

## 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. Titanium ingot was produced by 10 operations in 8 States and consumed by numerous firms to produce wrought products and castings. In 2013, an estimated 73% of the titanium metal was used in aerospace applications. The remaining 27% was used in armor, chemical processing, marine, medical, power generation, sporting goods, and other nonaerospace applications. The value of sponge metal consumed was about \$335 million, assuming an average selling price of \$13.60 per kilogram.

In 2013, titanium dioxide (TiO<sub>2</sub>) pigment, which was valued at about \$4.0 billion, was produced by four companies at six facilities in five States. The estimated use of TiO<sub>2</sub> pigment by end use was paint (includes lacquers and varnishes), 60%; plastic, 25%; paper, 10%; and other, 5%. 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>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013<sup>e</sup></b>
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	16,600	20,500	33,800	33,600	18,600
Exports	820	293	256	1,420	1,130
Consumption, reported	W	34,900	48,400	35,100	24,600
Price, dollars per kilogram, yearend	15.58	10.74	9.93	11.31	13.60
Stocks, industry yearend <sup>e</sup>	15,300	10,500	10,800	18,100	24,400
Employment, number <sup>e</sup>	300	300	300	300	300
Net import reliance <sup>2</sup> as a percentage of reported consumption	W	72	69	71	45
Titanium dioxide:					
Production	1,230,000	1,320,000	1,290,000	1,140,000	1,200,000
Imports for consumption	175,000	204,000	200,000	203,000	210,000
Exports	649,000	758,000	789,000	624,000	650,000
Consumption, apparent	757,000	767,000	706,000	719,000	760,000
Producer price index, yearend	164	194	268	268	248
Employment, number <sup>e</sup>	3,800	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 45,000 tons of scrap metal was recycled by the titanium industry in 2013. 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 (2009–12):** Sponge metal: Japan, 48%; Kazakhstan, 34%; China, 10%; and other, 8%. Titanium dioxide pigment: Canada, 41%; China, 17%; Germany, 6%; and other, 36%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–13</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.

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**Events, Trends, and Issues:** Domestic production of TiO<sub>2</sub> pigment was 1.20 million tons, a 5% increase compared with that in 2012. Imports in 2013 were expected to increase slightly over those of 2012. Exports in 2013 were also expected to increase over those of 2012 but remain considerably lower than the record-high export level of 2011.

In October, one of the leading global producers of TiO<sub>2</sub> pigment announced that it expected to complete the spinoff of its performance chemical division into a separate company within 18 months. In Ukraine, a new 120,000-ton-per-year pigment plant was expected to be constructed in the Crimea by 2015, and capacity at an existing plant in the same region was to increase to 120,000 tons per year from 40,000 tons per year. In Canada, a new 50,000-ton-per-year pigment plant in Quebec was expected to be constructed by 2015. In Singapore, a 54,000-ton-per-year pigment plant was closed owing to reduced demand and an increase in feedstock prices.

Although domestic consumption of titanium sponge in 2013 decreased by 30% from that of the previous year, shipments of titanium mill products in 2013 increased by 44% from those of 2012 owing to increased demand from the commercial aerospace industry. Several agreements were signed between aircraft and aircraft engine manufacturers with titanium metal and parts producers to ensure titanium supply. In Helena, MT, a major aerospace manufacturer announced plans to increase its titanium machining capacity for the manufacture of titanium airframe components. In South Africa, a pilot program was begun to develop the technology to refine titanium powder from titanium tetrachloride and was expected to produce 500 tons per year by 2017.

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

	Sponge production		Capacity 2013 <sup>3</sup>	
	2012	2013 <sup>e</sup>	Sponge	Pigment
United States	W	W	24,000	1,470,000
Australia	—	—	—	281,000
Belgium	—	—	—	74,000
Canada	—	—	—	104,000
China <sup>e</sup>	80,000	100,000	114,000	2,000,000
Finland	—	—	—	130,000
France	—	—	—	125,000
Germany	—	—	—	440,000
Italy	—	—	—	80,000
Japan <sup>e</sup>	40,000	40,000	62,200	309,000
Kazakhstan <sup>e</sup>	25,000	27,000	27,000	1,000
Mexico	—	—	—	130,000
Russia <sup>e</sup>	44,000	45,000	46,500	20,000
Spain	—	—	—	80,000
Ukraine <sup>e</sup>	10,000	10,000	10,000	120,000
United Kingdom	—	—	—	300,000
Other countries	—	—	—	900,000
World total (rounded)	<sup>4</sup> 200,000	<sup>4</sup> 222,000	284,000	6,560,000

**World Resources:**<sup>5</sup> Resources and reserves of titanium minerals are discussed under Titanium Mineral Concentrates. The commercial feedstock sources 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 + adjustments for Government and industry stock changes.

<sup>3</sup>Yearend operating capacity.

<sup>4</sup>Excludes U.S. production.

<sup>5</sup>[See Appendix C for resource/reserve definitions and information concerning data sources.](#)