

worked and unworked. Beginning with the ordinary definitions of complex numbers, etc., the author goes on to holomorphic functions, contour integration, and power-series; then we have Weierstrass's theory of infinite products, and after this various applications to gamma-functions and elliptic functions (both first-stage and second-stage). Finally, there are four chapters on linear differential equations, with applications to Legendre and Bessel functions. Singular points are considered after the manner of Cauchy; Weierstrass's theory of analytical continuation is explained; there is a good introduction to the work of Fuchs, Frobenius, etc., on linear differential equations; and the last chapter shows how to find solutions of $ax'' + bw' + cw = 0$ by means of definite integrals, with illustrations comprising Bessel functions and the hypergeometric series.

It is a small matter, perhaps, but we regret to see on p. 2 the formula $\tan \theta = y/x$ put in such a context that a beginner is apt to take it as a definition of $\text{amp}(x+iy)$. The proper definition of the latter is that it is any angle satisfying the two relations $\cos \theta = x/r$, $\sin \theta = y/r$, where $r = |x+iy| = \sqrt{x^2+y^2}$. No other definition meets the requirements of function-theory.

G. B. M.

PHYSICAL CHEMISTRY.

Theoretical Chemistry, from the Standpoint of Avogadro's Rule and Thermodynamics. By Prof. Walter Nernst. Revised in accordance with the seventh German edition by H. T. Tizard. Pp. xix+853. (London: Macmillan and Co., Ltd., 1916.) Price 15s. net.

THE fact that a fourth English edition of this treatise, based on the seventh German edition, has been called for is sufficient testimony, if any were still required, to the excellence of a work which has made for itself a high reputation for its individuality and lucidity. First published more than twenty years ago, the book was written from a definite point of view, emphasised in the title, owing to the belief of the author that "the theoretical treatment of chemical processes—the most important part of my task—depended, first, on the Rule of Avogadro, which seems to me an almost inexhaustible 'horn of plenty' for the molecular theory; and, secondly, on the Laws of Energy, which govern all natural processes." The position thus taken up by the author has become increasingly justified with time.

But although we give a glad welcome to this new edition of a valuable book, we cannot but feel some regret that certain sections should not have been made rather more modern, and that little or no attention should be given to some recent and valuable contributions to physico-chemical science. The translator frankly recognises that "the character of the work is slowly changing, since it is no longer possible in a book of this size to describe fully all modern develop-

ments of theoretical chemistry." This is quite true, but the reviewer cannot but feel that if the necessary trouble were taken, a certain amount of rearrangement of the matter would allow most of the important new developments to be at least indicated, if not fully treated. It must be regretted, for example, that in a book of this character no mention is made of the recent important work on X-ray spectra and the bearing of this on the atomic theory. Moreover, certain other sections, such as that on osmotic pressure, might with great advantage be rewritten (so far as the experimental work is concerned), in view of the investigations, in this particular field, of Morse and his collaborators, and of Lord Berkeley and E. G. J. Hartley. One table giving the results obtained by Morse and Frazer is reproduced, but it refers to some of the earlier work of these investigators carried out before their apparatus and technique had been perfected. In the case of this subject, moreover, the importance of which the author recognises, something more might be expected than the bare reference which is made to the work of Lord Berkeley and Mr. Hartley. (In passing, one may point out a misprint which seems to have gone through all editions of this work; namely, on p. 133, Flurin instead of Flusin. Likewise in the index.) Defects such as those indicated certainly diminish the value of the work for the general student, and the reviewer cannot regard as complete compensation the interesting treatment of Nernst's own researches, such as the sections dealing with the specific heat of solids and all that is based thereon, and the Nernst heat theorem.

Nevertheless, although there will always be a difference of opinion regarding the emphasis to be placed on the various sections of the subject, we cannot but recognise the success with which the author gives, in general, a survey of a very large and growing branch of knowledge; and this new edition of an inspiring and intellectually bracing book will doubtless receive the welcome it deserves. We ought also to express to the translator our appreciation of the general excellence of his work. Is, however, one may ask him, "depolarisators" (p. 778) an English word?

A. F.

OUR BOOKSHELF.

The Land and the Empire. By Christopher Turnor. Pp. 144. (London: John Murray, 1917.) Price 3s. 6d. net.

MR. TURNOR is well known as an enthusiastic landowner who firmly believes in the future of British agriculture if only it is properly taken in hand. He divides his book into three parts: the errors of the past; land settlement and education; and a sketch of an organised agricultural industry. The keynote to the whole is that a new outlook is wanted. On the rural side the Government, the landowners, and the farmers must all be brought to recognise that the holding of land implies the