

# Effect of Water Cement Ratio In Cement Concrete Strength with The Help of Plasticizers

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**Abstract-** The present investigation aims at the study of properties of concrete in which plasticizer like SNF is used as a partial replacement for water. Plasticizer was replaced partially with the water percentage, 1percentage, 1.2 percentage. A set of 6 numbers of concrete cubes of mix 1:1:2 were cast for each replacement ratios. The cubes were tested as per relevant BIS testing procedures for compressive strength at 7 and 28 days. The test results were compared with standard allowable compressive strength requirements of concrete specified by IS 516-1959. The plasticizer replacement was found to be having more strength than the standard strength. Also, the replacement ratio of 1.2 percentages was found to be optimum, giving the highest compressive strength among them. The investigation results indicate that the plasticizer can partly replace the water in cement concrete with higher or same strength and cheaper cost. It can lead to major achievement towards research and production of 'concrete', at lesser cost.

## I. INTRODUCTION

During the past decade, extensive international research on concrete materials technology has resulted in the emergence of new competitive materials technology: for instance high performance concrete(HPC)and self compacting concrete(SCC), Walraven(1999).The use of concrete for various construction works has in recent time to the escalation in the cost of construction materials particularly cement and aggregate. Aggregates which occupy 70-75 % of the total volume of mass concrete (Troxel et al 1968) has been one material, which if alternatives are provided will bring down the overall cost of construction (Kamang and Umoh 2005).Investigations into the development of new construction material are being conducted every day with the view to either replacing or using in combination with the conventional materials.

## II. METHODOLOGY

The present investigation aims in the study of properties of concrete in which plasticizer is used as a partial

replacement for water partially replaced by at replacement levels of 1percentage 1.2 percentage. At maximum strength obtain by water replacement by plasticizer.

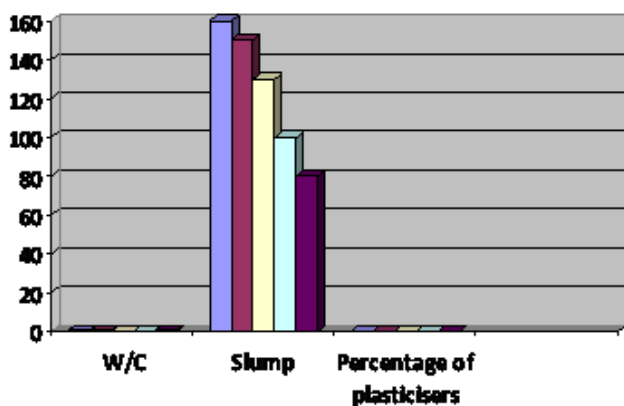
Initially started with check the physical properties of cement, coarse aggregate, and coarse sand after that a set of 5 numbers of concrete cubes were cast with concrete cube of ratio 1:1:2, without any replacement. After that, a set of 18 numbers of concrete cubes were cast with concrete ratio 1:1:2, on W/C .45, .43, .41,0.40,0.38 with plasticizer 1% of cement a set of 10 numbers of concrete cubes were cast with concrete ratio 1:1:2, on W/C .45, .43, .41,0.40,0.38 with plasticizer 1.2% of cement. All the concrete cubes were tested on the 7th and 28th day of casting.

## III. TEST RESULTS

Concrete cubes were tested for compressive strength to find the ultimate load for cement concrete. The specimens were tested under load control, and only the ultimate load was noted.

### M-25 Slump with 1 % Plasticizer (SNF):

Mix 1:1:2	Percentage Of Plasticizer	W/C	Slump(mm)
1	1%	0.45	160
2	1%	.43	150
3	1%	.41	130
4	1%	.40	100
5	1%	0.38	80

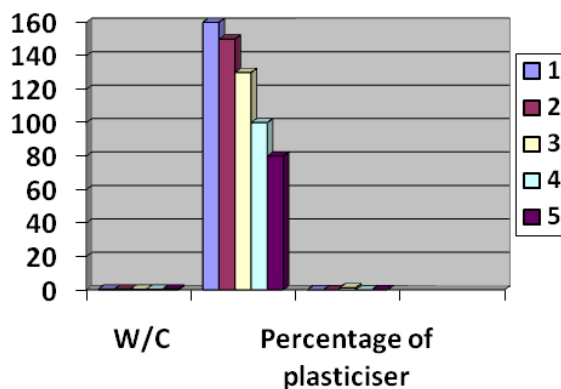


M-25 Slump with 1 % Plasticizer (SNF) (Bar Chart)

Mix 1:1:2	Percentage Of Plasticizer	W/C	Slump (mm)
1	1.2%	0.45	180
2	1.2%	0.43	170
3	1.2%	0.41	150
4	1.2%	0.40	110
5	1.2%	0.38	90

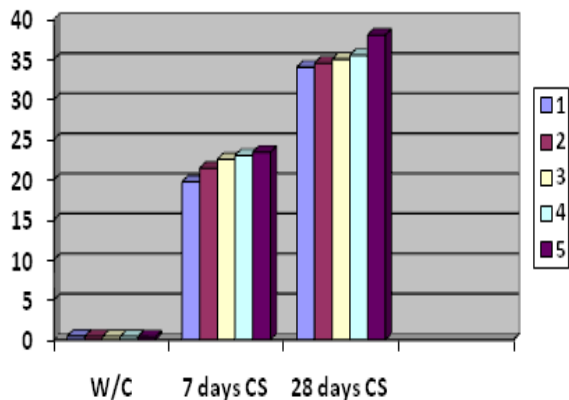
**Compressive Strength of Concrete Cubes in 7 and 28 days for different mix ratios(1% PLASTICIZER)**

Mix 1:1:2	Percent age of Plasticizer	W/C	7 days Compressive Strength (MPa)	28 days Compressive Strength (MPa)
1.	1%	0.45	19.70	34.00
2	1%	.43	21.40	34.5
3	1%	.41	22.50	35.00
4	1%	.40	23.00	35.5
5	1%	0.38	23.40	38.00



Slump with 1.2 % Plasticizer (SNF) Sulphonated Nephthalene formaldehyde

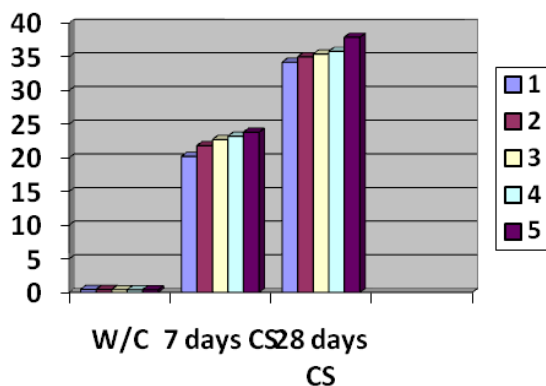
**Compressive Strength of Concrete Cubes in 7 and 28 days for different mix ratios (1.2% PLASTICIZER)**



Mix 1:1:2	% Plasticizer	W/ C	7 days Compressive Strength (MPa)	28 days Compressive Strength (MPa)
1.	1.2%	0.45	20.2	34.20
2	1.2%	0.43	21.80	35.00
3	1.2%	0.41	22.70	35.40
4	1.2%	0.40	23.20	35.80
5	1.2%	0.38	23.80	37.90

**Compressive Strength of Concrete Cubes in 7 and 28 day**

M-25 Slump with 1.2 % Plasticizer (SNF) Sulphonated Nephthalene formaldehyde

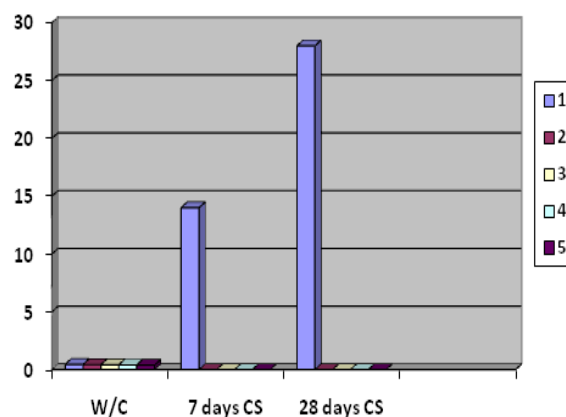


Compressive Strength of Concrete Cubes in 7 and 28 days

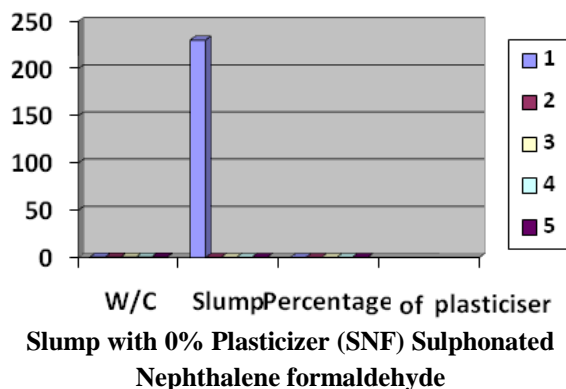
Slump with 0 % Plasticizer (SNF)

Mix 1:1:2	Percentage Of Plasticizer	W/C	Slump (mm)
1	0%	0.45	230
2	0%	0.43	0
3	0%	0.41	0
4	0%	0.40	0
5	0%	0.38	0

Mix 1:1:2	Percentage of Plasticizer	W/C	7 days Compressive Strength (MPa)	28 days Compressive Strength (MPa)
1.	0%	0.45	14.00	28.00
2	0%	0.43	0	0
3	0%	0.41	0	0
4	0%	0.40	0	0
5	0%	0.38	0	0



Compressive Strength of Concrete Cubes in 7 and 28 days



Compressive Strength of Concrete Cubes in 7 and 28 days for different mix ratios (0% PLASTICIZER)

IV. RESULT

In the present investigation-

1. The substitution of water by super plasticizer in ratio 1:1:2 of concrete. The compressive strength when we do not use plasticiser is maximum 28 Mpa after 28 days at 0.38 W/C ratio.
2. The substitution of water by super plasticizer in ratio 1:1:2 of concrete. The compressive strength of 1 percentage substitution of water by super plasticizers(SNF) is 38 MPa maximum after 28 days at 0.38 W/C(Water Cement Ratio).
3. The substitution of water by super plasticizer in ratio 1:1:2 of concrete. The compressive strength of 1.2 percentage substitution of water by super plasticizers(SNF) is 37.9 MPa maximum after 28 days at 0.38 W/C(Water Cement Ratio).

V. FUTURE SCOPE

- a) This type of comparison may be made using different types of superplasticizers.

- b) This type of comparison can also be made using different grades of concrete mix.

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