

TITANIUM MINERAL CONCENTRATES¹

(Data in thousand metric tons of contained TiO₂ unless otherwise noted)

Domestic Production and Use: Three firms produced ilmenite and rutile concentrates from surface-mining operations in Florida, Georgia, and Virginia. Based on reported data through October 2015, the estimated value of titanium mineral concentrates consumed in the United States in 2015 was \$670 million. Zircon was a coproduct of mining from ilmenite and rutile deposits. About 95% of titanium mineral concentrates were consumed by domestic titanium dioxide (TiO₂) pigment producers. The remaining 5% was used in welding-rod coatings and for manufacturing carbides, chemicals, and metal.

| Salient Statistics—United States: | 2011 | 2012 | 2013 | 2014 | 2015^e |
|------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------------------|
| Production ² (rounded) | 300 | 300 | 200 | 100 | 100 |
| Imports for consumption | 1,010 | 1,110 | 1,190 | 1,110 | 1,000 |
| Exports, ^e all forms | 16 | 26 | 7 | 1 | 1 |
| Consumption, estimated | 1,300 | 1,390 | 1,390 | 1,190 | 1,100 |
| Price, dollars per metric ton: | | | | | |
| Ilmenite, bulk, minimum 54% TiO ₂ , f.o.b. Australia ³ | 195 | 300 | 265 | 155 | 110 |
| Rutile, bulk, minimum 95% TiO ₂ , f.o.b. Australia ³ | 1,350 | 2,200 | 1,250 | 950 | 840 |
| Slag, 80%–95% TiO ₂ ⁴ | 463–489 | 694–839 | 538–777 | 720–762 | 742–755 |
| Employment, mine and mill, number ^e | 195 | 195 | 195 | 144 | 190 |
| Net import reliance ⁵ as a percentage of apparent consumption | 77 | 78 | 86 | 92 | 91 |

Recycling: None.

Import Sources (2011–14): South Africa, 35%; Australia, 31%; Canada, 17%; Mozambique, 11%; and other, 6%.

| Tariff: Item | Number | Normal Trade Relations 12–31–15 |
|----------------------------|---------------|--------------------------------------------|
| 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 TiO₂ pigments that are primarily used in paint, paper, and plastics. Domestic consumption of titanium mineral concentrates was estimated to be unchanged in 2015 from that of 2014.

Domestic mining of titanium ores and production of concentrates took place at one mine near Starke, FL; one mine near Nahunta, GA; and two mines near Stony Creek, VA. Prices for titanium mineral concentrates decreased slightly throughout the year. U.S. imports of ores and concentrates decreased by about 10% and exports were virtually unchanged. The operator of the Virginia mines expected to extract the remaining ore from both mines and complete operations by yearend 2015. The operator of the mine in Georgia was developing a second mine in Brantley County and had completed construction of a mineral sand plant near Offerman to process heavy-mineral concentrates from these mines. A fourth company was planning to process tailings from mineral sand mines in New Jersey to produce zircon and titanium concentrates. Construction of a mineral-sands concentrator in New Jersey was expected to be completed by the second quarter of 2016.

Global production of titanium concentrates (excluding the United States) was estimated to have decreased slightly in 2015 compared with that of 2014. One of the major producers of titanium slag produced less titanium slag, reportedly in response to low prices and weak demand. The startup of a new titanium slag project in Jazan, Saudi Arabia, was delayed until the second half of 2016 owing to technical issues. Heavy-mineral exploration and mining projects were underway in Australia, Madagascar, Mozambique, Tanzania, and Sri Lanka.

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World Mine Production and Reserves: Reserves for Australia were revised based on a Geoscience Australia publication. Reserves for Kenya were based on company reports.

| | Mine production | | Reserves ⁶ |
|--------------------------------------------|------------------|-------------------------|-----------------------|
| | <u>2014</u> | <u>2015^e</u> | |
| Ilmenite: | | | |
| United States ^{2, 7} | 100 | 100 | 2,000 |
| Australia | 720 | 720 | 140,000 |
| Brazil | 100 | 100 | 43,000 |
| Canada ⁸ | 480 | 360 | 31,000 |
| China | 960 | 900 | 200,000 |
| India | 190 | 210 | 85,000 |
| Kenya | 100 | 430 | 54,000 |
| Madagascar | 300 | 240 | 40,000 |
| Mozambique | 510 | 450 | 14,000 |
| Norway | 440 | 420 | 37,000 |
| Russia | 110 | 100 | NA |
| Senegal | 60 | 230 | NA |
| South Africa ⁸ | 600 | 480 | 63,000 |
| Ukraine | 250 | 240 | 5,900 |
| Vietnam | 560 | 540 | 1,600 |
| Other countries | <u>90</u> | <u>90</u> | <u>26,000</u> |
| World total (ilmenite, rounded) | 5,570 | 5,610 | 740,000 |
| Rutile: | | | |
| United States | (9) | (9) | (9) |
| Australia | 190 | 144 | 22,000 |
| India | 17 | 18 | 7,400 |
| Kenya | 22 | 65 | 13,000 |
| Madagascar | 9 | 9 | NA |
| Sierra Leone | 100 | 110 | NA |
| South Africa | 53 | 55 | 8,300 |
| Ukraine | 63 | 63 | 2,500 |
| Other countries | <u>17</u> | <u>19</u> | <u>400</u> |
| World total (rutile, rounded) | ⁹ 470 | ⁹ 480 | 54,000 |
| World total (ilmenite and rutile, rounded) | 6,040 | 6,090 | 790,000 |

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

^eEstimated. NA Not available.

¹See also Titanium and Titanium Dioxide.

²Rounded to one significant digit to avoid disclosing company proprietary data.

³Source: Industrial Minerals; yearend average of high-low price.

⁴Landed duty-paid value based on U.S. imports for consumption. Data series revised to reflect annual average price range of significant importing countries.

⁵Defined as imports – exports.

⁶See [Appendix C](#) for resource/reserve definitions and information concerning data sources.

⁷Includes rutile.

⁸Mine production is primarily used to produce titaniferous slag.

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