

PROJECT PROFILE
ON
CALCIUM CARBONATE

MONTH & YEAR
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STIFTUNG **FÜR DIE FREIHEIT**

CALCIUM CARBONATE

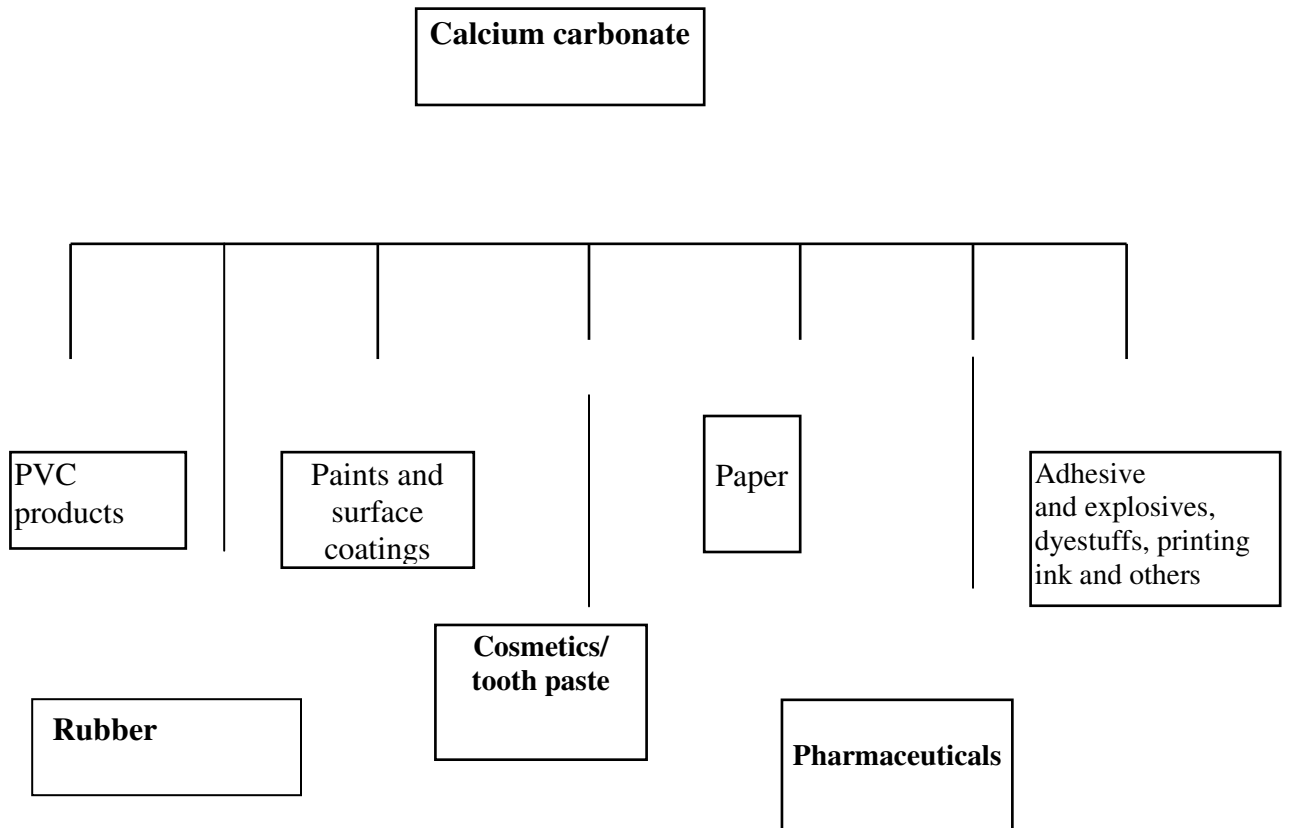
A. INTRODUCTION

Calcium carbonate is derived from lime stone. It is found naturally in the forms of lime stone, chalk and marble. Precipitated calcium carbonate and Activated calcium carbonate are produced industrially.

The natural ground Calcium carbonate and the precipitated material compete industrially, based primarily on particle size and the characteristics imparted to the product.

The precipitated types are distinguished by a finer and more uniform particle size, a narrower particle size range and a higher degree of chemical purity.

B. PRODUCT USES & SPECIFICATIONS



Specifications

Calcium carbonate finds applications in diversified sector and the specifications of the product required by different applications are marginally different.

Rubber industry

Characteristics	Requirements
Sieve residue on 150 micron IS sieve % by mass max.	0.01
Hydrochloric acid insolubles % by mass,max.	0.2
PH	10.5 ± 0.5
Loss on ignition, % by mass	43 to 46
Mn % by mass, max.	0.02
Cu% by mass, max.	0.005
Total fatty matter % by mass	2 to 3.5
Mixed oxides, % by mass	1.0
CaCO ₃ , % and MgCO ₃ together % by mass min.	92
Moisture content, % by mass max.	0.075
The ignition temperature shall be	950 ± 25 Deg C

Natural ground Calcium carbonate

(Occurs naturally as the principal constituent of limestone, marble and chalk.)

Precipitated calcium carbonate (Industrially produced)

Activated calcium carbonate (Industrially produced)

Cosmetic industry

S.No.	Characteristics	Requirements
1.	Fineness: Residue on 150 m IS sieve, % by mass, max.	0.1
2.	Loss on drying, % wt. mass, max.	1.0
3.	Bulk density, g/ml	As agreed to between the purchaser and supplier
4.	Calcium carbonate (as CCO_3), % by mass (on dry basis), min.	98.0
5.	Magnesium and alkali salts, % by mass	1.0 max
6.	Aluminium, iron, phosphates and matter insoluble in Hydrochloric acid, % by mass	0.5 max
7.	Iron (as Fe), % by mass, max.	0.03
8.	Arsenic (as AS_2O_3), parts per million, max.	2
9.	Heavy metals (as Pb), parts/million, max.	10
10.	Chlorides (as Cl), % by mass, max.	0.04
11.	pH of 10% aqueous suspension	9.0 to 10.0
12.	Barium	to pass test
13.	Sulphates	to pass test
14.	Flow point	As agreed to between the purchaser and the supplier

Explosive and Pyrotechnic industry

Calcium carbonate is used widely in propellant, pyrotechnic and other explosive

Compositions. This standard has been drawn up with a view to aiding the manufacturers of explosives and pyrotechnics in procuring material of requisite quality.

Types

The material shall be of the following two types:

Type I Calcium carbonate, natural and

Type II Calcium carbonate, precipitated

Description: Type I of the material shall be in the form of powdered calcite or limestone. It shall be white to off-white in colour. Type II of the material shall be in the form of white powder.

The material shall be free from extraneous matter and grit.

Requirements for Calcium carbonate for explosive and pyrotechnic industry:

S.No.	Characteristics	Requirement of	
		Type I	Type II
1.	Loss on drying, % by mass, max.	0.05	0.5
2.	Calcium carbonate (on dry basis), % by mass, min.	98.0	98.0
3.	Matter insoluble in dilute Hydrochloric acid, % by mass, min.	0.6	0.2
4.	Fineness (material retained on 125-	Nil	Nil

	micron* IS sieve) % by mass		
5.	Water insoluble alkali (as Na ₂ O) % by mass, max.	0.03	0.05
6.	Grit, % by mass, max.	0.06	0.02
7.	Chlorides (as Cl), % by mass, max.	0.05	0.04
8.	Total water soluble matter, % by mass, max.	0.05	0.5

* 90 micron for material required for use in propellents

Additional requirements for Calcium carbonate for use in propellants

S.No.	Characteristics	Requirement of	
		Type I	Type II
1.	Magnesium compounds (as MgCO ₃), % by mass, max.	0.5	0.5
2.	Iron (as Fe), % by mass, max.	0.05	0.05
3.	Settling test (volume occupied by 5g), ml	4 to 10	4 to 6

B. MARKET POTENTIAL

Calcium Carbonate is being manufactured in India since last three decades. The approximate demand of this product in India is around 3,00,000 MT per annum. This product is mainly used as a filler by different industry. Precipitated Calcium Carbonate is better substitute than most of the fillers in different categories

The Indian demand for the precipitated calcium carbonate can be estimated as under.

Precipitated Calcium carbonate
(in tonnes per annum)

Sector	Present demand
Paper	36000
PVC	90000
Rubber	54000
Cosmetic	36000
Paint	3600
Pharmaceuticals	1800
Miscellaneous	9000
Total	230400

Activated calcium carbonate:
(in tonnes per annum)

Sector	Present demand
PVC	54000
Rubber	21600
Cosmetic	3600
Total	79200

Total demand (in tonnes per annum)

Precipitated Calcium carbonate	230400
Activated Calcium carbonate	79200
Total	309600

Growth rate in annual demand for Precipitated calcium carbonate:

Sector	In percentage
Paper	6 to 7
PVC	10 to 11
Rubber	9 to 10
Cosmetic	12 to 13
Paint	10 to 11
Pharmaceuticals	12 to 13

As the industrial production in the country of the usage sectors is anticipated to grow at the rate of about 10% per annum the demand for the calcium carbonate is also expected to go up.

D. TECHNICAL ASPECTS

1. INSTALLED CAPACITY

The production capacity of Calcium Carbonate per day is estimated at 7 Tonnes on 3 shift basis and the capacity per annum is 2100 tonnes.

2. PLANT AND MACHINERY

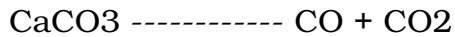
Machine name
Carbonation tank
Slurry and water storage tank
Hydration tank
Filter press
Centrifuge
Micro pulveriser
Rotary kiln
Air blowers & compressor

The total value of plant and machinery is estimated at Rs.160.00 lakhs. The machinery is available on turnkey basis.

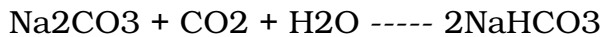
3. MANUFACTURING PROCESS

Precipitated calcium carbonate is manufactured by calcining limestone and recarbonating the hydrated slaked lime in vertical carbonation towers.

The reaction is exothermic and proper temperature control is maintained to get desired quality of the product.



Limestone



Technology developments

Technology based on Crystal Morphology:-

A new technology based on Crystal Morphology of Precipitated Calcium carbonate (PCC) have been developed by Mineral Technologies, USA.

Minerals Technologies, a company based in New York city has developed recently a patented PCC technology based on the manipulation of PCC crystal morphology. Minerals Technologies has a long experience in operating limestone and take mines, manufacturing mineral based furnace linings and producing PCC.

The company has patented technology allowing for the reaction of water, limestone and carbon dioxide to produce a synthetic PCC. The company

now produces the mineral in a variety of particle sizes from 0.01 to 100 um and shapes from spherical to scalenohedral and rhombohedral.

The company now offers 12 different types of PCC. This synthetic PCC has found many applications in industry. It has lowered the cost of manufacturing fine printing and writing paper. Specially engineered PCC crystals displace more expensive wood pulp and titanium dioxide and offer varying levels of gloss, light scattering or paper filling properties. Current trends in paper business in USA seem to favour increasing use of PCC.

Acid Tolerant Technology

The R&D of Mineral Technologies has led to the development of an acid tolerant PCC. This breakthrough could extend PCC into the market for newsprint, directory, magazine and catalog grade papers. Acid tolerant PCC opens a new paper market for PC. The new acid tolerant PCC provides a way to improve the brightness and quality of newsprint.

Certain grades of PCC offer such good light scattering ability that they serve an additional benefit of replacing TiO₂ in fine paper making. As PCC is much cheaper in price than TiO₂, the advantage of replacing TiO₂ with PCC is obvious economically. Minerals Technologies R&D has developed yet another process to produce PCC that could further endear the company to its paper industry customers. Its lime soda process yields byproduct caustic soda. In this process, soda ash can replace the carbon dioxide the company now gets from its mill host.

Minerals Technologies has signed agreements with two paper companies to provide Precipitated Calcium carbonate (PCC) using its acid- tolerant technology at three ground wood paper mills in North America.

4. RAW MATERIALS

Raw material requirement

Basis: One tonne of Precipitated Calcium Carbonate

Limestone (45% of Calcium Carbonate) 2000 kgs

Soda ash 8 Kgs

Coal 600 Kgs

Production-MTs 2100

Raw material required

	Per MT	Qty MTs	Rate Rs	Value Rs lakhs
Lime stone	2.00	4200	1100.00	46.20
Soda ash	0.00800	16.800	21000.00	3.53
Coal	0.60000	1260.000	5500.00	69.30
				119.03

5. LAND AND BUILDINGS

Land required—one acre – Cost Rs.15.00 lakhs.

Building area required- 8000 sq.ft Cost Rs.64.00 lakhs.

6. Utilities

Power:

The total power requirement of the unit will be 200 H.P.

Water:

Water 10000 gal.

Man Power Requirement:

Category	Nos.	Monthly Salary	Total monthly Salary
Supervisor	3	9000	27000
Skilled	6	7000	42000
Helpers	9	5000	45000
Assistants	4	6000	24000
			138000
Add : Benefits	20%		27600
Total			165600

Total wages per annum [Rs.lakhs] Rs.19.87 lakhs

7. IMPLEMENTATION SCHEDULE:

After making arrangements for the finance the project can be implemented within six months period

8. ASSUMPTIONS

Installed capacity per annum	Calcium carbonate -2100 MTs per annum
Capacity utilization-Year -1	60%
Year-2	70%
Year-3	80%
Selling price per unit	Rs.20000 per MT
Raw material cost	Rs.99.14 lakhs
Consumables per annum-at 100% (Rs. Lakhs)	Rs.46.20 lakhs
Power and Fuel-100% (Rs.lakhs)	Rs.59.09 lakhs

Wages & salaries -100% (Rs.lakhs)	Rs.19.87 lakhs
Repairs & Maintenance- p.m.	Rs.2.40 lakhs
Depreciation	Written down value method
General & administration Expenses per month	Rs.50000 per month
Selling expenses	3% on sales value
Interest on term loan and Working capital finance	14% per annum
Income tax provision	34% on taxable income

Technology Source

T.S. Enterprises,

Works :

E-416 Road No.14

Vishwakarma Ind.Area,

Jaipur-302 013, Rajasthan

Office :

A-151, Nehru Nagar, Jaipur - 302 016.

LIST OF MACHINERY SUPPLIERS

Carbonator tank Slurry and water storage tank Hydration tank	The Anup Engineering Ltd., P.B. No.1158, Ahmedabad-380 002 Aristo Engineers J-3, Vikas Udyog Nagar, Behind Kasturi Tower Phatak-Goddeo Road,
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	<p>Bhayander (E), Thane-401 105</p> <p>Abhinav Polymers A/2, 3909, GIDC Estate, Phase - IV, Vatva Ahmedabad-382 445 Gujarat</p>
Filter press	<p>Abhinav Polymers A/2, 3909, GIDC Estate, Phase - IV, Vatva Ahmedabad-382 445 Gujarat</p> <p>Chemi Filter Corpn. Shop No.3, Avanti Apts. Laxman Mhatre Road, Navagaon, Dahisar (W), Mumbai-400 068</p>
Centrifuge	<p>The Anup Engineering Ltd., P.B. No.1158, Ahmedabad-380 002</p> <p>B.M.T. Industries 15, Neelkanth Shopping Arcade 1st Floor, Chemburkar Marg, Chembur, Mumbai-400 071</p>
Micropulveriser	<p>Ganson Ltd. 645, Anna Salai Chennai-600 006</p>

	<p>ACE Pack Machines 23, V.N. Industrial Estate Bharathi Colony, Near Athiparasakthi Temple Peelamedu, Coimbatore-641 004</p> <p>Frigmaires Engineers PO Box 16353, 8, Janata Industrial Estate Senapati Bapat Marg Opp Phoenix Mill, Lower Parel (W) Mumbai-400 013</p>
Rotary kiln	<p>Veesons Boiler Engineers C-14/2, Industrial Estate, Trichy-620 015</p> <p>Nadi Airtechnics EBM - Nadi International Pvt. Ltd. (An Indo-German Joint Venture) 26 and 26/3, G.N.T. Road, Erukkencherry, Chennai-600 118, Tamil Nadu</p>
Air blowers and compressor	<p>Ishwar Engineering Co., 8/NPFG Laxmi Indl. Estate, New Link Road, Andheri (W), Mumbai-400 053</p> <p>Intensive Air Systems Ltd Regd. Office : Survey No.273 Bonthapally, Jinnaram Mandal</p>

	Medak (Dist.)-502 313 Andhra Pradesh
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LIST OF RAW MATERIAL SUPPLIERS

Name of the raw materials	Name of the company
Lime stone	<p>The major raw material required for the manufacture of Precipitated Calcium carbonate is Limestone. Limestone is abundantly available. Best quality limestone is available with Binny Limited, Mines at Rayalacheruvu.</p> <p>No problems are anticipated in procurement of limestone.</p>
Soda ash	<p>Tuticorin Alkalies & Chemicals Ltd., Tamil Nadu</p> <p>Tata Chemicals Ltd., Gujarat</p> <p>Sourashtra Chemicals, Gujarat</p> <p>Gujarat Heavy Chemicals Ltd., Gujarat</p> <p>DCW Ltd., Gujarat</p> <p>Punjab National Fertilisers, Punjab</p>

FINANCIAL ASPECTS

1. COST OF PROJECT

	[Rs.lakhs]
Land	15.00
Building	64.00
Plant & Machinery	160.00
Technical know how fees	2.00
Other Misc. assets	5.00
Pre-Operative expenses	20.00
Margin for WC	5.04
	<hr/>
	271.04

2. MEANS OF FINANCE

Capital	92.04
Term Loan	179.00
	<hr/>
	271.04

3. COST OF PRODUCTION & PROFITABILITY STATEMENT

	[Rs.lakhs]		
Years	1	2	3
Installed Capacity (MT)	2100	2100	2100
Utilisation	60%	70%	80%
Production/Sales (MT)	1260	1470	1680
Selling Price per MT	Rs.20,000		
Sales Value (Rs.lakhs)	<hr/> 252.00	<hr/> 294.00	<hr/> 336.00
Raw Materials	71.42	83.32	95.22
Packing materials	27.72	32.34	36.96
Power & fuel	35.45	41.36	47.27
Wages & Salaries	19.87	20.87	21.91

Repairs & Maintenance	2.40	2.64	2.90
Depreciation	24.80	21.11	17.97
Cost of Production	181.66	201.64	222.23
Admin. & General expenses	6.00	6.30	6.62
Selling expenses	7.56	8.82	10.08
Interest on Term Loan	25.06	21.93	15.66
Interest on Working Capital	3.67	3.67	3.67
Total	223.95	242.36	258.26
Profit Before Tax	28.05	51.64	77.74
Provision for tax	9.54	17.56	26.43
Profit After Tax	18.51	34.08	51.31
Add: Depreciation	24.80	21.11	17.97
Cash Accruals	43.31	55.19	69.28

4. WORKING CAPITAL:

	Months	Values	%	Margin	Bank
	Consumptions			Amount	Finance
Raw Materials	1.00	5.95	25%	1.49	4.46
Finished goods	0.25	3.78	25%	0.95	2.83
Debtors	1.00	21.00	10%	2.10	18.90
Expenses	1.00	0.50	100%	0.50	0.00
		31.23		5.04	26.19

5. PROFITABILITY RATIOS BASED ON 80% UTILISATION

<u>Profit after Tax</u>	=	<u>51.31</u>	15%
Sales		336.00	
<u>Profit before Interest and Tax</u>	=	<u>97.07</u>	33%
Total Investment		297.23	
<u>Profit after Tax</u>	=	<u>51.31</u>	56%
Promoters Capital		92.04	

6. BREAK EVEN LEVEL

Fixed Cost (FC):

	[Rs.lakhs]
Wages & Salaries	21.91
Repairs & Maintenance	2.90
Depreciation	17.97
Admin. & General expenses	6.62
Interest on TL	15.66
	<hr/>
	65.06
	<hr/>

Profit Before Tax (P) 77.74

$$\text{BEL} = \frac{\text{FC} \times 100}{\text{FC} + \text{P}} = \frac{65.06}{142.80} \times \frac{80}{100} \times 100$$

36% of installed capacity