

## Book Reviews

*Works intended for notice in this column should be sent direct to the Editor (A. J. C. Wilson, Department of Physics, University College, Cathays Park, Cardiff, Great Britain). As far as practicable books will be reviewed in a country different from that of publication.*

**Ionization X-ray Equipment for Research on Crystalline Materials at Various Temperatures.** By P. F. KONOVALOV, A. I. EFREMOV, B. V. VOLKONSKII, edited by Professor N. A. TOPOROV. (Translated from the Russian by Y. Shechtman). Pp. [v]+102 with 63 figures and 15 tables. Jerusalem: Israel Program for Scientific Translations, 1961. Price \$1.00.

The original of this book was issued by the Scientific Technical Society for the Production of Building Materials, Leningrad. By describing the apparatus and numerous examples of its application the authors hoped to help 'wide circles of workers in industry and in scientific research institutes'.

Details of a diffractometer capable of operation up to 1500 °C. are given which is claimed to reduce exposure time to 10–15 minutes instead of 10–100 hours required for photographic recording. If the presentation were not so confusing this ought to be a compulsory reading for young scientists. It reminds us that work can still be done with simple devices, such as an X-ray tube the focal area of which projects to no less than 0.3–0.5 mm. width, an 'ionization counter' with single-valve D.C. amplifier, and photographic drum recording (5 mm. per degree Bragg angle) of galvanometer readings. However, this image is somewhat spoiled by the description of a more complex version developed later on.

The last three-quarters of the book is devoted to examples of instrument applications. The wide range of subjects discussed includes the polymorphic transformation, thermal decomposition and expansion, hydration and dehydration of silicates, aluminates, carbonates and sulphates found in building materials. A table shows the influence of NaF, KF and CaF<sub>2</sub> additives on the thermal decomposition of tricalcium aluminate. Some theories are reviewed and existing divergent opinions are pinpointed, but no better solution is offered.

This book is painful reading to a stickler for detail. The translator has pointed out some difficulties in the original text, and added some warnings—two of these (on p. 90, and fig. 51) are not really necessary. A possible mix-up of figs. 38 and 39 is pointed out, but I would also query fig. 37. It appears that the legend printed as fig. 39 suits the curves on p. 64, the legend fig. 37 may fit on p. 65, and that on fig. 38 should probably be transferred to p. 63. It depends on whether there are one or several misprints in the relevant text on p. 61. The lowest curves on fig. 61, 62 and 63 are all labelled 'anhydrous compound' of 5CaO.3Al<sub>2</sub>O<sub>3</sub>, but they all seem different. It should be pointed out here that the expression pentacalcium trialuminate is used in this book to describe the cubic aluminate 12CaO.7Al<sub>2</sub>O<sub>3</sub> (Büsem & Eitel, 1936), and not the orthorhombic compound of 5–3 formula (Aruja, 1957).

There are really too many misprints of formulae, temperature and spacings data, text references to figures *etc.*, to list here. It is also difficult to follow several arguments. There is no bibliography as such and only

a few of the authors' names have publication dates attached. The latest date given is 1950, although a 'recent' paper by Bernal dates probably from 1952. The Russian alphabet offers its usual pitfalls. The book is said to be edited by N. A. Toporov, but the foreword is signed by N. A. Toporov and the framed transcription of the Russian title page shows N. A. Toporova. Double transliteration should return to the original name, but here G. Kyul' has been printed for H. Kühl, and Khel'big for Helbig.

Judging by the circulars of the book trade, translation from the Russian has become a popular pastime. In principle anything which facilitates such exchanges should be encouraged. However, no full re-issue should be welcome to burden our desks unless it gives something new in contents or presentation, or at least gives references not otherwise obtainable; also the author's co-operation should be obtained, if necessary, to reduce the incidence of errors, confusion, inconsistency and useless repetition to a manageable level. On this test it is regretted that this book, originally published in 1958 for the encouragement of the use of X-ray technique as a research tool in Russia, is published in English in 1961, including so many faults.

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**Proceedings of the Seventh Conference on Magnetism and Magnetic Materials.** Edited by J. A. OSBORN. Pp. [viii]+1019–1394. New York: Plenum Press, 1962. Price \$12.50 (in the United States of America), \$14.00 (elsewhere).

This volume reports on the Proceedings of the Seventh Conference on Magnetism and Magnetic Materials held by the American I.E.E. and the American Institute of Physics. This annual conference is the forum at which the most important advances in the science of magnetism are reported. The Journal of Applied Physics usually publishes a supplement which deals with the papers presented at that conference and this book is a reprint of the supplement published in March, 1962. The Proceedings of the successive conferences on Magnetism and Magnetic Materials are probably, therefore, the most important books for a person working in the field of magnetism. Unfortunately the special volume is expensive and so the chief buyers will be the libraries. This is a pity since the book should be on individual bookshelves wherever possible.

It is not possible in a brief review to go into all the 150 papers, but some of the more important items may be mentioned. The introductory general session is of interest. The first paper by Simkins on the study of the art of magnetic memories shows how magnetic films are superseding in speed the previously used magnetic ferrite cores but also showing that large memories with capacity for over 10,000 bits are still exclusively ferrites and that

even at approaching a million bits cycle times of  $1\frac{1}{2}$  microseconds can be achieved. Small thin film memories can give cycle times of 0.3 microsecond. Lax describes research in the Lincoln Labs on high magnetic fields. Fields of the order of up to 400,000 gauss are expected to be produced. Nagamiya's review of the screw spin structure is of interest to those interested in ferromagnetism of rare earths and similar substances. Rodbell and Bean give a paper where magnetic transitions are treated like phase transitions. This paper should be of help to many people and clarify their ideas about ferromagnetism, antiferromagnetism and paramagnetism and transitions between these states. Kunzler gives an impressive paper of the recent progress of hard superconductors which can already be used for fields of about 100,000 gauss. The prospects of increasing this are quite bright.

Dealing with magnetic thin film memories and their properties, Ballantyne shows that the ideas proposed by D. O. Smith on magnetic domain wall storage and logic have been experimentally demonstrated. Wolf gives a fairly comprehensive paper on the electrodeposition of magnetic films. Since most previous work is concerned with evaporated layers this may prove interesting to many readers. Takahashi reports on beautiful experiments to investigate the uniaxial magnetic anisotropy in evaporated films and finds that the origin of this lies in defects in the films. Sato, Toth and Astrue have a nice contribution on Bitter patterns of single crystal films of iron and nickel and Thomas has an important theoretical model for non-coherent rotation in magnetic films.

There is a fair number of papers on the investigation of internal fields in ferromagnetics by means of the Mossbauer effect and nuclear magnetic resonance. A whole session consisting of eight papers is devoted to this subject.

Ferromagnetic and ferrimagnetic anisotropy and spin configuration are discussed in a session with 11 papers. Many conventional ideas such as the one-ion model are further elaborated and investigated. There is an interesting paper by Rado and Folen on magnetoelectric effects in antiferromagnetic materials which reports on the observation of a magnetic polarization proportional to an applied electric field in antiferromagnetics. Two effects are postulated both of which have been observed.

Two sessions on oxides deal with all aspects of the magnetic properties of spinels and other ferrites as well as metal oxides like chromium and vanadium oxides. Crystal preparation is described by a few authors for spinels, garnets and hexagonal ferrites.

There are a number of papers on soft magnetic materials and permanent magnets; of special interest may be a review paper by Adams on recent development in soft magnetic alloys. There is no corresponding paper on permanent magnet materials but new materials are described by Sallo and Carr, and de Vos, Velge, van der Steeg and Zijlstra. Meiklejohn gives an excellent review of exchange anisotropy quoting many examples of systems in which this has been observed.

The book is, of course, identical in appearance with any issue of the Journal of Applied Physics except that it is bound in hard covers and has an excellent subject and author index.

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### **The Story of X-rays from Röntgen to Isotopes.**

By ALAN RALPH BLEICH. Pp. xiv + 186. New York: Dover, 1960. Price \$1.35.

This pleasant paperback—it is a new book, not a reprint—may fittingly be brought to the attention of crystallographers on the fiftieth anniversary of the discovery of X-ray diffraction. The author is a clinical professor of radiology in New York, and the book deals largely with medical applications, though industrial and other uses are not neglected, and there is a very timely chapter on the dangers of radiation, diagnostic and otherwise.

The crystallographer will not learn anything useful from the half dozen pages devoted to crystals. He will, however, be interested in 'Max von Laue's discovery that X-ray beams are refracted as they pass through crystals'. The value of the book lies in the fascinating story it tells of the early days of Röntgen's discovery, and the wide field it offers to awaken the interest of young people.

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### **Struktur und physikalisches Verhalten der Kunststoffe.** Ed. by K. A. WOLF. Pp. 974. Berlin: Springer, 1962. Price DM 168.

This book is the first part of a two-volume work on the structure, physical properties and testing of plastics; this first part deals with structure and physical properties. It consists of 48 contributions covering a great range of aspects of the subjects dealt with, by 51 authors, all specialists in their own fields, and it covers most of those aspects of polymer science which are of physical interest and are based on physical rather than chemical methods. Practical test methods and procedures will presumably be dealt with in the second volume.

The contents are arranged in five sections: a short introductory survey (14 pages), five chapters on molecular structure (144 pages), seven chapters on states of aggregation and transitions (154 pages), seventeen chapters on physical properties and their experimental investigation (396 pages), nine chapters on the physical properties of multi-component systems (141 pages), and five chapters on the alteration of properties by various methods (108 pages). Many of these chapters give useful introductions to the subjects they deal with, but polymer science has grown to such enormous proportions that even in a volume of nearly 1000 pages the space allotted to each subject is hardly sufficient to include the bare essentials; most chapters give the impression of extreme compression, and one feels that the authors have found it difficult to do justice to their themes in the space available.

Other general impressions are that the contributions are very uneven in quality, as is inevitable in a symposium by many authors, and that the scheme of division into the sections mentioned above has led to a certain amount of overlapping. The chapter by O. Kratky on X-ray diffraction in the physical properties section, for instance, covers some of the same ground as the chapter by K. Ueberreiter on the crystalline state in the section on states of aggregation; and some other topics in