

These, with the concise and illuminating descriptions in the text, should give any reader of ordinary intelligence a very fair idea of the marvellous discoveries of modern science regarding the things and movements around him.

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RARE ELEMENTS.

Introduction to the Rarer Elements. By Dr. Phillip E. Browning. Second edition, thoroughly revised. Pp. x+207. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1908.) Price 6s. 6d. net.

DURING the last few years our knowledge of the chemistry and properties of the rarer elements has been largely developed, and the scientific and commercial interests connected with them having assumed considerable importance, the publication of a second edition of the above useful handbook is to be welcomed.

The scheme of the work remains the same as in the edition of 1903; with each element an account is given of its discovery, occurrence, extraction, properties, &c., concluding with more or less voluminous details of experimental research work. The revision has been very thorough; some matter dealing with supposed elementary substances, the existence of which has since proved more than doubtful, has been removed—for example, the so-called elements etherion, lucium, glaukodymium, &c. A chapter on radio-elements by Dr. B. B. Boltwood is included, and the section on rare earths has been largely increased, and much valuable matter added to it.

The description of niobium and tantalum has been brought up to date, and all that is known of the latter interesting and very valuable metal, with its chemistry and unique properties, is given. The gases of the atmosphere, argon, helium, krypton, neon, and xenon, with their history and properties, are described in detail, and several pages are devoted to an account of some of the technical applications of the rarer elements which greatly emphasises the importance of research among these practically unknown substances; the book concludes with a series of tables for the qualitative separation of the rarer elements.

Speaking generally, as might be expected from the repute and position of the author, the work is thoroughly practical and trustworthy, and is confined to a brief description of known facts, the author having wisely refrained almost completely from touching upon the huge mass of speculative matter that has unhappily been woven into this branch of chemistry; no mention is made of the alleged transmutation of copper into lithium by radium emanation, and no surmises are given of the results that may be expected to follow the production of so many pounds of radium, &c.; in fact, the brevity is carried to an extent that is almost to be regretted, but what is given is to the point. The chapter on the radio-active elements commences with a brief account of the discovery of radio-activity by M. Henri Becquerel, and of radium by P. and S. Curie and G. Bemont, with the properties of uranium, ionium, actinium, thorium, &c.,

and the section concludes with a table of radio-activities giving the "radiation emitted," "disintegration constant," and "half-value time period" for all the known radio-elements.

Much valuable matter has been added to the section on rare earths; a list is given of more than 170 rare-earth minerals, with the composition, percentage of yttria, ceria, thoria, and zirconia, so far as is known in each case; and in the portion dealing with the chemistry, a diagrammatic scheme for their separation is shown; this diagram is a novelty, and will be found a distinct help in elementary work on rare earths, but considering the obscurity that undoubtedly still surrounds the reactions of many of these bodies it can only be taken as suggestive.

It is much to be regretted that little or nothing is said about the spectra of these obscure bodies, particularly as it is by the study of their spectra that most of them have been recognised and isolated; the extremely characteristic spark spectra of yttrium, samarium, europium, ytterbium, scandium, and other elements are passed over without notice; when we take as only one instance the fact that the very rare element scandium can be directly detected in minerals containing it by a single observation, this is the more remarkable.

We may give as an instance of the present activity of research among the rare earths the fact that since this edition went to press the announcement has been made by G. Urbain and by Auer von Welsbach of the decomposition of ytterbium into two distinct substances.

It is a very great pity that the work has not been properly indexed; brevity in this direction is a decided disadvantage, and takes much from the usefulness of the work.

J. H. G.

A GENERAL HISTORY OF SCIENCE.

Aus der Werkstatt grosser Forscher. Allgemeinverröndliche erläuterte Abschnitte aus den Werken hervorragender Naturforscher aller Völkler und Zeiten. By Dr. Friedrich Dannemann. Dritte Auflage. Pp. xii+430. (Leipzig: W. Engelmann, 1908.) Price 6 marks.

DR. DANNEMANN'S book represents an attempt to trace the gradual growth of scientific knowledge by a superficial examination of critical epochs in which some new discovery has been made available or some truth apparent. It seems a very desirable, as it is a very pleasant, task to survey the whole history of natural science, to recall the men whose genius and achievements have widened the outlook, and given force and direction to new researches. Such a study may be pleasantly impressive and momentarily stimulating, but while it lacks in thoroughness and precision its educational value must be small. A student of a particular department of science should know, it is true, the successive stages by which that subject has advanced, and the author is quite justified in intimating that the study of the original memoirs in which the great masters have developed their results, in the language in which they have expressed themselves, is eminently calculated to present the