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Nota di contenuto	Industrial Catalysis Optimizing Catalysts and Processes; Contents; 1 Introduction; 1.1 Introduction; 1.2 Catalysis in an Industrial Reactor; 1.3 Catalytic Reactors; 1.3.1 Large Particle Catalyst; 1.3.2 Small Particle Catalyst; 1.4 Characteristics of Reactor Performance; References; 2 Kinetics; 2.1 General; 2.2 Heterogeneous Catalytic Reactions; 2.3 Catalyst Performance; 2.3.1 Deactivation; 2.3.2 Selectivity; 2.4 Kinetics in Practice; References; 3 Production and Physical Characteristics of Solid Catalysts; 3.1 Introduction; 3.2 Catalyst Manufacture; 3.2.1 Materials and Methods 3.2.2 Precipitated Catalysts3.2.3 Impregnated Catalysts; 3.2.4 Skeletal Catalysts; 3.2.5 Fused and Molten Catalysts; 3.2.6 Calcination; 3.2.7 Reduction; 3.2.8 Shape Formation of the Catalyst Particles; 3.3 Physical Characterization of Catalysts; 3.3.1 Void Fraction; 3.3.2 Surface Area; 3.3.3 Pore-size Distribution; 3.4 Mass and Heat Transfer in Porous Catalysts; 3.4.1 Introduction; 3.4.2 Ordinary Diffusion in Multicomponent Gases; 3.4.3 Models of Mass Transport in Porous

Media; 3.4.4 Heat Transfer in Porous Catalysts; 3.4.5 Mass Diffusivities; References
4 Catalysis and External Transfer Processes4.1 Mass Transfer in Heterogeneous Systems; 4.2 Heat and Mass Transfer Coefficients for Flow around Catalyst Particles; 4.2.1 Two-phase Reactors; 4.2.2 Three-phase Reactors; 4.3 Thermal Behavior of Catalyst Particles and Pellet Runaway; 4.4 Criteria for the Absence of Transport Limitations; References; 5 Experimental Methods; 5.1 Measurement of Diffusion in Porous Solids; 5.1.1 Diffusion Cell Method; 5.1.2 Steady-state Methods; 5.1.3 Unsteady-state Methods; 5.1.4 Chromatographic Techniques; 5.2 Measurement of Reaction Rates; 5.2.1 Introduction
5.2.2 Laboratory Reactors for Determination of Kinetics5.2.3 Single Pellet Diffusion Reactor; 5.2.4 Dynamic Methods; 5.2.5 Other Reactor Types; 5.3 General Aspects of Kinetic Investigations; 5.3.1 Criteria for Ideal Mixing in a Recycle Reactor; 5.3.2 Errors in the Determination of Kinetic Parameters; References; 6 Calculation of Effectiveness Factor; 6.1 Literature Survey; 6.2 Generalized Definitions; 6.2.1 Effectiveness Factor n; 6.2.2 Zeroth Aris Number An0; 6.2.3 First Aris Number An1; 6.2.4 Comparison of An0 and An1; 6.3 Generalized Approximations; References; 7 Complex Situations
7.1 Intraparticle Temperature Gradients7.1.1 Two - and Three-parameter Model; 7.1.2 Aris Numbers; 7.1.3 Negligibility Criteria; 7.2 Bimolecular Reactions; 7.2.1 Aris Numbers; 7.2.2 Negligibility Criteria; 7.2.3 Multimolecular Reactions; 7.3 Intraparticle Pressure Gradients; 7.3.1 Pressure Gradients; 7.3.2 Effective Diffusion Coefficient; 7.3.3 Aris Numbers; 7.3.4 Negligibility Criteria; 7.3.5 Bimolecular Reactions; 7.4 Anisotropic Catalyst Pellets; 7.5 Summary Complex Situations; References; 8 Design of Catalyst Pellets; 8.1 Porous Structure and Observed Reaction Rate
8.1.1 Porous Structure and Catalyst Activity

Sommario/riassunto

Designed to improve both skills and confidence in troubleshooting, this book covers the chemical point of view for engineers, and the engineering point of view for chemists. It introduces mathematical tools that can be used to calculate the effectiveness of catalyst pellets as a function of shape, size, pore size, type of kinetics and diffusion, as well as temperature and pressure conditions -- a method applicable to laboratory as well as large-scale operations. The practical value of the text is enhanced by some 30 examples of optimizing catalysts and troubleshooting.

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