

and in internal combustion engines. Interesting possibilities also are suggested by the fact that a little water vapour increases the combustion level in hydrogen explosions.

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¹ NATURE, 139, 67 (1937).

² Phil. Mag., 21, 280 (1936).

³ Phil. Mag., 18, 311 (1934).

⁴ Phil. Mag., 21, 280 (1936).

⁵ NATURE, 139, 67 (1937); also 138, 930 (1936).

⁶ Phil. Mag., 22, 513 (1936).

Physical Constants and some Curious Coincidences

MANY comments have been made on the nearness of a certain constant in modern physics to the number 137, but I have seen no comments on the following coincidence.

The velocity of light *in vacuo* is 2.99774×10^{10} cm. a second, and the gravitation constant is 6.670×10^{-8} in c.g.s. units; the first of these is therefore just a little less than 3×10^{10} and the second just a little greater than $\frac{2}{3} \times 10^{-7}$, both interesting coincidences with simple numbers in themselves, but the product of these numbers is 1,999.5, a remarkably close approach to 2,000. The product is, however, not a 'mere number' and the coincidence must therefore depend upon the relative magnitudes of the c.g.s. units.

Curiously enough, if both the above physical 'constants' are expressed in English units, the product is 1.05, a very near approach to unity—another coincidence.

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Points from Foregoing Letters

PROF. E. M. FRAENKEL and Dr. C. A. Mawson report that although they are able to deposit the agent of the Rous fowl sarcoma by centrifugation at 15,000 r.p.m., they are unable to correlate the cancer-producing activity of the extracts and concentrates with the number of ultra-microscopic particles present, and suggest that only a fraction of the visible particles are associated with carcinogenic activity. They have been unable to obtain tumours by injection of acetone extracts of fresh or dried tumour tissue, but the residue left after the extraction of dried powder retains its carcinogenic properties.

New electrical measurements of the oxide films responsible for interference colours on copper and iron, announced by Drs. U. R. Evans and H. A. Miley, show satisfactory agreement with three other methods. Thus tested, the method has been used to study the rapid growth of invisible oxide on copper at 18° and 62° C. The results accord well with recent electron diffraction work by Dobinski.

The exchange of iodine atoms between organic compounds containing such atoms and sodium iodide or iodine itself, at a temperature of 100° C. in various solvents, has been investigated by H. A. C. McKay, by utilizing radioactive iodine as indicator. The author describes the behaviour of the higher alkyl iodides, (ethyl, propyl, isopropyl, butyl and isoamyl iodides), iodoacetic acid, β -iodopropionic acids and of some aromatic compounds (phenyl iodide, *p*-nitroiodobenzene, *p*-iodoaniline and *p*-iodobenzoic acids).

A table is submitted by Dr. L. H. N. Cooper, showing that the order in which acidic ions are arranged in the Hofmeister (lyotropic) series, which indicates their effectiveness in the swelling of gels, flocculation of sols, etc., runs parallel to the order of their (Gibbsian) standard free energies of formation from their elements. The free energies of formation of the halide ions are proportional to their electrode potentials, so that the effect may possibly be explained by the relative readiness of the ions to part with their electrons.

An example of the power of light of different wave-lengths (near and middle ultra-violet) to shift in opposite directions the equilibrium of a thermal oxidation-reduction reaction is described and discussed by G. Holst. The system considered consists of methylene blue (A)—leucomethylene blue (AH₂) and

phenylhydrazinesulphonate (BH₂)—benzenediazosulphonate in dilute acid solutions, the photo-active absorption of AH₂ being situated in the near ultra-violet, and that of BH₂ in the middle ultra-violet.

Dr. A. B. Wildman states that many fleece analyses indicate the existence of gradients over the fleece in mean fineness and fleece density. Such results are consistent with the idea of increased physiological activity in the skin anteriorly, and form evidence in addition to that of Dr. Galpin's for the existence of a main antero-posterior gradient in wool growth.

Symptoms of cretinism, a disease associated with the absence of the thyroid gland, are described by Miss M. M. O. Barrie in young rats deficient in vitamin E.

H. S. Hopf compares the nitrogen contents of the frass of wood-boring insects with that in the wood on which the insects feed. The results indicate that the larvæ retain much of the nitrogen from the wood, but the adult of the ash bark-beetle appears to be continuously decreasing its nitrogenous substance.

Jules Duchesne compares the values of the parallel frequencies calculated from the Raman and infra-red spectra of tetrachlorethylene, with those necessary to satisfy the relation deduced from the 'potential function' by applying the formula of Sutherland and Dennison. The author calculates the forces linking different atom groupings in the C₂Cl₄ molecule and finds the result at variance with the ordinary chemical conception of its structure.

From a study of the Raman spectra of ethyl ether and hydrochloric acids in equimolecular proportions, M. Wolkenstein and Prof. J. K. Syrkin conclude that the valency of oxygen in the oxonium molecule is not increased. The bond between the ether oxygen and HCl is of a type intermediate between the chemical and the Van der Waals forces, with a distance of the order of 1.3 Å. between the oxygen and hydrogen atoms.

Various factors influencing the 'combustion level' (ratio of maximum observed temperature to the theoretical temperature) in flames and explosions are discussed by Prof. W. T. David. These include the influence of the nature of the combustion gases, of the diluent gases, size of vessel, etc. The combustion level may be raised by increasing the pressure of the gases before combustion or by arranging for high instantaneous pressure in the flame front.