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Book Reviews

Physical and Chemical Aspects of Adsorbents and Catalysts. Edited by B. G. Linsen, Academic Press, London 1970. xxiv + 650 pp. £7.50.

This book was dedicated to the late Professor J. H. de Boer on the occasion of his seventieth birthday and his retirement from the Technological University of Delft. It is very sad to recall that it appeared only a few months before de Boer's death in April, 1971. The contributions by the sixteen eminent associates and former pupils of de Boer take the form of two short introductory accounts of his scientific achievements and eleven chapters dealing with the adsorption of gases and the surface and bulk properties of various active solids.

The book brings together the results and ideas of the Dutch surface chemists—mainly of the Delft school—and it provides a fitting tribute to de Boer's work and influence in many areas of pure and applied surface chemistry. Indeed, as E. J. W. Verwey suggests, de Boer's scientific achievements were really those of a chemist in the broadest sense. His doctor's thesis (of Groningen University) was concerned with certain organic sulfur compounds, but in 1923, at the age of twenty-four, de Boer turned his attention to physical and inorganic chemistry. The fruitful period of collaboration with A. E. van Arkel which followed led to the application of the electrostatic interaction theory to a wide range of academic and industrial problems, and resulted in a massive output of papers and patent applications. "Electron Emission and Adsorption Phenomena" appeared in 1935 and provided the stimulus for the later major studies on adsorption and catalysis.

Over the last twenty years of his life, de Boer managed to combine the career of a highly successful academic with that of a director of government and industrial research. With characteristic vitality de Boer played a leading role in organizing a number of international congresses on catalysis and related subjects, and was, of course, a founder editor of this Journal. It is significant that the first paper published in *Journal of Catalysis* (1962) was by de Boer and his co-workers and that it was concerned with the nature of solid surfaces and their interaction with adsorbed molecules. Amongst the numerous papers published by the Delft team since 1962, those concerned with the studies of porous catalysts (*Journal of Catalysis*, 1964, 1965, 1967, 1968) have perhaps attracted the most attention. In addition, they have provided the basic material for a substantial part of the book under review.

Three different aspects of surface chemistry are discussed in some detail in this book. The first three chapters (of 169 pp.) are devoted to the physical adsorption of gases and the texture of solids. Chapter 2, which deals with adsorption on homogeneous surfaces, is of special interest because it contains a theoretical analysis of some highly accurate adsorption data. In the middle section (Chaps. 4–10, of 356 pp.) a detailed account is given of the surface and bulk properties of alumina, magnesia, zirconia, uranium oxide, carbon, and silica-supported nickel catalysts. An excellent survey is provided of the work of the Dutch surface chemists on these industrially important active solids. The last chapter (of 98 pp.) is rather different in content and character; this deals with the interaction of oxygen with tungsten and molybdenum and includes a discussion of the results of field-emission and LEED investigations and provides a timely review of a difficult and rapidly changing subject.

It was perhaps inevitable that a book made up of a large number of separate contributions should lack certain qualities which would be demanded in a comprehensive treatise. It is true that the book does not set out to provide a systematic introduction to the subject of gas adsorption, but there are nevertheless a few rather serious inconsistencies. Thus, despite the constant reference to porosity and pore structures, little attempt has been made to standardize the classification of pore size and the exact meaning of the term "micropore" appears to change from one chapter to another. The real value of this book is that it brings together a considerable amount of information which has been available so far only in original papers and theses. The book will be useful to everyone interested in gas ad-

sorption and the characterization of absorbents and catalysts; it will also serve to remind us of one of the great chemists of our time.

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The Organic Chemistry of Palladium. Vol. 2. Catalytic Reactions. By P. M. MAITLIS, Academic Press, New York, 1971. xiii + 216 pp. $16.00.

The second volume of the series "The Organic Chemistry of Palladium," is dedicated to catalytic reactions. In the first chapter the author discusses the formation and cleavage of carbon–carbon bonds. Chapter II is dedicated to palladium-catalyzed reactions leading to carbon–oxygen bonds. Chapter III deals with the homogeneously catalyzed formation and cleavage of carbon–hydrogen bonds and comprises double bond isomerization, disproportionation, dehydrogenation, hydrogenation, and addition of H–X to olefins. In Chapter IV the catalytic formation of carbon–halogen, carbon–nitrogen, carbon–sulfur, carbon–silicon, and silicon–hydrogen bonds is outlined. Chapter V briefly summarizes some heterogeneously catalyzed reactions. The book covers the literature to 1970, as well as some more recent work, with more than 600 references. The various reactions are described primarily with respect to the possible mechanism and are illustrated by formula equations appealing to chemical intuition. The author rightly cautions the reader not to underestimate the complexity of palladium-catalyzed reactions. The specialist will undoubtedly find this book useful as a concise compilation of facts and will be stimulated to conduct further research. Organic chemists, which are still largely unfamiliar with the use of palladium salt-catalyzed reactions, may have some difficulty to recognize the practical utility of some of the reactions. In many instances the information provided is too brief, particularly insofar as experimental details are concerned. It would have been advantageous to include laboratory procedures of some of the synthetically useful or potentially useful reactions, to more clearly distinguish truly catalytic processes from stoichiometric reactions of palladium-coordinated ligands, and to outline current industrial applications from the technological point of view. In summary, the book will be most valuable to the specialist in the field but is of lesser value to the practising organic chemist who wishes to employ palladium-catalyzed reactions for the solution of his synthetic problems.

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