

Metal Organic Framework Market Opportunity, Growth Drivers, Industry Trend Analysis, and Forecast 2025-2034

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Abstracts

The Global Metal Organic Framework Market reached USD 9.8 billion in 2024 and is projected to expand at a CAGR of 13.1% from 2024 to 2034. This surge is largely driven by increasing demand for efficient gas storage, carbon fixation, hydrolysis, and catalysis. Advances in MOF synthesis, including hydrothermal, microwave-assisted, and electrochemical methods, are further propelling the market. Ongoing innovations are enhancing the functionality and efficiency of these materials, positioning them as a viable solution across multiple industries. However, cost challenges persist due to resource-intensive production processes requiring significant energy input and advanced machinery. Despite these barriers, MOFs offer transformative potential in addressing critical global issues, including environmental sustainability and healthcare advancements.

Various metal-based MOFs hold market significance. Aluminum MOFs, widely utilized for gas separation, were valued at USD 783.5 million in 2023 and are expected to maintain strong demand through 2034. Copper-based MOFs, recognized for their role in catalytic applications and energy storage, are projected to grow at a CAGR of 13.7%. Zinc-based MOFs, estimated at USD 1.5 billion in 2023, are on track to reach USD 6 billion by 2034 due to their applications in hydrogen storage and clean energy solutions.

In terms of synthesis methods, hydrothermal processes dominated the market in 2023 with a 35.3% share, favored for their scalability and stability in producing highly porous MOFs. Microwave-assisted synthesis, commonly used in specialized applications, is currently experiencing a decline. Meanwhile, ultrasonic synthesis, valued at USD 715.5 million in 2023, is forecast to reach USD 2 billion by 2034, driven by its effectiveness in creating high-porosity MOFs.

MOFs serve diverse applications across gas separation, catalysis, drug delivery, carbon capture, and atmospheric water harvesting. Gas storage led the market with a 28.2% share in 2023, fueled by rising industrial requirements for natural gas and hydrogen storage. The CO₂ capture and natural gas separation segment, valued at USD 1.7 billion in 2023, is expected to rise to USD 5.6 billion by 2034, benefiting from increased investment in air purification technologies. Drug delivery applications are also set to expand at a 15.3% CAGR, reaching USD 3.7 billion by 2034, owing to advances in personalized medicine and biotechnology.

The United States continues to dominate the MOF market in North America, with an estimated valuation of USD 2.6 billion in 2023 and a CAGR of 13.3%. Strict environmental regulations and a shift toward clean energy solutions are key growth drivers. Increased adoption of MOFs for adsorption, catalysis, and CO₂ capture has bolstered the country's leadership in the sector. Additionally, advancements in hydrothermal, microwave-assisted, and mechanochemical synthesis methods are positioning the U.S. as a hub for high-performance MOF innovation with scalable industrial applications.

Contents

CHAPTER 1 METHODOLOGY AND SCOPE

- 1.1 Market scope and definitions
- 1.2 Base estimates & calculations
- 1.3 Forecast calculation
- 1.4 Data sources
 - 1.4.1 Primary
 - 1.4.2 Secondary
 - 1.4.2.1 Paid sources
 - 1.4.2.2 Public sources

CHAPTER 2 EXECUTIVE SUMMARY

- 2.1 Industry 360° synopsis

CHAPTER 3 INDUSTRY INSIGHTS

- 3.1 Industry ecosystem analysis
 - 3.1.1 Factor affecting the value chain
 - 3.1.2 Profit margin analysis
 - 3.1.3 Disruptions
 - 3.1.4 Future outlook
 - 3.1.5 Manufacturers
 - 3.1.6 Distributors
- 3.2 Supplier landscape
- 3.3 Profit margin analysis
- 3.4 Key news & initiatives
- 3.5 Regulatory landscape
- 3.6 Industry impact forces
 - 3.6.1 Growth drivers
 - 3.6.1.1 MOFs are game changers in efficiently capturing CO₂, fueling the green energy shift.
 - 3.6.1.2 Ultra-high surface area makes MOFs the go-to material for hydrogen and natural gas storage.
 - 3.6.1.3 With controlled drug delivery, MOFs are transforming the future of targeted therapies.
 - 3.6.2 Industry pitfalls and challenges

3.6.2.1 MOFs' complex synthesis methods hinder large-scale, cost-effective manufacturing.

3.6.2.2 Traditional materials like activated carbon still dominate due to lower cost and proven reliability.

3.7 Growth potential analysis

3.8 Porter's analysis

3.9 PESTEL analysis

CHAPTER 4 COMPETITIVE LANDSCAPE, 2024

4.1 Introduction

4.2 Company market share analysis

4.3 Competitive positioning matrix

4.4 Strategic outlook matrix

CHAPTER 5 MARKET ESTIMATES AND FORECAST, BY PRODUCT, 2021 – 2034 (USD BN) (TON)

5.1 Key trends

5.2 Aluminium based

5.3 Copper based

5.4 Iron based

5.5 Zinc based

5.6 Magnesium based

5.7 Others

CHAPTER 6 MARKET ESTIMATES AND FORECAST, BY SYNTHESIS METHOD, 2021 – (USD BN) (TON)

6.1 Key trends

6.2 Hydro(solvo)thermal

6.3 Microwave

6.4 Ultrasonic

6.5 Mechanochemical

6.6 Electrochemical

6.7 Others

CHAPTER 7 MARKET ESTIMATES AND FORECAST, BY APPLICATION, 2021 – (USD BN) (TON)

- 7.1 Key trends
- 7.2 Gas separation and purification
- 7.3 Catalyst
- 7.4 Gas storage
- 7.5 Drug delivery
- 7.6 Carbon capture
- 7.7 Atmospheric water harvesting
- 7.8 Others

CHAPTER 8 MARKET ESTIMATES AND FORECAST, BY REGION, 2021 – 2034 (USD BN) (TON)

- 8.1 Key trends
- 8.2 North America
 - 8.2.1 U.S.
 - 8.2.2 Canada
- 8.3 Europe
 - 8.3.1 Germany
 - 8.3.2 UK
 - 8.3.3 France
 - 8.3.4 Spain
 - 8.3.5 Italy
 - 8.3.6 Netherlands
- 8.4 Asia Pacific
 - 8.4.1 China
 - 8.4.2 India
 - 8.4.3 Japan
 - 8.4.4 Australia
 - 8.4.5 South Korea
- 8.5 Latin America
 - 8.5.1 Brazil
 - 8.5.2 Mexico
 - 8.5.3 Argentina
- 8.6 Middle East and Africa
 - 8.6.1 Saudi Arabia
 - 8.6.2 South Africa
 - 8.6.3 UAE

CHAPTER 9 COMPANY PROFILES

- 9.1 BASF SE
- 9.2 CSIRO
- 9.3 Framergy
- 9.4 MOF Technologies
- 9.5 Mosaic Materials
- 9.6 Nanorh
- 9.7 Novo MOF
- 9.8 NuMat
- 9.9 Prof MOF
- 9.10 Promethean Particles

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