

Hydrogel Market Report by Raw Material Type (Synthetic, Natural, Hybrid), Form (Amorphous, Semi-crystalline, Crystalline), Composition (Polyacrylate, Polyacrylamide, Silicone-modified Hydrogels (SiH), and Others), Application (Contact Lenses, Personal Care and Hygiene, Wound Care, Drug Delivery, Tissue Engineering, and Others), and Region 2024-2032

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Abstracts

The global hydrogel market size reached US\$ 27.7 Billion in 2023. Looking forward, IMARC Group expects the market to reach US\$ 43.4 Billion by 2032, exhibiting a growth rate (CAGR) of 5% during 2024-2032. The increasing demand for sanitary napkins, baby diapers, and paper towels, coupled with numerous technological advancements across the healthcare industry, are bolstering the market.

Hydrogel Market Analysis:

Major Market Drivers: The widespread applications of hydrogels in the pharmaceutical industry to increase the storage stability of existing medical products are stimulating the market. Moreover, the launch of favorable policies by non-governmental organizations (NGOs) and government bodies to spread awareness about menstrual hygiene is also positively influencing the hydrogel market.

Key Market Trends: The growing investments in R&D activities to introduce cost-effective hydrogel dressings for improving the treatment of chronic wounds are among the emerging trends bolstering the market. Apart from this, the increasing demand for advanced wound care products to prevent surgical site infections is further acting as another significant growth-inducing factor.

Competitive Landscape: Some of the prominent companies in the global market include 3M Company, Ashland Global Holdings Inc., B. Braun Melsungen AG, Cardinal Health

Inc., Coloplast A/S, Essity AB, Evonik Industries AG, Hoya Corporation, Integra LifeSciences, Johnson & Johnson, Koninklijke DSM N.V., Medline Industries Inc., Medtronic plc, Smith & Nephew plc, and The Cooper Companies Inc., among many others.

Geographical Trends: Asia-Pacific currently dominates the global market, owing to the growing awareness towards personal hygiene in countries like India, Indonesia, China, etc. Additionally, continuous improvements in biotechnology and materials science are also fueling the market across Asia-Pacific.

Challenges and Opportunities: Stringent regulatory frameworks can be time-consuming and expensive, which is hampering the market. However, effective supply chain management strategies and strategic planning are expected to fuel the market in the coming years.

Hydrogel Market Trends:

Rising Medical Applications

The expanding pharmaceutical industry across various regions is one of the primary factors propelling the market. According to the Director General of the Pharmaceutical Export Promotion Council of India, the country exported approximately US\$ 24.62 Billion worth of pharmaceutical products, including drug intermediates, in FY2021-22. Additionally, pharmaceutical exports in India increased by 4.22% from April to October 2022, reaching US\$ 14.57 Billion. Besides this, the growing number of clinical trials related to hydrogel-based drug delivery systems are encouraging pharma companies to invest in targeted therapies, which is elevating the hydrogel market revenue. As per the data reported by NBCI in 2019, hydrogel was used for therapeutic or diagnostic purposes in around 223 clinical trials. Moreover, extensive investments in R&D activities to develop cost-effective products for improving the treatment of chronic wounds are also acting as significant growth-inducing factors. For instance, in May 2024, a team of scientists at the uOttawa Faculty of Medicine introduced peptide-based hydrogels that can minimize skin wounds, reshape and heal injured corneas, deliver therapeutics to damaged heart muscle, etc. Similarly, according to an article published by Nature Nanotechnology in May 2024, biomimetic-nanozyme amyloid hydrogel aids in alleviating the harmful effects of alcohol consumption via oral administration. Consequently, the launch of more effective and patient-friendly treatment options across the pharmaceutical industry is anticipated to fuel the hydrogel market in the coming years.

Growing Personal Hygiene Concerns

The growing utilization of hydrogels in sanitary products to make thinner pads with

higher absorbency and increased swelling pressure and suction power is positively influencing the market. The launch of various awareness programs, such as the Reproductive and Child Health Program, Eco Femme, My Pad, etc., by regulatory bodies to spread awareness about menstrual hygiene is augmenting the use of sanitary napkins, which, in turn, is stimulating the market. According to the report published by IMARC, the Indian sanitary napkin market size reached US\$ 758.5 Million in 2023. Looking forward, IMARC Group anticipated the market to reach US\$ 1,659.6 Million by 2032, exhibiting a growth rate (CAGR) of 8.8% during 2024-2032. In addition to this, numerous government organizations, such as the World Bank Group, World Health Organization, UNICEF, etc., are introducing menstrual hygiene management (MHM) programs for women and adolescent girls. Furthermore, the growing sales of personal care items are also augmenting the adoption of hydrogel, as it comprises skin-friendly ingredients, including silk fibroin, collagen, hyaluronic acid, etc. According to the data published in Cosmetic Europe, roughly 500 million consumers across the region utilize cosmetic and personal care products every day to enhance their well-being, protect their health, boost their self-esteem, etc.

Novel Technological Advancements

The increasing technological innovations, including the introduction of hydrogel electrolytes for producing safe and flexible batteries, are fueling the global market. For instance, according to the findings published in the journal *Angewandte Chemie International Edition* in September 2023, researchers at the Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT), a part of the Chinese Academy of Sciences (CAS), created innovative hydrogel electrolyte with an unusually high salt concentration. This development effectively mitigates water-induced side reactions, paving the way for extended and practical cycling capabilities in aqueous sodium-ion batteries. Apart from this, the inflating popularity of hydrogel-based sensors due to their flexibility and ability to detect deformations accurately is one of the hydrogel market's recent opportunities. For example, in July 2023, a review written by Dr. Weixing Song from the Department of Chemistry at the Capital Normal University emphasized the development status of various hydrogel sensors and highlighted strategies to enhance their mechanical and electrical performance. Moreover, the findings are valuable for designing components and structures of high-performance wearable hydrogel sensors. This, in turn, will continue to fuel the market in the coming years.

Global Hydrogel Market Segmentation:

IMARC Group provides an analysis of the key trends in each segment of the market, along with the hydrogel market forecast at the global, regional, and country levels for

2024-2032. Our report has categorized the market based on the raw material type, form, composition, and application.

Breakup by Raw Material Type:

Synthetic

Natural

Hybrid

Currently, synthetic accounts for the largest market share

The report has provided a detailed breakup and analysis of the market based on the raw material type. This includes synthetic, natural, and hybrid. According to the report, synthetic represented the largest segmentation.

Synthetic hydrogels have a higher capacity for water absorption than natural hydrogels, which is propelling the segment's growth. The amount of water in the hydrogel is usually determined by the properties of polymers and the density of networking. The inclusion of hydrophilic groups, such as $-SO_3H$, $-CONH_2$, $-COOH$, $-NH_2$, $-CONH$, and $-OH$, contributes to the network's hydrophilicity. Synthetic hydrogels are gaining extensive traction, owing to their high-water content, which is elevating the hydrogel market's recent price. Besides this, they provide excellent support for neuronal tissue growth in areas of brain injury, suggesting a potential strategy for brain tissue restoration. For instance, in May 2023, researchers at Hong Kong University developed electroconductive hydrogels by using the hybrid assembly of polymeric nanofiber networks. Moreover, these synthetic hydrogels offer excellent mechanical strength. Consequently, they find applications in the engineering of various bioelectronic devices for cardiac or neural interfaces.

Breakup by Form:

Amorphous

Semi-crystalline

Crystalline

Among these, semi-crystalline currently exhibits a clear dominance in the hydrogel market share

The report has provided a detailed breakup and analysis of the market based on the

form. This includes amorphous, semi-crystalline, and crystalline. According to the report, semi-crystalline represented the largest segmentation.

Semi-crystalline hydrogels refer to moderately water-swollen hydrogels containing crystalline domains. They exhibit optimal self-healing, melt-processability, and shape-memory functions. Furthermore, they find numerous applications, such as injectable gels, chemical motors, shape-memory hydrogels, smart inks for 3D or 4D printing, etc., as these hydrogels can undergo an abrupt and reversible change from a solid-like to a liquid-like state at the melting temperature. Additionally, the ability of these hydrogels to maintain a significant amount of water within their structure while displaying enhanced mechanical properties opens up possibilities for advanced uses in drug delivery systems, tissue engineering, and environmentally responsive technologies, where controlled responses to external stimuli are crucial.

Breakup by Composition:

Polyacrylate

Polyacrylamide

Silicone-modified Hydrogels (SiH)

Others

Currently, silicone-modified hydrogels (SiH) account for the majority of the global market share

The report has provided a detailed breakup and analysis of the market based on the composition. This includes polyacrylate, polyacrylamide, Silicone-modified Hydrogels (SiH), and others. According to the report, silicone-modified hydrogels (SiH) represented the largest segmentation.

Silicone-modified hydrogels (SiH) represent innovative materials that integrate the hydrophilic properties of hydrogels with the flexibility and durability of silicone. Additionally, they exhibit increased oxygen permeability, improved biocompatibility, enhanced mechanical strength, etc. Besides this, SiH finds extensive applications in the biomedical field, particularly in contact lens technology. Additionally, the integration of silicone improves the water retention abilities of the hydrogels, which is crucial for maintaining hydration and ensuring comfort in ocular applications. Beyond eye care, silicone-modified hydrogels are also being explored for wound dressing materials due to their ability to create a moist healing environment while being gentle on the skin. These characteristics also open up potential applications in drug delivery systems and tissue

scaffolds, where controlled release and structural integrity are essential. This, in turn, is expected to fuel the hydrogel market outlook over the forecasted period.

Breakup by Application:

Contact Lenses

Personal Care and Hygiene

Wound Care

Drug Delivery

Tissue Engineering

Others

Among these, personal care and hygiene products hold the largest market share

The report has provided a detailed breakup and analysis of the market based on the application. This includes contact lenses, personal care and hygiene, wound care, drug delivery, tissue engineering, and others. According to the report, personal care and hygiene products represented the largest segmentation.

The hygiene products comprising superabsorbent polymers, such as hydrogels, for absorbing large amounts of body fluids are gaining widespread popularity. As per the hydrogel market statistics, the increasing awareness about the importance of maintaining proper hygiene among infants, the expanding geriatric population, and the growing prevalence of functional and cognitive impairment are some of the key factors propelling the segment's growth. Besides this, the escalating demand for baby diapers is also acting as another significant growth-inducing factor. For example, according to IMARC, the global diaper market size reached US\$ 85.2 Billion in 2023. Looking forward, IMARC Group expects the market to reach US\$ 159.3 Billion by 2032, exhibiting a growth rate (CAGR) of 7% during 2024-2032. Additionally, the launch of favorable policies by government bodies to promote the adoption of sanitary products is stimulating the market. For instance, in India, the Karnataka Health Department introduced a scheme to provide free sanitary napkins to around 19 lakh girls aged 10 to 18 years in government-aided schools and colleges across the state.

Breakup by Region:

North America

United States

Canada

Asia-Pacific
China
Japan
India
South Korea
Australia
Indonesia
Others
Europe
Germany
France
United Kingdom
Italy
Spain
Russia
Others
Latin America
Brazil
Mexico
Others
Middle East and Africa

According to the hydrogel market overview, Asia-Pacific currently dominates the global market share

The market research report has also provided a comprehensive analysis of all the major regional markets, which include North America (the United States and Canada); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, and others); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia, and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa. According to the report, Asia Pacific accounted for the largest market share.

The increasing pharmaceutical industry is one of the key factors bolstering the market across the Asia-Pacific. For instance, according to CEIC Data, the pharmaceutical sales revenue across China in June 2022 accounted for US\$ 223,946 Million as compared to US\$ 146,041 Million in April 2022. This can be attributed to the diverse domestic drug production activities, comprising around 5,000 manufacturers and various small or medium-sized companies. Additionally, the widespread adoption of generic drugs is also acting as another significant growth-inducing factor. As per the Press Information

Bureau (PIB), India is one of the world's major suppliers of generic medicines, accounting for 20% of the global supply by volume. Moreover, drugs across the country are exported to more than 200 countries, with the United States being the key market. Besides this, according to the Indian Brand Equity Foundation, the Indian pharma industry is expected to reach US\$ 130 Billion by 2030. Apart from this, the introduction of advanced wound care products is anticipated to fuel the hydrogel market in Asia-Pacific over the forecasted period.

Competitive Landscape:

The market research report has provided a comprehensive analysis of the competitive landscape. Detailed profiles of all major hydrogel market companies have also been provided. Some of the key players in the market include:

3M Company
Ashland Global Holdings Inc.
B. Braun Melsungen AG
Cardinal Health Inc.
Coloplast A/S
Essity AB
Evonik Industries AG
Hoya Corporation
Integra LifeSciences
Johnson & Johnson
Koninklijke DSM N.V.
Medline Industries Inc.
Medtronic plc
Smith & Nephew plc
The Cooper Companies Inc.

(Please note that this is only a partial list of the key players, and the complete list is provided in the report.)

Hydrogel Market Recent Developments:

May 2024: According to a study published in *Advanced Materials*, a team of scientists at the Ningbo Institute of Materials Technology and Engineering (NIMTE) collaborated with researchers at the Max Planck Institute of Microstructure Physics to develop entangled mesh hydrogels (EMHs) via cryogelation, achieving rapid atmospheric water harvesting.

April 2024: Researchers at the Indian Institute of Science (IISc) designed a sustainable hydrogel to remove microplastics from water.

January 2024: MIT chemical engineers introduced a zwitterionic hydrogel system with a minimal environmental footprint for single-step water treatment.

Key Questions Answered in This Report

1. What was the size of the global hydrogel market in 2023?
2. What is the expected growth rate of the global hydrogel market during 2024-2032?
3. What are the key factors driving the global hydrogel market?
4. What has been the impact of COVID-19 on the global hydrogel market?
5. What is the breakup of the global hydrogel market based on the raw material type?
6. What is the breakup of the global hydrogel market based on the form?
7. What is the breakup of the global hydrogel market based on the composition?
8. What is the breakup of the global hydrogel market based on the application?
9. What are the key regions in the global hydrogel market?
10. Who are the key players/companies in the global hydrogel market?

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