In view of the great demand for travel services in North America at the time of the Congress it is strongly recommended that Congress participants make immediate arrangements for their transportation.

Living Accommodation

Provisional reservation of rooms in Montreal has already been made. These will be allotted in the order of receipt of the registration forms which accompany the general information booklet. Because accommodation in Montreal hotels and motels is much in demand during the summer months it is strongly recommended that these forms be sent to the nearest American Express office or correspondent as early as possible, and not later than 15 February 1957, to ensure the accommodation desired.

Excursions

An excursion of general interest to an important section of the St. Lawrence Seaway Development is being arranged for the afternoon of Saturday, 13 July 1957, and a day's outing by steamer on the St. Lawrence River is being organized for Sunday, 14 July 1957. Three trips of mineralogical and geological interest will be available for the period following the Congress. Further details are given in the general information booklet.

Exhibition

It is planned to arrange an exhibition of apparatus and books of crystallographic interest at the Congress Headquarters. Manufacturers and publishers wishing to receive detailed information should write to Dr A. O. McIntosh, Central Research Laboratory, Canadian Industries Limited, McMasterville, Quebec, Canada.

Free space will be made available for a display of experimental devices, charts, models, and other non-commercial items of interest to the Congress. Details of this exhibit may be obtained from the Chairman of the Commission on Crystallographic Apparatus, Prof. A. Guinier, Conservatoire National des Arts et Métiers, 292 rue Saint-Martin, Paris 3, France.

Programme for Non-active Registrants

Several interesting tours and short excursions are being arranged for non-active members during the technical sessions of the Congress. Details and tickets will be available at the time of registration in Montreal.

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 1, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Dynamical Theory of Crystal Lattices. By M. Born and K. Huang. Pp. viii+420 with 28 figs. Oxford: Clarendon Press (Geoffrey Cumberlege). 1954. Price 50*s*.

This book has an outstanding value because of its coordinated account of the work by Born and his collaborators on the theory of crystals. The last comprehensive review of their work was the article by Born & Maria Göppert Mayer, which appeared in 1933. Since then many important contributions have been made. The aim of the book is to deduce the macroscopic behaviour of crystals from their microscopic properties, the latter being described in the general case by the potential energy corresponding to small displacements of the atomic nuclei from the lattice points and by the parameters characterizing the behaviour of the atoms under the influence of electromagnetic fields. As a rule, the quantum mechanical treatment of the system of nuclei and electrons is applied only in order to justify those principles. Being basic to the theory given in this book, the adiabatic approximation is thoroughly discussed. In this approximation the motion of the electrons is treated as if the nuclei were at rest and a corresponding potential energy for their motion existed. For similar reasons, a treatment is given of the behaviour of molecular systems under the action of electromagnetic fields for long wavelengths. In the theory of optical phenomena, the case of X-rays is accordingly omitted. Because of the special behaviour of electrons in metals, which requires methods of their own and makes the validity of the adiabatic approximation questionable, the theory of metals is excluded. The scope of the book is further confined to crystals without imperfections. Likewise, surface phenomena are excluded.

The theory given in the book originated in several papers from 1912 and 1913 by Born and Th. von Karman where the mathematical foundation of the theory of the vibrations of simple crystal lattices was given together with its application to the problem of the specific heat of crystals. In these papers the so called periodic boundary condition was also introduced. These two principles form basic features of the present book and have there been worked out and applied in a general and systematic way.

The book consists of two parts called 'Elementary theories' and 'General theories', respectively. The first part gives an easily readable account of the elementary aspects of crystal forces and binding energies, elastic and thermal properties, infra-red vibrations, and also of the stability of lattice structures. The repulsive overlap forces acting between pairs of atoms in the crystal are discussed on the basis of the Thomas–Fermi statistical model and are also, as in the older theories, introduced as power or exponential functions of the interatomic distances. The aspects of the distribution function for the vibrational frequencies specifically connected with the lattice structure are discussed with reference to Blackman's investigations. The theory of the elasticity and stability of lattice structures is based on the special assumption of central two-body forces.

In the whole of this part of the book, and also in the second part, the deeper, purely quantum mechanical calculations from fundamental constants of the cohesive and elastic properties (as given by Hylleraas, Landshoff and Löwdin for some simple ionic crystals) are, unfortunately, only briefly referred to. The corresponding calculation by Schmidt for diamond is not mentioned. Although these calculations refer to rather special cases they give useful insight into the nature of the forces in crystals and have also, as Lundquist has recently found, an important bearing on the theory of the infra-red vibrations considered in the book. The necessity of introducing an 'effective' ionic charge then follows without *ad hoc* assumptions like those used in the book, thus emphasizing the value of the quantum mechanical approach.

The second part of the book contains in its first chapter the investigations of the adiabatic approximation and of the optical theory of molecular systems, and includes also a general treatment of the statistical mechanics of such systems under external forces. An interesting new treatment of this problem is given by Born in an Appendix. The following chapter forms a central part of the book. The authors give here a general theory of crystal vibrations and deduce the elastic and piezoelectric properties as limiting cases for long wavelengths and small frequencies. The methods used are those laid down by Born and v. Karman in their original papers and by Born in his book *Dynamik der Kristallgitter* of 1915. These methods are supplemented by those introduced by Ewald for the field caused by vibrating dipoles, whereby ionic lattices with their long-range Coulomb forces are incorporated in a consistent way. As shown in the book, the theory of elastic and piezoelectric properties can then be based on the most general quadratic expression for the potential energy corresponding to the short-range forces if the macroscopic elastic and piezoelectric equations, including the symmetry properties of the elastic constants, are assumed to be valid.

The reliance on macroscopic equations should be avoided in a consistant microscopic theory. For this purpose a different approach to the problem would apparently be required.

After the next chapter, where the thermal properties are considered in detail on the basis of the theory of finite deformations, there follows the important final chapter where an exposition is given of crystal optics, including applications to infra-red absorption, the Raman effect and the thermal scattering of light. Here the theory has met with considerable success in the interpretation of the measurements on the Raman effect.

No mention is made in this chapter of the original work by Ewald in which the foundations of this theory were given. Important generalizations and simplifications of the theory have, however, been achieved in the book.

The second part of Born & Huang's book is not easy to read, particularly because the authors write their formulae in a form as general as possible. It is hard not to get lost in the jungle of formulae and notations, although the authors have been careful in choosing their symbols. The intention of the authors in this part of the book has evidently been to give the general methods rather than to apply them to definite problems. Even so, a number of special assumptions have, however, been unavoidable and, in order to test them, more complete comparisons with experiments would have been of great use. The book would certainly also have been more valuable if the references given had been more complete and appropriate. In spite of this, however, the book is of great value in giving a thorough exposition of a wealth of methods of fundamental importance in crystal theory.

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Dielectric Behavior and Structure. By C. P. SMYTH. Pp. 441. New York; Toronto; London; McGraw-Hill. 1955. Price $9·00; 64*s*. 6*d*.

This book has been published in a chemical series and has been written primarily for chemists. It deals with many aspects of dielectrics, but its principal subject is the relation between dielectric behaviour and molecular structure, in particular the elucidation of the structure of molecules with the help of dielectric measurements.

The two first chapters deal with the theory of dielectric constant and loss. These are very well written and give an excellent introduction to the theory. The author himself is not a theoretician, and in some parts of these chapters he follows other authors very closely, but this is to the advantage of the book, as the material has been judiciously selected. The theoretical physicist will find those passages of considerable interest where the validity of the various theories is tested by comparison with experiment.

Concerning the treatment of dielectric loss, one criticism can be made which, however, applies equally to many other treatises on this subject. The loss is treated on a purely macroscopic basis and the concepts used are those of macroscopic physics and electrical engineering. These concepts are well established and easy to use, and as they are often encountered in papers on dielectric theory it is essential that the student become familiar with them. Nevertheless, the chemist, or, in fact, any reader who is interested in atoms and molecules rather than in electric condensers, voltages and charging currents, will find that these concepts alone do not satisfy him. To him the statement that the loss is due to the charging current having a component in phase with the voltage will appear not an explanation of the loss but merely a formalism to describe it. I think that, in addition to the macroscopic theory, an atomistic explanation of the dielectric loss should also be given, at least in a qualitative way. Many readers would understand the nature of the dielectric loss much better if they were told something about the atomic and molecular processes which lead to the transfer of energy from the electric field to the random internal motion of the dielectric.

The two introductory chapters are followed by several chapters dealing with the dielectric properties of gases, liquids and solids, and by one discussing measuring techniques.

This is followed by a very detailed discussion of the connexion between dipole moment, molecular structure and electronic configuration in the molecule, and by a number of chapters illustrating the conclusions concerning molecular structure which can be drawn from dielectric