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THOMSON REUTERS

[Singh* 6(5): May, 2019] ISSN 2349-4506
Impact Factor: 3.799

Global Journal of Engineering Science and Research Management

EFFECT OF SILICA FUME ON VARIOUS PROPERTIES OF FIBER REINFORCED CONCRETE

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DOI: 10.5281/zenodo.2703776

ABSTRACT

Cement is the most used production fabric in recent trend cement concrete is update by using admixtures including, slag, fly ash, silica fume to increase the characteristics energy of excessive overall performance of concrete to be able to decrease the shrinkage and creep and to increase tensile power, fibers are added. The scope of gift studies accord with the strength properties of concrete, at the impact of fractionally substitute of cement via silica fume with distinctive possibilities viz 0%, 5%, 7.5 and 10% become used inside the concrete and polypropylene fiber used with percent 0%, 0.5%. Strength Properties research involve compressive energy flexural elasticity tensile elasticity and abrasion. In present research the power houses of excessive power concrete of M40 grade at 7 days 14 days 28 days feature elasticity with one of a kind changing degrees of cement with silica fume are attention.

INTRODUCTION

Concrete contains cement, sand, coarse total and some quantity of water. Its prosperity lies in its adaptability as can be intended to withstand harshest situations while tackling the most persuasive structures. Specialists and researchers are further attempting to build its breaking points with the assistance of creative concoction admixtures and different supplementary cementations materials SCMs. Early SCMs comprised of characteristic, promptly accessible materials like volcanic powder or diatomaceous earth. The designing wonders like Roman water systems, the Coliseum are case of this strategy utilized by Greeks and Romans. These days, most solid blend contains SCMs which are fundamentally results or waste materials from other mechanical procedures. A composite material that comprises basically of a coupling medium, for example, a blend of Portland concrete and water, inside which are installed particles or sections of aggregate, usually a mix of fine and coarse total. Cement is by a long shot the most flexible and most generally utilized development material around the world. It fulfill extensive variety of execution specifications, not at all like other building materials, for example, common stone or steel, which for the most part must be utilized as they seem to be.

OBJECTIVE OF STUDY-

- The objective of the study the role of adding silica fume and polypropylene fibers to enhances the strength proper,ties of concrete.
- The objective of research use waste material silica flume and polypropylene fiber.
- The results shown in this study will provide more information on the behavior of silica flume and polypropylene fibers in concrete.

Material -

In the present study we used coarse aggregate, fine aggregate, cement, silica flume, polypropylene fibers are used to cast beam, cube, and cylinder. The specimen and properties of these materials are as under

(A) Cement

OPC of 43 grade is used for the investigation. The results for cement as obtained from various physical tests are as given. Mostly the tests were performed in procedures described inIS: 8112-2003. Cement is a adhesive in nature, a material that hardened and can be used to bind other material with each other. Cement is usually grey powder before being blended with different materials and water. It is utilized in construction can be characterized as being either hydraulic or non-hydraulic contingent on the capacity of the cement to set in nearness of water.

(B) Coarse aggregate

All coarse aggregate must be evaluate intimately and constantly watch and have to be taken in description into organize toward composed concrete of consistent quality. Coarse aggregates utilized during this research are

crushed aggregate of range 20 mm and 10mm. Specific gravity of coarse aggregates 2.58 for 20mm and 10 mm aggregates correspondingly Coarse aggregate water absorption value at 24 hours 0.52% and fine aggregate 1.0% respectively. Coarse aggregate 20mm is 50% used and 10mm 50% used

(C) Fine aggegate

Fine aggregate utilized as a part of the study is sand and ratify to zone III. Specific gravity value of fine aggregate used was 2.45

(D) Polypropylene fiber

In this study polypropylene fibers used 12 mm long and 0.20 micrometer in diameter size and Specific gravity is 0.91

(E) Silica fume

Silica fume illuminate change to rheological, mechanical and chemical properties. Concrete strength upgrade and decreased the bleeding and segregation of concrete with reinforcing the microstructure during filler impact. Specific gravity of silica flume 2.34 utilized in powder form.

(F) **Water**

In this study drinkable water utilized in the concrete mix design from the water supply system framework it is free from the organic material, and floating solids which have capacity to influenced the properties of the fresh and toughened concrete.

(G) **Chemical Admixture**

Super plasticizers or water sinking chemical admixtures are an fundamental element of concrete. AURAMIX 400 was utilized as chemical admitxture. It collect with IS: 9103:1999 and ASTM-C494 Type 'G' as a high range water sinking superplasticiser. Specific gravity of chemical admixture 1.1

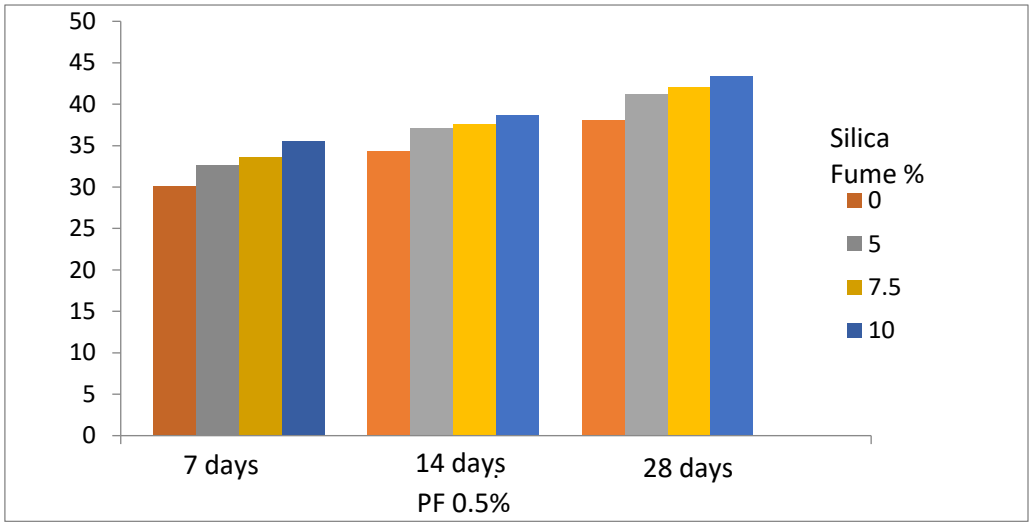
MIXING , DEMOULDING AND CURING

Through mixing and adequate curing are most essential for achieving a good concrete. In the laboratory , the concrete was mixed in hand mixing. The mixing time was kept to about 3-4 min for normal concrete. Generally, the demoulding was done 24hr of casting. Portable water was used in curing all the concrete. All the concretes were kept in most environment immediately after the initial set and before the demoulding.

Compressive strength

Concrete cubes confirming to IS : 516-1964 of size 150*150*150mm we cast for assurance for compressive strength . After 24hr the concrete cubes became be placed for water curing for 7days , 14 days and 28 days respectively . Before testing the cubes were air dried for 24hr, breaking loads were noted for 7days , 14days and 28 days.

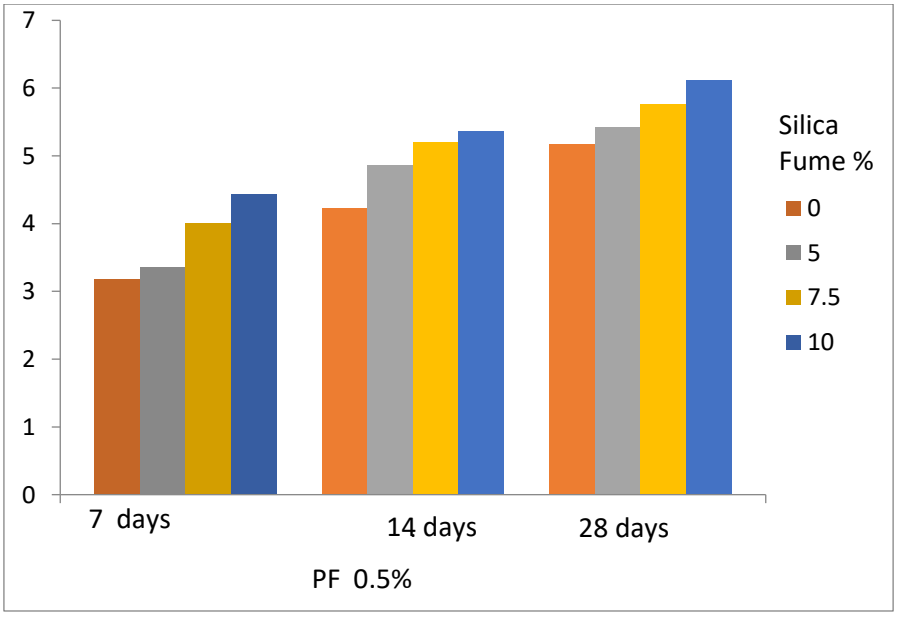
S.No	Polypropylene fiber (%)	Silica Flume (%)	Water Cement Ratio	Compressive Strength		
				7 Days	14 Days	28 Days
1	0	0	0.38	30.17	34.3	38.1
2	0.5	5	0.38	32.71	37.12	41.25
3	0.5	7.5	0.38	33.62	37.53	42.1
4	0.5	10	0.38	35.5	38.7	43.32



Spilt tensile strength test

Tensile strength is second major properties for concrete . Size of test sample of 15cm diameter , 30cm height and 0.3cm thick cylindrical mould is used in the test . The cylinder is placed left and right between the two plates of the compressive testing and the load is applied on it . The load at which the sample in the end fails is noted and spilt tensile strength is calculated.

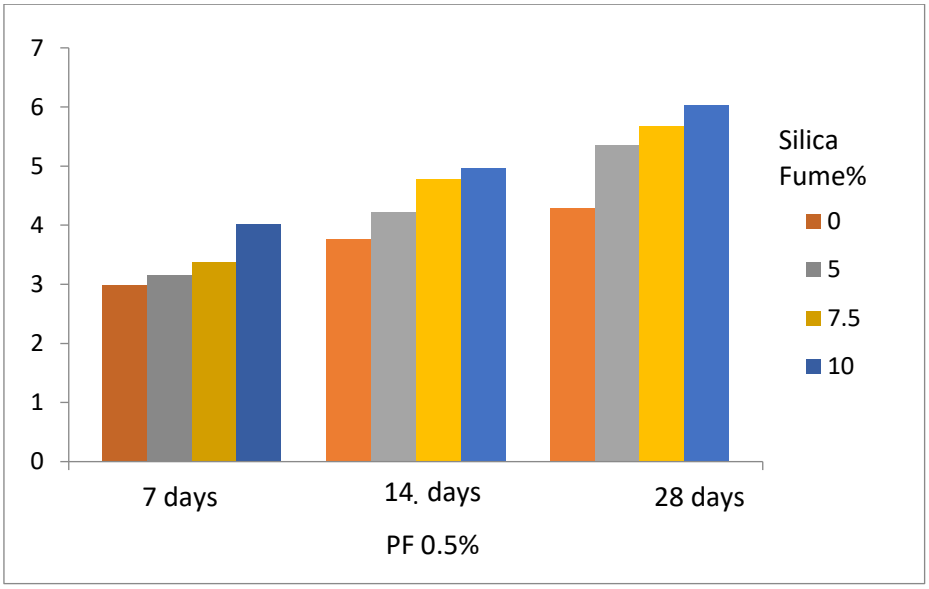
S. no	Polypropylene Fiber (%)	Silica flume (%)	Water cement ratio	Tensile Strength		
				7 Days	14 Days	28 Days
1	0	0	0.38	3.18	4.23	5.17
2	0.5	5	0.38	3.63	4.86	5.42
3	0.5	7.5	0.38	4.01	5.2	5.76
4	0.5	10	0.38	4.43	5.36	6.12



Flexural strength test -

The beam is tested to check the flexural behavior of the hardened concrete. The test is carried out in a universal machine of 60T load ability. Standard beam of size 10cm*10cm*50cm were tested under one point loading to study the flexural strength of concrete. The maximum tensile stress discover at the failure of beam is known as modulus and is calculated.

S.No	Polypropylene Fiber (%)	Silica Flume (%)	Water Cement Ratio	Flexural Strength		
				7 DAYS	14 DAYS	28 DAYS
1	0	0	0.38	2.98	3.76	4.29
2	0.5	5	0.38	3.15	4.22	5.36
3	0.5	7.5	0.38	3.38	4.77	5.68
4	0.5	10	0.38	4.02	4.97	6.03



CONCLUSION

1. The partial replacement of 10% silica flume with cement can giving most extreme conceivable compressive strength with polypropylene fiber
2. Addition of polypropylene fiber improves the tension stiffening effect considerably and this increase the bond stress of reinforced bars in composite fiber reinforced concrete than in plane concrete.
3. Silica fume has no large impact on flexural strength of concrete. In this perspective tests results exhibited in this study, it is fulfilled that a mixed design through 10% silica flume and 0.05% fiber volume division was ideal in flexural quality by means of keeping up an attractive workability.
4. Workability and flow characteristics are reduce by adding of polypropylene fibers in concrete mix; and it also diminishes segregation and bleeding in the concrete blends.
5. The early age shrinkage of polypropylene fibers decrease and dampness loss of the concrete blend not withstanding when low volume divisions of polypropylene fiber are used.
6. The deformation limit of concrete improve by addition of polypropylene fibers (PPF) and also upgrades the material ductility of concrete.
7. Polypropylene fibers reduce the settlement, plastic, water permeability and shrinkage

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