

Nitric Acid Market-Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 By Plant Type (Mono Pressure & Dual Pressure), By Sales Channel (Direct & Indirect), By End Use (AN & CAN, Nitrobenzene, TDI, TNT, Adipic Acid, Others), By Region, Competition

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Abstracts

The global nitric acid market was valued at USD 29.5 billion in 2022 and is projected to experience robust growth in the forecast period, with a CAGR of 2.8% through 2028. Nitric acid, a crucial chemical compound with diverse applications, plays a significant role in various industries worldwide. Over the years, the global nitric acid market has witnessed steady growth, driven by increasing demand from sectors such as agriculture, chemical manufacturing, electronics, and explosives. Nitric acid is primarily produced through the Ostwald process, where ammonia is oxidized to form nitric oxide, which is further oxidized to form nitrogen dioxide. This nitrogen dioxide is then dissolved in water to yield nitric acid, which can vary in concentration, ranging from highly concentrated fuming nitric acid to diluted solutions used for various applications.

Key Market Drivers:

Growing Demand for Nitric Acid in Fertilizers:

Nitric acid plays a crucial role in modern agriculture as a key component in the production of nitrogen-based fertilizers. The rising global demand for fertilizers, driven by population growth, expanding agricultural practices, and the need to enhance food production, has propelled the demand for nitric acid. Nitric acid-based fertilizers, such as ammonium nitrate, efficiently provide crops with nitrogen, improving agricultural

yields and supporting food security.

Growing Use of Nitric Acid in the Construction Industry:

Nitric acid has found a growing application in the construction industry, enhancing the durability, strength, and performance of construction materials. Its unique properties and diverse functionalities make it indispensable in various construction processes, including concrete production, corrosion protection, and surface treatment. The rising demand for nitric acid in construction applications is expected to drive market growth.

Growing Demand for Nitric Acid in Chemical Manufacturing Industry:

Nitric acid is extensively used in the chemical manufacturing industry for the production of various chemical compounds, including nitrobenzene and nitrocellulose. Nitrobenzene is a crucial precursor in the manufacturing of aniline, which is used in the production of rubber chemicals, dyes, and pharmaceuticals. Nitric acid's catalytic properties and corrosion inhibition capabilities further contribute to its demand in various industrial processes.

Nitric acid continues to play a vital role in multiple industries, contributing to their growth and development.

The Increasing Use of Nitric Acid in the Electronics Industry

Nitric acid, a highly reactive and versatile chemical compound, has experienced a significant surge in demand in recent years, primarily driven by its growing utilization in the electronic industry. The electronic industry heavily relies on nitric acid for various critical processes, including etching, cleaning, and passivation of electronic components. One of the primary applications of nitric acid in the electronic industry lies in the etching of printed circuit boards (PCBs). PCBs play a crucial role as essential components in electronic devices, serving as a platform to connect and support various electronic components. Nitric acid is utilized to selectively eliminate unwanted copper from the PCB surface during the etching process, thereby creating the desired circuit patterns. Moreover, nitric acid is widely employed as a cleaning agent to eliminate organic residues, particles, and metallic contaminants from the wafer surface. The cleanliness of wafers is of utmost importance in ensuring the production of high-quality semiconductor devices with enhanced performance, thereby establishing nitric acid as a vital element in semiconductor manufacturing. Additionally, nitric acid serves as a key raw material in the production of various chemicals used in the electronic industry.

These chemicals encompass nitric acid derivatives, which find application in specialty processes such as metal plating, circuitry fabrication, and the synthesis of organic compounds used in electronic devices.

Key Market Challenges

Volatility in Prices of Raw Materials

Numerous regions heavily depend on imported ammonia to fulfill their nitric acid production requirements. This reliance exposes manufacturers to geopolitical risks, fluctuations in currency exchange rates, and disruptions in the supply chain, all of which can result in unstable raw material costs. The volatility in raw material prices can present challenges for nitric acid manufacturers in maintaining stable profit margins. Sudden increases in raw material costs can erode profit margins, ultimately impacting the financial health of companies operating in the industry.

Rise in Environmental Concerns

The production of nitric acid involves the oxidation of ammonia, leading to the emission of nitrogen oxides (NO_x) as by-products. Nitrogen oxides are potent greenhouse gases that contribute to air pollution and the formation of acid rain. These emissions can have adverse effects on both human health and the environment. Furthermore, the production process itself consumes substantial amounts of energy, which can further contribute to carbon emissions and global warming. Nitric acid plants often necessitate significant electricity consumption for ammonia synthesis and the energy-intensive oxidation process.

Key Market Trends

Technological Advancements

Technological advancements are opening new horizons for the application of nitric acid, particularly in the field of nanotechnology. Nitric acid plays a vital role in the synthesis and functionalization of nanoparticles, which find applications in electronics, medicine, catalysis, and environmental remediation. The integration of digital technologies, such as data analytics and the Internet of Things (IoT), is driving process optimization and enhancing operational efficiency in nitric acid production plants. This improves operational efficiency, reduces downtime, and enables data-driven decision-making. In 2020, Stamicarbon unveiled its dual and mono nitric acid method known for its

exceptional energy recuperation. This is achieved through careful placement of the heat exchanger further down the ammonia burner. The distinctive characteristic of this process is the ability to reach high tail gas temperatures, up to 480°C. This is accomplished by positioning the final tail gas heater closer to the Pt/Rh gauzes within the ammonia burner vessel, where elevated process temperatures are encountered. Furthermore, advancements in safety systems and equipment have significantly improved workplace safety. Automation and remote monitoring systems reduce the need for manual intervention and exposure to hazardous environments.

Growing Utilization of Nitric Acids in Environmental Applications

Nitric acid plays a crucial role in air pollution control. It is used in processes such as selective catalytic reduction (SCR) of nitrogen oxides (NO_x) in industrial emissions. NO_x is a major air pollutant, contributing to smog, acid rain, and adverse health effects. By utilizing nitric acid in SCR systems, nitrogen oxides are converted into harmless nitrogen and water vapor, thereby reducing harmful emissions. In environmental monitoring, nitric acid is used as a reagent in water quality analysis. It is employed to preserve water samples for laboratory testing, ensuring accurate and reliable measurements of various parameters such as pH, nutrients, and trace metals. The increasing demand for nitric acid in environmental applications is expected to drive market growth. As governments and industries focus on sustainable practices and environmental regulations become more stringent, the need for nitric acid for pollution control and remediation is likely to rise.

Segmental Insights

Sales Channel Insights

In 2022, the direct sales segment emerged as the dominant force in the organic acid market and is projected to sustain its growth in the forthcoming years. Direct sales involve manufacturers directly selling nitric acid to end-users, including industrial consumers, chemical companies, electronics manufacturers, and agriculture businesses. This approach grants manufacturers greater control over the sales process, customer relationships, and pricing. Moreover, it facilitates a deeper understanding of customer needs and preferences, fostering enduring partnerships while offering enhanced opportunities for customization and customer support.

End Use Insights

In 2022, the adipic acid segment reigned supreme in the organic acid market and is expected to propel its expansion in the coming years. Adipic acid (chemical formula: $C_6H_{10}O_4$) serves as a dicarboxylic acid primarily employed in the production of nylon, specifically nylon-6,6. It plays a pivotal role as a fundamental raw material in the synthesis of nylon-6,6 via a two-step process involving nitric acid as an intermediate. Consequently, adipic acid stimulates the utilization of nitric acid within the chemical industry.

Regional Insights

The Asia Pacific region has firmly established itself as the frontrunner in the Global Organic Acid market, owing to rapid industrialization and economic growth observed in recent decades. As industrial activities expanded, the demand for nitric acid across various sectors, such as chemical manufacturing, electronics, and explosives, has witnessed a substantial upsurge. Moreover, the Asia Pacific region boasts a vast and diverse agricultural sector, with countries like China and India emerging as major contributors to the global fertilizer demand. The region takes pride in a robust chemical industry that heavily relies on nitric acid as a vital raw material for the production of diverse chemicals and chemical intermediates. The presence of well-established chemical manufacturing facilities in countries such as China, India, and Japan significantly contributes to the region's dominance in the global nitric acid market.

Recent Developments

On September 27, 2021, KuibyshevAzot and Casale announced the signing of an agreement for the construction of a 1575 MTD nitric acid (NA) and 2000 MTD Ammonium Nitrate Solution (ANS) facility in Togliatti, Russia. The facility, expected to be completed in the fourth quarter of 2024, will incorporate Casale's advanced NA2000 Dual Pressure techniques for nitric acid production and AN2000™ for ANS manufacturing. These cutting-edge techniques ensure minimal consumption and reduced emissions.

In 2022, Aarti Industries Limited (AIL) finalized a legally binding 20-year agreement with Deepak Fertilizers valued at over Rs. 8,000 crores. This agreement guarantees a steady and ample supply of Nitric acid, a crucial primary ingredient in production processes. The collaboration commenced on April 1, 2023, and eliminates the need for capital expenditure in concentrated Nitric acid backward integration. Additionally, the corporation separated its Pharmaceutical division into an independent publicly traded entity named Aarti

Pharmalabs Limited. This strategic move allows both firms to focus on their respective enterprises and explore opportunities for individual growth.

In 2020, VDM Metals Group, a German producer of nickel alloys and specialized stainless steels, implemented Henkel's advanced nitric acid (HNO₃) free Bonderite C-CP ('Cleanox') pickling method for specific wire products. The adoption of the Bonderite C-CP range of products addresses the market demand in the metals sector to significantly enhance the environmental friendliness of their manufacturing processes.

Key Market Players

- BASF SE
- Deepak Fertilisers and Petrochemicals Corporation Ltd (DFPCL)
- Gujarat Narmada Valley Fertilizers & Chemicals Limited (GNFC)
- Rashtriya Chemicals & Fertilizers Ltd.
- Yara International ASA
- Mitsubishi Chemical Corporation
- Sasol Ltd
- Nutrien Ltd
- Omnia Holding Limited
- Thyssenkrupp AG

Report Scope:

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

Nitric Acid Market, By Plant Type:

Mono Pressure

Dual Pressure

Nitric Acid Market, By Sales Channel:

Direct

Indirect

Nitric Acid Market, By End Use:

AN & CAN

Nitrobenzene

TDI

TNT

Adipic Acid

Others

Nitric Acid Market, By Region:

North America

Asia Pacific

Europe

Middle East & Africa

South America

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Nitric Acid Market.

Available Customizations:

Global Nitric Acid Market report with the given market data, Tech Sci 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).

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