the practising analyst will wish to have a copy of this book at hand as a primary reference source. The second volume, with the more novel approach of tackling materials under their appropriate headings as industrial commodities, could well prove to be the more important as a working guide to the application of DTA. J. A. BAIN

ENERGLYN (Lord) and BREALEY (L.): *Analytical Geochemistry* (Methods in Geochemistry and Geophysics, Vol. 5). Amsterdam, London, New York (Elsevier Publishing Company), 1971. xv+426 pp., 114 figs., colour frontispiece. Price £9·25.

The Preface to this work states that it sets out to be an introductory manual to the techniques required for the analysis of rocks and minerals, and is aimed at geologists who did not study chemistry as undergraduates. While such a reader will find matters to interest him, the book as a whole cannot seriously be recommended as a guide for the audience at which it is aimed.

In a work attempting to cover a very wide range of geochemical methods, questions of the level of treatment and of balance between the various topics have to be faced, and may legitimately be solved in a variety of ways. The reviewer none the less finds it surprising that this book—designed for a wide geological readership—while devoting for example a chapter over 60 pages in length to chromatography, dismisses the electron microprobe in a page and a half and ignores atomic absorption spectrophotometry altogether. Neither are the reasons for the unusual balance to be found in the fact that the work is a volume in Elsevier's series on geochemical and geophysical methods: other volumes fill some of the gaps, but still others duplicate topics treated here (including chromatography and X-ray spectrography).

The standard of treatment varies, but the opening chapter of the book—a 47-page Introduction to Geochemistry—is so idiosyncratic in its approach as to inspire little confidence in the remainder. It is difficult to follow the authors' purpose in this chapter, which begins with a vague and slightly misleading introductory section, mostly on crystal chemistry, followed by a section on the calculation of CIPW norms and Niggli values. Here, one begins to encounter the inaccuracies and inconsistencies with which the work abounds: except for MgO, K_2O, and TiO_2, for example, the molecular weights quoted on p. 4 all disagree with those used in Table III on p. 10. The opening chapter, among other topics, includes a section on fluidization and a description of the senior author's scale model of the Eakring anticline, followed by a longer section on organic geochemistry (for which the running titles incidentally read 'Organic Chemistry').

The following chapters are: 2. Qualitative Analysis (pp. 48–88); 3. Quantitative Chemical Analysis (pp. 89–142: only 'rapid' methods are treated in the main); 4. Chemical Analysis of the Minor Elements (pp. 143–212); 5. Emission Spectrography (pp. 213–43); 6. Flame Photometry (pp. 244–73); 7. X-ray Spectrography (pp. 274–303); 8. X-ray Diffraction (pp. 304–26); 9. Fluorimetry (pp. 327–39); 10. Chromatography (pp. 340–402); References (pp. 403–12); Index (pp. 413–26).

Apart from arguable eccentricities in choice and treatment of subject matter, the

book gives the impression of having been rather hastily put together, with no consistent attempt at thorough checking or proof-reading. A few random examples:

On p. 49, ammonia is described as an oxidizing agent. Table VIII, p. 52, lists reagents required for microchemical tests; the text repeats the list word for word on the next page, where it is implied that Table VIII in fact lists the tests themselves. On p. 111, it seems unlikely, to say the least, that 'Riley . . . uses either "Specpure" titanium dioxide or an analysed sample of anatase for the preparation of sodium bisulphate'. On p. 124, a new automatic titration apparatus devised by the senior author is mentioned, and illustrated on p. 125; despite various promises in the text, the reader searches in vain for a description of its use. On p. 165, the equation given for the iodine–thiosulphate reaction is erroneous and does not balance. Mineralogists will be unhappy to see cryolite (p. 167) assigned the composition Na_3AlF, and both molybdenite and wulfenite (p. 181) the composition MoS_2. Such slips are legion, and an attentive reader could amass a considerable list.

Despite some interesting material, particularly in the sections dealing with membrane colorimetry and chromatography, it is a great pity to have to say that this book is so full of errors and omissions that beginners in analytical geochemistry would be well-advised to avoid it and go for guidance to the available alternative works treating the various techniques in greater depth. Further, and very considerable, drawbacks are that insufficient attention is paid to potential sources of error in all kinds of quantitative analysis, and that no account is taken, in the main, of advances made since the early 1960s. It is also a very expensive book for its size and contents, even for libraries.

E. A. VINCENT

COES (L., Jr.). *Abrasives* (Applied Mineralogy Series, Vol. 1). Vienna and New York (Springer-Verlag), 1971. viii+177 pp., 51 figs., 52 tables. Price DM 51 (£6·46).

This is the first of a series of monographs on Applied Mineralogy. In a general preface to the series the publishers and editors outline the areas of technology and applied science that they include in this field: these range from refractories to pigments and from organic polymers to fuel for nuclear reactors. Although the main purpose of the series is stated to be to inform the engineer and technically interested scientist, the first volume will be of interest to mineralogists, and moreover sets a high standard for the rest of the series to follow.

A brief history of abrasive technology (4 pp.) is followed by five chapters on abrasive and polishing operations (28 pp.). Chapter 7 (6 pp.) is on natural abrasives other than corundum and diamond, i.e. quartz, fine-grained siliceous abrasives, and garnet. Alumina is treated in detail in Chapter 8 (29 pp.); the geology of corundum-bearing rocks is briefly described, but the main source of abrasive alumina is bauxite and the treatment of the raw material is described in detail. The petrology of fused alumina and its physical properties (hardness, mechanical and thermodynamic properties, thermal and electrical conductivity, and thermal expansion) and uses are then discussed, and the chapter ends with a description of alumina–zirconia abrasives. Chapter 9