

were manufacturing it. In the 'thirties Ciba helped to isolate progesterone and later worked with Reichstein on cortisone.

Part 2 finishes with a historical account of plastics, from ancient ceramic arts via gun-cotton (Schoenbein of the University of Basle in 1845), celluloid, the Chardonnet denitrification process, to the important modern epoxy resins of to-day such as Ciba's 'Araldite'.

The plain grey board covers of this book give no hint of the wealth of material within. Beautifully printed on high-quality paper with hundreds of illustrations, dozens of which are in beautiful colours, it stands in a class of its own.

I have noticed only one error of fact (p. 123). The dibromoanthraquinone which Graebe and Liebermann hydrolysed to alizarin was, in fact, the 2 : 3 dibromo compound and not the 1 : 2 as described, although this piece of 'research luck' was not discovered until several years after the event. A few expressions strike the English reader as unusual, for example, "in six years the price of quinine *dove* from 1.3 to 2.5 florins per oz.", "diazo dyestuffs" (we say 'azo dyes'), and the use of the word 'somnifacients' for what we (with perhaps less Latin and more Greek) call 'hypnotics'.

This work reflects great credit on Drs. Huber and Menzi, who wrote the text, on Drs. Wilhelm and Kappeli, who had the idea of thus celebrating Ciba's seventy-fifth anniversary, on the photographers and blockmakers, and on all those concerned with the book. All who are able to obtain a copy are indeed to be envied.

L. K. SHARP

## QUANTUM CHEMISTRY

### Quantum Chemistry

Methods and Applications. By R. Daudel, R. Lefebvre and C. Moser. Pp. xiii + 572. (New York: Interscience Publishers, Inc.; London: Interscience Publishers, Ltd., 1959.) 14.50 dollars.

IT is an interesting exercise to speculate on the probable contents of a new book on quantum chemistry. One can be fairly sure that there will be a discussion of the particle in the box, the hydrogen atom, the hydrogen molecule-ion, the hydrogen molecule itself and possibly methane, ethylene and benzene. But for the serious student of the subject it is the rest of the contents which will excite his main interest. The books entitled "Quantum Chemistry" which are already on the market differ very greatly in what their authors have seen fit to add to this rather pedestrian list of topics. The book by Eyring, Walter and Kimball makes much use of the theory of groups in the interpretation of spectra and is one of the best elementary sources for information about electromagnetic phenomena; on the other hand, in that book there is almost no discussion of the diverse and sophisticated facts of chemical reactivity. The book by Pitzer covers widely the basic principles of chemical physics, and lays considerable stress on statistical mechanics and molecular dynamics. Here again, however, there is virtually no discussion of chemical reactions in terms of molecular structure. The big book by Kauzmann is very largely devoted to atoms and the author never really crosses the border from physics into chemistry. Clearly, the word 'chemistry' means something quite different to these authors from what it means to the vast majority of chemists.

Now we have yet another book with the same title and a much braver effort. This new book, by Daudel, Lefebvre and Moser, represents a creditable attempt to set down in an orderly manner those developments which in recent years have made quantum chemistry a subject of real interest to the experimental worker. The centre of gravity of the book is the unsaturated hydrocarbons and their physical and chemical properties. This is not inappropriate, since until quite recently it would have been true to say that this particular field of study had yielded a greater crop of quantitative results than any other branch of theoretical chemistry. It is inevitable that a book of this sort should dwell on certain topics at the expense of others, and it would be easy to criticize the authors for having omitted any discussion of the recent striking advances in, for example, the theoretical chemistry of the transition elements. But this would be ungrateful, as the authors have obviously taken pains to include reference to the most important papers in the theory of conjugated molecules; the fact that their book is not as broad as its title suggests only bears witness to the great rate at which theoretical chemistry is now developing.

Turning to details, one is glad to have a clear account of the theory of antisymmetrized wave functions and the Hartree-Fock equations. Of less value is the short chapter on biochemical applications: we still know so little about the cell that it seems premature to attach any weight to a quantum mechanical theory of carcinogenesis. Again, the order of the chapters is perhaps a little odd; the two parts of the book are linked together by only a very tenuous thread, and it is strange to have a chapter on reaction-rates preceding one on chemical equilibria. Perhaps also in the second edition the authors might consider whether, for example, their long tables of bond angles are worthy of the space which they occupy in view of the very cursory discussion which is given to this set of data. But it is a fault on the right side to make too much reference to experimental results; it would indeed have helped the reader to appreciate the strength of the more sophisticated theory if more comparisons had been given between calculated and observed excitation energies in conjugated molecules.

Taken all in all, this book is certainly a useful addition to the literature.

H. C. LONGUET-HIGGINS

## HIGH-PRESSURE TECHNOLOGY

### The Design and Construction of High Pressure Chemical Plant

By Harold Tongue. Second edition, revised. Pp. xii + 250. (London: Chapman and Hall, Ltd., 1959.) 84s. net.

SINCE the first edition of this book was published in 1934 there has been a widespread increase in the use of high pressures in the chemical industry, particularly in the field of petrochemicals. New processes such as the polymerization of ethylene and the synthesis of diamond have been developed which operate at pressures and temperatures far greater than those attainable twenty-five years ago; furthermore, the advent of nuclear power has necessitated a great increase in the size of pressure plant. In order to describe the many developments in high-