

# Feldspar Minerals: Vol. 1, Crystal Structure and Physical Properties; Vol. 2, Chemical and Textural Properties

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# Book Reviews

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## **Feldspar Minerals: Vol. 1, Crystal Structure and Physical Properties; Vol. 2, Chemical and Textural Properties**

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by Joseph V. Smith  
*Springer-Verlag, New York, Volume 1, 627 p., 1974. \$40.10.*  
*Volume 2, 690 p., 1974. \$42.50.*

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The two volumes reviewed here taken with a third volume yet to appear are a monumental work on the most important, most widespread, and probably most complex of all mineral groups, the feldspars, by Joseph V. Smith of the University of Chicago who is generally acknowledged to be one of the world's leading mineralogists. Smith has written many papers on the feldspars (and on many other minerals), and in this work he has attempted nothing less than an assessment of every paper of significance published on the feldspars over the past several decades; he has arranged this unbelievably large amount of material into a coherent form, and he has concluded his discussion of most of the myriad of feldspar topics given in this book with his own critical evaluation. The results of this superhuman effort are these two six-hundred-page volumes which have just appeared, and a third on experimental phase equilibria and petrogenesis which will presumably be of equal size but which will not appear for "a few years".

The tremendous wealth of detail in this book makes it a godsend to the silicate mineral specialist for it gives him an up-to-date picture of all aspects of the feldspars, and it delineates the complicated and still controversial phase relationships between the different feldspar minerals (between the potassium feldspars sanidine, orthoclase and microcline, for example). But this same wealth of detail is the source of what is perhaps the book's greatest weakness for the non-specialist: it will likely demand of him considerable patience to extract what he wishes on a given aspect of the feldspars, and on some topics such as, for example, the relationship of the different potassium feldspars to each other, he may find it almost impossible to draw a clear and satisfying picture. It must be said, however, that few mineralogists or petrologists will not find these books of at least some value if they take time to explore them. The following comments should give the reader an idea of the scope of this work, and at the same time help guide him to sections that might particularly interest him.

Volume 1, *Crystal Structure and Physical Properties*, consists of Part 1, Crystal Structures, and Part 2, Physical Properties and Experimental Techniques, and Volume 2 embraces Part 3, Chemical Properties and Experimental Techniques, and Part 4, Growth, Diffusion, Defects and Intergrowths.

In Volume 1, Part 1 is preceded by a necessary and valuable 15-page Summary (of Volume 1) which includes phase diagrams with phases deduced and named largely on the basis of crystal-structural interpretation. This Summary will prove of some value to the general reader, but he may at the same time be dismayed by unfamiliar

terms such as "monalbite", "type e superstructure", and "Huttenlocker intergrowth". The fact is that the structural details of the feldspars are so inherently complex that the whole of Part 1 with its five chapters, and even the Summary, will be of value - nay, even understandable - to only the structural mineralogist.

Part 2 (Volume 1) offers more than Part 1 to the non-specialist. He should find useful the section of Chapter 6, X-ray Diffraction Techniques, that deals with Powder Techniques even though most of the data are readily available elsewhere. Similarly Chapter 8 on Light Optics should prove of value to anyone doing serious microscopic work on the feldspars because the graphs and tables incorporate the most recent observations, particularly those on the "high-temperature" (quenched) plagioclases as well as those on the more familiar "low-temperature" (slowly cooled) plagioclases. The general reader will find Chapter 9, Nomenclature and General Properties of Feldspars, of some value, but again this will be limited because of the dependence of a particular feldspar name on structural interpretation. Smith gives his own preferred nomenclature for the potassium feldspars on p. 429-430 ("theoretical maximum low microcline" (1), etc.) and for the sodium and the ternary feldspars on p. 446-449. Chapters 10 and 11 deal with the application to the feldspars of specialized techniques such as electron microscopy, infra-red absorption, and nuclear magnetic and Mossbauer resonance, and the last Chapter, 12, in Part 2 describes Miscellaneous Physical Properties such as colour, luminescence, density, etc. The general reader might well find of interest the very highly magnified electron micrographs of labradorites on

p. 504 and p. 506 that show them to consist not of one phase but of two "perthite-like" intergrowths (the "Huttenlocker intergrowths"). Petrologists interested in meteorites and in rocks associated with meteorite impact structures will appreciate the discussion on shock-metamorphic features and "maskelynite" on p. 578-589.

On the whole Volume 2, *Chemical and Textural Properties*, embodying as it does more geochemical/petrological material than Volume 1, is likely to find the wider readership of the two volumes. Part 3 (the first Part in Volume 2) on Chemical Properties and Experimental Techniques, consists of one short Chapter, 12, on Analytical Techniques, and one long (128 pages) Chapter, 13, on Chemical Properties (in which reference is made to more than 400 papers!). The many tables of modern analyses of major, minor and trace elements in all varieties of feldspar minerals, and the discussion of these, make this Chapter invaluable to anyone interested in the chemistry of feldspars. By the same token, many sections in the second and last Part of Volume 2, Part 4 on Growth, Diffusion, Defects and Intergrowths, will prove indispensable to most igneous and metamorphic petrologists, both because of the detailed descriptions, and the postulated processes from the literature, and because of Smith's own critical assessment at the conclusion of each section. Following are the topics (with page numbers in brackets) in this part of the book that will likely be of most widespread interest: the growth of feldspar crystals (196-106); zoning (206-247) in which the last 15 pages describe theories of zoning and Smith's evaluation; "tracht" (= crystal habit in relation to environment) (247-274); oriented plagioclase inclusions in K-feldspars and related topics (274-293); the optical and X-ray characteristics of all types of feldspar twins (303-390); perthites, obviously one of the most important topics (401-519); plagioclase intergrowths (peristerites, etc.) (519-544); and intergrowths of feldspars with other minerals - myrmekites (554-581); graphic granites (581-608), and clouded feldspars (623-630).

Such is the breadth and depth of this work. The two volumes are beautifully produced with large numbers of excellent drawings and photographs

and with thorough indexing in several different ways; the printing, paper and binding are of the highest quality. These books should be in every earth science library, and almost every mineralogist and petrologist will be amply rewarded if he takes the time and effort to read the parts of interest to him of this gargantuan description and analysis of the group of minerals that constitutes over half the earth's crust.

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## Geology of Kuroko Deposits

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Edited by S. Ishihara, K. Kanehira, A. Sasaki, T. Sato, and Y. Shimazaki  
*Mining Geology Special Issue No. 6.*  
435 p., 1974.  
*Society of Mining Geologists of Japan*  
*Nihon Kogyo-Kaikou Bldg., 8-5-4*  
*Ginza, Chou-ku, Tokyo, Japan.*  
9,000 yen

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Apparently acceding to international demand, the ever-accomodating Japanese geoscientists have published this classic among economic geology texts. Comprising 41 papers by 76 industry, university and government authors, Special Issue 6 is a rather complete review of the geology of the Kuroko deposits, defined in the first paper as "a stratabound polymetallic sulphide-sulphate deposit genetically related with Miocene felsic volcanism". The stated scope of the book is "to bring together the available geological and mineralogical data in one volume, so that individuals can make their own interpretation of the Kuroko deposits". About half the papers have previously appeared in *Mining Geology* in Japanese but have been up-dated for this volume; the remainder are new contributions.

The volume consists of three parts. Part I includes the definition of Kuroko Deposits and describes their geological characteristics for Japan as a whole, as well as for two of the more important mining regions of the country. Part I also includes a discussion of the relationship between the deposits and plate tectonics. Part II is a collection of 21 papers describing the geology of more than 20 selected mines and deposits. Judging from the remarkably similar content of the 21 "deposit-papers" the authors must have received strict guidelines from the editors. For example, the following topics are common to all 21 papers: stratigraphic sections of the mine area, geologic maps and cross sections of the deposits, and ore grades and tonnages. In addition, at least half of