

practice—by no means confined to India—of sowing mixed crops.

The monograph concludes with an account of the combined agronomic and costings studies in which the yields and costs of the methods worked out in the experiments have been compared, on a farm scale, with the present standard practices of the cultivator. Although each item, such as bunding, inter-cultivation or manuring, gives no significant improvement, their aggregate effect over the seven years 1934–35 to 1940–41 is appreciable. The methods advocated for each of the main tracts are described in detail. The main agronomic and research problems on which further work is needed are also briefly set out. Most of them are clearly important, but the main conclusion gained from a study of the monograph is of the value that resides in the full farm trial (including costings) on a scale within the capacity of the cultivator, of the new methods against the old. It is to be hoped that this feature of the scheme will receive even more attention, for it brings the experimenter and the cultivator together on common ground.

B. A. KEEN.

## ABSORPTIOMETRIC METALLURGICAL ANALYSIS

Metallurgical Analysis by means of the Spekker Photo-electric Absorptiometer

By Dr. F. W. Haywood and A. A. R. Wood. Pp. xii+128. (London: Adam Hilger, Ltd., 1944.) 18s. net.

WITH the advent of the Hilger 'Spekker' absorptiometer and the pioneer work carried out by E. J. Vaughan in applying this instrument to metallurgical analysis, absorptiometric methods have become widely popular, and this book has been published in order to meet the demand that has arisen for a volume containing a collection of methods which have been devised specially for use with the instrument known as the 'Spekker'.

The first of the two sections into which the book is divided is devoted to a full description of the principles underlying absorptiometric analysis and to the construction and manipulation of the instrument. In the second part are collected twenty-six methods describing procedures for the determination of the commonly occurring constituents of commercial ferrous, aluminium, copper and magnesium-rich alloys. Composite schemes of analysis are included for each class of alloy, whereby several constituents may be determined on one initially weighed sample of alloy without the necessity for chemical separations. The operation of the methods is fully described, including details for the construction of the necessary calibration graphs.

The presence of certain anomalies tends to detract from an otherwise well-written text. Thus, the ordinates of the many specimen calibration graphs are described as "drum readings" whereas the graphs are derived from "drum differences". In no less than four instances, 'direct' methods not involving difference readings are illustrated by 'typical' calibration graphs obtained from drum differences, in spite of the fact that in two of the cases it is stated that "Difference methods are not applicable". Such lapses are apt to confuse rather than assist. It is, perhaps, unfortunate that the authors did not devote more

space to explaining why certain procedures have been adopted. It is not clear why, in the determination of manganese in steel and magnesium alloys, oxidation to permanganic acid is effected by means of ammonium persulphate and silver nitrate, while, for the same constituent in copper and aluminium alloys, potassium periodate is used as the oxidant; neither is it explained why yellow filters are necessary when using the mercury lamp for determining manganese instead of the green filters which are used with the tungsten lamp and which are specified for other determinations with the mercury lamp. With the 'direct' methods which are described, certain interferences arise, and the need to correct for these is not mentioned in the text.

The utility of the book would have been increased appreciably by an explanation of these and certain other items, some of which conflict with my own experience. However, the book contains much information which should be welcome to laboratories contemplating the institution of absorptiometric methods, and it should make a useful addition to the library of the metallurgical chemist.

H. C. DAVIS.

## INTRODUCTION TO PHYSICS

College Physics

By Dr. C. E. Mendenhall, Prof. A. S. Eve, Prof. D. A. Keys and Prof. R. M. Sutton. Pp. vii + 693. (Boston, Mass.: D. C. Heath and Co., 1944.) 4 dollars.

AN introductory course in physics should aim at presenting the fundamentals rigorously without being excessively mathematical in outlook, and should also arouse enthusiasm for the subject and stimulate the student to pursue it further. In planning this text-book for first-year students in American universities, the authors have clearly had these intentions in mind. Fifteen chapters are devoted to mechanics and general physics, eight to heat, thirteen to magnetism and electricity, thirteen to optics, and two to atomic physics. Modern ideas and applications are kept in view throughout the book.

The general treatment is sound, and the principles are very carefully expounded. The sections on wave motion, sound, physical optics, electron physics, and radio are good. In some places the text is necessarily condensed; for example, geometrical optics is rather briefly treated.

A few minor points suggest themselves for criticism. A simple magnifying glass is said to give "considerable chromatic aberration"; Newton's law of cooling is offered as a small-excess approximation to the fourth-power radiation law; 'thermal capacity' is used to mean thermal capacity of unit mass; and Figs. 537 and 539 on thin-film interference and Newton's rings are inaccurately drawn.

There are more than 650 well-chosen problems, with answers. The book is well illustrated and adequately indexed. Viewed in relation to the needs of British students, it should be useful for First M.B. candidates, and for biologists and others to whom a more severely mathematical approach makes no appeal. Its fresh outlook and clear presentation should commend it also to those students of related sciences who wish to appreciate what physicists are trying to do and how they are setting about it.

G. R. NOAKES.