TITANIUM MINERAL CONCENTRATES[1]

[Data in thousand metric tons of contained titanium dioxide (TiO_2) unless otherwise noted]

Domestic Production and Use: In 2021, 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 South Carolina. Based on reported data through September, the estimated value of titanium mineral and synthetic concentrates imported into the United States in 2021 was $690 million. Abrasive sands, monazite, and zircon were coproducts of domestic titanium minerals mining operations. An estimated 95% of titanium mineral concentrates were consumed by domestic TiO_2 pigment producers. The remaining 5% was used in welding-rod coatings and for manufacturing carbides, chemicals, and titanium metal.

Salient Statistics—United States:	2017	2018	2019	2020	2021[e]
Production[2]	100	100	100	[e]100	100
Imports for consumption	1,170	1,100	1,160	807	1,000
Exports, all forms[e]	6	32	8	18	6
Consumption, apparent[3]	1,300	1,200	1,300	[e]900	1,100
Price, dollars per metric ton:					
Rutile, bulk, minimum 95% TiO_2, free on board (f.o.b.) Australia[4]	740	1,025	1,125	1,175	1,500
Ilmenite and leucoxene, bulk, f.o.b. Australia[5]	393	420	504	460	640
Ilmenite, average value of imports[6]	173	219	186	215	240
Slag, 80%–95% TiO_2, average value of imports[6]	664	738	792	757	750
Employment, mine and mill, number	286	299	310	216	250
Net import reliance[7] as a percentage of apparent consumption	92	91	92	88	90

Recycling: None.

Import Sources (2017–20): South Africa, 41%; Australia, 17%; Madagascar, 12%; Mozambique, 8%; and other, 22%.

Tariff: Item	Number	Normal Trade Relations 12–31–21
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 that are primarily used in paint, paper, and plastics. Demand for these primary uses is related to changes in the gross domestic product. Domestic apparent consumption of titanium mineral concentrates in 2021 was estimated to have increased significantly from that in 2020 when apparent consumption was affected by a downturn in economic activity owing to the global COVID-19 pandemic. Inventory changes were not included in the apparent consumption calculation. Exports of titanium mineral concentrates were small compared with apparent consumption. As of September, South Africa (27%), Madagascar (18%), Australia (15%), and Mozambique (15%) were the leading sources of titanium mineral concentrates imports to the United States. Mining and heavy-mineral-processing operations were expanded near Starke, FL, and prefeasibility studies were underway at the Titan heavy-mineral-sands project near Camden, TN.

In 2021, China continued to be the leading producer and consumer of titanium mineral concentrates, accounting for 37% 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 3.6 million tons in gross weight, an increase of 21% compared with those in 2020. As of October, Mozambique (32%), Australia (14%), Vietnam (13%), and Kenya (9%) were the leading sources of titanium mineral concentrates to China. In Saudi Arabia, commissioning of a project to produce up to 500,000 tons per year of titanium slag was delayed by technical problems and supply constraints resulting from COVID-19 restrictions. Other projects were being developed in Australia, China, Malawi, Mozambique, Norway, Senegal, and Tanzania.

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TITANIUM MINERAL CONCENTRATES

World Mine Production and Reserves: Reserves for Australia, Kenya, Madagascar, and South Africa were revised based on Government or industry reports.

	Mine production		Reserves[8]
	2020	2021[e]	
Ilmenite:			
United States[2, 9]	100	100	2,000
Australia	480	480	[10]160,000
Brazil	34	66	43,000
Canada[11]	595	600	31,000
China	2,800	3,000	230,000
India	174	180	85,000
Kenya	201	190	390
Madagascar[11]	254	310	22,000
Mozambique	965	970	26,000
Norway	444	440	37,000
Senegal	300	360	NA
South Africa[11]	1,020	1,000	30,000
Ukraine	464	430	5,900
Vietnam	138	220	1,600
Other countries	67	67	26,000
World total (ilmenite, rounded)[9]	8,000	8,400	700,000
Rutile:			
United States	([9])	([9])	([9])
Australia	190	200	[10]31,000
India	11	11	7,400
Kenya	73	71	170
Madagascar	8	10	400
Mozambique	6	9	890
Senegal	9	10	NA
Sierra Leone	114	120	490
South Africa	86	90	6,500
Ukraine	95	95	2,500
Other countries	13	13	NA
World total (rutile, rounded)[9]	605	630	49,000
World total (ilmenite and rutile, rounded)	8,600	9,000	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, 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 the nearest 100,000 tons to avoid disclosing company proprietary data.

[3]Defined as production + imports – exports. Rounded to the nearest 100,000 tons to avoid disclosing company proprietary data.

[4]Source: Fast Markets IM; average of yearend price.

[5]Zen Innovations AG, Global Trade Tracker.

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

[7]Defined as imports – exports.

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

[9]U.S. rutile production and reserves data are included with ilmenite.

[10]For Australia, Joint Ore Reserves Committee-compliant or equivalent reserves for ilmenite and rutile were estimated to be 38 million and 9.4 million tons, respectively.

[11]Mine production is primarily used to produce titaniferous slag.