KYANITE AND RELATED MINERALS

(Data in metric tons unless otherwise specified)

Domestic Production and Use: In Virginia, one firm with integrated mining and processing operations produced an estimated 80,000 tons of kyanite worth $40 million from two hard-rock open pit mines and synthetic mullite by calcining kyanite. Two other companies, one in Alabama and another in Georgia, produced synthetic mullite from materials mined from four sites; each company sourced materials from one site in Alabama and one site in Georgia. Synthetic mullite production data were withheld to avoid disclosing company proprietary data. Commercially produced synthetic mullite is made by sintering or fusing such feedstock materials as kyanite, kaolin, bauxite, or bauxitic kaolin. Natural mullite occurrences typically are rare and not economical to mine.

Of the kyanite-mullite output, 90% was estimated to have been used in refractories and 10% in other uses, including abrasive products, such as motor vehicle brake shoes and pads and grinding and cutting wheels; ceramic products, such as electrical insulating porcelains, sanitaryware, and whiteware; foundry products and precision casting molds; and other products. An estimated 60% to 70% of the refractory use was by the iron and steel industries, and the remainder was used by industries that manufacture cement, chemicals, glass, nonferrous metals, and other materials.

Andalusite was commercially mined from an andalusite-pyrophyllite-sericite deposit in North Carolina and processed as a blend of primarily andalusite for use by producers of refractories in making firebrick. Another company mined mineral sands in the southeastern United States; product blends that included kyanite and (or) sillimanite were marketed to the abrasive, foundry, and refractory industries.

Salient Statistics—United States:	**2021**	**2022**	**2023**	**2024**	**2025[e]**
Production:					
Kyanite, mine	[1]105,000	[1]85,900	[1]82,400	[1]78,600	80,000
Synthetic mullite	W	W	W	W	W
Imports for consumption (all kyanite minerals)	1,390	7,630	5,020	5,940	2,700
Exports (kyanite)	48,000	51,600	42,800	40,400	37,000
Consumption, apparent[2]	58,400	41,900	44,600	44,100	46,000
Price, average unit value of exports (free alongside ship),[3, 4] dollars per metric ton	369	382	428	460	510
Employment, number:[e, 5]					
Kyanite, mine, office, and plant	140	140	140	140	140
Synthetic mullite, office and plant	200	200	200	200	200
Net import reliance[6] as a percentage of apparent consumption	E	E	E	E	E

Recycling: Insignificant.

Import Sources (2021–24):[4] South Africa, 54%; Peru, 24%; France, 18%; and United Kingdom, 4%.

Tariff: Item	**Number**	**Normal Trade Relations 12–31–25**
Andalusite, kyanite, and sillimanite	2508.50.0000	Free.
Mullite	2508.60.0000	Free.

Depletion Allowance: 22% (domestic), 14% (foreign).

Government Stockpile: None.

Events, Trends, and Issues: Crude steel production in the United States, which ranked third in the world, increased by 1.6% to 54.6 million tons in the first 8 months of 2025 compared with that in the same period in 2024, indicating a similar change in consumption of kyanite-mullite refractories. Global crude steel production decreased by 1.7% to 1,231 million tons during the first 8 months of 2025 compared with that in the same period in 2024. Decreased global crude steel production during the first 8 months of 2025 was partially attributed to decreased demand from end-use sectors. The steel industry continued to be the leading consumer of refractories.

In January 2025, an Austria-based company finalized its acquisition of a United States-based producer of refractory products and associated minerals. In April 2025, an updated inferred mineral resource assessment was announced for a heavy-mineral-sand project in Cameroon that included an estimate for kyanite. The results of test work on the kyanite sample data were compared with kyanite sample data from Virginia.

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Andalusite supply remained constrained globally. Over the previous several years, andalusite mines in South Africa were adversely affected by electricity supply disruptions, flooding, labor disputes, and shipping problems. In 2025, exports from South Africa were estimated to be less than those reported in 2024. In Peru, andalusite production in 2025 was estimated to have been unchanged from that in 2024, but output was not expected to meet demand. Andalusite exports from China were estimated to be less than 7,000 tons, significantly less than those reported from other andalusite-producing countries such as France and Peru. Iran produced andalusite from three andalusite-garnet mines, but information was not available to make a reliable estimate of output.

In India, mining of new groups of minerals, including andalusite, was approved by the Government, but some sillimanite mines had previously been reclassified as beach sand minerals mines and, as a result, those mines were no longer considered sillimanite-producing mines. The State government of Tamil Nadu banned beach sand mining in 2013 and in 2025, an investigation into alleged unlawful mining of beach sand minerals such as garnet, ilmenite, monazite, rutile, sillimanite, and zircon was initiated. Five companies were ordered to make payments toward the cost of the minerals and royalties as part of the recovery proceedings. The Government of India banned private sector beach sand mining in 2019, but some sillimanite was produced in association with kyanite-producing mines.

If andalusite producers are unable to meet demand, market participants may consider alternate materials, such as refractory-grade bauxite and mullite. Similarly, when refractory-grade bauxite supply is limited, market participants may consider andalusite for specific refractory applications. Recycled refractory materials may also be used more often moving forward than they were in 2025.

World Mine Production and Reserves: Production in 2024 for China was revised significantly based on Government reports. Reserves for India were revised based on Government reports.

	Mine production[e]		Reserves[7]
	2024	2025	
United States (kyanite)	[1]78,600	80,000	Large
China (andalusite, crude ore)	50,000	50,000	5,000,000
France (andalusite)	60,000	60,000	NA
India (kyanite and sillimanite)	[8]2,710	2,500	9,100,000
Peru (andalusite)	40,000	40,000	NA
South Africa (andalusite)	130,000	120,000	NA
World total (rounded)[9, 10]	XX	XX	XX

World Resources:[7] Large resources of kyanite and related minerals are known to exist in the United States. The chief resources are in deposits of micaceous schist and gneiss, mostly in the Appalachian Mountains and in Idaho. Other resources are in aluminous gneiss in southern California. These resources are not economical to mine at present. The characteristics of kyanite resources in the rest of the world are estimated to be similar to those in the United States. Significant resources of andalusite are known to exist in China, France, Peru, and South Africa; kyanite resources have been identified in Brazil, India, and Russia; and sillimanite has been identified in India.

Substitutes: Two types of synthetic mullite (fused and sintered), superduty fire clays, and high-alumina materials are substitutes for kyanite in refractories. Principal raw materials for synthetic mullite are bauxite, kaolin and other clays, and silica sand.

[e]Estimated. E Net exporter. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

[1]Source: Virginia Department of Energy.

[2]Defined as kyanite production + imports of kyanite minerals – exports of kyanite minerals.

[3]Calculated from U.S. Census Bureau export data.

[4]Includes data for the following Harmonized Tariff Schedule of the United States code: 2508.50.0000.

[5]Estimated based on data from the U.S. Department of Labor, Mine Safety and Health Administration.

[6]Defined as imports – exports.

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

[8]Reported.

[9]In addition to the countries and (or) localities listed, Brazil, China, and Iran may have produced kyanite and related materials, but information was not available to make reliable estimates of output.

[10]World totals cannot be calculated because production and reserves are not reported in a consistent manner by all countries.