

## MAGNESIUM COMPOUNDS<sup>1</sup>

[Data in thousand metric tons, magnesium oxide (MgO) content,<sup>2</sup> unless otherwise specified]

**Domestic Production and Use:** In 2024, most U.S. magnesium compounds were produced from seawater and natural brines. The value of shipments of all types of magnesium compounds (excluding magnesium chloride) was estimated to be \$450 million compared with \$449 million (revised) in 2023. Magnesium 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 sold and processed stockpiled olivine.

In the United States, about 78% of magnesium compounds were consumed in the form of caustic-calcined magnesia, magnesium chloride, magnesium hydroxide, and magnesium sulfates across the following industries and uses, in descending order of quantity, environmental, chemical, agricultural, and deicing. The remaining magnesium compounds were consumed for refractories in the form of dead-burned magnesia, fused magnesia, and olivine.

<b>Salient Statistics—United States:</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024<sup>e</sup></b>
Production	363	432	412	428	430
Shipments (gross weight)	547	634	606	616	620
Imports for consumption	480	655	598	491	520
Exports	66	86	104	89	65
Consumption, apparent <sup>3</sup>	777	1,001	906	830	890
Employment, plant, number <sup>e</sup>	260	270	280	270	270
Net import reliance <sup>4</sup> as a percentage of apparent consumption	53	57	55	48	52

**Recycling:** Some magnesia-based refractories are recycled as construction aggregate, reused in refractory, and as foundry sand.

**Import Sources (2020–23):** Caustic-calcined magnesia: China,<sup>5</sup> 73%; Canada, 21%; and other, 6%. Crude magnesite: China,<sup>5</sup> 94%; Japan, 3%; and other, 3%. Dead-burned and fused magnesia: China,<sup>5</sup> 70%; Brazil, 18%; Turkey, 3%; and other, 9%. Magnesium chloride: Israel, 56%; Netherlands, 24%; Austria, 5%; and other, 15%. Magnesium hydroxide: Mexico, 59%; Netherlands, 14%; Israel, 13%; Japan, 5%; and other, 9%. Magnesium sulfates: China,<sup>5</sup> 56%; Germany, 11%; India, 11%; Vietnam, 7%; and other, 15%. Total imports: China,<sup>5</sup> 61%; Israel, 9%; Brazil, 8%; Canada, 8%; and other, 14%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b>
			<u>12–31–24</u>
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 and peroxide		2816.10.0000	3.1% ad valorem.
Magnesium chloride		2827.31.0000	1.5% ad valorem.
Magnesium sulfate (synthetic)		2833.21.0000	3.7% ad valorem.

**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:** In 2024, China was the leading producer of magnesia and magnesite and remained the principal exporter of magnesia to the United States and much of the world. Based on domestic import data for the year through August, imports from China of caustic-calcined magnesia increased by 90%, and imports of dead burned and fused magnesias from China decreased by 41% compared with those in the same period in 2023. The decrease in dead burned and fused magnesia imports was likely due to the slight decrease in U.S. crude steel production (based on data available through September). Dead burned and fused magnesia were consumed as refractories in steel production. In 2024, estimated domestic apparent consumption of magnesium compounds increased by 7% from that in 2023.

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In March, the U.S. Forest Service suspended the use of magnesium chloride-based aerial fire retardants for 2024 after inspections revealed corrosion in airtankers used for distributing the fire retardants. The magnesium chloride-based fire retardant was supplied by the largest domestic producer.

In May, a Finland-based specialty alloy producer acquired the mining rights for magnesite mines in Serbia from a Serbian-based refractory producer. The magnesite was supplied to the company's beneficiation plant in Cacak and sintered in its 100,000-ton-per-year production facility in Kraljevo.

**World Magnesite Mine Production and Reserves (gross weight):<sup>6</sup>** In addition to magnesite reserves, vast reserves of magnesium exist in well and lake brines and seawater from which magnesium compounds can be recovered. Reserves for China were revised based on Government reports.

	Mine production <sup>e</sup>		Reserves <sup>7</sup>
	2023	2024	
United States	W	W	35,000
Australia	500	490	<sup>8</sup> 280,000
Austria	771	760	49,000
Brazil	1,800	1,800	200,000
Canada	150	150	NA
China	13,000	13,000	680,000
Greece	393	390	280,000
India	<sup>9</sup> 123	160	66,000
Iran	216	210	10,000
Russia	2,500	2,500	2,300,000
Slovakia	<sup>9</sup> 391	380	1,200,000
Spain	680	670	35,000
Turkey	<sup>9</sup> 1,330	1,300	110,000
Other countries	373	370	2,500,000
World total (rounded)	<sup>10</sup> 22,200	<sup>10</sup> 22,000	7,700,000

**World Resources:**<sup>7</sup> 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 13 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. Serpentine could be used as a source of magnesia but global resources, including in tailings of asbestos mines, have not been quantified but are estimated to be very large.

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

<sup>e</sup>Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data.

<sup>1</sup>See also the Magnesium Metal chapter.

<sup>2</sup>Reported as magnesium content through Mineral Commodity Summaries 2016. Based on input from consumers, producers, and others involved in the industry, reporting magnesium compound data in terms of magnesium oxide (MgO) content was determined to be more useful than reporting in terms of magnesium content. Calculations were made using MgO contents: magnesite, 47.8%; magnesium chloride, 42.3%; magnesium hydroxide, 69.1%; and magnesium sulfate, 33.5%.

<sup>3</sup>Defined as production + imports – exports.

<sup>4</sup>Defined as imports – exports.

<sup>5</sup>Includes Hong Kong.

<sup>6</sup>Gross weight of magnesite (magnesium carbonate) in thousand tons.

<sup>7</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>8</sup>For Australia, Joint Ore Reserves Committee-compliant or equivalent reserves were 37 million tons.

<sup>9</sup>Reported.

<sup>10</sup>Excludes U.S. production.