X-ray Crystallography

X-Ray Diffraction in Crystals, Imperfect Crystals, and Amorphous Bodies. A. Guinier. Translated from the French edition (Paris, 1956) by Paul Lorrain and Dorothée Sainte-Marie Lorrain. Freeman, San Francisco, 1963. x + 378 pp. Illus. $11.

In 1956 Guinier produced a masterful text on x-ray crystallography, entitled *Théorie et Technique de la Radiocristallographie*. That text has been studied, though not widely enough, simply because it is in French. It is, moreover, too complete for the general scientific student and perhaps a little too theoretical for the scientist who is primarily interested in practical applications. Nevertheless, many of us have often thumbed its pages thinking that one should produce an English translation. But, as the years went by, one felt more disheartened because it was getting rather late.

Guinier evidently thought otherwise, and he obtained the collaboration of Paul Lorrain, better known as a nuclear physicist, and Dorothée Lorrain. Without great loss to the English-speaking reader, who can use several other introductory books, the Lorrains lightened their task by translating only the most important last part of the five parts of the original book; they also added an introductory chapter and substituted a few references to critical literature published since 1956. For the rest they produced a superb translation.

It must be clearly understood that Guinier did not, even in his original text, cover that part of x-ray diffraction which deals with crystal-structure determination. In his book, as in his own principal contributions, Guinier is concerned with departures from crystal perfection, the effects of crystal size, temperature, and strain, as well as solid-solution and long-range effects. His elegant Fourier technique enables him to build up the subject from diffraction by media without lattice order. There can be no doubt that this is a most important and successful book in that field. There are, however, limitations that arise from the passage of time. The subject is a very active one, and in the time that has elapsed since the volume was first published our knowledge has been extended, for instance, with regard to anomalous diffraction effects by nearly perfect crystals.

The author claims that "This book should be useful for solid-state physicists, metallographers, chemists, and even biologists." I hesitate, and ask: Should they not be given texts in which structural information obtainable by x-ray diffraction is integrated and contrasted with that from other techniques?

I do, however, feel great pleasure that, in the future, there will be no language excuse for disregarding Guinier's important book, which I recommend warmly to x-ray diffractionists, as well as to writers of textbooks and reviews of slightly wider fields.

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Comprehensive Résumé

The Chemistry of Wood. B. L. Browning, Ed. Interscience (Wiley), New York, 1963. x + 689 pp. Illus. $25.

Every man, woman, and child is familiar with trees, and most of us derive a great deal of pleasure and satisfaction from their everchanging beauty. But few realize, or even suspect, the biological, morphological, and chemical complexity of trees or of industrially important wood around which our modern lives revolve. Browning has performed a singular service in bringing together 16 collaborators to discuss in 12 chapters the many aspects of wood science. Each contributor has had many years of active research experience in his field, and we are thus assured of an authoritative treatment of the subject.

After a brief introductory chapter in which the supply and uses of wood are considered, the structure of wood is discussed in considerable detail from the anatomical viewpoint. Physical properties and a variety of wood defects are also considered. The composition and chemical reactions of wood are discussed in the next chapter. The presentation of the chemistry and physics of cellulose, which constitutes a separate chapter in this book, is by far the best available one-chapter treatise on cellulose, and it is recommended to all newcomers to this field. The chapters on the hemicelluloses and wood lignins are also excellent presentations of these complex substances which frequently seem to defy clear presentation. The extraneous components of wood, which are apparently classified as those substances that are neither cellulose, hemicellulose, or lignin, are discussed in the next chapter. The chemistry of developing wood is treated from the biochemical point of view, while the next chapter (on wood-water relationships) presents excellent discussions of such technologically important subjects as water sorption, surface area measurements, the thermodynamics of sorption, swelling, and shrinkage. The manufacture of wood pulp by the several chemical and mechanical methods of current industrial interest and a discussion of wood as a chemical raw material constitute the next two chapters. In the final chapter, the chemistry of bark is discussed, and it is interesting to note the many differences between the center wood and the bark.

Each chapter has its own list of references which appear to be quite extensive and complete. The book is well reproduced, and all illustrations are clear and informative. In general terms, this book is an excellent presentation of a complex subject, which should prove useful to both the novice and the experienced researcher.

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Chemical Technology

Fuel Cells. Will Mitchell, Jr., Ed. Academic Press, New York, 1963. xvi + 442 pp. Illus. $15.

This book, one of several state-of-the-art reports on fuel cells, consists of an introduction and nine chapters, each written by well-known contributors to research and development on fuel cells. Considerable quantitative information is included; this is of special value to the well-informed reader who is interested in making comparisons and evaluations. Although the symbols used for various quantities are not uniform from chapter to chapter, they are not difficult to follow. I noted only a few minor errors: for example, on page 53, an aldol condensation identified as a Cannizarro reaction.

The division of material into six of the chapters was made on the basis of types of cells and operating conditions: that is, high pressure hydrogen-oxygen cells, high-temperature cells, ion-exchange membrane cells, sodium amalgam-oxygen continuous feed cells, low