Mineralogical applications of crystal field theory. By ROGER G. BURNS. Pp. xii + 224. London: Cambridge University Press, 1970. Price £4. USA $13.50.

This book is fascinating to read for one who has been involved in the development of crystal field theory during the last twenty years. It shows how the theory has been applied to the solution of problems in geochemistry, mineralogy and geology, mostly in the last ten years. It is gratifying to see how helpful these ideas have been.

The book contains an elementary but adequate account of crystal field theory, especially as it is applied to the first row of transition metal ions. For these ions a great deal of useful data are given in tables. I imagine that a good student interested in the applications of crystal field theory could learn enough from this book to be able to use the theory.

For applications to mineralogy the most important results of crystal field theory are its explanation of color and pleochroism and the thermodynamic consequences of crystal field splitting, such as the site preference energies.

Several chapters are devoted to the presentation and interpretation of optical spectra of minerals, some of which have not been published previously. These polarized, single crystal spectra are very beautiful to a spectroscopist and a great deal of information can be inferred from them in spite of their apparent complexity and breadth. They suggest that minerals may be excellent subjects for further study by spectroscopists interested in transition metal ions at certain types of crystal sites. There is obviously much left to do in the detailed interpretation of optical spectra and their correlation with spin-resonance data, although the latter is hardly mentioned here.

In almost every chapter, the contribution to the lattice energy of the crystal caused by the removal of electronic degeneracy is mentioned in one way or another, so a student must soon realize that this is the major contribution of crystal field theory to mineralogy. Recognition that this electronic factor could legitimately be isolated and measured and used to explain site distribution of transition metal ions in minerals led to the first application of crystal field theory to a mineralogical problem. The bulk of four chapters is devoted to the consequences of this idea. The thermodynamic consequences of crystal field splitting are explained here by showing empirical data on lattice energies (the double-humped curve).

Since there are still people who believe that crystal field stabilization is something else, I am sorry the author did not include a Born–Haber cycle demonstration of where it comes from and why it is wrong to ignore it.

The book is elementary throughout and the physical arguments tend to be qualitative. Statements made and conclusions reached are however supported by an abundance of data and illustrations. This feature is one of the most attractive aspects of the book to this reviewer.

For a non-geologist it opens doors to a new field, and for a geologist it provides a useful set of tools. The book could thus be valuable to a wide audience.

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Deformation and strength of materials. By P. FELTHAM. Pp. vii + 135. London: Butterworths, 1966. Price 25 *s*.

This book is an introduction to some theoretical foundations of the mechanical properties of solids and liquids with emphasis on elasticity, visco-elastic behaviour, damping capacity, strength of real crystals, dislocations, fracture, fatigue and the behaviour of non-Newtonian fluids. It is based on lectures to science and technology undergraduates.

The author should not claim to present 'a theoretical foundation of surface science'. Essential topics on surface science are not treated and the presentation of the treated topics is more or less incomplete. Also, why does the author insist that he has not included topics well covered in other books? This is obviously not true. Fortunately, a good short selection of some of the essential well-known phenomena on deformation and strength of materials is described. The originality of such a small concise book should be and is given already by the selection of the topics and the type of representation.

The study of the book requires only an elementary knowledge of mathematics. No original papers are cited but the 18 books cited in the bibliography may be a help to study the subject in more detail.

In conclusion, the book may be recommended for readers, without a basic knowledge of this part of mechanics, to learn the language of the subject.

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