

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

(Data in metric tons unless otherwise noted)

**Domestic Production and Use:** Titanium sponge metal was produced by three operations in Nevada and Utah, and 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 2014, an estimated 75% of titanium metal was used in aerospace applications. The remaining 25% was used in armor, chemical processing, marine hardware applications, medical implants, power generation, sporting goods, and other applications. Assuming an average purchase price of \$11.20 per kilogram, the value of sponge metal consumed was about \$280 million.

In 2014, titanium dioxide (TiO<sub>2</sub>) pigment, which was produced by four companies at six facilities in five States, was valued at about \$4.4 billion. The estimated end-use distribution of TiO<sub>2</sub> pigment consumption was paint (includes lacquers and varnishes), 62%; plastic, 24%; paper, 11%; and other, 3%. Other uses of TiO<sub>2</sub> included catalysts, ceramics, coated fabrics and textiles, floor coverings, printing ink, and roofing granules.

<b>Salient Statistics—United States:</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014<sup>e</sup></b>
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	20,500	33,800	33,600	19,900	15,300
Exports	293	256	1,420	1,860	2,490
Consumption, reported	34,900	48,400	35,100	24,600	25,000
Price, dollars per kilogram, yearend	9.62	10.35	11.78	11.57	11.20
Stocks, industry yearend <sup>e</sup>	10,500	10,800	18,100	25,200	24,300
Employment, number <sup>e</sup>	300	300	300	300	300
Net import reliance <sup>2</sup> as a percentage of reported consumption	72	69	71	44	51
Titanium dioxide:					
Production	1,320,000	1,290,000	1,140,000	1,280,000	1,310,000
Imports for consumption	204,000	200,000	203,000	213,000	235,000
Exports	758,000	789,000	624,000	670,000	685,000
Consumption, apparent <sup>3</sup>	767,000	706,000	722,000	826,000	860,000
Producer price index, yearend	194	268	268	236	237
Employment, number <sup>e</sup>	3,400	3,400	3,400	3,400	3,400
Net import reliance <sup>2</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** About 50,000 tons of scrap metal was recycled by the titanium industry in 2014. Estimated use of titanium scrap by the steel industry was about 11,000 tons; by the superalloy industry, 1,100 tons; and in other industries, 1,000 tons.

**Import Sources (2010–13):** Sponge metal: Japan, 54%; Kazakhstan, 24%; China, 12%; and other, 10%. Titanium dioxide pigment: Canada, 39%; China, 19%; Germany, 7%; and other, 35%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–14</b>
	Titanium oxides (unfinished TiO <sub>2</sub> pigments)	2823.00.0000	5.5% ad val.
	TiO <sub>2</sub> pigments, 80% or more TiO <sub>2</sub>	3206.11.0000	6.0% ad val.
	TiO <sub>2</sub> 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 production of TiO<sub>2</sub> pigment was 1.31 million tons, a 2% increase compared with that in 2013. Domestic consumption was estimated to have increased by 5% in 2014 due to increased housing starts and new home sales. In China, a new chloride-route pigment plant was scheduled to begin production in the first quarter of 2015 with a capacity of 100,000 tons per year. In Mexico, a new chloride-route pigment plant was scheduled to begin production in 2016 with a capacity of 200,000 tons per year.

Domestic consumption of titanium sponge in 2014 was estimated to be essentially unchanged from that of 2013. Although titanium sponge consumption and end-of-year stocks in 2014 remained at levels close to those in 2013, imports of titanium sponge decreased by about 23% from those in 2012 owing to a slowdown in aircraft production. Due to progress made in certifying the titanium sponge product at its new plant in Rowley, UT, one of the three U.S. producers of titanium sponge permanently closed its older titanium sponge plant in Albany, OR, which had been idle since 2009, the same year the new plant in Rowley became operational. The completion of the premium quality certification process at Rowley was expected to be complete in 2015 and would enable the plant to produce titanium sponge for use in rotating jet engine parts.

Excluding domestic production, global production of titanium sponge in 2014 was estimated to have decreased by 8% owing to overcapacity and increased inventories. One of the two Japanese sponge producers announced joint venture plans with a Saudi Arabia-based pigment company to construct a new titanium sponge plant in Yanbu, Saudi Arabia. The plant, located adjacent to a titanium dioxide pigment plant, was expected to begin production in 2017 and have a capacity of 15,600 tons per year.

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

	Sponge production		Capacity 2014 <sup>4</sup>	
	2013	2014 <sup>e</sup>	Sponge	Pigment
United States	W	W	24,000	1,470,000
Australia	—	—	—	280,000
Belgium	—	—	—	74,000
Canada	—	—	—	100,000
China <sup>e</sup>	105,000	110,000	114,000	2,000,000
Finland	—	—	—	130,000
France	—	—	—	125,000
Germany	—	—	—	440,000
Italy	—	—	—	80,000
Japan <sup>e</sup>	42,000	25,000	57,000	310,000
Kazakhstan <sup>e</sup>	12,000	9,000	27,000	1,000
Mexico	—	—	—	130,000
Russia <sup>e</sup>	44,000	42,000	46,500	20,000
Spain	—	—	—	80,000
Ukraine <sup>e</sup>	6,300	6,000	10,000	120,000
United Kingdom	—	—	—	300,000
Other countries	—	—	—	900,000
World total (rounded)	<sup>5</sup> 209,000	<sup>5</sup> 192,000	279,000	6,560,000

**World Resources:**<sup>6</sup> Resources and reserves of titanium minerals are discussed under Titanium Mineral Concentrates. The commercial feedstocks for titanium are ilmenite, leucoxene, rutile, slag, and synthetic rutile.

**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. W Withheld to avoid disclosing company proprietary data. — Zero.

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

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

<sup>3</sup>Defined as production + imports – exports.

<sup>4</sup>Yearend operating capacity.

<sup>5</sup>Excludes U.S. production.

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