

fully determined $t = 30^{\circ}9$ C. The approximate values of the other constants are $\alpha = 0.001$, $\beta = 0.0008$, $R = 0.00371$, and $\epsilon = 0.000021$. With these, the above formula gives fair representations of the isothermals from 0° C. to 100° C., for ranges of pressure from 1 to 500 atm. These are, however, to be regarded as provisional values only. Further numerical work is required to determine them more exactly. The formula above is based on the assumptions (1) that the particles are hard spheres, and (2) that the absolute temperature is measured by the average energy of a free particle; and its agreement with experiment is regarded as strong evidence in favour of the truth of the second of these assumptions; which, in its turn, throws strong light upon the nature of the liquid, and even of the solid, state.

PARIS.

Academy of Sciences, April 6.—M. Duchartre in the chair.—On a system of equations from partial derivatives, by M. Émile Picard.—Transformation *in vitro* of lymphatic cells into *clasmatocytes*, by M. L. Ranvier. It is shown that the lymphatic cells of the frog may be transformed into ramified, immobile cells—that is, into *clasmatocytes*—by making a preparation of the peritoneal lymph and keeping it in a glass cell at a temperature of 25° C. for one hour.—On vaccination by minimum doses of vaccinating matter, by M. Ch. Bouchard. The results of numerous experiments indicate that vaccinating matters act efficaciously when the amount employed is only a small fraction of a milligram. In one experiment complete immunity was obtained by the total injection of 0.026 c.c. of the culture per kilogram of the subject.—Interpretation of the fire-ball painted by Raphael in his picture the “Madonna di Foligno,” by M. Daubrée (see NATURE, vol. xliii. p. 500, and *American Journal of Science*, March 1891).—The law according to which the sum of the distances from the moon to two certain stars varies in the function of time, by M. L. Cruls.—New nebulae discovered at Paris Observatory, by M. G. Bigourdan. This is a continuation of lists previously given, and contains a description of fifty-five new objects situated between nine and sixteen hours of right ascension.—Observations of the asteroid ⁽³⁰⁸⁾ discovered at Marseilles Observatory with the Eichens equatorial, by M. Borrelly. Observations for position were made on March 31 and April 1 and 4.—On the theory of surfaces applicable to a given surface, by M. J. Weingarten.—On the theory of applicable surfaces, by M. E. Goursat.—On an analytical problem which is connected with dynamical equations, by M. R. Liouville.—On regular continuous fractions relative to e^2 , by M. H. Padé.—On the mode of vibration of membranes, and the rôle of the thyro-arytenoidean muscle, by M. A. Hubert.—Preparation and properties of iodide of boron, by M. Henri Moissan. (See Notes, p. 568.)—On a new compound of molybdenum, by M. E. Péchard. A description of permolybdic acid, Mo_3O_7 , is given.—On a new method for the separation of iron from cobalt and nickel, by M. G. A. Le Roy. An electrolytic method is proposed for the separation of iron from cobalt and nickel.—On the asymmetry and the production of the rotatory power in the chlorides of the compound ammoniums, by M. J. A. Le Bel. The author shows that when four alcoholic radicals are substituted for the hydrogen in ammonium chloride, the molecule appears to attain an invariable geometrical form. This is experimentally proved by the existence of isomers and the appearance of rotatory power when these four radicals are different.—On the nitro-derivatives of dimethyl-ortho-anisidine, by MM. E. Grimaux and L. Lefevre.—On the transformation by heat from campho-sulpho-phenols to homologues of ordinary phenol, by M. P. Cazeneuve.—On terebenthene, by M. Raoul Varet.—On ethyl malonate, and ethyl-potassium malonate, by M. G. Massol.—On the micro-organisms found on grapes, and on their development during fermentation, by MM. V. Martinand and M. Rietsch.—Contribution to the study of the bleaching effect of the air, by MM. A. and P. Buisine.—Law of position of nervous centres, by M. Alexis Julien.—New observations on the oceanic sardine, by M. G. Pouchet.—On the supposed crane of Moctezuma II., by M. E. T. Hamy.—On the existence of tufts of andesite in the flysch of La Clusaz (Upper Savoy), by M. P. Termier.—On the phenomena consecutive to the alteration of the pancreas determined experimentally by an injection of paraffin in the *Wirsung* canal, by M. E. Hédon.—On the phenomena consecutive to the destruction of the pancreas, by

M. E. Gley.—Chemical researches on microbial secretions: transformation and elimination of the nitrogenous organic matter by the pyocyanic bacillus in a medium of a given culture, by MM. Arnaud and A. Charrin.

STOCKHOLM.

Royal Academy of Sciences, March 11.—On symbiosis as causing accessory secretions in the shells of marine Gastropoda, by Dr. Carl Aurivillius.—Researches on the amount of blood expelled from the heart, by Prof. Tigerstedt.—On pendulum observations made in the mines of Sala during 1890, by Prof. Rosén.—A report on a foreign tour undertaken to study constructions suitable for maritime purposes, by Herr Nystedt, marine engineer.—On the respiration of the Algæ, by Miss H. Lovén.—On the hydrography of the fiord of Gullmar, by Miss A. Palmqvist.—Observations mycologicæ; i. e. genere Russula, by L. Romell.—On the African species of the genus Xyris, by Dr. A. Nilsson.—An elementary demonstration of the fundamental proposition of the equation theory, by Dr. E. Phragmén.—On the cyclic system of Ribaucour, by Prof. Bäcklund.—The radiation of the clouds around the thermometric minima, by Dr. H. Hamberg.—Geological observations on Snaefellensand in the environs of the Faxebay in Iceland, by Dr. Th. Thoroddsen.—Derivation of a formula within the mathematical statistic, by Dr. G. Eneström.—Observations on the ephippia or the hivernal egg-capsules of *Daphnia pulex*, by Baron G. C. Cederström.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

A Dictionary of Applied Chemistry: Prof. T. E. Thorpe; vol. ii. (Longmans).—The Missouri Botanical Garden (St. Louis).—A Treatise on Plane Trigonometry: E. W. Hobson (Cambridge University Press).—Elementary Lessons in Heat, Light, and Sound: Prof. D. E. Jones (Macmillan and Co.).—The “Progressive” Euclid, Books 1 and 2: A. T. Richardson (Macmillan and Co.).—Magnetic Observations at the U.S. Naval Observatory, 1888 and 1889: J. A. Hoogewerff (Washington).—The Elements of Statics and Dynamics; Part 2, Elements of Dynamics: S. L. Loney (Cambridge University Press).—Traité Élémentaire d'Électricité: J. Foubert; 2me. édition (Paris, G. Masson).—The London and Middlesex Note-book (E. Stock).—Elementary Chemistry: W. J. Harrison (Blackie).—Familiar Objects of Every-day Life: J. Hassell (Blackie).

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