COMPARATIVE STUDY OF SELF CURING CONCRETE AND CONVENTIONAL CONCRETE

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Abstract— Today concert is widely used construction materials due to its good compressive strength and durability. Any laxity in curing will badly affect the strength and durability of concrete. Self curing concrete is one of the special concretes in mitigating insufficient curing due to human negligence paucity of water in arid areas, inaccessibility of structure in difficult terrains and in area where the presence of fluorides in water will badly affect the characteristics of concrete. the present study involves the use of shrinkage reducing admixture polyethylene glycol (PEG400) in concrete which helps in self curing and help for better hydration and hence strength. In this study the percentage of PEG 400 by weight of cement from 0% to 1.5% as the dosage of internal curing compound was mixed. The test result where studied both M20 and M25 mixes. It is found through this experiment study that PEG400 help in self curing by giving strength on par with that of the conventional curing method.

Index Terms— self curing concrete Polyethylene glycol PEG400.

I. INTRODUCTION

Concrete is the most widely used in construction material has several desirable properties like high compressive strength concrete, stiffness and durability under usual environmental factors. At the same time concrete is brittle and weak in tension. Plain concrete has two deficiencies, low tensile strength and a low strain at fracture. These shortcomings are generally overcome by reinforcing concrete. Normally reinforcement consists of continuous deformed steel bars or pre-stressing tendons. The advantage of reinforcing and pre-stressing technology utilizing steel reinforcement as high tensile steel wires have helped in overcoming the incapacity of concrete in tension but the ductility magnitude of compressive strength.

Concrete is prepared from a mixture of coarse and fine aggregates, Portland cement (PC), and water. Other additives such as fly ash and different types of admixtures such as air-entraining agents, accelerators, retarders, and plasticizers also may be used to improve the concrete's capabilities for workability and/or strength. Before concrete is produced, the components that make up concrete are tested for their qualitative performances. The aggregates for concrete are usually tested for gradation, hardness, specific gravity, absorption, and organic material impurities. PC usually is tested for consistency, initial and final set, soundness, and strength (with mortar). Water is tested at the source of supply for its purity and portability. Admixtures usually are considered acceptable on certification from the supply after mixing the components, fresh concrete is produced and transported to the field to be poured into its final place for hardening. Subsequently, a test for consistency, named the "slump test", is carried out on concrete samples. Excessive evaporation of water (internal or external) from fresh concrete should be avoided; otherwise, the degree of cement hydration would get lowered and thereby concrete may develop unsatisfactory properties. Curing operations should ensure that adequate amount of water is available for cement hydration to occur. This paper discusses different aspects of achieving optimum cure of concrete without the need for applying external curing methods.

II EXPERIMENTAL PROGRAMME

Materials

Cement - Portland pozzolana cement (PPC) was used for this study program; available in local market is used in the investigation. The cement conforming to various specifications as per of IS: 1489(part 1):1991 fly ash based. The specific gravity was 3 and the fineness was 3200 cm^2/gm.

Coarse aggregate -Crushed angular stone was used as coarse aggregate.

Fine aggregate The specific gravity 2.66and fineness modulus was 2.93 .bulking of sand 20%and silt content in sand is 1%

Polyethylene glycol (PEG 400) –Polyethylene glycol is a condensation polymer of ethylene oxide and water with the general formula H (OCH2CH2) nOH, where n is the average number of repeating ox ethylene groups typically from 4 to about 180. The abbreviation (PEG) is termed in combination with a numeric suffix which indicates the average molecular weights. It is water-soluble in nature.

Scope of Research

To study the strength properties of concrete made with curing compound i.e.polyethylene glycol as self curing agent with that of concrete made from conventional curing

Objectives

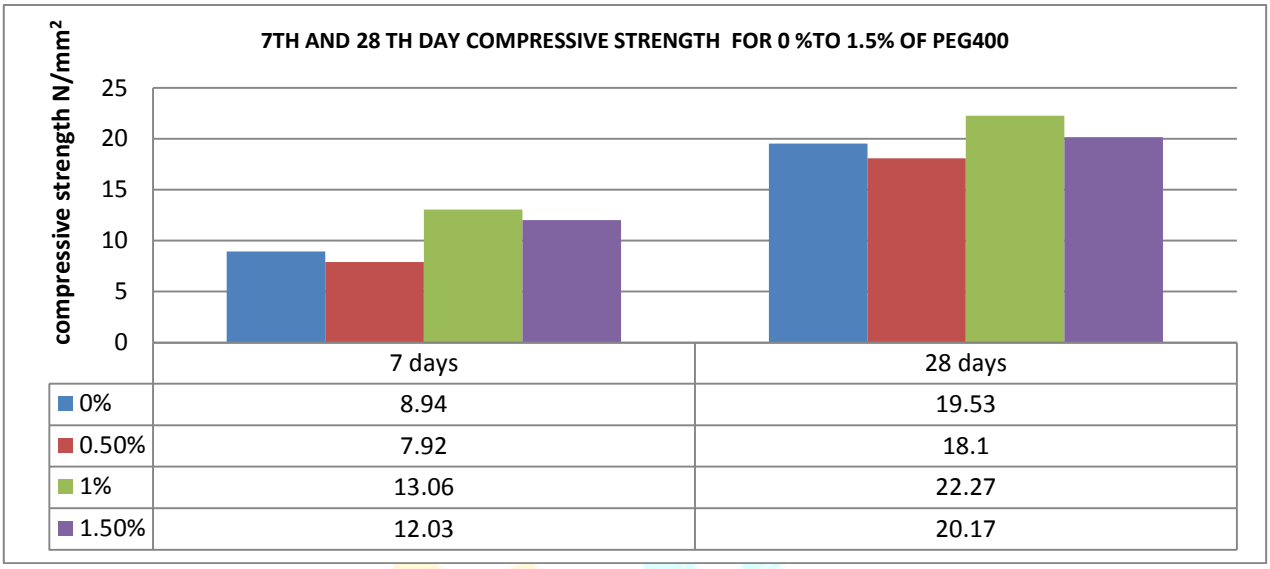
Following are the main objective of this study

1. To study the effect of self curing concrete varying the percentage of PEG400 from 0% to 1.5% by weight of cement forM20 and M25 grade of concrete and compare compressive strength with different % of PEG.
2. To study the compressive strength of conventional concrete with M20 and M25 grade of concrete
3. Finally compare the compressive strength of conventional concert and self curing concrete using PEG400

Methodology

1. Two grade of concrete has been selected for the research work M20 and M25.
2. Mix design of concrete to be done as per IS 10262-2009.
3. Testing of ingredients of concrete mix are carried out.

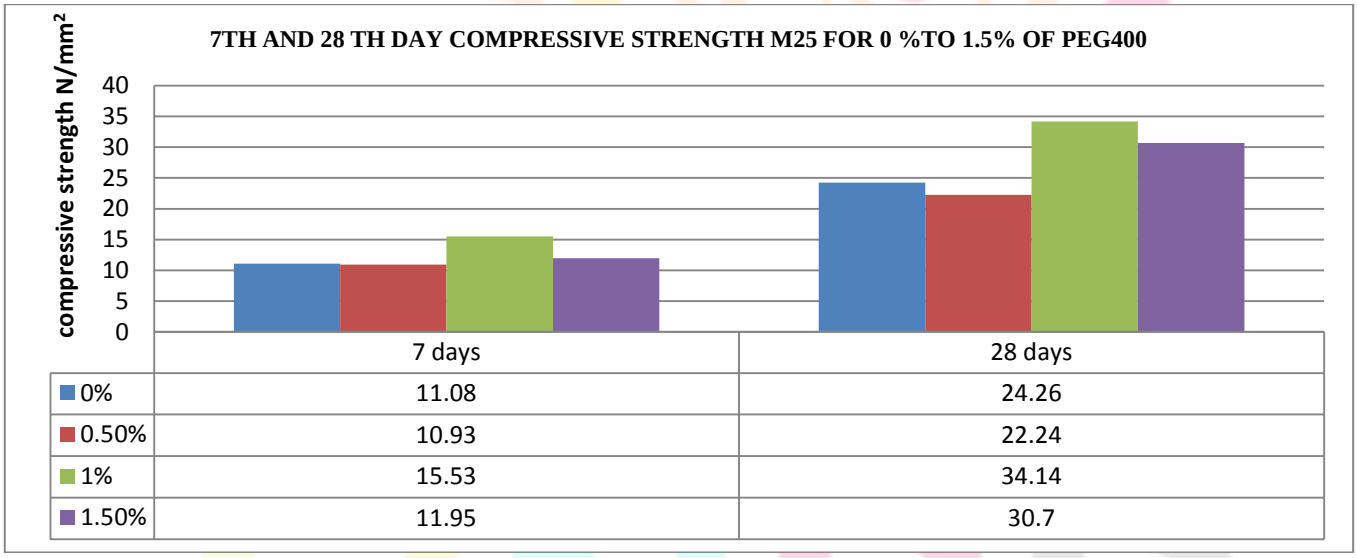
III.THE TEST RESULT AND DISCUSSION



	7 days	28 days
0%	8.94	19.53
0.50%	7.92	18.1
1%	13.06	22.27
1.50%	12.03	20.17

Figure1: compressive test result using PEG400 for M20 grade of concrete.

It is observed that compressive strength of 7th and 28th day of M20 grade of concrete. Using 0.5% of PEG400, the compressive strength compared to conventional concrete. Maximum compressive strength observed using 1% 0f PEG400. An increases the percentage PEG400 (1.5%) slightly decreases the compressive strength.



	7 days	28 days
0%	11.08	24.26
0.50%	10.93	22.24
1%	15.53	34.14
1.50%	11.95	30.7

Figure2: compressive test result using PEG 400 for M25 grade of concrete

It is observed that compressive strength of 7th and 28th day of M25 grade of concrete. Using 0.5% of PEG400, the compressive strength decreases compared to conventional concrete. Maximum compressive strength observed using 1% of PEG400. An increases the percentage PEG400 (1.5%) slightly decreases the compressive strength.

IV. CONCLUSION

1. The optimum dosage of PEG 400 for maximum strength is found to be 1% for M20 and M25 grade as compare to conventional concrete.
2. Self-curing concrete is the answer to many problems faced due to lack of proper curing.
3. Self-curing concrete is an alternative to conventional concrete in desert regions where scarcity of water is a major problem.

V. FUTURE SCOPE

The present research work leaves a wide scope for future investigators to explore many other aspects of this experimental work. Some recommendations for future research include:

1. The study can be done using different types of self curing agent such as PEG4000 and PEG200.
2. The experiment can be extended by increasing grades of concrete such as M30 and M40.

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