

matical forms and discusses methods of solution. Chapters on the energy spectrum during moderation and on the diffusion and thermalization of fast neutrons complete the first half of the book, and any reader well acquainted with its contents is fully equipped to embark on the study of reactor theory which follows. Here the introductory chapters are concerned with unreflected homogeneous systems, both critical and sub-critical. Non-uniform reactors and reflectors follow and provide an opportunity for the introduction of two-group analysis; multi-group methods also are mentioned briefly. Up to this point the discussion has been concerned principally with the steady state, but the emphasis changes with the introduction of perturbation theory and with the treatment of reactor kinetics. The last chapter in the book deals with the theory of control rods but, before this is reached, heterogeneous reactors receive the thorough treatment which by this stage the reader is taking almost for granted.

J. WALKER

## HETEROGENEOUS CATALYSIS

Advances in Catalysis and Related Subjects

Vol. 10. Edited by D. D. Eley, W. G. Frankenburg and V. I. Komarewsky. Pp. xvi+326. (New York: Academic Press, Inc.; London: Academic Books, Ltd., 1958.) 11 dollars; 88s.

THE preparation of this tenth volume of "Advances in Catalysis" has unhappily coincided with the death of two of the founding editors, W. G. Frankenburg and V. I. Komarewsky. Tributes to them appear appropriately at the beginning of the book. By maintaining a balance between the more academic and the more technical aspects of heterogeneous catalysis, and by allowing occasional excursions into homogeneous and biological catalysis, the editors have progressively encouraged the specialist to broaden his horizon. Vol. 10 carries this tradition further and is certain to add to the wide, international readership which the series already enjoys.

For the most part, the articles follow the pattern of earlier volumes by describing the contributions to knowledge of catalysis made over the years by individual groups, the accounts being written by one or more of the authorities concerned. Three of the seven articles ("The Infra-red Spectra of Adsorbed Molecules", by R. P. Eischens and W. A. Pliskin, "The Active Surface of Cholinesterases and their Catalytic Action in Ester Hydrolysis", by F. Bergmann, and "Commercial Alkylation of Paraffins and Aromatics", by E. K. Jones) also include sufficient description of related work in other laboratories to be classified as general reviews of the subjects indicated. The remaining four articles ("The Nature of Active Centres and the Kinetics of Catalytic Dehydrogenation", by A. A. Balandin, "The Influence of Crystal Face in Catalysis", by A. T. Gwathmey and R. E. Cunningham, "The Reactivity of Oxide Surfaces", by E. R. S. Winter, and "The Structure and Activity of Metal-on-Silica Catalysts", by G. C. A. Schuit and L. L. van Reijen) are comprehensive so far as the work of the originating laboratories is concerned, but rather selective in their coverage of parallel studies conducted elsewhere.

A. A. Balandin describes both the geometric and energetic aspects of his multiplet theory and applies it to a wealth of well-documented experimental data.

Since most of his original papers are in Russian, this account in English is particularly valuable. F. Bergmann gives a well-presented development of the present status of knowledge on the arrangement of the components at the cholinesterase surface and on the mechanism of enzymatic hydrolysis. R. P. Eischens and W. A. Pliskin describe their own important infra-red studies on metal-silica and oxide catalysts; they also include, among other topics, a critique of the Russian work on the spectra of adsorbed hydroxyl radicals. A. T. Gwathmey and R. E. Cunningham largely confine themselves to a descriptive, but very well-illustrated, account of the selective reactivity of certain faces of copper and nickel single crystals in oxidation and in the presence of carbon monoxide, ethylene and hydrogen-oxygen mixtures. The article by E. K. Jones describes (with a rather unnecessary amount of jargon) the sulphuric and hydrofluoric acid processes for the production of high-octane fuels and also outlines the newer developments in the petrochemicals field afforded by alkylation methods. G. C. A. Schuit and L. L. van Reijen apply fundamental thermodynamic and kinetic treatments to their thorough experimental studies of adsorption and catalysis on nickel-silica and other supported metal catalysts, and E. R. S. Winter gives a full account of his valuable research on the application of oxygen-18 and carbon-13 isotopes in studies of adsorption, catalysis and oxygen exchange at oxide surfaces.

The volume, which is well produced, will be indispensable to all laboratories where there is active research in heterogeneous catalysis.

F. S. STONE

## THE GENUS *OENOTHERA*

Taxonomy and Genetics of *Oenothera*

Forty Years Study in the Cytology and Evolution of the Onagraceae. By R. Ruggles Gates. (*Monographiae Biologicae*, Vol. 7.) Pp. 115. (The Hague: Dr. W. Junk, 1958.) 14 guilders.

THE genus *Oenothera* has been of considerable importance in the history of genetics and cytology, and Prof. Ruggles Gates has for many years been one of the most active students of the genus. His publications concerning the evening primroses have been numerous and it is useful to have an outline of the results summarized in one volume. Cytogenetically, species of *Oenothera* differ from the majority of plants the chromosome behaviour of which has been studied in that there is "pairing of the chromosomes at their end portions only". Thus are formed ring-pairs at meiosis. In addition, the evolutionary conditions in the genus are further complicated by non-disjunction, trisomics, polyploid mutations, genetic complexes, balanced lethals, self-sterility factors, self-pollination, and dominant mutations for smaller flowers. Since catenation, combined with the presence of balanced lethals, prevents the segregation of homozygotes in the offspring of a cross, there result plants which breed true although highly heterozygous.

The author has grown and studied hundreds of cultures of *Oenothera*. The resultant taxonomy, range, and distribution are given for a number of complexes, and culture variations are considered. The evolution of the genus is divided into two periods: first, the pre-Pleistocene, during which