

## BOOK REVIEWS

**THE CRYSTALLINE STATE. Volume III. THE DETERMINATION OF CRYSTAL STRUCTURES.** By H. LIPSON AND W. COCHRAN, Third Edition, Cornell University Press, Ithaca, New York, 1966, viii+414 pp., 388 tables, 393 figs., \$14.00.

The first edition of this book appeared in 1953, and the second in 1957, an indication of its popularity. Now the third "revised and enlarged" edition is available, reflecting the extensive changes in the subject of crystal-structure analysis since 1953, according to the authors' Preface to Third Edition. Whereas the first edition had nine chapters and nine appendices, the new edition contains fourteen chapters and no appendices. Five of the chapters are essentially the same in both editions. However, some of the older material has been completely revised and promoted to full chapter status. In this category are chapter 3 on Intensity Statistics Applied to Space-Group Determination, written by A. Hargreaves, chapter 9 on Direct Methods, written by M. M. Woolfson, and chapter 10 on Fourier Transforms and Optical Methods. Considerable rewriting has been done to bring up to date the material in chapter 7 on The Use of the Patterson Function, chapter 8 on Fourier Methods, and chapter 12 on Accuracy and Refinement. Essentially new topics are covered in chapter 11 on Effects of Thermal Vibration, chapter 13 on Neutron Diffraction and Electron Diffraction, and chapter 14 on Anomalous Scattering and Structure Determination. The former Appendices were removed because the information given there is now available in International Tables for X-Ray Crystallography. The references are dated through 1965.

The authors explain that they have deliberately omitted any detailed description of computer methods and techniques, having decided that any attempt to deal with the subject adequately in this volume is out of the question. In view of the current state of the computer art, the authors' decision seems very wise.

Every crystal-structure analyst will find a few minor sins of omission and commission, according to his personal lights, but all will undoubtedly have occasion to refer to the book frequently for the wealth of useful information it contains. The style and quality of the writing, editing, format, and illustrations are as excellent as in the earlier editions, and previously noted minor errors appear to have been corrected in this edition.

One curious oversight, however, should be mentioned. Although an entire chapter on neutron diffraction and electron diffraction has been added, spectroscopic methods and the information they can give about structures are virtually ignored. The short discussion of infrared absorption remains unchanged from the 1953 edition, and techniques such as nuclear magnetic resonance and Mössbauer spectra are not mentioned. This omission is perhaps the major shortcoming of an otherwise comprehensive introduction to the world of the modern crystal-structure analyst, a volume that belongs in the personal library of every scientist interested in the subject.

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**ELEKTRONENSTRAHL-MIKROANALYSE. VOL. IV OF HANDBUCH DER MIKROCHEMISCHEN METHODEN** By HANS MALISSA, Springer-Verlag Wien—New York, 1966, 154 pp., 79 figs., 36 tables, \$12.25.

During the past decade, the electron microprobe X-ray analyzer has become increasingly important as an analytical tool for the earth scientist, and most major geology departments are now engaged in extensive research programs involving this instrument.

Although the book by Malissa is written from the point of view of an analytical chemist rather than that of a geologist, and, hence, reports little on the special analytical problems in microprobe analysis resulting from the nature of geological samples, it is a welcome addition to the literature on electron probe techniques. The book provides much basic information on apparatus and correction procedures for quantitative analysis, and these apply as much to the work of the earth scientist as they do to that of the chemist.

The book is divided into four major chapters. The first deals with the principles of excitation of X-rays by electrons, their detection and measurement, as well as questions of sample properties and, in particular, surface conditions and relief. In the paragraph on sample preparation, the geologist will miss a discussion of preparation of polished thin sections for probe analysis. A second chapter is devoted to description of various instruments, their relative merits, as well as to a discussion of measurement of elements with atomic number below 12, micro-diffraction (Kossel technique), cathodo-luminescence, and X-ray microscopy. Procedures for correction of raw intensity data and discussion of precision and accuracy of quantitative data obtained with the electron probe are presented in chapter three. A final chapter is devoted to a description of examples of qualitative and quantitative analyses from the literature. An extensive reference list is included, covering not only the literature dealing with the theoretical and practical aspects of electron microprobe analysis but also papers on application of the instrument to metallurgy, biology, and geology.

The book gives a very concise account of the theoretical and practical principles as well as of applications of electron microprobe analysis. Because of the brevity (157 p.) of the book, the less experienced student may in places have difficulties in digesting the wealth of information presented. The more informed reader will, however, find the book a useful resume of electron microprobe analysis.

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