TITANIUM MINERAL CONCENTRATES[1]

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

Domestic Production and Use: Two firms produced ilmenite and rutile concentrates from surface-mining operations in Florida and Virginia. The value of titanium mineral concentrates consumed in the United States in 2012 was about $735 million. Zircon was a coproduct of mining from ilmenite and rutile deposits. About 95% of titanium mineral concentrates was consumed by domestic titanium dioxide (TiO_2) pigment producers. The remaining 5% was used in welding rod coatings and for manufacturing carbides, chemicals, and metal.

Salient Statistics—United States:	2008	2009	2010	2011	2012[e]
Production[2] (rounded)	200	200	200	300	300
Imports for consumption	1,110	927	958	1,030	1,110
Exports,[e] all forms	7	9	12	16	18
Consumption, estimated	1,440	1,360	1,460	1,310	1,410
Price, dollars per metric ton, yearend:					
Ilmenite, bulk, minimum 54% TiO_2, f.o.b. Australia	111	73	75	195	300
Rutile, bulk, minimum 95% TiO_2, f.o.b. Australia	525	533	540	1,400	2,250
Slag, 80%–95% TiO_2[3]	393–407	401–439	367–433	468–494	747–2,095
Stocks, mine, consumer, yearend	NA	NA	NA	NA	NA
Employment, mine and mill, number[e]	144	194	178	195	186
Net import reliance[4] as a percentage of estimated consumption	78	68	65	77	77

Recycling: None.

Import Sources (2008–11): South Africa, 39%; Australia, 35%; Canada, 16%; Mozambique, 7%; and other, 3%.

Tariff: Item	Number	Normal Trade Relations 12–31–12
Synthetic rutile	2614.00.3000	Free.
Ilmenite and ilmenite sand	2614.00.6020	Free.
Rutile concentrate	2614.00.6040	Free.
Titanium slag	2620.99.5000	Free.

Depletion Allowance: Ilmenite and rutile; 22% (Domestic), 14% (Foreign).

Government Stockpile: None.

Events, Trends, and Issues: Consumption of titanium mineral concentrates is tied to production of TiO_2 pigments primarily used in paint, paper, and plastics. Owing to increased production of TiO_2 pigment, domestic consumption of titanium mineral concentrates was estimated to have increased by 8% in 2012 compared with that in 2011.

Although world mine production increased in 2012, the price of titanium mineral concentrates continued to rise significantly. Rising costs for titanium minerals has encouraged vertical integration between the mineral and pigment industries.

In Kazakhstan, plans were underway to construct an ore-processing plant with a production capacity of 12,000 tons per year of rutile and 50,000 tons per year of ilmenite by 2014. In April, the first consignment of ilmenite from the Birzulovo deposit in the Kirovograd region of Ukraine was delivered to European and Asian markets. The initial production capacity at Birzulovo was 185,000 tons per year of ilmenite. In Sierra Leone, a tailings treatment project was under development to recover rutile from 22 million tons of tailings near the mineral separation plant in Mogwembo commencing in 2013. A feasibility study and continued preparations were underway to upgrade the ilmenite processing plant in Tyssedal, Norway. The upgrade would double the current capacity of 200,000 tons per year of titanium slag and process ilmenite from the Grand Côte mineral sands project in Senegal. The Grand Côte project was projected to produce 575,000 tons per year of ilmenite with mining operations anticipated to begin in 2013. In Madagascar, heavy-mineral resources at the Ranobe Mine were increased by 36% to 959 million tons at 6.1% heavy minerals with reserves of 161 million tons at 8.2% heavy minerals. Production of ilmenite was expected to begin in the second half of 2014. A study of the Koivu titanium project in Finland was completed for ilmenite production of 250,000 tons per year.

Prepared by **George M. Bedinger [(703) 648–6183, gbedinger@usgs.gov]**

TITANIUM MINERAL CONCENTRATES

World Mine Production and Reserves:

	Mine production		Reserves[5]
	2011	2012[e]	
Ilmenite:			
United States[2]	[6]300	[6]300	2,000
Australia	960	940	100,000
Brazil	45	45	43,000
Canada[7]	750	700	31,000
China	660	700	200,000
India	330	550	85,000
Madagascar	280	280	40,000
Mozambique	380	380	16,000
Norway[7]	360	350	37,000
South Africa[7]	1,110	1,030	63,000
Sri Lanka	31	60	NA
Ukraine	300	300	5,900
Vietnam	550	500	1,600
Other countries	40	40	26,000
World total (ilmenite, rounded)	6,100	6,200	650,000
Rutile:			
United States	([8])	([8])	([8])
Australia	440	480	18,000
Brazil	3	5	1,200
India	24	25	7,400
Mozambique	6	8	480
Sierra Leone	64	100	3,800
South Africa	122	131	8,300
Ukraine	56	60	2,500
Other countries	18	17	400
World total (rutile, rounded)	[8]730	[8]830	42,000
World total (ilmenite and rutile, rounded)	6,700	7,000	700,000

World Resources: Ilmenite accounts for about 92% of the world's consumption of titanium minerals. World resources of anatase, ilmenite, and rutile total more than 2 billion tons.

Substitutes: Ilmenite, leucoxene, rutile, slag, and synthetic rutile compete as feedstock sources for producing TiO_2 pigment, titanium metal, and welding-rod coatings.

[e]Estimated. NA Not available.
[1]See also Titanium and Titanium Dioxide.
[2]Rounded to one significant digit to avoid disclosing company proprietary data.
[3]Landed duty-paid value based on U.S. imports for consumption.
[4]Defined as imports – exports + adjustments for Government and industry stock changes.
[5]See Appendix C for resource/reserve definitions and information concerning data sources.
[6]Includes rutile.
[7]Mine production is primarily used to produce titaniferous slag.
[8]U.S. rutile production and reserve data are included with ilmenite.