

BOOK REVIEWS

VOLBORTH (A.). *Elemental Analysis in Geochemistry. Part A: Major Elements.* (Methods in Geochemistry and Geophysics no. 8.) Amsterdam, London, and New York (Elsevier), 1969. xv+373 pp., 76 figs., 15 tables. Price 135s.

The aim of this book is to bring the best of the classical analytical techniques within reach of the instrumentalist and also to give the gravimetric chemist an introduction to the simpler instrumental methods for analysing all elements found in major amounts in rocks and minerals. Thus the selection and combination of methods should permit a complete analysis of a complex substance with a maximum of simple double checks by different but compatible methods. The author remarks that disastrous consequences may result from relying solely on instrumental analysis and at the same time neglecting the needs and necessary improvements of the classical analyst's 'corner', if indeed any such space is left for him at all. Instrumentalists tend to forget that to transform the relative counts or intensities that they are measuring into meaningful figures they must use data originating mainly from the classical gravimetric analyst.

After dealing with the preparation of samples and a discussion of factors influencing the selection of methods of analysis, some details are given of methods of extraction and ion exchange separation, followed by details of classical gravimetric, volumetric, and other methods. There are also chapters on flame photometry and atomic absorption spectroscopy. The remaining third of the book is devoted to an account of instrumental non-destructive analysis, X-ray spectrographic analysis, and fast-neutron activation analysis.

The author is obviously aware of the dangers of presenting the subject matter in too terse a form but it would appear that he has not always been successful in giving sufficient details for this to be used as a laboratory textbook. This would not perhaps matter if reference was made to the full description of a particular method, but in fact there does not appear to be a single reference throughout the entire text, merely a 3½-page bibliography at the end of the book. The expressed aim was good but the result leaves the target hardly scarred.

R. A. HOWIE

MAXWELL (JOHN A.). *Rock and Mineral Analysis.* London and New York (Wiley: Interscience), 1968. xvii+584 pp., 14 figs. Price 229s. (\$24.50).

This book is written for the practising rock and mineral analyst and is intended to provide an up-to-date coverage of developments in analytical techniques in the last fifteen to twenty years. The salutary lesson of the results of the co-operative investigation of the G-1 and W-1 samples initiated in analytical laboratories a reappraisal of the methods and techniques then in use. In the last few years new techniques and new reagents have been forthcoming and it is useful to have an evaluation of the various methods now available for determining a particular element in silicate rocks. It may

therefore come as a surprise to some readers to find that the majority of methods given are still of the classical or conventional type, but the methods now described are in a refined and modified form, incorporating the newer techniques where experience has shown them to be reliable. There are detailed sections on sampling and sample preparation, precision and accuracy, and on the facilities and equipment of the laboratory. The various methods of analysis are discussed element by element in the order in which they are usually determined in the course of an analysis and this is followed by fully detailed descriptions of selected procedures, both for silicates and for carbonates. In addition to the routine methods of analysis equal prominence is given to selected procedures coping with such situations as the gravimetric determination of SiO_2 in the presence of boron, the need to retain any appreciable fluorine when determining water by the Penfield method, and the difficulties of decomposing refractory minerals. Additional chapters deal with X-ray spectrographic analysis and with atomic absorption spectroscopy for Mg, Li, and Zn. The treatment of these techniques is necessarily rather brief but the rapid development of the latter method is perhaps reflected in the statement that atomic absorption spectroscopy has not yet been successfully applied to the routine determination of aluminium in silicates: it has in fact been so used in the reviewer's laboratory for three years. Appendices present outline schemes for conventional silicate rock analysis ($F < 2\%$), for rapid chemical analysis of silicate rocks, and for the combined XRF-chemical rapid analysis of silicate rocks, and the book ends with a usefully detailed 26-page subject index.

The author gives a clear exposition of how the skilful application of the so-called classical methods in their present refined and modified form is still the best means of providing the accurate reference standards by which relative compositional readings are converted into meaningful compositional values. But it is also realised that many laboratories do not have access to the necessary instrumentation required for newer methods, and here we are given an expert appraisal of the recent refinements available for the classical methods. The detailed procedures described for silicate analysis will be welcomed—the reviewer even looks forward to the return of his now dog-eared copy of Washington's *The Chemical Analysis of Rocks* used by successive generations of students. This book should find a place in all analytical and geochemical laboratories as well as in departmental and personal libraries.

R. A. HOWIE

DALRYMPLE (G. B.) and LANPHERE (M. A.). *Potassium-Argon Dating*. San Francisco (W. H. Freeman and Company), 1969. xiv+258 pp., 98 figs. Price 70s.

This book gives an extremely detailed account of the history, principles, techniques, and some of the applications of the K/Ar method of dating. According to the authors, it is the first book to present a convenient summary rather than a comprehensive review about K/Ar dating.

After general introductions to such basic topics as atoms, elements, isotopes, radioactivity, the generalized age equation, the principles of the K/Ar 'clock', etc., the book goes on to describe in detail the principal methods used for radiogenic argon extraction and measurement, namely high-vacuum fusion followed by mass-