ZEOLITES (NATURAL)

(Data in metric tons unless otherwise noted)

Domestic Production and Use: In 2019, six companies in the United States operated nine zeolite mines and produced an estimated 98,000 tons of natural zeolites, a 14% increase from that in 2018. Two mines owned by an additional company were idle during the year, but zeolites may have been sold from ore stockpiles at one of these operations. Chabazite was mined in Arizona, and clinoptilolite was mined in California, Idaho, New Mexico, Oregon, and Texas. Minor quantities of erionite, ferrierrite, mordenite, and (or) phillipsite were also likely produced. New Mexico was estimated to be the leading natural zeolite-producing State in 2019, followed by, in descending order, California, Idaho, Texas, Oregon, and Arizona. The top three companies accounted for approximately 85% of total domestic production.

An estimated 92,000 tons of natural zeolites were sold in the United States during 2019, an increase of 14% compared with sales in 2018. Domestic uses were, in decreasing order by estimated quantity, animal feed, odor control, unclassified end uses (such as ice melt, soil amendment, synthetic turf, etc.), water purification, pet litter, wastewater treatment, fungicide or pesticide carrier, oil and grease absorbent, gas absorbent (and air filtration), fertilizer carrier, desiccant, and aquaculture. Animal feed, odor control, and water purification applications likely accounted for about 70% of the domestic sales tonnage.

Salient Statistics—United States:	2015	2016	2017	2018	2019[e]
Production, mine	75,100	75,200	82,400	86,100	98,000
Sales, mill	73,200	71,300	81,300	80,500	92,000
Imports for consumption[e]	<1,000	<1,000	<1,000	<1,000	<1,000
Exports[e]	<1,000	<1,000	<1,000	<1,000	<1,000
Consumption, apparent[1]	73,200	71,300	81,300	80,500	92,000
Price, range of value, dollars per ton[2]	110–950	100–400	100–300	[e]50–300	50–300
Employment, mine and mill[e, 3]	100	115	110	110	120
Net import reliance[4] as a percentage of apparent consumption	E	E	E	E	E

Recycling: Zeolites used for desiccation, gas absorbance, wastewater cleanup, and water purification may be reused after reprocessing of the spent zeolites. Information about the quantity of recycled natural zeolites was unavailable.

Import Sources (2015–18): Comprehensive trade data were not available for natural zeolite minerals because they were imported and exported under a generic U.S. Census Bureau Harmonized Tariff Schedule code that includes multiple mineral commodities or under codes for finished products. Nearly all imports and exports consisted of synthetic zeolites.

Tariff: Item	Number	Normal Trade Relations 12–31–19
Mineral substances not elsewhere specified or included	2530.90.8050	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

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ZEOLITES (NATURAL)

Events, Trends, and Issues: Prior to the 1990s, annual output of natural zeolites in the United States was less than 15,000 tons. Production rose more than sixfold from 1990 through 2019 owing predominantly to increases in sales for animal feed applications, although sales for odor control and water purification also increased significantly. In contrast, sales for pet litter declined substantially during this period as a result of competition from other products.

World Mine Production and Reserves: Many countries either do not report production of natural zeolites or production is reported with a 2- to 3-year lag time. End uses for natural zeolites in countries that mine large tonnages of zeolite minerals typically include low-value, high-volume construction applications, such as dimension stone, lightweight aggregate, and pozzolanic cement. As a result, production data for some countries may not accurately indicate the quantities of natural zeolites used in the high-value applications that are reflected in the domestic data.

World reserves of natural zeolites have not been estimated. Deposits occur in many countries, but companies rarely publish reserves data. Further complicating estimates of reserves is the fact that much of the reported world production includes altered volcanic tuffs with low to moderate concentrations of zeolites that are typically used in high-volume construction applications. Some deposits should, therefore, be excluded from reserves estimates because it is the rock itself and not its zeolite content that makes the deposit valuable.

Production data for multiple countries were revised based on information from Government and industry sources.

	Mine production[e]		Reserves[5]
	2018	2019	
United States	[6]86,100	98,000	Two of the leading companies in the United States reported combined reserves of 80 million tons in 2019; total U.S. reserves likely are substantially larger. World data are unavailable, but reserves are estimated to be large.
China	320,000	320,000	
Cuba	[6]52,600	55,000	
Indonesia	130,000	130,000	
Jordan	10,000	10,000	
Korea, Republic of	[6]144,000	150,000	
New Zealand	100,000	100,000	
Russia	35,000	35,000	
Slovakia	117,000	120,000	
Turkey	65,000	65,000	
Other countries	75,000	75,000	
World total (rounded)	1,100,000	1,200,000	

World Resources: Recent estimates for domestic and global resources of natural zeolites are not available. Resources of chabazite and clinoptilolite in the United States are sufficient to satisfy foreseeable domestic demand.

Substitutes: For pet litter, zeolites compete with other mineral-based litters, such as those manufactured using bentonite, diatomite, fuller's earth, and sepiolite; organic litters made from shredded corn stalks and paper, straw, and wood shavings; and litters made using silica gel. Diatomite, perlite, pumice, vermiculite, and volcanic tuff compete with natural zeolite as lightweight aggregate. Zeolite desiccants compete against such products as magnesium perchlorate and silica gel. Zeolites compete with bentonite, gypsum, montmorillonite, peat, perlite, silica sand, and vermiculite in various soil amendment applications. Activated carbon, diatomite, or silica sand may substitute for zeolites in water-purification applications. As an oil absorbent, zeolites compete mainly with bentonite, diatomite, fuller's earth, sepiolite, and a variety of polymer and natural organic products. In animal feed, zeolites compete with bentonite, diatomite, fuller's earth, kaolin, silica, and talc as anticaking and flow-control agents.

[e]Estimated. E Net exporter.

[1]Defined as mill sales + imports – exports. Information about industry stocks was unavailable.

[2]Range of ex-works mine and mill unit values for individual natural zeolite operations, based on data reported by U.S. producers and U.S. Geological Survey estimates. Average unit values per ton for the past 5 years were $150 in 2015, $140 in 2016 and 2017, and an estimated $125 in 2018 and 2019. Prices vary with the percentage of zeolite present in the product, the chemical and physical properties of the zeolite mineral(s), particle size, surface modification and (or) activation, and end use.

[3]Excludes administration and office staff. Estimates based on data from the Mine Safety and Health Administration.

[4]Defined as imports – exports.

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

[6]Reported figure.