

## TITANIUM AND TITANIUM DIOXIDE<sup>1</sup>

(Data in metric tons unless otherwise noted)

**Domestic Production and Use:** Titanium sponge metal was produced by one operation in 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, produced titanium that was further refined for use in electronics. A second sponge facility in Henderson, NV, with an estimated capacity of 12,600 tons per year, was idled since 2020 owing to market conditions. A third facility, in Rowley, UT, with an estimated capacity of 10,900 tons per year, has remained on care-and-maintenance status since 2016.

Although detailed 2022 consumption data were withheld to avoid disclosing proprietary data, the majority of titanium metal was used in aerospace applications, and the remainder was used in armor, chemical processing, marine hardware, medical implants, power generation, and consumer other applications. The value of imported sponge was about \$250 million, a significant increase compared with \$148 million in 2021.

In 2022, titanium dioxide (TiO<sub>2</sub>) pigment production, by four companies operating five facilities in four States, was valued at about \$3.4 billion. The leading uses of TiO<sub>2</sub> pigment were, in descending order, paints (including lacquers and varnishes), plastics, and paper. Other uses of TiO<sub>2</sub> pigment included catalysts, ceramics, coated fabrics and textiles, floor coverings, printing ink, and roofing granules.

<b>Salient Statistics—United States:</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022<sup>e</sup></b>
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption <sup>e</sup>	23,700	30,000	19,200	16,000	28,000
Exports	533	869	711	117	120
Consumption, apparent <sup>2</sup>	W	W	W	<sup>3</sup> 16,000	<sup>3</sup> 28,000
Consumption, reported	35,200	W	W	W	W
Price, dollars per kilogram <sup>4</sup>	10.70	10.70	10.60	11.20	11
Stocks, industry, yearend <sup>e</sup>	10,700	W	W	W	W
Employment, number <sup>e</sup>	150	150	150	20	20
Net import reliance <sup>5</sup> as a percentage of apparent consumption	>50	>50	>50	>95	>95
TiO <sub>2</sub> pigment:					
Production	1,150,000	1,000,000	1,000,000	1,100,000	1,100,000
Imports for consumption	268,000	226,000	262,000	251,000	260,000
Exports	528,000	401,000	386,000	494,000	420,000
Consumption, apparent <sup>2</sup>	890,000	825,000	876,000	857,000	940,000
Price, dollars per metric ton <sup>4</sup>	2,730	2,750	2,710	2,920	3,400
Producer price index (1982=100), yearend <sup>6</sup>	205	NA	NA	NA	NA
Employment, number <sup>e</sup>	3,050	3,050	3,100	3,200	3,200
Net import reliance <sup>5</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** Owing to limited responses from voluntary surveys, consumption data of titanium scrap metal for the titanium metal industry were withheld. Consumption data of titanium scrap for the steel, superalloy, and other industries were not available.

**Import Sources (2018–21):** Sponge metal: Japan, 89%; Kazakhstan, 9%; Ukraine, 1%, and other, 1%. TiO<sub>2</sub> pigment: Canada, 42%; China, 16%; Germany, 10%; Belgium, 5%; and other, 27%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–22</b>
Titanium oxides (unfinished TiO <sub>2</sub> pigments)	2823.00.0000		5.5% ad valorem.
TiO <sub>2</sub> pigments, 80% or more TiO <sub>2</sub>	3206.11.0000		6% ad valorem.
TiO <sub>2</sub> pigments, other	3206.19.0000		6% ad valorem.
Ferrotitanium and ferrosilicon titanium	7202.91.0000		3.7% ad valorem.
Unwrought titanium metal	8108.20.0000		15% ad valorem.
Titanium waste and scrap metal	8108.30.0000		Free.
Other titanium metal articles	8108.90.3000		5.5% ad valorem.
Wrought titanium metal	8108.90.6000		15% ad valorem.

**Depletion Allowance:** Not applicable.

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**Government Stockpile:** None.

**Events, Trends, and Issues:** The 500-ton-per-year Salt Lake City, UT, plant was the only active domestic producer of titanium sponge, and the Salt Lake City operations primarily supported the production of electronic-grade materials. Consequently, U.S. producers of titanium ingot and downstream products were reliant on imports of titanium sponge and scrap. Rebounding demand from the aerospace and other industries resulted in a 75% increase in imports of titanium sponge compared with those in 2021. Japan (82%), Kazakhstan (9%), and Saudi Arabia (7%) were the leading import sources for titanium sponge in 2022. U.S. imports of titanium scrap were about 17,000 tons. The United Kingdom and Germany (14% each), France (11%), Canada (10%), and Japan (9%) were the leading import sources for titanium waste and scrap in 2022. In 2022, the annual average duty-paid unit value of scrap imports was about \$7.50 per kilogram compared with \$4.80 per kilogram in 2021. In 2022, several companies were planning to expand domestic downstream production capacity. In Pennsylvania, one company was adding 7,300 metric tons per year of ingot melting capacity as well as additional forging capabilities. Another company planned to construct a new melt facility in West Virginia, although the annual capacity was not yet available. A third company expected to complete an initial 125 tons per year of titanium powder capacity using new technology and recycled metal feedstock. Following the onset of the conflict between Russia and Ukraine, major European and domestic aerospace consumers of titanium were seeking alternative sources of supply. Prior to the conflict, Ukraine was the leading source of titanium mineral concentrates supplying Russia's titanium metal industry.

Domestic production of  $TiO_2$  pigment in 2022 was an estimated 1.1 million tons. Although heavily reliant on imports of titanium mineral concentrates, the United States was a net exporter of  $TiO_2$  pigments. Exports of  $TiO_2$  pigments decreased in 2022 while imports increased.

### **World Sponge Metal Production and Sponge and Pigment Capacity:**

	Sponge production <sup>e</sup>		Capacity, 2022 <sup>7</sup>	
	2021	2022	Sponge	Pigment
United States	W	W	500	1,370,000
Australia	—	—	—	260,000
Canada	—	—	—	104,000
China	140,000	150,000	181,000	5,000,000
Germany	—	—	—	472,000
India	250	250	500	108,000
Japan	49,200	50,000	68,800	322,000
Kazakhstan	15,000	16,000	26,000	1,000
Mexico	—	—	—	300,000
Russia	27,000	25,000	46,500	55,000
Saudi Arabia	5,700	11,000	15,600	210,000
Ukraine	6,100	1,000	12,000	120,000
United Kingdom	—	—	—	315,000
Other countries	—	—	—	784,000
World total (rounded)	8240,000	8260,000	350,000	9,400,000

**World Resources:**<sup>9</sup> 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.

<sup>e</sup>Estimated. E Net exporter. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

<sup>1</sup>See also the Titanium Mineral Concentrates chapter.

<sup>2</sup>Defined as production + imports – exports.

<sup>3</sup>Excludes domestic production of sponge in Utah.

<sup>4</sup>Landed duty-paid value based on U.S. imports for consumption.

<sup>5</sup>Defined as imports – exports.

<sup>6</sup>Source: U.S. Department of Labor, Bureau of Labor Statistics.

<sup>7</sup>Yearend operating capacity.

<sup>8</sup>Excludes U.S. production.

<sup>9</sup>See Appendix C for resource and reserve definitions and information concerning data sources.