Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (M. M. Woolfson, Physics Department, University of York, Heslington, York YO1 5DD, England). As far as practicable books will be reviewed in a country different from that of publication.

Amphiboles (crystal chemistry, phase relations and occurrence). By W. G. ERNST. Pp. x + 125. New York: Springer-Verlag, 1968. Price DM 27,20. US $ 6.80.

This book is the first to be published in a series of monographs entitled *Minerals, Rocks and Inorganic Materials*, and it is one of the sub-series *Experimental Mineralogy*. These volumes are intended to provide a medium for the publication of extensive reviews of selected topics, of a kind which are not catered for by the standard journals (and not normally by review journals), nor by textbooks or advanced works of reference. The sub-series is intended to give for particular mineral groups a critical presentation of the results and implications of phase equilibrium studies.

The amphibole minerals have a basically simple chain-like crystal structure, determined by Warren in 1929. Two varieties, crocidolite and amosite, are important industrially since they are the raw materials of many asbestos products, and many other amphiboles are of widespread geological occurrence in igneous and metamorphic rocks. Although the structure is simple it incorporates sites for large, medium and small sized atoms of varying valencies so that there is considerable chemical complexity. This perhaps explains the relative lack of detailed study on the crystal chemistry and phase equilibria of amphiboles hitherto, but improved techniques have led to a great increase in this kind of work in recent years.

The present volume deals in separate chapters with experimentally and theoretically derived phase relationships of the main amphibole sub-groups, and puts these in an appropriate setting by discussing in earlier chapters the crystal structures and chemical variability of amphiboles, and also by giving, for each sub-group, an account of the natural modes of occurrence of the minerals, the kinds of rock in which they occur, and the common mineral associations.

The crystal structures of the amphibole minerals are very effectively summarized, but perhaps undue weight is given to conclusions from single projection structure determinations as compared with more recently completed full three-dimensional solutions. Unfortunately, a number of the latter are known to have been completed within the last few years but have so far only been published as abstracts of conference proceedings. Discussion of the ordering of cations (Fe, Mg, Al) in nearly equivalent sites is not as clear or as detailed as it might be. It is given in terms of ionic sizes only, and important crystal field effects are not mentioned at all.

The treatment of phase equilibrium relationships is extremely helpful to the reader. A good deal of the experimental work on amphiboles has in fact been done by Ernst and his co-workers within the last decade. Ernst discusses the way in which experimental results bear relation to natural occurrences of amphiboles in terms of temperature, pressure, oxidation potential, ranges of solid solution, and abundances of elements in different geological environments. He is perhaps unduly gloomy therefore in stating in the last paragraph of the book that 'because of the complex and subtle relationships between bulk compositions of the host rocks and amphibole compositions, very little can be said regarding amphibole parageneses in igneous and metamorphic rocks, in spite of painstaking studies by numerous investigators.'

This book and others in the series will undoubtedly be useful, as intended, to students and research workers who are interested in rocks and minerals, but the intention stated in the foreword '.....to publish, at reasonable prices.....', must be said to have been forgotten, ignored or revised. It is not uncommon for reviewers to feel that prices of books are high, but this one is unusually so. The price is not explained by an exceptionally lavish production; many of the figures, for example, are direct copies of varying quality from papers in journals.

A feature of this volume, which may not be typical of the series, is that in spite of a long reference list (comprehensive until early 1967), a rather high proportion of its content is available in a relatively small number of recently published papers.

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Chemical bonds in semiconductors and thermodynamics. Edited by Academician N. N. SIROTA. Pp. xi + 255 New York: Consultants Bureau, 1968. Price $27.50.

This book represents the substance of 47 papers read at 'The Third All-Union Congress on Problems of the Chemical Bond in Semiconductors, Minsk 1965'. The average length of each report is about 5 pages, so that most of them are effectively rather longish abstracts of the full papers read at the conference.

The papers are gathered into groups: General questions (6 papers), X-ray studies (12 papers), Thermochemistry (8 papers), Dynamics of crystal lattices (4 papers), and Physical properties of semi-conducting bonds (16 papers); the volume concludes with a somewhat strange article by Academician Sirota inspired by the centenary of the Second Law of Thermodynamics, and bearing chiefly on the relation between stars and galaxies and the uniform (or non-uniform) increase (or decrease) of entropy in different parts of a very large system.

Inevitably, in a collection of this sort, there is a certain scrappiness in treatment of the material; and a certain lack of cohesion. But in recent years the Russians have been very interested in chemical ideas as applied to semi-conductors, and it is very good to have, in this volume, a survey of much of their work, together with lots of references to other published work along the same lines. The outlook is – naturally – very much Russian, and the cov-