

“A Review Paper on Self Curing Concrete: A study of various self-curing agents”

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Abstract

Concrete is a mixture of cement, coarse-aggregates, fine aggregates and water with or without admixtures. It got strength by hydration process. To continue hydration, the relative humidity inside the concrete should be 80%. For maintain moisture, curing is needed.

Curing is supply of water from outside(External Curing) or from inside (with help of any moisture containing agent i.e. Self-Curing).

In this study, we review some previously published papers on self-curing concrete to find out suitable moisture retaining agents and some other admixtures to improve moisture holding capacity of concrete. The effect of self-curing agents on compressive strength is also reviewed.

Key words: Self-curing concrete, curing, compressive strength, PEG-400, Split tensile strength, PVA, Pre-saturated sawdust, PEG-600, Steel fibers.

Introduction

As the name suggests a self-curing concrete is one that not need supply of external curing after placing of concrete for maintaining optimum moisture level.

In formation of self-curing concrete, some additives rich in moisture holding properties are mix in concrete. The presence of these materials, even in very small amount improves the internal moisture of concrete.

Literature Review

C. Agalya and Dr. G. Dhanalakshmi[Feb-2018] had applied shrinkage reducing admixture polyethylene glycol-PEG 400 and steel fibers. The PEG-400 varies from 1%, 1.5% and 2% and the steel fibers 2% added in concrete compared with the conventional mix.

28 days compressive strength of M-20 mix samples for proportions 1% ,1.5% and 2% adding of Polyethylene Glycol-400 and 2% of Steel fiber were 21.67 N/mm², 24.94 N/mm² and 23.18 N/mm².

28 days flexural strength of these samples comes out to be 4.86 N/mm², 5.38 N/mm² and 4.93 N/mm² accordingly.

Iftikhar Azim, Bazid Khan , Shams-Ul-Islam and Sikandar Hayat Sajid [April-2015], in this used pre-saturated sawdust as a source of internal curing by partially replacing sand. Pre-saturated sawdust is used to replace fine aggregate at three replacement levels of 5% (Sample S1), 10% (Sample S2) and 15% (Sample S3) by mass respectively for M-30 mix.

The 7 days compressive strength of sample S2 and S3 got decreased by 51.16% and 50.56% as compared with conventional concrete. While sample S1 got increased value by 27.57 % as compared to conventional one.

Karthick R and Amrin Sulthana I. [March-2018] examine with Sodium Polyacrylate (SAP) as an internal curing agent in proportion 0.4% of weight of cement with Paraffin wax as a membrane coating in the experiment for M-20 concrete mix.

The compressive strength of sample with 0.4% SAP and without Paraffin coating obtain 15.13 N/mm² (07 days) and 22.42 N/mm² (28 days) as compare to 14.05 N/mm² (07 days), 23.87 N/mm² (28 days) for conventional concrete.

While, The compressive strength of sample with 0.4% SAP and with Paraffin coating obtain 11.58 N/mm² (07 days) and 19.02 N/mm² as compare to 14.05 N/mm² (07 days) , 23.87 N/mm² (28 days) for conventional concrete.

Vaseem Akram.N and Balachandiran.P [March-2018] formed self-curing concrete by using polyvinyl alcohol at a rate of 0%, 0.5%, 1%, 1.5% and 2% by weight of cement for M-30 design mix.

Compressive strengths of samples with proportion of PVA 0%, 0.5%, 1%, 1.5% and 2% are 20.7 N/mm², 19.45 N/mm², 20.73 N/mm², 21.23 N/mm² and 20.54 N/mm² (07 days) & 31.45 N/mm², 30.21 N/mm², 31.55 N/mm², 32.42 N/mm² and 31.13 N/mm² (28 days) respectively.

Dr. Sundararaman, S. and Azhagarsamy, S., examine M-20 grade of concrete they added 0.5%, 1%, 1.5% and 2% of **PEG-600** as admixture at the age of 3, 7 and 28 days.

They found that for compressive strength of 37.77 MPa and split tensile strength 12.88 MPa for 1% of PEG-600 was obtained at the end of 28 days.

Riyaz Ahmaed. K, Pradeep Kumar. A, Durai Priyadarshini, Kalaivani. and Kingsta Beautin. M, in this experiment took sodium lignosulphonate as self-curing agent with different percentage of (0.5%,1%,1.5%,2%,2.5%,3%) for 7,14,28 days and tested for compressive strength the mix designed for M20 grade of concrete.

By comparing with conventional concrete the best result for compressive strength with adding 0.5% of sodium lignosulphonate was 6.25% increased.

Conclusion

After going through by above research papers, following results can be obtained:

1. Self-curing concrete can be a method for solving the difficulties faced with curing.
2. Self-curing concrete is the best solution for curing in desert area where the availability of water is very less or not available.
3. Pre-saturated sawdust can be used as a self-curing agent for self-curing concrete.
4. Some important and popular self-curing agents are -
 - Polyethylene glycol -400
 - Polyethylene glycol -600
 - Sodium lignosulp,
 - Sodium Polyacrylate(SAP)
 - Polyvinyl alcohol

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