

MAGNESITE



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MAGNESITE

(ADVANCE RELEASE)

**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES**

Indira Bhavan, Civil Lines,
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471
PBX : (0712) 2562649, 2560544, 2560648
E-MAIL : cme@ibm.gov.in
Website: www.ibm.gov.in

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19 Magnesite

Magnesite ($MgCO_3$) is a carbonate of magnesium. It is usually found as irregular veins as an alteration product of serpentine ultramafic rocks and other magnesium-rich rock types formed by replacement of dolomite and dolomitic limestone, as bedded deposits and as irregular veins. Magnesite deposits in India, generally occur as crystalline mass, amorphous and massive. Calcium and silica are the most common impurities found in magnesite along with Fe_2O_3 and Al_2O_3 . It is a very important mineral for the manufacture of basic refractories, which could be largely used in the Steel Industry. In commerce, the term 'magnesite' refers not only to the mineral, but also to many products, obtained by calcining the natural carbonate, e.g., caustic magnesite (magnesia obtained by calcining crude magnesite at comparatively low temperatures, 700 to 1,000 °C, and retaining 2 to 7% CO_2 as carbonate) and dead-burnt or refractory magnesite (magnesia obtained by calcining magnesite at high temperatures, 1,500 to 1,800 °C, usually containing less than 0.5% CO_2). Pure magnesite calcined at still higher temperatures (1,600-1,800 °C) to expel carbon dioxide completely is termed as 'periclase' (MgO) in the trade. The dead burnt magnesite and fused magnesia are used in Refractory Industry to manufacture various refractory products. The caustic magnesia or low calcined magnesite is used as animal feed stuff and in the manufacture of oxichloride cement. The Refractory Industry is the major consumer of magnesite.

RESERVES/RESOURCES

The total reserves/resources of magnesite as per NMI database, based on UNFC system, as on 1.4.2015 is about 394 million tonnes of which Reserves and Remaining Resources are 82 million

tonnes and 312 million tonnes, respectively. Substantial quantities of resources are established in Uttarakhand (59%), followed by Tamil Nadu (25%) and Rajasthan (14%). Resources are also located in Andhra Pradesh, Himachal Pradesh, Jammu & Kashmir, Karnataka and Kerala.

Occurrences of magnesite in Tamil Nadu are low in lime and high in silica, whereas those of Uttarakhand are high in lime and low in silica. The Gradewise and Statewise reserves and resources of magnesite are furnished in Table - 1.

EXPLORATION & DEVELOPMENT

The exploration and development details, if any, are covered in the Review on Exploration & Development under "General Review".

PRODUCTION

Production of magnesite in 2018-19 at 147 thousand tonnes decreased by 25% as compared to that in the previous year. There were 11 reporting mines in 2018-19 as against 10 reporting mines in 2017-18. Five principal producers accounted for about 90% of the total output during the year 2018-19. About 72% of the total production of magnesite was contributed by private sector during 2018-19.

Uttarakhand continued to be the major producing State with maximum contribution of 59% to the total output during 2018-19 followed by Tamil Nadu and Karnataka.

Mine-head closing stocks of magnesite for the year 2018-19 were 80 thousand tonnes as against 78 thousand tonnes in the previous year.

The average daily employment of labour in magnesite mines during the year was 869 as against 937 in the previous year (Tables- 2 to 5).

**Table – 1 : Reserves/Resources of Magnesite as on 1.4.2015
(By Grades/States)**

(In '000 tonnes)

	Reserves				Remaining Resources					Total Resources (A+B)			
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332		Inferred STD333	Reconnaissance STD334	Total (B)
		STD121	STD122			STD221	STD222						
All India : Total	77867	165	4244	82276	6210	9345	45574	59010	59652	131707	213	311711	393988
By Grades													
High Grade	-	-	-	-	3217	-	3	2	-	26	-	3249	3249
Medium Grade	75021	40	4113	79174	1223	6463	11506	64	109	7954	-	27318	106492
Beneficial/Low	2701	125	122	2949	595	540	673	648	31558	117667	168	151850	154799
High & Medium Mixed	-	-	-	-	6	173	2059	-	-	100	-	2339	2339
Medium & Low Mixed	-	-	-	-	-	429	29237	58271	27766	207	-	115910	115910
Others	146	-	-	146	1168	1698	2090	24	-	2501	-	7480	7626
Unclassified	-	-	-	-	-	-	-	-	-	83	-	83	83
Not-known	-	-	8	8	-	43	7	-	219	3170	45	3482	3491
By States													
Andhra Pradesh	-	-	-	-	-	-	-	-	-	80	-	80	80
Himachal Pradesh	-	-	-	-	-	-	-	-	-	298	-	298	298
Jammu & Kashmir	-	-	-	-	3210	740	-	-	-	150	45	4145	4145
Karnataka	1264	125	-	1389	566	190	391	88	10	3179	168	4592	5981
Kerala	-	-	-	-	-	-	-	2	-	38	-	40	40
Rajasthan	-	-	-	-	912	1589	2121	-	149	49033	-	53804	53804
Tamil Nadu	73499	40	38	73577	499	6224	11529	17	737	5643	-	24649	98226
Uttarakhand	3104	-	4206	7310	1023	602	31534	58902	58756	73287	-	224103	231413

Figures rounded off

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Table-2: Principal Producers of Magnesite, 2017-18

Name & address of producer	Location of mine	
	State	District
N.B.Minerals n Corporation 6/575 Navabi Road Haldawani Distt Nainital -263 139 Uttarakhand	Uttarakhand	Pithoragarh
Almora Magnesite Ltd, Village Matela, P.O. Billori, Distt Bageshwar-263 630, Uttarakhand.	Uttarakhand	Bageshwar
S. Sundararajan, 5/22-A, Periyakollapatti Kannankuruchi, Post – Gorimedu, Distt Salem -636 008, Tamil Nadu.	Tamil Nadu	Salem
India Magnesia Product Limited, No. 11/239, Ramakrishna Road, Balaji Towers, 3 rd floor, Distt Salem – 636 007, Tamil Nadu.	Tamil Nadu	Salem
Jeewan Singh Mall Jakhari, Pithoragarh-262 502 Uttarakhand	Uttarakhand	Pithoragarh

**Table – 3: Production of Magnesite, 2016-17 to 2018-19
(By States)**

(Qty in tonnes; Value in ₹'000)

State	2016-17		2017-18		2018-19 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	299149	749297	195055	593650	146581	396564
Karnataka	8391	34997	8419	42682	9108	54251
Tamil Nadu	223406	623084	122430	444771	50346	200828
Uttarakhand	67352	91216	64206	106197	87127	141485

**Table – 4: Production of Magnesite, 2017-18 and 2018-19
(By Sectors/States/Districts)**

(Qty in tonnes; Value in ₹'000)

State/District	2017-18			2018-19 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	10	195055	593650	11	146581	396564
Public Sector	4	117310	358071	5	40563	91448
Private Sector	6	77745	235579	6	106018	305116
Karnataka	2	8419	42682	3	9108	54251
Mysore	2	8419	42682	3	9108	54251
Tamil Nadu	5	122430	444771	5	50346	200828
Salem	5	122430	444771	5	50346	200828
Uttarakhand	3	64206	106197	3	87127	141485
Bageshwar	1	36602	69727	1	33422	62393
Pithoragarh	2	27604	36470	2	53705	79092

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**Table-5: Mine-head Closing Stocks of Magnesite,
2017-18 and 2018-19
(By States)**

(In tonnes)

State	2017-18	2018-19 (P)
India	78149	80049
Jharkhand	1012	1012
Karnataka	4619	5649
Rajasthan	30	30
Tamil Nadu	71694	71617
Uttarakhand	794	1741

MINING AND MARKETING

Magnesite is being worked by opencast method by developing benches. In Salem area (Tamil Nadu), magnesite is found chiefly as encrustations, veins and stringers in ultrabasic rocks like dunite and peridotite. Stringers and veins occur irregularly in fractures of rocks giving rise to different patterns. Veins are broken and magnesite is sorted out manually. Major magnesite producing mines in Salem area belong to Tamil Nadu Magnesite Ltd (TANMAG a State Government Undertaking), Ponkumar Magnesite Mines, Mysore Minerals, Dalmia Magnesite Corporation (a Private Sector Enterprise) and SAIL Refractory Co. Ltd (a Central Government Undertaking). These mines are semi-mechanised as well as mechanised and uses compressors, wagon drills, jackhammers, power shovels, loaders, dumpers, dozers and pumps. Normally, Ammonium Nitrate Fuel Oil (ANFO) Mixture with high explosives as booster is used for blasting. The powder factor may go up to 10. The blasted rock or run-of-mine material containing 25 to 30% magnesite is subjected to manual sorting.

The hand-picked crude magnesite is further subjected to sorting and dressing in the dressing yard. Magnesite lumps which are not considered fit for dressing (containing 10 to 20% silica) constitute 2 to 6% of the run-of-mine. These lumps are hand-picked and stacked separately as rejects. The remaining material is further dressed to obtain usable magnesite containing less than 3% silica. The usable magnesite hardly constitutes 4 to 8% of blasted rocks even though run-of-mine contains 20 to 30% magnesite. In Uttarakhand, Almora Magnesite Ltd and N.B. Minerals Corporation are the important producers having mines in Bageshwar and Nainital districts, respectively.

Magnesite is marketed generally after calcination, that is, after converting it into lightly calcined or caustic magnesite and dead-burnt variety.

At TANMAG, the recovery of magnesite from blasted earth is about one in fourteen. After picking the magnesite, the remaining reject material is removed by mechanical operation using HEMM. TANMAG's annual crude magnesite production capacity is in the range of 75,000 to 1,00,000 tonnes.

USES AND SPECIFICATIONS

The major proportion (about 98%) of magnesite mined is used for conversion into calcined form which finds many applications. The other industries where raw magnesite is used are mosaic tiles, electrodes, chemicals and manufacture of magnesium metal. Magnesite is also used in fertilizers and by Food Processing Industry. As per the Industries Department, Govt. of Tamil Nadu, Policy Note 2016-17, about 2.7 tonnes of raw magnesite and 220 litres of furnace oil is required to produce one tonne of Dead Burnt Magnesite (DBM). Raw magnesite is dead-burnt for making basic refractory bricks, basic refractory mortars, ramming mass, tar/pitch impregnated magnesite, magnesia-carbon bricks, slide-gate plates and other refractories. As per the Industries Department, Govt. of Tamil Nadu, Policy Note 2016-17, about 2.7 tonnes of raw magnesite and 140 litres of furnace oil are required to produce one tonne of Caustic Calcined Magnesite (CCM). Caustic Calcined Magnesite is used in manufacturing sorel cement (magnesium oxychloride), castable refractories and extraction of magnesium metal. It is also the source material for manufacture of magnesium compounds like magnesium sulphate (Epsom salt) and other salts used in Paper and

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Pharmaceutical Industries. In Paper Industry, magnesium bisulphate produced from magnesite is used as cooking liquor for preparing pulp. It is also used in Textile, Rubber, Glass, Ceramic Industries and as animal feed stuff. Fused magnesia finds application as insulating material in tubular heating elements in Electrical Industry and refractory brick linings in steel furnaces.

Refractory Industry

Refractory Industry is one of the major consumers of magnesite in India. In the manufacture of refractories, deleterious constituents are SiO₂, CaO, Fe₂O₃ and Al₂O₃. The permissible limits for these constituents are governed by its end-use. The refractory bricks are made from Dead Burnt Magnesite by judicious blending of different types of raw magnesite before dead-burning or of different qualities of Dead Burnt Magnesite prior to brick making.

Indian steel plants use domestic DBM bricks containing up to 5% silica and 2.5% maximum CaO. By and large, Indian refractory makers prefer magnesite for making high-grade DBM containing MgO 45.5% (min.), SiO₂ 2.5% (max.) and CaO 1.5% (max.).

Chemical Industry

The BIS has prescribed specification - IS : 3607-1979, First Revision, Reaffirmed 2010, for magnesite to be used in Chemical Industry.

CONSUMPTION

The consumption of magnesite in 2018-19 decreased to 195 thousand tonnes from 248 thousand tonnes as recorded in the previous year. About 41% consumption was reported for refractory purposes followed by 30% for calcination purposes and 9% for ferro-alloys purposes. The Chemical Industry consumed magnesite predominantly for producing magnesium sulphate. Magnesite consumption pattern by industries is shown in Table - 6.

The BIS has prescribed the IS specification (14303-1995, Reaffirmed 2011) for magnesite for use in Refractory Industry.

Table – 6: Estimated Consumption* of Magnesite 2016-17 to 2018-19 (By Industries)

(In tonnes)			
Industry	2016-17	2017-18(R)	2018-19(P)
All Industries	230000	247800#	194700#
Calcination	148300	67600	58200
Chemicals	2500	6200	13100
Ferro alloys	18700	12000	17600
Refractories	60500	137000	80700
Others (foundry, iron & steel, paper, etc.)	-	25000	25100

Figures rounded off.

** Includes actual reported consumption and/or estimates made wherever required and due to paucity of data, coverage may not be complete.*

Consumption estimated from the despatches, as reported in Form-H under Rule-45 of MCDR, 2017.

INDUSTRY

Dead Burnt Magnesite (DBM)

Raw magnesite when calcined at temperatures in the range of 1,660-1,800 °C in the rotary kiln, carbon dioxide gets expelled completely and a dense product 'Dead Burnt Magnesite' is obtained. Dead Burnt Magnesite refers to the magnesite that is chemically unreactive or 'dead' therefore, enabling it to be used in brick making or monolithic hearths without undue difficulty arising out of hydration or shrinkage.

Caustic Calcined Magnesite (CCM)

Low calcined magnesite also known as Caustic Calcined Magnesite is obtained by calcining magnesite in a shaft or rotary kiln at temperature ranging between 800 °C and 1000 °C the incomplete dissociation, causes retention of 8 to 10% carbon dioxide as carbonate. Low calcined magnesia when mixed with water forms a feebly plastic paste. Industries like paper, rubber, ceramic, asbestos products, glass, etc. use caustic magnesia.

Fused Magnesia

Fused magnesia is produced by the fusion of the high-grade magnesite in Higgin's or electric arc tilt furnaces between 2,500 °C and 3,000 °C. It is resistant to the action of molten metals, basic slags and fluxes and high temperatures. It is used in the form of moulded vessels and as compressed material

for covering resistant elements of the furnaces used in the melting of lead, tin, etc.

As per the available information, presently there are seven major plants that manufacture Dead Burnt Magnesite, while there are four plants that produce calcined magnesite and one that produces fused magnesia (Table-7). By-product magnesium carbonate and other magnesium salts were also produced during salt manufacturing from sea water. Dalmia Magnesite Corporation and Tamil Nadu Magnesite Ltd are one of the major producers, producing DBM and caustic calcined grades.

As per Annual Report of National Mineral Development Corporation (NMDC) 2016-17, J & K Mineral Development Corporation Ltd, a subsidiary of NMDC has decided to set up a 30,000 TPA DBM plant at Panthal, Jammu. The project is pending with Ministry of Environment, Forest and Climate Change for Environment Clearance.

Sea Water Magnesia (SWM)

Sea water or lake bitters is an alternative source to obtain magnesia by chemical reaction. The main raw materials required other than sea water are dolomite or limestone, fresh water and sulphuric acid. The magnesia content of sea water is about 0.2%, and even by enrichment with dolomite, around 300 kilograms sea water need to be processed to obtain one kilogram of magnesia. The sea water magnesia can be used to manufacture Dead Burnt Magnesite, caustic magnesia and other magnesium compounds.

Table - 7: Manufacturing Plants of Dead Burnt Magnesite (DBM), Calcined Magnesite, etc.

Name of the plant	Location	Installed capacity (tpy)
Tamil Nadu Magnesite Ltd (TANMAG)	Salem, Tamil Nadu	30,000 (DBM) 19,500 (calcined magnesite)
Ramakrishna Magnesite Mines (Two Units)	-do-	21,600 (calcined magnesite)
SAIL Refractory Co. Ltd (Formerly, Burn Standard Co.Ltd)	-do-	54,000 (DBM) 18,000 (Calcined magnesite)
Dalmia Magnesite Corporation	-do-	72,000 (DBM)
Sri Ponkumar Magnesite Ltd	-do-	26,500 (DBM)
Almora Magnesite Ltd	Bageshwar, Uttarakhand	24,000 (DBM)
Minerals & Refractories	Haldwani, Uttarakhand	3,000 (DBM)
Hansaflon Plastochem Ltd	NA	1,500 (Fused magnesia)

Marine By-products

Carbonates, chlorides and sulphates of magnesium are obtained as by-products in the production of common salt by solar evaporation. Salt Commissioner, Jaipur, reported 15,274 tonnes production of magnesium chloride and 58 tonnes of by-product magnesium sulphate in 2016-17. The production is normally reported from the salt pans in Jamnagar-Gandhidham, Gujarat.

Magnesium Metal

Magnesium metal is a fairly strong, silvery-white, light-weight metal (about one-third lighter than aluminium). It is traditionally produced in ingot form of approximately 7 kg each with purity close to 99.9%. Its chief applications are, in die casting (alloyed with zinc), to remove sulphur in the production of iron and steel, for production of titanium in the Kroll process. The other application field of magnesium is in electronic devices. Defence equipment and nuclear reactor materials also consume magnesium.

Magnesium technology and its commercial production in India are still at its infancy. India has developed silico-thermic reduction process as well as fused salt electrolytic process, with capacity of 600 t/year for each process. However, the cost of production is very high as compared to the landed cost of imported magnesium metal. Hence, its production has been stopped by one of the companies. The production is only about 15-20% of the rated capacity.

TRADE POLICY

As per the Foreign Trade Policy (FTP) 2015-20, exports and imports of all grades and varieties of magnesite under Heading No. 2519 are allowed freely.

WORLD REVIEW

The world reserves of magnesite were 8,500 million tonnes in terms of magnesium oxide content, excluding large resources of magnesium-bearing substitutes, such as, dolomite, brucite and olivine. Further, magnesium compounds could be recovered economically from well & lake brines and from sea water. The latter, which contains 0.13% magnesium by weight, was a major source of magnesium metal and its compounds. Out of the total world reserves the major share was that of Russia & Dem. Rep of Korea (27% each) followed by China (12%) and Australia (4%) (Table-8).

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**Table – 8: World Reserves of Magnesite
(By Principal Countries)**

(In '000 tonnes of magnesium oxide (Mgo) content)

Country	Reserves
World : Total (rounded off)	8,500,000
Australia	320,000*
Austria	50,000
Brazil	390,000
China	1,000,000
Greece	280,000
India	82,000
Korea, Dem.Peop.Rep of	2,300,000
Russia	2,300,000
Slovakia	120,000
Spain	35,000
Turkey	230,000
USA	35,000
Other countries	1,400,000

Source: USGS, Mineral Commodity Summaries, 2020

*For Australia, Joint Ore Reserves Committee-compliant reserves were 37 million tonnes

The world production of magnesite was at 29.5 million tonnes in 2018. China continued to be the leading producer accounting for about 64% production, followed by Russia (9%) and Turkey(6%) and Brazil (5%). The world production of magnesite is furnished in Table-9. China, Turkey and Russia had the largest magnesite production capacity and accounted for about 85% of the total world production. The largest capacity of magnesite processing facilities in the world are in China and Russia. These countries accounted for about two-third of world magnesia from magnesite production capacity.

World capacity of primary magnesium production is about 3.52 thousand tonnes of which about 72% is through electrolytic route and balance through silico-thermic route.

**Table-9: World Production of Magnesite
(By Principal Countries)**

(In '000 tonnes)

Country	2016	2017	2018
World Total (rounded off)	30400	29400	29500
China ^e	18600	19000	19000
Russia ^e	2600	2600	2600
Turkey	3258	1694	1700
Brazil ^c	1652	1600*	1600*
Austria	645	730	808
Spain	583	788	738
Slovakia	433	610	615
Greece	418	499	464
Netherlands ^f	265	282	348
Saudi Arabia	286	302	325
Australia ^d	489	234	288
Korea, Dem. P.R. ^e	160	172	170*
Iran ^a	155	154	160
Canada ^b	150*	150*	150*
India ^e	299	195	145*
Other countries	371	342	360

Source: BGS, World Mineral Production, 2014-18.

* Estimated a: Years ended 20th March following that stated
b: Officially described as magnesitic dolomite and brucite
c: Including beneficiated and directly shipped material
d: Year ending of June of that stated e: Year ending 31st March following that stated. f: Chloride produced from solution mining

World production capacity for Caustic Calcined Magnesia was about 3.32 million tonnes/year and that of Dead Burnt Magnesite it is about 8.62 million t/yr. Worldwide, over 98% raw ore producers convert DBM to magnesia for commercial application, mainly in Refractory Industry (75%) based on both the sintered and fused forms generally called DBM and Electrofused Magnesia (EFM), respectively, for lining furnaces used in steel production, non-ferrous metals, cement, glass, ceramic and petrochemicals. Primary producers of magnesium metal and alloys were China, USA and Russia. The consuming market segments are aluminium alloying, die-casting and desulphurisation.

To provide a generalised view of the development in various countries the country-wise description sourced from the latest available publication of Minerals Yearbook 'USGS' 2017 is furnished below.

Australia

The world production of Australia in the year 2018 was 28700 thousand tonnes. Latrobe Magnesium Ltd. Completed the preliminary feasibility study for a primary magnesium plant in the Latrobe Valley, Victoria, which would use fly ash having a high magnesium content as the feed material. The study determined that the optimal plant size would be 3,000 tonnes per year instead of 5,000 tonnes per year as previously proposed. A bankable feasibility study was being conducted and expected to be completed in early 2018. Construction was expected to take about 1 year to complete once started. Future expansion to 40,000 tonnes per year was being considered.

Canada

In May, Alliance Magnesium Inc. started production of magnesium from its 25 kilogram per day pilot plant that was completed earlier in the year. Alliance planned to construct a 50,000 tonnes per year smelter to produce magnesium from asbestos mine tailings in Asbestos, Quebec. Construction of the first phase of the smelter with 5,000 tonnes per year of capacity would start once financing and permits were obtained, and expansion to 50,000 tonnes per year of capacity was to be constructed on a modular basis.

Mag One Products Inc. continued planning a smelter to produce magnesium from asbestos mine tailings near Danville, Quebec. The plant would have an initial capacity of 5,000 tonnes per year total production capacity would be scaled to market demand. The plant would also have the capability to produce high-purity magnesium compounds with ferronickel and high purity silica as byproducts.

West High Yield Resources Inc. continued an environmental study required for a mine permit application for its proposed Record Ridge project in British Columbia. The company proposed building a mine and smelter to produce magnesium from a serpentine deposit. The assessment indicated an 80% recovery rate for the magnesium. However, in June 2017, West High Yield presented the results of a micro-plant test prepared by Drinkard Metalox, Inc. (Charlotte, NC). Drinkard Metalox developed a nitric acid leach extraction process that would increase the magnesium recovery rate to 98% and allow the

production of multiple saleable products such as magnesium nitrate, nickel hydroxide, and high-grade magnesium oxide.

China

China produced 18,000 thousand tones of magnesite in 2017. It produced 930,000 tonnes of magnesium in 2017, 7% more than that in 2016. Magnesium consumption in China was estimated to be 480,000 tonnes, 22% more than the 393,000 tonnes consumed in 2016.

FOREIGN TRADE

Exports

The exports of magnesite decreased substantially by 34% to 6,273 tonnes in 2018-19 from 9,576 tonnes in the previous year. Exports were mainly to Sudan (14%), Malaysia (13%), Singapore (10%), Saudia Arabia & Bangladesh (9% each), Thailand & Ethopia (6% each). Out of the total exports in 2018-19, those of fused magnesia was 31 tonnes, non-calcined magnesite 357 tonnes, other magnesite 2,118 tonnes, magnesium oxide 3,197 tonnes and Dead Burnt Magnesite 508 tonnes. Exports of magnesium and scrap were 996 tonnes in 2018-19 as compared to 163 tonnes in the previous year. Exports were mainly to USA(50%), Korea Rp (10%)& Netherlands (9% each). The total export of all countries in the year 2018-19 for magnesite powder and flakes was 4 tonnes, Magnisium alloys wrought was 2 tonnes, magnesium Alloys Nes was 156 tonnes, magnesum wire was negligble and magnesium scrap was 834 tonnes respectively (Tables - 10 to 22).

Imports

Imports of magnesite drastically increased two folds to 4,64,367 tonnes in 2018-19 from 2,29,627 tonnes in the previous year. Imports were mainly from China (37%), Pakistan (16%), UAE (11% each), and Norway(15%). Out of the total imports in 2018-19, those of fused magnesia were 21,129 tonnes, calcined magnesite 36,157 tonnes, non-calcined 1,15,539 tonnes, Dead Burnt Magnesia 1,44,069 tonnes, other magnesite 98,589 tonnes and magnesium oxide 48,882 tonnes. Imports of magnesium and scrap was 19,854 tonnes in 2018-19 as against 15,604 tonnes in the previous year. Imports were mainly from China (90%). Hongkong (10%). All India Imports of magnesum powder and flakes were 2757 tonnes. (Tables-23 to 33).

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**Table – 10: Exports of Magnesite : Total
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	9578	188593	6273	204286
Singapore	750	34962	605	27903
Sudan	267	6874	881	23579
Thailand	557	14962	402	18949
Bangladesh	562	14857	552	18693
Saudi Arabia	165	3727	568	15104
Ethiopia	324	8607	371	12650
UK	35	6286	59	11972
China	128	8029	128	8997
Malaysia	1958	13948	802	7565
Pakistan	126	6198	140	7463
Other countries	4706	70143	1765	51411

Figures rounded off

**Table – 11: Exports of Magnesia (Fused)
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	370	16731	31	1797
Pakistan	82	4035	20	1040
Singapore	83	3528	11	514
UAE	4	498	++	135
Morocco	++	1	++	23
Iraq	-	-	++	18
Myanmar	-	-	++	17
Colombia	-	-	++	13
Turkey	-	-	++	10
USA	1	22	++	8
Zimbabwe	--	--	++	7
Other countries	200	8654	++	12

Figures rounded off

**Table–12: Exports of Magnesite (Calcined)
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	185	5823	62	1671
Japan	40	1152	40	1213
Nepal	21	486	13	406
Spain	64	2241	9	44
Malaysia	--	--	++	8
China	60	1944	--	--

Figures rounded off

**Table–13: Exports of Magnesite (Non-calcined)
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	150	4274	357	7842
Bangladesh	--	--	244	4671
Djibouti	--	--	24	760
Vietnam	10	463	15	717
Nigeria	--	--	16	512
Oman	75	987	25	421
Nepal	11	1909	10	284
Egypt	3	174	7	283
UAE	1	52	11	73
Malaysia	--	--	2	47
Ethiopia	--	--	1	34
Other countries	50	689	2	40

Figures rounded off

**Table– 14: Exports of Magnesite: Dead Burnt Magnesite
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	63	1129	508	13946
Saudi Arabia	--	--	424	11782
Oman	27	642	49	1180
Japan	--	--	20	562
USA	--	--	14	384
Australia	22	62	1	38
Chile	10	65	--	--
Indonesia	1	54	--	--
UAE	3	306	--	--

Figures rounded off

**Table – 15: Exports of Magnesium Oxide
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1876	78646	3197	139427
Singapore	607	29490	594	27389
Thailand	229	8806	398	18815
Sudan	78	2272	510	15796
Ethiopia	121	3218	370	12616
UK	9	1489	57	11955
Bangladesh	66	4265	120	7561
Pakistan	44	2162	115	6278
Netherlands	--	--	250	5471
China	48	3856	98	5422
Italy	125	4921	92	3578
Other countries	549	18167	593	24546

Figures rounded off

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**Table – 16: Exports of Magnesium & Scrap
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	163	28376	996	116663
USA	++	1120	496	53135
Bhutan	32	5655	74	13219
Korea Rep.of	-	-	99	9826
Brazil	63	8022	71	7159
Netherland	-	-	93	6898
Taiwan	-	-	63	5340
Nepal	10	1729	16	3017
Egypt	++	26	16	2749
UAE	20	3720	10	2534
Iran	-	-	1	1898
Other countries	38	8104	57	10888

*Figures rounded off***Table-18: Exports of Powders and Flakes
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2	756	4	2400
Malaysia	--	--	3	1216
Iran	--	--	1	988
Spain	--	--	++	71
Oman	-	--	++	51
Sri Lanka	++	25	++	32
Belgium	--	--	++	20
Zimbabwe	--	--	++	19
Ecuador	--	--	++	1
Azerbaijan	--	--	++	1
Turkey	--	--	++	1
Other countries	2	731	++	++

*Figures rounded off***Table – 17 : Exports of Magnesite (Other)
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	6937	81982	2118	39602
Sudan	189	4602	371	7783
Malaysia	1958	13948	800	7510
Bangladesh	496	10592	187	6457
UAE	640	8424	333	4808
China	35	2259	30	3575
Saudi Arabia	165	3689	140	3185
Nigeria	42	446	114	1832
Oman	118	2602	66	1638
Indonesia	72	2274	24	884
Australia	20	780	19	598
Other countries	3202	32366	34	1332

*Figures rounded off***Table-19: Exports of Magnesium & Alloys Wrought
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2	680	2	1010
UAE	--	--	++	574
Taiwan	--	--	++	138
Egypt	--	--	1	109
UK	--	--	++	87
Pakistan	--	--	++	34
Bangladesh	--	--	1	29
Korea Rep.of	--	--	++	22
USA	++	21	++	12
South Africa	--	--	++	3
Uganda	--	--	++	2
Other countries	2	659	++	++

Figures rounded off

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**Table-20: Exports of Magnesium&Alloys Nes
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	23	4386	156	16591
USA	++	339	80	6719
Bhutan	--	--	16	3175
Brazil	--	--	20	1786
Mexico	--	--	1	1181
Austria	--	--	++	927
Bangladesh	6	134	35	841
Germany	++	100	++	728
Sri Lanka	++	12	2	540
Ireland	--	--	++	310
Malaysia	1	896	1	150
Other countries	16	2905	1	234

Figures rounded off

**Table-21: Exports of Magnesium Wire
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	++	1028	++	1094
USA	++	733	++	452
Australia	--	--	++	303
Korea Rp.OF	--	--	++	94
Thailand	++	77	++	84
Malaysia	--	--	++	65
Pakistan	++	105	++	19
South Africa	++	2	++	19
New Zealand	++	15	++	14
UAE	++	8	++	13
Egypt	++	26	++	11
Other Countries	++	62	++	20

Figures rounded off

**Table-22: Exports of Magnesium & Scrap
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	135	21525	834	95561
USA	--	--	416	45953
Bhutan	32	5655	58	10044
Korea Rp	--	--	99	9710
Netherlands	--	--	93	6898
Brazil	63	8022	51	5373
Taiwan	--	--	63	5202
Nepal	8	1390	16	3007
Egypt	--	--	15	2629
UAE	20	3709	10	1947
Uganda	--	--	5	1002
Other countries	12	2749	8	3802

Figures rounded off

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**Table – 23: Imports of Magnesite : Total
(By Countries)**

Country	2017-18 (RS)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All countries	229627	5268652	464367	11120844
China	75539	2213096	173797	4739202
Australia	25	1157	24465	1916888
Ireland	30928	1064578	25455	1641284
Turkey	35825	811887	25415	972809
Japan	3580	250178	3224	324520
Pakistan	42992	174477	74124	303228
Netherlands	5636	213500	4777	251705
Norway	-	-	68928	203915
Greece	1486	55345	3349	99190
UAE	19598	38484	50647	91957
Other countries	14018	445950	10186	576146

*Figures rounded off***Table – 24: Imports of Magnesia (Fused)
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	16320	1049128	21129	1630684
China	15946	1024471	20769	1599633
Germany	27	2213	144	10382
Turkey	96	4818	120	7666
Mexico	164	12474	40	6162
Hong kong	--	--	50	5228
UK	4	278	4	1010
Belgium	1	161	1	334
Austria	--	--	1	269
Netherlands	57	2369	--	--
USA	25	2344	--	--
Other countries	--	--	--	--

*Figures rounded off***Table – 25: Imports of Magnesite (Non-calcined)
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	63048	219644	115539	390976
Pakistan	42847	172543	74078	302420
UAE	19410	35989	40621	76304
Greece	73	2412	319	7079
China	499	6421	324	4396
Iran	206	969	197	760
Japan	8	1118	++	17
South Africa	5	190	--	--
Germany	++	2	--	--

Figures rounded off

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**Table-26: Imports of Magnesite (Calcined)
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	35060	930628	36157	1542204
Ireland	21153	724814	20922	1259572
China	3716	51052	13063	168101
Austria	--	--	730	58343
Netherlands	313	14677	250	12984
Greece	80	2339	254	9064
Saudi Arabia	7016	93040	184	7398
Spain	248	6783	204	6716
France	--	--	300	5047
Belgium	4	310	65	4916
Turkey	2511	35777	125	4355
Other countries	19	1836	60	5708

*Figures rounded off***Table-27: Imports of Magnesite: Dead Burnt Magnesia
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	65155	1458690	144069	4911912
China	30521	617085	90049	1952186
Australia	--	--	21581	1691413
Turkey	29675	669795	24198	949066
Netherlands	3538	134015	3460	186315
Hong Kong	100	1540	1483	28816
Singapore	--	--	1500	27309
Jordan	--	--	375	27105
Greece	281	8458	757	23732
Saudi Arabia	100	3109	358	16351
Slovakia.	208	5401	208	6199
Other countries	732	19287	100	3420

Figures rounded off

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**Table-28: Imports of Magnesite (Other)
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty	Value	Qty	Value
	(t)	(₹'000)	(t)	(₹'000)
All Countries	27784	805152	98589	1208815
Ireland	9775	339764	4532	381712
Australia	3	331	2824	224874
Norway	--	--	68928	203915
China	9333	153154	6235	136828
Japan	2011	85229	1446	94093
Netherlands	1725	61641	1050	50549
Greece	754	25397	1765	46842
Belgium	20	1309	435	26238
UAE	--	--	10026	15648
Turkey	3275	93258	972	11722
Other countries	888	45069	126	16394

*Figures rounded off***Table – 29 : Imports of Magnesium & Scrap
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty	Value	Qty	Value
	(t)	(₹'000)	(t)	(₹'000)
All Countries	15604	2316794	19854	3582594
China	15432	2293175	17901	3237278
Hong Kong	44	6265	1828	324705
Br Virgin Is	--	--	75	13219
Nigeria	--	--	17	2122
Bulgaria	--	--	15	2053
Ghana	--	--	13	1631
Japan	1	299	1	669
Australia	--	--	3	486
Austria	12	1002	1	145
Poland	++	60	++	139
Other countries	115	15993	++	147

*Figures rounded off***Table –30 : Imports of Magnesium Oxide
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty	Value	Qty	Value
	(t)	(₹'000)	(t)	(₹'000)
All Countries	22263	805411	48882	1436253
China	15524	360912	43357	878058
Japan	1542	161996	1746	227040
Israel	582	73249	552	78553
Mexico	486	35217	930	76183
USA	905	64016	449	36532
France	29	11122	91	33620
Germany	41	11753	285	31653
UK	297	25697	253	30383
Saudi Arabia	1719	24061	482	14106
Greece	299	16739	254	12473
Other countries	839	20649	483	17652

Figures rounded off

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**Table – 31 : Imports of Magnesium & Alloys:Wrought
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	287	58371	341	82736
China	287	57730	283	69367
Hong Kong	--	--	58	13369
UK	++	641	--	--

*Figures rounded off***Table – 32 : Imports of Magnesium & Alloys NES
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	5347	852078	4933	930838
China	5340	834236	4927	907934
UK	2	12587	1	17253
Italy	--	--	3	1728
Switzerland	--	--	++	995
Thailand	--	--	1	812
Austria	1	654	1	757
Germany	++	455	++	399
USA	++	142	++	399
Singapore	--	--	++	303
Japan	--	--	++	219
Other countries	4	4004	++	39

*Figures rounded off***Table – 33: Imports of Magnesium Powder & Flakes
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3763	601428	2757	545581
China	3727	566457	2733	514956
France	--	--	19	18352
Germany	++	29	4	9941
Switzerland	30	20224	1	1977
Korea ,Rep of	--	--	++	327
Japan	++	166	++	28
Austria	6	14541	--	--
USA	++	9	--	--
Belgium	++	2	--	--

Figures rounded off

FUTURE OUTLOOK

The Refractory Industry that consumes magnesite to a large extent is experiencing a range of challenges. However, in India, the demand for refractories is not only promising but also encouraging as it rides on the prospects of the Cement and Steel Industries the growth of which is projected to show an upward trend in the near future. The demand for magnesite is therefore likely to grow correspondingly.

As Indian magnesite generally is of either containing high silica or high lime, the need for beneficiation concomitantly arises.

Beneficiation methods of magnesite at economic cost which could yield high-grade material is probably a viable way to meet the demand for magnesite in the future.

India's Refractory Industry is set to continue its expansion and is likely to benefit from the government's series of measures pitched specifically to stimulate the infrastructure development in the country. As the demand for magnesite too is concomitantly expected to rise, significant steps to explore and exploit magnesite become essential to meet the future demand.