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(Part- III : Mineral Reviews)

51st Edition

CALCITE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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7 Calcite

Calcite is a carbonate of calcium ($CaCO_3$) containing 56% CaO and 44% CO_2. It is one of the important industrial minerals also known as 'Calc Spar'. Pure crystallised transparent variety of calcite is known as 'Iceland Spar' which is used as Nicol prism in optical instruments using polarised light.

RESOURCES

The availability of calcite is abundant. As per UNFC system, the total resources of calcite as on 1.4.2010 are estimated at about 20.94 million tonnes of which about 2.66 million tonnes (13%) are proved and probable reserves. Of the total resources, chemical grade accounts for 22% and glass & ceramic grade about 4%. The remaining 74% resources fall under unclassified and other grades.

Rajasthan has the largest share (50%) of calcite resources, followed by Andhra Pradesh (42%) and Madhya Pradesh (6%). The remaining resources are located in Karnataka, Gujarat, Haryana, Tamil Nadu and Uttar Pradesh (Table - 1).

PRODUCTION, STOCKS & PRICES

The production of calcite at about 51,000 tonnes in 2011-12 increased by 33% as compared to that in the previous year. There were three primary mines along with one associated mine in 2011-12 as against four primary & two associated mines in the previous year. The entire production of calcite was reported by four producers in the private sector. Rajasthan was the only state producing calcite in both the years (Tables - 2 to 4).

The mine-head stock of calcite at the end of 2011-12 was 10,779 tonnes as against 6,244 tonnes in the beginning of the year (Table -5).

The average daily labour employment in 2011-12 was 31 as against 49 in the previous year. Prices of calcite are furnished in the General Review on 'Prices'.

Table – 2 : Principal Producers of Calcite, 2011-12

Name & address of producers	Location of mine	
	State	District
Wolkem Industries Ltd, E - 101, Mewar Industrial Area, Madri, Udaipur-313 003, Rajasthan.	Rajasthan	*Sirohi
Wolkem India Ltd, Wolkem House, Post Box No. 21, E-101, Mewar Industrial Area, Madri, Udaipur - 313 003, Rajasthan.	Rajasthan	Udaipur
Kalpana Minerals & Chemicals, Ashok Vatika, N.H.8, Sukher, Udaipur-318 004, Rajasthan.	Rajasthan	Udaipur
Perwa Minerals, A-153,'MAN DARPAN', Nehru Nagar, Jaipur - 302 016, Rajasthan.	Rajasthan	Sirohi

** Producing calcite as an associated mineral with wollastonite.*

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

(In 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 STD222	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221							
All India : Total	**1265135**	**38525**	**1360678**	**2664338**	**665454**	**227265**	**3126218**	**9122235**	**1236864**	**3805598**	**97476**	**18281110**	**20945448**
By Grades													
Chemical	503146	38017	186673	727836	348621	132342	1713928	-	-	1750993	-	3945884	4673720
Glass & Ceramic	-	-	804	804	52869	94923	108265	20250	67395	494177	-	837879	838683
Poor / Low	-	-	-	-	-	-	-	-	70310	134220	-	204530	204530
Others	544820	508	963270	1508598	27216	-	826693	500	-	22813	-	877222	2385820
Unclassified	193208	-	209931	403139	14763	-	184969	8557000	56921	949902	-	9763555	10166694
Not-known	23961	-	-	23961	221985	-	292363	544485	1042238	453493	97476	2652040	2676001
By States													
Andhra Pradesh	3267	500	-	3767	-	-	104970	8562700	5200	122148	-	8795018	8798785
Gujarat	-	-	-	-	-	-	-	-	-	12380	-	12380	12380
Haryana	-	-	-	-	166900	-	183900	-	-	-	-	350800	350800
Karnataka	-	-	-	-	-	-	64	-	14400	51865	-	66329	66329
Madhya Pradesh	-	-	-	-	215327	82577	194333	20250	180226	400791	97476	1190980	1190980
Rajasthan	1261868	38025	1360678	2660571	283227	144688	2642951	539285	1037038	3090782	-	7737971	10398542
Tamil Nadu	-	-	-	-	-	-	-	-	-	116632	-	116632	116632
Uttar Pradesh	-	-	-	-	-	-	-	-	-	11000	-	11000	11000

Figures rounded off.

Table – 3 : Production of Calcite, 2009-10 to 2011-12
(By State)

(Qty in tonnes; value in ₹ '000)

State	2009-10		2010-11		2011-12(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**49309**	**16980**	**38826**	**14104**	**51499**	**18342**
Rajasthan	49309	16980	38826	14104	51499	18342

Table – 4 : Production of Calcite, 2010-11 and 2011-12
(By Sector/State/Districts)

(Qty in tonnes; value in ₹ '000)

State/District	2010-11			2011-12(P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**4(2)**	**38826**	**14104**	**3(1)**	**51499**	**18342**
Private sector	4(2)	38826	14104	3(1)	51499	18342
Rajasthan	**4(2)**	**38826**	**14104**	**3(1)**	**51499**	**18342**
Sikar	1	40	12	-	-	-
Sirohi	1(1)	11870	4975	1(1)	21740	8285
Udaipur	2(1)	26916	9117	2	29759	10057

Figures in parentheses indicate the number of associated mines of wollastonite.

Table – 5 : Mine-head Stocks of Calcite, 2011-12 (P)
(By State)

(Qty in tonnes)

State	At the beginning of the year	At the end of the year
India	**6244**	**10779**
Rajasthan	6244	10779

MINING AND MARKETING

All calcite mines in the country are worked manually by opencast methods confined to shallow depths except the semi-mechanised Belkapahar Wollastonite and Calcite Mine of Wolkem Industries Ltd in Sirohi district, Rajasthan. There are certain difficulties in the mining of transparent crystals because transparency is damaged by application of pressure during mining which causes internal imperfections and cracks. Therefore, adequate care is taken during mining so that final marketable products can be produced with maximum recovery.

Calcite is usually marketed after pulverising or some initial processing and grinding in fine powder size ranging from 200 to 300 mesh. In Rajasthan, Wolkem India Ltd, the principal mining company, markets its products under three different trade names; viz, Calstar 1-5 (snow-white powder with 100% whiteness), Calsun 1-5 (snow white powder with 98.4% whiteness) and Belsun 1-5 (white powder with 95% whiteness). Besides, super snow-white micronised products (Calcron and Addon) of extremely high brightness and whiteness (25 to 5 micron) and ultra fine slurries and powder (FMT) with top size of 2 micron are also marketed by the company.

USES AND SPECIFICATIONS

Use of calcite is dictated by highest purity of $CaCO_3$, as high as +98%, with minimum inclusions and highest brightness. Its applications are in varying sizes from coarse to as fine as 10 to 2 microns. Various grades of calcite products marketed by Wolkem India Ltd contain $CaCO_3$ 95-98.5%, MgO 0.2-0.4%, SiO_2 0.3% and Fe_2O_3 0.03 -0.15%.

Calcite is one of the important ingredients required in glass and ceramic industries for imparting glaze and also as a flux. In pulverised form, it is used as a filler in rubber goods, textile and as an extender in paints and as a carrier in insecticides. Other uses are in the manufacture of mortar, cement, bleaching powder, and preparation of fat lime, soaps, detergents, plastics, polymers, etc.The $CaCO_3$ content in calcite used in glass industry is 95% (min) and in ceramic industry 97%. Calcium oxide is a mild flux and makes the glass stick to the articles shaped by its hardening nature. Generally, 54% (min) CaO is used. In ceramic industry, super-white calcite of 30 mesh is used generally; while in glass industry, powder size ranges from 20 to 80 mesh.

The transparent crystal of calcite (Iceland Spar) free from flaw is most valued in the optical industry for the manufacture of Nicolprism. However, polarised films and lenses are fast replacing Nicol prisms. 'Iceland Spar' used in optical instruments, like polarising microscopes, should have a high degree of purity and perfect crystalline structure. The mineral must be at least 2.54 cm long and 1.27 cm thick (2 inch cube is preferred), colourless, perfectly transparent and free from cloudy inclusions, cavities or foreign substances. It should be free from internal iridescence caused due to incipient cracks along cleavage planes and from twinning other than parallel to the base.

The specifications of calcite for various industrial uses are given in Table-6. BIS has prescribed IS : 15751-2007 as specification for use of calcite in ceramic industry.

Table – 6 : Specifications of Calcite Used in Different Industries

Constituent	Chemical	Cosmetic	Electrode	Glass	Ceramic
$CaCO_3$	99	97	95	95	95
Fe	0.5	200 ppm	–	–	–
Cu	–	10 ppm (max)	–	–	–
Mn	–	100 ppm (max)	–	–	–
As (max)	2 ppm	–	–	–	–
Pb	10 ppm	–	–	–	–
Chlorides	–	–	–	–	0.005 (max)
P	–	–	0.01	–	–
S	–	–	0.035	–	–
Iron & titanium	–	–	–	–	0.5
Fe_2O_3	–	–	–	0.15	–
$MgCO_3$	–	–	–	2.00	–
Moisture	–	0.2 (max)	–	–	–
SiO_2	–	–	2	–	–

Note: *Figures relate to percentages, unless otherwise stated.*

CONSUMPTION

The reported consumption of calcite at 87,700 tonnes in 2011-12 was 34% higher than in the preceding year. Paint industry accounted for about 34% consumption, followed by glass (36%), ceramic (21%), and pesticides (3%), etc. Industry wise consumption of calcite is given in Table-7.

FOREIGN TRADE

Exports of calcite increased to 3,240 tonnes in 2011-12 from 1373 tonnes in 2010-11. Exports were mainly to Nepal and Chad (Table - 8).

In 2011-12, imports of calcite increased to 260,231 tonnes from 143,164 tonnes in the previous year. Imports were mainly from Malaysia (57%), Vietnam (21%), China (8%) and Oman (5%) (Table - 9).

Table – 7 : Reported Consumption of Calcite 2009-10 to 2011-12 (By Industries)

(In tonnes)

Industry	2009-10	2010-11(R)	2011-12(P)
All Industries	**64300**	**65500**	**87700**
Cement	700(1)	700(1)	700(1)
Ceramic	16300(29)	18600(29)	18700(29)
Electrical	700(2)	700(2)	700(2)
Electrode	600(11)	2100(14)	2400(18)
Glass	12200(20)	9500(19)	31500(21)
Paint	30500(30)	29600(29)	29800(30)
Pesticide	2600(4)	2600(4)	2600(4)
Pharmaceutical	500(2)	1000(3)	600(3)
Others (abrasive, cosmetics, rubber & refractory)	200(6)	700(7)	700(7)

Figures rounded off. Figures in parentheses denote the number of units in organised sector reporting consumption. (*Includes actual reported consumption and/or estimates made wherever required).*

Table – 8 : Exports of Calcite (By Countries)

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**1373**	**6137**	**3240**	**14860**
Nepal	832	3358	2498	9003
Chad	-	-	350	2340
UAE	20	8	147	1628
New Zealand	-	-	154	1137
Bangladesh	54	446	64	610
Sri Lanka	72	440	23	109
Saudi Arabia	-	-	4	33
Other countries	395	1885	-	-

Table – 9 : Imports of Calcite (By Countries)

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**143164**	**430793**	**260231**	**1215618**
Malaysia	121399	339198	148049	672634
Vietnam	11718	55616	53760	282767
China	3420	16324	20067	81123
Egypt	500	1328	6611	34808
Oman	4540	11600	12818	32691
Turkey	156	831	3478	17073
Jordan	-	-	2313	13558
Thailand	181	1265	1659	13274
UAE	-	-	1449	9649
Greece	-	-	1550	8644
Other countries	1250	4631	8477	49397