

## 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 consume ingot to produce forged components, mill products, and castings. In 1999, an estimated 60% of the titanium metal used was in aerospace applications. The remaining 40% was used in the armor, chemical processing, power generation, marine, medical, sporting goods, and other nonaerospace applications. The value of sponge metal consumed was about \$264 million, assuming an average selling price of \$9.37 per kilogram (\$4.25 per pound).

In 1999, titanium dioxide (TiO<sub>2</sub>) pigment, valued at about \$3 billion, was produced by five companies at eight facilities in seven States. TiO<sub>2</sub> was used in paint, varnishes, and lacquers, 51%; plastics, 20%; paper, 18%; and other, 11%. 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>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999<sup>e</sup></b>
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	7,560	10,100	16,100	10,900	6,100
Exports	225	528	976	348	681
Shipments from Government stockpile excesses	—	—	227	1,384	453
Consumption, reported	21,500	28,400	32,000	28,200	17,500
Price, dollars per pound, yearend	4.40	4.40	4.40	4.40	4.25
Stocks, industry yearend <sup>e</sup>	5,270	4,390	5,470	10,600	8,700
Employment, number <sup>e</sup>	300	300	300	300	300
Net import reliance <sup>2</sup> as a percent of reported consumption	36	37	47	39	44
Titanium dioxide:					
Production	1,250,000	1,230,000	1,340,000	1,330,000	1,350,000
Imports for consumption	183,000	167,000	194,000	192,000	220,000
Exports	342,000	332,000	405,000	398,000	382,000
Consumption, apparent	1,080,000	1,080,000	1,130,000	1,130,000	1,160,000
Price, rutile, list, dollars per pound, yearend	1.01	1.09	1.05	.98	1.00
Stocks, producer, yearend	120,000	107,000	108,000	103,000	130,000
Employment, number <sup>e</sup>	4,600	4,600	4,600	4,600	4,600
Net import reliance <sup>2</sup> as a percent of apparent consumption	E	E	E	E	E

**Recycling:** New scrap metal recycled by the titanium industry was about 19,000 tons in 1999. In addition, estimated use of titanium as scrap and in the form of ferrotitanium made from scrap by the steel industry was about 5,200 tons; by the superalloy industry, 1,000 tons; and in other industries, 500 tons. Old scrap reclaimed was about 400 tons.

**Import Sources (1995-98):** Sponge metal: Russia, 54%; Japan, 33%; Kazakhstan, 6%; China, 4%; and other, 3%. Titanium dioxide pigment: Canada, 43%; Germany, 15%; France, 11%; Spain, 6%; and other, 25%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12/31/99</b>
	Waste and scrap metal	8108.10.1000	Free.
	Unwrought metal	8108.10.5000	15.0% ad val.
	Wrought metal	8108.90.6000	15.0% ad val.
	Titanium dioxide pigments	3206.11.0000	6.0% ad val.
	Titanium oxides	2823.00.0000	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. For fiscal year 2000, 4,540 tons of titanium sponge was being offered for sale.

### Stockpile Status—9-30-99<sup>3</sup>

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 1999	Disposals FY 1999
Titanium sponge	31,300	—	31,300	4,540	393

**Events, Trends, and Issues:** In 1999, domestic production of titanium pigment reached 1.35 million tons, a slight increase compared with 1998. Imports of pigment were estimated to have increased 13% compared with 1998, while exports decreased 6%. Apparent consumption of titanium pigment increased 3% and published prices of rutile-grade pigment increased slightly. Owing to reduced demand from commercial aircraft manufacturers, consumption of titanium sponge metal decreased 38% compared with that of 1998. Domestic production of titanium ingot and mill products were estimated to have decreased 20% and 28%, respectively.

Significant trends in the titanium pigment industry include: a consolidation of ownership; expansions by the chloride route in lieu of the sulfate-route; and increased demand for higher TiO<sub>2</sub> content mineral feedstocks (synthetic rutile and slag). In 1999, the world's top seven producers accounted for an estimated 85% of pigment capacity.

In the titanium metal industry, the cancellation of aircraft orders and a reduction of inventories held by consumers indicated a slowing in demand for titanium metal products.

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

	Sponge production		Capacity 1999 <sup>4</sup>	
	1998	1999 <sup>e</sup>	Sponge	Pigment
United States	W	W	21,600	1,486,000
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	24,200	19,200	25,800	336,000
Kazakhstan <sup>e</sup>	10,000	10,000	22,000	1,000
Mexico	—	—	—	120,000
Russia <sup>e</sup>	22,000	16,000	26,000	20,000
Spain	—	—	—	65,000
Ukraine <sup>e</sup>	1,200	2,500	6,000	120,000
United Kingdom <sup>e</sup>	—	—	—	304,000
Other countries	—	—	—	632,000
World total (rounded)	<sup>5</sup> 60,000	<sup>5</sup> 50,000	110,000	4,200,000

**World Resources:**<sup>6</sup> Resources and reserves of titanium minerals (ilmenite and rutile) are discussed in the section on titanium mineral concentrates. Most titanium for domestic sponge production was obtained from rutile or rutile substitutes. The feedstock sources for pigment production were ilmenite, slag, synthetic rutile, and 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 U.S. production.

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