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Biocatalyzed Acrylamide (BioACM) Market ? Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Application (Water Treatment, Oil & Gas, Paper Making and Others), By Region & Competition, 2021-2031F

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Abstracts

The Global Biocatalyzed Acrylamide (BioACM) Market is projected to expand from USD 4.05 Billion in 2025 to USD 6.51 Billion by 2031, reflecting a CAGR of 8.23%. BioACM is a high-purity chemical monomer created through the enzymatic hydration of acrylonitrile using a biological catalyst instead of the traditional copper-based process. The market is chiefly supported by the rising demand for polyacrylamide in wastewater treatment and enhanced oil recovery, where high-molecular-weight polymers are critical for efficient flocculation and viscosity modification. Furthermore, the industry is driven by the necessity to adopt green chemistry principles, as the biocatalytic route significantly lowers energy consumption and removes the hazardous waste associated with conventional synthesis. According to European Bioplastics, global bioplastics production capacity reached 2.47 million tonnes in 2024, highlighting the accelerating industrial shift toward sustainable polymer ecosystems utilizing such biobased monomers.

A major obstacle impeding the rapid growth of the BioACM market is intense economic competition from established chemical acrylamide production facilities. Many incumbent manufacturers operate fully depreciated copper catalysis plants that maintain low marginal production costs, making it challenging for new biocatalytic facilities to compete on price without regulatory incentives. Additionally, the market remains heavily dependent on the price volatility of acrylonitrile, the primary feedstock, which can unpredictably diminish profit margins and discourage capital investment in new biobased capacity expansions.

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Market Driver

The escalating global demand for polyacrylamide in water and wastewater treatment serves as a primary catalyst for the biocatalyzed acrylamide market. Municipalities and industrial operators rely extensively on high-molecular-weight polymers for effective sludge dewatering and water clarification processes. The biocatalytic production route yields acrylamide with significantly fewer impurities than copper-based catalysis, allowing for the polymerization of ultra-high molecular weight flocculants essential for modern filtration infrastructure. This reliance on advanced chemical treatment is growing as utilities face increasing pressure to optimize existing assets rather than construct new ones; indeed, Black & Veatch's '2024 Water Report' noted that 65 percent of surveyed water utility leaders identified aging infrastructure as their most significant challenge, underscoring the critical need for efficient chemical solutions to extend the operational lifespan of treatment facilities.

A global shift toward environmentally sustainable green chemistry practices further hastens the adoption of bio-based manufacturing processes. Unlike traditional hydration methods that require high temperatures and generate heavy metal waste, biocatalysis operates under ambient pressure and temperature conditions, offering substantial improvements in process safety and carbon footprint reduction. This alignment with corporate sustainability goals is driving chemical manufacturers to transition away from energy-intensive copper catalysts. According to the U.S. Department of Agriculture's March 2024 report, 'An Economic Impact Analysis of the U.S. Biobased Products Industry', the biobased products sector contributed USD 489 billion in value added to the U.S. economy, reflecting strong economic momentum behind biological synthesis methods. This sustainability trend supports major polyacrylamide producers like SNF Group, which reported a total production capacity of 1.45 million tonnes of polyacrylamide active equivalent in 2024, highlighting the vast scale of the downstream market dependent on reliable acrylamide feedstocks.

Market Challenge

Intense economic competition from established chemical acrylamide production facilities serves as a substantial barrier to the growth of the BioACM market. Incumbent manufacturers predominantly utilize fully depreciated copper catalysis plants, allowing them to operate with significantly lower marginal costs compared to the high capital expenditure required for constructing new biocatalytic facilities. This cost disparity makes it difficult for biobased entrants to achieve competitive pricing, particularly in price-sensitive sectors like wastewater treatment where procurement is driven by

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volume rather than sustainability metrics. Consequently, the inability to match the aggressive pricing strategies of legacy producers often erodes potential profit margins for new market players.

This challenge is exacerbated by the continued expansion of traditional chemical manufacturing hubs, which reinforces the market dominance of conventional synthesis methods. According to the American Chemistry Council, in late 2024, chemical production in China?a primary global hub for traditional acrylamide synthesis?recorded a year-on-year output increase of 9.7%. Such robust growth in the established chemical sector suggests that legacy producers retain the scale and capacity to absorb feedstock price volatility more effectively than emerging biobased competitors, thereby deterring capital investment in alternative production routes.

Market Trends

The integration of renewable bio-based acrylonitrile feedstocks is fundamentally reshaping the Global Biocatalyzed Acrylamide (BioACM) Market by enabling the production of fully sustainable monomers. While the biocatalytic hydration process itself is green, the industry is now moving to decarbonize the entire value chain by replacing fossil-derived propylene with biomass-sourced precursors. This shift allows manufacturers to offer products with a significantly reduced carbon footprint, catering to the stringent scope 3 emission targets of downstream polymer consumers. For instance, INEOS Nitriles launched a new product line in April 2024 that delivers a 90% reduction in greenhouse gas emissions compared to fossil-based equivalents, setting a new benchmark for raw material sustainability.

Simultaneously, the market is witnessing a decisive expansion of manufacturing capacities in emerging Asian economies, driven by the need to localize supply chains near high-growth application sectors. Producers are investing heavily in new facilities within these regions to serve the escalating requirements of the enhanced oil recovery and water treatment industries directly, thereby mitigating logistics costs and supply risks associated with long-haul transportation. This strategic localization ensures that large-scale infrastructure projects have immediate access to essential chemical inputs, as evidenced by SNF Group's announcement in January 2024 of a USD 250 million development plan to expand its production capabilities in Oman for enhanced oil recovery solutions.

Key Market Players

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BASF SE

Kemira Oyj

SNF Group

Mitsubishi Chemical Corporation

Nitto Denko Corporation

Arkema Group

Ashland Global Holdings Inc.

Solvay S.A.

Nippon Shokubai Co., Ltd.

Sumitomo Chemical Co., Ltd.

Report Scope

In this report, the Global Biocatalyzed Acrylamide (BioACM) Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Biocatalyzed Acrylamide (BioACM) Market, By Application

Water Treatment

Oil & Gas

Paper Making and Others

Biocatalyzed Acrylamide (BioACM) Market, By Region

North America

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United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Asia Pacific

China

India

Japan

Australia

South Korea

South America

Brazil

Argentina

Colombia

Middle East & Africa

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South Africa

Saudi Arabia

UAE

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Biocatalyzed Acrylamide (BioACM) Market.

Available Customizations:

Global Biocatalyzed Acrylamide (BioACM) Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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