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**D. M. Bishop: Group Theory and Chemistry,** p. XVI + 294, New York–London: Oxford University Press 1973, £ 8.50.

In the past ten years we have seen numerous books on group theory with applications in the physical sciences. Is there a real need for another book on this topic and where should the emphasis go? The author felt that there is a need for the chemist in general and he is quite right.

After the classical work of Weyl and Wigner, there are now contributions to quantum mechanics by Hammermesh, Heine, Meijer-Bauer and Tinkham and to applied chemistry by Cotton, Hall, Hochstrasser, Jaffé-Orchin, and Schonland, to name only the most popular ones. Neither of these books is ideal for chemistry: they are either too elementary or too sophisticated, too superficial or too specialized. What we expect these days from a useful group theory book is that any interested chemist can read it and that at the same time reference information is provided on a more advanced level. D. M. Bishop's book is of this type.

The author rather cautiously proceeds to persuade the reader in his first chapter that symmetry occurs naturally in everyday life before he confronts him with symmetry operations and operator algebra. The third chapter is on point groups and their classification. Next he introduces matrices and matrix representations. With two chapters on equivalent and reducible representations, and irreducible representations and character tables the general part is concluded. The following chapters emphasize applications: representations and quantum mechanics, molecular vibrations, molecular orbital theory, hybrid orbitals and transition metal chemistry. The book finishes with a list of the usual character tables. The sequential setup of the twelve chapters is logically convincing, but not unique. Other books have presented this material similarly. What is unique though is the attempt of the author to "spell out all the relevant mathematics in some detail". And here lies his real contribution: the basic material of each chapter is separated from specific theorems and proofs in related appendices in an elegant and consequential fashion.

To put the book to test, it was used in an introductory mathematics course for chemistry undergraduates. It compared favorably with other books inasmuch as there were no obstacles for the students. The problem sets are well related to the material covered. To go into details is almost superfluous. To mention only a few: the author presents symmetry operations on model molecules in a visually appealing way; not only are axes and planes clearly marked in the figures, but so are the effects of symmetry operations and their combinations step by step. Then there is the careful distinction between symmetry operations, transformation operators which are homomorphic with the former and matrices representing the latter. The definitions are usually clear and the introductions to each chapter are worthwhile to read. Few flaws or shortcomings are immediately apparent. On p. 9 it slipped by that in an example of a sum of linear operators the non-linear logarithm is contained. On p. 16 the definition of $\sigma_d$ cannot be applied to $C_{4v}$ where $C_2$ axes do not exist. But there is little consistency in the literature on this point. Finally, we feel that some basic group theory is missing which the chemist these days can afford. In particular, purely mathematical aspects of subgroups and classes, homomorphism and isomorphism and the consideration of general multiplication tables of groups up to six elements. Tinkham has given a beautiful example on a few pages in his second chapter. We are inclined to believe that D. M. Bishop could have done a good job at that, too.

Summarizing, we feel that the book is a pleasant surprise on an intermediate level of sophistication and that it can be used for reading self-study or reference in chemistry advantageously.

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