

Effect Of Curing Methods Of Various Sources Of Water On Concrete

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Abstract- This research investigated the effect of different sources of water on the compressive strength of concrete. Water samples from different sources of water were tested in the laboratory and studied the chemical characteristics of water from various sources of water. 15×15×15 PCC cube samples were cast of ratio (1 : 2.73 : 2.80). 10% and 20% of cement is replaced by fly ash. While mixing the concrete Super plasticizer was used as admixture named as FOSROC Auzamix 400. Suitability of a particular source of water for curing can be checked by casting concrete cubes using water and comparing its 7 days, 14 days and 28 days strength. Canal water, tap water and RO water was taken for curing. Submerged curing method adopted to evaluate the compressive strength of concrete. Cubes were investigated after subjecting them to curing conditions. Testing indicate that submerged curing method provide best results. Sources of water used in curing have a significant impact on the compressive strength on the resulting concrete. The result shows that RO water curing had the highest compressive strength. RO water curing was the best as compared to canal water and tap water. It was concluded that RO water could be used for curing because of canal water contains more hardness and chloride in the sample of water

Keywords- Compressive strength, concrete, effects of water quality parameters, Fly ash, Curing method.

I. INTRODUCTION

Water is an important ingredient of concrete. Part of water is utilized in the hydration of cement and the balanced water is required for imparting workability to concrete. Thus the quantity and quality of water is required to be looked into very carefully. The strength and durability of concrete is reduced due to the presence of chemical impurities in water. Most of the specifications recommended the use of potable water for making concrete. A practical solution would be tests for time of set and strength of concrete between the water under consideration and the water of proven quality.

To “cure” concrete is to provide concrete with adequate moisture and temperature to foster cement hydration for a sufficient period, of time.

Proper curing of concrete is crucial to obtain design strength and maximum durability, especially for concrete exposed to extreme environmental conditions at an early age. Others define curing as the process of controlling the rate and extent of moisture loss from concrete during cement hydration. High curing temperature (up to 212°F or 100°C) generally accelerates cement hydration and concrete strength gain at early age. Curing temperature below 50°F (10°C) are not desirable for early age strength development. When the curing temperature is below 14°F (-10°C) the cement hydration process may cease. Concrete needs to be kept for a longer time in formwork when cast in cold weather condition.

On the whole, the strength of concrete, its durability and other physical properties are affected by curing and application of the various types as it relates to the prevailing weather condition in a particular locality, as curing is only one of many requirements for concrete production, it is important to study the effect of different curing method which best adapts to each individual casting process. This study presents the effects of different curing methods on the compressive strength of concrete cured for 7, 14, 21 and 28 days.

3. EXPERIMENTAL INVESTIGATION

Materials Used

Various materials that have been used for the purpose of this project can be mainly enlisted in following manner.

- Cement
- Coarse Aggregate
- Fine Aggregate

Test on Concrete

Title : Determination of standard consistency of a given sample of cement. Objective: To determine the normal consistency of the given sample of cement. Theory: For finding out initial setting time, final setting time & soundness of cement, and strength a parameter known as standard

consistency has to be used. The standard consistency of a cement paste is defined as that consistency which will permit a Vicat plunger having 10mm diameter and 50mm length to penetrate to a depth of 33-35mm rod the top of the mould.
 Observation Table of Standard Consistency Test

Sr.No.	Weight of Cement (g)	Percentage of Water of Cement (%)	Amount of dry of water added (ml)	Penetration (mm)
1	200	28	140	13
2	200	30	150	10
3	200	32	160	6

Setting Time Test

Title :Determination of setting time of standard cement paste.
 Objective :To determine the initial setting and final setting time of a given sample of cement.

Observation Table of Setting Time Test

Type of setting	Setting Time (min)	Penetration from Top (mm)
Initial	30	5
Final	600	0

Slump cone test

Objective: To determine the workability of freshly mixed concrete by the use of slump test. Reference: IS: 7320-1974, IS: 1199-1959, SP: 23-1982. Apparatus: Slump cone, tamping rod, metallic sheet, weighing machine and scale.
 Material: Cement, sand, aggregate and water

Observations of Slump cone test

W/C ratio	0.5
Slump Value	110

Test on coarse aggregate

Title :To determine the water absorption of coarse aggregate.
 Theory: Water absorption of aggregate is the percentage of water absorbed by aggregate by its dry weight.

Apparatus:-Weighing balance, 16mm diameter tamping rod, cylindrical metal measure, twodry soft absorbent cloths, shallow tray, stainless steel container.

Procedure

IV. RESULT

Compressive Strength Test

Table represents the compressive strength of concrete mix with and without fly ash, where M1 is 0% fly ash replaced with cement i.e. is conventional mix, M2 with 10% of fly ash replaced, M3 with 20% of fly ash replaced with cement. Graphical representations of compressive strength of mix for 7, 14 and 28 days.

M1 mix of W/C Ratio 0.45 After curing

Type of water	7 days (N/mm ²)	14 days (N/mm ²)	28 days (N/mm ²)
Ro Water	52	54	60
Tap water	36	39	43
Canal water	34	36	40

Compressive Strength

M2 mix of 10 % of fly ash after curing

Type of water	7 days (N/mm ²)	14 days (N/mm ²)	28 days (N/mm ²)
RO water	42	45	52
Tap water	31	36	42
canal water	28	31	39.5

M3 mix of 20 % of fly ash after curing

Type of water	7 days (N/mm ²)	14 days (N/mm ²)	28 days (N/mm ²)
RO water	46	51	55
Tap water	38	42	47
Canal water	32	37	42

Hardness test results

Table : Hardness test results

RO water	202.11 mg/l
Well water	265 mg/l
Canal water	4300 mg/l

[13] IS:7320-1974, Indian standard code for specifications for slump cone t

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