

specimens, but methods of adjusting crystallographic directions parallel to axes of rotation or other instrumental directions. Crystallographers interested in accurate measurement of lattice parameters will be amused and possibly perturbed by the historical outline of units of wavelength given on pages 41 to 44. The measurement of X-ray intensities is discussed in great detail, including such things as the variation with wavelength of the sensitivity of detecting devices. Line broadening from small particle size, or rather the determination of particle size from line broadening and from small-angle scattering, is discussed fully, but there seems to be no discussion of line broadening from mistakes or stacking faults, and only a casual mention of line broadening from strain. The short chapter on radiation protection and the subject index to all three volumes are very welcome.

In short, Volume III of the International Tables for X-ray Crystallography, like Volumes I and II, is a necessity for all those working in the field of X-ray crystallography.

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**Molecular Structure and the Properties of Liquid Crystals.** By G. W. GRAY. London: Academic Press. 1962. Price 63s.

G. W. Gray a voulu, dans son livre, établir le rôle de la constitution chimique des composés organiques purs sur la nature et les propriétés des phases mésomorphes qu'ils peuvent fournir. Depuis la découverte des cristaux liquides, à la fin du siècle dernier, presque simultanément par F. Reinitzer et O. Lehmann, et l'œuvre fondamentale de Georges Friedel qui démontrait qu'il s'agissait d'états nouveaux de la matière, intermédiaires entre le solide et le liquide isotrope, de très nombreux travaux tant théoriques qu'expérimentaux, ont été publiés sur ce sujet.

Gray n'étudie ni le mésomorphisme lyotropique où la biréfringence optique est liée à la concentration de certains composés dans un solvant convenable, ni le mésomorphisme des composés biologiques. Aussi son livre s'adresse-t-il d'abord aux chimistes organiciens.

Cependant, les sept premiers chapitres qui constituent près de la moitié du volume décrivent minutieusement les différentes mésophases, smectique, nématique et cholestérique; les méthodes d'identification, les déterminations des températures de transformation; les arrangements moléculaires qui se déduisent des examens au moyen des méthodes physiques basées sur les rayons X, l'infrarouge, l'ultra-violet, la résonance magnétique protonique; les différentes théories qui tentent d'expliquer ces arrangements moléculaires et leurs propriétés.

Dans les trois derniers chapitres, plus chimiques et formant plus de la moitié du volume, l'auteur établit des relations entre le mésomorphisme et la constitution chimique pour prévoir, d'après la composition chimique d'un composé et les modifications apportées à cette constitution chimique, les mésophases qui peuvent apparaître.

Ce livre est un exposé très clair de tous les travaux, de toutes les hypothèses et théories qui se rapportent au mésomorphisme des composés organiques. Il fournit sur

le sujet une documentation aussi exhaustive qu'on puisse le souhaiter. Aussi tous ceux, chimistes, physiciens, biologistes qui s'intéressent aux cristaux liquides auront intérêt à le consulter.

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**Piezoelectric Properties of Wood.** By V. A. BAZHENOV [BAŽENOV]. Pp. xii+180. New York: Consultants Bureau, 1961. Price \$9.50.

Wood is undeniably an anisotropic material, and may be compared to an irregular crystal, with the remains of the plant cells corresponding to the unit cells of a crystal structure. The investigation of the piezoelectric properties of wood is therefore of interest to crystallographers, particularly since the discovery of the property is attributed to Šubnikov. Moisture would obviously be a disturbing factor, and the experiments described in this book were carried out on thin plates of wood baked to constant weight at 100 °C. and then impregnated with a mixture of beeswax and rosin. The book begins with three chapters of general theory, one on experimental methods, one on elastic anisotropy, and one on the correlation of the magnitude of the piezoelectric effect in wood with such things as the species of tree, the density, and the distance from the centre of the trunk. The three chapters at the end of the book deal with the structure of cellulose and the way in which wood is built up from cellulose and other substances. It seems established that the piezoelectric effect is due to oriented cellulose, and not to any of the other constituents.

The translator's name is not given, which is perhaps just as well for his reputation. The text abounds with such curious, though usually intelligible, terms as reflected axes (inversion axes), concomitant (compatible), and real (non-zero). Occasionally, also, there are sentences to which it is very difficult to attach a meaning: 'Wood may be regarded as a piezoelectric texture consisting of a set of cells as the elementary particles of this texture that are invested piezoelectric properties'. There is no index.

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**Clays and Clay Minerals. Volume 9. Proceedings of the Ninth National Conference on Clays and Clay Minerals.** Edited by A. SWINEFORD, Pp. xi+614. New York: Pergamon Press, 1962. Price £5.5.0.

This book contains papers given at the ninth annual North American National Conference on Clays and Clay Minerals held at Purdue University in October 1960. The conference featured two symposia; the first 'On the Engineering Aspects of the Physicochemical Properties of Clays' had 9 papers and occupies 198 pages; the second 'On Clay-Organic Complexes' had 13 papers and takes

up 154 pages. There are also 20 papers, in 216 pages, which were given in general sessions dealing with a wide range of clay mineral studies. The book begins with a report on a field trip held in conjunction with the conference and is completed by an adequate 11 page index.

As the title suggests, the unifying topic is clays, and everyone working in this field will find something of interest in the book. The subject matter, mainly the physical chemistry and mineralogy of clays, will be of only marginal interest to crystallographers. Crystallographers, however, may be interested in the one-dimensional swelling in water of crystals of the butylammonium-vermiculite complex described by Garrett and Walker. In the swollen crystals the 10 Å thick alumino-silicate layers are separated by some hundreds of Å of water. Facing p. 558 is a photograph showing crystals before and after swelling in which the swollen crystal appears to be about 40 times as thick as the crystal before swelling.

The editor and the printers are to be congratulated on the appearance of the book. The printing is good and few errors were noticed. The interval between the conference and the publication of the proceedings, nearly two years, does seem rather long for what is in effect an annual production.

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**Proceedings of the International Conference on Magnetism and Crystallography. Kyoto, 25-30 September, 1961. Volume III. Neutron Diffraction Study of Magnetic Materials.** Journal of the Physical Society of Japan. Volume 17. Supplement B-III 1962. Pp. 71. Price U.S. \$1.00.

The International Conference on Magnetism and Crystallography held in Kyoto, Japan, in September 1961

consisted of two parts, a conference on magnetism and a symposium on electron and neutron diffraction. For two sessions the two sections of the meeting combined together and the present volume of seventy pages is a collection of the 20 papers delivered at these joint sessions under the title 'Neutron Diffraction Study of Magnetic Materials'.

The reader will not be surprised to find that nearly all the papers are concerned with the transition metals of the iron group and their alloys or compounds. Unless, however, he has kept in close touch with this work he may well be surprised at the precision and discrimination in measurement which is now being achieved, the range of problem which is being studied (covering elastic and inelastic, coherent and incoherent scattering) and the variety and complication of the magnetic arrangements in solids which now stand revealed. As examples of the former we may note very careful studies of magnetic form factors, aimed at giving precise knowledge of the spin-density distribution in magnetic atoms, and measurement of the temperature-dependence of the lifetime of spin waves in magnetite: on the last topic we can see the fascinating magnetic structures postulated for chromium, manganese chromite and many of the rare-earth metals, involving sinusoidally varying magnetic moments and spiralling configurations of spins.

It is not usual to recommend a collection of conference papers as general reading. However, this compilation is exceptional. The papers are commendably short, averaging little more than three pages each, and a reader with only a slight interest in the subject may find that to read them all straight through does not require undue perseverance. It will be rewarded by a well-balanced view of the present knowledge and prospects in this field.

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