

TITANIUM AND TITANIUM DIOXIDE¹

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Titanium sponge metal was produced by three operations in Nevada and Utah. Owing to the dominance of two producers, production data were withheld to avoid disclosing company proprietary data. Titanium ingot was produced by 10 operations in 8 States. Domestic and imported ingot was consumed by numerous firms to produce wrought products and castings. In 2016, an estimated 79% of titanium metal was used in aerospace applications. The remaining 21% was used in armor, chemical processing, marine hardware applications, medical implants, power generation, sporting goods, and other applications. Assuming an average purchase price of \$8.05 per kilogram, the value of sponge metal consumed was about \$258 million.

In 2015, titanium dioxide (TiO₂) pigment production, by four companies operating five facilities in four States, was valued at about \$2.6 billion. The estimated end-use distribution of TiO₂ pigment consumption was paints (including lacquers and varnishes), 60%; plastics, 28%; paper, 5%; and other, 7%. Other uses of TiO₂ included catalysts, ceramics, coated fabrics and textiles, floor coverings, printing ink, and roofing granules.

Salient Statistics—United States:	2012	2013	2014	2015	2016^e
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	33,600	19,900	17,700	20,700	14,400
Exports	1,420	1,860	2,220	1,650	600
Consumption, reported	35,100	26,500	26,400	31,200	34,000
Price, dollars per kilogram, yearend	11.78	11.57	11.00	9.83	8.05
Stocks, industry yearend ^e	18,100	25,200	22,900	25,000	29,000
Employment, number ^e	300	300	300	300	150
Net import reliance ² as a percentage of reported consumption	71	44	58	61	41
Titanium dioxide pigment:					
Production	1,140,000	1,280,000	1,260,000	1,220,000	1,200,000
Imports for consumption	203,000	213,000	224,000	221,000	235,000
Exports	624,000	670,000	685,000	648,000	664,000
Consumption, apparent ³	722,000	826,000	802,000	792,000	771,000
Producer price index, yearend	268	236	224	176	150
Employment, number ^e	3,400	3,400	3,400	3,100	3,100
Net import reliance ² as a percentage of apparent consumption	E	E	E	E	E

Recycling: About 53,000 tons of scrap metal was recycled by the titanium industry in 2015. Estimated consumption of titanium scrap by the steel industry was about 9,760 tons; by the superalloy industry, 500 tons; and by other industries, 1,300 tons.

Import Sources (2012–15): Sponge metal: Japan, 61%; Kazakhstan, 20%; China, 9%; and other, 10%. Titanium dioxide pigment: Canada, 32%; China, 23%; Germany, 10%; and other, 35%.

Tariff: Item	Number	Normal Trade Relations 12–31–16
Titanium oxides (unfinished TiO ₂ pigments)	2823.00.0000	5.5% ad val.
TiO ₂ pigments, 80% or more TiO ₂	3206.11.0000	6.0% ad val.
TiO ₂ pigments, other	3206.19.0000	6.0% ad val.
Ferrotitanium and ferrosilicon titanium	7202.91.0000	3.7% ad val.
Unwrought titanium metal	8108.20.0000	15.0% ad val.
Titanium waste and scrap metal	8108.30.0000	Free.
Other titanium metal articles	8108.90.3000	5.5% ad val.
Wrought titanium metal	8108.90.6000	15.0% ad val.

Depletion Allowance: Not applicable.

Government Stockpile: None.

TITANIUM AND TITANIUM DIOXIDE

Events, Trends, and Issues: Domestic consumption of titanium sponge in 2016 was estimated to have increased by about 10% from that of 2015 owing to increased demand by the aerospace industry. In August, the operator of the titanium sponge plant in Rowley, UT, announced that it would idle the facility by the end of 2016 owing to global overcapacity and its ability to secure aerospace quality sponge under long-term supply agreements at prices lower than production costs at Rowley. The facility was to be idled so that it could be restarted if supported by market conditions. An additive manufacturing (3D printing) metal powder plant optimized for the production of aerospace parts opened near Pittsburgh, PA, and a separate company announced plans to commission an additive manufacturing plant for manufacturing aerospace structural components from titanium powder in Plattsburgh, NY, by yearend 2017.

Domestic production of TiO₂ pigment in 2016 was estimated to be about 1.20 million tons, essentially unchanged from that of 2015. The leading global producer of TiO₂ pigments started a new production line at its chloride-route plant in Altamira, Mexico, which was expected to increase capacity by 200,000 tons per year. In South Africa, a 25,000-ton-per-year pigment plant was closed owing to the age of the plant and low profit margins. The operator was preparing to spin off its other TiO₂ pigment plant holdings into a separate company.

World Sponge Metal Production and Sponge and Pigment Capacity:

	Sponge production		Capacity 2016 ⁴	
	2015	2016 ^e	Sponge	Pigment
United States	W	W	24,500	1,340,000
Australia	—	—	—	260,000
Belgium	—	—	—	87,000
Canada	—	—	—	102,000
China ^e	62,000	60,000	110,000	2,940,000
Finland	—	—	—	130,000
France	—	—	—	33,000
Germany	—	—	—	456,000
India	500	500	—	108,000
Italy	—	—	—	80,000
Japan ^e	42,000	54,000	68,800	314,000
Kazakhstan ^e	9,000	9,000	26,000	1,000
Mexico	—	—	—	300,000
Russia ^e	40,000	38,000	46,500	20,000
Ukraine ^e	7,700	7,500	12,000	120,000
United Kingdom	—	—	—	300,000
Other countries	—	—	—	822,000
World total (rounded)	⁵ 160,000	⁵ 170,000	290,000	7,400,000

World Resources:⁶ The commercial feedstocks for titanium and titanium dioxide are the titanium minerals, ilmenite, leucoxene, rutile, slag, and synthetic rutile. Resources and reserves of titanium minerals are discussed in the “Titanium Mineral Concentrates” chapter of this publication.

Substitutes: Few materials possess titanium metal’s strength-to-weight ratio and corrosion resistance. In high-strength applications, titanium competes with aluminum, composites, intermetallics, steel, and superalloys. Aluminum, nickel, specialty steels, and zirconium alloys may be substituted for titanium for applications that require corrosion resistance. Ground calcium carbonate, precipitated calcium carbonate, kaolin, and talc compete with titanium dioxide as a white pigment.

^eEstimated. E Net exporter. W Withheld to avoid disclosing company proprietary data. — Zero.

¹See also Titanium Mineral Concentrates.

²Defined as imports – exports.

³Defined as production + imports – exports.

⁴Yearend operating capacity.

⁵Excludes U.S. production.

⁶See [Appendix C](#) for resource and reserve definitions and information concerning data sources.