Oxygen Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Form (Gas, Liquid, Solid), By Application (Metals & Mining, Chemical, Oil & Gas, Healthcare, Others), By Region and Competition, 2019-2029F

Market Report | 2024-11-08 | 185 pages | TechSci Research

AVAILABLE LICENSES:

- Single User License $4900.00
- Multi-User License $5900.00
- Custom Research License $8900.00

Report description:

Global Oxygen Market was valued at USD 47.65 Billion in 2023 and is expected to reach USD 62.09 Billion by 2029 with a CAGR of 4.71% during the forecast period. Oxygen, an essential element in various industries, is seeing rising demand due to its critical role in sectors such as healthcare, steel manufacturing, chemicals, and wastewater treatment. The market's trajectory is shaped by advancements in production technologies, the growing need for high-purity oxygen, and an increasing focus on sustainable industrial practices.

One of the primary drivers of the global oxygen market is the healthcare sector's increasing demand. Oxygen therapy is crucial for the treatment of respiratory conditions, including chronic obstructive pulmonary disease (COPD), pneumonia, and more recently, COVID-19. As the global population ages and the prevalence of respiratory disorders rises, the demand for medical-grade oxygen continues to surge. Moreover, advancements in oxygen delivery systems and home-based oxygen therapies are further contributing to the market's growth.

The oxygen market is benefiting from advancements in air separation technologies, which allow for the efficient production of oxygen at high purity levels. Traditional cryogenic air separation remains dominant, but emerging technologies such as pressure swing adsorption (PSA) and vacuum swing adsorption (VSA) are gaining traction due to their energy efficiency and cost-effectiveness. These technologies are particularly appealing for smaller-scale operations and industries requiring consistent oxygen purity.

Despite its growth potential, the global oxygen market faces several challenges. High production costs, energy-intensive processes, and infrastructure limitations in certain regions can hinder market expansion. Additionally, the logistics of transporting oxygen, especially to remote areas, poses a significant challenge.

Key Market Drivers

Growing Demand of Oxygen in Healthcare Industry

One of the primary factors contributing to the growing demand for oxygen in the healthcare industry is the increasing prevalence of respiratory diseases. Chronic obstructive pulmonary disease (COPD), asthma, and pneumonia are among the leading causes of respiratory failure worldwide. The World Health Organization (WHO) estimates that over 3 million people die from COPD each year, a number expected to rise as air pollution and smoking rates increase. These conditions often require supplemental oxygen therapy, which has become a standard treatment in hospitals, clinics, and even home healthcare settings. As a result, the demand for medical-grade oxygen has surged, contributing to the overall growth of the oxygen market.

The world's aging population is another key driver of the growing demand for oxygen in the healthcare industry. As life expectancy increases, the prevalence of age-related diseases such as cardiovascular conditions, cancer, and chronic respiratory disorders is also rising. These conditions often necessitate long-term oxygen therapy, particularly for patients who require assistance with breathing or oxygen saturation maintenance. This trend is especially pronounced in developed regions such as North America and Europe, where the elderly population is expanding rapidly. As more patients require oxygen therapy to manage chronic illnesses, the global oxygen market is poised for continued growth.

UNICEF is actively advancing and implementing oxygen solutions to address the challenges of providing access to medical oxygen in underserved regions. These initiatives include robust oxygen concentrators designed for difficult environments, solar-powered and heat recovery oxygen plants ensuring a reliable power supply, the Oxygen-as-a-Service model, which harnesses public-private partnerships, and the Newborn CPAP Respiratory Support program, aimed at introducing and scaling innovative newborn care technologies.

Technological advancements in the healthcare industry are further boosting the demand for oxygen. Innovations in medical devices such as ventilators, oxygen concentrators, and portable oxygen systems have made oxygen therapy more accessible and efficient. These technologies are not only improving patient outcomes but are also expanding the applications of oxygen in healthcare. Portable oxygen concentrators, for example, enable patients to receive oxygen therapy outside of clinical settings, promoting greater independence and quality of life. As medical technologies continue to evolve, the role of oxygen in modern healthcare is expected to grow, driving market demand even further.

Growing Demand of Oxygen in Chemical Industry

Oxygen is a vital component in numerous chemical manufacturing processes, including oxidation reactions, combustion, and synthesis of various chemical compounds. Its application extends to the production of key chemicals such as ethylene oxide, sulfuric acid, and ammonia, all of which are central to a wide range of industrial activities. Oxygen's ability to facilitate these processes under controlled conditions not only improves product yield but also enhances energy efficiency. The increasing emphasis on maximizing production output and minimizing energy consumption has further intensified the demand for oxygen in the chemical sector.

Chemical looping, an emerging technology in the chemical sector, offers low CO_2 emissions and holds significant potential for energy and chemical production. A critical challenge for advancing chemical looping and integrating it into industrial applications is the selection and ongoing development of suitable oxygen carrier (OC) materials. These solid OC materials provide the required stoichiometric oxygen for various chemical processes. Key selection criteria for oxygen carriers include reactivity, cost, toxicity, thermal stability, attrition resistance, and chemical stability. To achieve optimal performance and long-term stability, oxygen carriers must be developed with careful consideration of reactor configurations, the objectives of the chemical looping process, the thermodynamic properties of active phases, interactions with support materials, internal ionic migration, and the strengths and limitations of synthesis methods employed.

The rapid growth of the global chemical industry, driven by rising demand for chemicals used in pharmaceuticals, agriculture, and consumer goods, has created a substantial need for industrial gases like oxygen. Countries with large-scale chemical production capabilities, such as China, India, and the United States, are seeing heightened demand for oxygen, given its integral role in both basic chemical production and advanced specialty chemicals. This upward trend in chemical production, combined with technological advancements, is expected to boost the consumption of oxygen at an accelerated rate in the coming years.

In addition to production demand, there is a growing focus on the environmental benefits of oxygen usage in industrial applications. The use of oxygen in chemical processes, particularly in combustion and gasification, significantly reduces harmful emissions by enhancing the combustion process. By achieving a cleaner and more efficient burn, industries can lower their carbon footprint while meeting stricter environmental regulations. As governments worldwide implement more stringent environmental

policies, industries are increasingly relying on oxygen to meet sustainability goals, further driving market growth.

Key Market Challenges

High Cost of Production

One of the primary drivers of the high cost of oxygen production is the energy-intensive nature of the air separation process. Most industrial oxygen is produced through cryogenic air separation, which involves cooling air to extremely low temperatures (-183C) to liquefy oxygen and separate it from nitrogen and other gases. This method, while effective at producing high-purity oxygen, consumes a significant amount of energy, making it one of the most expensive components in the production process.

In many regions, rising energy prices further exacerbate this challenge. The cost of electricity directly influences the operational expenses of air separation units (ASUs), making it difficult for producers to maintain competitive pricing. Additionally, in countries with limited access to affordable energy sources, the cost of oxygen production is particularly burdensome, affecting the overall market growth in these regions.

The infrastructure required for large-scale oxygen production and distribution adds another layer to the overall cost. Cryogenic ASUs are capital-intensive facilities that require specialized equipment, ongoing maintenance, and skilled labor to operate. For smaller industries or regions with low demand, the investment in such infrastructure may not be economically viable, limiting the accessibility of oxygen in certain areas.

Moreover, the logistics of oxygen distribution can be costly, especially in remote locations. Transporting oxygen, which is usually stored in compressed gas cylinders or cryogenic tanks, requires specialized vehicles and safety protocols, adding to the operational expenses of producers. These logistics challenges make it difficult for companies to expand their market reach, particularly in emerging economies or rural areas.

Key Market Trends

Emergence of Oxygen in Fuel Sector

One of the key ways oxygen is impacting the fuel sector is through oxygen-enhanced combustion technology. By enriching air with high-purity oxygen during combustion processes, industries can achieve more efficient fuel burning. This technique has proven especially beneficial in sectors that rely on heavy fuels, such as power generation and petrochemical refining. The introduction of additional oxygen during combustion improves fuel efficiency, reduces harmful emissions, and optimizes energy output.

Oxygen-enhanced combustion is particularly relevant in industries seeking to reduce their carbon footprints. By using oxygen in place of atmospheric air, which contains only about 21% oxygen, the combustion process becomes more complete, resulting in fewer pollutants like carbon monoxide and nitrogen oxides. As the global focus shifts towards reducing emissions and adopting sustainable energy practices, the use of oxygen in fuel combustion is expected to play a pivotal role in the energy transition, contributing to the expansion of the global oxygen market.

The global push toward hydrogen as a clean fuel source is another driver of oxygen demand in the fuel sector. Oxygen is an essential component in several hydrogen production processes, including water electrolysis, where water is split into hydrogen and oxygen using electrical energy. As governments and industries around the world invest heavily in green hydrogen production to meet decarbonization goals, the need for oxygen in this process is rising significantly.

Hydrogen fuel cells, which use hydrogen to produce electricity, are increasingly being adopted in transportation and energy storage applications. The production of green hydrogen, where renewable energy powers the electrolysis process, is particularly reliant on oxygen as a byproduct. This trend is expected to create substantial demand for oxygen in the coming years as hydrogen production scales up to meet global energy needs. The growing focus on hydrogen as a clean fuel is positioning oxygen as a critical resource in the transition to sustainable energy solutions.

Biofuel production, another segment of the fuel sector, is benefiting from the use of oxygen to enhance efficiency and output. In biofuel refineries, oxygen is often used in gasification and fermentation processes to produce bioethanol, biodiesel, and other renewable fuels. By enriching these processes with oxygen, producers can accelerate chemical reactions, increase fuel yields, and lower the overall environmental impact of production.

Segmental Insights

Form Insights

Based on Form, Gas have emerged as the fastest growing segment in the Global Oxygen Market in 2023. One of the primary

reasons for the rise of gaseous oxygen is its versatile use in various industries, such as manufacturing, energy, and chemicals. The steel manufacturing sector, which relies on gaseous oxygen in the blast furnace and basic oxygen furnace (BOF) processes, continues to be a major consumer. Oxygen gas helps optimize the combustion process, enhancing production efficiency while reducing emissions. Other industries, such as petrochemicals, pulp and paper, and glass manufacturing, also rely heavily on gaseous oxygen for efficient operations.

The gas segment offers substantial scalability and flexibility compared to other oxygen forms, such as liquid or compressed oxygen. Gaseous oxygen can be produced in varying volumes depending on specific industrial or medical needs, allowing for efficient resource allocation and minimizing waste. This flexibility is particularly beneficial in industries with fluctuating oxygen demand, where bulk oxygen storage might not be cost-effective.

As industries globally adopt more sustainable practices, the use of gaseous oxygen has gained traction as a cleaner option. It plays a crucial role in reducing emissions and optimizing combustion processes in industries such as energy production and metal refining. Additionally, in wastewater treatment, gaseous oxygen is increasingly used for aerobic biological processes, supporting environmental sustainability efforts by reducing chemical waste and improving water quality.

Application Insights

Based on Application, Metals & Mining have emerged as the fastest growing segment in the Global Oxygen Market during the forecast period. One of the primary drivers behind the growth of oxygen demand in the metals and mining sector is the rising need for high-purity oxygen in metal production processes. Oxygen plays a crucial role in various metallurgical processes, including steelmaking, copper production, and other non-ferrous metals. In steelmaking, for instance, the use of oxygen in basic oxygen furnaces (BOFs) allows for more efficient combustion of carbon and other additives, leading to higher quality steel with reduced impurities. This demand for cleaner and more efficient steel production methods is driving the growth of the oxygen market within the metals sector.

Moreover, the increasing global demand for metals, particularly in emerging economies, is further fueling the need for oxygen in production processes. As countries industrialize and urbanize, the consumption of metals for infrastructure development, construction, and manufacturing rises. Consequently, oxygen suppliers are positioned to benefit from this growing demand as they provide essential resources to support efficient metal production.

The mining industry is also evolving, with advancements in technologies leading to increased efficiency and productivity. Modern mining techniques, such as underground mining and hydrometallurgy, often require the use of oxygen for various applications, including mineral processing and ore extraction. For instance, oxygen is essential in the leaching process, where it enhances the extraction of metals from ores, improving overall recovery rates.

These technological innovations not only enhance the efficiency of mining operations but also reduce the environmental impact of metal extraction. By utilizing oxygen in these processes, mining companies can achieve higher yields while minimizing waste and emissions. As these technologies gain traction, the demand for oxygen in the mining sector is expected to grow significantly.

Regional Insights

Based on Region, Asia Pacific have emerged as the dominating region in the Global Oxygen Market in 2023. The Asia Pacific region, particularly countries like China, India, and Southeast Asian nations, is experiencing rapid industrialization and urbanization. This growth is spurred by increasing investments in manufacturing, healthcare, and chemical industries, all of which require substantial amounts of oxygen. As industries expand, the demand for oxygen in processes such as combustion, oxidation, and chemical synthesis rises correspondingly, solidifying the region's role in the global oxygen market.

Asia Pacific is home to some of the world's largest chemical and pharmaceutical companies. The increasing production of essential chemicals, pharmaceuticals, and specialty chemicals drives the demand for industrial oxygen. For instance, the production of ammonia, which heavily relies on oxygen, is crucial for fertilizer manufacturing in agricultural economies. The region's robust chemical sector not only meets local demand but also serves global markets, further enhancing its position in the oxygen market.

Government initiatives aimed at boosting infrastructure development and industrial output have been pivotal in the growth of the oxygen market in Asia-Pacific. Countries in this region are investing in advanced manufacturing capabilities, healthcare infrastructure, and energy projects, all of which require reliable oxygen supply. Additionally, policies promoting industrial gases, including oxygen, have further fueled market growth, encouraging domestic production and investment in oxygen generation technologies.

Key Market Players
- Air Products and Chemicals, Inc.
- Air Liquide India Holding Private Limited
- Bhuruka Gases Limited
- Daesung Industrial Gases Co., Ltd.
- Gulf Cryo Holding C.S.C
- INOX-Air Products Inc.
- Linde plc
- Matheson Tri-Gas, Inc.
- NIPPON GASES EURO-HOLDING, S.L.U.
- SOL SpA

Report Scope

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

- Oxygen Market, By Form:
  - o Gas
  - o Liquid
  - o Solid
- Oxygen Market, By Application:
  - o Metals & Mining
  - o Chemical
  - o Oil & Gas
  - o Healthcare
  - o Others
- Oxygen Market, By Region:
  - o North America
    - United States
    - Canada
    - Mexico
  - o Europe
    - France
    - United Kingdom
    - Italy
    - Germany
    - Spain
  - o Asia Pacific
    - China
    - India
    - Japan
    - Australia
    - South Korea
  - o South America
    - Brazil
    - Argentina
    - Colombia
  - o Middle East & Africa
    - South Africa

 Saudi Arabia
 UAE
Competitive Landscape
Company Profiles: Detailed analysis of the major companies present in the Global Oxygen Market.
Available Customizations:
Global Oxygen 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).

Table of Contents:

Oxygen Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Form (Gas, Liquid, Solid), By Application (Metals & Mining, Chemical, Oil & Gas, Healthcare, Others), By Region and Competition, 2019-2029F

Market Report | 2024-11-08 | 185 pages | TechSci Research

To place an Order with Scotts International:

- - Print this form
- - Complete the relevant blank fields and sign
- - Send as a scanned email to support@scotts-international.com

ORDER FORM:

Select license	License	Price
	Single User License	$4900.00
	Multi-User License	$5900.00
	Custom Research License	$8900.00
	VAT	
	Total	

*Please circle the relevant license option. For any questions please contact support@scotts-international.com or 0048 603 394 346.

** VAT will be added at 23% for Polish based companies, individuals and EU based companies who are unable to provide a valid EU Vat Numbers.

Email*		Phone*	
First Name*		Last Name*	
Job title*			
Company Name*		EU Vat / Tax ID / NIP number*	
Address*		City*	
Zip Code*		Country*	
		Date	2026-03-04

Signature