

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, Oregon, and Utah. Ingot was produced by 10 operations in 10 States. Numerous firms consumed ingot to produce wrought products and castings. In 2008, an estimated 79% of the titanium metal was used in aerospace applications. The remaining 21% was used in armor, chemical processing, marine, medical, power generation, sporting goods, and other nonaerospace applications. The value of sponge metal consumed was about \$542 million, assuming an average selling price of \$15.93 per kilogram.

In 2008, titanium dioxide (TiO₂) pigment, which was valued at about \$3.7 billion, was produced by four companies at eight facilities in seven States. The estimated use of TiO₂ pigment by end use was paint (includes lacquers and varnishes), 59%; plastic, 24%; paper, 12%; and other, 5%. Other uses of TiO₂ included catalysts, ceramics, coated fabrics and textiles, floor coverings, printing ink, and roofing granules.

<u>Salient Statistics—United States:</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008^e</u>
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	11,900	15,800	24,400	25,900	24,000
Exports	2,410	1,910	1,380	2,000	2,400
Shipments from Government stockpile excesses	3,910	2,510	—	—	—
Consumption, reported	21,200	26,100	28,400	33,700	34,000
Price, dollars per kilogram, yearend	7.88	11.78	13.58	15.75	15.93
Stocks, industry yearend ^e	7,660	4,330	8,240	7,820	11,000
Employment, number ^e	300	300	350	400	400
Net import reliance ² as a percentage of reported consumption	66	73	67	72	54
Titanium dioxide:					
Production	1,540,000	1,310,000	1,370,000	1,440,000	1,500,000
Imports for consumption	264,000	341,000	288,000	221,000	200,000
Exports	635,000	524,000	581,000	682,000	770,000
Consumption, apparent	1,170,000	1,130,000	1,080,000	979,000	930,000
Producer price index, yearend	158	172	165	162	178
Stocks, producer, yearend	NA	NA	NA	NA	NA
Employment, number ^e	4,400	4,300	4,300	4,300	4,200
Net import reliance ² as a percentage of apparent consumption	E	E	E	E	E

Recycling: New scrap metal recycled by the titanium industry totaled about 33,000 tons in 2008. Estimated use of titanium as scrap and ferrotitanium by the steel industry was about 10,500 tons; by the superalloy industry, 1,200 tons; and, in other industries, 1,400 tons. Old scrap reclaimed totaled about 600 tons.

Import Sources (2004-07): Sponge metal: Kazakhstan, 52%; Japan, 35%; Russia, 6%; China, 4%; and other, 3%. Titanium dioxide pigment: Canada, 32%; China, 13%; Germany, 8%; France, 6%; and other, 41%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12-31-08</u>
	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.

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Events, Trends, and Issues: Domestic production of TiO₂ pigment was an estimated 1.5 million tons, a moderate increase compared with that of 2007. Global production of TiO₂ was estimated to have increased 2% compared with that of 2007. TiO₂ pigment capacity expansions that were underway included those in Kwinana, Australia (50,000 tons per year, 2010), Orissa, India (40,000 tons per year, 2013), Yanbu, Saudi Arabia (92,000 tons per year, 2009), and Greatham, United Kingdom (50,000 tons per year, 2009). China's TiO₂ pigment production capacity was expected to rise to 1,500,000 tons per year by 2012. In France, the 65,000-ton-per-year Le Havre TiO₂ pigment plant was shut down owing to its high cost to operate. Rising prices for chlorine, energy, and sulfur increased manufacturing costs for TiO₂ pigment producers.

Almost all titanium metal producers were in the process of expanding sponge capacity to meet rising demand from aerospace and industrial uses. However, delays in two major aircraft programs resulted in lower prices for titanium metal products and delays in some capacity expansion programs. In Albany, OR, sponge capacity was increased to 9,980 tons per year. In Hamilton, MS, commissioning of a 9,070-ton-per-year sponge plant was delayed from 2010 to 2011. In Henderson, NV, sponge capacity was increased to 12,600 tons per year. In Rowley, UT, a new 10,900-ton-per-year sponge plant was expected to begin producing in 2009. In New Johnsonville, TN, capacity to produce titanium tetrachloride—the chemical intermediate used to produce titanium metal, TiO₂ pigment, and other compounds—was expanded by 45,000 tons per year. China's sponge capacity was expected to rise to 150,000 tons per year by 2012. In India, plans were underway to construct a 10,000-ton-per-year titanium sponge plant by 2009. Japan's sponge capacity was expected to rise to 66,000 tons per year by 2011. Russian production capacity was expected to increase to 46,500 tons per year by 2012. Several concerted efforts to develop a low-cost method for producing titanium metal were ongoing.

World Sponge Metal Production and Sponge and Pigment Capacity:

	Sponge production		Capacity 2008 ³	
	2007	2008 ^e	Sponge	Pigment
United States	W	W	23,100	1,580,000
Australia	—	—	—	241,000
Belgium	—	—	—	74,000
Canada	—	—	—	90,000
China ^e	45,200	55,000	78,000	900,000
Finland	—	—	—	130,000
France	—	—	—	125,000
Germany	—	—	—	440,000
Italy	—	—	—	80,000
Japan	38,900	39,000	40,000	317,000
Kazakhstan ^e	25,400	26,000	26,000	1,000
Mexico	—	—	—	125,000
Russia ^e	34,200	36,000	36,000	20,000
Spain	—	—	—	80,000
Ukraine ^e	9,200	10,000	10,000	120,000
United Kingdom	—	—	—	290,000
Other countries	—	—	—	670,000
World total (rounded)	⁴ 153,000	⁴ 166,000	213,000	5,280,000

World Resources:⁵ Resources and reserves of titanium minerals are discussed in Titanium Mineral Concentrates. The commercial feedstock sources for titanium are ilmenite, leucoxene, rutile, slag, and synthetic rutile.

Substitutes: There are few materials that 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. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

¹See also Titanium Mineral Concentrates.

²Defined as imports – exports + adjustments for Government and industry stock changes.

³Operating capacity.

⁴Excludes U.S. production.

⁵See Appendix C for definitions.