A Review Paper on Self Curing Concrete

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Abstract - *Use of self-curing concrete is done according to different needs and goals; it helps if water is not available near places of construction area or with expensive spending of money can provide water for curing; Self-curing concrete help for speed in construction work and having an economical project. As it is very important topic, many researchers have trying to develop it with different methods and techniques and after many studies and investigations It has been found that they used different material for having good results, some important materials which had acceptable results is super absorbent polymer, light weight aggregate, wood powder, polyethylene glycol 400 or 600 and other shrinkage reducing admixtures.*

***Key Words*: self-curing concrete, polyethylene glycol, wood powder, light weight aggregate, super absorbent polymer**

1.INTRODUCTION

For good performance and durability of concrete, curing is essential. Conventional curing also called external curing and internal curing is often referred to as "self-curing concrete". Internal curing has attracted more attentions because after casting concrete it brings very facility to construction work. Self-curing provides additional moisture in concrete for having good performance and durability. By comparing with conventional concrete the self-curing concrete reduce the water evaporation from concrete and increase the retention capacity of concrete and also it prevents early age cracking. Self-curing is vital for desert area where the availability of water is very less or not available so it can help to have an economical construction. There are different chemical and mineral admixtures with different properties are added in self-curing for minimizing the using of water in concrete.

2. MATERIALS

As per studying and review of many research papers, here will explain some important materials that had efficient result for utilizing in self curing concrete.

2.1 Cement

Cement is manufactured through a closely controlled chemical combination of calcium, silicon, aluminum, iron and other ingredients.

2.2 Polyethylene glycol (PEG)

Polyethylene glycol is a polyether compound with many applications from industrial manufacturing to medicine. PEG is also known as polyethylene oxide (PEO) or poly oxy ethylene (POE), depending on its molecular weight. The structure of PEG is commonly expressed as $H-(O-CH_2-CH_2)_n-OH$.

2.3 Super absorbent polymers

Super absorbent polymers are cross-linked hydrophilic polymers which can retain absorbed water under pressure due to an equilibrium balance of dissolution and thermodynamically favored expansion of polymer chains constrained by cross-linking structure.

2.4 Light weight aggregate

Light weight aggregate is the generic name of a group of aggregates having a relative density lower than normal density aggregates (natural sand, gravel and crushed stone), sometimes and is referred to as low density aggregate.

2.5 Wood powder

Wood powder is a byproduct from furniture and lumber mills. In a mosquito coil, it is compressed to create the structure of the coil, which is then infused with the active ingredient.

2.6 Shrinkage reducing admixtures

Shrinkage reducing admixtures Are added during batching can significantly decrease both the early and long-term during shrinkage. This is achieved by treating the cause of drying shrinkage within the capillaries and pores of the cement paste.

3. REVIEW OF LITERATURE

Azhagarsamy S and Sundararaman S, studied about compressive and split tensile strength of M25 grade concrete mix for 0.5%,1%,1.5% and 2% PEG-400 at the age of 3,7 and 28 days. The result for 0.5% PEG-400 the compressive strength showed an increasing of 18.76, 32.6 and 44.5 N/mm^2, by using of 1% and 1.5% of PEG-400 the maximum value obtained at the end of 28 days for 1% and 1.5% was 47.8 and 43.1 N/mm^2, 2% of PEG-400 showed a decreasing

trend in the compressive strength at the end of 3,7 and 28 days the compressive strength observed at the end of 28days for 2% of PEG-400 is 38.3N/mm^2, split tensile strength at the end of 3,7 and 28 days for 0.5% PEG-400 showed the increasing value of 1.76, 2.84 and 5.09 N/mm^2, result for tensile strength for adding 1% and 1.5% PEG-400 in 28days was 5.16 and 4.72 N/mm^2,with 2% showed decreasing trend in the split ensile strength at the end of 3,7 and 28 days ; for 2% in 28days was 4.35 N/mm^2.

M.Priya, S.Ranjitha, R.Tamil Elakkiya, in this investigated on self-curing concrete by adding of super absorbent polymer, PEG admixtures with 2%,4% and 6% of wood powder. Obtained result for 2% and 4% of wood powder compare to conventional concrete was found low compressive strength but 6% of wood powder compare to conventional concrete is high compressive strength.

Dr.Sundararaman, S. and Azhagarsamy, S., in their studies in M20 grade of concert they added 0.5%, 1%,1.5%and2% of PEG-600 as admixture at the age of 3,7and28days, it found that for compressive strength of 37.77MPa and split tensile strength 12.88MPa for 1% of PEG-600 was obtained at the end of 28 days and this result was very comparable to compressive and split ensile strength.

Magda I. Mousa, Mohamed G. Mahdy, Ahmed H. Abdel-Reheem, Akram Z. Yehia, investigated about physical properties of self-curing concrete. The first used type is pre-soaked lightweight aggregate with different percentage of 0.0%,10%,15% and 20% of volume of sand, second used type is a chemical agent of polyethylene glycol with different percentage of 1%,2% and 3% weight of cement. three cement content 300, 400, and 500 kg/m^3. Three different water cement ratios 0.5, 0.4 and 0.3 and two magnitudes of silica fume as pozzolanice additive 0.0% and 15% of cement weight, at different ages up to 28days. Result show that use of PEG improves the physical properties of concrete. 15% of light weight aggregate was effective while 20% saturated light weight aggregate was effective for permeability and mass loss but adversely volumetric water absorption. PEG was more effective than light weight aggregate. In all cases 2% PEG and 15% light weight aggregate were optimum values. Higher cement content or lower water cement ratio had more effective results and adding silica fume into concrete increase all physical properties.

M.Vidhya, S. Gobhiga and K. Rubini, in this paper investigated the fresh and hardened properties of concrete by adding 15% silica fume instead of cement, extract from Calotropis Gigantea and Cypress tree bark. Calotropis Gigantea started from 0.2% to 0.4% with gradual increase of 0.1%. 15% extract water of cypress bark used instead of mixing water. Good result from 0.4% Calotropis Gigantea, 15% and Cypress tree bark and 15% silica fume at the age of 7day and 28days is greater than the conventional concrete.

Riyaz Ahmaed. K, Pradeep Kumar. A, Durai Priyadarshini, Kalaivani. K, Kingsta Beautin. M, In this paper used sodium lignosulphonate as self-curing agent with different percentage of (0.5%,1%,1.5%,2%,2.5%,3%) for 7,14,28days and tested for compressive strength and split tensile 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 and for split tensile strength 2.5% increased.

4. CONCLUSION

- As a self-curing agent the polyethylene glycol -400 or polyethylene glycol -600 is a good admixture and by adding of 1% of this admixture for M25 and M20 grade of concrete it had good result but adding 2% of polyethylene glycol decreased strength of concrete.
- From studying of many papers it found that strength of self-curing concrete is more than conventional concrete.
- We can use wood powder as self-curing agent.
- Self-curing concrete is the way for solving the difficulty faced with curing.
- Self-curing concrete is the best answer for desert area where the availability of water is very less or not available.

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REFERENCES

[1]. Azhagarsamy S and Sundararaman S, "A Study on Strength and Durability of Self Curing Concrete Using Polyethylene Glycol-400", international journal of civil engineering and concrete structure, Vol. 1, No. 2, July 2016, ISSN 2455-7714

[2]. M.Priya, S.Ranjitha, R.Tamil Elakkiya, "self-curing", international journal seventh sense research group,ICCREST-2016,E-ISSN:2348-8352

[3]. Dr.Sundararaman, S. and Azhagarsamy, S., "Experimental Investigation on Strength Properties of Self Curing Concrete Using Polyethylene Glycol-600", international journal of current research , vol.8, june 2016, issue 06,pp.33296-33298

[4]. Magda I. Mousa, Mohamed G. Mahdy, Ahmed H. Abdel-Reheem, Akram Z. Yehia, "Physical Properties of Self Curing

Concrete(SCUC)", housing and building national research center, 18-may-2014.

[5]. M.Vidhya, S. Gobhiga and K. Rubini, "Experimental Study on Self Curing Concrete Using Biomaterials as Admixture", international journal of engineering research and modern education, ISSN:2555-4200, April-2017

[6]. Riyaz Ahmaed. K, Pradeep Kumar. A, Durai Priyadarshini, Kalaivani. K, Kingsta Beautin. M, "Experimental Study on Self Curing Concrete Using Sodium Lignosulphonate", international journal of emerging technologies and engineering, vol2 issue4, ISSN 2348-8050, April-2015