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Hexamethylenediamine Market Forecasts to 2030 – Global Analysis By Production Process (Adiponitrile Hydrogenation, Hexamethylene Cyanide Hydrogenation, Biotechnological Methods and Other Production Process), Application, End User and By Geography

https://marketpublishers.com/r/HF301A2D572CEN.html
Date: February 2025
Pages: 150
Price: US$ 4,150.00 (Single User License)
ID: HF301A2D572CEN

Abstracts

According to Stratistics MRC, the Global Hexamethylenediamine Market is accounted for $9.0 million in 2024 and is expected to reach $14.3 million by 2030 growing at a CAGR of 7.9% during the forecast period. Hexamethylenediamine (HMDA) is a colorless, water-soluble organic compound produced by hydrogenating adiponitrile, a petroleum-derived compound. It is crucial in the production of polyamides, particularly nylon 6,6, used in textiles, plastics, and industrial applications. HMDA has a strong amine odor and is hygroscopic, making it easy to absorb moisture. It is used as a hardener in epoxy resins, a curing agent in adhesives, and a component in synthetic fiber production. It is also used in coatings, films, and molded parts.

According to Apparel Resources, in 2022, the textile and clothing market in the European Union registered EUR 200 billion (USD 217 billion) in revenue.

Market Dynamics:

Driver:

Expansion in construction and infrastructure

Nylon 6,6 is used in geotextiles for soil stabilization, drainage, and erosion control in

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modern infrastructure projects, such as road construction and land reclamation. These geotextiles offer excellent resistance to mechanical wear and environmental stress, making them crucial for highways, railroads, and embankments in polymer composites and reinforced concrete, improving the structural integrity of buildings, bridges, and roads, thereby increasing the demand for hexamethylenediamine.

Restraint:

Development of alternative materials

As industries reduce their environmental footprint, bio-based polyamides and renewable polymers are being developed as eco-friendly alternatives to traditional petroleum-based materials. However, demand for these alternatives could limit the growth of the traditional HMDA market. Nylon 6,6, a high-performance polyamide derived from HMDA, is being replaced by alternatives like nylon 6, produced from caprolactam, which offer similar properties but may not rely on hexamethylenediamine further reducing HMDA's relevance in some markets.

Opportunity:

Growing demand for nylon 6,6 & advancements in chemical synthesis technologies

New synthesis methods, including efficient catalysts, reactor designs, and process intensification technologies, have improved the quality and consistency of hexamethylenediamine, reducing production costs and potentially lowering the price of nylon 6,6 and its precursors like HMDA. This decrease in production costs makes nylon 6,6 more affordable, expanding its application base and increasing demand for both nylon and HMDA. Green chemistry initiatives, such as bio-based routes to produce HMDA, are also influencing the market, making it more sustainable and appealing to environmentally conscious industries.

Threat:

Strict environmental regulations

Hexamethylenediamine, a key component of petrochemicals, is being heavily regulated due to its carbon footprint. Regulations on fossil fuel extraction and processing could lead to reduced availability and higher costs for essential raw materials. Carbon taxes and emissions caps could increase production costs, disrupt supply chains, and

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increase input costs. This could make HMDA production less economically viable, particularly in regions with stringent environmental laws hampering the market growth.

Covid-19 Impact

The COVID-19 pandemic significantly impacted the hexamethylenediamine (HMD) market, causing disruptions in supply chains, production delays, and reduced demand in key industries such as automotive and textiles. However, as industries gradually recovered, the demand for HMD rebounded, particularly in the production of nylon, adhesives, and coatings. The market also saw shifts in regional demand, witnessing a quicker recovery compared to other regions, influencing global market trends.

The adiponitrile hydrogenation segment is expected to be the largest during the forecast period

Over the forecasted timeframe, the adiponitrile hydrogenation segment is anticipated to dominate the market share owing to hydrogenation of adiponitrile which is the primary method for manufacturing HMD, used in industries like automotive, textiles, and electronics. Advanced hydrogenation technologies can improve efficiency and supply stability, benefiting industries like automotive, textiles, and electronics. This streamlined production process reduces disruptions and promotes steady market growth.

The epoxy curing agents segment is expected to have the highest CAGR during the forecast period

The epoxy curing agents segment is expected to hold highest CAGR during the estimation period due to the growing demand for advanced materials has driven the adoption of epoxy resins in sectors like automotive, aerospace, construction, marine, and electronics. Automotive and aerospace industries demand lightweight, strong, and durable materials, which HMD-based epoxy curing agents can provide. Construction and marine industries also demand high-performance coatings that can withstand harsh environmental conditions, making HMD-based curing agents essential for these industries.

Region with largest share:

The North America region is expected to hold the largest share of the market during the forecast period owing to advanced catalytic hydrogenation processes and large-scale production plants, particularly in the U.S., to meet regional and global demand. North

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America's R&D investments contribute to the development of more efficient methods and sustainable applications, such as epoxy resin formulations and environmentally friendly HMD-based products. These innovations ensure North American manufacturers' competitiveness and global market leadership.

Region with highest CAGR:

During the estimation period, the Asia Pacific region is expected to witness the highest CAGR growth rate due to focus on cleaner, more sustainable production methods for hydrogen peroxide (HMD). This includes improving energy efficiency, reducing emissions, and exploring alternative feedstocks. Consumer preferences for eco-friendly materials and products are also increasing, particularly in industries like textiles and construction. As these industries become more environmentally conscious, the demand for sustainable HMD applications is expected to grow.

Key players in the market

Some of the key players in Hexamethylenediamine market include Alfa Aesar, Asahi Kasei Corporation, Ascend Performance Materials, BASF SE, DOW, DuPont, Evonik Industries AG, Genomatica Inc., INVISTA, Liaoyang Petrochemical Company, Merck KGaA, Radici Partecipazioni SpA, Rennovia Inc., Shenma Industrial Co., Ltd., Solvay and Toray Industries Inc.

Key Developments:

In September 2024, Circular Polymers by Ascend and ReDefyne emphasized the expanded applications for post-consumer recycled materials, specifically nylons, PET (polyethylene terephthalate), and polypropylene (PP). This initiative reflects a growing trend towards sustainability in the plastics industry, driven by the increasing demand for environmentally friendly materials.

In September 2024, Evonik Industries announced a significant upgrade to its production process for ROHACELL®, high-performance foam, at its main facility in Darmstadt, Germany. This upgrade marks a pivotal shift as the production now relies exclusively on electricity sourced from renewable energy.

In March 2024, Asahi Kasei announced a strategic partnership with Genomatica to commercialize renewably-sourced nylon 6,6, utilizing Genomatica's bio-based hexamethylenediamine (HMD) as a key building block. This collaboration aims to

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accelerate the production of sustainable nylon, which is critical for various applications in the automotive and electronics sectors.

Production Processes Covered:

- Adiponitrile Hydrogenation
- Hexamethylene Cyanide Hydrogenation
- Biotechnological Methods
- Other Production Processes

Applications Covered:

- Nylon Synthesis
- Polyurethanes
- Epoxy Curing Agents
- Biocides & Lubricants
- Curing Agents & Adhesives
- Water Treatment Chemicals
- Other Applications

End Users Covered:

- Automotive
- Textile
- Plastics

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- Paints & Coatings
- Petrochemicals
- Other End Users

Regions Covered:

- North America
  - US
  - Canada
  - Mexico
- Europe
  - Germany
  - UK
  - Italy
  - France
  - Spain
  - Rest of Europe
- Asia Pacific
  - Japan
  - China
  - India

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- Australia
- New Zealand
- South Korea
- Rest of Asia Pacific

South America

- Argentina
- Brazil
- Chile
- Rest of South America

Middle East & Africa

- Saudi Arabia
- UAE
- Qatar
- South Africa
- Rest of Middle East & Africa

What our report offers:
- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2022, 2023, 2024, 2026, and 2030
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations

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- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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