ZEOLITES (NATURAL)

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Natural zeolites were mined by 10 companies in the United States, with 1 other company working from stockpiled materials or zeolites purchased from other producers for resale. Chabazite was mined in Arizona; clinoptilolite was mined in California, Idaho, Nevada, New Mexico, and Texas; and mordenite was mined in Nevada. New Mexico was the leading producing State in 2010, followed by Idaho, Texas, Arizona, California, and Nevada.

Natural zeolites mined in the United States are associated with the alteration of volcanic tuffs in alkaline lake deposits and open hydrologic systems. Commercial deposits are in Arizona, California, Idaho, Nevada, New Mexico, Oregon, and Texas. Smaller, noncommercial deposits also 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.

U.S. consumption of natural zeolites was 58,500 tons in 2010. Domestic uses for natural zeolites were, in decreasing order by tonnage, animal feed, odor control, pet litter, water purification, fungicide or pesticide carrier, wastewater cleanup, gas absorbent, horticultural applications (soil conditioners and growth media), oil absorbent, desiccant, and aquaculture. Animal feed, odor control, pet litter, and water purification applications accounted for more than 75% of the domestic sales tonnage.

Salient Statistics—United States:	**2006**	**2007**	**2008**	**2009**	**2010[e]**
Production, mine	63,200	57,400	60,100	59,500	59,000
Sales, mill	55,900	57,400	58,500	59,400	58,500
Price, range of value, dollars per ton[1]	30-900	30-900	30-900	30-900	30-900

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 (2006–09): Comprehensive trade data are not available for natural zeolites. Nearly all exports and imports are synthetic zeolites. Small amounts of natural zeolites have been imported from Bulgaria and India.

Tariff: Item	**Number**	**Normal Trade Relations 12-31-10**
Mineral substances not elsewhere specified or included	2530.90.80.50	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

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ZEOLITES (NATURAL)

Events, Trends, and Issues: Markets for natural zeolites generally were smaller and less associated with construction and manufacturing applications than most other industrial minerals. Consequently, the recent U.S. economic recession had only a relatively minor impact on the industry. However, construction markets outside of the United States, where natural zeolites are widely used as dimension stone, lightweight aggregate, and pozzolan, were affected by the 2008–09 recession because of the reduced level of building activity. World production probably remained unchanged in 2010 from that of 2009 because of the overall lack of economic growth in many regions of the globe.

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 for 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[2]		Reserves[3]
	2009	2010[e]	
United States	59,500	59,000	
China[e,4]	2,000,000	2,000,000	
Japan[e,4]	155,000	150,000	
Jordan[e]	[5]425,000	140,000	World reserves are
Korea, Republic of	165,000	210,000	not determined but are
Slovakia	90,000	85,000	estimated to be large.
Turkey[4]	100,000	100,000	
Other	5,500	5,000	
World total (rounded)	3,000,000	2,750,000	

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. Possible 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.

[e]Estimated.

[1]Estimate based on values reported by U.S. producers and prices published in the trade literature. Bulk shipments typically range from $100 to $200 per ton.

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

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

[4]Includes pozzolan applications.