

VERMICULITE

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: Two companies with mining and processing facilities in South Carolina and Virginia produced approximately 100,000 tons of vermiculite concentrate; actual data have been rounded to one significant digit to avoid disclosing company proprietary data. Flakes of raw vermiculite concentrate are micaceous in appearance and contain interlayer water in their structure. When the flakes are heated rapidly to a temperature above 870 °C, the water flashes into steam, and the flakes expand into accordionlike particles. This process is called exfoliation or expansion, and the resulting ultralightweight material is chemically inert, fire resistant, and odorless. Most of the vermiculite concentrate produced in the United States was shipped to 17 exfoliating plants in 11 States. The end uses for exfoliated vermiculite were estimated to be agriculture and horticulture, 48%; lightweight concrete aggregates (including cement premixes, concrete, and plaster), 14%; insulation, 11%; and other, 27%.

Salient Statistics—United States:	2016	2017	2018	2019	2020^e
Production ^{e, 1, 2}	100	100	100	100	100
Imports for consumption ^e	36	28	37	39	40
Exports ^e	21	16	14	9	10
Consumption:					
Apparent, concentrate ³	120	110	120	130	130
Reported, exfoliated	68	72	76	74	70
Price, range of value, concentrate, ex-plant, dollars per ton	140–575	140–575	140–575	NA	NA
Employment, number ^e	62	63	66	73	73
Net import reliance ⁴ as a percentage of apparent consumption ^{e, 2}	10	10	20	20	20

Recycling: Insignificant.

Import Sources (2016–19): South Africa, 71%; Brazil, 25%; Zimbabwe, 2%; Kenya, 1%; and other, 1%.

Tariff:	Item	Number	Normal Trade Relations 12–31–20
	Vermiculite, perlite and chlorites, unexpanded	2530.10.0000	Free.
	Exfoliated vermiculite, expanded clays, foamed slag, and similar expanded materials	6806.20.0000	Free.

Depletion Allowance: 14% (domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: U.S. exports and imports of vermiculite are not collected as a separate category by the U.S. Census Bureau. Despite the global COVID-19 pandemic, U.S. imports were estimated to be about 40,000 tons in 2020, essentially unchanged from those of 2019. Most imports came from South Africa and Brazil in 2020. One company announced price increases for vermiculite in 2020 but did not disclose specific price ranges.

A company in Brazil continued to expand production capacity at its vermiculite mine in central Brazil and continued with the development of another deposit near Brasilia to bring the company's total production capacity to 200,000 tons per year. Companies in China with significant vermiculite resources also were ramping up production, although processing operations continued to be somewhat constrained by increased enforcement of environmental regulations. Specific production data were not available for China.

Coarse-grade vermiculite remained in short supply. Sustained production at the 30,000-ton-per-year Namekara Mine in Uganda provides coarser grades to the market because it is considered to be one of the world's largest vermiculite deposits with significant portions of medium- and coarse-grade material. The Namekara deposit has enough resources for more than 50 years of production at previously announced rates. The company in Uganda pursued mine planning strategies after becoming the 100% owner of the mine.

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Exploration and development of vermiculite deposits containing medium, large, and premium (coarser) grades (mostly in China and South Africa) are likely to continue because of the higher demand for those grades. Finer grade production has exceeded consumption for several years. However, coarser grade (greater than 5-millimeter particle size) production has not been able to keep up with demand. Producers will continue to investigate ways to increase the use of the finer grades in existing products and in uses that require coarse material. Innovative applications continue to emerge, including the use of vermiculite to combat air pollution and absorb water in mines, replacing zeolites in ion-exchange columns, purifying wastewater, and containing or removing nuclear waste.

World Mine Production and Reserves:

	Mine production		Reserves⁵
	<u>2019</u>	<u>2020^e</u>	
United States	^e 2100	² 100	25,000
Brazil	50	50	6,600
Bulgaria	11	10	NA
China	NA	NA	NA
Egypt	8	8	NA
India	2	2	1,600
Russia	25	25	NA
South Africa	158	140	14,000
Uganda	7	7	NA
Zimbabwe	30	30	NA
Other countries	<u>3</u>	<u>3</u>	<u>NA</u>
World total (rounded) ⁶	390	380	NA

World Resources:⁵ In addition to the producing mines in South Carolina and Virginia, there are vermiculite occurrences in Colorado, Nevada, North Carolina, Texas, and Wyoming which contain estimated resources of 2 million tons to 3 million tons. Significant deposits have been reported in Australia, China, Russia, Uganda, and some other countries, but reserves and resource information comes from many sources and, in most cases, it is not clear whether the numbers refer to vermiculite alone or vermiculite plus other minerals and host rock and overburden.

Substitutes: Expanded perlite is a substitute for exfoliated vermiculite in lightweight concrete and plaster. Other denser but less costly alternatives in these applications include expanded clay, shale, slag, and slate. Alternate materials for loose-fill fireproofing insulation include fiberglass, perlite, and slag wool. In agriculture, substitutes include bark and other plant materials, peat, perlite, sawdust, and synthetic soil conditioners.

^eEstimated. NA Not available.

¹Concentrate sold or used by producers.

²Data are rounded to one significant digit to avoid disclosing company proprietary data.

³Defined as concentrate sold or used by producers + imports – exports.

⁴Defined as imports – exports.

⁵See Appendix C for resource and reserve definitions and information concerning data sources.

⁶Excludes China production.