

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

(Data in metric tons, unless otherwise noted)

**Domestic Production and Use:** Titanium sponge metal was produced by two firms with operations in Nevada and Oregon. Ingot was made by the two sponge producers and by nine other firms in seven States. About 30 firms consumed ingot to produce forged components, mill products, and castings. In 2000, an estimated 60% of the titanium metal used was in aerospace applications. The remaining 40% was used in armor, chemical processing, power generation, marine, medical, sporting goods, and other nonaerospace applications. The value of sponge metal consumed was about \$164 million, assuming an average selling price of \$9.37 per kilogram (\$4.25 per pound). The value of ingot produced from sponge and scrap was estimated to be \$500 million.

In 2000, titanium dioxide (TiO<sub>2</sub>) pigment, valued at about \$3.1 billion, was produced by four companies at eight facilities in seven States. Estimated use of TiO<sub>2</sub> pigment by end use was paint, varnishes, and lacquers, 50%; plastics, 21%; paper, 20%; and other, 9%. 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>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000<sup>e</sup></b>
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	10,100	16,100	10,900	6,000	7,800
Exports	528	976	348	807	1,900
Shipments from Government stockpile excesses	—	227	1,384	515	4,240
Consumption, reported	28,400	32,000	28,200	18,100	17,500
Price, dollars per pound, yearend	4.40	4.40	4.40	4.25	4.25
Stocks, industry yearend <sup>e</sup>	4,390	5,470	10,600	8,280	7,600
Employment, number <sup>e</sup>	300	300	300	300	300
Net import reliance <sup>2</sup> as a percent of reported consumption	37	47	39	44	62
Titanium dioxide:					
Production	1,230,000	1,340,000	1,330,000	1,350,000	1,440,000
Imports for consumption	167,000	194,000	192,000	225,000	225,000
Exports	332,000	405,000	398,000	383,000	470,000
Consumption, apparent	1,080,000	1,130,000	1,130,000	1,160,000	1,190,000
Price, rutile, list, dollars per pound, yearend	1.09	1.05	.98	1.01	1.01
Stocks, producer, yearend	107,000	108,000	103,000	137,000	136,000
Employment, number <sup>e</sup>	4,600	4,600	4,600	4,600	4,600
Net import reliance <sup>2</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** New scrap metal recycled by the titanium industry was about 19,200 tons in 2000. Estimated use of titanium as scrap and in the form of ferrotitanium made from scrap by the steel industry was about 6,500 tons; by the superalloy industry, 700 tons; and, in other industries, 700 tons. Old scrap reclaimed was about 400 tons.

**Import Sources (1996-99):** Sponge metal: Russia, 49%; Japan, 36%; Kazakhstan, 8%; China, 3%; and other, 4%. Titanium dioxide pigment: Canada, 38%; Germany, 14%; France, 9%; Spain, 7%; and other, 32%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12/31/00</b>
	Titanium oxides (unfinished TiO <sub>2</sub> pigment)	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.
	Titanium waste and scrap metal	8108.10.1000	Free.
	Unwrought titanium metal	8108.10.5000	15.0% ad val.
	Wrought titanium metal	8108.90.6000	15.0% ad val.
	Other titanium metal articles	8108.90.3000	5.5% ad val.

**Depletion Allowance:** Not applicable.

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**Government Stockpile:** The Defense National Stockpile Center continued to solicit offers for the sale of titanium sponge held in the Government stockpile. In addition to the quantities shown below, the stockpile contained 7,840 tons of nonstockpile-grade sponge. For fiscal year 2001, 4,540 tons of titanium sponge is being offered for sale.

Material	Stockpile Status—9-30-00 <sup>3</sup>			Disposal plan FY 2000	Disposals FY 2000
	Uncommitted inventory	Committed inventory	Authorized for disposal		
Titanium sponge	19,100	3,390	19,100	4,540	4,240

**Events, Trends, and Issues:** In 2000, domestic production of titanium pigment was 1.44 million tons, a 6% increase compared with 1999. Imports of pigment were unchanged compared with 1999, while exports increased significantly. Apparent consumption of titanium pigment increased about 3%; published prices of rutile-grade pigment were unchanged.

The number of domestic TiO<sub>2</sub> pigment producers was reduced to four when the Savannah, GA, facility was acquired by another TiO<sub>2</sub> producer. At New Johnsonville, TN, a third line was being added to increase capacity an estimated 65,000 tons per year. Other global TiO<sub>2</sub> pigment capacity expansions were expected at Chavara, India; Duisberg, Germany; Greatham, United Kingdom; Huelva, Spain; Kwinana, Western Australia; and Telok Kalong, Malaysia.

Owing to reduced demand from commercial aircraft manufacturers, consumption of titanium sponge metal decreased 3% compared with that of 1999. Domestic production of titanium ingot and mill product shipments were estimated to have decreased 8% and 10%, respectively.

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

	Sponge production		Capacity 2000 <sup>4</sup>	
	1999	2000 <sup>e</sup>	Sponge	Pigment
United States	W	W	21,600	1,540,000
Australia	—	—	—	189,000
Belgium	—	—	—	70,000
Canada	—	—	—	75,000
China <sup>e</sup>	2,500	2,500	7,000	45,000
Finland	—	—	—	100,000
France	—	—	—	238,000
Germany	—	—	—	360,000
Italy	—	—	—	80,000
Japan	18,900	19,000	25,800	336,000
Kazakhstan <sup>e</sup>	9,000	10,000	22,000	1,000
Mexico	—	—	—	120,000
Russia <sup>e</sup>	14,000	15,000	26,000	20,000
Spain	—	—	—	65,000
Ukraine <sup>e</sup>	4,000	4,000	6,000	120,000
United Kingdom	—	—	—	304,000
Other countries	—	—	—	630,000
World total (rounded)	<sup>5</sup> 48,000	<sup>5</sup> 51,000	110,000	4,300,000

**World Resources:** Resources and reserves of titanium minerals (ilmenite and rutile) are discussed in Titanium Mineral Concentrates. Titanium for domestic sponge production was obtained from rutile or rutile substitutes. The feedstock sources for pigment production were ilmenite, slag, and synthetic rutile.

**Substitutes:** There are few substitutes for titanium in aircraft and space use without some sacrifice of performance. For industrial uses, high-nickel steel, zirconium, and, to a limited extent, the superalloy metals may be substituted. In certain applications, 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.

<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>See Appendix B for definitions.

<sup>4</sup>Operating capacity.

<sup>5</sup>Excludes the United States.