

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 2006-07, DGM Madhya Pradesh, conducted mapping and sampling for calcite in Chhaktala and Sondwa area. Calcite/calcitic rock deposits of varying dimensions were demarcated and 0.091 million tonnes of resources were estimated. DMG, Rajasthan carried out exploration for calcite &

quartz by way of mapping 20 sq km area on 1:10,000 scale and 1 sq km area on 1:2,000 scale near villages Dallapura, Kamboi, Rajpura and Moras in tehsil Pindwara, district Sirohi. The DMG collected 57 samples for analysis and estimated 5 lakh tonnes resources of calcite under inferred category.

For calcite (alongwith garnet and marble) DMG, Rajasthan carried out exploration by way of mapping 10.5 sq km area on 1:10,000 scale and 1 sq km area on 1:2,000 scale near villages Harpura, Fatehgarh, Jetpura in tehsil Kotri, Salria, Shahpura district Bhilwara. The DMG collected 21 samples for analysis the results of which are awaited.

PRODUCTION, STOCKS & PRICES

The production of calcite at about 82 thousand tonnes in 2007-08 dropped by 23% as compared to that in the previous year due to low market demand especially in Madhya Pradesh. There were 4 reporting mines in 2007-08 as against 7 mines in the previous year. Three principal producers reported 99% of the total production of calcite. The entire production was reported in private sector (Tables - 2 to 4).

The mine-head stocks of calcite at the end of 2007-08 were 3,606 tonnes as against 8,573 tonnes at the beginning of the year (Table - 5).

The average daily employment of labour in 2007-08 was 45 against 63 in the previous year. Prices of calcite are furnished in Table - 6.

CALCITE

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

(In tonnes)

Grade/State	Reserves				Reamaining 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	3218256	178420	3345354	6742030	166900	12346	1106370	9097635	1241559	4109651	97476	15831937	22573967
By Grades													
Chemical	1907770	114912	1941928	3964610	-	-	65209	-	-	1933046	0	1998255	5962865
Glass & ceramic	64512	63500	104472	232484	-	12346	12346	20250	72090	490032	0	607064	839548
Poor/Low	-	-	-	-	-	-	-	-	70310	134220	0	204530	204530
Others	790473	8	963270	1753751	-	-	826693	-	-	22813	0	849506	2603257
Unclassified	185657	-	276311	461968	-	-	3629	8557000	56921	1027416	0	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	0	8689062	8797334
Gujarat	-	-	-	-	-	-	-	-	-	12380	0	12380	12380
Haryana	-	-	-	-	166900	-	183900	-	-	-	0	350800	350800
Karnataka	-	-	118	118	-	-	-	-	14400	52415	0	66815	66933
Madhya Pradesh	226970	63500	202028	492498	-	-	-	20250	184921	396005	97476	698652	1191150
Rajasthan	2985359	114920	3040863	6141142	-	12346	922470	515185	1037038	3399557	0	5886596	12027738
Tamil Nadu	-	-	-	-	-	-	-	-	-	116632	0	116632	116632
Uttar Pradesh	-	-	-	-	-	-	-	-	-	11000	0	11000	11000

Figures rounded off.

CALCITE

Table – 2 : Principal Producers of Calcite, 2007-08

Name & address of producers	Location of mine	
	State	District
*Wolkem Industries Ltd. Salumber House, Ambavgarh, Udaipur-313 001, 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, Rajasthan.	Rajasthan	Udaipur

* Producing calcite as an associated mineral with wollastonite.

**Table – 3 : Production of Calcite, 2005-06 to 2007-08
(By States)**

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

State	2005-06		2006-07		2007-08 (p)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	73558	19486	105724	37520	81548	30705
Madhya Pradesh	655	98	150	23	-	-
Rajasthan	72903	19388	105574	37497	81548	30705

**Table – 4 : Production of Calcite, 2006-07 and 2007-08
(By Sector/States/Districts)**

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

State/District	2006-07			2007-08 (p)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	7(3)	105724	37520	4(3)	81548	30705
Private sector	7(3)	105724	37520	4(3)	81548	30705
Madhya Pradesh	3	150	23	-	-	-
Badwani	3	150	23	-	-	-
Rajasthan	4(3)	105574	37497	4(3)	81548	30705
Sirohi	(1)	51241	20496	(1)	43105	18320
Udaipur	4(2)	54333	17001	4(2)	38443	12385

Figures in parantheses indicate the number of associated mines.

CALCITE

**Table – 5 : Mine-head stocks of Calcite, 2007-08 (p)
(By States)**

(In tonnes)

State	At the beginning of the year	At the end of the year
India	8573	3606
Gujarat	47	47
Madhya Pradesh	160	90
Rajasthan	8366	3469

**Table - 6 : Prices of Calcite, 2005-06 to 2007-08
(Domestic Markets)**

(In Rs. per tonne)

Grade	Market	2005-06	2006-07	2007-08 (p)
Calcite ROM	Ex-mine Udaipur (Rajasthan)	375-400	400	400
Calcite sub grade mineral	Ex-mine Udaipur (Rajasthan)	135	135	135
Grade I	Ex-mine Udaipur (Rajasthan)	1783	NQ	-
Grade II	Ex-mine Udaipur (Rajasthan)	416	415	425
Grade III	Ex-mine Udaipur (Rajasthan)	295	295	-

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 Industries Ltd, the principal mining company, markets its products under three different trade names; viz, Calstar snow-white

powder with 100% whiteness, Calcium white powder with 98.4% whiteness and Belsum white powder with 95% whiteness.

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 5 microns.

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.

CALCITE

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-7.

Table - 7 : Specifications of Calcite for 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.

CONSUMPTION

The consumption of calcite in 2007-08 was 36,600 tonnes. Glass industry accounted for about 47% consumption, followed by ceramic (24%), paint (14%), pesticides (7%), etc. Industrywise consumption of calcite is given in Table-8.

**Table - 8 : Reported Consumption of Calcite
2005-06 to 2007-08
(By Industries)**

Industry	(In tonnes)		
	2005-06	2006-07	2007-08 (p)
All Industries	41400	36600	36600
Cement	5200 (1)	700 (1)	700 (1)
Ceramic	9100 (31)	8700 (31)	8700 (31)
Electrical	700 (3)	700 (3)	700 (3)
Electrode	500 (12)	600 (12)	600 (12)
Glass	17300 (23)	17300 (23)	17300 (23)
Paint	5300 (30)	5300 (30)	5300 (30)
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.

FOREIGN TRADE

Exports of calcite increased to 3,222 tonnes in 2007-08 from 1,366 tonnes in 2006-07. Exports were mainly to Nepal and Sudan (Table - 9).

In 2007-08, imports of calcite increased to 101,471 tonnes from 46,465 tonnes in the previous year. Imports were mainly from Malaysia (61%) and Kenya (35%) (Table - 10).

CALCITE

**Table - 9 : Exports of Calcite
(By Countries)**

Country	2006-07		2007-08	
	Qty (t)	Value (Rs. '000)	Qty (t)	Value (Rs. '000)
All Countries	1366	5746	3222	9842
Nepal	805	3000	1422	6018
Sudan	-	-	1479	2590
UAE	93	674	240	870
Italy	26	29	58	189
Bangladesh	20	192	20	167
Kenya	17	51	-	-
Malaysia	21	117	-	-
Pakistan	20	96	-	-
Sri Lanka	262	1175	-	-
Surinam	82	375	-	-
Other countries	20	37	3	8

**Table - 10 : Imports of Calcite
(By Countries)**

Country	2006-07		2007-08	
	Qty (t)	Value (Rs. '000)	Qty (t)	Value (Rs. '000)
All Countries	46465	1028361	101471	349669
Kenya	2175	10375	35950	176113
Malaysia	44074	91464	62114	155203
China	16	81	928	5688
Vietnam	-	-	425	2021
Thailand	72	436	288	1863
Turkey	-	-	172	874
Singapore	-	-	40	221
UAE	-	-	44	177
Iran	64	243	-	-
Unspecified	-	-	1500	7463
Other countries	64	925762	10	46