PLASTER OF PARIS

1. INTRODUCTION:

Plaster of Paris is also known as Dried Calcium Sulphate, Dried Gypsum, Calcium Sulphate dehydrate. Appearance of plaster of Paris is Fine, odorless, tasteless powder. It is available in two grades, i.e. Grades Alpha and Beta. Its Molecular formula is CaSO4 1/2H2O, having Molecular weight 145.15, Melting point 163(-1/2 H2O) Deg.C Solubility in 100 g water at 25 Deg.C, g 0.30. When the product is mixed with water, it sets to a hard mass. Upon setting, it expands slightly and this property is used to reproduce the finest details size reduction up to 1 mm is done in certain dental and jewellery castings.

Characteristics of Alpha type

Alpha type is distinguishable from Beta in that its particles disintegrate very little when mixed with water. It requires far less mixing water to form a workable slurry. Consequently, Alpha has the ability to produce denser and higher compressive strength casts with less excess water, beyond that required for recrystallization.

Characteristics of Beta type

Beta type without additives is not suitable for plastering because the initial setting occurs too late and the final setting too early. Also, its particle size distribution is not suitable for plaster.

2. PRODUCT & ITS APPLICATION:

Ceramic industry: Used by the ceramic industry in the production of dishes, sanitary ware, art ware, stone ware and related products. Mixture of Alpha and Beta plaster is the favored moulding plaster especially for ceramics. Plaster of Paris is used in the ceramic industry for three related purposes. Model making: This requires a dense uniform plaster of Paris which can be readily carved. Making moulds for pressing and jiggering shapes in plastic clay. Making moulds for slip casting ware, In the manufacture of chemical porcelain, Chemical porcelain is a

white vitrified dense transparent, body with or without glaze. In the manufacture of electrical insulators and low tension porcelain insulators In the manufacture of sanitary wares, Making decorative moulding and building interior features, Hospitals and Dental laboratories-Pharmaceutical Grade. In decorative moulding, Art plasters are essentially moulding plasters used in making decorative moulding modified to increase surface hardness, chip resistance and reduce paint absorption of casts made from this material. In building interior features, Moulding plasters are used to form columns and other
building interior features. In manufacturer of chalk crayons, Chalk crayons are round and tapered shape sticks of different colors made of plaster of Paris. They are extensively used for writing on black boards and markings on any colored surface. Hospitals and Dental laboratories-pharmaceutical grade, Orthopedic plasters are used by hospitals and clinics for all types of orthopedic cast work such as surgical caste, orthopedic bandages etc. Both Alpha and Beta plasters are used in dental laboratories.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

Promoter must have basic knowledge of chemical process and operation and quality of gypsum. It is desirable to have Graduate in any Science.

4. MARKET POTENTIAL AND MARKETING ISSUES, IF ANY:

There are reported to be around 400 producers of Plaster of Paris in the country. Most of the units are in the un-organized and cottage sector, producing low grade product, essentially meeting the local requirements. Estimated Indian Installed Capacity is 2, 50,000tons per annum.

INDIAN DEMAND:

The demand is assessed in the following sector, Sanitary ware, Electrical insulators, Crockery items including ceramic art ware, table wares and allied items, Surgical bandages, Plaster boards, Miscellaneous such as chalk crayons, sculptures, jewellery and dental impressions, statues and toys, paint, in moulding and casting process of nonferrous alloys. Total world production of gypsum: 120 million tons per annum. Total estimated production of Plaster of

Paris for various grades Around 50 million tons per annum. Global growth rate in demand Around 1 to 2% per annum Consolidated Statement of Demand.

5. RAW MATERIAL REQUIREMENTS:

Major raw materials require are the Gypsum, maleic anhydride, and Sodium hydroxide.
Gypsum available in form of NATURAL GYPSUM, MARINE GYPSUM, DRIED GYPSUM and PHOSPHO GYPSUM.

6. MANUFACTURING PROCESS:

Washed marine gypsum is pulverized to 200 I.S. mesh. The pulverized gypsum is fed to reactor where water is added to make slurry. Sodium maleate is added as a crystal modifier. The reaction is carried out under pressure at 40 psig for one hour under agitation. The slurry is filtered hot using vacuum filtration. The cake is washed with boiling hot water. The hot cake is transferred to dryer immediately in hot trays and dried at 120-130 deg.C. The dried product is sieved through 100 I.S. mesh and packed in bags.

7. MANPOWER REQUIREMENT:

The enterprise requires 16 employees as detailed below**:**

Sr. No.	Designation of Employees	Monthly Salary ₹	Number of employees required				
			Year-1	Year-2	Year-3	Year-4	Year-5
1	Machine Operators	12,000	2	2	2	3	3
2	Helpers	8,000	6	6	8	8	10
3	Sales/ Purchase man	10,000	2	2	2	1	1
4	Accounts/Stores Asst	12,500	1	1	1	1	1
5s	Office Boy	9,500	1	1	1	1	1
	Total		12	12	14	14	16

8. IMPLEMENTATION SCHEDULE:

The project can be implemented in 3 months' time as detailed below:

Sr. No.	Activity	Time Required *(in months)*
1	Acquisition of premises	1.00
2	Construction (if applicable)	2.00
3	Procurement & installation of Plant & Machinery	1.00
4	Arrangement of Finance	2.00
5	Recruitment of required manpower	1.00
	Total time required *(some activities shall run concurrently)*	3.00

9. COST OF PROJECT:

Sr. No.	Particulars	₹in Lacs
1	Land	3.00
2	Building	7.50
3	Plant & Machinery	30.00
4	Furniture, Electrical Installations	2.00
5	Other Assets including Preliminary / Pre-operative expenses	1.00
6	Working Capital	11.00
	Total	**51.00**

10. MEANS OF FINANCE:

Bank term loans are assumed @ 75 % of fixed assets.

Sr. No.	Particulars	₹in Lacs
1	Promoter's contribution	11.00
2	Bank Finance	40.00
	Total	**51.00**

11. WORKING CAPITAL CALCULATION:

The project requires working capital of ₹ 11.00 lacs as detailed below:

Sr. No.	Particulars	Gross Amt	Margin %	Margin Amt	Bank Finance
1	Inventories	8.00	25.00	2.00	6.00
2	Receivables	3.00	25.00	0.75	2.25
3	Overheads	0.00	100%	0.00	-
4	Creditors	-	40%	-	-
	Total	11.00		2.75	8.25

12. LIST OF MACHINERY REQUIRED:

A detail of important machinery is given below:

Sr. No.	Particulars	UOM	Qtty	Rate (₹	Value (₹in Lacs)
	Plant & Machinery / equipments				
a)	***Main Machinery***				
i.	Screw conveyor 3 HP motor	Nos	1.00	500000	5.00
ii.	Micro pulveriser With 2 HP motors	Nos	1.0	50000	0.50
iii.	Reactor Hot filtration and crushing unit with pump Fluid Control Equipment Dryer Weiging scale	Nos Nos. NOS Nos.	1.0 1.0 1.0 1.0	300000 1000000 400000 50000	3.00 10.00 4.00 0.50
b)	***Ancilliary machinery***				
i.	Boiler and Storage tanks	Nos Nos.	1 4	3.000 0.25	3.00 1.00
ii.	Trolleys	Nos.	5	10000	0.50
	sub-total Plant & Machinery				**27.50**
	Furniture / Electrical installations				

Sr. No.	Particulars	UOM	Qtty	Rate (₹)	Value (₹in Lacs)
a)	Office furniture	LS	1.00	50,000	0.50
b)	Stores & Spares	LS	1.00	30,000	0.30
c)	Computer & Printer	Nos	1.00	1,00,000	1.00
	sub total				**1.80**
	Other Assets				
a)	Licenses and other fees		2.00	50,000	1.00
	sub-total Other Assets				**1.00**
	Total				**30.30**

13. PROFITABILITY CALCULATIONS:

Sr. No.	Particulars	UOM	Year-1	Year-2	Year-3	Year-4	Year-5
1	Capacity Utilization	%	60%	70%	80%	90%	100%
2	Sales	₹. In Lacs	25.20	29.40	33.60	37.80	42.00
3	Raw Materials & Other direct inputs	₹. In Lacs	12.00	14.00	16.00	18.00	20.00
4	Gross Margin	₹. In Lacs	13.20	15.40	17.60	19.20	22.00
5	Overheads except interest	₹. In Lacs	5.00	5.50	6.00	6.50	6.50
6	Interest @ 10 %	₹. In Lacs	4.80	4.80	3.50	2.25	1.50
7	Depreciation	₹. In Lacs	10.00	6.00	3.00	2.40	1.8
8	**Net Profit before tax**	₹. In Lacs	**-6.60**	**-0.90**	**5.10**	**8.05**	**12.20**

14. BREAKEVEN ANALYSIS:

The project shall reach cash break-even at 29.54 % of projected capacity as detailed below:

Sr. No.	Particulars	UOM	Value
1	Sales at full capacity	₹. In Lacs	42.00
2	Variable costs	₹. In Lacs	20.00
3	Fixed costs incl. interest	₹. In Lacs	06.50
4	BEP = FC/(SR-VC) x 100 =	% of capacity	29.54 %