

RUTILE¹

(Data in thousand metric tons of contained TiO₂, unless otherwise noted)

Domestic Production and Use: Rutile was produced at one mine in Florida. At two other mines in Florida, rutile was included in a bulk concentrate containing mostly ilmenite and leucosene. The major coproduct of these mines is zircon. Synthetic rutile was produced at one plant in Alabama. Domestic rutile production data was withheld to avoid revealing company proprietary data. The value of U.S. rutile consumption in 1998, including synthetic rutile, was about \$190 million. Two firms, with facilities in Nevada and Oregon, used titanium tetrachloride primarily made from rutile to manufacture titanium. Of 28 consuming firms, mainly in the Eastern United States, 5 companies used 93% of the rutile consumed to produce titanium dioxide (TiO₂) pigment. Welding-rod coatings and miscellaneous applications, which include fiberglass and titanium metal, consumed about 7%.

Salient Statistics—United States:	1994	1995	1996	1997	1998^e
Production	W	W	W	W	W
Imports for consumption ²	311	295	305	311	362
Exports ^e	4	6	3	5	16
Shipments from Government stockpile excesses	18	17	—	—	—
Consumption, reported ²	478	439	365	383	410
Price, dollars per ton of rutile, yearend, bulk, f.o.b. Australian ports	420	600	563	530	500
Stocks, mine, distributor and consumer, yearend	141	52	77	80	70
Employment, mine and mill, ³ number	400	400	400	400	450
Net import reliance ⁴ as a percent of reported consumption	76	90	76	79	87

Recycling: None.

Import Sources (1994-97): Australia, 54%; South Africa, 37%; and other, 9%.

Tariff:	Item	Number	Normal Trade Relations (NTR) 12/31/98	Non-NTR⁵ 12/31/98
	Rutile concentrate	2614.00.6040	Free	Free.
	Synthetic rutile	2614.00.3000	Free	30% ad val.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: None.

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Events, Trends, and Issues: Domestic consumption of rutile concentrates was estimated to have increased 7% compared with 1997. In 1998, imports of all rutile concentrates were estimated to have increased 16% compared with 1997. However, although imports of natural rutile increased 31%, imports of synthetic rutile decreased 3% compared with 1997. Increased availability of rutile concentrates caused prices for natural rutile concentrates to decrease 6% compared with 1997.

In Australia, two of the world largest mineral sands producers planned to merge their two companies. If completed, the merger would improve recovery rates and extend the mine life of some reserves by processing of minerals at more efficient plants. The International Monetary Fund approved a \$16 million loan to support the repair of mining operations in Sierra Leone. Prior to civil strife in 1995, the Sierra Leone operation had been the world's largest single producer of natural rutile.

Exploration and development of titanium mineral deposits continued in 1998. In the United States, deposits under examination included Camden, TN, Escalante, UT, Powderhorn, CO, and Okefenokee, GA. Canadian deposits under investigation included Shubenacadie River Basin, Nova Scotia, and Pipestone Lake, Manitoba. In Australia, investigations were ongoing at Broken Hill, Spring Hill, and Twelve Mile, New South Wales; Goondicum, Western Queensland; Ouyen, Victoria; and a large portion of the Murray Basin in New South Wales, Victoria, and South Australia. South African exploration and development investigations were ongoing at Bothaville. In preparation for a full feasibility study, a metallurgical study was completed for the Kwale mineral sands project in Kenya.

Fewer environmental pollution problems are encountered when pigment is produced from rutile rather than ilmenite. The chloride process, using a rutile feed, generates about 0.2 ton of waste per ton of TiO_2 product; the sulfate process, using ilmenite, generates about 3.5 tons of waste per ton of product. Producing synthetic rutile from ilmenite results in about 0.7 ton of waste, mainly iron oxide, per ton of product. Direct chlorination of ilmenite generates about 1.2 tons of waste, mainly ferric chloride, per ton of TiO_2 .

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁶	Reserve base ⁶
	1997	1998 ^e		
United States	W	W	700	1,800
Australia	171	190	⁷ 17,000	⁷ 51,000
Brazil	2	2	40	85,000
India	13	13	6,600	7,700
Italy	—	—	—	8,800
Sierra Leone	—	—	3,100	3,100
South Africa	108	108	8,300	8,300
Sri Lanka	3	2	4,800	4,800
Thailand	3	4	NA	NA
Ukraine	<u>95</u>	<u>95</u>	<u>2,500</u>	<u>2,500</u>
World total (may be rounded)	⁸ 395	⁸ 414	43,000	170,000

World Resources: Identified world resources of rutile (including anatase) total about 230 million tons of contained TiO_2 . Major rutile resources occur in Australia, India, Italy, Sierra Leone, South Africa, and the United States.

Substitutes: Ilmenite, titaniferous slag, and synthetic rutile made from ilmenite may be used instead of natural rutile for making pigment, metal, and welding-rod coatings.

^eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data.

¹See also Ilmenite and Titanium and Titanium Dioxide.

²Includes synthetic rutile.

³Employment at three sand deposit operations in Florida, which produced either rutile concentrate or a titanium mineral concentrate, where ilmenite and zircon were major coproducts and where employees were not assigned to specific commodities.

⁴Defined as imports - exports + adjustments for Government and industry stock changes.

⁵See Appendix B.

⁶See Appendix D for definitions.

⁷Increase from 1997 based on data published by the Australian Bureau of Resource Sciences.

⁸Excludes U.S. production.