

KYANITE AND RELATED MINERALS

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: One firm in Virginia with integrated mining and processing operations produced kyanite from hard-rock open pit mines. Another company produced synthetic mullite in Georgia. Of the kyanite-mullite output, 90% was estimated to have been used in refractories and 10% in other uses. Of the refractory usage, an estimated 60% to 65% was used in ironmaking and steelmaking and the remainder in the manufacture of chemicals, glass, nonferrous metals, and other materials.

Salient Statistics—United States:	2003	2004	2005	2006	2007^e
Production:					
Mine ^e	90	90	90	90	90
Synthetic mullite ^e	40	40	40	40	40
Imports for consumption (andalusite)	4	4	6	4	1
Exports ^e	35	35	35	35	35
Shipments from Government stockpile excesses	—	0.1	—	—	—
Consumption, apparent ^e	99	99	101	99	96
Price, average, dollars per metric ton:					
U.S. kyanite, raw ¹	NA	NA	NA	NA	224
U.S. kyanite, calcined ¹	279	272	272	313	333
Andalusite, Transvaal, South Africa ¹	220	238	238	248	235
Stocks, producer	NA	NA	NA	NA	NA
Employment, kyanite mine, office, and plant, number ^e	125	120	130	135	130
Net import reliance ² as a percentage of apparent consumption	E	E	E	E	E

Recycling: Insignificant.

Import Sources (2003-06): South Africa, 100%.

Tariff: Item	Number	Normal Trade Relations 12-31-07
Andalusite, kyanite, and sillimanite	2508.50.0000	Free.
Mullite	2508.60.0000	Free.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: None

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Events, Trends, and Issues: The steel industry worldwide continued to be the leading consumer of refractories. According to International Iron and Steel Institute data, world crude steel production for the first 8 months of 2007 was about 7% higher than in the comparable period of 2006. The three leading steel-producing countries were China with about 39%; Japan, 10%; and the United States, 8%.

The refractories industry continues to consolidate and adjust according to domestic and global market conditions. Demand for refractories has been favorable; however, the rate of refractory consumption by industry has declined in recent years because of materials advances and product improvements. Other factors have been processing and operations changes by user industries.³

Natural raw materials such as andalusite and kyanite continue to be important in refractory manufacturing. In addition, as the need for higher grade, more durable refractories has continued to increase, refractories technology has advanced, with increased usage of synthetic raw materials. Examples include aluminosilicate fiber, mullite, zirconia–mullite, and other materials.³

Other trends are the increased development and use of monolithic (unshaped) refractories and a gradual increase in usage of recycled refractory materials.³

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves and reserve base ⁴
	2006	2007 ^e	
United States ^e	90	90	Large in the United States. South Africa reports a reserve base of about 51 million tons of aluminosilicates ore (andalusite and sillimanite).
France	65	65	
India	22	23	
South Africa	230	230	
Other countries	5	6	
World total (rounded)	410	410	

World Resources: 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 area 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 thought to be similar to those in the United States.

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.

^eEstimated. E Net exporter. NA Not available. — Zero.

¹Prices from trade journal.

²Defined as imports – exports + adjustments for Government and industry stock changes.

³Semler, C.E., 2007, The refractories world today—An overview: Industrial Minerals, no. 475, April, p. 55-61.

⁴[See Appendix C for definitions.](#)