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Investigation review of Self Curing Concrete experiment results

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Abstract - *A Concrete is import material in construction industry. In current days 95% structures was constructed in Reinforce Concrete Construction. Now it very difficult to avoid concrete also important to maintained their properties as per structural requirement. To gain desire properties of concrete curing is important aspect to achieve physical properties and durability aspects. Any carelessness in curing will hamper in the strength and durability of concrete. To avoid this study is investigating detail studies self curing concrete using lightweight aggregates (LECA), Polyethylene-glycol and Silica fume. To study physical properties and durability aspects of self concrete done in experiments with different variations. The study results show improvement in physical and durability properties of concrete. It is also observer improvement in studies by use of Silica fumes as additional filler of concrete.*

Key Words: Self-curing concrete; internal curing; Leca; Polyethylene-glycol; Silica fume …

1. INTRODUCTION

The concrete industries face new challenges on daily basis. Manufacturing of concrete with more verities to fullfill structural requirement to achieve all properties is important aspect with any issues on main concern. However concrete made with locally available material and without compromising any properties of concrete. The curing of concrete is important to justify physical and durability aspects of concrete. In normal curing concrete is cure from outside surface after mixing placing and finishing. In self curing concrete lead to give that can be cured to provide additional moisture is concrete to maintained water this help complete hydration process. The concept of self curing agents is to reduce the water evaporation from concrete and hence increase. In current days water scarcity is increasing in all parts of India and effecting construction industry. Use of maximum water for curing should avoid saving water by looking alternative techniques as self curing concrete

1.1 Scope of Research

B The intend of this research is to evaluate the effects of self-curing admixture such as pre-soaked lightweight aggregate (leca) and polyethylene-glycol with different ratios on the physical

1.2 Objective of Study

The objective of this research to find detail investigation of concrete properties such as volumetric water absorption, water permeability water sorptivity and mass loss) for concretes containing different cement contents, different self curing concrete, different water cement ratio and different contain of silica fumes.

2. Mechanism of Internal Curing

Constant evaporation of moisture takes place from an exposed surface due to the difference in chemical potentials (free energy) between the vapors and liquid phases. The polymers added in the mix mainly form hydrogen bonds with water molecules and reduce the chemical potential of the molecules which in turn reduces the vapors pressure, thus reducing the rate of evaporation from the surface

3. Material Use as Self Curing

Polyethylene-Glycol(PEG): Polyethylene glycol is produced by the interaction of ethylene oxide with water, ethylene glycol, or ethylene glycol oligomers The reaction is catalyzed by acidic or basic catalysts. It is used as water reducing agent. Lightweight aggregate is a type of coarse aggregate that is used in the production of lightweight concrete. The Standard

Industrial Classification (SIC) code for lightweight aggregate manufacturing is 3295; there currently is no Source Classification Code (SCC) for the industry.

4. Literature Review

Magda I. Mousa , Mohamed G. Mahdy , Ahmed H. Abdel-Reheem ,Akram Z. Yehia had published paper in HBRC Journal on "Physical properties of self-curing concrete (SCUC)"[1] This paper authors are done full investigation of physical properties of self curing concrete. In paper we found comparative study to two different self curing compounds with respect to get optimal performance of concrete. First combination are use as Pre-soaked lightweight aggregate (leca) with different ratios; 0.0%, 10%, 15% and 20% of volume of sand. Further to this second parameters are chemical agent of polyethylene-glycol (Ch.) with different percentages 1%, 2% and 3% of weight of cement. Even more over experiment done on three different cement contain (300, 400 and 500 kg/m3), and three different water cement ratio (0.5, 0.4, and 0.3). Silica fuel is also in use to compete study on Self curing concrete. All

physical properties are evaluated up to 28 days ages. The concrete spacemen kept in temperature 25 C for 28days.
In internal curing method additional internal water is to be supplied via saturated lightweight aggregates or in case of polyethylene glycol causes reduction of the surface tension which helps to increases the water retention capacity of the concrete. The internal curing helps immediate for initial hydration of concrete which found good results in early days strength results. Internal curing is also beneficial in concrete where low water cement ratio is defined to maintain.

Material use in this experiment was ordinary Portland cement with specific weight 3.12 g/cm3, specific surface 3000 cm2/g and silica fume are widely available in Egypt in powder form with silica (SiO2) of 95%, siliceous sand as a fine aggregate (with fineness modulus of 2.79), and gravel as a coarse aggregate of nominal maximum size (20 mm) from Suez quarry were used. The super plasticizer (SP.) used was conplast 430, which is of the sulphated naphthalene formaldehyde condensate type. Mixing of concrete components was achieved by using a horizontal mixer. All the dry constituents were placed in the mixer and mixed for 2 min to ensure uniformity of the mix. Half of the mixing water was added gradually during mixing and followed by the remaining water with super plasticizer. Finally, self-curing agent such as polyethylene-glycol or saturated light weight aggregate (leca) was added gradually during mixing (in SCUC mixes). Mixing of all ingredients continued for a period of 2 min. After mixing spacemen are casted of 10 cm x 10 cm x 10 cum molds and 10 cum dia cylinders. The tests conducted in this paper are as follows

4.1 Volumetric water absorption

It was observe that volumetric water absorption was decrease as self curing agent Leaca increase in concrete up 15% which help to good water retentions which lead less pours and more compacted concrete also increase hydrations of cement smoothly. In case of polyethylene glycol relative to conventional concrete during the experiment, where after 28 days concrete with 1%, 2% and 3% Ch. decreased by about 8.2%, 18.4% and 14.3%, respectively, compared with 0.0% (conventional concrete) to confirm that 2% Ch. is the optimum ratio. Increasing cement content from 300 kg/m3 to 400 kg/m3 in concrete caused significant decrease in volumetric water absorption, Use of silica fumes help to reduction of pours and capillaries to increase volumetric water abortions in experiment.

4.2 Water permeability:

The water permeability of concretes containing leca (SCUC) or conventional concrete decreases with time at 28 days 10%, 15% and 20% leca content caused less water permeability by about 36%, 35% and 30%, respectively, compared with conventional concrete where no leca is used. Concrete with polyethylene glycol 1%, 2% and 3% is decreased by about 36%, 42% and 41%, respectively, compared to conventional concrete. Reducing water–cement ratio from 0.5 to 0.4 and 0.3 causes significant less water permeability by about 19.4% and 31%, respectively, after 28 days and cement content of 400 and 500 kg/m3 exhibits sharp reduction in water permeability by about 62.4% and 90% respectively relative to the mix with cement content of 300 kg/m3 after 28 days.

4.3 Water sorptivity:

In this paper At 28 day's age, the concrete with 10% and 15% leca gives lower water sorptivity by about 17.5% and 10.6% respectively, while 20% leca gives 6.3% increment relative to conventional concrete. Self-curing concretes with polyethylene glycol of 1%, 2% and 3%. Show lower water sorptivity by about 3.2%, 25% and 18.8%, respectively, relative to conventional concrete. Reducing water–cement ratio in concrete from 0.5 to 0.4 and 0.3 causes lower water sorptivity by about 16.8% and 36.8, respectively, after 28 days.

4.4 Mass loss:

It is found that 10% saturated leca as self-curing agent in concrete, leads to a minor reduction in mass loss especially at early ages with reference to conventional concrete. It is also found increasing polyethylene glycol ratio increase mass loss also at 2% of polyethylene glycol given optimization identification. It is also observe higher cement contain lead more heat of hydration and lead to mass loss of concrete.

5. CONCLUSIONS

In this paper authors and investigated and concluded that The use of self-curing agent (saturated leca) and polyethylene glycol on 15% and 2% respectively increase physical properties of concrete with compare to conventional curing. In addition of further silica fumes as pozzolanic admixture in self curing concrete increase physical properties not only pozzolanic reaction but also due to its better water retention, water–cement ratios; 0.5, 0.4 and 0.3, and silica fume ratios A conclusion section must be included and should indicate clearly the advantages, limitations, and possible applications of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

REFERENCES

[1] R.K. Dhir, P.C. Hewlett, J.S. Lota, T.D. Dyre, An investigationinto the feasibility of formulating self-curing concrete, Mater.Struct. 27 (1994) 606–615..

[2] D.P. Bentz, P. Lura, J.W. Roberts, Mixture proportioning forinternal curing, Concr. Int. 27 (2005) 35–40..

[3] M Ozaki, Y. Adachi, Y. Iwahori, and N. Ishii, Application of fuzzy theory to writer recognition of Chinese characters, International Journal of Modelling and Simulation, 18(2), 1998, 112-116..

[4] Magda I. Mousa , Mohamed G. Mahdy , Ahmed H. Abdel-Reheem ,Akram Z. Yehia,(2015), "Physical properties of self-curing concrete (SCUC)", HBRC Journal (2015) 11: 167–175.

[5] Magda I. Mousa , Mohamed G. Mahdy , Ahmed H. Abdel-Reheem ,Akram Z. Yehia (2015), "Self-curing concrete types; water retention and durability", Alexandria Engineering Journal (2015) 54, 565–575.

[6] Mr. Hans Reinhardt and Dr Silvia Weber(1998)," Self cured high performance concrete", J. Mater. Civ. Eng., 1998, 10(4): 208-209.

[7] Gaston Espinoza-Hijazin, Álvaro Paul and Mauricio Lopez (2012), "Concrete Containing Natural Pozzolans New Challenges for Internal Curing" J. Mater. Civ. Eng., 2012, 24(8): 981-988.

[8] Mateusz Wyrzykowski, Pietro Lura , Francesco Pesavent, and Dariusz Gawin (2012)," Modeling of Water Migration during Internal Curing with Superabsorbent Polymers", J. Mater. Civ. Eng., 2012, 24(8): 1006-1016

[9] Ya Wei, Yaping Xiang,; and Qianqian Zhang,(2014)" Internal Curing Efficiency of Prewetted LWFAs on Concrete Humidity and Autogenous Shrinkage Development", J. Mater. Civ. Eng., 2014, 26(5): 947-954..