

BOOK REVIEWS

SMITH (J. V.). *Feldspar Minerals. I. Crystal structure and physical properties*. Berlin, Heidelberg, and New York (Springer-Verlag), 1974. xx+627 pp., 252 figs. Price DM 98.30 (\$40.10).

In this major treatise, J. V. Smith can truly be said to have left no stone unturned, certainly if the 'stone' contains a feldspar. Judging by vol. 1, the complete work will amount to a critical review of all the published research on feldspars that has any lasting significance, ranging from publications of the eighteenth century to the time of writing (in effect up to 1973).

Vol. 1 (reviewed here) is concerned mainly with crystal structure and physical properties, vol. 2 (also already published) mainly with chemical properties and intergrowths, and vol. 3 (in preparation) with phase equilibria and petrogenesis.

The first quarter of vol. 1 is specifically devoted to describing the crystal structures of feldspars, first in general terms and then in the greatest of detail, but in fact crystal structure is also referred to constantly throughout the remainder of the volume. A great deal of data on crystal structural parameters (atomic coordinates, cell dimensions, etc.) are collected and collated in a way that will be most helpful to the future feldspar researcher. The volume deals with the basic structures of the principal feldspars, and also with the incredibly complex, sometimes subtle but nevertheless important, changes of structure that occur with changes of chemical composition in the Na, K, Ca field, and with changes in temperature (ordering processes).

The first two topics dealt with under 'physical properties' are the cell dimensions and thermal expansions of feldspars. Others treated are: optical properties, spectroscopic studies (including infra-red, nuclear magnetic resonance, electron spin resonance, and Mössbauer), colour, luminescence, electrical and thermal conductivity, mechanical properties, and density. In addition, thermal behaviour as revealed by thermal gravimetric and differential thermal analysis techniques is discussed, and considerable space is given to researches in the rapidly growing field of electron-optical studies.

If a mineralogist or geologist is to make maximum and critical use of data obtained by various techniques, he should ideally have a good understanding of those techniques, the basis of their interpretation, and their theoretical and practical limitations. The author therefore tries in each case, and with varying detail and varying success, to give some explanation of the techniques. Some readers will appreciate these expositions as helpful introductions to further reading and deeper understanding. Others will gain a general awareness of the techniques, but will rely on the author's own understanding and his consequent appraisal of the results achieved by them.

It is evident from the author's personal role over the past twenty years in so many aspects of feldspar investigation that there could hardly be a person better qualified to produce this *magnum opus*. He writes in a highly distinctive style (no coy avoidance of first person singular), with an eye for the historical development of the subject, and for the principal *dramatis personae* who have formed the outstanding 'schools of

thought' expressing what have often appeared to be conflicting views on feldspars. A clear message of general importance that emerges from the history of feldspar researches is that successive concepts are seldom completely right or completely wrong.

A large amount of energy and print has been devoted over the years to questions of feldspar classification and nomenclature. The subject is dealt with fully here, giving the various systems employed by different investigators, and also a judgement as to their relative merits and a unifying scheme suggested by J. V. Smith. It is made clear that, while for many feldspars (e.g. albite, anorthite) assignment to a name on the basis of observations is fairly straightforward, for some others (e.g. orthoclase) it would depend very much on the method, and in particular, the scale of the observations. This point is emphasized strongly. Thus, observations by light microscope necessarily 'average' over dimensions of several μm , X-ray diffraction over perhaps a thousand \AA , while electron microscopy can give information relating to a few unit cells or even one unit cell. This leads, for example, to some specimens being correctly described as simultaneously optically monoclinic and 'X-ray triclinic'. The author appreciates well that the geologist in the field has only his eyes for observation, and that not all geologists have access to electron microscopes, and he offers naming procedures suitable at varying levels of investigation.

By using a work of this kind, researchers are usually able to see, more clearly and readily than by perusing the journals, where there are gaps in present knowledge and good scope for further research. Joe Smith does not leave much to chance, emphasizing explicitly for the benefit of his readers where there are likely to be fruitful fields. One should not assume that because of the colossal task of producing and updating these volumes, Joe Smith will not be there among the future fruit pickers!

Since the book achieves so much, it would be almost churlish to offer criticisms. However, I do feel that the author has succumbed to giving a little too expansive a treatment in places, and perhaps to using a little too conversational a style, leading to a greater length of text than is really desirable. Extra space could have been used to more effect in order to give more and larger figures, many of which suffer from overcrowding with information.

The book is well produced, and contains a subject index, author index, locality index, and rock-type index. Each chapter has its own list of references. Page numbers of figures and tables are usefully listed at the end of the book.

J. V. Smith is to be congratulated on the prodigious feat of producing these volumes, which I am sure constitute a landmark in the subject of mineralogy.

J. ZUSSMAN

SMYKATZ-KLOSS (W.). *Differential Thermal Analysis: Application and Results in Mineralogy* (Minerals and Rocks, vol. 11). Berlin, Heidelberg, and New York (Springer-Verlag), 1974. xiv+185 pp., 82 figs., 36 Tables. Price £9.86.