Book Reviews

Geochemistry: A Survey of the Chemistry of the Earth. Kalervo Rankama and Th. G. Sahama. Chicago: Univ. Chicago Press, 1950. 912 pp. $15.00.

This book is an important contribution to earth science by two eminent Finns, whose broad knowledge of geochemistry is matched by their deep interest in the subject, as shown by the thoroughness with which they have covered the field. An introductory section contains an illuminating discussion of the meaning and proper field of geochemistry. Following Goldschmidt, they believe that this science has for its three objectives the establishment of the abundance of elements and nuclides in the earth; accounting for the manner in which the elements are distributed in the minerals and rocks of the lithosphere and in natural products of whatever kind; and the discovery of the laws governing the relative abundance of the elements.

In discussing the interrelationships and overlapping of mineralogy, geology, chemistry, and geochemistry, the authors dispose of the matter of definition by the wise remark that the definition of geochemistry should not so much involve the subject matter but rather the viewpoint of the scientists attacking its problems. If, for example, the particular subject under consideration is the differentiation by crystallization of a magma, both the petrologist and the geochemist must ordinarily deal with the same basic factors. But the petrologist thinks first of the physical processes involved in differentiation, and the geochemist thinks first of the difference in chemical composition of the various products that are formed. For purposes of orderly treatment, the authors chose to divide the subject matter into two main parts. The first deals with the background and general laws that determine the occurrence and distribution of particular elements; the second treats in detail all the elements in the periodic system in relation to their occurrence.

Although by its name geochemistry has to do with the earth, the first chapter of the book treats of the composition and structure of meteorites, which are interesting in themselves because they supply information on interplanetary and interstellar masses. In addition, they bear directly on geochemistry because, according to general belief, these visitors from outer space represent fragments of a body similar in physical-chemical properties to the earth. The condensed account of the chemical and mineralogical constitution of meteorites, therefore, serves as a useful introduction to the remainder of the book.

Chapter 2 brings together in convenient form information on the abundance of elements and nuclides in the upper silicate layer of the earth (the lithosphere). Succeeding chapters deal with the geochemical structure of the earth, distribution of the elements among the geochemical spheres of the earth, geochemistry of the lithosphere, geochemistry of the hydrosphere, geochemistry of the atmosphere, and geochemistry of the biosphere. Part I concludes with a chapter on "Cosmochemistry and Geochemistry" and one entitled "Outline of the Geochemical Evolution of the Earth." In these sections, the authors bring together a great variety of facts and theories on cosmogony and the evolution of the earth. Naturally, in a subject such as this, many of the issues are befogged by controversy, but the authors deal fairly and rationally with the divergent views.

In Part II, consisting of 36 chapters, the known elements up to and including atomic number 96 are covered for each element or group of elements under the heads of abundance and geochemical character, the occurrence of the element in rocks, its biogeochemistry, its cycle during geologic processes, and such other heads as may be of importance for the particular element.

The value of this outstanding work is enhanced by a brief historical outline that mentions the milestones and great names in geochemistry, and by some appendices of convenient reference material, such as tables of the atomic and ionic radii of the elements and of the electronic structure of the elements. In addition to literature references and an author index, there is a subject index with over 3,000 listings. The book is clearly written, and the data are presented in convenient form. Typography is attractive, and the book shows evidence of careful preparation, editing, and proofreading. In their preface Rankama and Sahama modestly disclaim any intention to offer here a textbook of geochemistry or a complete account of all geochemical information. Rather, the volume represents an attempt to survey the broad field and to account for the present status of geochemical knowledge. In this purpose they have succeeded admirably, and students of earth science will find this an indispensable reference work.

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Physical Methods in Chemical Analysis, Vol. I. Walter G. Berl, Ed. New York: Academic Press, 1950. 664 pp. $12.00.

Fourteen competent specialists under the editorship of W. G. Berl contributed to this volume, which represents an impressive piece of work. It renders clear evidence of the continuously increasing importance of physical methods in chemical analysis during the past three decades. Accuracy, convenience, and speed are the characteristics of physical methods that qualify them to supersede older procedures. During the classical period of analytical chemistry, when gravimetric and volumetric methods played the main role, a few physical methods