

## 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 Utah. 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 2001, an estimated 65% of the titanium metal used was in aerospace applications. The remaining 35% was used in armor, chemical processing, power generation, marine, medical, sporting goods, and other nonaerospace applications. The value of sponge metal consumed was about \$174 million, assuming an average selling price of \$7.91 per kilogram. The value of ingot produced from sponge and scrap was estimated to be \$600 million.

In 2001, titanium dioxide (TiO<sub>2</sub>) pigment, valued at about \$3.0 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%; paper, 20%; plastics, 20%; and other, 10%. 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>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001<sup>e</sup></b>
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	16,100	10,900	6,000	7,240	11,500
Exports	976	348	807	1,930	2,180
Shipments from Government stockpile excesses	227	1,384	515	4,870	4,410
Consumption, reported	32,000	28,200	18,100	18,200	22,000
Price, dollars per kilogram, yearend	9.70	9.70	9.37	9.37	7.91
Stocks, industry yearend <sup>e</sup>	5,470	10,600	7,970	5,010	6,000
Employment, number <sup>e</sup>	300	300	300	300	300
Net import reliance <sup>2</sup> as a percentage of reported consumption	47	39	44	72	58
Titanium dioxide:					
Production	1,340,000	1,330,000	1,350,000	1,400,000	1,340,000
Imports for consumption	194,000	200,000	225,000	218,000	200,000
Exports	405,000	398,000	384,000	464,000	432,000
Consumption, apparent	1,130,000	1,140,000	1,160,000	1,150,000	1,100,000
Price, rutile, list, dollars per pound, yearend	1.05	0.98	1.01	1.01	1.00
Stocks, producer, yearend	108,000	103,000	137,000	141,000	153,000
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 totaled about 18,000 tons in 2001. Estimated use of titanium as scrap and in the form of ferrotitanium made from scrap by the steel industry was about 6,000 tons; by the superalloy industry, 900 tons; and, in other industries, 700 tons. Old scrap reclaimed totaled about 500 tons.

**Import Sources (1997-2000):** Sponge metal: Russia, 47%; Japan, 37%; Kazakhstan, 12%; and other, 4%. Titanium dioxide pigment: Canada, 36%; Germany, 14%; France, 8%; Spain, 6%; and other, 36%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12/31/01</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 (DNSC) continued to solicit offers for the sale of titanium sponge held in the Government stockpile. For fiscal year 2002, 4,540 tons of sponge is planned for disposal. In support of an armor upgrade program, DNSC provided the U.S. Army with 227 tons of sponge. In addition to the quantities shown below, the stockpile contained 10,600 tons of nonstockpile-grade sponge.

Material	Stockpile Status—9-30-01 <sup>3</sup>			Disposal plan FY 2001	Disposals FY 2001
	Uncommitted inventory	Committed inventory	Authorized for disposal		
Titanium sponge	11,277	788	11,277	4,540	4,350

**Events, Trends, and Issues:** In 2001, domestic production of TiO<sub>2</sub> pigment was 1.34 million tons, a 5% decrease compared with 2000. Imports of pigment decreased 8% compared with 2000, while exports decreased 7%. Apparent consumption of pigment decreased 5% and published prices of rutile-grade pigment decreased slightly.

Although consumption of titanium metal in 2001 increased an estimated 21% compared with that of 2000, consumption of titanium metal in 2002 was expected to decrease significantly because of reduced demand from commercial aircraft.

One of the major titanium metal producers idled its 6,800-ton-per-year titanium sponge plant at Albany, OR. The closure leaves only one major domestic producer of titanium sponge. Domestic sponge capacity decreased from 21,600 tons per year in 2000 to 14,800 tons per year in 2001. Owing to high operational costs, plans were made to idle the 44,000-ton-per-year sulfate-route TiO<sub>2</sub> pigment plant at Baltimore, MD. The 50,000-ton-per-year chloride-route pigment plant at the Baltimore facility was expected to continue operating.

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

	Sponge production		Capacity 2001 <sup>4</sup>	
	2000	2001 <sup>e</sup>	Sponge	Pigment
United States	W	W	14,800	1,540,000
Australia	—	—	—	189,000
Belgium	—	—	—	70,000
Canada	—	—	—	75,000
China <sup>e</sup>	1,900	2,000	6,900	45,000
Finland	—	—	—	100,000
France	—	—	—	238,000
Germany	—	—	—	360,000
Italy	—	—	—	80,000
Japan	18,800	20,000	26,000	322,000
Kazakhstan <sup>e</sup>	8,380	8,500	22,000	1,000
Mexico	—	—	—	120,000
Russia <sup>e</sup>	20,000	20,000	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	—	—	—	632,000
World total (rounded)	<sup>5</sup> 54,000	<sup>5</sup> 55,000	102,000	4,300,000

**World Resources:**<sup>6</sup> 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. — 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>See Appendix B for definitions.

<sup>4</sup>Operating capacity.

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

<sup>6</sup>See Appendix C for definitions.