

Preparation, Properties and Selected Applications of Catalyst Supports

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Introduction

As feedstock and energy prices increase, petrochemical producers struggle to balance the mandate that they simultaneously increase production while using less energy and producing fewer byproducts. These increasingly severe conditions will often require new processes and/or new catalyst-carrier systems. The stringent demands placed on these carrier-catalyst systems will cause even more emphasis to be placed on quality issues. This paper will survey various methods used to prepare engineered porous ceramic materials for hydrocarbon conversion processes and discuss some applications.

What are Catalyst Carriers and what do they do?

Historically, catalysis was believed to occur on metallic or metal compound surfaces with no influence of the carrier. Researchers knew that obtaining the proper dispersion of active material crystallites was a key to good catalytic activity as well as a way to use the costly metals more efficiently. Catalytic scientists now realize that the carrier enables this proper dispersion while adding both physical strength and the ability to make special shapes. Originally referred to as the "inert support," the catalyst carrier is now considered integral to the catalyst system and is developed in tandem with the catalyst. A survey of the patent literature, for example, shows that the catalytic selectivities for the ethylene oxide synthesis reaction have increased from 60 - 65% in the 1960's to nearly 90% today using the classic alpha-alumina supported silver catalyst system. The principal differences that have led to this large increase in performance are promotion systems and carrier modifications. With this background in mind, this paper will discuss what requirements a good catalyst carrier must fulfill.