Brownlow (A. H.). *Geochemistry*. Englewood Cliffs and London (Prentice-Hall Inc.), 1979. xii+498 pp., 112 figs. Price £15·00.

Recent years have seen a number of geochemical books, many of them on specialized topics, come on to the market, but there is still a need for a wider choice of introductory texts. This book goes some way to satisfying that need. In the space of nine chapters, a wide range of topics is discussed from the origin of life to regional metamorphism and plate tectonics.

The author's approach is one that has tended to keep the account of chemical principles distinct from that of petrology. Three of the nine chapters deal with the topics of thermodynamics, crystal chemistry, and water chemistry. These are followed by three chapters on petrology discussed mainly in terms of chemical compositions or reactions, but with little reference to the principles discussed earlier. Many opportunities to integrate these two parts of the book have been lost. Petrological 'case histories' are given but often each is a précis, without addition or further review, of published accounts. Some aspects are dealt with in such a superficial way that one fears student readers may well become confused and would be better off reading an introductory text devoted to petrology.

The three other chapters are: an introductory one on topics such as the periodic table, and abundance of the elements; on isotope geochemistry, giving the principal dating methods as well as a short account on stable isotopes; and a useful chapter on organic geochemistry.

The chemical chapters are concisely and well written and are presented so that readers need not have much mathematical knowledge. They are in a traditional mould and much of the material can be found in existing introductory texts. Indeed, the problem of what is best incorporated in, and what may reasonably be omitted from, an introductory geochemical text must be a serious one for any author. However, for a book of this title it is a pity that there is rather little, or no, discussion on a number of aspects of present day geochemistry. These include the kinetics of geochemical processes; the modelling of fractional crystallization and partial melting processes in magma generation; and the geochemistry of ore deposits.

Each chapter ends with a list of selected references and a good number of problem questions with the answers provided. It is a well-produced book that can be recommended for its chemical chapters to students wanting an introduction. It will take its place alongside the other available introductory texts but is unlikely to become the leader.

PAUL HENDERSON

Grove (E. L.), editor. *Applied atomic spectroscopy, Vol. 1*. New York and London (Plenum Press), 1978. xviii+313 pp., 122 figs. Price $47.40. *Vol. 2*. 1978. xx+344 pp., 23 figs. Price $47.40 (set of two: $90.00).

This two-volume set attempts to cover the basic principles, instrumentation, and methodology of atomic spectroscopy. Although no rigid definition of the procedures covered is given, the two volumes cover most of the currently used spectroscopy techniques and discuss their application to specific types of materials in some detail. The authors and chapter titles have been given in M.A.79-2013.

It is inevitable in such a collection that the usefulness of each chapter will vary considerably from reader to reader. Nevertheless the two books contain a great deal of valuable information, although much is not of direct relevance to geological materials. The first chapter on photographic photometry for example contains much detailed information and a comprehensive collection of references, although photographic techniques are not now widely used for the analysis of geological materials. The chapter on laser emission spectroscopy is of great interest but the practical applications of this method of excitation have yet to be demonstrated. The account of electrode material and design gives valuable information on a somewhat neglected area of emission spectroscopy.

The chapter on the behaviour of refractory materials in a direct-current arc plasma is of more direct relevance to geological materials. A considerable amount of background theoretical information is given and specific analytical methods for apatites and silicates discussed. This account could perhaps have been improved by a fuller coverage of the more recent literature (of the 155 references quoted only a handful are post 1970), also the methods used to obtain the quoted detection limits should have been clarified.

The last chapter in Vol. 1 gives an excellent and concise account of the present state of knowledge of sea-water chemistry, covering both established and recent methods of analysis.

In Vol. 2, the chapters on precious metals and the petroleum industry applications refer specifically to the analysis of geological samples, although in a somewhat generalized way. The chapter on the petroleum industry does include some interesting information on the metallic elements found in crude petroleum and a valuable assessment of burner design and interferences in atomic absorption work.

The books contain a lot of valuable information; the accessibility of this information would have been greatly improved with a more comprehensive index.

The authors of these books are in some respects victims of the field of research in which they work. Recent developments have occurred so rapidly that the accounts are already somewhat dated. There is, for example, no extensive discussion of inductively coupled plasmas as excitation sources. However, the authors and editor cannot be blamed for this and the book will provide a valuable reference work for some years to come.

J. N. WALSH

Rochow (J. G.) and Rochow (E. G.). *An Introduction to Microscopy by Means of Light, Electrons, X-rays or Ultrasound.* New York and London (Plenum Press), 1978. xvi+367 pp., 221 figs., 2 pls. (1 in colour). Price $35.00.

Rochow and Rochow set out to encompass the whole field of microscopy in one volume and consider both optical microscopy and instrumental methods. Two particular themes run through this book. The first theme acknowledges the objective results of microscopy and concentrates on the subjective aspects of interpretation, whilst the second theme elevates resolution of detail to the status of an attribute of a microscope more significant than magnification. The claim on the jacket of this book is that it is 'the first book to deal with *all* aspects of microscopy in one volume', although it deals with fewer topics than are covered in for instance 'The Encyclopedia of Microscopy' (G. L. Clark, ed., 1961).

An opening chapter gallops through a history of microscopy from magnifying glasses in AD 60 to instrumental methods in thirteen pages like the proverbial American tourist on a 'Cooks' tour. Nevertheless I found this chapter very readable and the pages on corrections for aberrations particularly useful. Any doubts that resolution is less important than magnification are dispelled here. Definitions, attributes contributing to visibility, and principles is the title of the next chapter which provides necessary definitions and optical theory and an introduction to the first theme of the book on the subjective nature of the interpretative process.

Two chapters deal efficiently with the principles of the optical microscope in transmitted and reflected light. Continuously throughout these chapters the particular problems of biological microscopy are examined and the reader may feel that this field and the techniques rather than their application are the authors' main interest. This view is encompassed by the following abstract which contains the authors total contributions under the heading Field of View: 'Field of view is important in biological microscopy because natural material is so complex and variable. Biologists know this, and they know how to cope statistically with the variables. Their experience with computers and the design of experiments makes them potentially good microscopists, who need only to understand more about the construction and use of their instruments.'

Three chapters follow on microscopy with polarized light and microscopical properties of fibres and crystals. Whilst there is general coverage of these subjects it is insufficient in depth for, e.g. the mineralogical or microscopic aspects of the first year of a degree course in geology. Passing reference is made to the universal stage but the absence of a description and discussion of its application is particularly unfortunate as is the overwhelming concern of the chapter on crystal properties with organic crystals and microscopic morphology. There is no adequate treatment here of mineralogical examination of thin sections despite a well-produced Michel-Lévy Chart.

A useful chapter on micro-photography is followed by two very informative chapters discussing methods of enhancing contrast by phase modulation, contrast modulation, dispersion staining, and interferometry.

The chapters on Transmission Electron Microscopy, Scanning Electron Microscopy, the Field-Emission Microscope, X-ray Microscopy, and Acoustic Microscopy are written in a gauche style which leaves me with the impression that the authors have no great practical experience of these subjects. There are many errors and situations where the choice of words is inappropriate almost as though these chapters had been rewritten from other texts without a sufficient degree of understanding. To give just a few examples we learn that electron microscopes use '... an electron beam whose rays . . . one at a time, strike the specimen', and it is necessary to clean the electron column not to prevent astigmatism, but to prevent the apertures being 'plugged by contaminant' or 'to keep the apertures open'. As an example of the atomic number effect contributing to a back-scattered electron image we are presented with a photomicrograph of a pure gold surface with interesting topography but no variation in atomic number. The chapter on X-ray Microscopy though, comes near to providing a satisfactory description of how this technique is applied and interpreted.

This book makes some valid comments on microscopy especially in regard to resolution, subjective interpretation, and useful magnification. It provides an introduction without depth and is not an authoritative text. The book displays too many errors and omissions—where for instance is the