

accounted for by external energy of the combustion gases, for which it may be assumed that temporarily the specific heat of the combustion gases is much lower than normal. This may be explained by an excitation lag theory¹, which states that in the case of combustion imparting chemical energy to a gas other than monatomic, this energy is first absorbed as translatory energy. It may be thought that this would apply especially in the case of the nitrogen of the charge. Both the pressure of the gas and its rate of heat transfer to the combustion chamber walls being dependent on the translatory energy, these findings may explain to some extent the mechanical and thermal damage due to detonation.

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¹ Lewis, B., *Z. phys. Chem.*, B, 19, 536 (1932). Lewis, B., and von Elbe, G., *J. Chem. Phys.*, Feb. 1935; see also discussion on paper by Rassweiler-Withrow, *SAE. Journal*, April 1935.

Vitamin E Deficiency in the Suckling Rat

IN a paper recently published¹, I have shown that the characteristic defects in the offspring of vitamin E - deficient rats may be cured by administering to them concentrates of the vitamin. It seemed important to confirm that this curative action is due to vitamin E and not to some other constituent of the concentrates derived from natural sources. This I have now done by administering 2 milligrams of synthetic *d-l*-tocopherol (Roche) to the offspring of vitamin E - deficient rats.

This further observation that the synthetic vitamin produces the same curative effects as the concentrate from natural sources, taken in conjunction with my previous publications, shows conclusively that the missing factor in the milk of vitamin E - deficient does is vitamin E.

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¹ Barrie, M. M. O., *Biochem. J.*, 32, 1467, 1474 (1938).

Points from Foregoing Letters

By means of a zinc - mercury lamp which gives sharp spectral lines without accompanying hyperfine structure components or continuous spectrum, Sir C. V. Raman and C. S. Venkateswaran find that the light scattered backwards by glycerine and by phenol exhibits well-defined Brillouin components on either side of the incident lines. The authors infer that the viscosity of glycerine, as usually measured, has little influence on the propagation of thermal compression waves of very high frequencies.

Prof. J. B. S. Haldane gives a formula for the probability that a given individual would be killed by an explosive bomb, and calculates roughly the efficiency of various types of shelters and trenches against light and heavy bombs.

A graph is submitted by Dr. L. F. Richardson showing that during the arms race of 1909-13 the increase in expenditure for armaments of France, Russia, Germany and Austria combined followed a linear relation with reference to time. Dr. Richardson connects this with his previously deduced formula expressing the interaction of fear with cost and with grievances in international relations.

By means of paraffin absorption measurements, A. E. Downing and Prof. C. D. Ellis estimate the position of the resonance levels for slow neutrons in several heavy elements. In bismuth they find two levels (at 1 and 11 volts respectively) corresponding to high excited states of radium E. Thorium and uranium likewise show two resonance levels each, while with cobalt only one (at about 1 volt) was observed. Iodine appears also to have two resonance levels, which might explain the anomalous results recently reported by Michiels.

The viscosities of hydrogen and heavy hydrogen gas at various temperatures between 293° K. and 14° K. have been determined by A. van Isterbeek and Miss A. Claes. They find that at room temperature the ratio between the viscosities is proportional to the ratio of the square roots of the molecular

weights of the two molecules, but at lower temperature the ratio decreases.

The absorption of hydrogen and nitrogen gas by tantalum at very low pressures ('clean up') at different temperatures is described by D. A. Wright. The absorption is considerably modified by the presence of surface oxide, which explains the various results reported by previous investigators.

Large increases in the longitudinal incremental permeability of a wire made of iron-nickel alloy (serving as core of a solenoid) is found by J. S. Webb, when a direct current is passed through the wire so as to produce a superimposed circular field. The author submits graphs showing the variation of the inductance of the solenoid as a function of the direct current through the conducting core and also the variation of the longitudinal incremental permeability when the core is twisted through various angles.

P. F. Holmes and M. G. M. Pryor report the presence of large numbers of the barnacle *Balanus improvisus*, upon reeds in Horsey Mere, Norfolk, following upon increased salinity of the water brought about by the temporary break-through of the sea during the storm of last spring.

The percentage ratio of various blood groups among the inhabitants of Khasia and Jaintia Hills, Assam, derived from an examination of fifty individuals, is given by Captain R. N. Basu and compared with the blood group distribution among Japanese, Negritos and Indians.

S. Hands and Dr. S. Peat report the presence in methylated agar-agar of a derivative of 3 : 6-anhydro-*l*-galactose, which is isolated as the crystalline dimethyl 3 : 6-anhydromethyl-*l*-galactoside. Evidence is given in support of the constitution assigned to the latter substance. E. G. V. Percival, J. C. Somerville and I. A. Forbes have likewise isolated from agar an anhydro-sugar derivative which preliminary investigations indicate to be *l*-galactose.