

BOOK REVIEWS

Catalysts for Fuels from Syngas: New Directions for Research. By G. ALEX MILLS. IEA Coal Research, London, August 1988.

This book is a quite detailed report on the current state of science and technology of catalytic conversion of synthesis gas to liquid hydrocarbons and to oxygenated fuels. It identifies exploratory research results and new catalytic concepts of potential importance for improvements in indirect coal liquefaction. It is based on an evaluation of more than 300 recent research papers and concludes that there are three major opportunities to improve syngas conversion processes by means of new and improved catalysts which will provide higher selectivity to high-performance fuels, decreased plant investment costs, and improved thermal efficiency. The report includes recommendations for research for near term applications, research for the midterm, and research for the long range. The book is a valuable compilation and evaluation of research and development papers in the syngas conversion field. It contains a chapter of economic considerations which, however, is rather brief and does not allow conclusions as to the economic value of the individual process improvements. The author estimates that catalysts having improved capabilities for syngas conversion have the potential to improve the economics of synthetic fuels manufacture by 10 to 30%. This may be an optimistic estimate since the syngas conversion step contributes no more than one-third to the overall cost of a process based on coal and involving syngas production and purification as well as syngas conversion.

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Applied Heterogeneous Catalysis. By J.-F. LE PAGE *et al.* [Transl. by Ethel B. Miller and Ryle L. Miller]. Editions Technip, Paris, 1987. 560 pp. Fr. F. 825.

A wealth of scientific and engineering experience has been contributed to the writing of "Applied Heterogeneous Catalysis" by a team of authors (J.-F. Le Page, J. Cosyns, P. Courty, E. Freund, J.-P. Franck, Y. Jacquin, B. Juguin, C. Marcilly, G. Martino, J.

Miquel, R. Montarnal, A. Sugier, and H. van Landeghem) from the Institut Français du Pétrole. The book is a translation by Ethel B. Miller and Ryle L. Miller from the original French text published in 1978. It arose from the research of a group of scientists and engineers who determined and subsequently developed correlations enshrining the preparation and behaviour of catalysts used in the petrochemicals industry. Much of the information and all of the examples contained in the text are distilled from experimental data and operating experience of the Institut Français du Pétrole and Rhône-Poulenc who jointly formed the Procatalyse Company to develop appropriate catalysts suitable for commercial processes.

The full extent of the text comprises eight chapters totaling 508 pages including references but excluding the subject index, foreword, and preface. The first chapter deals with general matters and principles relating to heterogeneous catalysis. None of the principles are dealt with in any depth in this chapter but a useful introduction to what follows is given. Chapter 2 provides an introduction to the chemical kinetics of single and multistep reactions and indicates how a rate-limiting step may be identified. There is nothing contained in Chapter 2 which is not adequately discussed in other well-known texts.

Chapters 3, 4, and 5 on the other hand provide a good deal of original information concerning the selection, development, and preparation of catalysts used for petrochemical processing. They are nevertheless not unique because the principles of catalyst preparation were discussed at considerable length in the volumes of "Contact Catalysis" edited by Szabó and Kalló and published by Elsevier in 1976. Similarly much helpful material is incorporated in Chapters 6 and 7 which deal with the physical properties and physicochemical characteristics of catalysts. Many academic researchers would find the sections on morphological and mechanical properties helpful and instructive. Chapter 8 on the design of catalytic reactors is really a review of principles and practice which have been elaborated more explicitly elsewhere. Perhaps it is the more extensive and comprehensive Chapter 9 containing specific examples of catalyst and process development which is not only illuminating but also pertinent and specific. In this chapter alone a whole range of pragmatic design and operating experience is divulged which, collectively, is a useful reference source.

The claim that the book might be of interest to teachers (of chemistry and chemical engineering) is somewhat excessive for there is only a minimum of principles treated in any depth. However, the text