

Electrostatic Hazards in Powder Handling

Glor, Martin, Research Studies Press, Ltd. and John Wiley & Sons, 1988, 171 pp., \$59.95

This book should be on the list of required reading for anyone handling fine powders. It can be read in one afternoon after a review of electrostatics using some suitable physics textbooks or Moore's *Electrostatics and Its Applications* (Wiley, 1973). Useful text begins in Chapter two. Here, charging of powders is explained, using Nylon 66 particles contacted with metals of different work

functions, as an example. While this example is good, the reader is being told that there is no theory to compute work functions and surface charge. Electro-negativities of elements given in the periodic table are related to the work functions. Work functions can be used to estimate the surface charge of particles by semiempirical formulas proposed by Professor S. L. Soo of the University of Illinois.

Chapter three briefly reviews the ignition of powders emphasizing the minimum ignition energy requirements. Chapter four discusses various modes of electrostatic discharges. Estimates of en-

ergy released in discharges are given. Chapter five summarizes the major measurement techniques, such as the Faraday cage method for measuring charge to mass ratio. Chapter six is the heart of this little book. It assesses electrostatic hazards and safety measures. It is this discussion rather than the weak treatment of fundamentals that justifies the high price of this little volume in a series of eight books on electrostatics.

Dimitri Gidaspow
Dept. of Chemical Engineering
Illinois Institute of Technology
Chicago, IL 60616

Shape Selective Catalysis in Industrial Applications

By N. Y. Chen, William E. Garwood, and Francis G. Dwyer, Marcel Dekker, New York, 1989, 320 pp., \$99.75

This book is volume 36 in the Chemical Industries Series written by the three authors who have vast experience in the industrial applications of zeolites. The book, which contains nine chapters, is claimed to be the first complete guide to current and potential industrial applications, of shape-selective zeolite catalysis.

Chapters 1-3 briefly introduces the fundamentals of zeolite catalysis. The discussions are well done and a wealth of references are provided. In addition to the normal descriptions of reactant, product, and transition state shape selectivity, coulombic field interactions and their implications for catalysis are discussed briefly. These chapters give the reader a good background on the underlying principles of shape selective zeolite catalysis.

Chapter 4 deals with shape selective acid catalysis. The hydrocarbon reactions of olefins, paraffins, aromatics and naphthenes over medium-pore zeolites

are covered in detail and the discussions are well referenced. Next, reactions involving oxygen- and nitrogen-containing compounds are illustrated. The chapter closes with a brief, but interesting, discussion of acid-catalyzed hydrogenation chemistry.

Chapters 5, 6 and 7 illustrate industrial uses of the aforementioned chemistries. In Chapter 5, applications in petroleum processing such as cracking, reforming, and dewaxing are covered in sufficient detail for the reader to fully understand these processes. Chapter 6 illustrates industrial processing of aromatics. The synthesis of benzene-toluene-xylenes is presented followed by a discussion of the ethylbenzene and paraethyltoluene syntheses. The paraethyltoluene synthesis is a particularly good example of how shape-selective zeolite catalysis has opened new commercial opportunities. (Paraethyltoluene can be used as a precursor for the synthesis of certain polymers which have several advantages over polystyrene.) Chapter 7 overviews the methanol to gasoline (MTG) and light olefins (MTO) processes and then closes with a section of synthesis gas conversions.

Chapter 8 deals with new opportunities in shape-selective catalysis. Discussions involving alternative feedstocks such as shale oil, coal and biomass and applications in industries, other than petrochemicals, are highlighted.

Overall, this book is an excellent overview of shape-selective catalysis in industrial applications involving acid catalysis and the Mobil processes. It is well referenced and easy to read. It is a good reference source book on the shape-selective zeolite catalysis. However, I disagree with the claim of its completeness. This it is not. Missing in the text are at least two very important and interesting conversions (non-Mobil) which illustrate new fundamentals in shape-selective zeolite catalysis. They are those which use the platinum-zeolite L aromatization catalyst and the titanium-ZSM-5 oxidation catalyst. Other than this point, the book is very good.

Mark E. Davis
Chemical Engineering Dept.
Virginia Polytechnic Institute and
State University
Blacksburg, VA 24061