

After the short introductory chapter, Chapters 2 to 4 consider respectively the chemistry, phase relations, and geochemistry of the platinum-group elements. These provide a solid grounding in the properties and abundances of these elements from which the following six chapters on the study and properties of the known Pt-group minerals logically follow.

Sample preparation and analytical methods are dealt with in Chapters 5 and 6 while the substantial Chapters 7 and 8 contain the mineralogical data under three broad headings—X-ray crystallographic and density data, ore microscopy, and analyses of named minerals. The second section is the largest, providing a useful compilation of reflectance spectra for most of the minerals. The splitting of data here into three sections could prove troublesome in that much extra searching is required to extract, for instance, the chemical analysis pertaining to a specific reflectance spectrum. Nevertheless the information is all there and the authors are to be congratulated on their achievement in collating so much information on a rapidly developing subject. Numerous illustrations, both of polished sections (including sixty in colour on three plates) and of scanning electron micrographs, are included. Doubtful, discredited, or incompletely characterized *named* species receive very short shrift—none of their optical or chemical properties are given, and they do not appear in the index. However unnamed minerals receive much more lavish treatment, with a separate chapter and full individual discussion.

The final two chapters deal with platinum-group element deposits and recovery of the elements from their ores, completing a very comprehensive survey of the subject. The book is going to be essential to all workers concerned with these minerals and their deposits, and the price seems reasonable.

A. M. CLARK

Neumann, H.-J., Paczynska-Lahme, B., and Severin, D. *Composition and Properties of Petroleum*. New York (Halsted Press) and Chichester (John Wiley and Sons Ltd.), pp. 137, 79 figs. Price £9.50.

This Volume 5 in the series *Geology of Petroleum*. It is divided into four parts covering (1) composition, (2) analysis, (3) properties, and (4) classification of petroleum, natural gases and oil-field waters.

Part one begins with the chemical components of petroleum and natural gas and helpfully gives both European and American terms. Gas hydrates are summarized in a page, and there is a short but comprehensive section on the composition of oil-field waters. The first part of the book concludes

with a section on the chemical aspects of the origin of petroleum and natural gases. Unfortunately this section, which should be interesting to geologists and mineralogists, has been condensed and omits mention of most modern research.

The second part of the book is a comprehensive summary of the different methods used in the analysis of crude oils. In the third part the properties of petroleum are described, initially in terms of phase behaviour and then finally in the reservoir. Although this treatment has obvious parallels with works on reservoir engineering (as in volume 3 of this series) the presence of this subject may prove useful to the reader who is not otherwise concerned with reservoir engineering.

The last part of the book on classification of petroleum, natural gases and oil-field waters containing useful information in a condensed form.

This may prove to be a useful reference work. It is somewhat hindered by the translation which, although understandable, has ungainly patches. The interesting glossary includes the German terms for the various entries.

H. C. POTTER

Evans, A. M., Editor. *Metallization Associated with Acid Magmatism*. Chichester and New York (John Wiley and Sons), 1982. xiv + 385 pp., 155 figs., 7 sketch-maps. Price £21.00.

This volume contains twenty-six papers submitted for the International Symposium on Problems of Mineralization Associated with Acid Magmatism held at Exeter University in December 1979.

The majority of the papers presented deal with tin and tungsten mineralization and the petrology and evolution of granitic plutons with which it is associated, several of them being concerned with south-west England. The behaviour of tin during granite differentiation is discussed by M. Stone, based on studies on the Tregonning-Godolphin granite, and hydrothermal activity in the St. Just area of west Cornwall is analysed by N. J. Jackson *et al.* who conclude that the principal ore-bearing main stage fluids were overwhelmingly of meteoric origin and mainly of low to moderate salinity (10–20 eq. wt. % NaCl) in the minimum ture range 280–450 °C. Tourmalinization in Cornwall is discussed by B. Charoy and also by P. Allman-Ward *et al.* and mineralization zonation near the granite batholiths in both Cornwall and northern England is compared by J. McM. Moore who advocates the concept of multiple generation of single-pass hydrothermal convective cells. J. P. N. Badham compares tin and copper mineralization in felsic igneous rocks and asks where the tin exhalites are. Other European tin and tungsten

provinces examined include those of Portugal (A. M. R. Neiva), west central Spain (J. Saavedra), and Sardinia (M. Biste). African tin-tantalum-niobium acid rocks and pegmatites are represented by papers by Bowden and by Matheis *et al.* on Nigerian provinces and by Legg and Namateba on Zambian pegmatites; the Thailand tin-bearing granites are also discussed, Norman and Trangcotchasan favouring ore deposition from fluids derived from a magma rather than from meteoric connate waters. Reports are also given on a stanniferous peraluminous granitic pluton in Nova Scotia and on the numerous Bolivian tin deposits; Dulski *et al.* consider that the Bolivian Tertiary tin porphyries must have inherited the tin from the older metallogenic crust.

More general papers cover the mineralogy and geochemistry of the group IVb elements, the zoning of tin-tungsten-molybdenum metallization and the reasons for the association of tin and fluorine in natural assemblages, and B. van de Pijpekamp reports that using a matrix of fifty-three mineralogical, textural, and structural features, a measure of tin potential can be obtained from thin-sections of the rocks of granitic complexes. The importance of fluorine is emphasized also by the experimental work of D. A. C. Manning who demonstrates a 100°C lowering of the minimum liquidus temperature and a considerable change in minimum melting composition for the addition of 4 wt. % F to the system Q-Ab-Or-H₂O at 1 kbar.

Other papers include reports on mineralization around the Drammen granite, Norway, the Leinster granite, Ireland, and Precambrian granites (U-bearing) in Sweden.

The book gives an excellent insight into current thinking on the continuing controversies involving ore genesis associated with granitic rocks. Further applications of modern chemical and isotopic methods are clearly urgently needed before sufficient understanding of the processes involved can lead to the establishment of proven criteria for identification of potential ore-bearing granites by mineralogical and geochemical methods. The book is well-produced with clear diagrams and abundant full references with each paper. Its reasonable price should encourage wide readership.

R. A. HOWIE

Thorpe, R. S., Editor. *Andesites: Orogenic Andesites and Related Rocks*. Chichester, New York, Brisbane, Toronto, and Singapore (John Wiley and Sons), 1982. xiii + 724 pp., 277 figs. Price £59.50.

This is a collection of thirty-one papers covering all aspects of orogenic andesites and related

magmas. It starts with an introductory review by the editor in which he emphasizes the plate tectonic setting of andesite volcanism, and this is a theme which continues throughout the rest of the volume. The following two contributions are concerned with andesites as rocks, and in particular a very extensive survey by Ewart of their major element composition and mineralogy establishes that there is a difference between the predominant magma types of the island arcs and the active continental margins. The remaining 600 pages of the book are roughly divided into two parts: a survey of the Earth's major andesite provinces one by one, with a geological and geochemical summary of the known information on each region; and a series of articles on specific aspects of andesite petrogenesis and their geological significance.

Most of the geographical accounts are of excellent quality. Each contributor gives the geological background, with information on such things as geophysical evidence of the tectonic environment, eruption history, magma types, and detailed geochemistry. Some of the contributions illuminate additional special features of the individual provinces. Marsh's account of the Aleutian Islands draws attention to the relationship between lava flux and subduction rate. McBirney and White discuss the anomalous Cascade province, which does not apparently overlie a Benioff zone and is not near an oceanic trench. On the other hand Carr *et al.* and Hutchison, in their respective contributions on Central America and Indonesia, emphasize the particularly close relationship between volcanism and the inclined seismic zones in those areas. Aramaki and Ui provide a valuable service to English-speaking readers by reviewing the extensive Japanese literature on this subject. The contributions by Innocenti and Tarney and their co-workers reveal the great structural complexity of the volcanic provinces in western Asia and the Scotia Sea region.

The special topics covered by the later sections of the book include eruption mechanisms, sub-volcanic plutonism, experimental studies on andesitic and related melts, trace element, and isotope geochemistry, the occurrence of ancient andesites, their role in continental growth, and the mineralization associated with andesites. Many of the contributors address themselves to the fundamental question of where andesite magmas originate: in subducted oceanic crust or in the overlying mantle, and with or without contributions from oceanic sediment and continental crust? These questions are particularly dealt with in the excellent reviews of experimental evidence by Mysen and T. H. Green and of isotopic evidence by Hawkesworth. There does not appear to be any