reducing the oxide films on these surfaces with hydrogen.—N. F. Mott: The scattering of fast electrons by atomic nuclei. The scattering of electrons by an atomic nucleus is investigated, using the wave equation of Dirac and a scattering formula obtained which gives the spin-relativity correction to be applied, for fast β -particles, to the usual Rutherford formula.—L. J. Freeman: Further investigations of the spectrum of ionised nitrogen (N II). Nine terms belonging to a quintet system have been identified and two new terms of the triplet system. Some 75 lines have been newly classified.—A. E. Gillam and R. A. Morton: The absorption spectra of halogens and inter-halogen compounds in solution in carbon tetrachloride.—R. A. Frazer and A. J. Duncan: On the criteria for the stability of small motions.—R. A. Frazer and W. J. Duncan: On the numerical solution of equations with complex roots.—G. C. McVitie: On Einstein's unified field theory.

Physical Society, May 10.—W. E. Sumpner: Heaviside's fractional differentiator. The paper deals with (1) Heaviside's experimental methods; (2) the index operator, its definition and justification; (3) its use with Leibnitz's theorem; (4) its use with binomial and exponential expansion; (5) functions of the operator; (6) Heaviside's operators; (7) examples; (8) the impulse function.—J. H. Awbery:

A simple method of fitting a straight line to a series of observations. The method has a rational basis, and can be carried out much more quickly than the method of least squares.—E. W. H. Selwyn: Arc spectra in the region $\lambda 1600$ – $\lambda 2100$. A simple method is described of photographing ordinary arc spectra down to about $\lambda 1600$. Additions have been made to the analysis of the spectra of Mg I, Be I, and Bi.—K. R. Rao: The spectrum of trebly ionised thallium.—G. A. Wedgwood: The elastic properties of thick cylindrical shells under internal pressure. An experimental investigation of the usually accepted theory. Longitudinal and diametral extensions were determined of a number of steel cylinders subjected internally to hydrostatic pressure, the cylinders being closed at the ends by covers secured to the shell itself. Discrepancies seem to be due to the non-isotropic nature of the material.

PARIS.

Academy of Sciences, April 29.—Henri Villat: The alternating vortices of H. Bénard in a canal of finite width.—E. Mathias: Contribution to the study of fulminating matter. Its two modes of decomposition. A review of descriptions by witnesses of cases of globular lightning. Certain of these describe the dissipation as without noise; in others, and these form the majority, the disappearance was accompanied with very violent explosions.—J. A. Schouten: The geometrical signification of the semi-symmetrical property of an integral connexion, which leaves invariant the fundamental tensor.—Georges Durand: A manner of conceiving the theory of envelopes.—D. Pompeiu: Certain systems of linear equations and an integral property of functions of several variables.—René Lagrange: Certain functions associated with the functions of Legendre.—E. Hille and J. Tamarkin: A relation between the results of Minetti and Valiron.—Alex. Véronnet: There are three distinct dynamics, and three only, corresponding to the three spaces of Euclid, Riemann, and of Cartan.—Lucien Féraud: Some applications of Pfaffian systems.—René Lucas: Remark on the equations of electromagnetism.—Neronoff: The law of attraction.—R. Hocart: The diamagnetism of some binary halogen compounds. The diamagnetism of the ions is not strictly additive, and hence it is not possible to describe the diamagnetic properties of substances by means of a single coefficient. The coefficients of solutions of hydrochloric acid, common salt, and potassium chloride are given, the accuracy being from 0.1 per cent to 0.3 per cent.—G. Föex: The diamagnetism of the crystal of azoxyanisole and the precession of Larmor.—Jean Becquerel and W. J. de Haas: The fundamental law of paramagnetic magnetisation of a crystal and the law of paramagnetic rotatory dispersion.—J. Gillies: The trajectory $3d$ in the ionised atoms P II, S II, S III, and Cl III. Quadruplets of Cl. III.—Charles Nordmann: A new method for the reproduction of colours.—Marinesco: The structure of solutions of gelatine. A study of the relations between the dielectric constant of gelatine solutions and their concentration.—Nahmias: The evaluation of the α -radiation of the active deposit of actinium by the measurement of its β -radiation.—H. Herszfeld and H. Jedrzejowski: The conditions of formation of groupings of radioactive atoms.—René Delaplace and G. Rebière: The irradiation of ergosterol: the action of the ultra-violet rays of quartz and of the soft X-rays. Diagrams are given showing the changes in the ultra-violet spectrum of ergosterol produced by various times of exposure to ultra-violet light. Soft X-rays produce effects qualitatively similar.—Antoine Willemart: The isomerisation of some acetylene car-

binols into ethylene ketones. The transformation of alcohols of the type $R_1R_2C(OH)-C\equiv CR_3$ into the ketones $R_1R_2C=CH-CO-R_3$ either by alcoholic sulphuric acid or through the chlorides is a general reaction. Several examples are given.—Huan: The action of ethylmagnesium bromide on the tetraethyl-diamide of succinic acid.—L. Royer: The possible asymmetry of the corrosion figures obtained by an active isotropic liquid. Results on the corrosion of calcite crystals are given which are in general agreement with the views of Hettich.—A. Amstutz: The crystallophyllian conglomerates of Mayombe, in the French Congo.—P. L. Violle and A. Giberton: The antitoxic properties of calcium towards sparteine sulphate. A guinea-pig survived indefinitely the injection of a mortal dose of sparteine sulphate when the latter was mixed with a solution of calcium chloride.—Marc Bridel: Researches on the variation of colour in plants in the course of their drying. The glucoside of *Lathræa clandestina* is aucuboside (aucubine).—Charles Pontillon: The pigmentation of *Sterigmatocystis nigra* cultivated on fatty media. The yellow coloration sometimes observed in *Sterigmatocystis nigra* cultivated on fatty media is a consequence of the lack of homogeneity of the culture medium due to the mode of preparation of the mineralised gelose solution.—René Wurmser and Jean Geloso: A glucose derivative, a constituent of the oxido-reduction equilibrium of the cells.—Mme. L. Randoin and R. Lecoq: The primordial rôle of the alimentary equilibrium in the utilisation of lactose.—Edouard Chatton, André Lwoof, and Mme. Marguerite Lwoof: The infrastructures and the genetic continuity of recessive ciliary systems.

Official Publications Received.

BRITISH.

Memoirs of the Indian Meteorological Department. Vol. 25, Part 3: Data of Heavy Rainfall over Short Periods in India. Pp. 109-143. (Calcutta: Government of India Central Publication Branch.) 2.2 rupees; 4s.
Supplement to the Journal of the Indian Mathematical Society, Vol. 17. Report of the Sixth Conference of the Indian Mathematical Society held at Nagpur in December, 1928. Pp. iii+24. (Madras.)
Annual Report of the Zoological Society of Scotland for the Year ending 31st March 1929. Pp. 63+8 plates. (Edinburgh.)
Indian Central Cotton Committee: Technological Laboratory. Bulletin No. 19, Technological Series No. 14: Further Tests on the Effect of Temperature and Humidity on Cotton Spinning. By A. James Turner. Pp. 17. (Bombay.)
Quarterly Journal of the Royal Meteorological Society. Vol. 55, No. 230, April. Pp. 103-214. (London: Edward Stanford, Ltd.) 7s. 6d.
Apia Observatory, Apia, Western Samoa. Report for 1926. Pp. 96. (Wellington, N.Z.: W. A. G. Skinner.)
Air Ministry: Aeronautical Research Committee. Reports and Memoranda. No. 1204 (Ae. 365): Wind Tunnel Experiments on the Design of an Automatic Slot for R.A.F. 34 Section. By F. B. Bradford and F. W. G. Greener. (T. 2682.) Pp. 11+4 plates. 9d. net. No. 1215 (Ae. 374): The Accelerated Motion of a Cylindrical Body through a Fluid. By H. Glauret. (T. 2727.) Pp. 10. 9d. net. (London: H.M. Stationery Office.)
The Physiological Society. Session 1929-30. Rules, List of Members and Dates of Meetings. Pp. 32+VIII. (London: University College.)
Proceedings of the International Mathematical Congress held in Toronto, August 11-16, 1924. Edited by Prof. J. C. Fields, with the collaboration of an Editorial Committee. Vol. 1: Report of the Congress; Lectures; Communications to Sections I and II. Pp. 935. Vol. 2: Communications to Sections III, IV, V and VI. Pp. 1006. (Toronto: The University of Toronto Press.)

FOREIGN.

Mitteilungen der Naturforschenden Gesellschaft Bern aus dem Jahre 1928. Pp. xliii+269+6 Tafeln. (Bern: Verlag Paul Haupt.)
Ministry of Agriculture, Egypt: Cotton Research Board. Sixth Report, 1925-27. Pp. v+104+29 plates. (Cairo: Government Press.) 15 P.T.
Ministry of Agriculture, Egypt: Technical and Scientific Service (Botanical Section). Bulletin No. 87: The Branching of Egyptian Cotton Plants. By Dr. J. Templeton. Pp. 5+2 plates. (Cairo: Government Press.) 3 P.T.
Scientific Papers of the Institute of Physical and Chemical Research. No. 188: The Uranium-Thorium-Ratio in Monazites. By Satoyasu Iimori. Pp. 229-236. 20 sen. Supplement, Vol. 10, No. 9: Geographical Distribution of certain Minerals in Japan. By Satoyasu Iimori and Toyofumi Yoshimura. Pp. 5-46. 45 sen. (Tokyo: Iwanami Shoten.)
Journal of the Faculty of Science, Imperial University of Tokyo. Section 2: Geology, Mineralogy, Geography, Seismology. Vol. 2, Part 8: Neogene Shells from some Provinces of Chugoku. By Matajiro Yokoyama. Pp. 363-368+1 plate. (Tokyo: Maruzen Co., Ltd.) 45 sen.