place in mythology, religion, history, art, and letters. Even if the author chooses to confine himself to the scientific aspects of lightning alone, as Uman has done, he must choose from a formidable mountain of observations, data, theories, and speculations. Some readers may be disappointed to find that this book scarcely mentions unusual lightning phenomena, such as those associated with volcanoes, tornadoes, and nuclear explosions, that it has nothing to say about the role of lightning in anthropology, ecology, biology, atmospheric chemistry, and cloud physics, and that it does not deal with such topics as whistlers, spherics, lightning control, or the effects of lightning on animals, buildings, and airplanes.

All of this is, of course, expecting far too much. If the author had chosen a more restrictive title that better described his book, for example, "Physics of the Lightning Flash," there would be little to criticize. He has done a solid and useful piece of work to provide a clear, authoritative, and up-to-date exposition of many of the physical phenomena associated with lightning. Until now this material has not been available in a single text.

One of the particularly useful portions of this book is the introductory chapter, which provides a condensed version of the detailed discussions that follow. The first table, which gives minimum, maximum, and representative values that have been measured for more than a dozen important variables associated with the lightning flash, is a valuable compilation. The six chapters that follow, treating in detail such subjects as lightning photography and spectroscopy, electrical measurements, thunder, and the theory of discharge processes, will be useful for the advanced student and the scientist working in this field.

Two appendices provide an introduction to the very puzzling literature of bead and ball lightning, which, as Uman notes, is voluminous enough to fill a book of its own. Two other appendices bring lightning research up to date with a discussion of recent developments and project it into the future with suggestions for further studies. The value of the book is enhanced by comprehensive lists of references and detailed author and subject indexes.

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A Technique

Chemical Applications of Mössbauer Spectroscopy. V. I. GOLDANSKII and R. H. HERBER, Eds. Academic Press, New York, 1968. xiv + 701 pp., illus. $29.

The phenomenon of recoilless emission and absorption of nuclear gamma radiation, reported by R. L. Mössbauer in 1958, has now taken its place alongside other nuclear phenomena such as nuclear magnetic resonance as an important and unique method for investigation in several branches of physics and allied fields. Thus, as an addition to the excellent account by G. K. Wertheim (*Mössbauer Effect: Principles and Applications*, Academic Press, 1964) there has been a need for a comprehensive treatment of the subject at the research level. The proceedings of several conferences and the now-yearly reports of the Mössbauer symposia (*Mössbauer Effect Methodology*, vols. 1–4, I. J. Gruverman, Ed., Plenum, 1965–1968) have partially filled this need. The present volume, edited by V. I. Goldanskii and R. H. Herber, should go a long way toward providing a satisfactory one-volume reference work. The title of the book is too restrictive; it could, justifiably, have been called "Applications of Mössbauer Spectroscopy."

In a field that has developed as explosively as has Mössbauer research, it is probably inevitable that a useful book would consist of a series of articles contributed by a large number of workers. The editors have sought to overcome the resulting lack of continuity and uniformity by means of numerous and detailed footnotes. These notes also often serve as addenda to bring the text up to date.

The book covers the important applications of the Mössbauer effect to nuclear, solid state, and atomic physics and to pertinent problems in biophysics. Chemical applications are indeed stressed, after suitable introductions, in the treatment of the Mössbauer effect in ^{57}Fe, ^{119}Sn, xenon and iodine, the rare earths, and the heavy elements. Some special effects are described and an excellent treatment of spin relaxation phenomena in solids is included. The only serious drawback to the use of the book as a general reference work on the Mössbauer effect is the omission of applications to relativity and resonant time effects and to mineralogy and geophysics, where Mössbauer spectroscopy is increasingly used. Topics such as the implantation of Mössbauer nuclei in various environments are too recent to have been included.

In summary it should be stressed that the book does provide the first comprehensive treatment of the applications of Mössbauer spectroscopy to chemical problems. The impressive amount of research reported in this area supports the early prediction that this may be where the Mössbauer effect will make its greatest contributions in the long run.

This reviewer has already had occasion to consult the book in the course of research and found it very helpful. The hackneyed phrase of the reviewer seems especially appropriate: no serious research worker in this field should be without access to this book.

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Crystallography

Molecular Crystals. Their Transforms and Diffuse Scattering. JOSÉ LUIS and MARISA AMORÓS. Wiley, New York, 1968. xxiv + 479 pp., illus. $22.50. Wiley Monographs in Crystallography.

This is the second book in a series, Wiley Monographs in Crystallography, edited by Martin J. Buerger, the first of which was *Polymorphism and Polytypism in Crystals* by A. R. Verma and P. Krishna.

The book is essentially divided into two parts. The first three chapters deal with the theory of scattering of x-rays by atoms and molecules, by an ideal periodic structure, and by a real crystal. The remaining three treat applications to the diffuse scattering of molecular crystals, diffuse scattering by thermal waves, and temperature dependence of diffuse scattering. In the theoretical treatment an important place is taken by the Q-function (self-image of the electron density) and by the difference Fourier transform (the difference of the molecular Fourier transforms at temperature $T = 0$ and temperature T). There is also a great deal of emphasis on optical analogs, particularly Fraunhofer patterns obtained by representing atoms by disks of varying size and recording the diffraction pattern of the assembly. The text is supplemented by a large number of excellent illustrations.

The chief merit of the book is that it is practically the first one available