

Evaluating Pore Structure and Morphology of Hydrocarbon-Conversion Catalysts

Abstract

Porosimeter tests on FCC catalyst powder and pellets of different sizes are interpreted using 3-D stochastic pore networks to elucidate an improved measure of the powder's internal pore structure. The elucidated pore structure can be evaluated against image analysis of low melting point alloy penetration sections examined on a scanning electron microscope (SEM), whereby the state of penetration of the internal pores is frozen into a 2-D sectional image. Actual SEM images can be compared directly with 'theoretical' random sections of 3-D stochastic networks. In this way stochastic pore networks form a suitable coherent structural framework for reconciling mercury porosimetry and low melting point alloy penetration. The more realistic description of the pore structure provided by 3-D stochastic networks is directly suited to the analysis of diffusion, reaction and coke laydown processes in cat cracker operation.