

21 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 1.4.2005 are estimated at about 22.6 million tonnes of which about 6.74 million tonnes (30%) are proved and probable reserves. Of the total resources, chemical grade accounts for 26% and glass & ceramic grade about 4%. The remaining 70% resources fall under unclassified and other grades.

Rajasthan has the largest share (53%) of calcite resources, followed by Andhra Pradesh (39%) and Madhya Pradesh (5%). The remaining reserves/resources are located in Karnataka, Gujarat, Haryana, Tamil Nadu and Uttar Pradesh (Table - 1).

EXPLORATION AND DEVELOPMENT

In 2009-10, DMG, Rajasthan carried out exploration by mapping and sampling in Jallore district. The particulars are furnished in Table-2.

PRODUCTION, STOCKS & PRICES

The production of calcite at about 50 thousand tonnes in 2009-10 decreased by 26% as compared to the previous year due to low market demand. There were 3 primary mines along with one associated mine in 2009-10 as against 2 primary & one associated mines in the previous year. The entire production was reported in private sector (Tables - 3 to 5).

The mine-head stock of calcite at the end of 2009-10 was 6,338 tonnes as against 5,732 tonnes at the beginning of the year. The entire stocks were held in Rajasthan.

The average daily employment of labour in 2009-10 was 30 as against 23 in the previous year. Prices of calcite are furnished in the General Review on 'Prices'.

Table – 2 : Details of Exploration for Calcite, 2009-10

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DMG, Rajasthan Jalore	N/V Padavi Tehsil Raniwara	1:10,000 1:2,000	10 0.5	–	–	8	The investigation was taken up for calcite along with fluorite & Baryte. Presence of calcite has been noticed about 1 km NE of Padavi village in two open wells, and another presence was also seen in the form of vugs in the nala cutting. Calcite resources were not estimated.

**Table - 1 : Reserves/Resources of Calcite as on 1.4.2005
(By Grades/States)**

(In tonnes)

Grade/State	Reserves			Remaining resources						Total resources			
	Proved STD111	Probable STD121	Total (A)	Feasibility STD211	Pre-feasibility STD221	Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	Total (A+B)		
All India : Total	3218256	178420	3345354	6742030	166900	12346	1106370	9097635	1241559	4109651	97476	15831937	22573967
By Grades													
Chemical	1907770	114912	1941928	3964610	-	-	65209	-	-	1933046	-	1998255	5962865
Glass & ceramic	64512	63500	104472	232484	-	12346	12346	20250	72090	490032	-	607064	839548
Poor/Low	-	-	-	-	-	-	-	-	70310	134220	-	204530	204530
Others	790473	8	963270	1753751	-	-	826693	-	-	22813	-	849506	2603257
Unclassified	185657	-	276311	461968	-	-	3629	8557000	56921	1027416	-	9644966	10106934
Not-known	269844	-	59373	329217	166900	-	198493	520385	1042238	502124	97476	2527616	2856833
By States													
Andhra Pradesh	5927	-	102345	108272	-	-	-	8562200	5200	121662	-	8689062	8797334
Gujarat	-	-	-	-	-	-	-	-	-	12380	-	12380	12380
Haryana	-	-	-	-	166900	-	183900	-	-	-	-	350800	350800
Karnataka	-	-	118	118	-	-	-	-	14400	52415	-	66815	66933
Madhya Pradesh	226970	63500	202028	492498	-	-	-	20250	184921	396005	97476	698652	1191150
Rajasthan	2985359	114920	3040863	6141142	-	12346	922470	515185	1037038	3399557	-	5886596	12027738
Tamil Nadu	-	-	-	-	-	-	-	-	-	116632	-	116632	116632
Uttar Pradesh	-	-	-	-	-	-	-	-	-	11000	-	11000	11000

Figures rounded off.

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Table – 3 : Principal Producers of Calcite, 2009-10

Name & address of producers	Location of mine	
	State	District
*Wolkem Industries Ltd Lake House, P.P. Singhal Marg, Udaipur-313 004, Rajasthan.	Rajasthan	Sirohi
Wolkem India Ltd Noble House, Swaroop Nagar, P. O. Udaipur, Rajasthan.	Rajasthan	Udaipur
Kalpana Minerals & Chemicals, Ashok Vatika, N.H.8, Sukher, Udaipur-318 004, Rajasthan.	Rajasthan	Udaipur

* Producing calcite as an associated mineral with wollastonite.

**Table – 4 : Production of Calcite, 2007-08 to 2009-10
(By State)**

(Qty in tonnes; value in Rs. '000)

State	2007-08		2008-09		2009-10(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	86364	34844	67284	22729	49542	16731
Rajasthan	86364	34844	67284	22729	49542	16731

**Table – 5 : Production of Calcite, 2008-09 and 2009-10
(By Sector/State/Districts)**

(Qty in tonnes; value in Rs.'000)

State/District	2008-09			2009-10(P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	2(1)	67284	22729	3(1)	49542	16731
Private sector	2(1)	67284	22729	3(1)	49542	16731
Rajasthan	2(1)	67284	22729	3(1)	49542	16731
Sirohi	(1)	24369	10357	(1)	17502	7438
Udaipur	2	42915	12372	3	32040	9293

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

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 CaCO₃, 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 CaCO₃ 95-98.5%, MgO 0.2-0.4%, SiO₂ 0.3% and Fe₂O₃ 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 CaCO₃ content in calcite used in glass industry is 95% (min) and in ceramic industry 97 percent. 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 Nicol prism. 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.

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 ₂ O ₃	–	–	–	0.15	–
MgCO ₃	–	–	–	2.00	–
Moisture	–	0.2 (max)	–	–	–
SiO ₂	–	–	2	–	–

Note: Figures relate to percentages, unless otherwise stated.

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CONSUMPTION

The reported consumption of calcite at 65,600 tonnes in 2009-10 was 10% higher than in the preceding year. Paint industry accounted for about 46% consumption, followed by glass (21%), ceramic (24%), pesticides (4%), etc. Industrywise consumption of calcite is given in Table-7.

FOREIGN TRADE

Exports of calcite decreased to 674 tonnes in 2009-10 from 1,073 tonnes in 2008-09. Exports were mainly to Nepal and Bangladesh (Table - 8).

In 2009-10, imports of calcite increased to 111,887 tonnes from 66,205 tonnes in the previous year. Imports were mainly from Malaysia (79%), Oman (9%) and China (7%) (Table - 9).

**Table – 7 : Reported Consumption of Calcite
2007-08 to 2009-10
(By Industries)**

(In tonnes)

Industry	2007-08	2008-09(R)	2009-10 (P)
All Industries	43000	59400	65600
Cement	700(1)	700(1)	700(1)
Ceramic	8900(32)	8900(32)	15800(33)
Electrical	700(3)	700(3)	700(3)
Electrode	600(12)	600(12)	600(12)
Glass	14200(23)	14800(24)	14100(24)
Paint	14600(32)	30400(32)	30400(32)
Pesticide	2600(4)	2600(4)	2600(4)
Pharmaceutical	500(2)	500(2)	500(2)
Others (abrasive & refractory)	200(5)	200(5)	200(5)

Figures rounded off. Data collected on non-statutory basis. 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	2008-09		2009-10	
	Qty (t)	Value (Rs. '000)	Qty (t)	Value (Rs. '000)
All Countries	1073	4217	674	3644
Nepal	1511	2089	526	2612
Bangladesh	–	–	68	675
Saudi Arabia	–	–	51	158
Sri Lanka	–	–	24	131
UAE	85	751	5	68
Kenya	22	30	–	–
New Zealand	110	718	–	–
Sudan	345	629	–	–

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**Table – 9 : Imports of Calcite
(By Countries)**

Country	2008-09		2009-10	
	Qty (t)	Value (Rs. '000)	Qty (t)	Value (Rs. '000)
All Countries	66205	188222	111887	368852
Malaysia	59623	158123	88395	277838
China	815	5821	7790	42855
Oman	2773	6889	10578	23970
Vietnam	1850	9750	4836	22360
Thailand	587	3869	150	1036
Chinese Taipei/Taiwan	–	–	98	481
Germany	3	16	15	168
Turkey	25	205	25	144
Italy	10	72	–	–
Kenya	500	3411	–	–
Other countries	19	66	–	–