

TITANIUM AND TITANIUM DIOXIDE¹

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Titanium sponge metal was produced by two operations in Nevada and Utah. Production data were withheld to avoid disclosing company proprietary data. The facility in Salt Lake City, UT, with an estimated capacity of 500 tons per year, used the Armstrong method to produce high-purity titanium for use in electronics. The operations in Nevada, with an estimated capacity of 12,600 tons per year, used the Kroll method, the dominant process of titanium sponge production for use in aerospace, industrial, and all other applications. A third facility, in Rowley, UT, which produced titanium sponge using the Kroll method, was idled and placed on care-and-maintenance status in 2016 owing to low titanium sponge prices.

In 2018, an estimated 80% of titanium metal was used in aerospace applications; the remaining 20% was used in armor, chemical processing, marine hardware, medical implants, power generation, and consumer and other applications. Assuming an average purchase price of \$9.10 per kilogram, the value of sponge metal consumed was about \$309 million.

In 2018, titanium dioxide (TiO₂) pigment production, by four companies operating five facilities in four States, was valued at about \$3.0 billion. The estimated end-use distribution of TiO₂ pigment consumption was paints (including lacquers and varnishes), 69%; plastics, 25%; paper, 5%; and other, 1%. Other uses of TiO₂ included catalysts, ceramics, coated fabrics and textiles, floor coverings, printing ink, and roofing granules.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	17,700	20,700	16,200	24,100	23,000
Exports	2,590	1,700	724	3,130	600
Consumption, reported	26,400	31,200	34,100	37,400	34,000
Price, dollars per kilogram, yearend	10.00	9.40	9.50	9.70	9.10
Stocks, industry, yearend ^e	22,900	25,000	25,100	13,200	10,000
Employment, number ^e	300	300	150	150	150
Net import reliance ² as a percentage of reported consumption	57	61	45	88	75
Titanium dioxide pigment:					
Production	1,260,000	1,220,000	1,240,000	1,260,000	1,200,000
Imports for consumption	224,000	221,000	247,000	239,000	270,000
Exports	685,000	649,000	651,000	634,000	550,000
Consumption, apparent ³	802,000	792,000	840,000	870,000	920,000
Producer price index (1982=100), yearend ⁴	224	176	175	205	217
Employment, number ^e	3,400	3,110	3,110	3,110	3,050
Net import reliance ² as a percentage of apparent consumption	E	E	E	E	E

Recycling: About 61,500 tons of titanium scrap metal was consumed in 2018—50,000 tons by the titanium industry, 9,800 tons by the steel industry, 600 tons by the superalloy industry, and 1,100 tons by other industries.

Import Sources (2014–17): Sponge metal: Japan, 81%; Kazakhstan, 7%; Ukraine, 7%; China, 3%; and other, 2%. Titanium dioxide pigment: Canada, 34%; China, 24%; Germany, 10%; Mexico, 4%; and other, 28%.

Tariff:	Item	Number	Normal Trade Relations
			12–31–18
	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	8108.20.0010	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.

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Depletion Allowance: Not applicable.

Government Stockpile: None.

Events, Trends, and Issues: Domestic consumption of titanium sponge in 2018 was estimated to have decreased by about 9% from that of 2017, owing to continued demand from the aerospace industry. Additive manufacturing (3D printing) techniques for aerospace applications continued to progress.

In May 2018, the U.S. Department of the Interior, in coordination with other executive branch agencies, published a list of 35 critical minerals (83 FR 23295), including titanium. This list was developed to serve as an initial focus, pursuant to Executive Order 13817, “A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals” (82 FR 60835).

In Yanbu, Saudi Arabia, the first batch of titanium sponge was produced in August. The Yanbu facility was jointly owned by a Saudi Arabian industrial company and a Japanese titanium producer. The plant was expected to have a capacity of 15,600 tons per year.

Domestic production of TiO₂ pigment in 2018 was estimated to be about 1.2 million tons, a decrease from that of 2017. A proposed merger between two major TiO₂ pigment producers was delayed pending approval from U.S. regulators. If approved, the combined company operations would have a capacity of 1.3 million tons per year and would be the largest global producer of TiO₂ pigments. In Pori, Finland, a 130,000-ton-per-year pigment plant was shut down after experiencing fire damage in 2017. In 2018, the plant resumed operations and was producing at a rate of approximately 25,000 tons per year. In September, the owner announced its intention to close the facility by yearend 2021.

World Sponge Metal Production and Sponge and Pigment Capacity:

	Sponge production		Capacity 2018 ⁵	
	2017	2018 ^e	Sponge	Pigment
United States	W	W	13,100	1,370,000
Australia	—	—	—	260,000
Canada	—	—	—	104,000
China ^e	72,000	70,000	110,000	3,250,000
Germany	—	—	—	472,000
India	500	500	500	108,000
Japan ^e	51,000	52,000	68,800	314,000
Kazakhstan ^e	9,000	9,000	26,000	1,000
Mexico	—	—	—	300,000
Russia ^e	40,000	40,000	46,500	55,000
Saudi Arabia	—	500	15,600	210,000
Ukraine ^e	8,000	8,000	12,000	120,000
United Kingdom	—	—	—	315,000
Other countries	—	—	—	784,000
World total (rounded)	⁶ 181,000	⁶ 180,000	293,000	7,660,000

World Resources: Reserves and resources of titanium minerals are discussed in the Titanium Mineral Concentrates chapter.

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.

⁴U.S. Department of Labor, Bureau of Labor Statistics.

⁵Yearend operating capacity.

⁶Excludes U.S. production.