

to star formation, but this particular discussion has not shown any great advance over the treatment of ten years ago.

Diffuse Matter in Space contained many statements which, though somewhat speculative at the time, have proven to be very insightful. For example, in 1968 Spitzer wrote with regard to the amount of interstellar molecular hydrogen, "In a relatively dense cloud . . . the radiation in the Lyman bands of H_2 may be entirely absorbed, dissociation may be absent, and an appreciable fraction of the hydrogen may be molecular." Observations have verified this suggestion, and I imagine that readers of *Physical Processes in the Interstellar Medium* will find other, similarly stimulating, ideas. Astronomers interested in either the interstellar medium or related fields will wish to give this book careful study.

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Molecular Symmetry and Group Theory

A. Vincent
156 pp. Wiley, New York, 1977. \$13.50
clothbound, \$5.95 paperbound

This small book offers a programmed self-study on applying elementary group theory to simple problems involving the symmetry, bond structure and vibrations of molecules. It aims at chemistry and physics undergraduates who might gain from using these techniques before being ready to tackle symmetry, groups and representations as part of a formal theory. The emphasis is on learning to use this mathematical tool, rather than on proving its theorems.

There is a definite need for such a book. Every teacher knows how time-consuming the initial transfer of language and of the conceptual short-cut thinking in this field can be. After much drawing of pictures and handwaving, students are usually advised to go through enough examples on their own as the only way to really come to grips with the subject. A good self-study program would be ideal in easing their way.

In this spirit, Alan Vincent, a chemistry teacher at Kingston Polytechnic in England, has put together seven programs. The first five establish the vocabulary and concepts in terms of concrete examples, leading up to Cartesian representations of molecules and their character analysis. The last two apply this analysis to problems in chemical bonding and in molecular vibrations. The only prerequisite is some modern elementary chemistry.

On the whole, the text fulfills its aim. The logic of the step-by-step advance of

each program is good. Each step both advances and draws on past material to build a body of rules and knowledge. A test and a review (called "revision" in the British usage of this book) at the end of each program are a fair summary of the competence expected. Vincent reports good success of the text with English students.

As in using any self-study text, the reader here must be very alert to typos, ambiguities in symbols or equations, and looseness in language. I found some of each (pages 35 and 36 are fully interchanged in my copy!), but with a little

backtracking the proper corrections can be inserted without loss of continuity. I found two other practical shortcomings. With the character tables permanently bound into the book, working each program requires endless page shuffling. A separately available table in a backpocket, such as in F. A. Cotton's *Chemical Applications of Group Theory* (1971)—issued by the same publisher and using the exact same set of tables—would have been very desirable. Secondly, the index of a self-study book must be sufficiently comprehensive to allow a reader to back-track or refresh a memory without much

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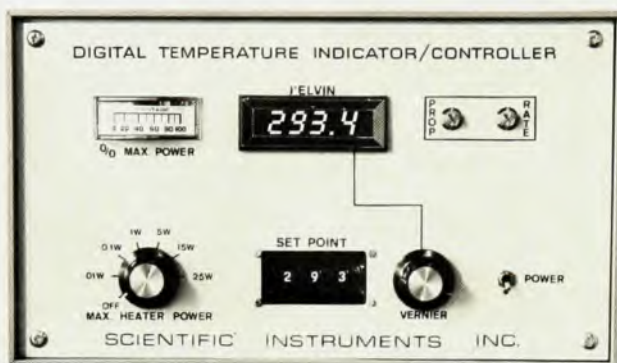
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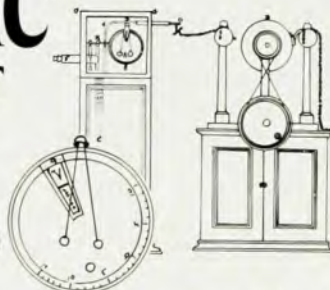
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search. Here the index is spotty—for example, the term “character”, used in at least four senses, is not listed at all—and this again makes for unnecessary page shuffling.

Despite such shortcomings, the book can be a time-saving adjunct in courses on chemistry or group theory, and is worth trying out on our own students.

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Chemical and Biochemical Applications of Lasers, Vol. 3

C. B. Moore, ed.

325 pp. Academic, New York, 1977.
\$16.50

This book is concerned with laser isotope separation and infrared laser photochemistry, topics that are timely and of both scientific and technological significance. The book is divided into two chapters: “Laser isotope separation” written by C. Bradley Moore and Vladilen Letokhov, and “Multiple photon infrared laser photochemistry” by Rafael Ambartsumian and Letokhov. These authors have made *outstanding* contributions to this field and are the logical people to write such a text.

The book is invaluable to any student or scientist who is entering this research field. It is well organized and as up-to-date as can be reasonably expected. The text is well referenced and illustrated, and the notation used throughout the text is consistent and clear. The manner of presentation is such as to encourage creative thought. For instance, the end of each chapter contains ideas that are very innovative and for which only one or two publications may exist in the literature. Conceptual foundations are carefully laid out and explained in detail. Examples of current research result are used to punctuate the text, and these results are presented in a concise, tasteful manner so as to inform, but not bore, the reader.

Many ideas are put forth that are speculative and that may point to important new future research areas. I found this style very stimulating and worthwhile. The usual conservative leaning of the “review article” is not present in this book, and the authors offer considerable insight into the logical extensions of the present experiments. Readers should be aware of this writing style and not take everything in the text as the last word on the subject, as the strength of the book lies in its coverage of a very rapidly expanding research field rather than its accuracy. The style of presentation is somewhat unique, as 75%