BOOK REVIEWS

Johnson, W. M., and Maxwell, J. A. *Rock and Mineral Analysis.* 2nd Edition. New York (Wiley-Interscience), 1981, xi + 489 pp., 18 figures. Price £38·85 ($69.85).

J. A. Maxwell's first edition of this book had the misfortune to appear (in 1968) during a period of rapid change in the world of analytical geochemistry. The book dealt principally with classical and colorimetric methods of rock analysis and devoted only a small section to atomic absorption spectrophotometry, which was at that time sweeping boldly across the geochemistry laboratory and pushing many traditional methods into retirement. The new edition combines those portions of its forebear that are still relevant, with substantial new sections on atomic absorption and X-ray fluorescence, concluding with brief reviews of four other analytical methods. There are three appendices, including a useful compilation of standard reference materials by S. Abbey.

The book is now divided into five parts. Part I follows the first edition closely, covering capably and in some detail such general matters as laboratory equipment, sample preparation and digestion, and the estimation of accuracy. None the less there are a few obvious omissions: for example, tungsten carbide is not among the grinding media whose contaminating properties are discussed. For these safety-conscious times, the discussions of HF and $HClO_4$ hazards and of fume extraction are perhaps rather sketchy. Part II, likewise mostly inherited from the first edition, describes the supplementary determinations which integrated instrumental schemes cannot accomplish, such as FeO, the volatiles, and phosphorus.

Part III, the most successful part of the book, provides a concise, up-to-date and well-referenced guide to the geochemical uses of atomic absorption spectrophotometry that will be valuable both to the practising analyst and to the newcomer. Complete analytical procedures are given for thirty individual elements of geochemical interest, which succeed in illustrating many of the specific problems that the adventurous analyst will encounter, and the techniques by which they can be overcome.

The description of X-ray fluorescence in Part IV, though providing a well-written summary, is too brief to interest the analyst working in this field, for whom the book professes to have been written. One senses little of that authority, born of years of practical experience, that one seeks in a book such as this, and there is a lack of critical and expert appraisal of such questions as using a heavy absorber. It is here too that one's doubts about the authors' decision to sidestep theory (and incidentally instrument design) are most acutely felt. Today's instrumental analyst, dependent for success on complex physical processes, cannot afford to divorce his practical procedures from their theoretical foundation. True, the theory is available in other texts, but why then should we buy this one?

The book suffers from a general lack of balance, in which the earlier sections, mainly dealing with older methods drawn from the first edition, have been given space disproportionate to their continuing importance. This tendency becomes most pronounced in the final section, which offers brief summaries of four other methods of analysis. Here the electron microprobe, surely the supreme development in the field of mineral analysis, is dismissed in four pages (written by A. G. Plant), less than half the space lavished on the determination of water content in an earlier chapter! ICP emission spectrometry is likewise compressed into only a few pages, scarcely a fair measure of its future promise.

In summary, there is much that is useful in this book and the standard of preparation and writing is high. The most recent references are early 1980, but the book's utility as a literature source is compromised somewhat by the lack of an author index. It must be said that it provides less than a balanced survey of the field it aims to cover; indeed that field may be too wide for two individuals to encompass satisfactorily.

The price is rather high, particulary when one recognizes that the second edition is a hundred pages shorter than the first; the book is destined for the laboratory bench rather than personal bookshelves.

R. C. O. GILL

Sudot, T., and Shimoda, S., Eds. *Clays and Clay Minerals of Japan* (Developments in Sedimentology, **26**). Tokyo (Kodansha Ltd.), Amsterdam, Oxford, and New York (Elsevier Sci. Publ. Co.), 1978. x + 326 pp., 110 figs. Price Dfl. 140.00 ($60.75).

Undoubtedly this is a book for the clay-mineral specialist, but such specialists must be greatly indebted to the authors for bringing between two

covers a digest of work on Japanese clays. Not only is this work very substantial in volume, but it is scattered through a wide range of journals, mineralogical, geological, geographical, pedological, and ceramic—and some of this is by no means easy to obtain in Europe.

The first chapter, which comprises nearly a third of the total text (by Sudo), is intended as a general introduction and begins with a short section on techniques of identification which is probably the weakest in the book; by limiting itself to descriptions of the use made by Japanese workers of the available methods it would be very difficult to understand by anyone not already familiar with the subject. The next section on modes of occurrence is a useful summary; it is then followed by a detailed description of each of the clay minerals.

Chapter 2 (by Nagasawa), on the weathering of pyroclastics, is a brief but succinct account of a subject little studied outside Japan. The following section (by Shirozu) deals with the Kuroko deposits, an area of much wider interest than simply clay mineralogy; by concentrating on the clay minerals, however, the author sheds new light on these intriguing formations.

The remainder of the book takes each individual group of clay minerals and describes their Japanese occurrences and mineralogy in great detail. There is a wealth of information here quite invaluable to the specialist who needs comparative data. Perhaps the major criticism of this book is that such a specialist, in order to find the data he needs, on, say, allophane, would need to search not only the chapter on this mineral, but also the long section in the introduction on it, and parts of other papers as well.

It is perhaps too much to hope that in a subject so large and incoherent as clay mineralogy, the editors could have provided more systematization; as it is, the work offers little to the non-specialist reader, except a general impression that clay minerals in Japan are very different from those of Western Europe. It also seems very strange that the book should appear in a series devoted to sedimentology; since the approach is almost purely mineralogical, and the majority of the minerals described are of hydrothermal origin.

J. E. PRENTICE

Williams, H., and McBirney, A. R. *Volcanology*. San Francisco (Freeman, Cooper & Co.), 1979. 398 pp., 233 figs. Price $33.50.

In their preface the authors state that their intention is to summarize the present state of knowledge of volcanoes and to provide an advanced reference book. They have succeeded in this and have produced a logically organized work that provides a readable account of volcanic processes and is also a source of detailed descriptions of volcanic activity and its products. The book does not pretend to provide the answers and part of its value is that the reader is left to decide for himself between the various proposals.

The introduction provides a brief historical background to the development of igneous petrology, marking some of the major landmarks. The point is fairly made that despite the strong accent on laboratory studies of volcanic rocks observation of eruptions still provides insights unobtainable in any other way.

Chapter Two, on the physical nature of magma, reviews what is known of the rheological, thermal, and other physical properties of magma. Here what could have been an uninspiring listing of properites is made both readable and relevant to geological problems.

The long and interesting Chapter Three on the generation, storage, and rise of magma leads one to wonder how magma is ever produced, let alone becomes lava. The manifestly self-evident fact that magma has been produced on a considerable scale throughout Earth history, coupled with the knowledge that temperature increases with depth, led geologists to the facile conclusion that melting readily occurs and that there is easily available adequate pressure to drive magma to the surface. Yet as Williams and McBirney show, it is not that simple. They briefly review three mechanisms by which the mantle may melt—local influx of extra heat, rapid uplift, and addition of volatiles. They clearly doubt the ability of these mechanisms to produce much basalt, but acknowledge the importance of volatiles in calc-alkaline volcanicity. From the inadequacies of the three obvious mechanisms they are thrown back on Daly's model of magma being kept in 'hot storage' in a vitreous substratum. While appreciating the lack of support from seismic evidence for a glassy layer the authors rightly imply that there is still much to be learned about the physical properties of rocks at elevated temperatures and pressures before it can be ruled out.

A similar approach is adopted to the problem of rise of magma. The treatment provides a judicious mixture of geological observation and physical objection. Because the book does not aim to have all the answers this reviewer now feels far less unhappy at the unconvincing replies he gave his first year when they wanted to know just how the Whin Sill was emplaced!

The section of the book devoted to processes of volcanism is completed by a useful chapter on the mechanics of eruption.