EFFECT OF SUPER PLASTICIZERS ON PROPERTIES OF CONCRETE

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Abstract

*The use of mineral and chemical admixtures in concrete is a common solution to achieve full compaction particularly where reinforcement in congestion. The paper has been made an attempt to study the influence of four different naphthalene based super plasticizers with a dosage of 0.2,0.4,0.6,0.8,01,1.2 percent on performance of concrete .The present experimental procedure which gives immense help to the researcher to understand the behaviour of naphthalene based super plasticizer on property of fresh, hardened and durability property of concrete. In the present project work grade of concrete M30 is used for the study and four type of super plasticizers (**Chloride free sulphonated naphthalene polymer, Naphthalene Formaldehyde condensate, Sulphonated Naphthalene formaldehyde condensates, Modified Naphthalene formaldehyde condensates**) are used for present study. The super plasticizer is replaced with different dosages by weight of cement. The fresh properties of super plasticized concrete is studied on the results of , slump test, compaction factor test , vee-bee consist meter, it is observed that (**Chloride free sulphonated naphthalene polymer, Naphthalene Formaldehyde condensate, Sulphonated Naphthalene formaldehyde condensates, Modified Naphthalene formaldehyde condensates**) 0.6% dosage shows better performance with conventional concrete. Relatively the hardened and durability of super plasticized concrete is studied.*

Keywords: *Super plasticizers, workability*

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1. INTRODUCTION

Concrete is a composite product produced by mixing cement, aggregates and water and sometimes admixture if needed, undergoes a number of operations such as handling, placing and curing. Inspection and control at all stages of procurement of raw materials to the development of finish product contributes to the uniformity of concrete. Concrete has occupied an important place among construction materials and is widely used in all types of civil engineering structures ranging from a small building to heavy structures, ever since concrete has been accepted as a material. Engineers have been trying to improve its quality, strength, durability, etc., against adverse conditions. The aim of the engineers is to make the concrete not only everlasting but also an economical material of construction in comparison to other materials such as steel as timber. The 20th century has been truly described as the concrete age since all over the world, concrete, either plain, reinforced or pressurised, has been advancing with tremendous strides, and replacing all the time – honoured construction materials.

2. MATERIALS AND METHODOLOGY

2.1 Materials Used

a) Cement: Cement used in the project OPC 43 confirming to IS-8112:1989
b) Fine Aggregate: In the present work sand (local crushed sand) was used as fine aggregate with a fineness modulus of 2.39 and specific gravity of 2.67. Fine aggregate is classified as zone II as per IS 2386(I, II), 1963
c) Coarse aggregate: For the experimental work, locally available crushed stone aggregate of size 20mm to 4.75mm were utilized for different test that were carried out on the aggregates as per IS 2386,1988 part III
d) Fly ash: fly ash of class F grade from Raichur Thermal power plant (RTPS), Karnataka was used in the study.
e) Water: Potable water which is free from chloride, was utilized for the project work.

2.2. Methodology

Mix design

- Mix design for M30 grade conventional and super plasticized concrete is designed as per IS 10262:2009.
- The dosage of super plasticizer varied from (0.2 – 1.2%) with respect to cement quantity
- The fresh property of concrete is evaluated using slump test, compaction factor test, vee-bee consist meter test
- The hardened property of concrete is evaluated using compression test, split tensile test, flexural test.
- Durability test of concrete is done by Alkaline solution and Acidic solution

3. RESULTS AND DISCUSSIONS

3.1 Result and Discussion

The comprehensive assessment of influence of different super plasticizer on structural concrete in the context of mobilization of slump and compressive strength of the concrete specimen with varying super plasticizer content

(0.2,0.4,0.6,0.8,1.0,1.2)% with cement content .The influence of variation in super plasticizer on the slump value developed for concrete is evaluated and also super plasticizer addition for concrete are examined by monitoring compressive strength as a function of curing period. The compacted specimen are cured at room temperature for a range from 7, 14 and 28 days.

3.1.1 Fresh Property

The fresh property of conventional concrete and super plasticized concrete is evaluated using slump test. The Table 1 and Figure 1 shows variation of slump value with different dosage of super plasticizers

Table 1: Dosage of super plasticizer vs slump

Dosage of SP	SP1 Slump in "mm"	SP2 Slump in "mm"	SP3 Slump in "mm"	SP4 Slump in "mm"	CONVENTIONAL CONCRETE "mm"
0.2	35	40	40	30	62
0.4	40	60	55	65	
0.6	90	85	80	90	
0.8	100	110	120	140	
1.0	115	135	140	110	
1.2.	95	85	100	80	

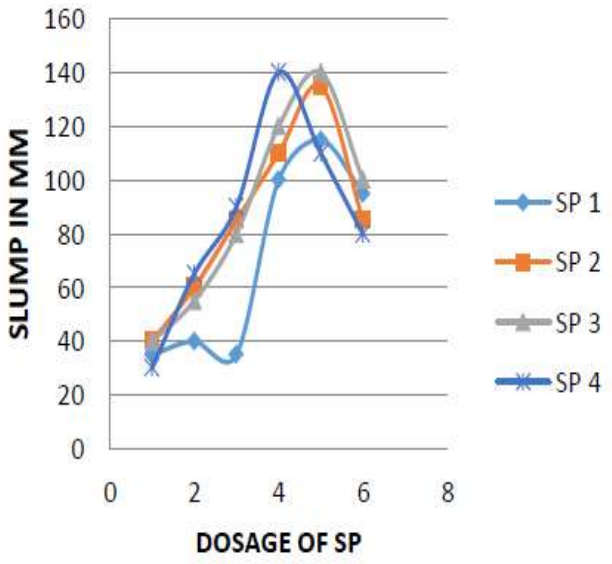

Fig 1: Dosage of super plasticizer vs slump

3.1.2 Hardened Concrete

Table 2: Compressive strength values for different dosage of super plasticizers

No of days	Dosage of SP	SP1 N/mm^2	SP2 N/mm^2	SP3 N/mm^2	SP4 N/mm^2	Conventional Concrete N/mm^2
7	**0.2**	8.9	21.0	21.7	19.8	24.82
	0.4	21.6	23.7	23.8	20.4	
	0.6	21.5	19.8	27.2	24.6	
	0.8	22.0	23.3	25.5	26.5	
	1.0	23.0	26.3	24.3	23.0	
	1.2	22.8	23.1	26.6	24.5	

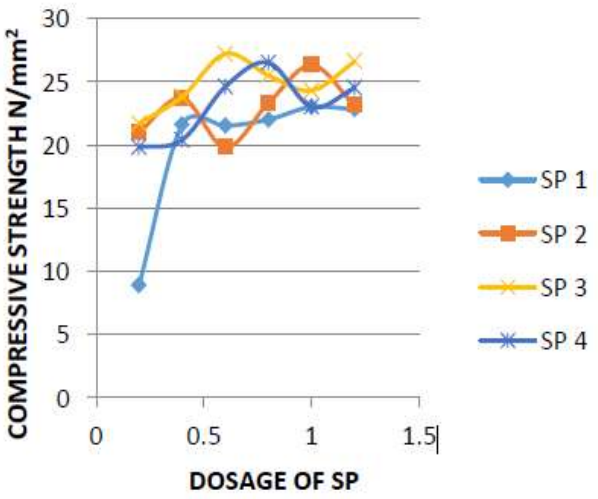

Fig 2: Compressive strengths vs dosage of different super plasticizers

4. CONCLUSION

- Properties of concrete in fresh and hardened stages have been improved with the addition of four types of super plasticizer for mix of concrete.
- The super plasticizers have shown increase in the workability, water reduction, compressive strength, cement saving requirements of concretes.
- SP3 (Sulphonated Naphthalene Formaldehyde Condensates) shows better workability in fresh state and strength characteristics in hardened state over conventional concrete.

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