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Experimental Studies On Fresh And Hardened Properties Of Acrylic Modified Blendedconcrete

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Abstract

The Property of conventional concrete can be improved by0adding Polymers. In this project Acrylic polymers and GGBS were used with cement composites to increase the properties of concrete. The present study is focused on the properties of Acrylic modified cement concrete in both fresh and hardened state. The concrete of M20 grade conventional concrete is used and the Acrylic is mixed from 0% to 20% and GGBS are mixed with 50% were used. The results obtained are the limited addition of Acrylic and GGBS with conventional cement concrete up to 50% which enhances the strength of concrete.

1. INTRODUCTION

The new building material is necessary to develop for to the constructions industry with better-quality properties are required for satisfying the new application. The development of concrete with improve properties is very necessary for the concrete technologist. Already in market special concrete has its own development and its application. In addition to the special concrete new type of concrete called as "Acrylic modifiedConcrete". Presently researchers are required to focus on additive based to the conventional concrete.

Therefore, practices like vibration, pressure application spinning etc., have been adopted mainly to reduce the porosity[1]. Modern day concrete frequently incorporates one or more chemical admixture to achieve specified material property. The reaction between cement particle and additive (Acrylic) will have greater influence on fresh property, hardened property and durability property of concrete which is using for construction. The effect is also depends on type of additive, Chemical composition, and percentage ratio which is used. It can be incorporated either single binder or aggregate cement mix. The concrete which is modified by polymer is called polymer-modified concrete.[2] The advantage of Acrylic modified concrete has a significant role on that the concrete with lower water cement ratio can be adopted. From the various researcher it has be concluded that aqueous or dispersed form.[3] The main focusing portion in polymer adjusted concrete is that it helps to increase

the compressive strength.

Polymeric modifiers are added to a concrete or mortar formulation to overcome such deficiencies and increase the number of potential uses. Several kinds of polymeric materials are currently available, and they will generally improve flexibility and often the overall strength of the cement beyond that of unmodified material.[4] At the same time, they improve the adhesion of the cement to the substrate.[5] But some consideration should be given to the intended use of the concrete or mortar since the modifiers vary in the degree to which they improve performance; furthermore, certain modifiers may be used successfully in only some kinds of applications.[6]

2. PROPERTIES OF MATERIALS

Cement:
In the present experimental studies, Ultratech cement of 53 grade confirming to IS 8112-1989 was used and the cement sample was tested as per IS-4031-1988 and IS 269-1976.

Fine aggregate's:
The fine aggregate used which is locally available. Specific gravity value was observed is 2.679 and pertaining to zone $\overline{II}$.

Coarse aggregate's:
For the present work maximum aggregates of size 20mm.

Ground Granulated Blast Furnance Slag (GGBS):
GGBS was from JSW Bellary was used in present work. The power plant is situated at 16°21′18″N77°20′31″E Coordinates.

Acrylic:
Acronol 7846 was from BASF was used in present work. The solid content of 45 to 50 percent and pH value of 8 and density of 1.04g/cm^3.

Water:
Potable water is been utilized for the entire project work and which is free from chloride.

3. Results and Discussion

Present project focused on fresh and hardened concrete with addition of Acronol and Ground Granulated Blast Furnace slag to the concrete is carried out. From the test results the concrete mix design prepared as per IS 10262-2009 for concrete grade mix M20. They are added separately into the conventional concrete by the dosages between 0 % to 20% and GGBS variation of 50%. The fresh property are slump test has carried out for all dosage of Acrylic and determined optimum dosage. Similarly Hardened Property determined by compressive strength for all dosage studied at 7 and 28 days.

Slump Test:
The slump test is carried out using slump cone apparatus. The concrete slump apparatus is a frustum of a cone, with a height of 300 mm having the openings at the base with 200 mm in diameter and at the top is 100 mm diameter. The apparatus is placed on a smooth surface and is fille with concrete in three layers, and then the workability tested. The slump is measured by placing the cone just besides the slump concrete and the temping rod is placed over the cone so that it should also come over the area of slumped concrete.

Compressive Strength Test:
The compressive strength is measured in Compressive testing machine (CTM) with capacity

of 3000kN. The compression strength is done on a cube specimen of the size 150x150x150mm of 42 concrete cubes 7 groups, 6 cubes for each of the mixes with different dosage of Acrylic and GGBS along with controlled concrete as 1 group having 6 cubes. The compressive strength of the cubes was tested at the0ages of 7 and 28 days.
From the experimental investigation following results are obtained for concrete by addition of Acrylic and Ground blast furnaces slag. The fresh property determined using the slump test and result shows that for 15% acrylic and 50% ggbs shows maximum slump value of 100mm.In addition the compressive strength and Split Tensile strength of concrete has determined for the addition of acrylic and GGBS. The maximum compressive strength obtained for the 15% acrylic and 50%GGBS.

Figure 1. Slump Test

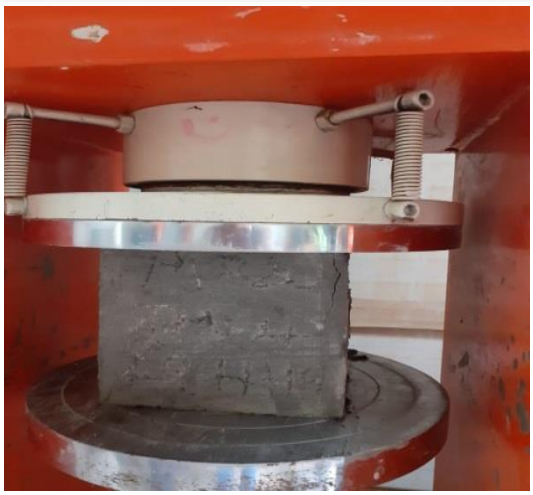

Figure 2.Compressive Strength Test

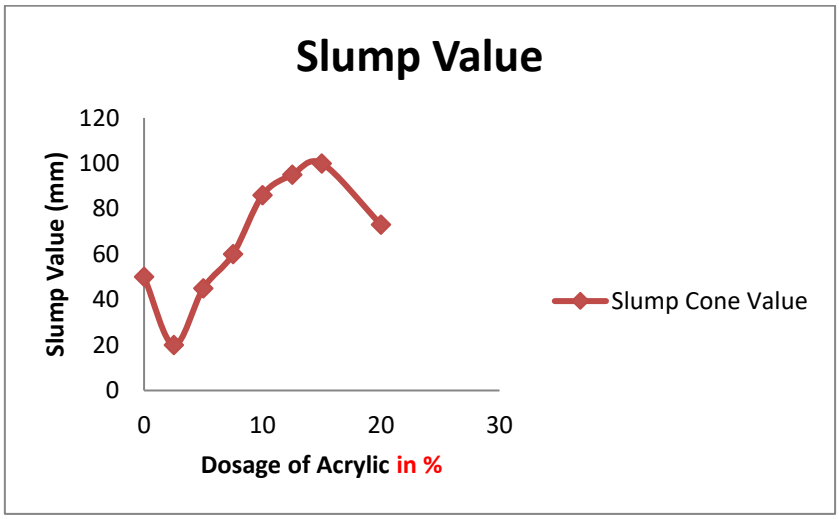

Figure 3: Graph of Slump vs Dosage of Acrylic

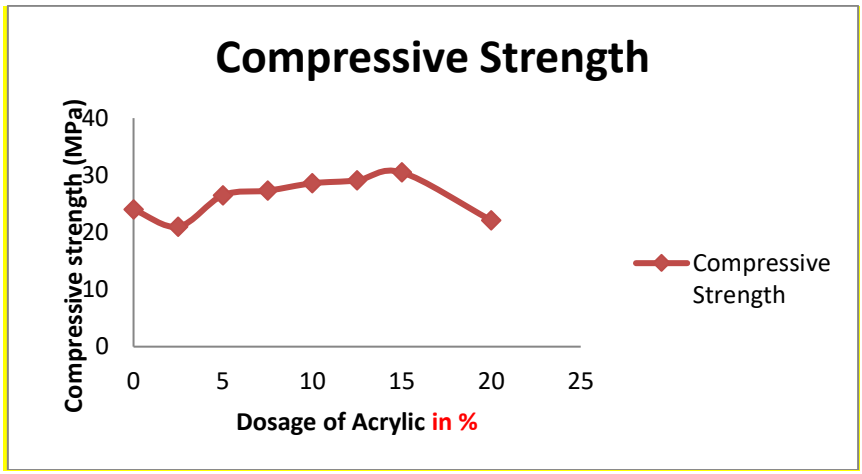

Figure 4:Graph of Compressive strength vs Dosage of Acrylic

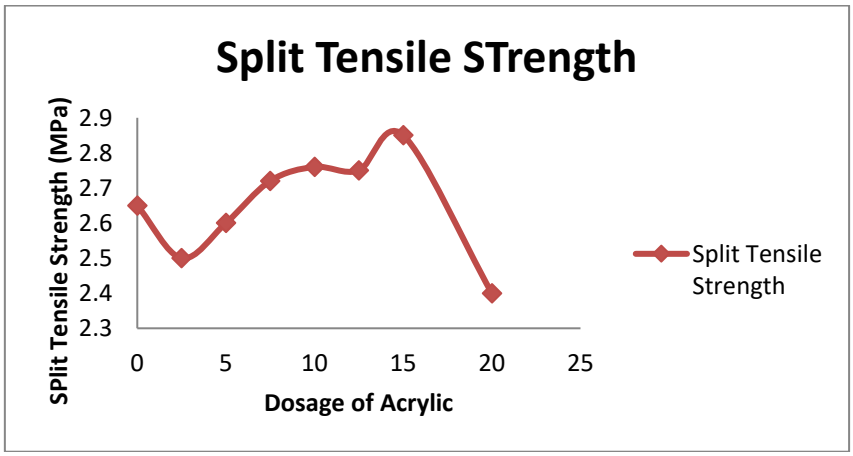

Figure 5: Graph of Split Tensile strength vs Dosage of Acrylic

Table 1: Table Showing Fresh and Hardened Property

Sl no	Grade of Concrete	Replacement % ofcement	Slump (mm)	Compressive strength (N/mm^2)	Split Tensile strength (N/mm^2)
1	M20	0	50	24	2.65
2		2.5	20	21	2.5
3		5	45	26.5	2.6
4		7.5	60	27.3	2.72
5		10	86	28.6	2.76
6		12.5	95	29.1	2.75
7		15	100	30.5	2.85
8		20	73	22.1	2.4

4. CONCLUSIONS

Based on the experimental test results, following conclusions were drawn:

- It was observed from the experimental results which shows that there is an effect on properties of concrete (Fresh and hardened) significantly.
- It was observed that, as increase in dosage of acrylic there is an increase in the slump up to 15% later the slump got decreases.
- It was observed that, as increase in dosage of acrylic there is an escalation in the compressive strength and split tensile strength to 15% later the strength got decreases.

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