

ZEOLITES (NATURAL)

(Data in metric tons unless otherwise noted)

Domestic Production and Use: In 2017, 8 companies in the United States operated 11 zeolite mines and produced an estimated 79,000 tons of natural zeolites, an 8% increase from that of 2016. One other company might also have mined zeolites, but specific information on the operational status was not available. Chabazite was mined in Arizona, and clinoptilolite was mined in California, Idaho, New Mexico, Oregon, and Texas. New Mexico was estimated to be the leading natural zeolite-producing State, followed by California, Idaho, Texas, Oregon, and Arizona. The top three U.S. companies accounted for approximately 85% of total domestic production.

An estimated 77,000 tons of natural zeolites were sold in the United States during 2017, an increase of 11% compared with sales in 2016. Domestic uses were, in decreasing order by estimated quantity, animal feed, water purification, odor control, unclassified end uses, oil and grease absorbent, fungicide or pesticide carrier, pet litter, wastewater treatment, gas absorbent (and air filtration), fertilizer carrier, soil amendment, aquaculture, and desiccant. Animal feed, odor control, and water purification applications likely accounted for about 75% of the domestic sales tonnage.

Salient Statistics—United States:	2013	2014	2015	2016	2017^e
Production, mine	69,500	62,800	75,100	73,400	79,000
Sales, mill	68,300	62,500	73,200	69,500	77,000
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 ^{e, 1}	68,300	62,500	73,200	69,500	77,000
Price, range of value, dollars per metric ton ²	50–800	110–440	110–950	100–400	100–400
Employment, mine and mill ^{e, 3}	105	95	100	115	110
Net import reliance ⁴ as a percentage of estimated 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 (2013–16): 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. Nearly all imports and exports consisted of synthetic zeolites.

Tariff: Item	Number	Normal Trade Relations 12–31–17
Mineral substances not elsewhere specified or included	2530.90.8050	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

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 nearly fivefold from 1990 through 2016, owing predominantly to increases in animal feed sales, although sales for odor control, wastewater treatment, and water purification applications also increased. In contrast, sales for pet litter declined during this period as a result of competition from other products.

In 2017, one major U.S. company that mines in California finished construction of a new processing plant with an annual capacity of more than 35,000 tons, a tenfold increase in comparison to the former plant. The company will begin a project to further expand its production capacity in February 2018. Another leading company reported that sales of natural zeolites for animal feed, synthetic turf, wastewater treatment, and water purification were increasing rapidly. In Canada, multiple companies acquired rights to develop properties with significant resources of natural zeolites.

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

World reserves of natural zeolites have not been estimated. Deposits occur in many countries, but companies rarely, if ever, 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 of natural zeolites in China was revised significantly downward for the past several years owing to new information from a Government source. Output from China had previously been estimated at roughly 2 million tons per year. China remained the leading global producer of natural zeolites, accounting for nearly 30% of estimated worldwide production.

	Mine production ^e		Reserves ⁵
	<u>2016</u>	<u>2017</u>	
United States	673,400	79,000	World reserve data are unavailable but are estimated to be large.
China	300,000	300,000	
Cuba	51,000	55,000	
Jordan	13,000	13,000	
Korea, Republic of	191,000	200,000	
New Zealand	80,000	80,000	
Turkey	55,000	60,000	
Other countries	<u>350,000</u>	<u>350,000</u>	
World total (rounded)	1,100,000	1,100,000	

World Resources: Recent estimates for domestic and global resources of natural zeolites are not available. Resources of chabazite, clinoptilolite, erionite, mordenite, and phillipsite within the Basin and Range province 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.

^eEstimated. E Net exporter.

¹Defined as mill sales + imports – exports.

²Range of ex-works mine and mill unit values for individual natural zeolite operations, based on data reported by U.S. producers. Unit values for most operations have varied from \$100 to \$230 per ton in the past 5 years. 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.

³Excludes office staff.

⁴Defined as imports – exports.

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

⁶Reported figure.