

TITANIUM MINERAL CONCENTRATES¹

[Data in thousand metric tons, titanium dioxide (TiO₂) content, unless otherwise specified]

Domestic Production and Use: In 2023, one company recovered ilmenite and rutile concentrates from its surface-mining operations near Nahunta, GA, and Starke, FL. A second company processed existing mine tailings to recover a mixed heavy-mineral concentrate in California. Abrasive sands, monazite, and zircon were coproducts of domestic titanium minerals mining operations. Based on trade data through August, the estimated value of titanium mineral and synthetic concentrates imported into the United States in 2023 was \$600 million. More than 95% of titanium mineral concentrates were consumed by domestic TiO₂ pigment producers. The remainder was used in welding-rod coatings and for manufacturing carbides, chemicals, and titanium metal.

Salient Statistics—United States:	2019	2020	2021	2022	2023^e
Production ²	100	100	100	200	200
Imports for consumption	1,160	807	969	950	670
Exports, all forms ^e	8	18	30	110	70
Consumption, apparent ^{2, 3}	1,300	900	1,000	1,000	800
Price, dollars per metric ton:					
Rutile, bulk, minimum 95% TiO ₂ , free on board (f.o.b.) Australia ⁴	1,110	1,170	1,300	1,470	1,490
Ilmenite and leucoxene, bulk, f.o.b. Australia ⁵	478	459	595	530	330
Ilmenite, average unit value of imports ⁶	186	215	240	285	390
Slag, 80%–95% TiO ₂ , average unit value of imports ⁶	792	757	774	867	1,000
Employment, mine and mill, number	310	315	290	305	410
Net import reliance ⁷ as a percentage of apparent consumption	92	89	90	81	75

Recycling: None.

Import Sources (2019–22): South Africa, 37%; Madagascar, 16%; Australia, 12%; Canada, 10%; and other, 25%.

Tariff:	Item	Number	Normal Trade Relations 12–31–23
	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 closely tied to production of TiO₂ pigments that are primarily used in paint, paper, and plastics. Demand for these primary uses is related to changes in the gross domestic product. Although inventory changes were not included in the apparent consumption calculation, domestic apparent consumption of titanium mineral concentrates in 2023 was estimated to have decreased significantly from that in 2022. The decrease in apparent consumption was the result of a reduction in imports. Exports of titanium mineral concentrates also decreased significantly and were primarily in the form of mixed concentrates derived from mine tailings.

In 2023, as of August, Canada (60%) and South Africa (30%) were the leading sources of titanium slag imports into the United States. Mozambique (43%), Madagascar (22%), and Senegal (20%) were leading sources of ilmenite, and South Africa (61%), Australia (32%), and Kenya (7%) were the leading sources of rutile. There were no imports of synthetic rutile.

In 2023, China continued to be the leading producer and consumer of titanium mineral concentrates, accounting for approximately one-third of global production of ilmenite. Mozambique and South Africa also were leading producers of titanium mineral concentrates. China's imports of titanium mineral concentrates were about 4.4 million tons in gross weight, a 27% increase compared with those in 2022. As of September, Mozambique (49%), Norway (10%), and Vietnam (7%) were the leading sources of titanium mineral concentrates to China.

TITANIUM MINERAL CONCENTRATES

World Mine Production and Reserves: Reserves for Australia, Canada, China, Kenya, Madagascar, Mozambique, South Africa, and “Other countries” were revised based on company and Government reports.

	Mine production		Reserves ⁸
	<u>2022</u>	<u>2023^e</u>	
Ilmenite:			
United States ^{2, 9}	200	200	2,000
Australia	400	400	¹⁰ 180,000
Brazil	28	54	43,000
Canada ¹¹	520	500	52,000
China	3,140	3,100	210,000
India	210	210	85,000
Kenya	190	140	130
Madagascar ¹¹	320	320	27,000
Mozambique	1,400	1,600	22,000
Norway	410	430	37,000
Senegal	410	340	NA
South Africa ¹¹	1,100	1,000	28,000
Ukraine	190	60	5,900
Vietnam	170	140	1,600
Other countries	<u>110</u>	<u>110</u>	<u>1,200</u>
World total (ilmenite, rounded) ⁹	8,800	8,600	690,000
Rutile:			
United States	(9)	(9)	(9)
Australia	200	200	¹⁰ 35,000
India	13	13	7,400
Kenya	73	58	70
Madagascar	—	—	520
Mozambique	8	9	720
Senegal	9	8	NA
Sierra Leone	130	110	2,900
South Africa	100	100	6,100
Ukraine	95	50	2,500
Other countries	<u>10</u>	<u>10</u>	<u>20</u>
World total (rutile, rounded) ⁹	640	560	55,000
World total (ilmenite and rutile, rounded)	9,400	9,200	750,000

World Resources:⁸ Ilmenite accounts for about 90% of the world’s consumption of titanium minerals. World resources of anatase, ilmenite, and rutile total more than 2 billion tons.

Substitutes: Ilmenite, leucosene, rutile, slag, and synthetic rutile compete as feedstock sources for producing TiO₂ pigment, titanium metal, and welding-rod coatings.

^eEstimated. NA Not available. — Zero.

¹See also the Titanium and Titanium Dioxide chapter.

²Rounded to the nearest 100,000 tons to avoid disclosing company proprietary data.

³Defined as production + imports – exports.

⁴Source: Fast Markets IM; annual average.

⁵Source: Zen Innovations AG, Global Trade Tracker.

⁶Landed duty-paid unit value based on U.S. imports for consumption. Source: U.S. Census Bureau.

⁷Defined as imports – exports.

⁸See Appendix C for resource and reserve definitions and information concerning data sources.

⁹United States rutile production and reserves data are included with ilmenite.

¹⁰For Australia, Joint Ore Reserves Committee-compliant or equivalent reserves were estimated to be 43 million tons for ilmenite and 11 million tons for rutile, respectively, TiO₂ content.

¹¹Mine production of titaniferous magnetite is primarily used to produce titaniferous slag.