

BOOK REVIEW

THE 22ND EDITION OF THE MANUAL OF MINERAL SCIENCE. By Cornelis Klein. John Wiley & Sons, Inc., New York, 2002, 641 p. plus CD-ROM, \$115.95.

This is a textbook that I wish had been available to me when I took mineralogy 30 years ago. The book is the most complete mineralogy reference I have encountered for undergraduate students. The author makes a point of mentioning that he has tried to make this edition more "user friendly" and Kase Klein has certainly succeeded. The book even has an enclosed CD-ROM that succinctly condenses many of the major portions of the text with useful added features for presentation on a PC.

The true strength of this book is in the depth of information available and the clear manner in which it is presented. The clarity issue is tackled straight out of the box, with Klein's discussion in the Preface of his motivation for restructuring this edition of the book. He makes a clear case for introducing crystal chemistry to students before the text delves into the realm of crystallography. The rationale is that at most schools a college level chemistry course is a prerequisite to mineralogy, and students with such a background will have a better grasp of crystallography if the tenets of crystal chemistry are laid out first. It certainly works for me. The Preface goes further by summarizing the contents of the chapters, describing the use of "interest boxes," defining the goals of the book, explaining the content and use of the CD-ROM, and describing the availability of an instructor's slide set and lab manual.

Chapter 1, the Introduction, describes the history of mineralogy, crucial scientists that advanced the field, and instruments that played a critical role in bringing mineralogy to where it is today.

Physical Properties of Minerals in Hand Specimen are presented in Chapter 2. The descriptions are both complete and informative, with figures that provide very good illustrations of the properties being described. Chapter 3, Elements of Crystal Chemistry, provides an exhaustive explanation of the major principles encountered. The two atom models (Bohr and Schrödinger) are well explained. This chapter on crystal chemistry brings students up to a beginning graduate level of understanding not often found in most texts. Mineral Reactions, Stability, and Behavior are described in Chapter 4. Major sections of this chapter deal with mineral reactions and stability in a precise way, with excellent discussions of phase diagrams (1, 2, and 3+ components), polymorphic reactions, exsolution, metamictization, pseudomorphism, twinning, and the origin of color. The author's use of HRTEM photographs is especially helpful in illustrating reactions such as clinopyroxene reacting to amphibole and talc, or sillimanite to kaolinite. Chapter 5 provides a summary of the most important crystallographic concepts, including internal order, symmetry, crystal morphology, symmetry nomenclature, and symmetry of motifs, lattices and plane groups. Chapter 6 (Selected Point Groups and Space Groups) discusses first the concept of stereographic projection and then the detailed description of 19 of the most common point groups with examples of some space group representations. Analytical methods in mineralogy are nicely covered in Chapter 7; this chapter gives an overview of the most com-

monly used analytical techniques. The author gives more extensive coverage to X-ray powder diffraction and optical methods, which is refreshing. Even though the author states that "...students will find that gaining proficiency and self-confidence in optical measurements is a generally slow and a quite demanding learning experience," I would encourage every mineralogy student to master this valuable discipline. The next five chapters (eight through twelve) provide systematic descriptions of the common rock forming minerals, with a refreshing bent toward crystal chemistry. Once again, the photographs and figures are informative and highly useful in this context. The chapter on gem minerals (Chapter 13) is very factual, summarizes both natural and synthetic gem materials and their properties, and describes the analytical instruments used to identify them. Chapter 14 provides three determinative tables for the identification of minerals. The text book concludes with a valuable mineral index and a subject index.

The CD-ROM disc that is included with the book is easy to load, easy to navigate, and contains a good deal of supplemental information. The modules on crystal chemistry and crystallography provide many animations that deal with three-dimensional concepts that would be difficult to convey from a two-dimensional illustration.

Finally, a note about the very minor shortcomings of this textbook. There are a series of color plates included in the book. Whether the photographs are of rock-forming minerals or of gems, the resolution is high quality and of representative phases. However, none of the photographs contain a scale. This would have been very useful. In addition Plates 1-8 have minerals that are obviously sorted by their chemical or structural group (native element, carbonate, halide, phosphate, sorosilicate, cyclosilicate, nesosilicate, etc.). It would have been helpful to label the photos by their group names. The editing and proof reading of this text was extraordinary; I located only one spelling error in a figure caption.

The only item I had any disagreement with was the author's freestyle form of referencing in some chapters. Two examples will suffice to illustrate the point. In Chapter 1 a discussion of the Canfield mineral collection at Smithsonian cites A. Roe, 1990, in volume 21 of the Mineralogical Record. This reference is not listed in the references at the end of the chapter. A second example was one where the author cited the title of the article in the text (Encyclopedia of Mineral Names, 1997), but it was difficult to locate the same item in the references at the end of the chapter, where it was cited as Blackburn, W.H. and W.H. Dennen, 1997.

In summary, the author has produced a mineralogy textbook that covers all the major points in depth for an introductory college course. He does so in a very clear and concise manner, with a style that is easy to comprehend. I believe any professor would do quite well using this as a text for their class, and the students would have a valuable instrument for learning mineralogy. Finally, any practicing geologist outside the discipline of mineralogy would find this to be an excellent reference text for the field of mineralogy.

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