



# World Enzymes

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Industry Study with Forecasts for **2013 & 2018**

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## INDUSTRY STRUCTURE

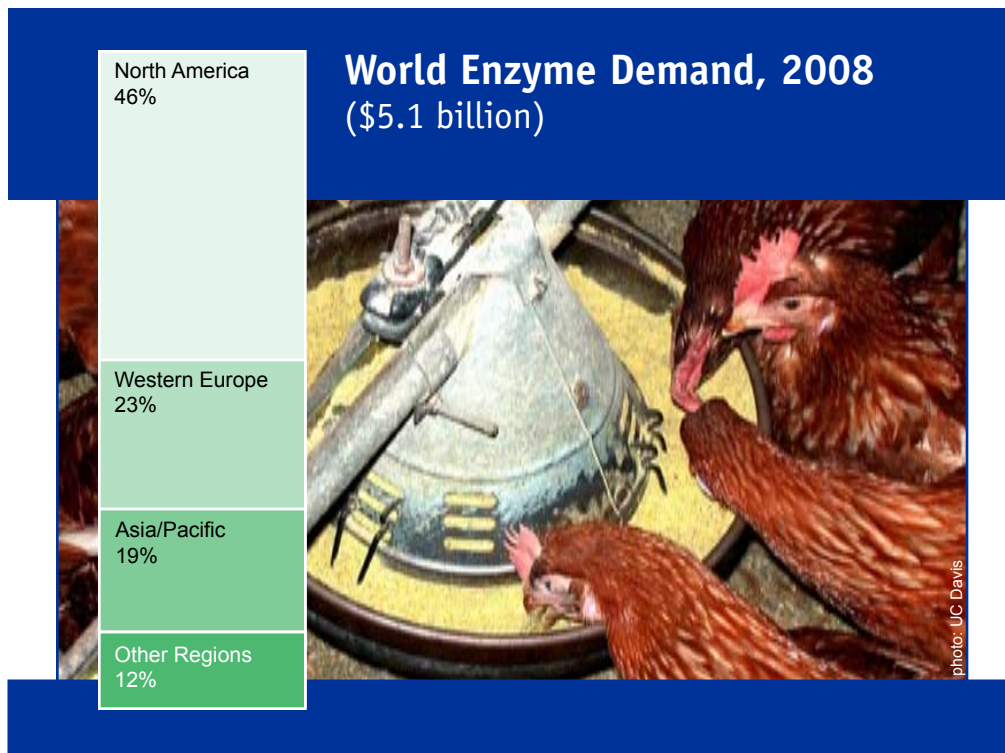
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*Specialty enzymes such as polymerases and nucleases, along with various other enzyme types, will outpace the more industrially concentrated lipases, carbohydrases and proteases.*

## Global demand to rise 6.3% yearly through 2013

The world market for enzymes is expected to recover from a difficult 2009 to reach \$7 billion in 2013. Continued strong demand for specialty enzymes, as well as above-average growth in the animal feed and ethanol production markets, will drive advances. Reflecting the above-average growth in specialty enzymes, polymerases and nucleases, along with various other enzyme types, will outpace the more industrially concentrated lipases, carbohydrases and proteases. From a regional perspective, the developed economies of North America and Western Europe will achieve healthy gains, while the fastest growth will continue to come from the more rapidly developing economies of the Asia and the Africa/Mideast regions, Latin America and Eastern Europe.

Through 2013 world enzyme demand will average annual increases of 6.3 percent, led by pharmaceutical and biocatalyst enzymes, both of which will be less susceptible to the effects of lowered global economic activity. Diagnostics enzyme demand will also fare well due to expanded access to medical care in developing countries, and the advent of health care reform in the United States. With pharmaceutical companies having difficulty bringing new small-molecule drugs to market, biotechnology will continue to gain in impor-



tance, helping to sustain demand for research and biotechnology enzymes.

## Animal feed, ethanol production markets to pace industrial enzymes

Among the industrial enzyme markets, animal feed and ethanol production will both achieve above-average advances, while the food and beverage market will grow at a slower, but healthy pace. Animal feed enzymes will achieve their fastest growth in developing markets where rising per capita incomes will continue to increase demand for meat in the local diets. Demand for ethanol production enzymes, however, will slow

from the torrid 2003-2008 pace as countries re-evaluate the use of food-derived raw materials for ethanol production. While the development of second generation biofuels derived from cellulosic raw materials will help sustain demand growth, a variety of processes -- including some that do not use enzymes -- will be employed, restraining advances. Food and beverage enzyme demand growth will moderate to a below-average pace through 2013, reflecting the challenging environment in North America and Western Europe. Similarly, growth in the cleaning product and other industrial markets will also be below average.

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## Sample Text, Table & Chart

### ASIA/PACIFIC

#### China: Enzyme Demand

China is the second largest enzyme market globally, and the second largest industrial enzyme market in China. Demand increased rapidly in tandem with the overall Chinese economy over the past decade. Growth in demand is expected to continue through 2013, just ahead of the US market. China has surpassed Japan to become the world's largest enzyme demand market given the country's wo...

**SAMPLE TEXT**

The enzyme market in China is heavily weighted toward food enzymes, reflecting the country's greater emphasis on manufacturing development over the past decade. In 2008, food and beverage was the largest market for industrial enzymes, reflecting the country's domestic food industry, the increasing consumption of western products, and China's growing importance as a producer of processed food for export. Additionally, the presence of major western enzyme manufacturers such as Novozymes and Danisco (through its Genencor subsidiary) boosted the profile of enzyme technology in food processing. Cleaning product (detergent) enzymes were the second largest industrial enzyme market, due in large part to the rapid growth in soap and detergent production, while the animal feed enzyme market has experienced a jump in demand to come in third. The fastest growth, however, has been in ethanol production, as China went from producing almost no fuel ethanol in 2003, to being the third largest producer behind the US and Brazil in 2008. The majority of the other industrial enzyme market is textile and leather enzyme demand. Growth in this area was slow from 2003 to 2008 due mostly to rapidly falling prices for textile enzymes, which suppressed demand in value terms even as volumes expanded rapidly.

The market for specialty enzymes developed much later in China than in more developed nations, a reflection principally of China's deficit

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TABLE VII-4

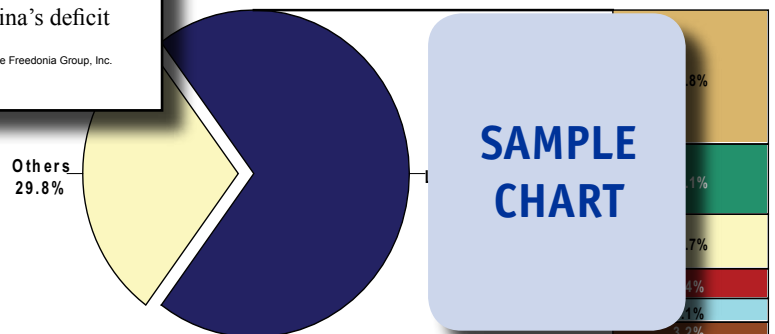
CHINA ENZYME DEMAND BY TYPE & MARKET  
 (million dollars)

Item	1998	2003	2008	2013	2018
Enzyme Demand					260
By Type:					
Carbohydrases					4
Amylases					2
Other carbohydrases					2
Proteases					8
Polymerases & Nucleases					6
Lipases					3
Other Enzymes					9
By Market:					
Industrial					2
Food & Beverage					0
Cleaning Products					0
Ethanol Production					7
Animal Feed					0
Other Industrial					5
Specialty					8
% China					5
Asia/Pacific Enzyme Demand	330	303	390	430	2280

**SAMPLE TABLE**

CHART IX-1

WORLD ENZYME MARKET SHARE, 2008  
 (\$5 billion)

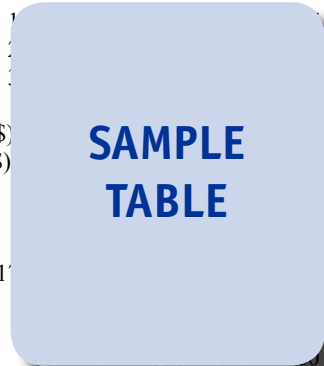


**SAMPLE CHART**

## Sample Profile, Table & Forecast

**TABLE VII-3**  
**CHINA ECONOMIC INDICATORS**

Item	1998	2003	2008	2013	2018
Population (mil persons)					
\$ GDP/capita					
Gross Domestic Product (bil 2007\$)					
Manufacturing Value Added (bil 2007\$)					
Chemical Mfg Value Added (bil 2007\$)					
Food/Beverage Value Added (bil 07\$)					
Soap & Detergent Shipments (bil \$)					
Animal Feed Shipments (bil \$)					
Pharmaceutical Shipments (mil \$)					
\$ enzymes/mil \$ GDP					
Enzyme Demand (mil \$)					



**COMPANY PROFILES**

**Biocatalysts Limited**  
 Cefn Coed  
 Parc Nantgraw  
 Cardiff, Wales CF15 7QQ  
 United Kingdom  
 44-1443-843-712  
 http://www.biocatalysts.com

Annual Sales: \$10 million  
 Employees: 100

Key Products: Enzymes for food processing, pharmaceuticals, and other applications

Biocatalysts Limited is a manufacturer of enzymes primarily used in the food processing industry. The Company offers a range of standard enzyme products and is also involved in the design and development of customized enzyme products.

The Company makes enzymes for a wide range of food processing applications, including fruit and vegetable processing, egg processing, baking and flavor development. Biocatalysts' enzymes for fruit and vegetable processing include various cellulases, pectinases, beta-glucanases and esterases that can be used in juice production, peeling of citrus fruits, wine making and beer brewing. These enzymes are suitable for increasing yield, enhancing flavor development, reducing filtration problems and improving final product characteristics. Many of the Company's fruit and vegetable processing enzymes are sold under the DEPOL, PROMOD and MACER8 brand names.

Egg processing enzymes made by Biocatalysts include LIPOMOD 34P for removal of yolk lipid contamination from egg whites; C641L,

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"Demand for enzymes in China will rise nearly 13 percent annually to \$645 million in 2013, with rapid growth occurring in all markets, though in most cases the pace will moderate from historical levels. Growth in specialty enzymes will outpace industrial enzymes, albeit from a much smaller base, as rising per capita GDP, and government initiatives to support advances in biotechnology, help drive demand. Some industrial enzyme markets such as ..."  
 --Section VII, pg. 206



**OTHER STUDIES**

**World Nutraceutical Ingredients**

This study analyzes the global nutraceutical ingredient industry. It presents historical demand data (1998, 2003, 2008) and forecasts to 2013 and 2018 by product (e.g., nutrients, minerals, vitamins, herbal and non-herbal extracts), world regional market (e.g., Asia/Pacific, Western Europe, North America) and for 36 major national markets. The study also considers market environment factors, details industry structure, evaluates company market share and profiles industry players.

#2565 ..... 10/2009 ..... \$5800

**Soy Chemicals**

This study analyzes the US soy chemicals industry. It presents historical demand data (1998, 2003, 2008) and forecasts for 2013 and 2018 by product (e.g., methyl soyate, vitamin E, isoflavones, epoxidized soybean oil, lecithin, sucrose esters, industrial soybean oil, polyols, waxes) and market (e.g., foods and beverages, biodiesel, plastics, printing inks, coatings, personal care, pharmaceuticals, candles). The study also considers market environment factors, evaluates company market share and profiles industry players.

#2538 ..... 09/2009 ..... \$4700

**Alternative Sweeteners**

US demand for alternative sweeteners is projected to grow 3.4% annually through 2013, as food processors and consumers seek healthier food options with fewer calories or less high fructose corn syrup. Sucralose, acesulfame potassium (ace-K), erythritol and stevia extract rebiana (reb-A) will see above average gains. This study analyzes the \$1.1 billion US alternative sweetener industry, with forecasts for 2013 and 2018 by product and market. It also evaluates market share and profiles industry players.

#2497 ..... 05/2009 ..... \$4600

**In Vitro Diagnostics**

US demand for *in vitro* diagnostic (IVD) products is forecast to increase 5.4 percent annually through 2013. Clinical chemistry and immunoassay will remain the top two IVD methodologies. Nucleic acid testing products will generate the fastest demand gains while endocrine condition testing remains the largest application. This study analyzes the \$17.6 billion US IVD industry, with forecasts for 2013 and 2018 by product, application and market. It also evaluates company market share and profiles industry players.

#2455 ..... 03/2009 ..... \$4800

**Enzymes**

US demand for enzymes will grow 6% annually through 2012. Advances will be led by continued rapid expansion in the fuel ethanol segment of the starch processing enzyme market, as well as strong growth in the large pharmaceutical and smaller biocatalyst and pulp and paper markets. Animal feed will also contribute to gains. This study analyzes the \$1.9 billion US enzyme industry, with forecasts for 2012 and 2017 by market and product. It also evaluates market share and profiles industry competitors.

#2351 ..... 06/2008 ..... \$4600

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