Indian Minerals Yearbook 2015

(Part- III : MINERAL REVIEWS)

54th Edition

GYPSUM

(FINAL 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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26 Gypsum

Gypsum ($CaSO_4.2H_2O$) is a hydrated calcium sulphate used widely in industry because of its special property of losing three-fourth of the combined water of crystallisation when moderately heated (calcined) to about 130ºC. Besides, calcined gypsum when cooled, finely ground and made plastic with water can be spread out, cast or moulded to any desired surface or form. On drying, it sets into a hard rock-like form. Selenite is a colourless, transparent, crystalline variety of gypsum, whereas alabaster is a fine-grained, massive variety, white or shaded in colour. Silky and fibrous variety of gypsum is called satin spar. Anhydrite ($CaSO_4$) is a calcium sulphate mineral found associated with gypsum commonly as a massive or fibrous mineral.

Gypsum that occurs in nature is called mineral gypsum. In addition to mineral gypsum, seawater and some chemical and fertilizer plants are sources of by-product marine gypsum and by-product chemical gypsum, respectively. The latter is obtained as by-product phospho-gypsum or fluoro-gypsum or boro-gypsum, depending upon the source. Phosphoric acid plants are important sources of by-product phospho-gypsum.

Marine gypsum is recovered from salt pans during production of common salt in coastal region, particularly in Gujarat and Tamil Nadu. The recovery of by-product gypsum and marine gypsum together is substantial and is comparable with the production of mineral gypsum.

FGD Gypsum is a unique synthetic product derived from flue gas desulphurisation (FGD) systems at electric power plants. Sulphur dioxide emission control systems used by coal-fired power plants remove sulphur from combustion gases using 'scrubbers'. In addition to FGD gypsum, synthetic gypsum includes materials such as phospho-gypsum, titano-gypsum, fluoro-gypsum and citro-gypsum.

RESOURCES

As per UNFC system, the total resources of mineral gypsum in India as on 1.4.2010 were estimated at 1,286 million tonnes of which 39 million tonnes have been placed under 'Reserves' and 1,247 million tonnes under 'Remaining Resources' category.

Of the total resources, Fertilizer/Pottery grade accounts for about 82% and Cement/Paint grade 12%. The Unclassified and Not-known grades together account for 5% resources. The remaining one percent of resources is shared by Surgical Plaster and Soil Reclamation grades. By States, Rajasthan alone accounts for 82% resources and Jammu & Kashmir 14% resources. The remaining 4% resources are in Tamil Nadu, Gujarat, Himachal Pradesh, Karnataka, Uttarakhand, Andhra Pradesh and Madhya Pradesh (Table- 1).

EXPLORATION & DEVELOPMENT

No exploration activities reported for gypsum during 2014-15.

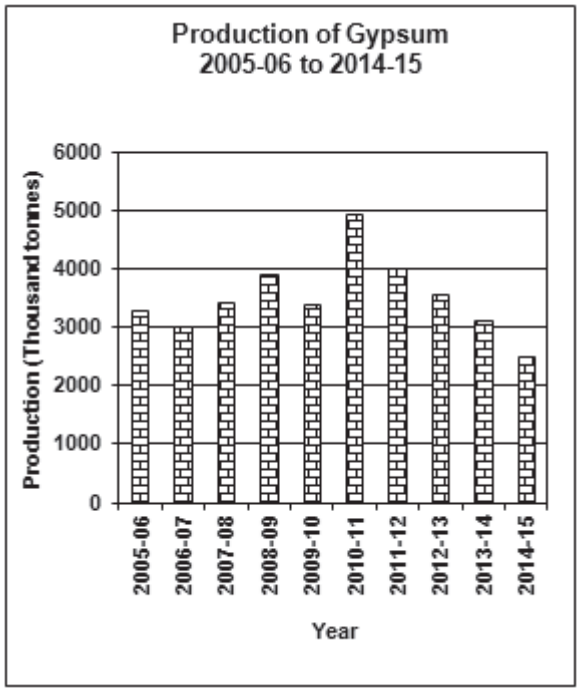

Table – 1 : Reserves/Resources of Gypsum as on 1.4.2010
(By Grades/States)

(In '000 tonnes)

Grade/State	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	**22494**	**239**	**16363**	**39096**	**8502**	**73651**	**17659**	**8455**	**710853**	**428272**	**10**	**1247402**	**1286498**
By Grades													
Surgical Plaster	776	-	-	776	-	1039	82	-	-	3773	-	4894	5670
Fertilizer/Pottery	8097	81	276	8454	2196	9185	270	7680	703244	320454	-	1043029	1051483
Cement/Paint	9955	158	16087	26200	6120	63035	14677	532	2876	39366	10	126616	152816
Soil reclamation	-	-	-	-	185	392	2573	100	206	7939	-	11395	11395
Unclassified	-	-	-	-	-	-	56	78	2943	33548	-	36625	36625
Not-known	3666	-	-	3666	-	-	-	66	1585	23191	-	24842	28508
By States													
Andhra Pradesh	-	-	-	-	-	-	-	-	-	404	-	404	404
Gujarat	9	5	24	38	-	-	-	-	-	15138	-	15138	15176
Himachal Pradesh	-	-	-	-	-	-	1365	-	-	3081	-	4446	4446
Jammu & Kashmir	1664	153	442	2259	4784	9785	6570	7680	-	146694	-	175513	177772
Karnataka	-	-	-	-	-	-	-	-	-	3784	-	3784	3784
Madhya Pradesh	-	-	-	-	-	-	-	-	-	69	-	69	69
Rajasthan	20821	81	15834	36736	3405	63397	3105	750	710604	237550	-	1018811	1055547
Tamil Nadu	-	-	64	64	313	469	6584	25	249	19540	10	27190	27254
Uttarakhand	-	-	-	-	-	-	35	-	-	2012	-	2047	2047

Figures rounded off

PRODUCTION, STOCKS AND PRICES

Gypsum

The production of gypsum in 2014-15 at 2.48 million tonnes decreased by 20% as compared to that in the previous year.

There were 31 reporting mines during 2014-15 as against 38 in the preceding year. Two principal producers together accounted for about 97% of the total production of gypsum in 2014-15. Four mines producing above 2 lakh tonnes annually contributed 70% of the total production, 2 mines producing between one & two lakh tonnes contributed 9% of the total production, 2 mines producing between 50 thousand to 1 lakh tonnes contributed 7% of the total production and 12 mines producing between 10 thousand to 50 thousand tonnes accounted for 13% of the total production. Nominal production of gypsum was reported from 11 other mines, each producing below 10 thousand tonnes annually. Almost the entire production of gypsum was contributed by the mines under Public Sector and very nominal quantity of production was reported by Private Sector mines.

Rajasthan continued to be the leading producer, contributing about 99% of the total output. The remaining 1% was contributed by Jammu & Kashmir. (Tables- 2 to 5).

The mine-head closing stock of gypsum for the year 2014-15 was 104 thousand tonnes as against 88 thousand tonnes in the previous year (Table- 6).

The average daily labour employed in gypsum mines during 2014-15 was 337 as against 393 in the previous year.

Domestic prices of gypsum are furnished in the General Review on 'Prices'.

Table – 2 : Principal Producers of Gypsum, 2014-15

Name and address of producer	Location of mine	
	State	District
Rajasthan State Mines & Minerals Ltd, C 89-90, Janpath, Lal Kothi Scheme, Jaipur- 302 015, Rajasthan.	Rajasthan	Bikaner Sri Ganganagar Hanumangarh Jaisalmer Jalore Nagaur
FCI Aravali Gypsum & Minerals India Ltd, (formerly known as Fertilizer Corp. of India Ltd) Mangu Singh Rajvi Marg, Paota 'B' Road, Jodhpur-342 010, Rajasthan.	Rajasthan	Bikaner Sri Ganganagar Jaisalmer

Table – 3 : Production of Gypsum, 2012-13 to 2014-15
(By States)

(Qty in tonnes; Value in ₹ '000)

States	2012-13		2013-14		2014-15(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**3556723**	**1699808**	**3115363**	**1545061**	**2477849**	**1283871**
Gujarat	38	4	20	3	-	-
Jammu & Kashmir	43432	13080	32211	9663	28694	8608
Rajasthan	3510063	1685212	3080992	1534541	2449155	1275263
Tamil Nadu	3190	1512	2140	854	-	-

Table – 4 : Production of Gypsum, 2013-14 & 2014-15 (By Sectors/States/Districts)

(Qty in tonnes; Value in ₹'000)

State/District	2013-14			2014-15 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**38**	**3115363**	**1545061**	**31**	**2477849**	**1283871**
Public sector	31	3080239	1534835	28	2439821	1267044
Private sector	7	35124	10226	3	38028	16827
Gujarat	**3**	**20**	**3**	**-**	**-**	**-**
Kachchh	3	20	3	-	-	-
Jammu & Kashmir	**2**	**32211**	**9663**	**2**	**28694**	**8608**
Doda	1	15821	4746	1	11724	3517
Ramban	1	16390	4917	1	16970	5091
Rajasthan	**31**	**3080992**	**1534541**	**28**	**2449155**	**1275263**
Barmer*	2*	-	-	-	-	-
Bikaner	12	1991627	1013108	11	1750934	909810
Sri Ganganagar	11	329892	160683	10	284670	149386
Hanumangarh	2*	-	-	2*	-	-
Jaisalmer	3	409953	194728	3	312895	163223
Jalore	-	-	-	1*	-	-
Nagaur	1	349520	166022	1	100656	52844
Tamil Nadu	**2**	**2140**	**854**	**1***	**-**	**-**
Coimbatore	1	1010	403	-	-	-
Erode	1	1130	451	1*	-	-

(*): only labour reported.

Table – 5 : Production of Gypsum, 2013-14 & 2014-15 (By Frequency Groups)

(Qty in tonnes)

Production group	No. of mines		Production for the group		Percentage in total production		Cumulative percentage	
	2013-14	2014-15(P)	2013-14	2014-15(P)	2013-14	2014-15(P)	2013-14	2014-15(P)
All Groups	**38**	**31**	**3115363**	**2477849**	**100.00**	**100.00**	**–**	**–**
Up to 10000	15	11	22974	9376	0.74	0.38	0.74	0.38
10001-50000	14	12	433863	317058	13.93	12.80	14.67	13.18
50001-100000	2	2	174481	179803	5.60	7.26	20.27	20.44
100001-200000	2	2	298543	214785	9.58	8.67	29.85	29.11
Above 200000	5	4	2185502	1756827	70.15	70.90	100.00	100.00

Table - 6: Mine-head Closing Stocks of Gypsum, 2013-14 & 2014-15 (By States)

(Qty in tonnes)

State	2013-14	2014-15 (P)
India	**87784**	**103725**
Gujarat	461	81
Jammu & Kashmir	6	3
Rajasthan	86907	103321
Tamil Nadu	410	320

Selenite

The production of selenite was 207 tonnes in the year 2014-15 under review as against 531 tonnes during the previous year. The entire production of selenite was reported by Rajasthan State Mines & Minerals Ltd (RSMML), a Public Sector Undertaking, that operates three mines, two in Barmer & one in Bikaner district of Rajasthan (Tables- 7 to 9).

There were no mine-head closing stocks of selenite for the year 2013-14 and 2014-15.

The average daily labour employed in selenite mines during 2014-15 was 11 as against 9 in the previous year.

Domestic prices of selenite are furnished in the General Review on 'Prices'.

Table – 7 : Principal Producers of Selenite, 2014-15

Name & Address of Producer	Location of Mines	
	State	District
Rajasthan State Mines & Minerals Ltd, C 89-90, Janpath, Lal Kothi Scheme, Jaipur –302 015, Rajasthan.	Rajasthan	Barmer Bikaner

Table – 8 : Production of Selenite, 2012-13 to 2014-15
(By State)

(Qty in tonnes; Value in ₹'000)

State	2012-13		2013-14		2014-15(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India/ Rajasthan	**7577**	**10226**	**531**	**706**	**207**	**456**

Table – 9 : Production of Selenite, 2013-14 and 2014-15
(By Sector/State/Districts)

(Qty in tonnes; Value in ₹'000)

State/District	2013-14			2014-15(P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**1**	**531**	**706**	**2**	**207**	**456**
Public sector	1	531	706	2	207	456
Rajasthan	**1**	**531**	**706**	**2**	**207**	**456**
Barmer	-	-	-	1	207	456
Bikaner	1	531	706	1*	-	-

**: only labour reported.*

MINING AND MARKETING

Gypsum deposits are usually found at shallow depths and are scattered over large areas. The deposits are mined out by opencast method and usually by manual mining except in a few semi-mechanised mines in Rajasthan. In semi mechanised mines, gypsum is excavated by backhoe excavator and directly loaded into trucks/ dumpers. The trucks and dumpers loaded with gypsum are despatched directly to the user-industry or are taken to railway siding for further loading into railway wagons for dispatch to far living user industry. In some mines of Rajasthan, the excavated gypsum is ground before despatching to the user or party. Based on the use of gypsum, the production is classified into different grades like Fertilizer grade, Cement grade, plaster of Paris grade, Surgical grade, etc.

High-grade gypsum is mostly mined in Bikaner and Jaisalmer districts of Rajasthan. Some gypsum mines in Bikaner district also produce crystalline variety, i.e., selenite. Gypsum from Rajasthan is despatched to cement plants in India spread over Rajasthan, Gujarat, Madhya Pradesh, West Bengal, Uttar Pradesh, Bihar, Jharkhand, Chhattisgarh, Himachal Pradesh, etc. Besides, a substantial quantity, containing about 60-70% $CaSO_4.2H_2O$ is supplied to Punjab, Uttar Pradesh, Haryana, Delhi, etc. for reclaiming alkaline soil. A sizeable quantity of gypsum from mines in Barmer, Bikaner, Jaisalmer, Hanumangarh, Sri Ganganagar and Nagaur districts of Rajasthan is also supplied to the plaster of Paris units in Rajasthan, Uttar Pradesh, Haryana, Maharashtra, West Bengal, Delhi, etc.

M/s Saint Gobain Gyproc India Ltd and Boral Gypsum India Pvt Ltd are among the market leaders in plaster of Paris industries and specialise in dry construction techniques.

USES AND SPECIFICATIONS

Cement, fertilizer (ammonium sulphate) and plaster of Paris are the three important industries in which gypsum is utilised. Gypsum of less purity in crushed form is utilised in portland cement manufacturing for controlling the setting time of portland cement (i.e. as a retarder to prevent quick set). It is added to the clinker just before final grinding to finished cement. Proportion of gypsum in Cement Industry is 4-5% of the cement produced. Both, mineral and by-product gypsum are used in cement manufacture. Calcined gypsum finds use in manufacturing plaster of Paris. It is also used in manufacturing partition blocks, sheets & tiles, insulation boards for stucco and lattice works. Gypsum board is primarily used as a finish for walls and ceilings. It is also used as a binder in fast dry tennis court clay. Low-grade gypsum is calcined and used as gypsum plaster after preparation of mortar. It is used for internal plastering and masonry work. Requirement of low-grade gypsum for use in Building Industry as per IS:12654-1989 (Reaffirmed 2010) is: $CaSO_4.2H_2O$ not less than 60%. In pottery, calcined gypsum is used for preparation of moulds in the production of sanitarywares. The used and discarded moulds are in turn again used as source of gypsum in cement and other industries. Low-grade gypsum is used in conditioning of alkaline soil and as manure in agriculture mainly for correcting black alkali soils. BIS has also prescribed IS:6046-1982 (First Revision; reaffirmed 2008) for gypsum for agricultural use.

Selenite, a crystalline variety is used to a limited extent for gypsum plate for petrological microscopes, known as Sensitive Tint. It is also used in the Ceramic Industry for making moulds, to manufacture surgical grade plaster of Paris and also for producing white cement. Plaster of Paris Industry requires high purity gypsum. Different grades of plaster of Paris are manufactured depending upon the period for setting. For surgical plaster, a minimum 96% $CaSO_4.2H_2O$ grade gypsum is required.

High-purity gypsum may be utilised for manufacturing of ammonium sulphate fertilizer. Ground pure white gypsum is also used as a filler in paper, paints and textile goods. Ground low-grade gypsum is used in mine dusting, manufacture of black board chalks and as a filler in insecticides. Besides, gypsum is also used in other industries like pharmaceutical, textile and asbestos products.

Alabaster, a dense, massive, granular and translucent variety, is employed as ornamental stone in statuary and interior decoration.

BIS specification for by-product gypsum (IS:10170-1982, reaffirmed 2008) lays down a minimum 70% content of $CaSO_4.2H_2O$ and maximum limit of 0.75% Na, 1.0% F and 15% free moisture on dry basis. The material should pass through 2 mm sieve, but 50% of material should also pass through 0.25 mm (60 mesh) sieve. The specifications of by-product gypsum for use in plaster, blocks and boards, as per IS:12679-1989 (reaffirmed 2010), is given in Table -10. Besides, BIS has prescribed IS:1290-1973 (Second Revision; reaffirmed 2011) for mineral gypsum. Specifications of mineral gypsum for different industries are given in Table-11.

Table – 10 : Requirement of By-product Gypsum for Use in Plaster, Blocks and Boards (IS:12679 - 1989, Reaffirmed 2010)

Sl. No.	Characteristic	Requirement		
		Phospho-gypsum	Fluoro-gypsum	Marine-gypsum
1.	P_2O_5 % by mass (max)	0.40	–	–
2.	F % by mass (max)	0.40	1.00	–
3.	Na_2O % by mass (max)	0.10	–	–
4.	K_2O % by mass (max)	0.20	–	–
5.	Organic matter % by mass (max)	0.15	–	–
6.	$CaSO_4.2H_2O$ % by mass (max)	85.00	90.00*	85.00
7.	Cl as NaCl % by mass (max)	0.10	–	0.10
8.	pH of 10% aqueous suspension of gypsum (min)	5.00	5.00	6.00

Note: **Fluoro-gypsum shall be in anhydrous form (as CaSO4).*

Table – 11 : Specifications of Mineral Gypsum in Different Industries

Constituent	Surgical plaster	Ammonium sulphate fertilizer	Pottery	Cement	Reclamation of soil	Extender in paints
Free water	1.0% (max.)	–	1.0% (max.)	–	–	0.5% (max) when heated for 2 hr. at 45°C
CO_2	1.0% (max.)	–	3.0% (max.)	–	–	–
SiO_2 & other insoluble matter	0.7% (max.)	6.0% (max.)	6.0% (max.)	–	–	–
Iron & aluminium oxide	0.1% (max.)	1.5% (max.)	1.0% (max.)	–	–	–
MgO	0.5% (max.)	1.0% (max.)	1.5% (max.)	3.0 (max.)	–	–
$CaSO_4.2H_2O$	96.0% (min.)	85-90% (min.)	85.0% (min.)	70-75% (80-85% for export quality cement)	70% (min.)	75% (min.)
NaCl	0.01% (max.)	0.003% (max.)	0.1% (max.)	0.5% (max.)	–	–
Na_2O	–	–	–	–	0.75% (max.) (Na)	–
Fineness	–	–	–	–	Residue on 2 mm sieve : Nil & on 0.25 mm sieve : 50% (max.)	Residue on 240 mesh B.S. test sieve : 0.5%
Oil absorption	–	–	–	–	–	Within 5% of the approved sample
Colour	–	–	–	–	–	Close match to the approved sample
Lead & its compounds (calculated as metallic lead)	–	–	–	–	–	0.5% (max.) when lead-free gypsum is required.
Physical form	–	–	–	–	–	In the form of dry powder.
Microscopic form	–	–	–	–	–	Material should match entirely with the characteristics of gypsum crystals.

BY-PRODUCT GYPSUM

Phospho-gypsum

Phospho-gypsum is produced as a by-product during the manufacture of phosphoric acid by wet process. The quality & quantum of phospho-gypsum generation depend upon the quality of the phosphate rock, process route used to produce phosphoric acid, calcium sulphate generated either in dihydrate ($CaSO_4.2H_2O$) or the hemihydrate ($CaSO_4.1/2\ H_2O$) form. Generally, about 4 to 6 tonnes of phospho-gypsum are generated to recover one tonne of phosphoric acid. The purity of phospho-gypsum ranges from 77 to 98% $CaSO_4.2H_2O$. It contains about 0.2 to 0.7% total P_2O_5. Phospho-gypsum is mostly used in Cement and Fertilizer industries. The principal producer of phospho-gypsum are given in Table- 12.

Table – 12 : Principal Producers of Phospho-gypsum

State	Unit
Andhra Pradesh	Coromandel International Ltd, Visakhapatnam.
Gujarat	(i) Gujarat State Fertilizers and Chemicals Ltd, Fertilizernagar, Vadodara district. (ii) Hindalco Industries Ltd, P.O. - Dahej.
Kerala	(i) Fertilizers & Chemicals Travancore Ltd, Udyogamandal, Ernakulam district. (ii) Fertilizers & Chemicals Travancore Ltd, Ambalamedu, Ernakulam district.
Maharashtra	Rashtriya Chemicals & Fertilizers, Chembur, Mumbai.
Odisha	(i) Paradeep Phosphates Ltd. (ii) IFFCO, Paradeep, district Jagatsinghpur.
Tamil Nadu	(i) Southern Petrochemical Industries Corporation Ltd, Thoothukudi. (ii) Coromandel International Ltd, Ennore, Thiruvallur. (iii) Sterlite Industries (India) Ltd, Thoothukudi.
West Bengal	Tata Chemicals Ltd, Haldia.

Presently, most phosphoric acid plants dispose the phospho-gypsum generated, by way of stacking it within the plant premises. These stacks are subsequently sold off when demand arises for them. Phospho-gypsum generated from phosphoric acid plants contains three types of impurities such as residual acid, fluorine compounds and trace elements, including those that are radioactive that are considered to be potentially harmful.

The environmental concerns associated with phospho-gypsum stacks are fluoride uptake and ground & surface water pollution. For useful application of phospho-gypsum, the presence of fluorine and phosphate contents considered deleterious. The phosphate content affects setting properties of cement and fluorine content causes ring formation in kiln. Besides, phospho-gypsum also poses radiological hazard due to the presence of naturally occurring uranium and radium in the phosphate ore. Phospho-gypsum is known to contain about 1% P_2O_5, 1% F and 10 to 30 times more radon, none of which is desirable. These entities along with radon that were a scare in the 1980s resulted in a 1989 EPA (Environment Protection Agency, USA) ruling that phospho-gypsum is unsuitable for sale as common gypsum.

Fluoro-gypsum

Fluoro-gypsum is obtained as a by-product during the manufacture of aluminium fluoride and hydrofluoric acid using fluorite. Important units that produces aluminium fluoride are Navin Fluorine International Ltd, Udhana-Navsari Road, Surat district, Gujarat; Tanfac Industries Ltd, SIPCOT Industrial Complex, Cuddalore, Tamil Nadu; Maya Rasayan Ltd, Mumbai; Aegies Chemical Ltd Dombivali, Thane, Maharashtra, etc. and these in all likelihood recover fluoro-gypsum in their chemical plants.

Boro-gypsum

By-product boro-gypsum is obtained at a plant which refines calcium borates (colemanite and ulexite) to produce borax and boric acid. Borax Morarjee Ltd, Ambarnath, Thane district, Maharashtra is one of the main Company

engaged in refining of borates and had reported production of by-product boro-gypsum in the past. However, detailed information on production of boro-gypsum is not available. National Peroxide Ltd, Kalyan, Maharashtra produces sodium perborate, information on production of boro-gypsum, if any at this plant is not available.

Marine Gypsum

Marine gypsum is obtained as a by-product during the production of common salt by solar evaporation. The total production of marine gypsum as per the Salt Commissioner, Jaipur, was 170,916 tonnes in 2013-14 and 246,687 tonnes in 2014-15, reported from Gujarat and Tamil Nadu. Marine gypsum recovered from Gujarat, earlier, showed 89.72-92.62% $CaSO_4.2H_2O$, 0.48 to 2.08% NaCl, 0.57% $MgCl_2$, 3.42% $MgSO_4$ and 3.48 to 7.65% insolubles. No recent test results are available.

CONSUMPTION

About 8.99 million tonnes gypsum in all forms was consumed in organised sector in 2014-15 as against 9.23 million tonnes in 2013-14. A substantial quantity of mineral gypsum as well as phospho-gypsum was used in Agricultural Sector for conditioning of alkaline soil. The respective share of natural gypsum, by-product gypsum and marine gypsum in total consumption during 2014-15 was about 58%, 37%, and 5%. Consumption of Gypsum in plaster of Paris moulds was negligible. Almost the entire quantity of natural gypsum in 2014-15 was consumed in the manufacture of cement (99%). The remaining nominal consumption was in plaster of Paris, Asbestos products, Ceramic, Fertilizer, Refractories, Textile, Pharmaceutical, Paint and Chemical Industries. The entire quantity of marine gypsum and gypsum moulds was consumed in Cement and Ceramic Industries, respectively. By-product gypsum was also almost entirely consumed for manufacture of cement and meagre consumption was in Ceramic and Fertilizer Industries in 2014-15 (Table- 13).

Table- 13 : Consumption of Gypsum, 2012-13 to 2014-15
(By Industries & Categorywise)

(In tonnes)

Category	Industry	2012-13	2013-14(R)	2014-15(P)*
All Industries	**Grand Total**	**9274100**	**9229300**	**8990500**
Natural Gypsum	**Total**	**5608700**	**5393100**	**5223000**
	Asbestos products	700(4)	700(4)	700(4)
	Cement	5568900(88)	5353300(91)	5183400(93)
	Ceramic	400(1)	400(1)	400(1)
	Fertilizer	100(1)	100(1)	100(1)
	Paint	++(2)	++(2)	++(2)
	Pharmaceutical	900(2)	900(2)	900(2)
	Plaster of Paris	37700(5)	37700(5)	37500(5)
	Refractories	++(1)	++(1)	++(1)
	Textile	++(1)	++(1)	++(1)
By-product Gypsum	**Total**	**3179700**	**3307900**	**3283000**
	Cement	3178900(76)	3305800(83)	3280900(85)
	Ceramic	600(1)	600(1)	600(1)
	Fertilizer	200(1)	1500(2)	1500(2)
Marine Gypsum	**Total**	**482800**	**525400**	**481500**
	Cement	482800(17)	525400(18)	481500(18)
Gypsum Moulds	**Total**	**2900**	**2900**	**3000**
	Ceramic	2900(5)	2900(5)	3000(5)

Figures rounded off.
Figures in parenthesis denote the number of units in organised sector reporting consumption.*
*(*Paucity of data hence coverage may not be completed)..*

INDUSTRY

Saint-Gobain Gyproc India (formerly India Gypsum Ltd) has been a pioneer in introducing light weight interior construction practices. The Company manufactures an extensive range of gypsum boards & plasters systems, and providing solutions for partitions, wall panels, ceilings and internal wall linings. SGGI has three manufacturing plants located at Jind (Haryana), Wada (near Mumbai) and Bengaluru that produce light weight construction solution, gypsum plaster boards and other accessories. Saint-Gobain lays great emphasis on new business development models with an aim to strengthen its presence in the Indian market. With commitments to investments in manufacturing activities in place, the Company has operative plans to diversify by bringing in advanced technological competency for manufacturing state-of-the-art products and expanding its hold in the market.

Boral Gypsum India Pvt Ltd (BGI) is also among the market leader in designing, manufacturing and supplying gypsum board, standard and technical metal systems for ceilings & partition, aesthetic range of ceiling tiles, joint compounds and complete accessories. BGI makes use of mineral gypsum, sedimentary rock extracted from mines and synthetic gypsum, generated from by-products produced during energy generation or during processing of industrial waste. The mineral gypsum is mostly supplied from different mines of Rajasthan State Mines & Minerals Ltd and FCI Aravali Gypsum & Minerals India Ltd, located mainly in Rajasthan.

In the year 2008-09, Rashtriya Chemicals and Fertilizers Ltd (RCF) formed a Joint Venture Company with Fertilizers and Chemicals Travancore Limited (FACT) by incorporating FACT-RCF Building Products Ltd (FRBL) to set up a Rapidwall project at Kochi. Both RCF and FACT have 50:50 equity holding in the Company. The plant was commissioned in June 2012 and is in operation. The plant was set up to utilise by-product gypsum generated to produce load bearing wall panels, wall plaster and wall putty through Rapidwall technology provided by Rapid Building Systems Pty Ltd, Australia, a world leader in making large size load bearing building panels from Gypsum. The JV has obtained BMTPC Certification for the Gypwall panels.

FRBL, Kochi, manufactures PREFAB GYPWALL which is a revolutionary low-cost load bearing pre-fabricated walling system with broad construction application. Glass fibre reinforced gypsum (GFRG) wall, a new composite wall product, is made of gypsum plaster reinforced with glass fibre. GFRG Wall panel is suitable for use in residential, commercial and industrial building construction. FRBL also manufactures gypsum based silky wall plaster/shine wall putty, a unique light weight material and is an advanced substitute to the conventional cement and sand plastering. FRBL plaster reduces plastering/finishing time by about 60% providing smooth shrinkage crack free walls and ceilings. The plaster can be applied directly over brick /stone masonry or concrete surfaces which does not require water curing and is ready to be painted in less than 48 hours.

WORLD REVIEW

The world reserves of gypsum are large. The total reported production of gypsum in 2014 was about 176.7 million tonnes as against 170.7 million tonnes in 2013. China was the largest producer accounting for 22%, followed by USA (10%), Iran & Thailand (8% each), Iraq (6%), Turkey & Mexico (5% each), Spain & Russia (4% each) and Australia, Brazil, Canada & India (2% each) (Tables- 14 & 15).

Table – 14 : World Reserves of Gypsum (By Principal Countries)

(In '000 tonnes)

Country	Reserves
World: Total (Rounded)	**Large**
Brazil	290000
Canada	450000
India*	39000
Iran	1600
USA	700000

Source: *Mineral Commodity Summaries, 2016.*
** India's total resources of gypsum as per UNFC are placed at 1,286 million tonnes as on 1.4.2010.*

Table – 15: World Production of Gypsum (By Principal Countries)

(In '000 tonnes)

Country	2012	2013	2014
World: Total	**162768**	**170765**	**176619**
Algeria	2000	2078	2130
Argentina	1433	1450	1500
Australia	3835	3589	3700
Austria[(a)]	792	635	730
Brazil	3750	3333	3300
Canada[(a)]	2550	2654	1811
Chile	799	1015	843
China	37000	37000	37000
Egypt[(a)]	966	1000	1000
France[(a)]	2315	2190	1908
Germany[(a)]	1949	1778	1802
India[#*]	3564	2930	2737
Iran	14179	17354	17500
Iraq	9424	10462	10462
Italy[(a)]	3201	3192	8551
Mexico	9456	7903	8500
Oman	1915	2785	3387
Pakistan	1260	1250	1322
Poland[(e)]	1395	1270	1232
Russia	3100	5100	5300
Saudi Arabia	1700	1700	1780
Spain	6360	7389	7000
Thailand	12304	13240	13302
Turkey	8248	9790	9800
Ukraine[(a)]	2186	2175	1525
UK	1200	1200	1200
USA	15800	16300	17100[(e)]
Other countries	10086	10002	10196

Source: *World Mineral Production, 2010-2014.*
(a): Including Anhydrite, # Including Selenite
**India's production of gypsum during 2012-13,2013-14 and 2014-15 was 3,557 thousand tonnes, 3,115 thousand tonnes and 2,478 thousand tonnes, respectiely.*
**India's production of selenite during 2012-13, 2013-14 and 2014-15 was 7,557 tonnes, 531 tonnes and 207 tonnes, respectiely.*

FOREIGN TRADE

Exports

Exports of gypsum and plaster at 65,645 tonnes in 2014-15 increased by 34% from 48,924 tonnes in the preceding year. Exports of alabaster was not reported during 2014-15. Gypsum & plaster were exported mainly to Nepal (92%) (Table-16).

Imports

Imports of gypsum at 44,21,048 tonnes in 2014-15 increased from 32,31,930 tonnes in 2013-14. Imports of alabaster increased marginally to 912 tonnes in 2014-15 from 877 tonnes in 2013-14. Gypsum was imported mainly from Oman (68%), Pakistan (20%), Iran (8%), Thailand (2%) and UAE (1%). All the Alabaster was solely imported from Spain. (Tables- 17 & 18).

Table – 16: Exports of Gypsum & Plaster (By Countries)

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹''000)	Qty (t)	Value (₹'000)
All Countries	**48924**	**109055**	**65645**	**158036**
Nepal	47106	73634	60297	92993
Bhutan	-	-	2947	23809
UAE	42	674	287	7419
Sri Lanka	222	3235	320	5897
Australia	-	-	138	5671
Bangladesh	244	1822	548	4536
Singapore	160	5808	80	3945
Papua New Guinea	-	-	300	3098
Tanzania Rep.	308	7316	134	2388
Kenya	90	1943	162	2360
Other countries	752	14623	432	5920

Table – 17: Imports of Gypsum (By Countries)

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**3231930**	**5252011**	**4421048**	**6747745**
Oman	1818917	2740567	3013022	4210918
Pakistan	557507	792954	905197	1281990
Iran	359327	605933	356668	636536
Thailand	449815	862962	88298	279095
USA	2106	100799	1734	86326
UAE	31698	35746	43003	73466
South Africa	++	5	8364	67349
Turkey	1391	30451	1312	32610
China	1115	24276	1027	25285
Germany	332	12732	494	19172
Other countries	9722	45586	1929	34998

Table – 18 : Imports of Alabaster (By Countries)

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**877**	**23975**	**912**	**24831**
Spain	874	23914	912	24831
Other countries	3	61	-	-

FUTURE OUTLOOK

India's domestic resources of gypsum are large enough to meet increased demand. The apparent domestic demand of gypsum was estimated at 5.66 million tonnes by 2011-12 and 8.71 million tonnes by 2016-17 at 9% growth rate as per the Report of the Working Group for 12th Plan, Planning Commission of India. The apparent consumption of Gypsum, Anhydrite, Marine gypsum and plaster during 2012-13 (P) was about 6.54 million tonnes.

With renewed focus on improving the economy and upscaling industrial developments, India lays greater emphasis on creation of infrastructure. As per the Working Group report, augmentation of infrastructural activities will endanger further growth of the Cement Industry which concomitantly will raise the consumption of gypsum and therby its demand. Further, as per the report, steps would be necessary to find out suitable mining technology to exploit, deep-seatedgypsum resources in Bhadvasi deposit, Nagaur district Rajasthan. State-of-the-art-technology needs to be adopted for the exploitation of deep-seated gypsum.

Other segments that would attract attention would be production of gypsum wallboard which is currently negligible in India. It could find better prospects as its light weight and other special characteristics. It being an excellent partition material could facilitate its utility in high rise building constructions. In view of the environmental problem arising from huge accumulation of phospho-gypsum at different fertilizer plants, possibilities of finding other plausible means for its utilisation has become a necessity. Low-grade gypsum being cheaper could find better prospects in its application more as a soil conditioner for reclamation of alkaline soils.