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).

Hamilton Scholarships in Crystallography

The Walter C. Hamilton Memorial Fund, established under the auspices of Associated Universities, Inc., will be used to provide financial assistance each year to one or more graduate or advanced undergraduate students for work on crystallographic problems at Brookhaven National Laboratory, particularly with neutron diffraction techniques. Students will be selected for these awards on the basis of the scientific merits and feasibility of their research proposals, educational background and experience, and letters of reference. U.S. citizenship is not a requirement. It is expected that each student will spend one to two months at Brookhaven collecting and analysing neutron diffraction data under the guidance of a BNL crystallographer. Computational and other facilities of the Laboratory will be made fully available. The individual stipends, intended to cover travel and housing expenses, will generally be in the range of 300 to 600 dollars. The students selected will be designated as Walter C. Hamilton Scholars.

It is anticipated that the first award will be for the academic year 1974–75. The deadline for applications will be March 1, 1974. Applicants should submit the following material to the Chairman, Chemistry Department, Brookhaven National Laboratory, Upton, NY 11973, U.S.A.

(1) Description of the proposed problem (not to exceed 5 double-spaced pages).

(2) Educational background and experience (which must include some acquaintance with diffraction techniques).

(3) Three letters of reference, including one from the sponsoring professor.

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 contry different from that of publication.

Vibrational spectra and structure of silicates. By A. N. LAZAREV, translated by G. D. ARCHARD. Pp. x + 302. New York and London: Consultants Bureau, 1972. Price $37.50.

This is the English edition of a Soviet version published in 1968. A number of changes have been made and new references added. In particular Chapter V has been completely rewritten. The book also includes material on organosilicon compounds, germanates and other relevant compounds.

The scope of the work can be indicated by the Chapter titles: I. Introduction to the theory of the vibrational spectra of molecules and complex ions in crystals; II. Vibrational spectra and structure of complex anions in silicates. Island structures; III. Relations between the vibrational spectrum and structure of the complex anions in silicates. Highly condensed structures; IV. Use of spectroscopy in the crystal-chemical study of silicates; V. Spectra and crystal chemistry of the silicates of the rare-earth elements; VI. Spectra and flexibility of the Si–O–Si and P–O–P bonds.

The English edition is to be warmly welcomed as a considerable synthesis of vibrational spectroscopy and structure analysis, and as a combination of experiment, description and theory. Much ground is covered and extensive references are given to Soviet and foreign literature. The translation reads well, the printing is acceptable, and the whole work conveys an air of authority.

As an example of the new material in Chapter V one may cite the study of structures of the thortveitite $Sc_2Si_2O_7$ type. First, infrared spectra are given for $Sc_2Si_2O_7$, $Sc_2Ge_2O_7$, and intermediate solid solutions. These are analysed with force constants for an isolated X_2O_7 model. Despite certain satisfactory features, it is concluded that the quasimolecular approximation is inapplicable for the lower-frequency vibrations of the anion. Molecular-vibrational-theory methods are described for use with crystals at $\mathbf{k}=0$, and then applied in calculations of the spectra of $Sc_2Si_2O_7$, $Yb_2Si_2O_7$, and $Sc_2Ge_2O_7$. The derived force field shows Sc–O force constants about one quarter those for Si–O; the mixing between lattice vibrations and the low-frequency deformation vibrations of the X_2O_7 groups is clearly shown.

Other such sections discuss such topics as the use of symmetry in the interpretation of crystal vibrational spectra; the variation of force constants for Si–O bonds; the correlation between mode frequencies and Si–O–Si angles; vibrations in rings, chains, ribbons and layers; phase transformations; and the study of the coordination of cations with respect to oxygen.

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Polarons in ionic crystals and polar semiconductors. Edited by JOZEF T. DEVREESE. Pp. 809. Figs. 166, Tables 5. Amsterdam: North Holland 1972. Price *f* 140.00 (*ca.* U S. $43.75).

This book is the proceedings of the Advanced Study Institute on Fröhlich Polarons and Electron-Phonon Interaction in Polar Crystals' held at the University of Antwerp

in August, 1971. This was a sequel to the 1962 Scottish Universities' Summer School on Polarons and Excitions'. The lectures in this book are intended to cover the major theoretical and experimental developments in the polaron field in the intervening period, 1962–1971.

The overall bias is to the theoretical formulations. The theoretical articles are detailed and reveal a continuing preoccupation with the technical details of the various rival formalisms. There is a particularly useful in-depth treatment of optical absorption and cyclotron resonance properties of free Fröhlich polarons. There are also a number of interesting, well written experimental studies including polaron infrared absorption in the silver and alkali halides and a detailed review of the transport properties of strongly ionic crystals.

The book does present a comprehensive picture of the state of play in relation to the polaron and, as always with such collections of lectures, there is something for everyone. The book as a whole will be invaluable to the expert or the would-be expert. The interested non-specialist should dip into the book. He will undoubtedly find something to interest him. If he wishes to obtain an overall view of the field, he must go elsewhere.

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Magnetic interactions in solids. (International Series of Monographs on Physics). By H. J. ZEIGER and G. W. PRATT. Pp. xv + 660, Figs. 84, Tables 30. Oxford Univ. Press, 1973. Price £19·50.

This is the latest monograph in the Oxford University series, the aim of which is to provide an opportunity for workers to publish systematic accounts of their work in limited fields of study. This volume certainly does that, and concentrates mainly on the magnetic properties of ions in crystal fields and band electrons in a magnetic field.

There are introductory chapters on the magnetic Hamiltonian, and the theory of the magnetic properties of one- and many-electron atoms, where one-electron and Hartree–Fock approximations are developed in detail. The main meat of the book is in Chapter 4 on the magnetic properties of ions in crystal fields, and Chapters 5 and 6 on band electrons in a magnetic field and the effective-mass approximation. Impurity states and excitations in a magnetic field and indirect interactions in metals are offered as a dessert. In order to render this diet more digestible, several group theoretical properties and results of statistical mechanics and thermodynamics which are needed but which would interrupt the flow of the book have been grouped in eight substantial appendices.

The authors declare that their original intention was to produce a book on ordered magnetic systems, but in the course of preparation they found this too formidable a task and therefore restricted themselves to the topics mentioned above. Perhaps the title of the book should therefore have been chosen to reflect that development, as most people will expect to find a treatment of ferromagnetic interactions, Heisenberg and Ising models *etc.* in a book entitled *Magnetic interactions in solids.*

It is no mean feat of scholarship to prepare simultaneously what are essentially eight review articles, and one must applaud the authors' efforts in unifying the treatments and notations from so many different sources and in providing so many worked examples to clarify the points under consideration. Unfortunately the Gaussian system of units which has been used tends to give the book a slightly dated look. This may in fact be a criticism of the whole monograph series written at this level of detail, in that none of the chapters can be completely up-to-date, and in this case references to original papers and review articles of the late sixties and early seventies are sparse.

Nevertheless it is a very valuable reference book and can be recommended as a worthwhile addition to departmental libraries, to give postgraduate and research workers a consistent and unified treatment of this area of theory.

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Computational methods for large molecules and localized states in solids. Edited by F. HERMAN, A. D. MCLEAN and R. K. NESBET. Pp. xii + 396. Figs. 63 New York: Plenum Press, 1973. Price $22.50.

Theoretical chemists and theoretical solid-state physicists have to a great extent gone their separate ways over the last twenty years or so, but recently both groups have come to recognise that computations of the properties of large molecules and of localized states in solids have much in common. The Proceedings of the Symposium at the IBM Research Laboratory at St Jose, California, in May 1972 are symptomatic of the useful dialogue being established between the two groups of workers.

The 31 papers discuss computational methods, molecules large and small, and solids in varying states of disorder; many of the results are available elsewhere but the articles are very readable, and the limitations of the various methods are often more clearly exposed than in the normal literature. In particular the Panel Discussion provides some fresh insights into the crucial issues of the field. For crystallographers the discourse is somewhat disappointing with no discussion of the relation between bonding, charge density, and related observable quantities. However, even at a price of $22·50 it is worthy of a place on the library shelves.

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