

Membrane Filtration Technologies – A Global Market Overview

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Abstracts

Membrane Filtration Technologies Market Trends and Outlook

Membrane Filtration can be described as a process employing the pressure difference between two sides of a membrane to mechanically sieve undesirable particles, ions and macromolecules from fluids. For this, membrane filters having a range of pore diameters are used, based on the type of particles to be eliminated. The membrane performs the role of a barrier in allowing the passage of specific substances through its pores, while rejecting the same for others, depending on their size, charge or other properties.

The global market for Membrane Filtration Technologies is anticipated to record a CAGR of 9.2% over the 2024-2030 analysis period in reaching a projected US\$34.3 billion by 2030 from an estimated US\$20.3 billion in 2024.

The worldwide market for Membrane Filtration Technologies is primarily being driven by factors that include growing demand from the food & beverage and pharma sectors, the concept of ultrapure water gaining considerable ground, need to purify & reuse wastewater due to an impending water crisis, rise in contamination levels necessitating effective technologies, momentum in ultrafiltration & nanofiltration technologies, demand for microfiltration sustaining despite its technological maturity and forward osmosis becoming a viable alternative.

Membrane Filtration Technologies Regional Market Analysis

Asia-Pacific represents the leading global market for Membrane Filtration Technologies and is also likely to post the fastest growth in demand because of a growing population,

an increasing industrial base, entry of global players and growth in R&D and technological activities aimed at providing safe and unpolluted water to all end-consumers. Over the past few years, unprecedented heat waves have been witnessed across Southeast Asia, due which droughts and water scarcity have become rampant issues. Overcoming these requires reusing water, a process in which Membrane Filtration Technologies play a critical role. Europe and North America are other major regions for these technologies, though South America and Middle East & Africa would overtake both in terms of growth.

Membrane Filtration Technologies Market Analysis by Technology

The most widely used technologies for Membrane Filtration comprise Microfiltration, Ultrafiltration, Nanofiltration, Reverse Osmosis and Membrane Chromatography, among others. Among these, the worldwide demand for Reverse Osmosis (RO) is the largest, as this technique offers the capacity to eliminate almost 99% of undesired mineral content from water, thus making it extremely popular in home-based water filtration machines. RO uses pressure to push water through a semi-permeable membrane that results in removing contaminants, such as colors, flavors, particles and odors. Moreover, since water forms the fundamental component of the beverage industry, Reverse Osmosis has gained wide acceptance in this field to ensure the provision of pure water. On the other hand, the global demand for Ultrafiltration (UF) technology would likely log the fastest CAGR during the analysis period because of wider adoption, greater R&D endeavors for further technological improvement and a demand for safe water in various sectors. This technique enables in the elimination of dissolved and colloidal material at low transmembrane pressure. As a result, the process of dissolved metal ions of low-molecular weights or hydrated ions passing through the ultrafiltration membrane is facilitated due to the membrane having pores larger in diameter than the dissolved metal ions. Apart from being economical, Ultrafiltration's major benefits include low operating pressure, lower energy consumption compared to nanofiltration or reverse osmosis, minimal need for manual interventions, desirable permeate yield and easy disinfection.

Membrane Filtration Technologies Market Analysis by Mode of Fabrication

By mode of fabrication, the market for Membrane Filtration can be categorized into Hollow Fiber, Spiral Wound, Tubular and Plate & Frame. Spiral Wound type of membrane filters account for the largest share, since this design's compactness, efficiency and cost-effectiveness are highly significant for membrane filtration systems used in water treatment, desalination and industrial processes. A typical spiral wound

system comprises permeate tubes, permeate spacers, feed spacers and membranes, which can be utilized in microfiltration, ultrafiltration and nanofiltration. However, the Hollow Fiber design, because of being highly effective in eliminating contaminants, such as bacteria, fungi and viruses, is anticipated to register the fastest growth over the analysis period.

Membrane Filtration Technologies Market Analysis by Material Type

Ceramic and Polymeric are the two most widely used materials for making Membrane Filters, of which demand for the latter is dominant, a trend that would continue over the coming years. Primary reasons for this include greater flexibility, ease of use and relatively lower costs of Polymeric Membranes. The various types of polymeric materials used for this purpose include polyethersulfone (PES), polysulfone (PS), cellulose-based materials, polytetrafluoroethylene (PTFE), polyacrylonitrile (PAN) and polyvinyl chloride (PVC), all of which have outstanding chemical stability, selectivity and durability. These membranes are used in water treatment for removing suspended solids, bacteria, viruses and other contaminants, while in treating industrial and domestic wastewater, polymeric membranes help eliminate pollutants and contaminants for enabling their safe disposal in the environment. Despite being in considerable use, the global market for Ceramic Membrane Filtration systems is likely to register a slower growth, owing to factors, such as high cost, membrane fouling, brittleness, low resistance to cleaning chemicals & solvents and tendency to get damaged by pressure fluctuations.

Membrane Filtration Technologies Market Analysis by End-Use Sector

Municipal, Residential and Industrial are the three major end-use sectors for Membrane Filtration Technologies, with the Industrial sector being the largest and also the fastest growing. This area encompasses several sub-sectors that need safe and pure water for their operations, including Food & Beverage, Chemicals, Electronics & Semiconductors, Pharmaceuticals, Pulp & Paper, Oil & Gas, Mining, Petrochemical and Power Generation. Among these, the Food & Beverage sector leads the demand for Membrane Filtration Technologies, since this is a critical area where the requirement of uncontaminated water is paramount. The Pharmaceutical industry represents another area that needs a constant supply of pure and safe water for production, as also for researching and developing new drugs and medications, due to which the demand for Membrane Filtration Technologies in this sub-segment of the Industrial sector will post healthy growth. The demand for Membrane Filtration Technologies in the Municipal end-use sector, however, is anticipated to clock the fastest CAGR over the analysis period,

since municipalities across the globe are responsible for treating and providing safe drinking water.

Membrane Filtration Technologies Market Report Scope

This global report on Membrane Filtration Technologies analyzes the market based on technology, mode of fabrication, material used and end-use sector. In addition to providing profiles of major companies operating in this space, the latest corporate and industrial developments have been covered to offer a clear panorama of how and where the market is progressing.

Key Metrics

Historical Period: 2021-2023

Base Year: 2023

Forecast Period: 2024-2030

Units: Value market in US\$

Companies Mentioned: 85+

Membrane Filtration Technologies Market by Geographic Region

North America (The United States, Canada and Mexico)

Europe (France, Germany, Italy, Spain, The United Kingdom and Rest of Europe)

Asia-Pacific (China, Japan, India, South Korea and Rest of Asia-Pacific)

South America (Argentina, Brazil and Rest of South America)

Middle East & Africa

Membrane Filtration Technologies Market by Technology

Membrane Chromatography

Microfiltration

Nanofiltration

Reverse Osmosis

Ultrafiltration

Membrane Filtration Technologies Market by Mode of Fabrication

Hollow Fiber

Plate & Frame

Spiral Wound

Tubular

Membrane Filtration Technologies Market by Material Type

Ceramic

Polymeric

Membrane Filtration Technologies Market by End-Use Sector

Industrial

o Chemicals

o Electronics & Semiconductors

o Food & Beverage

- o Mining
- o Petrochemicals
- o Pharmaceuticals
- o Power Generation
- o Pulp & Paper
- o Oil & Gas
 - Municipal
 - Residential

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Plate & Frame

Spiral Wound

Tubular

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Polymeric

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Industrial

Chemicals

Electronics & Semiconductors

Food & Beverage

Mining

Petrochemicals

Pharmaceuticals

Power Generation

Pulp & Paper

Oil & Gas

Municipal

Residential

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3M Company

Advantec MFS, Inc.

Air Products, Inc.

Alfa Laval AB
Amazon Filters
AMS Technologies Ltd
Applied Membranes, Inc.
Aquaporin A/S
Aquarion AG
Aquatech International LLC
Asahi Kasei Corp
AXEON Water Technologies
Axium Process Ltd
BASF SE
Baghouse.com
Berghof Membrane Technology GmbH
Big Brand Water Filter
CITIC Envirotech
Chanson Water Co Ltd
Clean Liquid Systems
Corning, Inc.
Critical Process Filtration, Inc.
Culligan International Co
Cytiva
DIC Corp
Danaher Corp (Pall Corp)
Danamark WaterCare Ltd.
Degremont Technologies
Donaldson Co, Inc.
Drew Marine USA, Inc.
DuPont de Nemours, Inc.
DWA GmbH & Co KG
Elmatec
Evoqua Water Technologies LLC
Filtration Group
FlowTech Corp
GEA Group AG
Graver Technologies LLC
Guo Chu Technology (Xiamen) Co Ltd.
Huber SE
Hydranautics (A Nitto Group Company)
Hyflux Ltd

Imemflo Filtration Pvt Ltd
KHS Group
Koch Membrane Systems, Inc./Koch Separation Solutions
LG Chem
Litree Purifying Technology Co Ltd
MMS Membrane Systems
MANN+HUMMEL
Membrane Solutions LLC
Membrane Solutions (Nantong)
Membrane System Specialists, Inc.
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Merck KGaA
Microdyn-Nadir GmbH
Mitsubishi Rayon
Nilsan Nishotech Systems Pvt Ltd
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Novasep
Origin Water
Pall Corporation
Parker-Hannifin Corp
Pentair plc
Pervatech BV
Polymem SAS
Porvair Filtration Group
ProMinent GmbH
Refractron Technologies Corp
Repligen Corp
SPX Flow, Inc.
Sartorius AG
Shandong Zhaojin Motian Co Ltd
Shelco Filters
Spintek Filtration, Inc.
Suez Water Technologies and Solutions
Synder Filtration, Inc.
The Dow Chemical Co (DuPont Water Solutions)
The Wabag Group
Thermax Limited
Thermo Fisher Scientific
Tianjin Motimo Membrane Technology Co Ltd.

Toray Industries, Inc.

Veolia Environment SA

Veolia Water Technologies, Inc.

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ZwitterCo

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Nanofiltration

Reverse Osmosis

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Ceramic

Polymeric

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Chemicals

Electronics & Semiconductors

Food & Beverage

Mining

Petrochemicals

Pharmaceuticals

Power Generation

Pulp & Paper

Oil & Gas

Municipal

Residential

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REGIONAL MARKET OVERVIEW

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