

Experimental Study on Temperature Resistance Mortar by using Vedic Plaster in Place of Cement

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ABSTRACT

The present study deals with behaviours of mortars by using materials Vedic plaster and normal 53 grade cement. It is also giving results on thermal resistance of both mortars. This study also calculates the strength comparison, initial and final setting time, consistency, soundness of both mortars, we can also check the specific gravity of Vedic plaster and normal cement. For the mix proportion of cement mortar will take 1:3 & Vedic mortar is 1:1 with respect to cement, Vedic plaster & fine aggregate. For the study the final strength is more in cement mortar, but the thermal consistency will be in Vedic plaster.

KEYWORDS: Vedic plaster, Thermal Consistency, Strength.

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I. INTRODUCTION

Cement mortar is the most important and widely used construction material in construction of any structure. Due to which demand of cement mortar increases daily. And since cement is the basic binding material in cement mortar, simultaneously demand of cement is also increased. But production of cement requires lots of energy and also creates pollution. Production of cement is responsible for about 6% of total CO₂ emission in the world. This gas is responsible for deflection of ozone layer in the atmosphere. So this is one of the reasons to search for possible alternatives for cement. The other reason is because of heavy increase in temperature in the atmosphere. Vedic plaster obtained by naturally available materials gypsum and cow dung ash with a specified proportion mix. So, it will decrease environmental pollution obtained by the cement and its by-products.

1.1 ADVANTAGES OF VEDIC PLASTER:

- ✓ As no curing it saves thousands of litres of water.
- ✓ Save electricity which was required to pump water while curing cement plaster.
- ✓ It's a thermal insulator so keeps your building cooler in summer and hotter in winters. So electric bill for cooling or heating of building will reduce permanently.
- ✓ Gypsum is sound proof, heat proof and fire proof.
- ✓ Gypsum and cow dung both protect from radiations.
- ✓ Give natural fragrance in house.
- ✓ Give attractive smooth and aesthetic surface.
- ✓ Attaches cow again to economy.

1.2 OBJECTIVES:

- ✓ To observe the thermal conductivity of Vedic plaster and normal cement plaster.

- ✓ To understand the strength properties of Vedic plaster and cement plaster.
- ✓ To observe the environmental impact of both Vedic plaster and conventional plaster.

II. LITERATURE REVIEWS

- ✓ S. Sathish Kumar, Dr.A. Anbuhezian investigated (2018) that (An experimental study of fully replacement of cow dung ash (CDA), Alumina & lime for cement) lateral strength and durability is high. And he also analysed that it is a self-curing concrete.
- ✓ K.M. shelote, R. jajodya, H.R. gavali, M.V. madurwar, S Gadve & R.V. Ralegaonkar investigated (2019) that (Experimental and computational analysis of energy efficient plaster) it as lower density and thermal conductivity that saves 24% of operational energy.

III. METHODOLOGY:

In this project we introducing Vedic plaster into mortar in place of cement. Vedic plaster is a cow dung material which makes the mortar cool. The human being will live at a temperature of 20°C to 25°C. For this investigation firstly we have done the basic test on Vedic plaster with respect to of cement like normal consistency, initial and final setting time, specific gravity and sound ness test. After finding the results of above tests we will prepare the Vedic mortar and as well as cement mortar. do the comparison of both mortars by comparing the thermal consistency of both mortars. Comparison of strength on both mortars.

IV. MATERIALS & EQUIPMENTS USED

The ingredients used in this study are,

- ✓ Gypsum based cow dung (Vedic) plaster.
- ✓ Ordinary Portland Cement of 53 Grade cement conforming to IS: 169-1989.
- ✓ Fine aggregate and conforming to IS: 2386-1963.
- ✓ Water.

4.1 VEDIC PLASTER:

Vedic Plaster is composed of cow dung and gypsum in a particular ratio, which when mixed in water creates a paste of plaster. This plaster when used at the walls of brick and mortar insulates the walls and do not allow heat to enter inside the house. The plaster also prevents dampening of houses.



Fig 1 Vedic Plaster



Fig 2 Cement

4.2 CEMENT:

Cement is a binder, a substance used for construction that sets, hardens to other materials to bind them together. Cement is seldom used on its own, but rather to binds sand and gravel (aggregate) together. Cement mixed with fine aggregate produces mortar for masonry, or with sand and gravel, produces concrete.

4.3 FINE AGGREGATE:

Aggregate is the granular material used to produce mortar and when the particles of the granular material are so fine that they pass through a 4.75mm sieve, it is called fine aggregate. It is widely used in the construction industry to increase the volume of mortar; thus, it is a cost saving material.



Fig 3 fine aggregate



Fig 4 water

4.4 WATER:

Water is an important component of cement mortar. When cement comes in contact with water, an exothermic reaction occurs and setting of cement starts. Water used in the mixing is to be fresh and free from any organic and harmful solution which will lead to deterioration in the properties of the mortar. Salt water is not acceptable but chlorinated drinking water can be used. Potable water is fit for use as mixing water as well as for curing.

4.5 EQUIPMENTS:



Fig 5 Compressive Mechine Fig 6 Thermometer

V. RESULTS

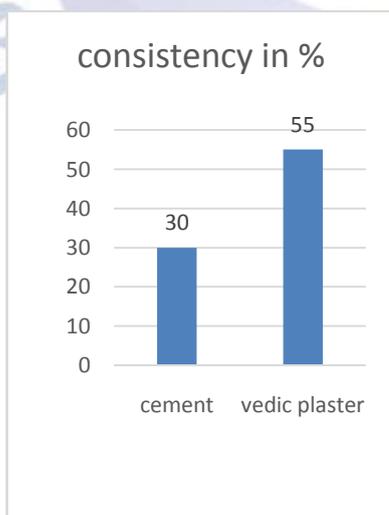
Vedic plaster is gypsum-based cow dung plaster. Gypsum is a mineral composed of calcium sulphate dihydride. In addition, cow dung contains large amount of protein in it that helps in binding and setting of mortar. The normal consistency is obtained at the range of 55% of water content, the initial setting time of Vedic plaster was observed to be 65 min and set plaster patches did not show any disintegration, popping or pitting. And the final setting time is obtained at 960 min, the specific

gravity observed to Vedic plaster as 2.08, the soundness of Vedic plaster 12 mm it gives the minimum requirements of thermal expansion of the mortar. Finally, the Vedic plaster temperature range will be 20°C to 25°C at the atmosphere temperature of 35°C. At this temperature the human will live without any mechanical cooling equipment's. The compressive strength is 4.5 mpa for 28 days

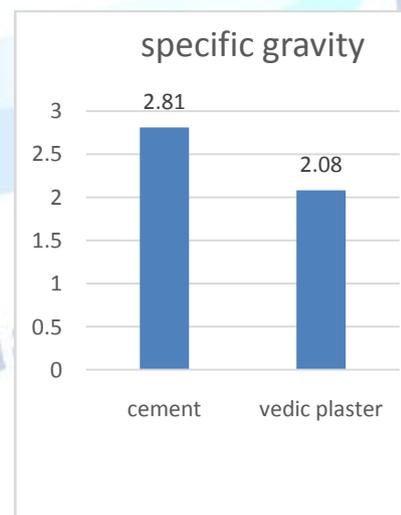
Cement is a normally using binding material at the mortar. The Results of normal consistency, initial and final setting time, soundness, specific gravity will be obtained as 30% of water content, 35 min, 630 min, 8 mm, 2.81 respectively. The cement mortar temperature range will be 30°C to 35°C at the atmosphere temperature of 35°C. At this temperature the human will not them without any mechanical cooling equipment. The compressive strength is 18 mpa for 28 days

Table 1 Results

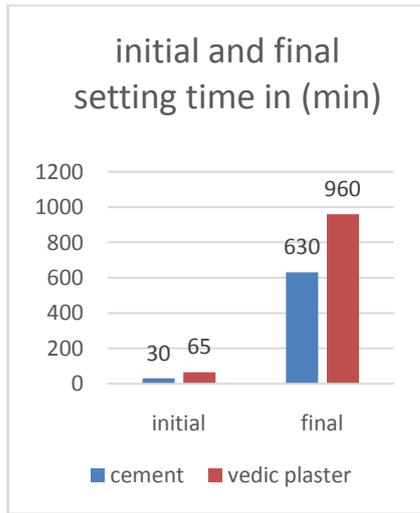
	CONSISTENCY	INITIAL SETTING TIME	FINAL SETTING TIME	SOUNDNESS	SPECIFIC GRAVITY	COMPRESSIVE STRENGTH	THERMAL CONSISTENCY
CEMENT	30% OF WATER CONTENT	35mins	630mins	8mm	2.81	7,14,28 days strength respectively 6.5,15,18 mpa	30°C to 35°C
VEDIC PLASTER	55% OF WATER CONTENT	65 mins	960 min	10 mm	2.08	7,14,28 days strength respectively 3,3.5,4.5 mpa	20°C to 25°C



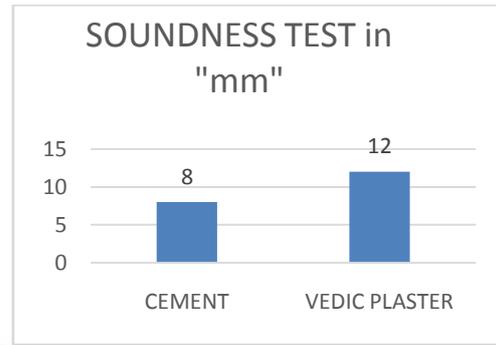
Bar chart 1 Consistency



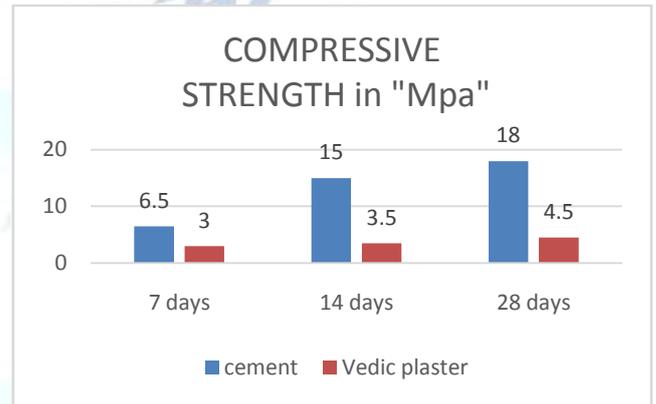
Bar chart 2 Specific gravity



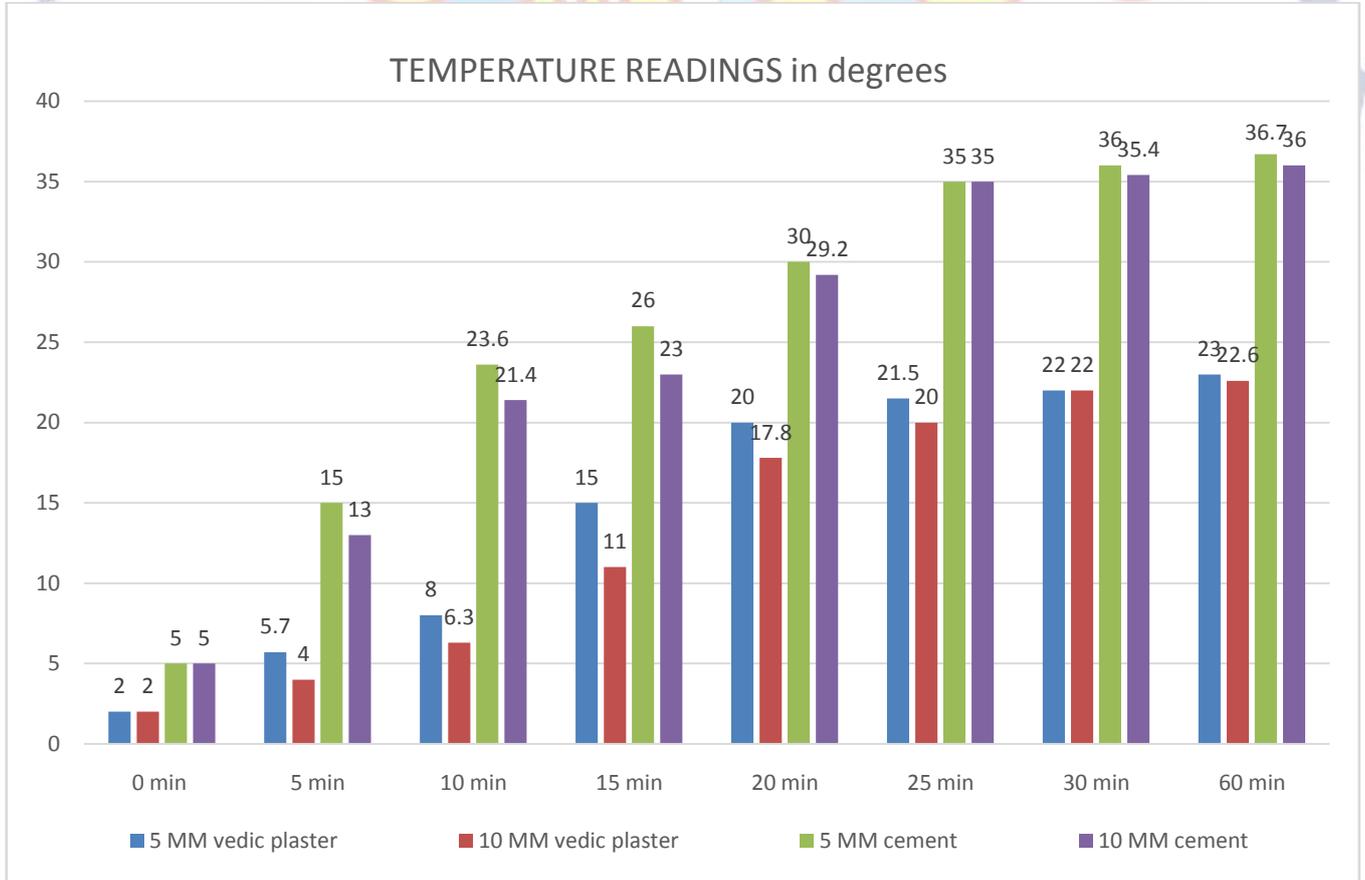
Bar chart 3 Initial final setting time



Bar chart 4 Soundness Test



Bar chart 5 Compressive Strength



Bar chart 6 Temperature Readings

VI. CONCLUSION

It can be concluded that Vedic plaster helps in decreasing the room temperature, ultimately it helps to controlling the inside room temperature. Vedic plaster is a gypsum-based cow dung plaster which is naturally available material, hence by using Vedic we have to control the CO₂ content in the atmosphere from the decreasing of cement usage so the cement manufacturing will be decreasing the environment pollution will reduces it will save the environment. Vedic mortar will not require the additional curing but cement mortar will consume more water in the form of curing, by using Vedic mortar it will saves large amount of water. The material (Vedic plaster) will resist the sound, heat and fire but the cement does not resist those things, by using Vedic we will safe from those things.

SCOPE FOR FUTURE STUDY:

The several changes happening in the environment the temperature of atmosphere increasing day by day. In the increasing temperature it is difficult to live at cement structure like buildings, industries etc. because of cement is also a heat material. To avoid temperature in cement structure we can use artificial temperature operating mechanism like AIR CONDITIONERS, COOLERS etc.it leads to environment pollution by using of naturally available materials we can resist the temperature then it is safe to environment. Now a day's environment pollution is one of the largest problems in the atmosphere.

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