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Book Review

C. D. H. Chisholm: Group Theoretical Techniques in Quantum Chemistry. London: Academic Press 1976. 271 pages, price £9.00 (US-$22.25)

The aim of this volume in the series "Theoretical Chemistry" is to help postgraduate students to make the transition from the elementary books on group theory to the more advanced textbooks. The book therefore starts out with a short introduction (7 pp.) followed by "a whole chapter" (19 pp.) of Elements of linear algebra. This is followed by chapters on Group representation (8 pp.), Irreducible representations of finite molecular symmetry groups (8 pp.) and Applications of irreducible representations (14 pp.). These chapters lean heavily on the more extended treatments by Hamermesh and McWeeny, as does indeed a great part of the present volume.

Then follows chapters on The symmetric group, Spin-free quantum chemistry, Continuous groups, Irreducible tensors and Lie algebra, Spinors and double groups, Direct products and coupling coefficients, Subgroups and branching rules, Classification of many-electron states, Fractional parentage, and Tensor operator analysis. Two appendices on General results in the theory of Lie groups and some basic tables relating to the classification of states conclude the book.

Throughout the book no general theorems are proven since these "can be found elsewhere in the literature".

There is to my mind no doubt that a book having the outlined content would be an excellent idea. It seems to me, however, that too much ground is covered in much too small a space. I do not think the book can stand alone; there are certainly many nice details and examples, but in order to use it as a textbook it would require a great deal of supplementary reading. It is really a synopsis of what would be an (unwritten) large modern textbook on "Group Theory and Quantum Chemistry".

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