ILMENITE[1]

(Data in thousand metric tons of contained TiO_2, unless otherwise noted)

Domestic Production and Use: Two firms produced ilmenite concentrate from heavy-mineral sands operations in Florida, and one firm produced ilmenite in California as a byproduct of sand and gravel production. Based on average prices, the value of U.S. ilmenite consumption in 1996 was about $275 million. Major coproducts of ilmenite from heavy-mineral sands deposits are rutile and zircon. About 99% of the ilmenite and titanium slag was consumed by five titanium pigment producers. The remainder was used in welding rod coatings and for manufacturing alloys, carbides, and chemicals.

Salient Statistics—United States:	1992	1993	1994	1995	1996[e]
Production	W	W	W	W	W
Imports for consumption[2]	615	564	584	586	590
Exports[e]	16	7	9	15	7
Consumption:[2] Reported	882	889	W	W	W
Apparent	W	W	W	W	W
Price, dollars per metric ton:					
Ilmenite:					
Bulk, 54% TiO_2, f.o.b. Australian ports	65	63	77	83	93
Slag:[e]					
80% TiO_2, f.o.b. Sorel, Quebec	276	276	278	244	297
85% TiO_2, f.o.b. Richards Bay, South Africa	322	330	334	349	351
Stocks, mine, distributor and consumer, yearend[2]	254	218	208	137	150
Employment, mine and mill[3], number	400	395	400	400	400
Net import reliance[4] as a percent of apparent consumption	W	W	W	W	W

Recycling: None.

Import Sources (1992-95): South Africa, 58%; Australia, 26%; Canada, 8%; and other, 8%.

Tariff: Item	Number	Most favored nation (MFN) 12/31/96	Non-MFN[5] 12/31/96
Ilmenite and ilmenite sand	2614.00.6020	Free	Free.
Titanium slag	2620.90.5000	Free	Free.

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

Government Stockpile: None.

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ILMENITE

Events, Trends, and Issues: Another year of near record titanium pigment consumption resulted in a high demand for ilmenite and titanium slag concentrates. Consequently, prices for ilmenite and slag concentrates increased moderately. Although total imports of ilmenite plus slag were nearly unchanged, imports of slag decreased 16% while imports of ilmenite increased 19%. Imports of ilmenite from Australia increased significantly.

Exploration and development of titanium mineral deposits continued in 1996. These activities were most evident in Australia, Canada, India, Indonesia, Mozambique, Russia, South Africa, Ukraine, the United States, and Vietnam. Producers continued efforts to develop higher grade concentrates. In Canada, a producer of titanium slag initiated a project to produce an upgraded version of titanium slag suitable for use by chloride-base pigment production.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves[6]	Reserve base[6]
	1995	1996[e]		
United States	W	W	8,000	59,000
Australia	1,130	1,150	33,000	88,000
Brazil	56	60	18,000	18,000
Canada (slag)	652	650	31,000	36,000
China	80	80	30,000	41,000
Egypt	—	—	—	1,700
Finland	—	—	1,400	1,400
India	162	160	30,000	38,000
Italy	—	—	—	2,200
Madagascar	—	—	—	19,000
Malaysia	84	90	—	1,000
Norway (ilmenite and slag)	374	320	40,000	40,000
South Africa (slag)	842	840	63,000	63,000
Sri Lanka	34	35	13,000	13,000
Ukraine	100	100	5,900	13,000
Other countries	5	5	1,000	1,000
World total (rounded)	[7]3,520	[7]3,490	270,000	440,000

World Resources: Ilmenite supplies about 90% of the world's demand for titaniferous material. World ilmenite resources total about 1 billion tons of titanium dioxide. Major resources occur in Australia, Canada, China, India, New Zealand, Norway, South Africa, Ukraine, and the United States.

Substitutes: Rutile and synthetic rutile were extensively used to produce titanium dioxide pigment.

[e]Estimated. W Withheld to avoid disclosing company proprietary data.

[1]See also Rutile and Titanium and Titanium Dioxide.

[2]Includes titanium slag from Canada, Norway, and South Africa and leucoxene from Australia.

[3]Includes operating employees shown under Rutile, subject to the same footnoted comments.

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

[5]See Appendix B.

[6]See Appendix C for definitions.

[7]Excludes U.S. production.

RUTILE[1]

(Data in thousand metric tons of contained TiO_2, 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 leucoxene. The major coproduct of these mines is zircon. Synthetic rutile was produced at one plant in Alabama. The value of U.S. rutile consumption in 1996, including synthetic rutile, was about $290 million. Two firms, with facilities in Nevada and Oregon, used titanium tetrachloride primarily made from rutile to manufacture titanium. Of 16 consuming firms, mainly in the Eastern United States, 5 companies used 95% of the rutile consumed to produce titanium dioxide (TiO_2) pigment. Welding-rod coatings and miscellaneous applications, which include fiberglass and titanium metal, consumed 5%.

Salient Statistics—United States:	1992	1993	1994	1995	1996[e]
Production	W	W	W	W	W
Imports for consumption[2]	299	349	311	295	353
Exports[e]	7	3	4	6	3
Shipments from Government stockpile excesses	—	1	18	17	—
Consumption: Reported[2]	438	436	478	439	440
Apparent	W	W	W	W	W
Price, dollars per ton of rutile, yearend:					
Bulk, f.o.b. Australian ports	405	378	420	600	650
Stocks, mine, distributor and consumer, yearend	140	179	141	52	100
Employment, mine and mill[3], number	400	395	400	400	400
Net import reliance[4] as a percent of apparent consumption	W	W	W	W	W

Recycling: None.

Import Sources (1992-95): Australia, 56%; South Africa, 28%; Sierra Leone, 14%; and other, 2%.

Tariff: Item	Number	Most favored nation (MFN) 12/31/96	Non-MFN[5] 12/31/96
Rutile concentrate	2614.00.6040	Free	Free.
Synthetic rutile	2614.00.3000	Free	30% ad val.

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

Government Stockpile:

Stockpile Status—9-30-96

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 96
Stockpile-grade rutile (gross weight)	0.01	2.07	—	—

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RUTILE

Events, Trends, and Issues: In 1996, imports of rutile concentrates were estimated to have increased 20% compared with 1995. However, imports of natural rutile decreased slightly while imports of synthetic rutile increased 49%. A global shortage of natural rutile resulted in increased prices for natural and synthetic rutile concentrtates.

Exploration and development of titanium mineral deposits continued in 1996. 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 initiated 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]
	1995	1996[e]		
United States	W	W	500	1,800
Australia	190	190	4,300	43,000
Brazil	2	2	40	85,000
India	13	15	6,600	7,700
Italy	—	—	—	8,800
Sierra Leone	—	—	3,100	3,100
South Africa	84	90	8,300	8,300
Sri Lanka	2	2	4,800	4,800
Ukraine	3	3	2,500	2,500
World total (may be rounded)	[7]294	[7]302	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.

[e]Estimated. W Withheld to avoid disclosing company proprietary data.

[1]See also Ilmenite and Titanium and Titanium Dioxide.

[2]Includes synthetic rutile.

[3]Employment 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.

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

[5]See Appendix B.

[6]See Appendix C for definitions.

[7]Excludes U.S. production.