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Global Titanium Dioxide Market: Analysis By Production, By Grade (Rutile and Anatase), By Production Process (Sulfate & Chloride), By Application (Paints and Coatings, Plastics, Pulp and Paper, Cosmetics and Others), By Region, Size & Forecast with Impact Analysis of COVID-19 and Forecast up to 2028

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Abstracts

Titanium dioxide (TiO2) is a naturally occurring compound primarily used as a white pigment in various industrial and consumer applications. It is renowned for its exceptional opacity, brightness, and ability to reflect light, making it a crucial ingredient in products like paints, coatings, plastics, papers, cosmetics, and food items. Its high refractive index allows for efficient light scattering and opacity enhancement, vital for achieving vibrant colors and enhancing the coverage of materials. The global titanium dioxide market in 2022 was valued at US$19.87 billion and is expected to reach US$27.03 billion by 2028, growing at a CAGR of 5.26%, during the forecast period of 2023-2028.

The global titanium dioxide pigment market production capacity reached 9.47 million tons in 2022. The booming construction and automotive sectors have escalated the demand for paints, coatings, and plastics, thereby increasing the need for TiO2 as a critical component. While there is an abundant geological reserve of titanium dioxide, the current production capacity falls short of satisfying future demand. It is anticipated that suppliers will need to increase prices for their raw materials to compensate for rising fuel costs over an extended period. This adjustment is also expected to encourage the development of new projects that are currently in progress or still in the planning stages. Consumption tends to parallel general economic trends for the end-

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use applications. Ultrafine grades of titanium dioxide (particle sizes between 1nm - 150nm) are used as catalysts, UV blockers, color pigment precursors, and electroceramics. This area is growing but is still relatively small.

Market Segmentation Analysis:

By Grade: The report splits the global titanium dioxide market into two different grade: Rutile and Anatase. The rutile segment dominated the market in 2022. Rutile pigment is the most common naturally occurring form of titanium dioxide (TiO2), having higher hiding powers and weathering properties in comparison to anatase. Rutile grade TiO2 is used as a carrier in paint applications for producing white color in plastics and prevents color fading in the paper. The growing construction industry is anticipated to fuel the demand for rutile grade TiO2 during the forecast period.

By Production Process: The global titanium dioxide market can be divided into two segments on the basis of production process: Sulfate and Chloride. The sulfate production process segment dominated the market in 2022. Iodine powder is treated with concentrated sulfuric acid (H2SO4) to produce titanyl sulfate and is further hydrolyzed for the formation of metatitanic acid and is then calcined and pulverized to obtain whiter titanium powder. The sulfate process of producing titanium dioxide is highly suitable for manufacturing paints and coatings. The growing automotive industry has propelled the demand for lightweight paints, which, in turn, has fueled the demand for sulfate-based TiO2.

By Application: The report divides the global titanium dioxide market into five applications: Paints and Coatings, Plastics, Pulp and Paper, Cosmetics and Other. Paints and coatings segment held the maximum share of the market. Titanium dioxide (TiO2) is a key component in paints and coatings due to its ability to provide opacity, brightness, and UV resistance. It's used in interior and exterior paints, industrial coatings, automotive coatings, and more. As urbanization and construction projects continue to rise globally, the demand for paints and coatings increases. TiO2 is essential for producing high-quality, long-lasting paints that enhance the appearance and durability of buildings. Moreover, the automotive industry's expansion drives demand for coatings, as TiO2 is used in automotive paints for aesthetic appeal, corrosion resistance, and protection against harsh environmental conditions.

By Region: According to this report, the global titanium dioxide market can be divided into four major regions: Asia Pacific (China, India, Japan, and Rest of Asia Pacific), Europe (Germany, UK, France, and Rest of Europe), North America (The US, Canada

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and Mexico), and Rest of the World. Asia Pacific held the maximum share in the global titanium dioxide market. The substantial market share can be attributed to the increasing construction activities in India, China, and various Southeast Asian nations, which have spurred the demand for paints and coatings in the region. This surge in demand is anticipated to bolster the growth of the product. The recent economic development and rapid industrialization in the Asia Pacific region have also played a significant role in driving the titanium dioxide market's expansion. Furthermore, the market is being propelled by the growing need for lightweight automotive vehicles.

China is the world's largest producer of titanium dioxide, accounting for a significant portion of the global production capacity. The country's production capacity has been steadily increasing due to its growing industrial and manufacturing sectors. The primary catalyst behind the growth in consumption lies in China, specifically driven by the burgeoning coatings and plastics sectors. There is significant untapped potential for further expansion, considering that the per capita consumption of TiO? in China stands at approximately 1.7 kilograms per year, in contrast to North America's 3.0 kilograms per year and Western Europe's 2.7 kilograms per year.

The US is among the major producers of titanium dioxide, and the demand for the product within the country has been growing in recent years. This has led to increased production, but has also reduced the need for exports. Furthermore, the US government has imposed tariffs on imported titanium dioxide from China. This has made it more expensive for the US companies to import the product, which has also reduced the exports in order to meet the country consumption.

Market Dynamics:

Growth Drivers: Growing construction sector has emerged as a significant driving factor for the titanium dioxide market. As construction activities surge globally, particularly in emerging economies, the demand for high-quality architectural coatings and construction materials has intensified. Titanium dioxide enhances the aesthetic appeal and longevity of structures by providing superior coverage and protection against harsh environmental conditions. This heightened demand from the construction industry has led to increased consumption of titanium dioxide. Further, the market is expected to increase due to rising automotive production, increasing use of titanium dioxide in plastics formation, increasing cosmetics and personal care products range and growing food & beverage industry.

Challenges: However, some challenges are impeding the growth of the market such as

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stringent environmental policies of governments, especially in APAC and EU and volatility in cost of titanium dioxide. Several waste products are released during the production of titanium dioxide; therefore, several restrictions have been implemented by governments across the world to control the emission and ensure careful disposal of this waste. Titanium dioxide is manufactured either by using sulfuric acid called the sulfate process or chlorine, which is known as the chloride process. In the sulfate process, the proposition of waste release is higher—China is the leading manufacturer of titanium dioxide globally. Most manufacturing plants utilize the sulfate process to manufacture titanium dioxide and dump a large amount of sulfuric acid into the seawater. Titanium dioxide itself is acidic, and its improper disposable method creates numerous environmental problems.

Trends: A major trend gaining pace in titanium dioxide is nanotechnology integration. Nanotechnology integration has emerged as a significant trend in the titanium dioxide market, revolutionizing its production and application processes. This trend involves the manipulation and utilization of materials at the nanoscale level, enabling enhanced properties and functionalities of titanium dioxide. Titanium dioxide nanoparticles exhibit unique characteristics due to their small size, such as increased surface area and improved reactivity. More trends in the market are believed to augment the growth of titanium dioxide market during the forecasted period include shift towards sustainable products and growing concept of digitalization.

Impact Analysis of COVID-19 and Way Forward:

The COVID-19 pandemic had a negative impact on the titanium dioxide market, causing disruptions in the supply chain, fluctuations in demand, production slowdowns, and shifts in consumer behavior. Lockdowns, travel restrictions, and labor shortages disrupted supply chains, leading to delays in raw material deliveries and increased transportation costs. Titanium dioxide manufacturers faced challenges in sourcing materials and components, resulting in production delays and higher costs. Additionally, key sectors like paints and coatings, automotive, and construction, which rely on titanium dioxide, saw reduced demand due to economic downturns and restrictions, affecting the market.

However, as the situation improved and economies began to recover in 2021 and beyond, there was a gradual rebound in the titanium dioxide market. The post-COVID era has seen an increased emphasis on sustainability and environmentally friendly practices. As sustainability becomes a key focus, industries using these applications could drive demand for titanium dioxide. Ongoing research and innovation in materials

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science could lead to the development of new applications for titanium dioxide. For instance, advancements in nanotechnology might open up new possibilities for its use in electronics, medical devices, and other high-tech industries.

Competitive Landscape and Recent Developments:

The titanium dioxide market is moderately consolidated with the presence of few number of players dominating worldwide. The top four players accounted for more than 50% of the total production volume for titanium dioxide in 2022. Prominent players are adopting strategies such as expansion, mergers & acquisitions, and partnerships to strengthen their market presence in various regions.

Key players of the titanium dioxide market are:

Ineos Group

Tronox Holdings Plc.

Kronos Worldwide, Inc.

The Chemours Company

Evonik Industries AG

Iluka Resources Limited

Venator Materials PLC

LB Group (Lomon Billions)

Ishihara Sangyo Kaisha, Ltd.

Kerala Minerals and Metals Ltd.

CNNC Hua Yuan Titanium Dioxide Co., Ltd

Companies in the industry continuously invest in research and development to improve their production processes, enhance product quality, and develop new applications.

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Innovations in manufacturing techniques and product formulations can provide a competitive edge. In January 2022, LB Group announced the investment of US$157.6 million at the Xiangyang site to construct a new 200ktpa titanium dioxide (TiO2) pigment finishing plant. Two TiO2 pigment finishing lines would be built, each with the ability to process 100ktpa TiO2 pigment intermediate product.

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