

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 ilmenite production data was withheld to avoid revealing company proprietary data. The value of U.S. rutile consumption in 1996, including synthetic rutile, was about \$196 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, titanium metal and welding-rod coatings, consumed about 7%.

<u>Salient Statistics—United States:</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997^e</u>
Production	W	W	W	W	W
Imports for consumption ²	349	311	295	305	329
Exports ^e	3	4	6	3	5
Shipments from Government stockpile excesses	1	18	17	—	—
Consumption, reported ²	436	478	439	365	383
Price, dollars per ton of rutile, yearend:					
Bulk, f.o.b. Australian ports	378	420	600	563	530
Stocks, mine, distributor and consumer, yearend	179	141	52	77	80
Employment, mine and mill, ³ number	395	400	400	400	400
Net import reliance ⁴ as a percent of apparent consumption	W	W	W	W	W

Recycling: None.**Import Sources (1993-96):** Australia, 51%; South Africa, 36%; Sierra Leone, 9%; and other, 4%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Most favored nation (MFN)</u> <u>12/31/97</u>	<u>Non-MFN⁵</u> <u>12/31/97</u>
	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.

RUTILE

Events, Trends, and Issues: Based on increased production of titanium pigment, domestic consumption of rutile concentrates was estimated to have increased 5% compared with 1996. In 1997, imports of all rutile concentrates were estimated to have increased 8% compared with 1996. Although imports of natural rutile decreased 2%, imports of synthetic rutile increased 20% compared with 1996. Increased availability of rutile concentrates caused prices to decrease 6% compared with 1996.

Exploration and development of titanium mineral deposits continued in 1997. These activities were most evident in Africa, Australia, Canada, India, Indonesia, Mozambique, Russia, Ukraine, the United States, and Vietnam. Producers continued efforts to develop higher grade concentrates. In Australia, a synthetic producer completed a project to produce an upgraded product lower in uranium and thorium content. Sierra Leone's loss as a major source of natural rutile continued to affect the global market.

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
	1996	1997 ^e		
United States	W	W	500	1,800
Australia	171	190	4,300	43,000
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	95	95	2,500	2,500
World total (may be rounded)	⁷ 395	⁷ 414	30,000	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.

⁷Excludes U.S. production.