

ZEOLITES (NATURAL)

(Data in metric tons unless otherwise noted)

Domestic Production and Use: In 2015, eight companies in the United States operated 10 zeolite mines and produced an estimated 72,400 tons of natural zeolites, a 13% increase from that of 2014. 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 Idaho, Texas, California, Oregon, and Arizona. The top three U.S. companies accounted for about 85% of total domestic production.

An estimated 71,100 tons of natural zeolites were consumed in the United States during 2015. Domestic uses for natural zeolites were, in decreasing order by tonnage, animal feed, odor control, water purification, unclassified end uses, pet litter, wastewater treatment, gas absorbents (and air filtration), fertilizer carriers, oil absorbents, desiccants, catalysts, fungicide or pesticide carriers, aquaculture, and cement (primarily downhole cement applications by the drilling industry). Animal feed, odor control, water purification, pet litter, and wastewater treatment accounted for nearly 80% of the domestic sales tonnage.

Salient Statistics—United States:	2011	2012	2013	2014	2015^e
Production	65,400	74,000	69,500	64,100	72,400
Sales, mill	65,200	70,500	68,300	62,700	71,300
Imports for consumption ^e	150	5	5	25	25
Exports ^e	1,100	750	200	175	200
Consumption, apparent ^{e, 1}	64,200	69,800	68,100	62,600	71,100
Price, range of value, dollars per metric ton ²	40–800	50–800	50–800	110–440	110–440
Employment, mine and mill	95	110	105	95	100
Net import reliance ³ 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 (2011–14): Comprehensive trade data were not available for natural zeolites. Nearly all imports and exports were synthetic zeolites.

Tariff: Item	Number	Normal Trade Relations 12–31–15
Mineral substances not elsewhere specified or included	2530.90.8050	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: During the past 20 years, the animal feed industry has seen the greatest increase in sales of natural zeolites. Sales for cement, odor control, wastewater treatment, and water purification applications have also increased in the past 10 years, although expansion of these markets has not been as great as with animal feed. Sales for pet litter declined during the past 20 years because of competition from other products and shifting of some pet litter sales to other zeolite markets.

The permitting process for expanding the pit at the Bear River Zeolite project in southeastern Idaho was initiated in 2015. The company was targeting applications in the oil and gas industry as end uses for the increased zeolite production. Another U.S. company received a permit to mine all minerals at its operation in southeastern Oregon, allowing for the removal of overburden that was inhibiting access to the zeolite deposit. At full production, the mine, which contained an estimated 45 million tons of zeolite resources, had the potential to be one of the top employers among all domestic zeolite mines.

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World Mine Production and Reserves: Most countries do not report natural zeolite production. Countries mining large tonnages of zeolites typically use them in low-value applications. The ready availability of zeolite-rich rock at low cost and the shortage of competing minerals and rocks are probably the most important factors encouraging its large-scale use. Examples of such usage are dimension stone, lightweight aggregate, pozzolanic cement, and soil conditioners.

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 that contain low to moderate concentrations of zeolites. These typically are 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.

	Mine production ^e		Reserves ⁴
	2014	2015	
United States	⁵ 64,100	72,400	World reserves are not determined but are estimated to be large.
China ⁶	2,000,000	2,000,000	
Cuba	44,000	43,000	
Jordan	13,000	13,000	
Korea, Republic of	230,000	230,000	
Turkey	45,000	70,000	
Other countries ⁶	<u>350,000</u>	<u>350,000</u>	
World total (rounded)	2,750,000	2,780,000	

World Resources: World resources have not been estimated for natural zeolites. An estimated 120 million tons of chabazite, clinoptilolite, erionite, mordenite, and phillipsite is present in near-surface deposits in the Basin and Range province in the United States. Resources in the United States may approach 10 trillion tons for zeolite-rich deposits.

Substitutes: For pet litter, natural 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.

²Estimate based on values reported by U.S. producers and prices published in the trade literature. Bulk shipments typically range from \$100 to \$230 per ton.

³Defined as imports – exports.

⁴See [Appendix C](#) for resource/reserve definitions and information concerning data sources.

⁵Reported figure.

⁶Includes materials appropriate for pozzolan applications.