

## BOOK REVIEW

**Catalysis and Inhibition of Chemical Reactions.** By P. G. ASHMORE. Butterworths, London, 1963. xi + 375 pp. Price 75 sh.

Notwithstanding the great industrial significance of catalysis, surprisingly few textbooks on catalysis have been published. It is gratifying that this gap in the literature has been filled by professor Ashmore's book on catalysis and inhibition of chemical reactions. The author, who has recently been appointed professor of physical chemistry at Manchester College of Science and Technology, has made an attempt to treat the various aspects of the whole field of catalysis in one single book. Consequently, the author had to make a confined selection from the literature available and he did this in such an attractive way that his book has become an excellent introduction to catalysis.

Apart from the introduction (Chap. 1) containing some general discussions, the book can be divided into three parts. The first part, comprising Chaps. 2 to 4, deals with homogeneous catalysis. In Chapter 2 (26 pp.) the homogeneous catalysis by proton transfer is treated. Some of the subjects dealt with are general acid-base catalysis, hydrolysis of esters, catalysis by metal ions, and by concentrated acids and the Friedel-Crafts synthesis. In Chap. 3 (8 pp.) the catalysis by group or electron transfer is discussed. In addition to oxidation-reduction reactions of ions in solution reductions by molecular hydrogen may be found here. In Chap. 4 (24 pp.) a survey of enzyme-catalyzed reactions is given. Kinetic expressions for various types of reactions are mathematically derived.

The second part (Chaps. 5-8) is devoted to the heterogeneous catalysis. In Chap. 5 (14 pp.) an introduction is given to this particular subject followed by a discussion of the structure determination of heterogeneous catalysts by physical adsorption techniques. Chapter 6 (41 pp.) gives a survey of various aspects of chemisorption in relation to heterogeneous catalysis. The main subjects of this chapter are chemisorption on metals and oxides, heats of adsorption, adsorption isotherms, and rates of adsorption and de-

sorption. Although mention is made of infrared spectra of adsorbed molecules, other modern experimental methods for the study of chemisorption such as flash desorption, field-emission microscopy, surface potentials, or magnetic measurements have been omitted. This is a pity since these methods become gradually more important for the study of chemisorption. In Chap. 7 (18 pp.) a number of reactions following the Langmuir-Hinshelwood mechanism are collected and discussed. An interesting and critical discussion of the compensation effect may be found in this chapter. In Chapter 8 (51 pp.) the Rideal mechanism for the ortho-para hydrogen conversion and hydrogen-deuterium exchange is discussed. The rest of this chapter deals with various important reactions such as hydrogenation and exchange of ethylene, hydrogenation and dehydrogenation of cyclic compounds, synthesis of ammonia and methanol, Fischer-Tropsch synthesis, catalytic oxidations, and cracking.

The final part (Chaps. 9-11) deals with catalysis and inhibition of chain reactions. In Chap. 9 (25 pp.) the rates of some chain reactions are discussed. The reactions between chlorine and hydrogen, carbon monoxide, or hydrocarbons are discussed; thermal decompositions are mentioned as well. Chapter 10 (31 pp.) gives a survey of the catalysis, initiation, and inhibition of polymerization reactions. Free-radical polymerization is discussed in detail; ionic polymerization and the heterogeneous catalysis of polymerization are mentioned. The last chapter of the book (25 pp.) deals with some chain reactions with oxygen, low-temperature autoxidations and oxidation of various hydrocarbons. The derivation of various types of adsorption isotherms for uniform and nonuniform surfaces is separately given in two appendices.

In conclusion it may be said that the book gives a well-planned survey of the whole field of catalysis and it may be recommended as an excellent introduction.

J. ERKELENS

*Unilever Research Laboratory,  
Vlaardingen, The Netherlands*