

STUDY ON SELF CURING CONCRETE USING LIQUID PARAFFIN WAX AS EXTERNAL AGENT

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ABSTRACT: Concrete is most widely used construction material due to its good compressive strength and durability. Curing plays a major role in developing the concrete microstructure and pore structure. Curing is the process of maintaining proper moisture content particularly within 28 days to promote optimum cement hydration immediately after placement. Good curing is not possible in most of the cases such as vertical members, human errors, places where there is scarcity of water, In such conditions self curing concrete is very adaptable. One of the techniques of self curing concrete is by using Hydrophilic materials (water loving, such compounds have an affinity to water and are usually charged or have polar side groups to their structure that will attract water).

INTRODUCTION:

Commonly available Hydrophilic materials are Polyethylene Glycol, Paraffin Wax, Acrylic acid. The use of Hydrophilic materials minimizes the loss of water from the concrete and helps in continuous curing of concrete. In this study, considered grade of concrete is M40. The effect of variation in strength parameters i.e., Compressive Strength, Split Tensile Strength and Flexural Strength were studied with Liquid Paraffin Wax (self curing agent) (0.1% weight of cement) and compared with that of conventional cured concrete. The admixture Conplast SP430 was added (0.3% weight of cement). The design mix proportion was 1:1.45:2.95.

Self Curing Concrete (SCUC):

- Self curing concrete is one of the special concretes in mitigating insufficient curing due to human negligence, scarcity of water in arid areas, inaccessibility of structures in difficult terrains and in areas where the presence of fluorides in water will badly affect the characteristics of concrete.
- The concept of self curing agents is to reduce the water evaporation from concrete and hence increase the water retention capacity of the concrete compared to conventional concrete.
- It was found that Hydrophilic materials (water loving. Such compounds have an affinity to water and are usually charged or have polar side groups to their structure that will attract water) such as Polyethylene Glycol, Paraffin wax, or Acrylic acid can be used as self curing agents in concrete.

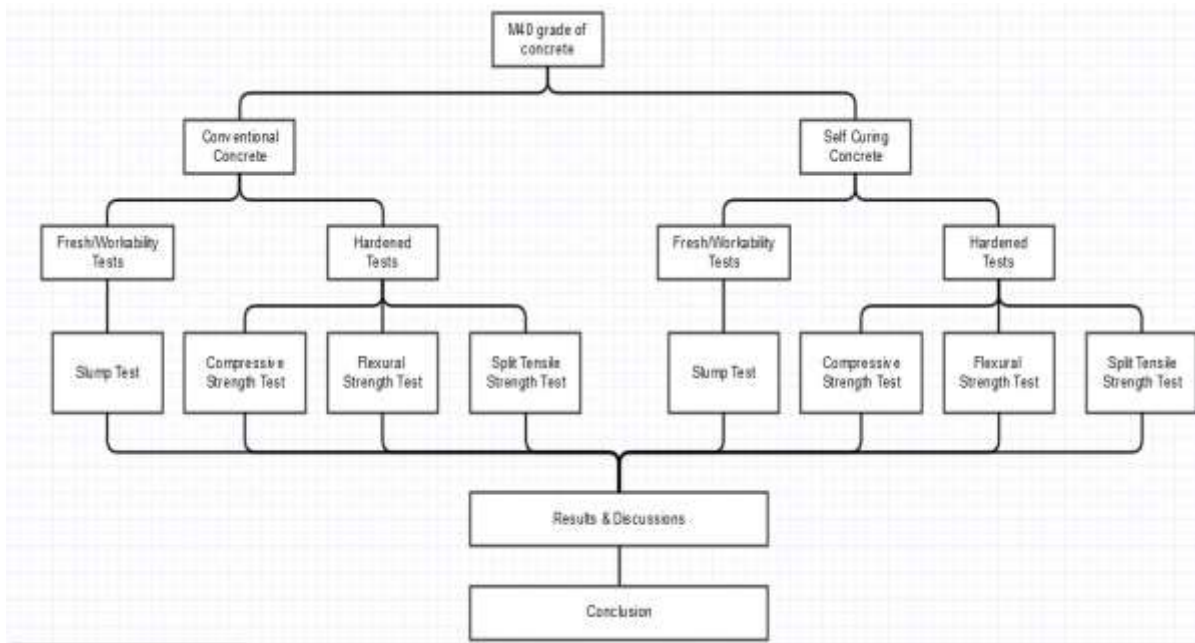
Need of Self Curing:

Conventional curing is not possible in the following cases:-

- For the vertical member
- In the places where there is scarcity of water such as Hill top etc.,
- In the places where manual curing is not possible

In such cases, it may lead to the formation of crack in the member and hence affects strength and durability.

Flow chart of experimental programme:



Experimental Program:

- To study the strength characteristics such as compressive strength, flexural strength, split tensile strength for M40 grade of concrete.
- Total 18 cubes were casted with dosage of 0.1% of self curing agent (liquid paraffin wax) under indoor and water curing conditions. Compressive strength test was conducted after 7, 14 and 28 days of curing.
- Total 18 cylinders were casted with dosage of 0.1% of self curing agent (liquid paraffin wax) under indoor and water curing conditions. Split tensile strength test was conducted after 7, 14 and 28 days of curing.
- Total 18 prisms were casted with dosage of 0.1% of self curing agent (liquid paraffin wax) under indoor and water curing conditions. Flexural strength test was conducted after 7, 14 and 28 days of curing.
- The graphs plotted between strength (compressive strength, flexural strength, split tensile strength) and days of curing.

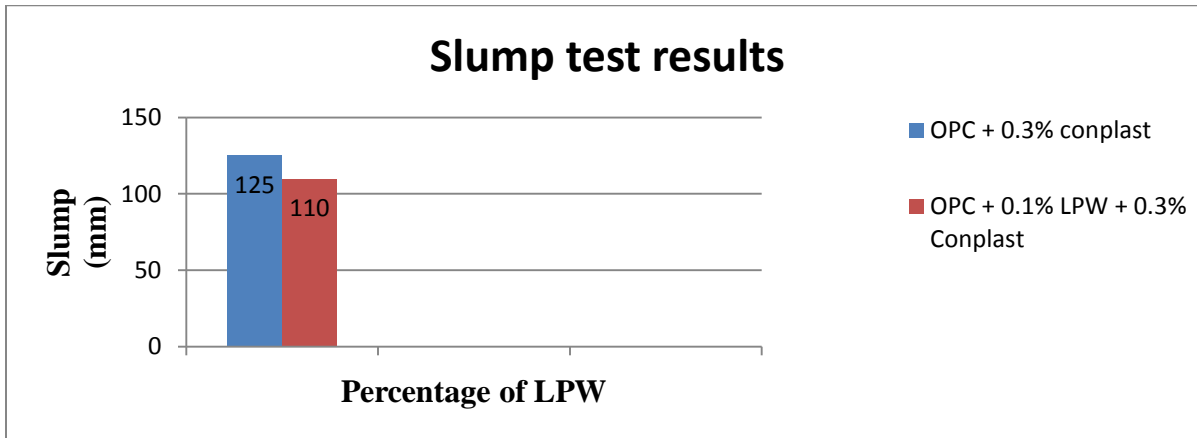
Mix proportion:

Water	Cement	Fine Aggregate	Coarse Aggregate (60% + 40%)
167.4	418.50	607.83	1235.98 (741.59+494.39)
0.40	1.00	1.45	2.95

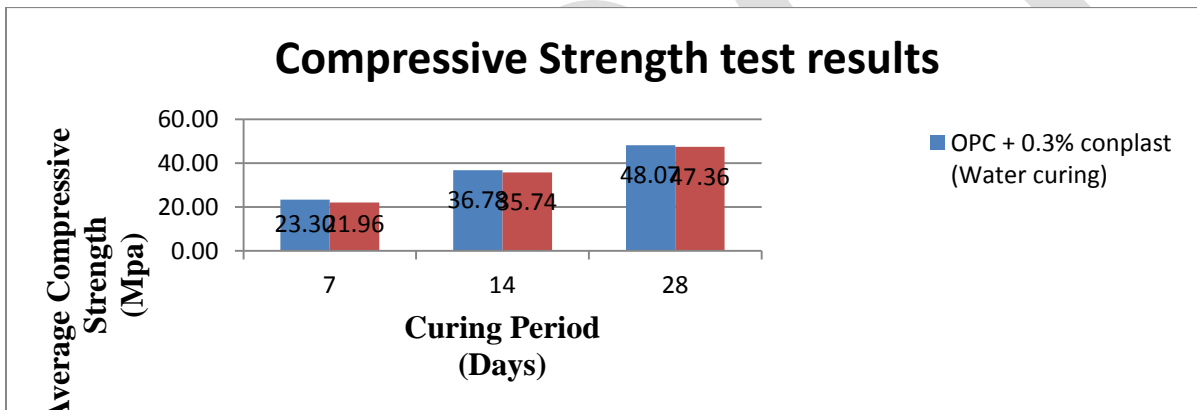
Hence for 1 Cum of Concrete

Cement	418.50 Kg
Water	167.40 Kg
Fine Aggregate	607.83 Kg
Coarse Aggregate	1235.98 Kg
20 mm	741.59 Kg
10mm	494.39 Kg
Paraffin wax (0.1% by weight of cement)	0.42 Kg
Conplast SP430 (0.3% by weight of cement)	1.26 Kg

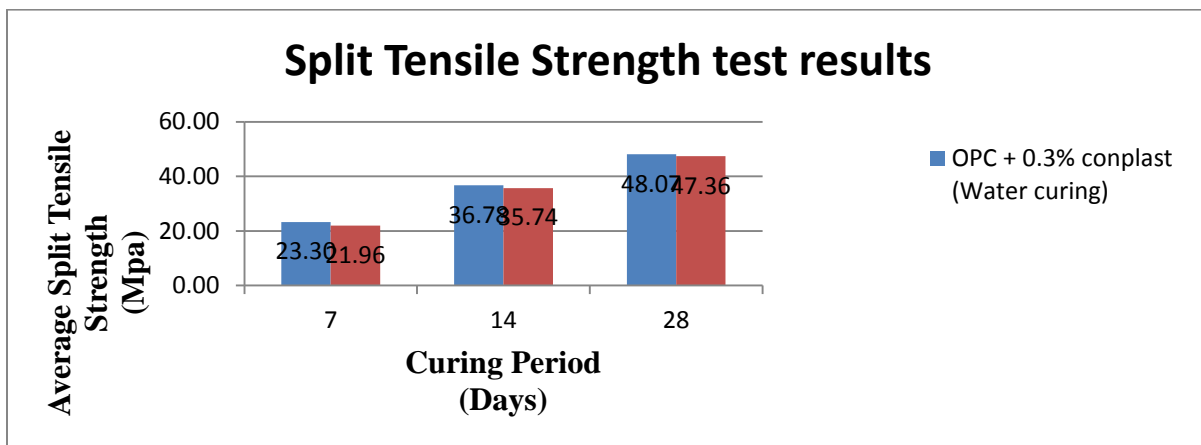
TEST RESULTS:



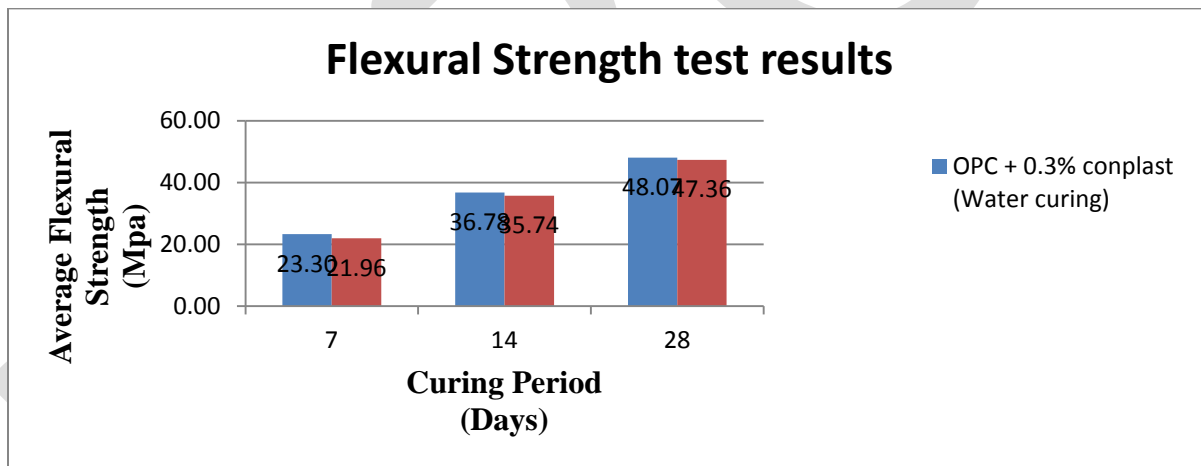
- From the above graph, observed that there was a decrease in the percent of slump of 12 % in self curing concrete when compared to conventional concrete.



- From the above graph, observed that there was reduction in compressive strength of self curing concrete (air curing) of 5.75% when compared to conventional concrete (water curing) at 7 days.
- From the above graph, observed that there was reduction in compressive strength of self curing concrete (air curing) of 2.83% when compared to conventional concrete (water curing) at 14 days.
- From the above graph, observed that there was reduction in compressive strength of self curing concrete (air curing) of 1.48% when compared to conventional concrete (water curing) at 28 days



- From the above graph, observed that there was reduction in split tensile strength of self curing concrete (air curing) of 7.33% when compared to conventional concrete (water curing) at 7 days.
- From the above graph, observed that there was reduction in split tensile strength of self curing concrete (air curing) of 9.49% when compared to conventional concrete (water curing) at 14 days.
- From the above graph, observed that there was reduction in split tensile strength of self curing concrete (air curing) of 6.19% when compared to conventional concrete (water curing) at 28 days



- From the above graph, observed that there was reduction in Flexural strength of self curing concrete (air curing) of 1.41% when compared to conventional concrete (water curing) at 7 days.
- From the above graph, observed that there was reduction in Flexural strength of self curing concrete (air curing) of 1.03% when compared to conventional concrete (water curing) at 14 days.
- From the above graph, observed that there was reduction in Flexural strength of self curing concrete (air curing) of 2.02% when compared to conventional concrete (water curing) at 28 days.

Conclusions:

- The slump of Self Curing Concrete was decreased by 12% when compared to conventional concrete.
- The compressive strength of Self curing concrete decreased by 1.48% when compared to Conventional concrete.
- The split tensile strength of Self curing concrete decreased by 6.19% when compared to Conventional concrete.
- The flexural strength of Self curing concrete decreased by 2.02% when compared to Conventional concrete.
- Strength of Self curing concrete is on par with conventional concrete.

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