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# Methods of Self Curing Normal Vibrated Concrete

Mohammadrizwan Shaikh[1], Saifali Shaikh[2], Mohammadrehan Malek[3], Sanjay Verma[4], Shubham Gadaria[5], Shahrukh Khan Pathan[6]
[1-5]Civil Engineering, Sigma Institute of Engineering, Bakrol - Vadodara
[6]Assistant Professor, Civil Engineering, Sigma Institute of Engineering, Bakrol - Vadodara

## ABSTRACT

Concrete is a broadly used material for construction, due to its high strength, availability, long life span and compatibility. A normal Conventional concrete requires at least 28 days of curing achieving its advisable strength. Due to the large development in construction and due to absence of water at many places, conventional curing method proves to be costly and comes with many problems. In this situation, self-curing concrete comes into light. Self-curing concrete is the special concrete which gains importance in current days as it avoids the necessity of implementing extra water for curing. This type of curing technique can widely adopted in places where shortage of water is there. In this research, attempts have been done to understand the feasibility and efficiency of self-curing concrete and compare it with the conventional concrete.
**Keywords:** Water Retention, Compressive Strength, Self-Curing, Porous Aggregates, Absorption

## I. INTRODUCTION

Curing is the procedure of applying water to the freshly hardened concrete to promote the hydration process of cement. Due to applying of water, hydration of cement continues and simultaneously gain in the strength also continues. If curing stops, gain in strength of the concrete is restricted. For better performance and durability of concrete, proper curing of concrete is essential. Nowadays, normally external curing is used to achieve this.

Water is the only source mostly used as a raw material in construction works such as mixing and curing and it is also one of the vital thing used widely in industries as well as in day to day needs in human life. As a result of this, water is about to become scarce. If this situation prevails, then the cost construction will reach to a point where common man cannot afford to build a home. Hence to mitigate this water problem in construction field, self-curing concrete came into existence.

Self-curing or internal curing is a technique that can be used to provide additional moisture in concrete for more effective hydration of cement and to reduced dehydration. When concrete is open to the atmosphere, due to the various factors like temperature, humidity and wind, water in the concrete starts evaporating. Due to evaporation the initial water cement ratio is reduced and it results in the partial hydration of cement and hence reduces the quality of concrete. Due to the reduction in water cement ratio, at initial stage, due to plastic shrinkage, micro cracks are occurs in the concrete and at final stage, these micro cracks propagates and become wider due to the drying shrinkage. Temperature of curing is one of the key factors which affect the rate of gain of strength of concrete. At higher temperature normal concrete losses its strength due to the formation of the cracks, reduction in water cement

ratio and incomplete hydration of cement researches show that, each cubic meter of concrete requires water about three times of its volume for the complete hydration. The main aim of the study is to eliminate the quantity of water used in the curing of concrete and to achieve the target strength of concrete without curing.

## II. MATERIAL USED

**Cement -** Portland pozzolona cement of 53 grade

**Sand –** locally available river sand passing through 4.75 mm IS sieve

**Aggregate -** A reddish brown colored, rough textured, angular and nominal maximum size of 20 mm aggregates available at tajpura, near halol, Vadodara. An aggregate absorbs the water about 10 % of their weight.

**Water –** potable, test less, odor less, color less, free from any harmful compounds

## III. METHODOLOGY

As initial stage, we carried out the literature review about the studies on self-curing concrete. Then, we carried out the search for materials to be used in generation of self-curing concrete and find out the various properties of these materials.

Then after, we casted the cubes for determination of compressive strength of self-curing concrete without curing. Results of the testing are then analyzed and acceptability of the project work was concluded.

### CONCRETE

Grade destination – M20
Cement – Portland pozzolona cement
Coarse aggregate size – 20 mm

### TEST DATA FOR MATERIAL

Density of cement – 1430 kg/m$^3$
Density of fine aggregate – 1750 kg/m$^3$
Density of coarse aggregates – 1800 kg/m$^3$
Water absorption of aggregate – 10%
W/C ratio – 0.45

### AGGREGATE WATER ABSORPTION TEST

First, we dried the samples in oven for 24 hours at 105° C. after that, we put four samples each of same mass samples in the water for 48 hours and weights all the samples before and after putting in water. Results are shown in the table below.

| Sr. No. | Dry weight of aggregate sample | Saturated weight of aggregate sample |
|---|---|---|
| 1. | 186 | 204 |
| 2. | 186 | 205 |
| 3. | 186 | 206 |
| 4. | 186 | 205 |
| **Total** | **744** | **820** |

Water absorption =

$$\frac{\text{Saturated weight of aggregate sample} - \text{Dry weight of aggregate sample}}{\text{Dry weight of aggregate sample}}$$

$$= \frac{820 - 744}{744}$$

$$= 0.1021 * 100$$

$$= 10.21\ \%$$

Mix proportion (1:1.5:3) becomes,

| | Cement | Fine aggregate | Coarse aggregate |
|---|---|---|---|
| **Proportion** | 1 | 1.5 | 3 |
| **Density (kg/m³)** | 1430 | 1750 | 1800 |
| **Quantity(kg) /m³** | 260 | 480 | 980 |

### DETERMINATION OF WATER CONTENT

Water/cement ratio = 0.45

Cement content = 260 kg/m³

Therefore, water content = 260*0.45

= 117 liters

### COMPRESSIVE STRENGTH TEST

We casted the 9 cubes of 100*100*100mm, using porous aggregates and nominal mix of M20 and tested them at 7 days, 28 days and 56 days simultaneously without curing. Testing results are given in a below result table.

| **Days** | 7 | 28 | 56 |
|---|---|---|---|
| **Average Compressive Strength** | 17.17 | 18.67 | 19.67 |
| **Percentage Strength** | 86 | 93 | 98 |

## IV. RESULT ANALYSIS

Points to be noted while analyzing the result of compressive strength of self-curing concrete

- At 7 days, while conventional concrete achieve its 65% strength, self-curing concrete achieve 86% strength.
- At 28 days, 7% loss in desired strength of concrete is noted.
- At 56 days, self-curing concrete achieves 98% of its desired strength.

## V. CONCLUSION

The study shows that, use of reddish brown colored, rough textured, angular, porous aggregate in self-curing concrete shows considerable increase in gain of strength at early age. But, at that time minor decrease in gain of strength is shown in later age at 28 and 56 days without curing. However, this minor deficiency in strength can be neglected by using some kind of water retaining admixtures.

## VI. REFERENCES


[1]. Riyaz Ahamed, Pradeep Kumar A., Durai Priyadarshani, Kalaivani K., Kingsta Beautlin. "Experimental Study on Self-Curing Concrete using Sodium Lignosulphonate", International journal of Emerging Technologies and Engineering, Volume 2 Issue 4, April 2015, ISSN 2348-8050.

[2]. Basil M Joseph. "Studies on Properties of Self Curing Concrete using Polyethylene Glycol", IOSR Journal of Mechanical and Civil Engineering, e-ISSN: 2278-1684, p-ISSN: 2320-334X, PP 12-17.

[3]. Stella Evangeline. "Self-Curing Concrete and Its Inherent Properties", Stella Evangeline Int. Journal of Engineering Research and Applications, ISSN: 2248-9622, Volume 4, Issue 8 (Volume 7), August 2014, pp.66-71.

[4]. V. Revathy, C.J.Ganga Lakshmi. "Experimental Study on Self Curing Concrete with Flyash and Quarrydust", Civil Engineering Department, Sivanthi Adianar College of Engineering, Tamin Nadu, India.

[5]. K. Nithya, K. Ranjitha, P. Kumar. "Experimental Study on Self Curing Concrete", International Research Journal of Engineering and Technology, Volume: 04 Issue: 03, March-2017.

[6]. M. Pavan Kumar, Sunkara Pavan Ayyappa, G. T. Naidu. "An Experimental Study on Self Curing Concrete Using Liquid Paraffin Wax", International Journal of Research in Engineering

and Technology, e-ISSN: 2319-1163, pISSN: 2321-7308.

[7]. C. Selvamony, M. S. Ravikumar, S. U. Kannan and S. Basil Gnanappa. "Investigation on Self Compacted Self Curing Concrete Using Limestone Powder and Clinker", ARPN Journal of Engineering and Applied Sciences, Volume 5, March 2010.

[8]. S. Zhutovsky, K. Kovler, A. Bentur. "Assessment of Distance of Water Migration in Internal Curing of High Strength Concrete".