

ZEOLITES (NATURAL)

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Natural zeolites were mined by six companies in the United States, with another company working from stockpiled materials or zeolites purchased from other producers for resale. Chabazite was mined in Arizona; clinoptilolite was mined in California, Idaho, New Mexico, and Texas. New Mexico was the leading producing State in 2012, followed by Idaho, Texas, Arizona, and California.

Natural zeolites mined in the United States are associated with the alteration of volcanic tuffs in alkaline lake deposits and open hydrologic systems. Smaller, noncommercial deposits are found in several other Midwestern and Western States. Zeolite minerals such as chabazite, clinoptilolite, erionite, mordenite, and phillipsite occur in these deposits, but the most commonly mined zeolites are chabazite, clinoptilolite, and mordenite.

Domestic uses for natural zeolites were, in decreasing order by tonnage, animal feed, pet litter, cement, odor control, water purification, wastewater cleanup, fungicide or pesticide carrier, gas absorbent, fertilizer carrier, oil absorbent, desiccant, catalyst, and aquaculture. Animal feed, cement, odor control, pet litter, wastewater treatment, and water purification applications accounted for more than 70% of the domestic sales tonnage.

Salient Statistics—United States:	2008	2009	2010	2011	2012^e
Production	60,100	59,500	61,300	65,400	68,000
Sales, mill	58,500	59,400	60,000	65,200	68,000
Imports for consumption ^e	200	200	150	100	100
Exports ^e	200	500	400	1,100	1,100
Consumption, apparent ^e	60,100	59,200	61,050	64,400	66,500
Price, range of value, dollars per metric ton ¹	30–900	30–900	30–900	40–800	45–800
Net import reliance ² as a percentage of estimated consumption	E	E	E	E	E

Recycling: Natural zeolites used for most applications are not recycled. Natural zeolites used for such applications as desiccants, gas absorbents, wastewater cleanup, or water purification may be reused after reprocessing of the spent zeolites.

Import Sources (2008–11): Comprehensive trade data are not available for natural zeolites. Nearly all exports and imports are synthetic zeolites.

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

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: U.S. consumption of natural zeolites increased mainly in markets such as animal feed, cement (as a pozzolan in specialty applications), gas absorbent, odor control, and wastewater treatment. Sales to other markets were more erratic, with sales increasing in some years and declining in others. Increased demand for natural zeolites to remove radioactive isotopes from nuclear-plant cooling waters and runoff continued in 2012, mainly as the result of remediation work done following the 2011 earthquake and tsunami in Japan that caused structural damage to several nuclear reactors. Although data is not available on U.S. trade of natural zeolites, the United States was believed to be a net exporter of natural zeolites in 2012.

In the United States, natural zeolite markets were smaller and less associated with construction and manufacturing than other industrial minerals. Construction markets outside of the United States, where natural zeolites were widely used as dimension stone, lightweight aggregate, and pozzolan, continued to be affected by the sluggish economic growth because of the reduced level of building activity.

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World Mine Production and Reserves:² Natural zeolite production data are not available for most countries. 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 enabling its large-scale use. It is also likely that a significant percentage of the material sold as zeolites in some countries is ground or sawn volcanic tuff that contains only a small amount of zeolites. Some examples of such usage are dimension stone (as an altered volcanic tuff), 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 reserve 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, and therefore some deposits should be excluded from reserve estimates because it is the rock itself and not its zeolite content that makes the deposit valuable.

	Mine production ³		Reserves ⁴
	<u>2011</u>	<u>2012^e</u>	
United States	65,400	68,000	World reserves are not determined but are estimated to be large.
China ⁵	2,000,000	2,000,000	
Japan ⁵	155,000	150,000	
Jordan	12,000	12,000	
Korea, Republic of	240,000	230,000	
Slovakia	80,000	85,000	
Turkey	150,000	100,000	
Other	<u>120,000</u>	<u>110,000</u>	
World total (rounded)	2,820,000	2,800,000	

World Resources: World resources have not been estimated for natural zeolites. An estimated 120 million tons of clinoptilolite, chabazite, 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 attapulgite, 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. 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.

^eEstimated. E Net exporter.

¹Estimate based on values reported by U.S. producers and prices published in the trade literature. Bulk shipments typically range from \$100 to \$250 per ton.

²Defined as imports – exports.

³Estimates for countries that do not report production represent a range with possibly 15% to 20% variability, rather than an absolute value.

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

⁵Includes materials appropriate for pozzolan applications.