

Bonding Materials

Material with adhesive and cohesive properties which make it capable to bond building units into a compact whole. This definition embraces a large variety of cementing materials, among them:

1. Gypsum plaster
2. Lime
3. Cement

Gypsum plaster:

Gypsum plaster comprise all that class of plastering and cementing materials which are obtained by partial or complete dehydration of natural gypsum.

Raw materials - Gypsum rocks:

Pure gypsum is a hydrous lime sulfate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), the composition of which by weight is:

Lime sulfate	→	Lime CaO	32.6%
	→	Sulfur trioxide SO_3	46.5%
Water H_2O			20.9%
Total =			100 %

Natural deposit of gypsum are very seldom pure, the lime sulphated being adulterated with silica, alumina, iron oxide, calcium carbonate and magnesium carbonate. The total of all impurities varies from a very small amount up to a maximum of about 6%.

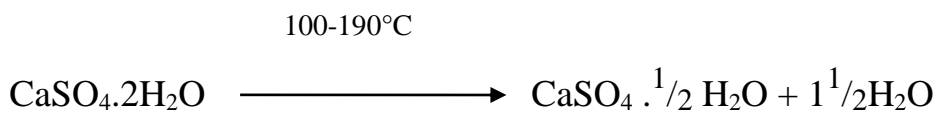
Manufacture of gypsum plaster:

Process of manufacture:

There operations are involved in the process of manufacturing plaster. **Crushing, grinding and calcinations.** Rock gypsum is crushed to fragments about 25mm in diameter, which are passed through a finishing mill. The grain gypsum is then calcined in rotary kilns.

Theory of calcinations:

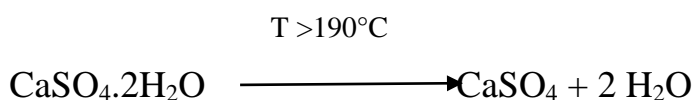
If pure gypsum is subjected to any temperature above 100 °C, but not exceeding 190°C, three-fourth of the water of combination originally present is driven off:



The resultant product is called plaster of Paris ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$). Plaster of Paris readily recombines with water to form gypsum, hardening in a very few minutes:



If the gypsum is calcined at temperature much above 190 °C it losses all its water of combination, becoming an anhydrous sulfate of lime:



Properties of gypsum plasters:

1) **Setting and hardening:**

The term "setting" is meant the initial loss of plasticity, whereas "hardening" means the subsequent gain in strength and in ability to resist indentation or abrasion. The setting of plaster of Paris and other gypsum plasters is a process recombination of the partly or totally dehydrated lime sulfate or gypsum.