



2013 Minerals Yearbook

MAGNESIUM COMPOUNDS [ADVANCE RELEASE]

MAGNESIUM COMPOUNDS

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The leading form of magnesium compounds is caustic-calcined magnesia used in environmental applications, agricultural supplements, and the chemical industry. Domestic caustic-calcined magnesia shipments in 2013 increased slightly from those in 2012, imports for consumption increased by 17%, and apparent consumption increased by 8%. The second leading form of magnesium compounds is refractory magnesia (dead-burned and fused) for refractory products used by the steel, cement, and glass industries. Production of refractory magnesia increased by nearly 50%, but shipments decreased by 15%, net imports for consumption decreased by 29%, and apparent consumption of refractory magnesia in the United States declined by 22%. Domestic shipments of magnesium hydroxide were 3% higher, but magnesium sulfate shipments decreased by 9% (table 3). About 69% of U.S. magnesium compounds production came from seawater and well and lake brines. The remainder was recovered from dolomite, magnesite, and olivine. Imports made up for the shortfall in domestic production with China as the main source, accounting for 49% of the refractory magnesia imports and 54% of the imports of caustic-calcined magnesia (table 6).

Legislation and Government Programs

In June, the U.S. Department of Commerce, International Trade Administration (ITA), rescinded an administrative review of its antidumping duty order on certain imports of magnesia-carbon brick from China between September 1, 2011, and August 31, 2012. The companies requesting the review withdrew their requests. In December, the ITA rescinded an administrative review of its antidumping duty order on certain imports of magnesia-carbon brick from Mexico between September 1, 2012, and August 31, 2013. The company requesting the review withdrew its request. The antidumping duties in both cases were established in 2010 (U.S. Department of Commerce, International Trade Administration, 2013a, b).

Production

In 2013, 155,000 metric tons (t) of caustic-calcined magnesia was produced in the United States (table 1). Production data for dead-burned magnesia and fused magnesia were withheld to avoid disclosing company proprietary data. Data for magnesium compounds were collected by the U.S. Geological Survey (USGS) from an annual voluntary survey of U.S. operations. Of the nine operations canvassed, six responded, representing more than 90% of the magnesium compounds shipped and used, including data for some compounds that were not reportable in table 3. Data for the three nonrespondents were estimated on the basis of prior-year production levels.

Fused magnesia was produced by one company in the United States; UCM Magnesia Inc. [a subsidiary of UCM Group plc (Stafford, United Kingdom), a subsidiary of Imerys Minerals Ltd. (Paris, France)] operated a plant in Cherokee, AL. Olivine Corp., the only company in the United States to produce olivine, operated a mine and processing plant in Washington.

Great Salt Lake Minerals Corp. (GSLM) [a subsidiary of Compass Minerals International, Inc. (Overland Park, KS)] revised plans to build new solar evaporation ponds on the Great Salt Lake in Utah, citing environmental concerns. The new plan proposed construction of evaporation ponds on the remote west side of the Great Salt Lake instead of on the east side of the lake near the processing plant. Magnesium chloride, potassium sulfate, and salt were produced by GSLM from the Great Salt Lake. The revised proposal called for production capacity of GSLM's main product, potassium sulfate, to increase initially by 35% and magnesium chloride capacity could be increased if market conditions warranted. A project schedule was pending regulatory approval. GSLM marketed magnesium chloride mainly for deicing and dust control applications (Great Salt Lake Minerals Corp., 2013).

Consumption

In 2013, environmental applications (water treatment and stack-gas scrubbing) remained the largest tonnage end use for domestic consumption of caustic-calcined magnesia, with 50% of the total. The other major end-use sectors for caustic-calcined magnesia were agriculture (animal feed and fertilizers), 41%, and chemical intermediates, 8%. Dead-burned magnesia and fused magnesia were used for refractory products, with the steel industry being the leading end-use sector for domestic consumption. The cement and glass industries also consumed refractory products made from dead-burned and fused magnesia.

Magnesium hydroxide was used, in descending order, for water treatment, as a chemical intermediate, in medicines and pharmaceuticals, and in fertilizer. Magnesium sulfate was used, in descending order, for chemicals, fertilizer, pulp and paper, rubber, pharmaceuticals, and water treatment. Magnesium chloride was used mainly for ice control. Magnesium chloride brines were used for road dust and ice control.

Foreign Trade

Net imports of caustic-calcined magnesia in 2013 were 16% more than those in 2012. Net imports of dead-burned and fused magnesia in 2013 were 29% less than those in 2012 (tables 4 and 6). China and Brazil remained the leading sources of imports of dead-burned and fused magnesia supplying 49% and 32%, respectively. The leading sources of caustic-calcined

magnesia imports remained China (54%), Canada (28%), and Australia (15%).

World Review

The largest capacity magnesite-processing facilities in the world are in China, Turkey, and Russia. These countries accounted for more than 80% of world magnesia from magnesite production in 2013. China, with 69% of the total, was the world's leading magnesite producer. World production of magnesite increased by 6% in 2013 compared with that in 2012 to 24.8 million metric tons (Mt) (table 9). Japan, the Netherlands, and the United States accounted for about 57% of the world's magnesia production capacity from seawater or brines (table 8). Fused magnesia was produced in Australia, Brazil, China, Iran, Israel, Japan, the Republic of Korea, Mexico, North Korea, Norway, Russia, Turkey, the United Kingdom, and the United States. World production capacity for fused magnesia was about 1.05 million metric tons per year (Mt/yr) at yearend 2013. World production capacity for dead-burned magnesia was 8.62 Mt/yr (table 8).

Norway has been the world's principal producer and supplier of olivine. Other producers include Australia, Austria, Brazil, China, Greece, Italy, Japan, the Republic of Korea, Mexico, Spain, Taiwan, Turkey, and the United States. Roberts (2008) estimated that total world production of olivine in 2008 was 8.4 Mt, although the total was likely less in 2013 with mine closures, particularly in Greenland and the United States, owing to the global economic downturn in 2008–09.

Brazil.—Ibar Nordeste S.A. (Brumado) commissioned a new rotary kiln at its plant in Brumado. The new kiln increased caustic-calcined magnesia capacity to 160,000 metric tons per year (t/yr) from 100,000 t/yr (Wilson, 2013).

Canada.—In February, Karnalyte Resources Inc. (Calgary, Alberta) received approval of its Environmental Impact Statement from the Saskatchewan Ministry of Environment (SME) for the proposed magnesium chloride and potash solution mining project at Wynyard, Saskatchewan. In September, Karnalyte received notice from the SME that it could proceed with the construction permitting process. Karnalyte planned to develop the carnallite-sylvite mineral deposit to produce 100,000 t/yr of magnesium chloride brine (32% MgCl₂), 104,000 t/yr of hydromagnesite, and 625,000 t/yr of potash (Karnalyte Resources Inc., 2013a, b).

China.—In June, Qinghai Western Magnesium Co. Ltd. commissioned the first phase of a 100,000-t/yr magnesium hydroxide plant adjacent to Tuanjie Lake (Lismore, 2013a). In July, Magnesita Refratários S.A. (Contagem, Brazil) acquired Dalian Mayerton Refractories Co. Ltd., which owned a 50,000-t/yr magnesium-carbon refractory plant in Dalian (Magnesita Refratários S.A., 2013).

Korea, North.—In 2012, production of magnesia was approximately 178,000 t, 30% less than that in 2011. Shortages of coal and transportation issues were cited for the decline in production (Lismore, 2013a).

Norway.—In November 2012, refractory producer RHI AG (Vienna, Austria) opened an 80,000-t/yr fused magnesia plant in Porsgrunn. During the startup, however, an overspill damaged

1 of the 10 furnaces, forcing the entire plant to shut down. Although repairs initially were projected to be completed in February 2013, technical problems were still delaying the restart at yearend. The plant used magnesia recovered from seawater as its feedstock (Ollett, 2013; RHI AG, 2013a, b, d, 2014a).

Russia.—In July, Magnezit Group (Moscow) completed construction of an 80,000-t/yr high-temperature shaft kiln to process briquetted calcined magnesia at its plant in Satka, Chelyabinsk. Construction also continued in Satka on a 100,000-t/yr multiple-hearth furnace to produce dead-burned magnesia. When completed, the plant's capacity for dead-burned magnesia would increase to 130,000 t/yr. In addition, five electric fusion furnaces, each with a capacity of 10,000 t/yr of fused magnesia, were being installed at the Satka plant. Magnezit also continued work on the second stage of the Razdolinsk, Krasnoyarsk project, that would increase caustic-calcined magnesia capacity to 200,000 t/yr from 50,000 t/yr and fused magnesia capacity to 150,000 t/yr from 50,000 t/yr when completed in 2015. Magnesite from the nearby Kirgiteisk deposit was mined to supply the Razdolinsk plant (Lismore, 2013c; Magnezit Group, 2013a, b).

In November, Nikochem Corp. (Volgograd) completed expanding the magnesium chloride capacity of its plant in Volgograd to 60,000 t/yr from 30,000 t/yr, and commissioned a 5,000-t/yr magnesium hydroxide plant. Ramp up of the magnesium hydroxide plant was completed in the first quarter of 2014 and expansion to 7,500 t/yr was planned for completion in early 2015. Nikochem also planned to construct a 50,000-t/yr fused magnesia plant. Nikochem produced bischofite from deposits near Volgograd as its feed stock (Lismore, 2013b; O'Driscoll, 2013).

Slovakia.—In June, Magnezit completed expanding the Slovomag plant in Lubenik which increased periclase carbon brick capacity to 32,000 t/yr from 5,000 t/yr (Magnezit Group, 2013c).

Spain.—Magnesitas Navarras S.A. (Navarra) was preparing to start magnesite production in 2014 from the Borobia and Zibeti deposits. The deposits' magnesite reserves were 50 Mt and 7 Mt, respectively (Wilson, 2013).

Turkey.—Kümaş Manyezit Sanayi A.Ş. (Kutahya) completed a new 80,000-t/yr rotary kiln at its Kutahya plant, expanding caustic-calcined and dead-burned magnesia capacities to 265,000 t/yr from 185,000 t/yr. Kümaş also planned to expand fused magnesia capacity at the Kutahya plant to 35,000 t/yr from 17,500 t/yr by the end of the first quarter in 2014 (Lismore, 2013d).

In August, RHI offered to purchase a magnesite mine and adjacent processing facilities in Erzurum from Cihan Group, and the acquisition was completed in April 2014. RHI planned to reopen the mine and expand and modernize the plant, increasing sintered magnesia capacity to 100,000 t/yr from 60,000 t/yr (RHI AG, 2013c, 2014b; Syrett, 2013).

Outlook

According to the World Steel Association (2014b), world crude steel production reached a record 1.607 billion metric tons in 2014, an increase of 3.5% compared with that of 2013. China

continued to be the leading steel-producing nation, accounting for 46.7% of the global total in 2013. In the first 5 months of 2014, world steel production continued to increase slightly, with production 2.4% more than that in the comparable period of 2013 (World Steel Association, 2014a).

The global supply of magnesia and magnesium compounds is expected to be sufficient to meet global demand. Steel production in China increased by 2.7% in the first 5 months of 2014, less than the 8.0% increase in the same period in 2013. Continued growth in the consumption of magnesia-base refractories was expected in China but at a slower rate. Development of magnesite deposits in Australia and Canada and recent expansion of processing capacity in Australia, Brazil, Iran, the Netherlands, Norway, Russia, and Turkey may increase supplies of magnesium compounds outside of China. Previous expansions have been driven by the desire of refractory producers to have captive supplies of magnesium compounds to lessen dependence on supplies from China, a trend that is expected to continue.

Because caustic-calcined magnesia is used in a variety of applications, the economic downturn did not affect U.S. consumption as significantly as consumption of refractory magnesia, which was tied directly to the performance of the U.S. steel industry. Increased consumption of caustic-calcined magnesia as a feed supplement and fertilizer additive was expected as the nutrient value of magnesium gains more attention. Magnesium hydroxide continued to be used mainly in water treatment, but interest in magnesium hydroxide flame retardants continued to increase. Substitution of magnesium hydroxide for halogenated flame retardants in some plastics, for which there is concern about corrosiveness and toxicity of smoke and other emission products, could increase magnesium hydroxide use.

Carbon sequestration is gaining world attention as a method to reduce greenhouse gas emissions into the atmosphere. Magnesium-base minerals, particularly brucite and olivine, were being investigated as minerals that are naturally capable of sequestering carbon dioxide emitted by burning fossil fuels and other human activities and transforming the gas into a geologically stable carbonate. If this technology were to be developed commercially, it could represent a new market for these minerals.

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TABLE 1
SALIENT MAGNESIUM COMPOUND STATISTICS¹

(Thousand metric tons and thousand dollars)

	2009	2010	2011	2012	2013
United States:					
Caustic-calcined and specified magnesias: ²					
Shipped by producers: ³					
Quantity	147	162	155	152	155
Value	42,200	47,000	48,800	46,000	47,700
Exports ⁴	1	(5)	(5)	(5)	1
Imports for consumption ⁴	126	127	111	114	133
Refractory magnesia:					
Shipped by producers:					
Quantity	W	W	W	W	W
Value	W	W	W	W	W
Exports	8	9	18	16	19
Imports for consumption	151	323	384	292	215
World, production of magnesite	18,300 ^r	21,200 ^r	27,300 ^r	23,300 ^r	24,800 ^c

^cEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data.

¹Data are rounded to no more than three significant digits.

²Excludes caustic-calcined magnesia used in the production of refractory magnesia.

³Includes magnesia used by producers.

⁴Caustic-calcined magnesia only.

⁵Less than ½ unit.

TABLE 2
U.S. MAGNESIUM COMPOUND PRODUCERS, BY RAW MATERIAL SOURCE, LOCATION, AND PRODUCTION CAPACITY, IN 2013¹

(Metric tons, MgO equivalent)

Raw material source and producing company	Location	Capacity	Products
Magnesite, Premier Magnesia, LLC	Gabbs, NV	140,000	Caustic-calcined magnesia.
Lake brines:			
Great Salt Lake Minerals Corp.	Ogden, UT	250,000	Magnesium chloride and magnesium chloride brines.
Intrepid Wendover-Potash, LLC	Wendover, UT	45,000	Magnesium chloride brines.
Well brines, Martin Marietta Magnesia Specialties, LLC	Manistee, MI	314,000	Caustic-calcined magnesia, dead-burned magnesia, and magnesium hydroxide.
Seawater:			
South Bay Salt Works	Chula Vista, CA	3,000	Magnesium chloride brines.
SPI Pharma, Inc.	Lewes, DE	5,000	Magnesium hydroxide.
Total		757,000	

¹Data are rounded to no more than three significant digits; may not add to total shown.

TABLE 3
U.S. MAGNESIUM COMPOUNDS SHIPPED AND USED¹

	2012		2013	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined and specified (USP and technical) magnesias ²	152,000	\$46,000	155,000	\$47,700
Magnesium hydroxide [100% Mg(OH) ₂] ²	176,000	89,400	182,000	86,600
Magnesium sulfate, anhydrous and hydrous	51,900	24,300	47,400	22,500
Refractory magnesia	W	W	W	W

W Withheld to avoid disclosing company proprietary data.

¹Data are rounded to no more than three significant digits.

²Excludes material produced as an intermediate step in the manufacture of other magnesium compounds.

TABLE 4
U.S. EXPORTS OF CRUDE AND PROCESSED MAGNESITE, BY COUNTRY¹

Material and country	2012		2013	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined magnesia:				
Canada	--	--	1,030	\$525
Indonesia	--	--	84	81
Mexico	142	\$89	176	117
Other	48 ^r	50 ^r	182	149
Total	190 ^r	139 ^r	1,470	872
Dead-burned and fused magnesia:				
Brazil	132	138	81	195
Canada	4,500	1,850	3,510	1,440
China	122	163	191	343
Germany	719	648	999	924
Korea, Republic of	268	241	152	142
Mexico	574	442	558	557
Saudi Arabia	453	253	15	49
South Africa	6,810	4,140	10,100	6,030
Taiwan	30	23	1,570	1,410
Turkey	79	90	138	157
Venezuela	1,080	648	270	161
Other	1,140	1,550	1,380	1,770
Total	15,900	10,200	18,900	13,200
Other magnesia:				
Brazil	449	509	348	449
Canada	2,660	3,140	3,370	3,330
China	945	2,540	866	1,710
France	382	333	1,190	822
Germany	811	664	707	621
India	569	605	781	905
Korea, Republic of	464	515	568	599
Mexico	1,770	1,080	1,490	1,080
Netherlands	834	715	706	475
Spain	367	351	--	--
Taiwan	2,070	2,060	587	624
Venezuela	48	69	8	32
Other	3,350	4,580	3,330	4,690
Total	14,700	17,200	14,000	15,300
Crude magnesite:				
Australia	32	12	--	--
Brazil	841	110	39	39
Canada	449	152	112	86
Germany	309	40	1	4
Iceland	618	92	288	272
Mexico	861	113	53	54
Panama	536	70	67	155
Trinidad and Tobago	296	39	11	15
United Kingdom	441	58	191	184
Venezuela	515	67	2	4
Other	315	46	117	179
Total	5,210	799	881	992

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 5
U.S. EXPORTS OF MAGNESIUM COMPOUNDS¹

Material	2012		2013		Principal destinations in 2013
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	
Magnesium chloride, anhydrous and other	10,300	\$6,880	8,850	\$6,400	Canada, 90%.
Magnesium hydroxide and peroxide	22,900	19,600	22,100	17,300	Canada, 56%; Sweden, 14%; Mexico, 7%.
Magnesium sulfate, natural kieserite and epsom salts	211	587	295	295	Canada, 96%.
Magnesium sulfate, other	12,100	4,720	10,200	4,320	Canada, 96%.

¹Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF CRUDE AND PROCESSED MAGNESITE, BY COUNTRY¹

Material and country	2012		2013	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Caustic-calcined magnesia:				
Australia	12,100	\$2,720	20,600	\$6,150
Brazil	--	--	2,560	854
Canada	36,100	16,300	36,900	16,900
China	62,900	15,200	71,500	17,200
Hong Kong	1,150	283	1,080	292
Israel	797	145	784	143
Turkey	611	372	--	--
United Kingdom	2	10	--	--
Other	580	411	50	69
Total	114,000	35,500	133,000	41,600
Dead-burned and fused magnesia:				
Australia	2,320	1,660	4,510	2,330
Austria	13,100	5,290	4,660	2,210
Brazil	50,400	23,600	68,600	32,200
China	160,000	96,600	106,000	78,500
Germany	34	121	255	311
Greece	2,600	1,340	1,700	836
Israel	3,330	11,900	2,560	8,470
Japan	1,640	4,230	2,280	5,720
Mexico	468	533	349	442
Netherlands	7,060	4,730	73	78
Russia	15,800	6,040	--	--
Spain	8,150	2,280	7,060	2,330
Turkey	7,340	5,470	14,900	8,860
Ukraine	19,100	13,100	--	--
United Kingdom	21	219	721	1,280
Other	216 ^r	720 ^r	821	1,290
Total	292,000	178,000	215,000	145,000
Other magnesia:				
Australia	1,660	3,390	1,320	1,060
Brazil	3,670	1,520	7,970	2,570
Canada	232	100	62	25
China	3,710	1,710	8,910	3,270
Israel	1,700	4,800	1,640	4,510
Japan	1,020	2,540	902	2,370
Mexico	5,410	4,760	3,690	3,990
Russia	1,490	539	--	--
Slovakia	1,300	568	997	428
Spain	5,600	2,370	265	116
Other	156	671	174	813
Total	26,000	23,000	25,900	19,100
Crude magnesite:				
Brazil	350	401	320	498
China	6,380	1,040	6,550	896
France	60	124	--	--
Hong Kong	4,940	1,100	2,920	759
Israel	510	347	265	836
Japan	399	709	496	882
United Kingdom	931	1,240	259	682
Other	402	215	492	241
Total	14,000	5,180	11,300	4,790

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF MAGNESIUM COMPOUNDS¹

Material	2012		2013		Principal sources in 2013
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	
Magnesium chloride, anhydrous and other	53,800	\$17,100	47,800	\$13,800	Israel, 55%; Netherlands, 27%; Germany, 13%.
Magnesium hydroxide and peroxide	5,070	13,700	5,730	15,200	Austria, 36%; Israel, 32%; Netherlands, 10%.
Magnesium sulfate, natural epsom salts	2,870	1,160	2,220	1,040	China, 99%.
Magnesium sulfate, natural kieserite	32,900	2,370	58,600	1,860	Germany, 71; China, 29%.
Magnesium sulfate, other	24,300	14,800	32,400	16,600	China, 39%; Germany, 32%; Mexico, 13%.

¹Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 8
WORLD MAGNESIUM COMPOUNDS ANNUAL PRODUCTION CAPACITY,
DECEMBER 31, 2013^{1,2}

(Thousand metric tons, MgO equivalent)

Country	Raw material				Total
	Magnesite		Seawater or brines		
	Caustic- calcined	Dead- burned	Caustic- calcined	Dead- burned	
Australia	218	110	--	--	328
Austria	76	325	--	--	401
Brazil	96	380	12	--	488
Canada	100	--	--	--	100
China	1,440	2,740	--	--	4,180
France	--	--	30	--	30
Greece	90	110	--	--	200
India	20	202	--	--	222
Iran	25	40	--	--	65
Ireland	--	--	--	90	90
Israel	--	--	10	60	70
Italy	25	--	--	--	25
Japan	--	--	50	70	120
Jordan	--	--	10	50	60
Korea, North	25	100	--	--	125
Korea, Republic of	--	--	--	40	40
Mexico	--	--	15	95	110
Netherlands	--	--	10	205	215
Norway	--	--	30	--	30
Poland	--	10	--	--	10
Russia	200	2,400	--	--	2,600
Saudi Arabia	39	32	--	--	71
Serbia	--	35	--	--	35
Slovakia	--	465	--	--	465
South Africa	12	--	--	--	12
Spain	150	70	--	--	220
Turkey	106	544	--	--	650
Ukraine	--	170	20	80	270
United States	140	--	191	195	526
Total	2,760	7,730	378	885	11,800

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes capacity at operating plants as well as at plants on standby basis.

TABLE 9
MAGNESITE: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country	2009	2010	2011	2012 ^c	2013 ^c
Australia	344,000	275,000	640,000 ^{r, e}	300,000	450,000
Austria, crude	544,716	757,063	867,912	778,810 ^{r, 3}	780,000
Brazil, beneficiated	409,909	483,882	476,805	480,000	480,000
Canada ^{e, 4}	140,000	150,000	150,000	150,000 ^r	150,000
China ^e	13,000,000	14,000,000	19,000,000	16,000,000	17,000,000
Greece, crude	380,834	396,000	541,813 ^r	351,266 ^{r, 3}	350,000
Guatemala	17,247	--	311	27,132 ^{r, 3}	17,196 ³
India ^c	253,000 ^r	301,000 ^r	236,000 ^r	224,000 ^r	213,000
Iran	130,575	126,702	172,697 ^r	170,000 ^r	170,000
Korea, North ^e	150,000	150,000	254,000 ^r	178,000 ^r	250,000
Pakistan	2,639 ^r	5,159 ^r	4,908 ^r	5,444 ^{r, 3}	5,176 ³
Poland, concentrate	47,000	63,000	75,000 ^{r, e}	84,000 ^r	84,000
Russia ^c	1,000,000	1,200,000	1,200,000	1,300,000 ^r	1,300,000
Slovakia, concentrate	807,000 ^r	800,000	800,000 ^{r, e}	600,000	700,000
South Africa	47,600	27,700	31,900	31,000	31,000
Spain, calcined	163,930	195,893	239,000 ^r	275,000 ^r	280,000
Turkey, run-of-mine	861,180	2,316,763	2,588,276 ^r	2,300,000	2,500,000
United States	W	W	W	W	W
Zimbabwe	449	-- ^e	--	--	--
Total	18,300,000 ^r	21,200,000 ^r	27,300,000 ^r	23,300,000 ^r	24,800,000

^cEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data; not included in "Total." -- Zero.

¹World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Figures represent crude salable magnesite. In addition to the countries listed, Bulgaria produced magnesite, but output is not reported quantitatively and available information is inadequate for formation of reliable estimates of output levels. Includes data available through May 23, 2014.

³Reported figure.

⁴Magnesitic dolomite and brucite.