Book Reviews

Zeolites, Crystal Growth, Polymers and Miscellanea

Catalysis on Zeolites. Edited by *D. Kalló* and *Kh. M. Minachev*. Akadémiai Kiadó, Budapest 1988. xi, 583 pp., bound, DM 115.00.—ISBN 963 05 4559 x

During recent decades zeolites and related molecular sieve materials have proved remarkably successful in various branches of chemistry and chemical engineering. Perhaps the most striking progress has been achieved in the application of zeolites as catalysts. Important advantages of zeolites over more conventional porous solids are their high density and strength of acid sites, the availability of numerous techniques for chemical modifications, and their thermal stability. Moreover, with the advent of molecular sieve materials, the door was opened to shape-selective catalysis, which led to a number of new catalytic processes. Today, zeolites can be tailored for a wide variety of catalytic applications. It is therefore not surprising that catalysis on zeolites is among the major research topics in almost all industrialized countries. About 15 years ago, the European socialist countries, in an attempt to coordinate and intensify their efforts in the field of zeolite catalysis, founded a coordination council, and this book is a state-of-the-art report on the achievements of this multinational cooperation.

The book contains 17 chapters written by experts from Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland and the Soviet Union. About two-thirds of these chapters focus on non-catalytic aspects of zeolite science, e.g., quantum chemical studies, hydrothermal synthesis, spectroscopic characterization, and chemical procedures for modifying zeolites such as ultrastabilization and dealumination at high temperatures by gaseous reactants such as $SiCl_4$, or isomorphous substitution of silicon and aluminum by transition metals. An excellent chapter by *Wichterlová* et al. deals with the introduction of trivalent cations such as $Al^{3\oplus}$, $Fe^{3\oplus}$ and $Cr^{3\oplus}$ into zeolites, and the catalytic properties of the resulting materials. The six catalytic chapters focus around the preparation or transformation of hydrocarbons, e.g., the disproportionation of alkylaromatics, the Fischer–Tropsch synthesis, the dehydration of methanol, and the oligomerization and hydrogenation of alkenes. In one chapter the concept of hard and soft acids or bases is applied to zeolites. The final chapter reviews industrial applications of zeolites in the German Democratic Republic: catalysts were developed at Leuna for hydrocracking of vacuum gas oil, isomerization of light gasoline, isomerization of C_8-aromatics, and shape-selective hydrocracking of n-alkanes in reformer gasoline.

This is a very valuable book which contains a number of outstanding chapters prepared with great care and expertise. Among these are the chapter by *Shpiro* et al. on the application of SIMS, XPS and related spectroscopic techniques to zeolites, the chapter by *Wichterlová* et al. mentioned above, and the review by *Becker* et al. on industrial zeolite catalysts developed in the GDR, to mention only a few. The value of the book is further enhanced by the long lists of references given at the end of each chapter and the thoroughly prepared subject index.

The contributions collected in this volume also prove that the joint endeavor of the socialist countries led to a very high level of research in zeolite materials science. Given this high level, one wonders why the book pays hardly any attention to the more recent molecular sieves, i.e., zeolites of the newer generations, crystalline aluminophosphates, and materials derived from the latter, such as silicoaluminophosphates. It is also surprising that there is no chapter on the use of zeolite catalysts for the manufacture of organic intermediates containing oxygen, nitrogen, sulfur and other heteroatoms. Nevertheless, in view of the high quality of the contributions and the well-arranged layout, the book can be recommended to everybody who is involved with zeolites and zeolite-like molecular sieve materials.

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Crystals in Gels and Liesegang Rings. By *H. K. Henisch*. Cambridge University Press, Cambridge 1988. xiii, 197 pp., bound, $ 35.00.—ISBN 0-521-34503-0

Although, in general, large crystals are not obtained in gels, the use of gels opens the door to the search for crystals with new and interesting optical or electronic properties. Moreover, the techniques are incomparably cheap and may lead to crystals of high perfection. Since the physical and chemical processes in gels are very complex, and inadequate understanding often results in poor crystal growth, this comprehensive review of the techniques of crystal growth in gels will be greatly appreciated.

This instructive presentation reveals the extensive practical experience of the author and his group. The book is divided into five chapters, the first four of which have already been published by the author in the monograph "Crystal Growth in Gels" (Pennsylvania State University