

# Determination of Optimum Water Cement Ratio and Dosage of Admixture for M30 Grade of Concrete

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**Abstract-** Super plasticizers are commonly known as High Range Water Reducers because it permits low water cement ratio as well as the workability also improved. In very recent decades, super plasticizers creates milestone in the advancement of chemical admixtures for Portland cement concrete and ordinary cement concrete. Hence we have planned to determine the optimum dosage for the admixture and water cement ratio required for M30 concrete. Also in this present experimental investigation two different types super plasticizers are intended to be used one based on naphthalene . Compressive strength, flexural strength and workability properties of various mixes are to be experimented and documented.

**Keyword:**M30,Water reducers(SP),workability and water cement ratio.

## I. INTRODUCTION

in india, about 90-95 percent of the construction materials market for both structural and non-structural applications is made of concrete compared with other materials used for similar functions. Concrete, generally, is a product made from cement, water and aggregates and an additional material known as admixture, is sometimes added to modify certain properties of concrete. Cement is the chemically active constituent but its reactivity is only brought into effect upon mixing with water. The aggregate plays no important roles in chemical reaction but its usefulness arises because it is an economical filler material or hard composite material with good resistance to volume changes which take place within the concrete after mixing, besides improving durability of concrete. In hardened state, concrete is a rock like material with a high compressive strength. In its plastic state, concrete may be moulded into any form of shapes, it may be used to advantages

architecturally or solely for decorative purposes.the super plasticizer added in the concrete is 0.5% of SP , 1.5% of SP.the comparison between the normal concrete and super plasticizer added concrete is discussed below.

## II. OBJECTIVES

The followings are the objectives of the study, which include:

- A. To determine the optimum dosage of concrete retarder and super plasticizer for normal concrete.
- B. The optimum Super plasticizer added to achieve the better strength and workability of concrete

## III. LITERATURE REVIEW

First of all various books and journals were collected for reference and study before starting the project work for having ideas about how the project should be.

Some of the literature reviews are

1. Venu Malagavelli\*, Neelakanteswara Rao Paturu 2012. " **Strength and Workability Characteristics of Concrete by Using Different Super Plasticizers**".
2. Antoni , James Gabriel Halim ,In 2017. " **optimizing polycarboxylate based super plasticizer dosage with different cement type**".
3. Salahaldeen Alsadey, 2013 **Effects of Super Plasticizing and Retarding Admixtures on Properties of Concrete**"
4. I. B. Muhit ,

**“Dosage Limit Determination of Super plasticizing Admixture and Effect Evaluation on Properties of Concrete”**

**IV. MATERIALS USED**

**A. super plasticizer**



**Properties**

- supply form - liquid
- colour - brown
- specific gravity - 1.1@27 C+\_1C
- chloride contents – nil

**B. Cement**

Cement used to prepare the specimen was 53 grade Ordinary Portland cement, conforming to IS 12269:2013 with a fineness of 1%, standard consistency of 35% and Initial setting time 28mins.

**C. Coarse aggregates**

Coarse aggregates of 4.75mm to 12.5mm size aggregates were used

**D. Fine aggregates**

Fine aggregates are taken for concrete preparation which pass through 2.36mm sieve size.

**E. Water**

Portable water was used for mixing and curing of concrete specimens.

**V. MIX DESIGN**

mix design for M30 grade of concrete was designed by adding the super plasticizers in the amount of 0.5%, 1.5% by weight of cement.

**VI. TEST RESULTS**

**A. Compressive Strength**

Compressive strength was tested in compressive testing machine. Cube specimen of size 150mmx150mmx150mm were adopted for the test. Compressive strength was tested after 7, 14 and 28 days of curing. The results of the tests are tabulated below.

**B. Tensile Strength**

Tensile strength was tested in compressive testing machine. Cylinder specimen of size 150mmx300mm were adopted for the test. Tensile strength was tested after 7, 14 and 28 days of curing. The results of the tests are tabulated below.

**C. Flexural strength**

Flexural strength was tested by two point load method of specimen size 500x100x100mm were adopted for the test. The specimens are tested after the curing of 28 days. The results of the tests are tabulated below

**VII. MATERIALS TEST RESULT**

**Table-1 Physical properties of cement**

Fineness modulus	Normal consistency	Initial setting time	Final setting time
4%	34%	30mins	10hrs

**Table-2 Physical properties of fine aggregates**

Specific gravity	Water absorption	Fineness modulus
2.72	1%	2.8

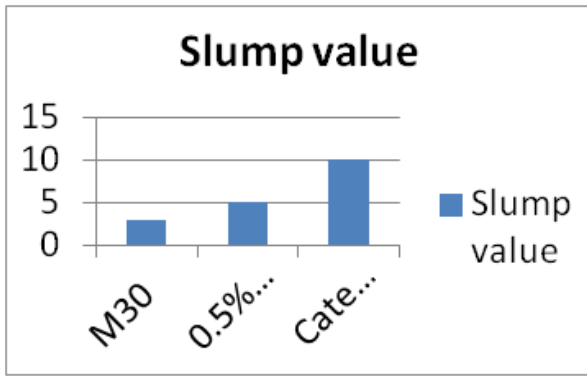
**Table-3 Physical properties of Coarse aggregates**

Specific gravity	Water absorption	Fineness modulus
2.72	1%	7.8

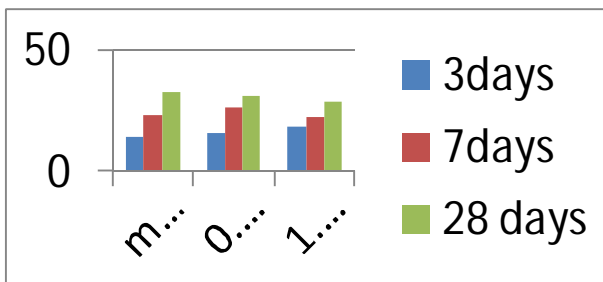
**Table 6.1 Properties of cement**

TEST	RESULT
SPECIFIC GRAVITY	3.15
FINESS	4%
INITIAL SETTING TIME	30mins
FINAL SETTING TIME	10hrs
CONSISTENCY TEST	34%

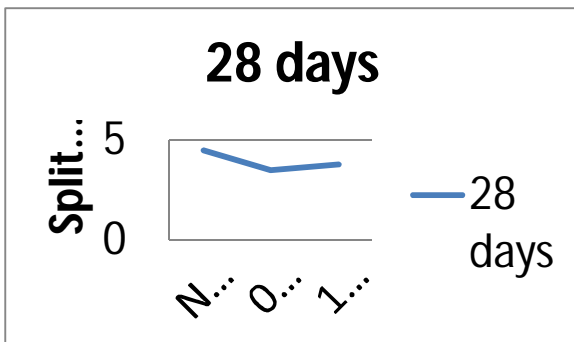
**slump cone test :**



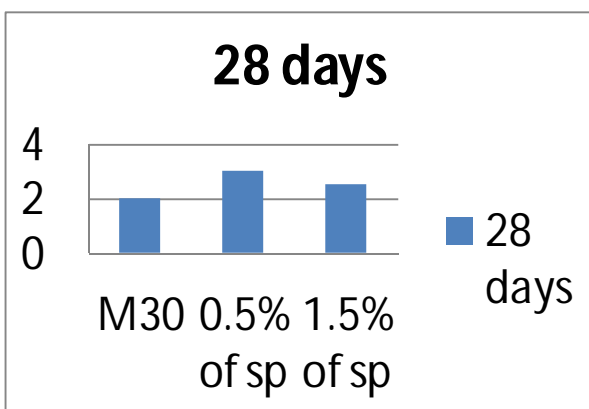
compressive strength :



splittensilestrength:



flexural strength :



### VIII. CONCLUSION

1. the addition of the super plasticizer improves the flowability of concrete, however there is an optimum dosage for each water content. excessive use super plasticizer causes bleeding and segregation.
2. The workability and compressive strength of concrete increases with the use of super plasticizers
3. after the comparisons between normal concrete strengths and SP strengths of different ratios, the 0.5% of SP added concrete gives better strength.
4. Slump loss can be reduced by using the super plasticizer admixture. However, effectiveness is higher for super plasticizer concrete than normal concrete.
5. The effective minimum dosage is 600 ml/100 kg of cement and maximum effective dosage is 1000 ml/100kg of cement. The effective range of dosage is 0.6-1.0%.

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