United States Biocatalysts Market Size Analysis Report - Market Share, Forecast Trends and Outlook (2025-2034)

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Report description:

The United States biocatalysts market was valued at USD 221.76 Million in 2024. The industry is expected to grow at a CAGR of 5.20% during the forecast period of 2025-2034 to attain a valuation of USD 368.16 Million by 2034.

United States Biocatalysts Market Growth

The growth of the United States biocatalysts market is primarily driven by increased sales of pharmaceutical products. Biocatalysts, especially enzymes, are widely used to produce active pharmaceutical ingredients (APIs) by the synthesis of complex pharmaceutical compounds through a sustainable, eco-friendly biocatalytic process. This reduces the need for toxic reagents and harsh conditions, which often leave harmful by-products at the end.

Moreover, the popularity of biologics and personalised medicines is propelling the use of biocatalysts for precise and efficient manufacturing of medicinal drugs in the country. According to the National Health Institute, the country recorded one of the highest sales values for pharmaceutical products globally in 2022, landing on revenue exceeding USD 600 billion. Further growth in the pharmaceutical industry is inevitable during the coming years owing to rising health concerns in the US. This is expected to positively impact the country's production of biocatalysts for medicinal applications.

Key Trends and Recent Developments

Technological advancements, the development of kosher and halal-certified enzymes, and rising research opportunities are major trends of United States biocatalysts market.

October 2024

BRAIN Biotech Zwingenberg and Biocatalysts Ltd, two of the most efficient companies that belong to the Brain Biotech Group, a major supplier of biocatalysts in the US, collaborated to form a new business BRAIN-Biocatalysts Life Science Solutions to scale up their production of bio enzymes for the life sciences industry. The company combined the former's enzyme discovery and optimisation capabilities with the latter's large-scale commercial manufacturing facilities to deliver an end-to-end solution to the life sciences industry.

August 2024

Twist Bioscience Corporation, a listed company in New York collaborated with Tokyo's bitBiome Inc. to launch a joint Transaminase Enzyme Screening Kit, a curated collection of forty-eight highly diverse transaminase enzymes ready for in-house screening and evaluation. The enzyme catalysed the transfer of an amine group from an amine donor for the synthesis of chiral amines, a crucial ingredient for the sustainable manufacturing of pharmaceutical products.

August 2023

US-based Cascade Biocatalysts, a biomanufacturing company pioneering the production of sustainable biocatalysts, raised a pre-seed fund worth USD 2.6 million led by Ten VC, and with the participation of firms such as Amplify.LA, Boost VC, Range Ventures, Spacecadet, and the Cool Climate Collective. The company aimed to use the raised funds to scale its production from a lab to a pilot or project stage and support the influx of its initial customers.

March 2023

Biocatalysts Ltd., a leading supplier of biocatalysts in the US, launched a new enzyme Nuclease 46L (N046L), a hydrolase enzyme for breaking down different types of nucleic acids using different sources. The enzyme was considered a cost-effective solution for DNA elimination in a variety of biotechnology applications, especially in the precision fermentation market.

Technological Developments in Biocatalysts Production is Enhancing Market Productivity

The United States biocatalysts market is witnessing several technological advancements in the production process to enhance its speed, efficiency and precision. A few of these include enzyme engineering, protein design, and bioprocessing techniques. Aside from their usual benefits, these techniques enhance the stability of biocatalysts as well, making them more adaptable to various industrial processes and increasing their scope of use. For instance, BASF and the University of Graz developed a new computer-assisted model in July 2024, to optimize the efficiency of biocatalytic production processes by enabling the understanding of enzymatic catalysis. Such efforts and developments are significantly contributing to the overall productivity of the biocatalysts market.

Development of Kosher and Halal Certified Enzymes Increasing the United States Biocatalysts Market Revenue

The development of Kosher and Halal-certified enzymes, driven by the rising consumer demand for food and pharmaceutical products that meet religious dietary requirements, is inculcating inclusivity in the biocatalysts market and resulting in its revenue growth. These certifications diversify the opportunities for biocatalyst manufacturers to supply their products across all US regions without being restricted by religious constraints. Key players are ensuring the development of biocatalysts that meet the requirements of these certifications. For instance, Biocatalysts Ltd., a leading supplier of biocatalytic enzymes in the US, announced the launch of its new enzyme Promod 517MDP (P517MDP), to extend its range of Kosher and Halal certified enzymes, specifically targeting the dairy protein market.

Rising Research Opportunities Encouraging Innovation in the United States Biocatalysts Market

Rising research opportunities for the biocatalysts industry in the country are providing a flourishing ground for innovations. This is being enhanced by public funding, government grants, and the establishment of new research institutes through public-private partnerships. Increased research enhances the chance for the development of cost-effective biocatalysis processes and discoveries of biocatalyst use which will affect the United States biocatalysts market growth in the long run. In a relevant effort, the Center for Biocatalysis and Bioprocessing (CBB) in the US (Iowa) launched a new program to train the PhD students to become the next generation leaders of the US biocatalysts industry. The National Institutes of Health (NIH) funded the five-year programme with an initial annual investment of USD 425,555 beginning July 2024.

Enzyme Engineering Increasing the United States Biocatalysts Market Value

Enzyme engineering is playing a pivotal role in increasing the market value of biocatalysts in the United States. They enable the creation of genetically modified enzymes customised to suit the needs of different industrial processes. The various segments such as protein engineering and directed evolution facilitate the development of enzymes that can withstand harsh conditions, exhibit higher activity rates, and catalyse reactions with unique precision, improving the overall performance and cost-effectiveness of industrial processes. The ability to engineer enzymes has led to several developments in this domain by industry leaders. For instance, Codeexis, a well-known enzyme engineering company announced in May 2024, that it had successfully synthesised an oligonucleotide via an enzymatic route to support RNA-based therapeutics manufacturing, setting a historical milestone.

United States Biocatalysts Market Trends

The United States biocatalysts market development is driven by emerging health benefits from its use in the pharmaceutical, food and beverages sectors. As enzymes, biocatalysts enable the production of food, beverages, and medicinal products through a sustainable eco-friendly process. Also, they serve as an ideal alternative to chemical additives and flavour enhancers resulting in the development of healthier and more natural products. Besides these commonly known benefits, biocatalysts are also being used to add nutritional qualities to food products. For instance, in the latest development, Kraft Heinz, a US-based food and beverage company, funded research by a group of Harvard scientists that developed an enzyme that reduced the amount of sugar absorbed by the bloodstream, turning it into a fibre good for the gut health, when added to a chocolate bar, encased in an edible substance. The research contributed significantly to Kraft's objective to cut down 60 million pounds of sugar from its products by 2025.

United States Biocatalysts Products Industry Segmentation

United States Biocatalysts Market Report and Forecast 2025-2034 offers a detailed analysis of the market based on the following segments:

Market Breakup by Type:

- Hydrolases
- Oxidoreductases
- Transferases
- Others

Market Breakup by Source:

- Microorganisms

 Plants
 Animals

Market Breakup by Application:

 Food and Beverages
 Cleaning Agent
 Biofuel Production
 Agriculture and Feed
 Biopharmaceuticals
 Others

Market Breakup by Region:

 New England
 Mideast
 Great Lakes
 Plains
 Southeast
 Southwest
 Rocky Mountain
 Far West

United States Biocatalysts Market Share

Transferase Enzymes are Leading the Biocatalysts Market Share Owing to Increased Adoption of Genetically Engineered Crops and Feed

As per the United States biocatalysts market analysis, transferase biocatalysts are widely used in the genetic engineering industry, particularly agricultural applications. They are essential in facilitating the insertion or modification of genes for the development of genetically modified organisms (GMO) including crops and feed. The country has been witnessing increased adoption of these products across the agricultural domain, propelling the demand for transferase biocatalysts. According to the US Department of Agriculture, the gene-edited herbicide-tolerant soybean reached its highest adoption at 96% of the total acreage in 2024. In the same year, the adoption of herbicide-tolerant cotton acreage stood at 93% in 2024 whereas that of herbicide-tolerant corn stood at 90%.

Moreover, the demand for hydrolase enzymes is expanding in the food and dairy sector due to new developments from key market players. They are not only being used to enhance the flavours and nutrient efficiency of food products but also are making food items suitable for the food consumption needs of the diverse population. For instance, Biocatalysts Ltd., a pioneer in the development of biocatalysts, announced the launch of its new Kosher and Halal-certified hydrolase enzyme Promod 517MDP, targeting the dairy protein market. It is a highly efficient exopeptidase that achieves more than 40 degrees of hydrolysis in casein protein, breaking it down into its smaller parts, peptides and amino acids which increases the solubility and improves the digestibility of food products.

Microorganisms-Based Biocatalysts Account for the Highest Biocatalysts Market Share in United States

Microorganisms-based biocatalysts account for the highest share in the industry owing to their applicability in a wide range of

industrial processes such as biofuel production, food processing, and the synthesis of pharmaceutical products. Moreover, they are immensely sustainable as their biocatalytic processes produce minimal by-products and can be completed under mild conditions. Realising their growing popularity, several major industry leaders have enhanced the use of microbes in their biocatalyst production processes. For instance, Biocatalysts Ltd, a brainchild of the biotech giant, BRAIN Biotech AG, developed a platform Plug & Produce in August 2024 to scale up the manufacturing of bioenzymes with microbes such as yeast, bacteria, and fungi as hosts.

Besides, plant-based biocatalysts are also growing in popularity due to the changing food consumption patterns of the US population. Industry reports suggest that the country had a 1.5% vegan whereas 4.2% vegetarian population in 2024. Increasing globalisation and health concerns are causing a further rise in this share, propelling the demand for plant-based biocatalysts to enhance the flavour profile, texture, and shelf-life of vegetarian and vegan packaged food items and beverages.

Increased Use of Biocatalysts in the Food and Beverages Sector Propelling the Growth of Biocatalysts Industry in United States

Biocatalysts are widely used in the food and beverage industry to enhance the flavour, nutrients, and shelf-life of products, improving their overall quality for human consumption. They are particularly used to break down starches into sugar to produce sweeteners and ferment brewing as well as dairy beverages in the food processing industry. Their growing demand has encouraged major biocatalyst companies to increase their footprint in the food and beverages industry of the United States. In a similar effort, Biocatalysts Ltd., a major supplier of biocatalysts in the US launched Lipomod 4MDP in July 2021, a unique enzyme to flavour and increase the shelf-life of dairy products. This enzyme was Kosher and Halal certified, ensuring inclusivity of its use across all US regions.

Biofuel production, especially bioethanol and biodiesel, is also driving the United States biocatalysts market expansion. In this regard, enzymes such as cellulases and lipases are found to be frequently and most used. They facilitate easy conversion of biomass into biofuels, making the production process extremely efficient and eco-friendly. The US Department of Agriculture estimated the total bioethanol production at 15.4 billion gallons and the combined biodiesel and renewable diesel production at 3.1 billion gallons in 2022. With growing demand in the energy and transport sector, a further increase in biofuel production will create new opportunities for the market.

United States Biocatalysts Market Regional Analysis

The Great Lakes Region is Leading the United States Biocatalysts Market Owing to the Presence of Several Research and Innovation Centres

The Great Lakes region is leading the market due to the presence of several research and innovation centres such as the Northwestern University in Illinois, one of the most developed biotech research institutions in the region. These institutes, supported by public-private partnerships and research grants from the government are creating new United States biocatalysts market opportunities for regional as well as national players.

Similarly, the Far West region is the epicentre of the pharmaceutical industry in the US and its largest pharmaceutical market, California, was among the top six US states for pharmaceutical and medicine exports in 2023, generating a total export turnover of USD 9.3 billion. This indicates a high demand for biocatalysts in the region's pharmaceutical manufacturing sector, as they are essential in enabling efficient, sustainable, and precise chemical reactions during drug synthesis.

Competitive Landscape

United States biocatalysts market key players are expanding their scope in various industries include food and beverages,

healthcare, ecological solutions, and chemical manufacturing to raise their revenue growth in the long term. Moreover, they are developing new biocatalyst manufacturing processes that are more sustainable, ensuring their prolonged stability in the market.

Novonesis Group (Novozymes A/S)

Novonesis Group was formed most recently in 2024 with the merger of Chr. Hansen and Novoenzymes. The company is known for harnessing the power of bio enzymes to provide a wide range of bio solutions for more than thirty industries, including healthcare, food, and beverages. It has a strong research and manufacturing portfolio with around 40 R&D application centres, and over 20 manufacturing sites worldwide.

Codexis, Inc.

Codexis, a bio enzyme engineering company in the United States was incorporated in 2002 and went public on the New York-based stock exchange NASDAQ in 2010. The company is known for engineering enzymes and offering solutions for the betterment of human health and environmental sustainability. These include the development of biocatalysts for sustainable manufacturing of active pharmaceutical ingredients (API), effective disease treatments, and accurate molecular diagnosis.

DSM-Firmenich AG

DSM-Firmenich AG was founded in 2023 by merging the Netherlands-based chemical industry pioneer DSM (Dutch State Mines) and Switzerland-based Firmenich & Cie. Currently, the company specialises in nutrition, health, and beauty products with primary activities being manufacturing, research, and addition of essential nutrients, flavours, as well as fragrances to these products using biocatalysts.

BRAIN Biotech AG (Biocatalysts Ltd.)

BRAIN Biotech AG was established in 1993 as the parent company of the Germany-based firm BRAIN Biotech. It has research sites in Germany and production sites in the UK, Continental Europe and the United States. The company pioneer in the fields of industrial biotechnology and bioeconomy, offering tailor-made bio solutions for several industries, including the development of enzymes and proteins, microorganisms and production strains, as well as bioprocess development and up-scaling.

Other key players considered in the United States biocatalysts market report are BASF SE, Sterling Pharma Solutions Limited, AB Enzymes GmbH, Almac Group Limited, and Amano Enzyme Inc. among others.

Table of Contents:

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