

Recensio

LIONEL SALEM: The Molecular Orbital Theory of Conjugated Systems, IX + 576 pages.
W. A. Benjamin Inc., New York-Amsterdam 1966.

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This is indeed a very nice book. As is stated in the preface "the primary aim is to present the foundations of molecular orbital theory as well as the concepts which underlie its most important applications". It does just this for conjugated systems, starting out with the simple Hückel theory, covering 43 pages, and then goes on to consider the self-consistent field molecular orbital methods in 40 pages. Thus having laid the framework for what is to follow it uses the next 450 pages to discuss the tremendous applications of these basic ideas, first of all of course to the properties of the ground states, giving among other things a very clear account of the magnetic properties of both closed shells and radicals having unpaired electrons.

Chemical reactivity is treated in 42 pages and after that there is an excellent discussion of the properties of the excited states and ultraviolet spectra of conjugated molecules. The last chapter deals with the sophisticated theory of the interaction between vibrations and electronic structures; good account is given of the Jahn-Teller effect and of the consequences of the pseudo Jahn-Teller effect. The book concludes with six useful appendices, the last being a set of four problems. This is probably the weakest part of the book since the problems deal only with simple Hückel theory. As stated in a footnote the problems originated from various examination papers. It is of course true that it is hardly possible to put the more "advanced" S.C.F. problems before students if they are to be solved within the limited time allocated to an examination. Yet, in a textbook as advanced as this inclusion of such problems would have been highly desirable. By the way, no solutions are offered to the problems.

The dust cover claims that "the book is suitable for courses in organic chemistry, chemical physics and theoretical chemistry". I would strongly question "organic chemistry". Apart from the "sciencemanship" of an organic chemist having this book placed prominently on his desk I doubt whether it would be of much more benefit to him. Indeed, is it not somewhat debateable whether experimentally oriented organic chemists should be exposed to even Hückel theory? There is no doubt that even the solution of simple Hückel problems is not an easy thing for the majority of experimental chemists — having achieved this difficult task their great temptation is to believe that the resulting numbers have a direct bearing on chemistry. This is usually not the case. It is at this point that Dr. Salem's book may after all be useful to organic chemists since from its study it is evident how much more work must be done before one can obtain even tentatively meaningful numbers. The emphasis placed in the book on the importance of self consistent field methods is indeed of great value and ought to act as a brake for the more unscrupulous uses of simple Hückel theory found in the literature.

The book is written in a clear and precise English and it is obvious that Dr. SALEM has enjoyed writing it. The printing is nice and clear with, as far as I could see, very few misprints. Many references are given to basic research papers. With a sound introductory course in quantum mechanics behind them most chemists would benefit from studying this book.

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