Professor **G. M. Brown**, Professor of Geology at the University of Durham, Professor **J. W. Christian**, Professor of Physical Metallurgy at the University of Oxford, Dr **A. R. Lang**, Reader in Physics at the University of Bristol, and Professor **R. Mason**, Professor of Chemistry at the University of Sussex, have been elected Fellows of the Royal Society.

Dr **G. F. Claringbull**, Director of the British Museum (Natural History), and Professor **P. B. Hirsch**, Isaac Wolfson Professor of Physical Metallurgy at the University of Oxford, have been knighted.

Dr **Michael Hart** has been seconded to the Central Policy Review Staff but he will continue his duties as a Co-Editor of *Journal of Applied Crystallography* from Bristol.

Professor **Clifford G. Shull**, Professor of Physics at the Massachusetts Institute of Technology, Cambridge, U.S.A., has been elected to the National Academy of Sciences.

Professor **A. R. J. P. Ubbelohde**, Professor of Thermodynamics at Imperial College, London, has been awarded the George Skakel Memorial Award by the American Carbon Society.

Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. The notes (in duplicate) should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 13 White Friars Chester CH1 1NZ, England).

Structure Reports

In addition to the five volumes of *Structure Reports* published in November 1974 (Volumes 30*B*, 31*B*, 32*B*, 33*B* and 35*B*, covering the organic literature for 1965–68 and 1970), five more volumes have just been published. These latest volumes cover all the literature for 1963 and the literature for metals and inorganic compounds for 1965, 1966, 1968 and 1970. All the annual volumes, up to and including Volumes 39*A* and 39*B* (for 1973), should be published by the end of 1975. This will bring *Structure Reports* up to date and make it even more useful to all crystallographers.

The five volumes just published are:

Volume 28, covering all the literature for 1963 (viii+723 pages). Price: 225 Netherlands guilders.
Volume 30*A*, covering the literature for metals and inorganic compounds for 1965 (viii+487 pages). Price: 75 Netherlands guilders.
Volume 31*A*, covering the literature for metals and inorganic compounds for 1966 (viii+278 pages). Price: 75 Netherlands guilders.
Volume 33*A*, covering the literature for metals and inorganic compounds for 1968 (viii+535 pages). Price: 95 Netherlands guilders.
Volume 35*A*, covering the literature for metals and inorganic compounds for 1970 (viii+499 pages). Price: 95 Netherlands guilders.

Orders may be placed direct with the publisher (Oosthoek, Scheltema & Holkema, Emmalaan 27, Utrecht, The Netherlands), with Polycrystal Book Service, P.O. Box 11567, Pittsburgh, Pa. 15238, U.S.A., or with any bookseller. Details of price reductions for personal subscriptions and for standing orders may be obtained direct from Oosthoek, Scheltema & Holkema or from Polycrystal Book Service.

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.

Technische Mineralogie. Band 7. Materialverhalten anisotroper Festkörper.

By W. Dreyer. Pp. x+395, Figs. 120, Tables 41. Vienna, New York: Springer-Verlag, 1974. Price (Bound) S894,00, DM125,00, U.S.$51,30.

The opening chapter – on the present state and aims of research on crystalline textures – indicates the particular contribution which this book makes to the literature. The next two chapters give a very exhaustive mathematical presentation of the analysis, much of which is used in later chapters. The four remaining chapters treat of thermal expansion, thermal conductivity, electrical conductivity and dielectric susceptibility respectively. In each chapter the tensor treatment is first given for single crystals and then this is followed by the modifications necessary for polycrystalline specimens, such as rocks or rolled metal sheets. The effect of preferred orientation is carefully analysed. There are many examples of the working out of the principal coefficients from the quantities measured on particular kinds of crystals going from triclinic through all the systems down to cubic. There are also many tables of the physical constants relating to these four properties – thermal expansion, conduction (thermal and electrical) and dielectricity.

There are a few errors. On p. 87 a $\sqrt{3}$ has been omitted in equations 738/740 and a 3 in equation 741. On p. 88 the calculated values of the principal coefficients of expansion are incorrect both in magnitude and direction. On p. 92 the formula 762 introduces confusion because $\tan^2 2\theta = \tan^2(\pi - 2\theta)$. As a result the value of the expansion coefficient calculated from the formula is incorrect.

The book is beautifully printed and the illustrations are numerous and very clear. The bibliography is extensive. The book can be warmly recommended, both for the detailed working out from practical measurements of second-order tensor properties and also for the mathematical treatment of polycrystalline aggregates.

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The chemistry of imperfect crystals.

By F. A. Kröger. Vol. 1. Pp. xiii+313, Figs. 58, Tables 10. Price *f* 70.00 (about U. S. $25.50). Vol. 2: pp. 1000. Price *f* 275.00 (about U. S. $105.75). Vol. 3: pp. xiv+306, Figs. 42, Tables 15. Price *f* 100 (about U.S. $38.50). Amsterdam: North Holland, 1974.

This is a book primarily for research workers already in, or about to enter, the field of solid-state physics, chemistry or materials science; it is a book for the working specialist, rather than the amateur. It concedes little to a user unfamiliar with crystal structures or who does not already know the context and priorities of the subject.

The first edition was published in

1964; the second is a thoroughly updated and somewhat expanded version. The book has the characteristics both of a textbook, with its detailed didactic presentation of theory, and of a review with its numerous references to the literature. This dual objective is the main difficulty of the book, for with so large a subject the material has become so bulky that its practical usefulness is jeopardized. The author is aware of the size of the field and of the existence of many smaller works dealing with specialized areas, but he is also aware of the value of a coherent presentation of a subject by a single author. He consciously offers his book, therefore, as giving, 'as before, a one-man view of solid-state chemistry'.

The new edition has essentially the same structure as the first but the three parts of the original book have become three separately bound volumes. The first volume (which appeared ahead of the other two, about six months ago) deals with preparative procedures and the theory of crystal growth. A good deal of basic thermodynamics is included. The second volume, the largest of the three, deals with imperfections (including impurities) in crystalline materials, and their physico-chemical consequences. The first three chapters of this volume are particularly useful – and readable – as a survey of the nature of crystal imperfections in general. Subsequent chapters develop the detailed physical chemistry and mathematics of equilibria involving imperfections of all possible kinds, and then examine the application of such analysis to increasingly complex substances, from elements, through a substantial range of binary compounds to the more important tertiary compounds. The third volume is a study of all situations which are specifically not in equilibrium, *i.e.* relaxation effects, chemical changes or reactions in or on solids. This includes sections on the diffusion of crystal imperfections, precipitation of impurities, the mechanisms of sintering and tarnishing, the electrochemistry of imperfect solids, the photographic process and charge-transfer catalysis. This third volume is perhaps the most useful to the active research worker. Through the three volumes, the numbering of the chapters runs sequentially but the page numbering does not, which seems inconsistent; also, the three indexes are quite separate. Cross-referencing within the three volumes is frequent but between them rather rare.

The thoroughness with which the literature citations have been updated is impressive, and reflects also the expansion of the subject during the past decade. A useful table in Vol. 1 lists all substances which have been grown as single crystals, with the methods used and the literature references. In the first edition, this contained about 200 entries and 230 references; it now extends over 38 pages, has 700 entries and 1100 references. Only molecular solids (*e.g.* organic crystals) are conspicuous by their absence from these compilations. Mammoth tables are a feature of this book: a table in Vol. 2, listing binary compounds for which any work has been carried out on the influences of impurities on crystal properties, runs to 86 pages and has 3400 references. There are many such enormous tabulations. They do not make for smooth reading of the book but they certainly contain a wealth of information, allowing the reader instant access to the original literature at whatever point he likes.

A vital contribution that Kröger has made to the subject (in addition to his own research work in this field) is the symbolism he has devised for crystal imperfections. This is presented at the beginning of Vol. 2 and is used continuously throughout the book. There is a useful summary on p. 275, at the end of Vol. 3. Characteristically it is rather elaborate, so as to allow for all possible situations. Perhaps it is because it has appeared cumbersome that it has not been widely adopted, but it is in fact an elegant and practical scheme, worth knowing and using.

Misprints are remarkably few, considering the size and complexity of this book (although there is a bad typographical displacement on p. 469 of Vol. 2). There is one serious infelicity in the occasional use of the term 'free enthalpy' for the Gibbs free energy, *G*. Free energy relationships play an important part in this book, so it is a pity that this invitation to confusion is presented. 'Free enthalpy' is neither defined nor explained as such; indeed, the impression that it is being used interchangeably with the normal term is fortified by duplicated index entries. If 'free enthalpy' was merely a verbal indiscretion, then it is curious that this was not corrected during re-editing, when linguistic slips such as 'specie' were removed. As it stands it is misleading, for *G* is emphatically not a sort of enthalpy.

Taken as a whole the book is excellent in terms of clarity, coherence and internal consistency. Its width of coverage is masterly, even encyclopaedic; its accurate presentation of detail is remarkable. As a reference text, giving both the broad panoramic view and a meticulous literature survey, it must be unique in the field. Only its cost is unfortunate, for at £70 one can hardly expect the book to be purchased by ordinary individuals. Any of the three volumes can of course be bought separately but this is not really to be recommended, for the work is intended as a single treatise. However, many libraries must surely acquire this book and many working scientists and technologists will find invaluable its compendious stock of organized information.

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Book Received

The following book has been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.

Handbook of Geochemistry. Executive Editor: K. H. WEDEPOHL. Editorial Board: C. W. CORRENS, D. M. SHAW, K. K. TUREKIAN, J. JEMANN. Vol. 2, Part 4. Pp. VI + 898, Figs. 113. Berlin, Heidelberg, New York: Springer - Verlag, 1974. Loose-leaf binder DM 298,00, US $122.20. Subscription price for purchases of Vol. 2: Loose-leaf binder DM238,40, US $97.80.

This is the fourth part of a work which is produced in loose-leaf form for assembly by the user. The chapters are numbered according to the atomic numbers of the elements and the present instalment either completes or supplies in complete form the following chapters:

Boron 5, Carbon 6, Nitrogen 7, Oxygen 8, Fluorine 9, Magnesium 12, Silicon 14, Chlorine 17, Vanadium 23, Iron 26, Copper 29, Zinc 30, Gallium 31, Selenium 34, Bromine 35, Silver 47, Antimony 51, Tellurium 52, Iodine 53, Barium 56, Tungsten (Wolfram) 74, Gold 79, Thallium 81 and Lead 82.