Catalysts are essential to the lifeblood of the economy, and their market trends offer insight into a diverse set of industries.

The catalyst industry is an important economic driving force and, at the same time, a server of many masters. These traits combine to produce a dynamic market that offers insight into the trends playing out in an array of important sectors of the technology marketplace.

Catalysts are responsible for more than $3.5 trillion in goods and services of the global gross domestic product annually, according to The Catalyst Group (TCG; www.catalystgrp.com), a Spring House, PA–based consulting firm. Catalysts—ranging from homogeneous transition metal compounds to conventional acids to zeolites, and so on—are significant factors in industrial productivity, costs, and environmental friendliness. Specifically, they play vital roles in the areas of oil refining, petrochemicals, polymers, fine chemicals, pharmaceuticals, and environmental applications such as degrading pollutants in waterways and controlling automobile emissions through catalytic converters. Overall, this added up to about a $10.2 billion global market value in 2001, and TCG projects an average annual growth rate (AAGR) of 4.5% through 2007.

Although it exerts such a powerful influence on so many diverse aspects of the economy, the directions and growth of the catalyst industry are still very dependent on the needs of its client sectors. A major portion of the projected growth is expected to stem from increased demand for catalysts in the manufacturing of fine chemicals and intermediates, particularly for pharmaceuticals. TCG reports that until about five years ago the catalyst industry did not even recognize the fine chemicals sector as a major market; now they forecast an 8% AAGR in this area through 2007, from a 2001 level of $1.1 billion. One important reason behind this is an increasing need in the pharmaceutical industry for very selective synthesis, including single enantiomer production. Annual chiral drug sales have exceeded $100 billion and are rising at a rapid rate. This has sparked vigorous activity in asymmetric, that is, chiral, catalysis—underscored by the 2001 Nobel Prize in chemistry awarded to Knowles, Noyori, and Sharpless (see http://pubs.acs.org/cen/topstory/7942/7942notw1.html). Enantioselective synthesis offers a very favorable alternative to carrying out extra enantiomer separation steps. Furthermore, ongoing work in devising strategies for more easily retaining and reusing these expensive asymmetric metal complexes offers the opportunity to enhance their industrial appeal. (see The Greening of Catalysis, p 29)

On the other hand, the outlook for catalysts in the refining and petrochemical industries is less favorable, with predicted AAGRs of 1.9 and 0%, respectively. Fluid-cracking catalysts for breaking down crude oil and hydroprocessing catalysts for cleaning up impurities are vital to refining and subsequent production of petrochemicals as well. However, these applications have been constant for many years, and improvements in catalytic technologies that have increased activity per unit weight and deactivation resistance actually decrease the volume of demand for catalyst material. But the growing need to reduce impurities, such as sulfur, in refinery products to meet stricter environmental regulations has opened up a key niche for growth. Catalyst manufacturers are, therefore, putting more focus on catalysts needed for processes like hydrodesulfurization, a market that is expected to expand.

Naturally, environmental regulations have also had a strong effect on environmental catalysis applications overall, and annual growth for this sector is slated to be 8.1%, the highest of all.

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