

BOOK REVIEWS

Zussman (J.), editor. *Physical methods in determinative mineralogy*. London and New York (Academic Press), 1977. xiv + 720 pp., 227 figs. Price £23.50 (\$34.90).

The first edition of this book proved to be popular particularly with postgraduate students who found it a useful introduction to the variety of physical techniques applied to mineralogical research. The success of the book lay in the way the physical basis of each technique was concisely described and then followed by practical details and a carefully selected list of references.

In this second edition one of the original techniques has been omitted and two new ones added. The techniques now featured are: mineral separation; transmitted-light microscopy; reflected-light microscopy; automatic image analysis; X-ray fluorescence spectrometry (XRF); electron-probe microanalysis (EPMA); instrumental neutron activation analysis (INAA); atomic absorption spectroscopy (AAS); X-ray diffraction (XRD); electron microscopy and electron diffraction (EM); infra-red spectroscopy (IR); thermal techniques; density determinations; and radiographic techniques.

Whilst the addition of INAA and automatic image analysis to the list is laudable, it is perhaps a little unfortunate that optical emission spectroscopy has been omitted. The recent introduction of plasma sources to direct reading optical spectrographs has improved both sensitivity and precision to such an extent that many workers believe that the technique will compete with, and in some cases excel, both XRF and INAA.

Many of the chapters in this second edition have had only minor revisions from the first edition, the paucity of recent references indicating that these techniques have remained essentially unchanged over the past decade. Other chapters have been more extensively revised or entirely rewritten.

The rewritten chapter on reflected-light microscopy has a lucid account of the theory and practice of reflected-light microscopy with good descriptions of reflectance and colour measurement. There are useful tabulations on reflectance and micro-hardness data. The newly included technique of automatic image analysis is described in some detail and the advantages and disadvantages of different instruments discussed. Most of the applications quoted are in ore mineralogy and it is clear that it is in this field that the technique has most to offer. A useful section on trace element analysis has been added to the chapter on XRF and it is pleasing to

see that the drawing of a plunger system for the preparation of fusion discs has been omitted. Many workers found this device difficult to use and a more convenient one is now referred to (p. 265). More modern EPMA instrumentation is described in the next chapter but of greater significance is the addition of an up-to-date account of energy-dispersive analysis; both instrumental and data-reduction aspects are considered. The new chapter on INAA is rather disappointing because although the subject is treated quite briefly (26 pp.), the clarity of the description compares unfavourably with the previous chapters. Electron microscopy is becoming more important in mineralogy and the treatment of this subject has been extended to include some discussion of the dynamical theory of electron diffraction contrast, weak-beam methods, and lattice imaging. The combination of analytical facilities with TEM is dealt with somewhat cursorily. The modern scanning transmission electron microscope STEM can be combined with both X-ray and energy-loss spectrometers to provide analytical data on a scale of a few hundred Å. These techniques will undoubtedly be used to study small-scale compositional variations in minerals. Infra-red spectroscopy is dealt with at much greater length than in the first edition and numerous applications are described. This chapter has a very extensive reference list. The thermal techniques grouped together in chapter twelve do not seem to have changed recently; however, this chapter has been rewritten by a new author using many of the original examples. The short chapter on radiographic techniques now includes a section on fission-track radiography.

This book can certainly be recommended but the diversity of techniques discussed and the comparatively high price make it more appropriate for libraries than individuals.

P. SUDDABY

Nockolds (S. R.), Knox (R. W. O'B.), and Chinner (G. A.). *Petrology for Students*. Cambridge and London (Cambridge Univ. Press), 1978. viii + 435 pp., 128 figs. Price £17.50 (hard cover), £6.50 (paperback).

Although the name of Alfred Harker has been dropped from the title this new text is effectively a revised and expanded version of Harker's *Petrology for Students*. It retains many of the original drawings and includes a large number of new ones.