

BOOK REVIEWS

THE CHEMISTRY OF THE ATMOSPHERE AND OCEANS.

By H. D. Holland. Wiley-Interscience, New York, 1978. xiv + 351 pages, 115 figures, 64 tables. \$24.95.

This book is a long-awaited summary of years of work by its author and other geochemists who have followed Clarke in attempting to understand the chemistry of the earth by examining quantitatively where everything goes. That is, a balance sheet is made of the various processes affecting the earth in order to discover which are the most important. As such it is really more a statement of an approach than it is a summary of recent research. This type of geochemistry has become a mature science: with the important exceptions of the treatment of hydrothermal processes at mid-ocean ridges and some of the material on atmospheric problems, the information here was available in the literature five years ago, albeit scattered. Consequently, the fundamental ideas presented are no longer in a state of flux. Thus I think it is time for the type of approach illustrated by this book to move beyond specialized graduate courses and into the undergraduate curriculum. While this book by itself would not be a suitable text for an undergraduate geochemistry course, much of the material it contains should be included in a geology undergraduate's training.

The book covers four areas: soils, fresh water, seawater, and the atmosphere. The interaction of these is constantly stressed, and it is particularly welcome to see such a thorough treatment of atmosphere-water interactions, in view of increasing concern about atmospheric pollution. In fact, this book is a good place to start in deciphering past geochemical conditions and projecting man's future influence. In terms of specific topics, I was very glad to see an extensive discussion of hydrothermal alteration of sea-floor basalts at the ridges. This process is very important in regulating seawater composition and in the formation of some orebodies. It also seems likely that it should eventually affect processes in subduction zones. Similarly, more work is needed on the geochemical effect of subducted sediments: one wonders whether andesitic volcanism has become more calcic since the appearance of calcareous forams in the Cretaceous. As Holland points out, these two sea-floor spreading processes completely alter Clarke-type geochemical balances.

The book contains very useful summary tables that make it an indispensable reference. In addition, the coverage of the literature is very thorough. My only criticism is that more treatment should have been given to stable isotopes. In summary, I think the book is an invaluable source of information for professionals, and would be a fine teaching vehicle, although the price may be a deterrent.

J. B. MAYNARD
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MINERALS OF NEW YORK STATE. By David E. Jensen. Ward Press, Box 1712, Rochester, N.Y. 14603, 1978. 219 pages, 80 illustrations, 32 colored plates. \$12.95 (hard cover), \$7.95 (soft), plus \$1.50 handling.

David E. Jensen, well known to many mineralogists from his long (1931-1974) association with Ward's Natural Science Establishment, has distilled his lifetime interest in the minerals of New York into this excellent book. It commences with a chapter "History of New York State Mineralogy" (15 p.), which consists largely of brief biographies of scientists and collectors who have made notable contributions to the state mineralogy. A brief (2 p.) account of mineralogical magazines is followed by a 30-page section on the minerals of the principal rock types and the important mines of the state (New York City mineralogists may feel somewhat slighted in that Manhattan Island is dispensed of in a single paragraph under pegmatites). The major part of the book is the chapter "Descriptive Mineralogy" (p. 51-179), which describes in alphabetical sequence 195 recognized species and gives locality data, along with literature references; many subspecies and varieties are referred to under the species names. This section is illustrated by many excellent photographs (32 in color) by Mrs. Jensen; a scale would have been a useful addition. A comprehensive bibliography (30 p.) completes the book. It is an altogether worthy addition to the growing number of state mineralogies, and should be of value to scientists and hobbyists alike.

BRIAN MASON
Smithsonian Institution

GEOCHEMISTRY OF ELEMENTS IN THE SUPERGENE

ZONE. By A. I. Perel'man. Israel Program for Scientific Translations, 1977. 266 pages. \$37.50. From the 1972 Russian edition *Geokhimiya elementov v zone gipergeneza*, Izdatel'stov "Nedra," Moskva.

Perel'man's book is divided into three major sections: The Supergene Zone, The Geochemistry of Aerial Migrants, and The Geochemistry of Aqueous Migrants. The first section has four chapters, the second two, and the third five.

In the first chapter, Perel'man summarizes the physicochemical parameters of the elements which influence element migration in the supergene zone and presents some tables and graphs showing concentrations in several environments. Chapter 2 has a discussion of the concept of rate of migration of the elements, and very briefly treats methods of expressing ratios illustrative of element distribution and processes, and analytical results. Geochemical systems are discussed in Chapter 3, and the concept of geochemical barriers is reiterated and illustrated with a good table, "Major geochemical barriers of the supergene zone." Paragenesis is described briefly and terms used in the text are defined (e.g. biophilic coefficient, thalassophilic coefficient, technophilic coefficient). Three pages describing the geochemical classification of the elements on the basis of their migration characteristics in the supergene zone comprise Chapter 4.

Chapter 5 on active aerial migrants (O, H, C, N, I) describes the role of these elements in terms of their importance to life and hence their effects on the supergene environment in reasonable form. Chapter 6, on passive aerial migrants (A, Ne, Kr, He, Xe, Rn), is

rather condensed (8 pages) but is a reasonable summary of the element roles in the supergene zone. He and Rn deserve more consideration than they are given.

The last 5 chapters on the easily mobile anions Cl and Br, on easily mobile anions with variable valence S, on mobile cations Ca, Na, Mg, Sr, and Ra, on mobile anions F and B, and on weakly mobile cations K, Ba, Rb, Li, Be, Cs, and Tl, present reasonable summaries of element concentrations and reactions they undergo in the supergene zone in comparison to these concentrations and processes in rock, biosphere, and aqueous systems, *i.e.*, in the landscape geochemistry aspect Perel'man has written on so well in other publications.

There are 209 bibliographic citations, 98 covering 1966–1971, 75 covering 1956–1965, with the rest being pre-1956. Only 11 of the citations are foreign and all are in English. Many classical references are not cited and perhaps this is the greatest negative aspect of the book, although the technical editor seemingly excuses this by implying that we get a good review of the Russian work on supergene zone geochemistry. We do, but workers who do not publish in Russian but rather in English, German, and French, for example, deserve citation of their work.

There are misspellings or errors in name ending. For example, p. 251, Chukhrov is correct, not Chukhrova. This and other similar trifles may be the result of the translation. However, more serious is the fact that incorrect formulas are given, for example, for ammoniojarosite (p. 77), likasite (p. 77), kaliborite (p. 188), creedite (p. 183), gearksutite (p. 183), palygorskite (p. 157); on p. 181, schroekingite has an incorrect formula and is spelled wrong. One would hope that the data in the several tables do not suffer similar errors.

I would recommend the book as reference for library purchase. At \$37.50, it is overpriced.

FREDERIC R. SIEGEL
The George Washington University

EXPLORATION AND MINING GEOLOGY. By William C. Peters. Wiley, New York, 1978. 696 pages. \$21.95.

According to the author the purpose of this book is to furnish an overview of the geologist's work in mineral discovery and mineral production.

An interesting 14-page preliminary chapter deals with the exploration and mining geologist in historical perspective. The book is divided into five parts. Part one is titled "The Geologic Base Line" because it presents the assumptions and measurements from which all subsequent work is derived. This part, which covers 127 pages, is subdivided into 3 chapters: mineral deposits in the subsurface environment, mineral deposits in the zone of weathering, and metallogenic processes and provinces.

Part two, called "The Engineering Factors," introduces disciplines such as rock mechanics, soil mechanics, hydrology, and mining practice that must be taken into account when dealing with earth materials. This part, which is 63 pages long, is subdivided into two chapters: some elements of geotechnics and approaches to mining.

Part three considers the economic factors that the geologist must be familiar with to successfully cooperate with engineers and administrators in site selection for exploration and mining. Sixty-four pages are devoted to this part which is presented under the heading "The Economic Framework" and consists of two chapters: mines

and mineral economics and ore value and the concept of an orebody.

Part four (217 pages), which bears the title "Gathering and Presenting Geologic Data," is subdivided into nine chapters which cover in considerable detail the following subjects: preliminary studies, reconnaissance, mapping surface geology, geologic mapping in underground mines, exploration geophysics, exploration geochemistry and geobotany, drilling for geologic information, sampling orebodies and estimating reserves, and communication. Part five ("The Geologist's Role in Exploration and Mining") runs over 80 pages and contains 3 chapters: exploration programs, the examination and evaluation of prospects and mines, and mining operations and mining geology.

Eight appendices (53 pages) list common abbreviations used in field and laboratory notes, give symbols for field and mine geologic mapping, provide information on sources of preliminary data and information for exploration projects, present format and checklist for mineral property evaluation reports, list geologic time terms and metric equivalents, provide environmental guidelines for mineral exploration, and index maps for mining sites. The book also contains a 35-page list of references and a 16-page general index.

The author obviously has a good deal of practical experience in the mining field which he quite successfully conveys to the reader. Most sections of this volume are well written, and the material is clearly presented. In spite of its nearly 700 pages this book is not large enough to permit in-depth treatment of all the subjects belonging inside its comprehensive framework. Some very interesting subjects, such as Eh-pH diagrams, are treated very superficially. However, adequate references are usually provided for those of the readers who want additional information. The book is richly illustrated, and most figures are useful. Some of the photomicrographs are poorly reproduced, and the lettering on several figures is too small or too blurred to be easily read.

The book has much to offer to seniors and graduate students in economic geology, and practicing mining geologists will find it useful. It should be reserved a space on the shelves of every geology library.

The publisher deserves congratulation on a fine printing job. The less than average number of printing errors witness careful proof-reading. The binding is poor.

GUNNAR KULLERUD
Purdue University

CRYSTAL STRUCTURE DATA OF INORGANIC COMPOUNDS. By Wolfgang Pies and Alarich Weiss. Volume 7, Part C1 of *Landolt-Börnstein: Numerical Data and Functional Relationships in Science and Technology*, edited by K.-H. Hellwege and A. M. Hellwege. Springer-Verlag, Berlin, 1978. xxv + 260 pages, 35 figures. DM 290, approx. \$145.

See reviews of previous parts (*Am. Mineral.*, 59, 1142; 61, 344; 61, 814; 63, 800). This part covers ammonium compounds (including azides and imides), nitrides, nitrites, and nitrates and a few additional nitrogen compounds. For each compound the formula, space group, cell dimensions, cell content, calculated and observed specific gravity, and (if available) structure type, crystal form, and refractive indices are given. Since nitrogen compounds are few and rare as minerals, this volume will be more useful in a chemical than a mineralogical library.

BRIAN MASON
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CRC HANDBOOK OF CHEMISTRY AND PHYSICS, 59th Edition, 1978-1979. Edited by Robert C. Weast. CRC Press, West Palm Beach, Florida, 1978. 2488 pages. \$44.95 within U.S., \$49.95 outside U.S.

The 59th edition of this classic reference work comprises six sections and a 57-page index. The six separately-paginated sections are: A, Mathematical Tables (121 p.); B, The Elements and Inorganic Compounds (429 p.); C, Organic Compounds (792 p.); D, General Chemical (326 p.); E, General Physical Constants (387 p.); F, Miscellaneous (376 p.). The most useful section for earth scientists is section B; it includes a lengthy essay on the elements (p. B4-B66); physical constants of minerals, which gives name, formula, specific gravity, hardness, crystalline form and color, and indices of refraction (p. B220-B225); X-ray crystallographic data, molar volumes, and densities of minerals and related substances (p. B226-B259). Section D contains a great deal of thermodynamic data, including a lengthy part on lattice energies (p. D88-D108). For cosmochemists, Section E contains tables of physical data for the planets, their satellites and some asteroids (p. F174-F186). This new edition continues the great tradition of this work as a basic data source for all scientists, and should be readily available in every laboratory and library.

BRIAN MASON
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LIST OF BOOKS RECEIVED

HUMID LANDFORMS. By Ian Douglas. Volume One of *An Introduction to Systematic Geomorphology*. MIT Press, Cambridge, Massachusetts. xvi + 288 pages. \$15.00.

MODIFICATION OF SOIL STRUCTURE. Edited by W. W. Emerson, R. D. Bond and A. R. Dexter. Wiley-Interscience, New York, 1978. xvii + 438 pages. \$46.00.

COAL DESULFURIZATION PRIOR TO COMBUSTION. Edited by Robert C. Eliot. Noyes Data Corporation, Park Ridge, New Jersey 07656, 1978. x + 307 pages. \$42.00.

OUR CHANGING PLANET. By John Gribbin. Thomas Y. Crowell, New York, 1977. 165 pages. \$7.95.

ROCK BLASTING. By U. Langefors and B. Kihlström. Halsted Press, Wiley, New York. 438 pages. \$25.00.

DESERT LANDFORMS. By J. A. Mabbutt. Volume Two of *An Introduction to Systematic Geomorphology*. MIT Press, Cambridge, Massachusetts. xx + 340 pages. \$15.00.

BORON AND REFRACTORY BORIDES. Edited by V. I. Matkovich. Springer-Verlag, New York, 1977. x + 656 pages. \$82.80.

A DICTIONARY OF THE NATURAL ENVIRONMENT. By F. J. Monkhouse and J. Small. Halsted Press, Wiley, New York, 1978. 320 pages. \$19.50.

COAL RESOURCES, CHARACTERISTICS AND OWNERSHIP IN THE U.S.A. Edited by Robert Noyes. Noyes Data Corporation, Park Ridge, New Jersey, 1978. 346 pages. \$45.00.

ODDITIES OF THE MINERAL WORLD. By William B. Sanborn. Van Nostrand Reinhold Company, New York, 1976. 142 pages. \$9.95.

EXPLORATION GEOCHEMISTRY ANALYTICAL METHODS (in Russian with English summaries). Edited by L. V. Tauson. Vinogradov Institute of Geochemistry, Irkutsk, 1977. 244 pages. 1r.19k.

GEOCHEMISTRY OF ENDOGENETIC PROCESSES (in Russian with English summaries). Edited by L. V. Tauson.

Vinogradov Institute of Geochemistry, Irkutsk, 1977. 226 pages. 1r.19k.

REFLECTION SEISMOLOGY: A TOOL FOR ENERGY RESOURCE EXPLORATION. By Kenneth H. Waters. Wiley-Interscience, New York, 1978. 377 pages. \$28.00.

NOTICES

MAC Short Course—May 1979

Immediately prior to the 1979 joint meeting of the GAC and MAC in Quebec City, the MAC is sponsoring a Short Course in Mineralogical Techniques of Asbestos Determination. The course begins on the afternoon of Sunday May 20 and continues through May 22. It is designed for those who have some basic understanding of the asbestos mineral group including physical methods in determinative mineralogy, but who are not experts. Enrollment is limited. Deadline for registration is May 1, 1978. Fees are \$250.00 (\$150.00 for full-time students). No registration form is required; a deposit of \$50.00 may be sent to Professor Robert L. Ledoux, Department of Geology, Université Laval, Quebec, Canada, G1K 7P4. Cheques should be made payable to MAC 1979 Short Course, in Canadian currency. Further information may be obtained from Professor Ledoux (416-656-2177).

Nominations for Awards, Honors, and Elected Officers of MSA

Members of the Society are urged to take an active part in making nominations for the awards of the Society. Nominations with adequate documentation should be sent to the Secretary, Mineralogical Society of America, 1909 K Street, N.W., Washington, D.C. 20006, no later than May 1 for transmittal to the appropriate committee. The nominator must be a member of the Society. The various awards are as follows:

1. The **Roebing Medal** is the highest award of the Mineralogical Society of America for scientific eminence as represented primarily by scientific publication of outstanding original research in mineralogy. The science of mineralogy is defined broadly for purposes of the Roebing Award, and a candidate need not qualify as a mineralogist; rather his published research should be related to the mineralogical sciences and should make some outstanding contribution to them. Service to mineralogy, teaching and administrative accomplishment are not to be considered as a primary merit for the award. The award is not restricted to Americans. Nationality, personality, age of the candidate, or place of employment shall not be considered.

2. The **Mineralogical Society of America Award** is given in recognition of an outstanding contribution or series of contributions within the fields of interest to the Society. The work for which the award is given must have been published in a single or series of papers prior to the month in which the candidate's 35th birthday falls. Candidates are limited to persons who shall not have reached the age of 37 before January 1 of the year in which the award is decided upon (1979). The Award shall be made without regard to nationality, personality, or place of employment. Membership in the Mineralogical Society of America or publication in *The American Mineralogist* is not prerequisite.

3. **Fellowship** nominations are invited and forms may be obtained from the Secretary. Three members of the Society must sponsor each nominee.

4. Suggestions for nominations for all offices of the Society are welcome; documentation need not be as extensive as for the awards.

Larry W. Finger, Secretary