seems to put the cart before the horse. In the following descriptive section Niggli's mineralogical divisions are shown, and the calculation of Niggli values and the C.I.P.W. norm demonstrated by examples. The role of volatile constituents is treated rather fully, and well. The treatment of sedimentary rocks is illustrated by examples from the author's own researches, the emphasis being on processes rather than description. In Metamorphic Petrogenesis, too, the account of chemical processes dominates. A section of 12 pp. deals with fabric and rock deformation.

In a preliminary note it is admitted that the tables of mineral properties in Part III cannot be a substitute for a textbook of systematic mineralogy. The arrangement is a conventional chemical one—they are not determinative tables—and 300 species are listed. The petrological tables list chemical analyses and volume % modes for typical igneous, sedimentary, and metamorphic rocks. The high proportion of German books and papers in the selected literature list diminishes its usefulness to the beginning student, but will be very useful to those more advanced.

There are some infelicities in translation and a few misprints and mistakes, but the production on the whole is good. There are two qualities of paper interleaved, to allow for half-tones. The cheaper kind is pleasanter to read from, but the type-face and the rather large number of words per line make the text a little unattractive.

This is a good book for an instructor to possess, but not very useful to the student, who will, in any case, not be able to afford it. M. H. BATTEY

ERNST (W. G.). *Earth Materials.* New York and Hemel Hempstead (Prentice/Hall International), 1969. ix+150 pp., 90 figs. Price 25*s.*

Twenty years ago the beginning student of Earth materials could get by with a minimal knowledge of physical chemistry, even of mineral structure. Today the approach has changed. The formation of minerals and rocks is ultimately referable to physics and chemistry, and therefore the student should be invited to think physico-chemically from the start. Professor Ernst's book goes further than most short books on the subject in promoting this requirement. The first two chapters are concerned mainly with crystal chemistry and petrochemistry. Then there are two chapters on minerals and three on rocks. The section on elementary thermodynamics, in Chapter 2, is of necessity highly condensed and the student may not get much from it, but it directs his attention to the fact that petrogenetic processes operate in accordance with thermodynamic principles. The three chapters devoted specifically to rocks comprise about one-third of the book, and here the beginner student is offered less than he needs, but this is fair enough as the book is intended (p. vi) 'to supplement and enrich other introductory textbooks'. R. W. D. ELWELL

BATES (R. L.). *Geology of the Industrial Rocks and Minerals.* London (Constable: Dover Books), 1970. xiv+459 pp., 65 figs. Price 33*s.* 6*d.*

This is a reprint of a well-known textbook first published in 1960. The technical material has been in some measure 'up-dated' by supplemental references, but the

book shows its age mainly by the almost apologetic attitude to the role of the geologist in industry. It is doubtful if geologists in the 1970s will feel the need to justify their existence so strenuously.

This is a suitable text for final-year undergraduates, presenting a great deal of geological data with a firmly economic slant. It brings together much scattered information in a form it would be difficult to find elsewhere; the section on industrial perlite for example. In covering such a wide field the author has had to deal somewhat superficially with some problems, but he presents a large number of specific areas, which read as 'case-histories' and are very illuminating. It is understandable that he has chosen most of his examples from North America, which the U.K. student might find off-putting. It is odd, for instance, to see the South African asbestos production discussed in a paragraph after ten pages devoted largely to that of Quebec.

A more serious deficiency for the non-American student is that the A.S.T.M. standards for industrial rocks are used throughout, and the undergraduate using this text alone might be left unaware of the wide range of standards used elsewhere in the world.

The author has adopted a classification of rocks and minerals corresponding to geological origin rather than industrial use; this is surely right in an undergraduate course. He is inconsistent, however, in superimposing on this a division into Rocks on the one hand and Minerals on the other, especially as the definition of these terms is based on bulk and value. Thus nepheline syenite and pegmatite appear as Minerals, whilst kaolinite is counted as a rock. But these are minor criticisms of a work that supplies the student with a comprehensive text in a much-neglected field.

J. E. PRENTICE

CLOUD (P.) and a Committee of the National Academy of Sciences—National Research Council. *Resources and Man.* San Francisco (W. H. Freeman). 1970. 259 pp., 54 figs. Price $2.95 (24*s.*).

Those concerned with the supply of useful minerals (and rocks) for man's use are becoming increasingly preoccupied with the exponential rise in demand resulting from the population explosion. In general terms, in each 36-year period, consumption is equivalent to the estimated total consumption in the whole of previous history; the process is obviously one that cannot continue indefinitely. This volume asks the question: can man approach a kind of dynamic equilibrium with his environment so as to avert destructive imbalances? Even though it tries to look well beyond the year 2000, it also keeps the shorter term in view; but in both cases the answers are not altogether reassuring.

The topics dealt with (and their authors) are: the human ecosystem (Marston Bates); interaction between man and his resources (John I. Chapman); United States and world populations (Nathan Kenfitz); food from the land (Sterling B. Hendricks), food from the sea (William E. Ricker); of immediate interest to the mineralogist are the discussions of mineral resources from the land (Thomson S. Lovering), mineral resources from the sea (Preston Cloud), and energy resources (M. King Hubbard).