

Book review

Advances in Catalysis. Volume 25; edited by D.D. Eley, H. Pines, and P.B. Weisz, Academic Press, New York, San Francisco and London, 1976, xii + 457 pages, \$42.50.

This twenty-fifth volume of *Advances in Catalysis* contains six reviews. The review of metal-catalyzed oxidations of organic compounds by Sheldon and Kochi is exhaustive, well-done, and could stand alone as a good monograph. It is, in my view, the highlight of the book. This chapter has something for everyone: biological oxygenases, to model dioxygen complexes, to metal-catalyzed reactions with peroxides, etc. Emphasis is on mechanisms and the treatment is critical. The chapter on asymmetric homogeneous hydrogenation by Morrison, Masler, and Neuberger, is timely, up to date (some 1975 references) and I think well-done. Newcomers in this area will find this chapter very useful. Organometallic chemists familiar with this area will find nothing new here but should appreciate the collected references. The chapter on the hydrogenation of α,β -unsaturated ketones by Augustine is fine, but specialized and I do not feel that it will receive general readership. Moreover, judging from the cited references, the "advances" were made in the 1950's and 1960's, and this article, therefore, seems to review activity in an area past its bloom. The chapter by Knözinger on catalytically active oxides will find use in circles outside organometallic chemists, but the review of hydrocarbon reactions on metal catalysts by Clarke and Rooney is worth reading to gain a feel for some mechanistic aspects of reactions catalyzed heterogeneously by noble metals. Some small attempts to connect the heterogeneous work with homogeneous metal complex work are made, but the problem is that homogeneous catalysts are not found to isomerize alkanes and the like. The first chapter, on the application of molecular orbital theory to catalysis, by Baetzold is only as good as the procedures reviewed. There is likely considerable mis-placed faith in both extended Hückel theory and complete neglect of differential overlap (CNDO) procedures applied to clusters which is the subject of this review. This review does provide a readable theorist's approach to clusters and catalysis, but the detailed results discussed may be questioned. Comparisons of the various theories and calculational procedures have been published in the recent literature, subsequent to the publication of this volume: e.g., R.P. Messmer, S.K. Knudson, K.H. Johnson, J.B. Diamond, and C.Y. Young, *Phys. Rev. B*, 13 (1976) 1396; R.P. Messmer, C.W. Tucker, Jr., and K.H. Johnson, *Chem. Phys. Lett.*, 36 (1975) 423.

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