Elementary Physical Chemistry.

A Class Book of Physical Chemistry. By Prof. T. Martin Lowry and Dr. Samuel Sugden. Pp. vii + 436. (London: Macmillan and Co., Ltd., 1929.) 6*s*. 6*d*.

THIS book gives a clear and straightforward account of the principal parts of elementary physical chemistry. It contains instructions for carrying out illustrative experiments, and is provided with questions at the ends of the chapters.

In the preface the authors state that, since "the normal scope of an elementary course of physical chemistry is already well defined", they have "in the main been content to keep within it, without trying to exploit unduly the more novel or personal points of view". This is doubtless a prudent attitude, but it naturally limits the interest of the book as a contribution to the solution of that fascinating but difficult problem now confronting all teachers of physical chemistry, namely, how to present to their pupils the results of the last ten years of investigation. Modern work, both theoretical and experimental, has completely changed the aspect of many parts of physical chemistry, co-ordinating much that was fragmentary, and illuminating much that was obscure, but unfortunately a good deal of it is mathematically considerably more complex and difficult than that which it has superseded. An elementary treatise which is wholly modern in outlook will be something of a pioneering work. The nearest approach to it which we yet have in English is perhaps H. S. Taylor's shorter book, "Elementary Physical Chemistry".

In relation, however, to its stated object, the book under review is quite a good one. It deals first with the three states of matter and the phenomenon of liquefaction, then discusses in turn the phase rule, osmotic pressure and the determination of molecular weights, and proceeds to thermochemistry, chemical equilibrium, velocity of chemical change, and the mechanism of chemical change. Two chapters on electrochemistry follow, and finally one on colloids and one on adsorption. Thermodynamic proofs are given shortly in connexion with the matters to which they are relevant. One naturally looks for some account of the parachor, and is not disappointed, a few pages being devoted to a brief but clear summary of the principal results.

On p. 306 the dictum that "chemical action is reversed electrolysis" is endorsed, but the reviewer is still unable after reading this particular section of the book to attribute any more meaning than before to this well-known phrase. The statement on the preceding page that "pure water formed from highly purified hydrogen and oxygen will not initiate an explosive combination of these gases", though quoted by nearly all books, is meaningless. If the pure water is formed, the gases have evidently combined, and whether or not the combination is explosive is purely and simply a question of the relative rates of the production of heat and of its removal by conduction.

The proof of Avogadro's law from the kinetic theory, given in Chapter i., is misleading. It is not obvious without elaborate and difficult proof that the average kinetic energy of the individual molecules is the same for each gas: therefore the impression should not be conveyed that it is self-evident. The ordinary elementary discussion involves something very like an argument in a circle.

It must not be supposed that the two points here dealt with are in any way characteristic of the book as a whole. Most of it is clearly and accurately written, and it is likely to be thoroughly useful to certain kinds of student.

Classical Electrodynamic Theory.

Lehrbuch der Elektrodynamik. Von Prof. Dr. J. Frenkel. Band 2: *Makroskopische Elektrodynamik der materiellen Körper.* Pp. xii + 505. (Berlin: Julius Springer, 1928.) 45 gold marks.

THE second volume of Frenkel's "Elektrodynamik" extends the microscopic theory—the individual electron theory—to the form of the theory, obtained by statistical averaging, which is concerned more with the behaviour of matter in bulk, that is, with electromagnetic phenomena as they are presented to our senses. The work is divided into two main sections, the first of which contains a derivation of the form of the equations of the theory applicable to fields containing distributions of matter of various types; here we find a detailed exposition of such subjects as dielectric and magnetic polarisation, of electrical conductivity, and of the energy and mechanical relations of the bodies in the field.

The second section of the work starts with a discussion of the propagation of electromagnetic waves in material media—of both limited and unlimited extent. This is followed by a treatment of the so-called quasi-stationary phenomena, including the usual problems of electromagnetic induction. Finally, there are brief chapters on electrostatics, magnetostatics, and electrokinetics, and an