

Market Study: Titanium Dioxide (2nd ed.)



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Yours faithfully, Oliver Kutsch

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- **Obtain a more detailed picture of your segment**
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- **Have a look at the future**
Find out if new investments and technologies are worthwhile and how to gain access to future markets. We also show possible market scenarios
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Identify opportunities and risks on your target markets in time

This study is useful for:

- Manufacturers, suppliers and traders of ilmenite, leucoxene, natural and synthetic rutile, titanium slag, and pigments
- Producers of paints and varnishes, paper, plastics, printing inks, rubber, fibers, ceramics, catalysts, titanium
- Associations and institutes
- Executive board, technology and production, strategic planning, R&D, market research, marketing, sales and distribution, procurement

In this brochure you will find the following information:

- An introduction on page 3
- A summary of the table of contents on page 4
- Following this, there are example pages from the study
- Please use the form on the last page to easily order your copy or a free reading sample!

Titanium dioxide (TiO₂) is the most important pigment type for paints, varnishes, paper, and plastics and also needed, for example, for the production of glass, ceramics, and catalysts. The market research company Ceresana extensively analyzed the global market for titanium dioxide along the complete value-added chain already for the second time: from the feedstocks ilmenite, leucoxene, and rutile to the refined intermediates titanium slag and synthetic rutile up to the individual sales markets.

Ilmenite was by far the most important feedstock for the production of titanium dioxide in 2015 with an amount of over 11.2 million tonnes. This figure includes both the amount of ilmenite that was processed worldwide into end products such as pigments and also the amount that was needed for the production of titanium slag and synthetic rutile.

“Titanium dioxide” is the generic term for ilmenite, leucoxene, natural and synthetic rutile, as well as titanium slag. All of these products contain different amounts of titanium dioxide - depending on product type and country of origin. Ilmenite has a varying titanium dioxide content of between 38% and 60%. The content of natural and synthetic rutile is between 93% and 96% and of titanium slag between 81% and 95%. Worldwide, almost 8.7 million tonnes of pure titanium dioxide (100%) were available in 2015. Approximately 61% thereof were processed into pigments. For other end prod-

ucts, such as technically pure titanium, electrical conductors, and chemical intermediates, about 11% were utilized. About 28% were used for further refinement into synthetic rutile and titanium slag.

While only a few countries dominate the market for these feedstocks the processors in Asia-Pacific, North America, and Western Europe determine the demand. Thus, this report offers a detailed analysis of the amounts of production, demand, and trade of titanium dioxide pigments. Additionally, the most important sales markets thereof are examined. Here, application in paints and varnishes dominates with a market share of over 56%, followed by plastics, paper, and other pigment applications, for example food and sunscreen. Titanium dioxide is classified as the most important white pigment with the highest refractive index.

The Study in Brief:

Chapter 1 provides a depiction of the global market for titanium dioxide - including forecasts up to 2023. From the feedstocks ilmenite, rutile, and titanium slag up to the sales markets, information on the regions Western Europe, Eastern Europe, North America, South America, Asia-Pacific, the Middle East, and Africa is given.

Chapter 2 offers market data on the 17 most important countries: Data on demand, revenues, production, production capacity, import, and export is provided for each country. The

analysis starts with the feedstock situation (ilmenite, rutile, titanium slag) and then examines the demand for titanium dioxide per feedstock type and application (pigments, production of intermediates like synthetic rutile and titanium slag, and other applications). As a final step, the market for titanium dioxide pigments is analyzed: capacities, production, demand, trade, and application areas.

Chapter 3 examines the application areas of titanium dioxide pigments in detail: paints and varnishes, paper, plastics, and other applications. Data is split by the sales markets Western Europe, Eastern Europe, North America, South America, the Middle East, and Africa as well as the major countries.

Chapter 4 provides profiles of the largest manufacturers of titanium dioxide feedstock and pigments - clearly arranged according to contact details, revenues, profit, product range, production sites, capacities, and profile summary. In-depth profiles of 71 producers are given, for example of Henan Billions Chemicals Co., Ltd., Huntsman International LLC, Iluka Resources Ltd., Indian Rare Earths Ltd., Kenmare Resources plc, Kronos Worldwide Inc., Rio Tinto Group, The Chemours Company, The National Titanium Dioxide Company Ltd. (Cristal), and Tronox Limited.

1 Market Data

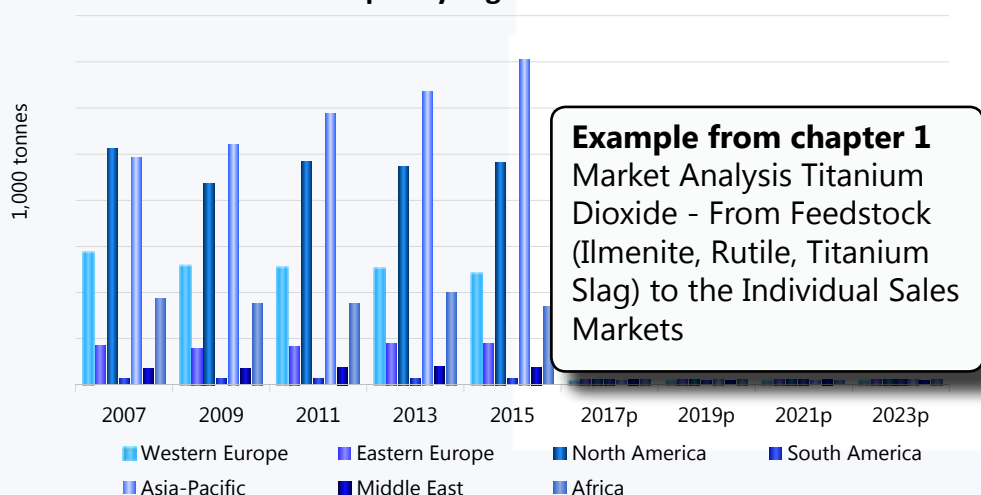
- 1.1 World
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 - 1.1.1.2 Demand
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Worldwide demand for Titanium dioxide from 2007 to 2023 – split by region

Ceresana



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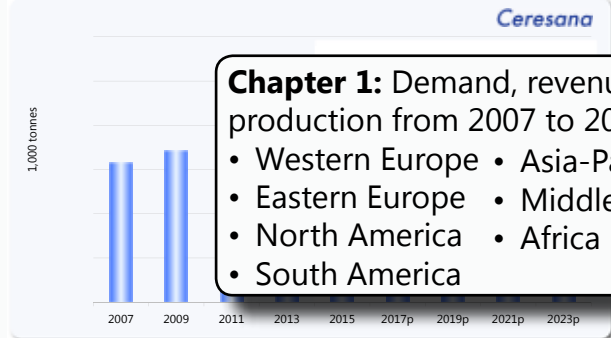
4 Company Profiles

- 4.1 Western Europe
 - Ireland (1 Producer)
 - United Kingdom (2)
- 4.2 Eastern Europe
 - Czechia (1)
 - Poland (1)
 - Slovenia (1)
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 - China (33)
 - India (9)
 - Japan (4)
 - South Korea (1)
 - Sri Lanka (1)
 - Vietnam (1)
- 4.5 Middle East
 - Saudi Arabia (1)
- 4.6 Africa
 - Sierra Leone (1)
 - South Africa (1)

1.8.1 Feedstock (Ilmenite / Rutile / Titanium Slag) - Africa

1.8.1.1 Production

In 2015, Africa produced about X million tonnes of feedstock. We forecast output to increase by X% p.a. until 2023. The highest growth will be generated by ilmenite. Its production will rise by X% p.a. from X million tonnes in 2015 to X million tonnes in 2023. Titanium slag will rank second with a production volume of X million tonnes and rutile will rank third with X tonnes.



Chapter 1: Demand, revenues & production from 2007 to 2023:

- Western Europe
- Eastern Europe
- North America
- South America
- Asia-Pacific
- Middle East
- Africa

Graph: Feedstock production in Africa from 2007 to 2023

in 1,000 tonnes	2007	2009	2011	2013	2015	2017p	2019p	2021p	2023p	2015 - 2023
Ilmenite	X	X	X	X	X	X	X	X	X	X% p.a.
Rutile	X	X	X	X	X	X	X	X	X	X% p.a.
Titanium Slag	X	X	X	X	X	X	X	X	X	X% p.a.
Total	X	X	X	X	X	X	X	X	X	X% p.a.

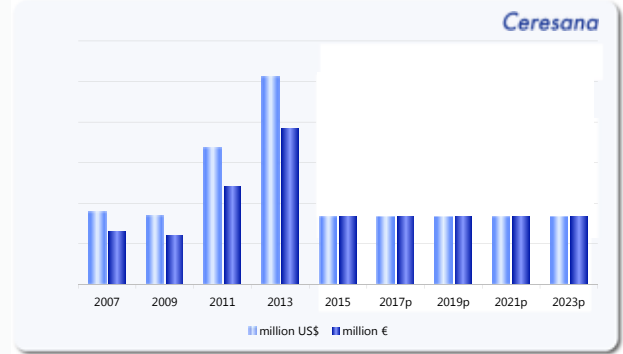
Table: Feedstock production in Africa from 2007 to 2023 – split by feedstock types

Country	Company	in tonnes
KEN	Base Resources Ltd.	Ilmenite: XXX
MDG	Rio Tinto Group	Rutile: XXX
SEN	TiZir Limited	Rutile and Leucocoxene: XXX
ZA	Richards Bay Minerals (RBM) - JV between Rio Tinto (X%), Blue Horizon (X%) and employees (X%)	Titanium Slag: XXX
...		

Table: Feedstock capacity in Africa in 2015 - split by producers

1.8.1.2 Demand and Revenues

Revenues generated with feedstock in Africa amounted to about USD X million in 2015. We forecast a growth rate of X% p.a. for the 2015 to 2023 period and expect a market value of approx. USD X million to be recorded in 2023. In 2015, about X million tonnes of feedstock were processed in Africa. Ilmenite was by far the most important product. Only X million tonnes of titanium slag were utilized.



Graph: Feedstock revenues in Africa from 2007 to 2023 in million USD and million EUR

2.5.3 India

2.5.3.1 Feedstock (Ilmenite / Rutile / Titanium Slag)

...

2.5.3.2 Titanium Dioxide

In 2015, about X tonnes of titanium dioxide in the form of ilmenite and X tonnes in the form of rutile were utilized. X tonnes of the overall X tonnes were used for the production of pigments, X tonnes for the production of synthetic rutile, and X tonnes for other applications. Total demand will increase by X% p.a. to X tonnes in 2023.

in 1,000 tonnes	2007	2009	2011	2013	2015	2017p	2019p	2021p	2023p	2015 - 2023
Ilmenite	X	X	X	X	X	X	X	X	X	X% p.a.
Rutile	X	X	X	X	X	X	X	X	X	X% p.a.
Titanium Slag	X	X	X	X	X	X	X	X	X	X% p.a.
Total	X	X	X	X	X	X	X	X	X	X% p.a.

Table: Titanium dioxide demand in India from 2007 to 2023 – split by feedstock types

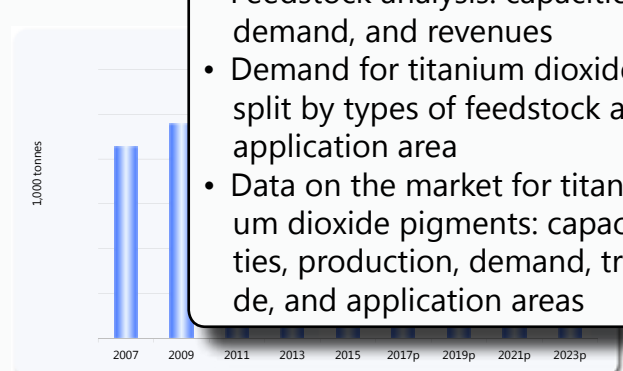
in 1,000 tonnes	2007	2009	2011	2013	2015	2017p	2019p	2021p	2023p	2015 - 2023
Pigments	X	X	X	X	X	X	X	X	X	X% p.a.
Other Applications	X	X	X	X	X	X	X	X	X	X% p.a.
Synthetic Rutile / Titanium Slag	X	X	X	X	X	X	X	X	X	X% p.a.
Total	X	X	X	X	X	X	X	X	X	X% p.a.

Table: Titanium dioxide demand in India from 2007 to 2023 – split by application

2.5.3.3 Titanium Dioxide Pigments

Production volume of titanium dioxide pigments rose to more than X tonnes in 2015. We forecast output to increase by X% p.a. in the upcoming eight years. Accordingly, production volume will rise to approx. X tonnes in 2023. Indian foreign trade with titanium dioxide pigments mainly consists of imports, amounting to approx. X tonnes in 2015. About X tonnes were exported. The company Kerala Minerals and Metals Limited plans to expand its titanium dioxide pigment capacity by X tonnes in 2017.

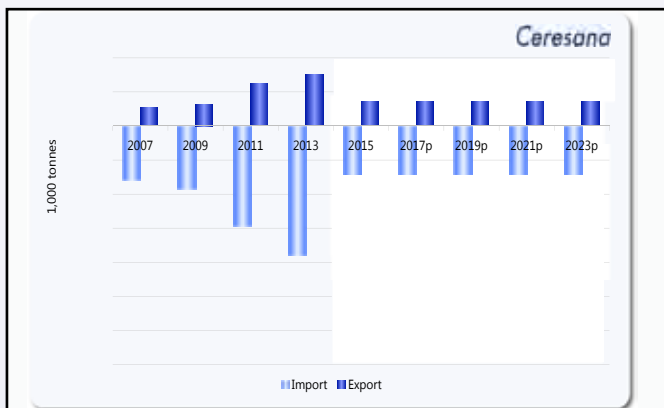
The most important application area for titanium dioxide pigments in 2015 was the segment paints and varnishes. Demand for plastics ranked second, followed by paper. For the upcoming eight years, we forecast highly dynamic growth rates for the plastics industry in particular. The areas paints and varnishes growth rates of X% and X%.



Graph: Production of titanium dioxide pigments in India from 2007 to 2023

Chapter 2: Market data at a global level and of 17 countries:

- Feedstock analysis: capacities, demand, and revenues
- Demand for titanium dioxide split by types of feedstock and application area
- Data on the market for titanium dioxide pigments: capacities, production, demand, trade, and application areas



Graph: Import and export of titanium dioxide pigments in India from 2007 to 2023

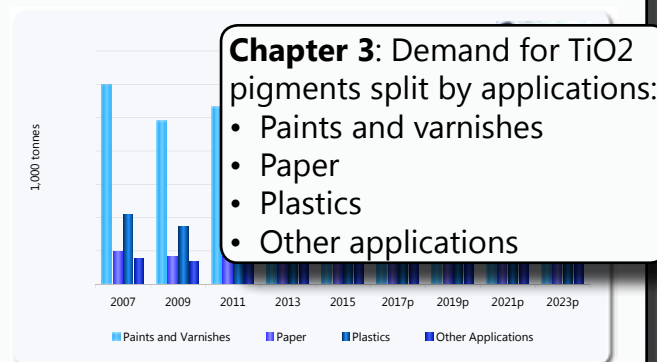
Company	in tonnes
Kerala Minerals and Metals Limited	XXX
Travancore Titanium Product Ltd.	XXX
Beach Mineral Company India Ltd.	XXX
V.V. Mineral Ltd.	XXX
Kolmak Chemicals Ltd.	XXX
Total	XXX

Table: Titanium dioxide pigment capacity in India in 2015 – split by producers

3 Applications: Titanium Dioxide Pigments

3.4 North America

Demand for titanium dioxide pigments in North America increased to X tonnes in 2015. About X tonnes thereof were processed in paints and varnishes, that is approx. X %. Demand in the production of plastics ranked second. The most dynamic relative increase in the upcoming eight years is expected for the demand on the part of the producers of plastics. Market volume of titanium dioxide pigments in this segment is likely to rise to approx. X tonnes in 2023. An only moderate increase of X% p.a. is expected for the segment paper. We forecast total demand to increase by, on average, X% p.a. in the upcoming eight year period. Accordingly, market volume will amount to approx. X million tonnes of titanium dioxide pigments in 2023.



Graph: Demand for titanium dioxide pigments in North America from 2007 to 2023 – split by application

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Financial Key Data (in million USD)

Year	Net Income	Total Revenues
2015	-307	2112
2014	-417	1737
2013	-90	1922
2012	-	1133
2012	-	1832

General Information about the Company

2015 sales divided by business segments

TiO2	71%
Alkali	29%

2015 sales divided by regions

North America	44%
APAC	23%
EMEA	18%
LATAM	15%

Production Sites	The company's production sites are located in: <ul style="list-style-type: none"> • Hamilton, MS, USA • Henderson, NV, USA • Botlek, the Netherlands • Perth, Australia • KwaZulu-Natal, South Africa (KZN Sands) • Namakwa, South Africa (Namakwa Sands) • The company owns further facilities in South Africa, Australia, and the USA.
Profile Summary	Tronox Limited was formed in 2011 for the purpose of the combination of Tronox Incorporated and 74% of Exxaro Resources Ltd. Tronox employs approximately 3,800 direct employees and 600 contractors in 20 locations all around the world (December 31, 2015). The enterprise holds total assets amounting to USD 5.1 billion and is listed on the New York Stock Exchange. The expenses for research and development totaled USD 13 million in 2015. In the same year, Tronox acquired the Alkali Chemical Division of FMC Corporation in an USD 1.64 billion cash transaction. Tronox has maintained an ISO 14001 certified Environmental Management System.
Specific Information about Titanium Dioxide	
Product Details	The company mines and processes titanium ore and manufactures several grades of titanium dioxide through its vertically integrated business Titanium Dioxide. It is used for paints, coatings, paper, plastics, and printing inks. Tronox produces its titanium dioxide with proprietary chloride process technology. The company plans to close its rutile and ilmenite production sites near Richards Bay and in the same year it will open new plants in Fairbreeze.
Associated Companies	n. a.

Chapter 4: Data and facts on 93 producers, clearly arranged by:

- Financial key data
- Production sites & capacities
- Profile summary
- Product details

Site / Plant – TiO2 (current)	Capacity (tonnes/year)	
Hamilton, MS; USA		
Site / Plant – Ilmenite (current)	Capacity (tonnes/year)	
Site / Plant – Ilmenite (planned)	Start-Up	Capacity (tonnes/year)
	Closure 2016	
	2016	
Site / Plant – Rutile (current)	Capacity (tonnes/year)	
Site / Plant – Rutile (planned)	Start-Up	Capacity (tonnes/year)
	Closure 2016	
	2016	
Site / Plant – Synthetic Rutile (current)	Capacity (tonnes/year)	
Site / Plant – Titanium Slag (current)	Capacity (tonnes/year)	
Site / Plant – Leuc		

Chapter 4: Detailed profiles of the most important manufacturers, such as Chemours, Cristal, Henan Billions, Huntsman, Iluka Resources, Indian Rare Earths, Kenmare Resources, Kronos, Rio Tinto & Tronox.

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