BOOK REVIEW

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Richard L. Liboff: Primer for Point and Space Groups

Springer, 2004. 220 pp (ISBN 0-387-40248-9) US $59.95

This text, a part of the series Undergraduate Texts in Contemporary Physics, is intended as an introductory book on group theory for undergraduates in materials science, electrical engineering, physics, chemistry, physical chemistry, and applied mathematics. The book covers a number of topics, including many that are not normally covered in an undergraduate course on group theory. The first three chapters very quickly cover the basics of abstract group theory. Chapter 4 covers the applications of group theory to quantum mechanics, as well as Young diagrams and the full rotation group. Chapter 5 covers space groups, Brillouin Zones, and the group of k. Chapter 6 is dedicated to atoms in crystals and correlation diagrams. Finally, Chapter 7 introduces elements of abstract algebra (including integral domains, rings, and fields), leading up to a discussion of the Galois group.

While the text covers many topics not normally covered in a typical chemistry course on group theory, a number of topics that are normally included in such a course are not covered. In particular, neither chemical bonding nor the spectroscopic applications of group theory is mentioned. Crystal field theory is covered, from an atomic standpoint, in Chap. 6, but the applications of this to bonding and/or molecular orbital diagrams are not included.

The readability of the text is somewhat compromised by some errors in critical places, as well as by the very high level of mathematical background assumed. The book requires of its readers a very sophisticated knowledge of advanced mathematics, almost certainly beyond what can be expected for all but the most advanced undergraduate chemistry students, especially in the later chapters.

Overall, this text will probably be useful as a reference to those in physics, materials science, and applied mathematics, but I would not recommend it as a text for a course in the chemical applications of group theory, especially not at the undergraduate level. The text would be more useful for those involved in the advanced study of solid state materials, as this tends to be the focus of the work.

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