

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 25s.

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 33s. 6d.

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