

list of the typical compounds known, their characteristics, estimation, separation and finally valuable experimental work for laboratory practise. Numerous references to original papers are given.

To round the work off, consideration is given to platinum and gold, which are without doubt rare metals in some laboratories. Some five pages are allotted to the newly discovered gases in the atmosphere, wherein the fact, not generally known, that Cavendish in 1785 found argon, is alluded to. The last few pages are given to an enumeration of some of the unconfirmed discoveries of new elements within recent times, in fact since 1896. Radium and polonium are disposed of in one paragraph.

There is an index and no advertisements are in the back, for which thanks are due the publishers, who made the book of good appearance.

While in such an abbreviated work the author was confined to well-defined and verified observations, perhaps it might have added value to mention incidentally those uses to which some of the rarer substances are put.

The reviewer is doubtless not familiar with the classification of the author, who places thorium and zirconium in the aluminium group. By analogy according to the oxides, hydroxides and salts, these elements would come in the silicon-titanium group. In the preparation of lanthanum, didymium, etc., no mention is made of the recent elegant electrical methods of Muthmann. In the list of minerals bearing thorium, auerlite is not mentioned. The book does not pretend to contain it all, however.

Every one does not specialize in rare earth chemistry, but the reviewer can not well understand how a teacher of inorganic chemistry can be without some work on the subject. These substances constitute as integral a part of that subdivision of science as any of the other elements.

From the numerous requests for assistance and advice as to literature on the subject, made the reviewer from technical laboratories,

it may be well to say that many would do well to have a copy of this book close by. The book is to be commended as fulfilling in a most satisfactory manner what it pretends.

CHAS. BASKERVILLE.

Lehrbuch der kosmischen Physik. II., Physik der Atmosphäre. Von DR. SVANTE AUGUST ARRHENIUS. Leipzig, S. Hirzel. 1903. 8vo. Pp. viii + 553; 138 figs. and charts.

The author of the 'Lehrbuch der kosmischen Physik,' Dr. Svante August Arrhenius, who is professor of physics at the high school in Stockholm, is already known to meteorologists, chiefly through his researches on the effect of the earth's atmosphere upon solar radiation, and on the relation of the moon's declination to atmospheric electricity and magnetism. The 'Lehrbuch' embraces over 1,000 pages all told, of which between 500 and 600 deal with the physics of the atmosphere. With this second portion of the book this review is alone concerned.

Any one who reads these chapters on the atmosphere with the idea that he will find in them a general account of meteorological phenomena such as is to be had in most of the text-books on meteorology will be disappointed. The author makes no attempt to discuss his subject from such a point of view. He expressly states in his preface that he has tried to avoid matters which are purely astronomical, geological or meteorological, and that he has, so far as possible, discussed only such problems as have close relations with physics and chemistry. We have, therefore, in this 'Lehrbuch' no text-book or reference book on general meteorology, but a discussion of the more directly physical relations of the subject. From this standpoint Dr. Arrhenius has given us an excellent piece of work. It is a compact summary of the most important recent investigations of the physics of the atmosphere, and as such it will prove useful to working meteorologists and physicists. The text, however, contains many mathematical formulæ and numerical data and, therefore, makes decidedly 'heavy' reading. The consideration of the measurement of solar radiation is particularly extended. The chapter on

clouds (VIII.) may be taken as a good example of the difference between the present work and the usual text-book of meteorology, and yet this very chapter is more 'popular' than many in the same book. The principal cloud forms are illustrated by means of one unsatisfactory woodcut on page 642. Indeed, the illustrations are comparatively few in number, considering the size of the book. Regarding the origin of cyclones, Arrhenius says (p. 725) that since we know nothing of the vertical temperature distribution in tropical cyclones there is no argument from that standpoint against the convectional theory, as there is in the case of the extra-tropical, 'which are usually cooler at their centers than in the surrounding air.' It has been found necessary to abandon Ferrel's theory for extra-tropical cyclones, although 'it contains a great deal which fits the conditions in the case.' The Hann theory is quoted from Hann's 'Lehrbuch,' and on page 757, after referring to the investigations of Mr. H. H. Clayton on the cyclones of the United States, the author adds that, in the light of the facts now available, 'these cyclones are to be considered as belonging to an earlier stage of development than the European cyclones.' Besides referring to Mr. Clayton's work on cyclones, reference is also made to the Blue Hill kite and cloud investigations and to the results of the studies on New England thunder-storms, carried on some years ago by the New England Meteorological Society. The results obtained in the recent attempts to prevent hail-storms by means of 'weather shooting' are stated (page 805) to be very doubtful. Chapter XIV. concerns 'Meteorological Acoustics,' which is a new heading in a book on meteorology. Chapter XV. (60 pp.) is an extended discussion of 'Meteorological Optics,' a subject which is receiving much attention in Europe. Chapters XVII. and XVIII. (109 pages) treat at some length the subjects of 'Atmospheric Electricity,' and 'Auroras and Terrestrial Magnetism.'

R. DEC. W.

SCIENTIFIC JOURNALS AND ARTICLES.

The Journal of Physical Chemistry, No. 6, June. 'Adherence of Electrolytic Metal Deposits,' by C. F. Burgess and Carl Ham-buechen. A paper calling attention to some of the problems of electro-plating, which should be attacked from a scientific standpoint. 'Chemical, Potential and Electromotive Force,' by Wilder D. Bancroft. A development of the work of Gibbs. 'Electrochemical Analysis and the Voltaic Series,' by J. E. Root. An experimental investigation of the relations between voltage and current in different solutions of the metals which may be determined electrolytically. From these is deduced the voltaic series in each solution used, at the temperatures of 20° and 60°. The theoretical possibilities of separation of the different metals electrolytically is discussed. No. 7, October. 'Electrolytic Copper Refining,' by F. J. Schwab and I. Baum. An interesting piece of experimental work designed to determine the best conditions of current density, temperature, etc., for the economical refining of copper. 'The Composition of the Surface Layers of Aqueous Amyl Alcohol,' by Clara C. Benson. The foam of a solution of amyl alcohol is found to be slightly more concentrated than the solution from which it is derived. The solution strength was determined by a viscosity method, depending upon an ingenious apparatus for the uniform production of drops. 'A Correction,' by Geo. H. Burrows.

The Popular Science Monthly for October opens with a paper by Franz Boas on 'The Decorative Art of the North American Indian,' which is largely devoted to showing that the idea now expressed by a given design may be something that was not intended at the outset. In 'Highways and Byways of Animal Life' Herbert F. Osborn discusses some of the peculiar adaptations of animals and the causes which have led to them. Frederick Adams Woods presents arguments and figures to show 'The Correlation Between Mental and Moral Qualities,' and under the title 'Co-operation, Coercion, Competition' Lindley M. Keasbey considers the three characteristic