dielectric constant. The mathematics is not taken very far, but is adequate for the purpose of the monograph, whilst the account of experimental methods gains by Prof. Smyth's personal experience. The second and main section is upon the effect of structure, and includes chapters on the chief types of compounds (principally organic), electric moments and theories of valence, electronic and atomic polarisation, and molecular association. It is evident that much still remains to be done, both in the extension of measurements and in their interpretation, but Prof. Smyth has shown himself sufficiently master of the subject not to minimise difficulties. It would not be surprising if a number of these were found to be connected with quantum resonance, or were resolved in some similar manner in the theory of molecules now coming from Hund, Slater and others. The last section consists of tables of molecular moments.

Debye and Errera have left Prof. Smyth with the least interesting part of the work; he is to be congratulated on having made it readable as well as useful.

A Textbook of Thermodynamics. By F. E. Hoare. Pp. xii+271. (London: Edward Arnold and Co., 1931.) 15*s.* net.

MR. HOARE has been successful in writing a treatise on thermodynamics which gives a very clear account of the theoretical side of the subject and an unusually detailed description of its applications. The reviewer has had an opportunity of testing some parts of the book in a recent course on thermodynamics of an introductory character and has found the descriptions both accurate and lucid. The author, who holds the diploma of the Imperial College, has evidently been influenced by the teaching of the late Prof. Callendar, and excellent use is made of the latter's work on the properties of steam. Experimental results are frequently quoted, and some numerical examples are included in the text. For the benefit of the student who finds difficulty in applying thermodynamic principles in practical cases, we should like to see numerical exercises added in a second edition. The work can be recommended to students who are taking an honours degree in physics.

We note that Mr. Hoare does not adopt the terms 'enthalpy' or 'free energy'. It may be suggested that the time has come when some decision should be sought by international agreement as to the nomenclature and notation to be used in the practical and theoretical aspects of the subject of heat. H. S. A.

The Nature of a Gas. By Prof. Leonard B. Loeb. Pp. x+153. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1931.) 12*s.* 6*d.* net.

THIS monograph is published under the auspices of the National Research Council of America and is the first of a series related to electrical insulation. Gases are utilised as insulators and also occur in insulating materials, and knowledge of their properties is of importance to those responsible for the design and construction of electrical apparatus of all descriptions. The book contains three chapters, the first an introduction describing modern theories of the electrical constitution of atoms and molecules, the second giving an account of the kinetic picture of a gas, and the third dealing with ionisation phenomena.

The first two chapters are concerned mainly with researches already familiar to the physicist, and many readers will turn with special interest to the third chapter in which Prof. Loeb's own work rightly finds a place. Much useful information is here incorporated, but we must confess to some measure of disappointment with the result. This is due in a large measure to the many problems still unsolved in this branch of physics, but in part to the use of terms, such as 'elastic' and 'inelastic' collisions, which are not adequately defined. As the author points out, too much of the 'how' of the processes described can scarcely be looked for, and we must content ourselves at present with the bare facts.

Vector Analysis: with Applications to Physics. By Prof. Richard Gans. Authorised translation from the sixth German edition by Winifred M. Deans. Pp. ix+163. (London, Glasgow and Bombay: Blackie and Son, Ltd., 1932.) 12*s.* 6*d.* net.

THE special features of this book are the emphasis laid upon the applications of the subject and the forty-four examples with their full solutions (occupying fourteen pages) in an appendix. The first chapter deals with scalar and vector products and their applications, chiefly to electric circuits. The second introduces differential operations; after defining gradient, divergence and curl we are given many applications to mechanics and physics. An interesting historical note points out that the symbol like an inverted delta was first introduced by Hamilton, who called it "nabla", after a Hebrew stringed instrument. The third chapter deals with orthogonal curvilinear co-ordinates, with applications to Laplace's equation, wave motion, and rigid dynamics. The fourth chapter, headed "Tensors", is disappointing. It opens well by following the historical development of the subject, which is connected with elasticity, but it is misleading to state that "A tensor is determined by six numbers", and the whole of the chapter seems spoilt by the implicit assumption that all tensors are necessarily of the second order and in three dimensions. The fifth and last chapter deals with applications to hydrodynamics and electrodynamics. Except for the tensor chapter, the book appears likely to be useful to students of applied mathematics and physics.

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