

# Comparison of Capillary Effect of Marble Slurry With Fine Aggregate

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**Abstract** - Marble slurry is being produced in so huge quantity in marble producing areas like Kishangarh, Makrana, Rajsamand, Udaipur and Alwar that the scene surrounding is like Siachin, Leh and Laddakh. It seems that whole topography is covered by snow fall. This is not a pleasant scene at all. This bye product is creating Sevier damage to the environment. This material requires to be utilized at mass level. Only construction industry has potential to consume at such mass level. It is available in lot and free of cost in marble producing areas. In sequence of different experiments Capillary effect is also necessary for finding its utility in embankment works. Rate of capillary rise of water in marble slurry is Soil mixed with marble slurry will be also favorable for making WBM. A natural resource i.e. Fine aggregate may be saved and at the same time lot of money can be save.

**Key words:** - Marble slurry, topography, capillary effect, fine aggregate and environment.

## I. INTRODUCTION

Marble Slurry is fine particles generated during process of cutting, grinding and polishing process dissolved in water. This suspension of marble fines in water, generated during processing and polishing because water is used as a cooling agent to the cutting blades.

**Marble waste an Environmental Hazard:**-This is becoming a major threat to the Environment in the state of Rajasthan. In the mining and processing activities near about one thousand Gang saws and thousands of cutters are creating 1.5-2.0million tons of marble waste i.e. marble slurry. This Marble waste is indestructible waste and harmful to common man, Animals and also to the Vegetation creating aesthetic problems. Some bad effects of the marble slurry on Environment may be listed as under: -

1. The waste cannot be destroyed.
2. The sites which are dumping grounds are limited and distort the overall scene of the Area.
3. The top fertile soil becomes unfertile due to Marble Dust.
4. The marble slurry flows with rain water into the rivers and other water bodies polluting them.
5. Polluted water affecting irrigation and drinking water resources.
6. Pollution of air.

These all the factors may give a thunder shock to the growth of the marble industry. It is therefore a scientific and engineering responsibility of government and industry to solve the problem.

## II. LITERATURE REVIEW

Many researchers worked on marble slurry to be utilized, but the amount consumed is very less. It's necessary to utilize on mass level for solution of the problem.

According to Saied Farhana et.al, (2013) concluded in Year of Publication: 2013 The utilization in lot of construction materials by the construction industry, created extreme lack of construction materials and leading to the nature / environmental hazard. In last ten years, construction industry has been associated by many research fellows for utilizing this industrial by product in cement concrete in sequence to minimize the exploitation of natural resources.

According to Ankit Nileshchandra Patel, Prof. Jayesh kumar Pitroda(2013) the waste material generated directly in the environment can cause the environmental problem. Hence the reuse of this waste material is necessary in the construction Industry. Presently large amounts of Stone dust are generated in natural stone processing plants with an important impact on the environment and humans April-June, 2013. Stone wastes are generated as a waste during the process of cutting and polishing of Marble/Granite/Kota stone. The inventive use of Stone slurry in concrete by substituting OPC and PPC cement with the product was the second option of the conventional cement concrete.

Mamta Rajgor, Jayesh kumar Pitroda(2013) explained and published in April 2013 a new approach to the manufacturing of bricks was driven out by consuming Class F fly ash. Marble and granite production took a boom in last 10 years with the trend of private and public sector in early 1990s.Resulting in the lot of amount of quarrying, mining and processing waste. Stone waste is an extreme polluting waste due to its alkaline nature, and its production

and processing procedure, it is providing a health threat to the environment. One of most important part of construction is Brick. Most of common masonry Units use as a building material due to its properties.

Nutan Patel et.al, (2014) concluded Waste consumptions is a basic requirement to any construction or production industry. It is anticipated that there is billion ton of mining waste is produced in every year. Even if a portion of this waste may be consumed on-site like as refilling of quarry pit. Waste generated at quarries and manufacture plants is near about same.

### III. MATERIALS

Fine aggregate is a major ingredient for construction. For starting construction work nobody can imagine any type of construction without fine aggregate or sand. Now a days fine aggregate cost are very high and also availability is very less. So construction cost is also increasing. On the other hand Marble slurry is a bye product of marble industry creating environmental pollution, available in lot. If marble slurry is proved having appropriate properties for construction work it will be a revolution. It will result in low cost construction and reduce the pollution nuisance created by marble slurry.

### IV. METHOD

For finding rate of capillary rise in marble slurry and fine aggregate. Arrangement made was in such a way that the specimen was kept in a cylindrical vessel open at both ends but at one end was closed by blotting paper to allow water through it. The cylindrical vessel having measuring scale at the surface to measure the height in millimeter. At the fixed interval of time height of rise of water in specimen is noted down to find out rate of capillary rise. This property is also important to research because if like sand or fine aggregate if marble slurry is used to prepare sub base and if capillary rate is high than it can destroy the surface above.

#### Apparatus.

500ml measuring Beaker, Desiccators and 1.18mm sieving Grill, Graph paper, "U" shape capillary tube and blotting paper etc.



Figure- 1 capillary test

### V. PROCEDURE

Taking a graph strip with scaling 0, 1, 2, 3,.....8, 9 centimeter with 1mm least count.

Pasting the graph scale on beaker with 0 exactly at top so that on keeping it up side down 0 will be at base.

Putting a "U" shaped thinner capillary tube through notch of beaker for release of air from inside the beaker fixing with tape both side.

Oven dry Marble Slurry at ina furnace in a dish at a heat of 100°C-110° C for 24.0 ± 0.50time period

Cool-down the waste in a air close-fitting vessel the desiccators' up to room temperature. Slurry at Room temperature(15-25<sup>0</sup>C)

Fill the beaker 3/4 with oven dried cool slurry and fixing blotting paper on top. Place a 2.18mm grill in desiccator and keep beaker upside down over it. Fill water upto grill or touching the blotting paper.

The sample kept in Desiccators on the grill on Blotting paper in a inverted beaker and filled water in the desiccators up to blotting paper. Now marble slurry will absorb the water by the capillary action. Looking continuously note down the rise of moisture in the slurry sample according to time. Find out the rate of rise of moisture in slurry.

Table No.-1 Capillary rise in marble slurry

SNO.	TIME minute	0	3	8	10	15	20	25	30	35	40
T-1	Rise of moisture mm	0	15	24	32	40	43	47	50	55	60
T-2	Rise of moisture mm	0	16	27	30	36	41	48	51	55	58
T-3	Rise of moisture mm	0	15	25	33	39	42	48	51	56	59

RISE IN MM marble slurry

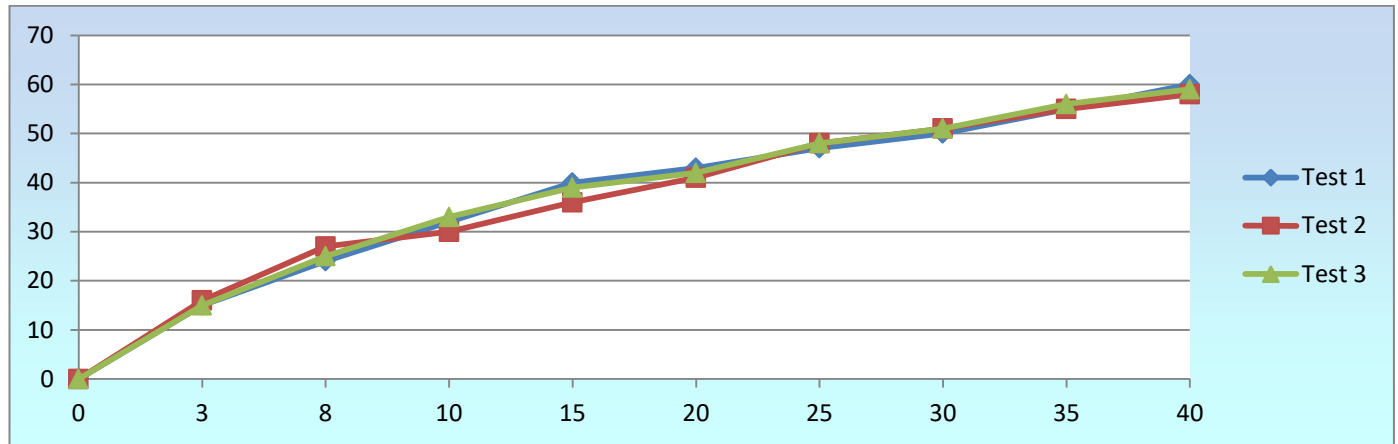


Figure-2 Capillarity

TIME IN MINUTES

Table No.-2 Capillary rise in fine aggregate

SNO.	TIME minute	0	4	8	10	15	20	25	30	35	40
T-1	Rise of moisture mm	0	17	27	34	41	45	50	57	59	65
T-2	Rise of moisture mm	0	15	25	33	40	46	49	56	59	66
T-3	Rise of moisture mm	0	17	26	33	39	44	50	57	58	64

RISE IN MM Fine aggregate

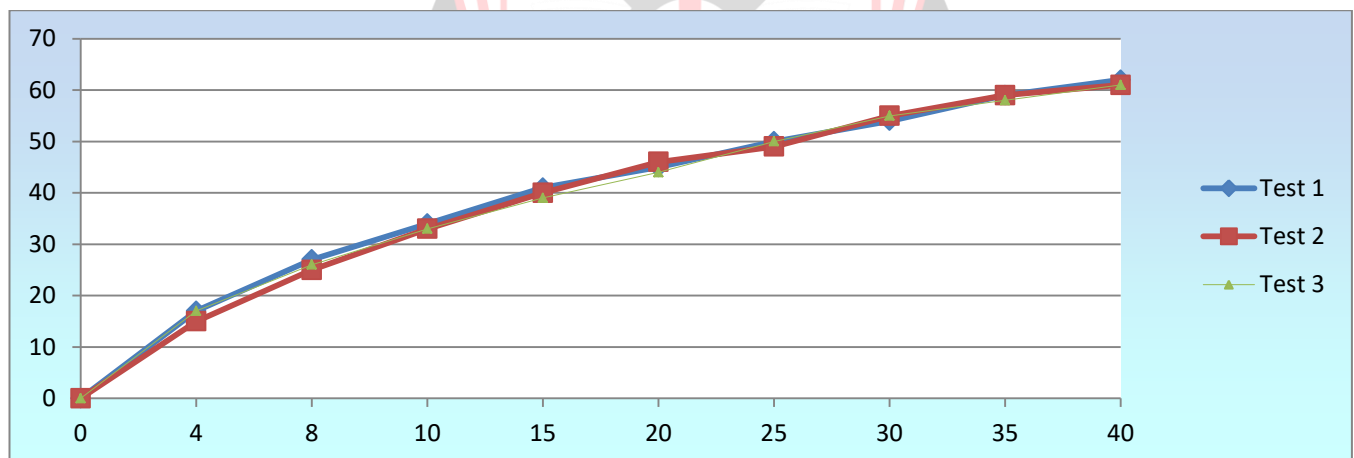


Figure-3 Capillarity

TIME IN MINUTES

**VI. RESULT**

After studying the test results and graph drawn in between Time (in minutes) and rise (in millimeters) near about a linear line is traced. So it can be assumed that the rate of capillary action (rise) is uniform and this rate is near about to be 1.5 mm/minute ( $2.5 \times 10^{-3}$  cm/sec) same as of standard fine aggregate  $10^{-6}$  -  $10^{-3}$  cm/sec. Which is near about same as of fine aggregate and the graph is parallel to the fine aggregate graph..

**VII. CONCLUSION**

As per test results of marble slurry and fine aggregate are near about the same. This shows that capillary rise property of Marble slurry is parallel as of fine aggregate and may be

utilized in place of fine aggregate for the same purpose. Also it may be utilized in partial replacement of fine aggregate in Cement mortar or Cement concrete.

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