American Mineralogist, Volume 75, pages 938–939, 1990

BOOK REVIEWS

ENCYCLOPEDIA OF MINERALS, second edition. By W. L. Roberts, T. J. Campbell, and G. R. Rapp, Jr., with photographs edited by W. W. Wilson. Van Nostrand Reinhold, New York, 1990. xxxii + 979 pages. $99.95.

The authors are to be congratulated for providing a valuable reference book with useful physical, optical, and chemical data on more than three thousand mineral species. The format of this edition is similar to that of the first edition: an alphabetical listing by mineral name (from abelsonite to zykaite), followed by formula, crystal system, class, space group, Z, unit-cell dimensions, intense X-ray diffraction lines, refractive indices, 2V, hardness, density, cleavage, color, luster, mode of occurrence, and, most importantly, one or more selected references to pertinent literature in English. The second edition has 1000 new entries and 240 new color photographs of spectacular mineral specimens, as well as 104 black-and-white, mostly BSE, photos and 45 crystal drawings. As the first edition was published in 1974, much new mineral data are available for incorporation into the second edition. Indeed, approximately a third of all references cited are after 1974, including some papers from 1987. It is clearly worthwhile to purchase the new edition of this book.

A few minor errors are scattered throughout the book. This reviewer would prefer that the "lattice constants" were described as "unit-cell dimensions." Morganite is a chromian beryl, not a Cs-bearing mineral. Tawmawite is a chromian epidote, not a "chromium variety of epidote." Tantalum does not "= tantalum carbide"; it was originally identified as tantalum metal but is now believed to be TaC. Some of the varietal names listed are so outdated that they should simply be discarded. Bredigite is listed as "unstable at atmospheric temperatures and pressures," but the phrase "atmospheric temperatures" has no meaning and bredigite is stable at low pressure. In any case, this is an unnecessary note, and fortunately a similar phrase is not used elsewhere, e.g., for coesite, cohenite, diamond, larnite, or sapphirine. Cliftonite is a pseudocubic variety of graphite, not a valid mineral species. Some of the formulae given group together unique sites, i.e., $(Mn,Mg)Si_2O_6$ rather than $MnMgSi_2O_6$ for donpeacorite and its unnoted dimorph kanoite. The formula of diopside is written unconventionally with the smaller octahedral cation listed first, $MgCaSi_2O_6$. Ferrosilite is more than a component in pyroxene; ferrosilite, not orthoferrosilite, is the proper name for Fe-rich orthopyroxene. The authors haven't consistently identified all polymorphs, i.e., sanidine vs. microcline and orthoclase, majorite vs. enstatite and clinoenstatite, and suessite vs. gupeiite (Fe_3Si). In addition, the reviewer can't resist noting that the pyroxene esseneite ($CaFeSiAlO_6$) was misspelled as essenite and that it is not listed as a species under the pyroxene group. Such errors will not lead most readers greatly astray, as the primary use of the book will be in identification of possible minerals with the data provided, followed by consultation of the cited literature. One major improvement that the authors should consider for the third edition is to provide a chemical index, similar to those given by W. E. Ford in Dana's *Textbook of Geology* (1932) and by H. Strunz in his *Mineralogische Tabellen* (1970), which are clearly outdated. An updated cation-based index would be of great use to the analyst who is trying to identify minerals from chemical data.

At $99.95 this book seems expensive. However, considering its dimensions, 2½ in. × 8½ in. × 11 in., and weight, 7.7 lbs, as well as the 48 color plates, this tome has to be one of the best bargains in scientific reference books. The reviewer is pleased to have this book on his shelf. He strongly recommends it for purchase by geology libraries and by those scientists involved with identification of less common minerals.

E. J. Essene
University of Michigan

FUNDAMENTALS OF OPTICAL, SPECTROSCOPIC, AND X-RAY MINERALOGY. By S. Mitra. Wiley Eastern Limited, New Delhi, India. (Distributed in U.S. by John Wiley and Sons, Inc., New York, NY.) 1989. xv + 236 pages. $19.95.

Spectroscopic techniques and the concepts of solid state chemistry and physics are becoming more and more important in mineralogy, and the quantitative aspects of mineralogy are becoming more and more important in petrology. At the same time, textbook prices continue to climb to remarkable heights. Those of us who teach courses in "modern mineralogy" or "mineral physics" or just plain "mineralogy" with an up-to-date view of things are thus faced with a dilemma: there is no one good text that covers the basics of optical mineralogy, spectroscopy, and X-ray diffraction, and it is hard to ask students to spend $150 to $200 on the multiple books that are needed.

This new book by S. Mitra seems to be an attempt to deal with the problem. First of all, it is a real bargain: the $19.95 price is not a misprint, and it is a hardcover edition. This should make it of real value where funds for book purchases are even more limited than in developed nations: the author knows the needs of his country well, I suspect. The low cost has been made possible in part by the use of relatively low-quality paper and inexpensive printing of figures, but also, unfortunately, by an apparent lack of serious editing. More on this below.

In 180 pages of text, the author introduces some of the basic concepts of optical mineralogy, visible and infrared

0003–004X/90/0708–0938$02.00

spectroscopy (both transmission and reflection), and X-ray crystallography. Included in this space are a wide range of rather detailed pragmatic tips on making actual measurements, including suggestions on equipment that often specify brands. Much of the text will serve as a useful background, if supplemented by careful lectures and other reading. I found, however, that many passages were so terse as to be confusing or even misleading to the novice in the field.

The text is followed by 30 pages of appendices listing optical properties, X-ray determinative methods, and powder XRD lines for specific minerals. Some of this may be particularly useful in laboratory exercises, or when access to other books is very limited.

This attempt at producing an efficient, brief introductory text could have been greatly improved by careful editing. Typographical errors abound. More significantly, apparently precious space is wasted in the text by poor organization: concepts are frequently discussed before terms are defined, or are duplicated. Hund's rule is defined three times in two pages but doesn't appear in the index, for example. Multiple figures with the same message appear in several chapters.

A book like this can only scratch the surface, and the author is well aware of this limitation. It should, however, not only give a student some familiarity with the jargon of the trade, but also tell him or her where to go to learn more. My biggest complaint is thus that the references listed are generally very out of date, being mostly from the 60s and early 70s. In the chapter on IR spectroscopy, the most recent references were published in 1978, and the most modern reference on molecular orbital theory is 1974! The often pragmatic and very inexpensive MSA *Reviews in Mineralogy* are neglected entirely.

In summary, this book may play a role in modernizing introductory mineralogy courses, especially where funds and library access is limited. I don't think that it will gain widespread use in the U.S. and Europe, however.

J. F. Stebbins
Stanford University