

MAGNESIUM COMPOUNDS¹

[Data in thousand metric tons of magnesium oxide (MgO) content unless otherwise noted]²

Domestic Production and Use: Seawater and natural brines accounted for about 70% of U.S. magnesium compound production in 2017. The value of production of all types of magnesium compounds was estimated to be \$250 million. Magnesium oxide and other compounds were recovered from seawater by one company in California and another company in Delaware, from well brines by one company in Michigan, and from lake brines by two companies in Utah. Magnesite was mined by one company in Nevada. One company in Washington mined olivine and processed it for use as foundry sand. About 60% of the magnesium compounds consumed in the United States were used in agricultural, chemical, construction, environmental, and industrial applications in the form of caustic-calcined magnesia, magnesium chloride, magnesium hydroxide, and magnesium sulfates. The remaining 40% was used for refractories in the form of dead-burned magnesia, fused magnesia, and olivine.

Salient Statistics—United States:	2013	2014	2015	2016	2017^e
Production (shipments)	280	285	280	292	330
Shipments (gross weight)	425	435	424	441	490
Imports for consumption	439	515	621	401	400
Exports	71	79	83	99	110
Consumption, apparent ³	648	721	818	594	620
Employment, plant, number ^e	250	250	260	260	260
Net import reliance ⁴ as a percentage of apparent consumption	57	60	66	51	47

Recycling: Some magnesia-based refractories are recycled, either for reuse as refractory material or for use as construction aggregate.

Import Sources (2013–16): Caustic-calcined magnesia: China, 49%; Canada, 20%; Australia, 11%; Brazil, 11%; and other, 9%. Dead-burned and fused magnesia: China, 56%; Brazil, 25%; Ukraine, 6%; Turkey, 6%; and other, 7%. Magnesium chloride: Israel, 62%; Netherlands, 28%; China, 3%; India, 2%; and other, 5%. Magnesium hydroxide: Mexico, 32%; Israel, 21%; Austria, 19%; Netherlands, 12%; and other, 16%. Magnesium sulfates: China, 76%; Germany, 19%; Canada, 2%; Mexico, 2%; and other, 1%.

Tariff:⁵ Item	Number	Normal Trade Relations 12–31–17
Crude magnesite	2519.10.0000	Free.
Dead-burned and fused magnesia	2519.90.1000	Free.
Caustic-calcined magnesia	2519.90.2000	Free.
Kieserite	2530.20.1000	Free.
Epsom salts	2530.20.2000	Free.
Magnesium hydroxide	2816.10.0000	3.1% ad val.
Magnesium chloride	2827.31.0000	1.5% ad val.
Magnesium sulfate (synthetic)	2833.21.0000	3.7% ad val.

Depletion Allowance: Brucite, 10% (Domestic and foreign); dolomite, magnesite, and magnesium carbonate, 14% (Domestic and foreign); magnesium chloride (from brine wells), 5% (Domestic and foreign); and olivine, 22% (Domestic) and 14% (Foreign).

Government Stockpile: None.

Events, Trends, and Issues: Global consumption of dead-burned and fused magnesia increased by about 5% during the first 8 months of 2017 compared with that in the same period of 2016, as world steel production increased in 2017. Prices for dead-burned magnesia and caustic-calcined magnesia increased as steel production increased, despite abundant supplies from China. Consumption of dead-burned and fused magnesia increased slightly in the United States in 2017 and was expected to increase at a gradual rate in the foreseeable future.

Consumption of caustic-calcined magnesia continued to increase for animal feed supplements and fertilizer as the importance of magnesium as a nutrient gained recognition. Environmental applications, such as wastewater treatment, also accounted for increasing consumption of magnesium compounds, including caustic-calcined magnesia and magnesium hydroxide.

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At the end of 2016, China eliminated its quotas on magnesia exports. This action was not expected to result in increased exports in the near term as magnesia exports in previous years have been below quota levels. A small amount of production capacity closed at magnesia plants in China during the first part of 2017; however, stronger enforcement of environmental regulations by the Government of China resulted in more shutdowns in the second half of the year, but employment concerns limited shutdowns at the Provincial level in China. Particularly, the magnesia industry in Liaoning Province (the leading magnesia-producing Province) was still generally composed of companies with small capacities and obsolete equipment.

Although magnesia from North Korea has been sold in China for many years, imports from North Korea were restricted by the Government of China in 2017. Significant price increases were reported for magnesia exports from China during the second half of 2017. With lower production in China and reduced imports to China from North Korea, decreased supplies and increased prices were expected to continue.

World Magnesite Mine Production and Reserves:⁶ In addition to magnesite, vast reserves exist of well and lake brines and seawater from which magnesium compounds can be recovered. Reserves for Australia, Brazil, China, Greece, and Turkey were revised based on Government reports.

	Mine production		Reserves ⁷
	2016	2017 ^e	
United States	W	W	35,000
Australia	425	450	⁸ 320,000
Austria	710	730	50,000
Brazil	1,100	1,200	390,000
China	18,600	18,000	1,000,000
Greece	400	400	280,000
India	317	300	90,000
Korea, North	700	300	1,500,000
Russia	1,300	1,300	2,300,000
Slovakia	560	570	120,000
Spain	300	310	35,000
Turkey	2,700	2,700	230,000
Other countries	770	770	1,400,000
World total (rounded)	⁹ 27,900	⁹ 27,000	7,800,000

World Resources: Resources from which magnesium compounds can be recovered range from large to virtually unlimited and are globally widespread. Identified world magnesite and brucite resources total 12 billion tons and several million tons, respectively. Resources of dolomite, forsterite, magnesium-bearing evaporite minerals, and magnesia-bearing brines are estimated to constitute a resource of billions of tons. Magnesium hydroxide can be recovered from seawater. As serpentine could be used as a source of magnesia, a project in Canada was exploring a method to produce magnesia from serpentine in tailings of an asbestos mine in Quebec.

Substitutes: Alumina, chromite, and silica substitute for magnesia in some refractory applications.

^eEstimated. W Withheld to avoid disclosing company proprietary data.

¹See also Magnesium Metal.

²Previously reported as magnesium content. Based on input from consumers, producers, and others involved in the industry, it was determined that reporting magnesium compound data in terms of contained magnesia was more useful than reporting in terms of magnesium content. Conversion factors used: magnesite, 47.8% MgO; magnesium chloride, 42.3% MgO; magnesium hydroxide, 69.1% MgO; and magnesium sulfate, 33.5% MgO.

³Defined as shipments + imports – exports.

⁴Defined as imports – exports + adjustments for industry stock changes.

⁵Tariffs are based on gross weight.

⁶Gross weight of magnesite (magnesium carbonate) in thousand tons.

⁷See [Appendix C](#) for resource and reserve definitions and information concerning data sources.

⁸For Australia, Joint Ore Reserves Committee-compliant reserves were about 38 million tons.

⁹Excludes U.S. production.