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Use of Silica Fume in Concrete Partially Replacement By Cement" -A REVIEW

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Abstract - In the recent past, there have been considerable attempts for improving the properties of concrete with respect to strength and durability, especially in aggressive environments. High performance concrete appears to be better choice for a strong and durable structure. A large amount of byproduct or wastes such as fly-ash, copper slag, silica fume etc. Are generated by industries, which causes environmental as well as health problems due to dumping and disposal. Proper introduction of silica fume in concrete improves both the mechanical and durability characteristics of the concrete. Silica fume is an outcome of producing silicon by the highly purity quartz in a submerged arc electric furnace heated at 2000^0c with coal coke as fuel.

***Key Words*: Silica-fume, Cement, pozzlanic, concrete, compressive strength test, flexural strength test, tensile test.**

1. INTRODUCTION

Now a day's concrete is widely used in all types of construction work .in concrete the main constitute material is cement, sand and aggregate. We are a civil engineer so our main purpose is to how to give high quality work with limited resources such as material and manpower. we use silica fume in concrete to enhance durability and mechanical properties silica fume particle size is very small that fills in the small pores that be improve workability in concrete and reduce permeability silica fume particles are spherically shaped size between 0.1-0.3 um Silica fume is also known as micro silica..its colour is light to dark gray constitute material 85% of amorphous particle. Silicafume particle size is very fine as compare to $1/50^{th}$times of ordinary Portland cement particle. It also protects the reinforcement in concrete from the corrosion especially in salty environment. Silica fume is fill the voids of aggregate and also fills the small pores of cement. Specific surface area of silica fume is 15000-30000 m^2/kg. c Specific gravity of silica fume 2.2 to 2.3

2. METHODOLOGY CONSIDERED

Silica fume is an brilliant admixture for existing as it leads to improved manufacturing property. It will lessen thermal furious cause by the warmth of strengthen hydration, advance toughness to harass by sulphate and acid waters, and augment potency.

2.1 SILICA FUME

Silica fume, a by-product of the ferrosilicon manufacturing, is a exceedingly pozzolanic textile that is used to increase unthinking and resilience property of material. It possibly will be supplementary straight to actual as an personality constituent or in a bring together of Portland bolster and silica exude.

The program consists of casting and testing of total 17 cubes, 17 beams and 17 cylinders specimens. The specimen of standard cube of 150mm x 150mm x 150mm, standard beam of 150mmx500mmx700mm and standard cylinder of 150 mm diameter and 300 mm height were casted with and without silica fume. Compressive testing machine (CTM) is used to test the specimens.

Concrete cubes 150x150 x150mm were casted and tested at 7,14,and 28 days as per IS: 516 – 1959 and compressive strength is reported. Concrete cylinders of size 150 mm diameter and 300 mm height were casted and tested at 28 day as per IS: 5816-1999 and split tensile strength is reported. Concrete beams of size 150 x150 x700 mm were casted and tested for 28 days as per IS: 516 - 1959 and flexural strength is reported.

Table -1: Hardened concrete test for 7 days

Strength	0% of silica fume	5 % of silica fume	10 % of silica fume	15 % of silica fume	20 % of silica fume
Compressive Strength (N/mm2)	25.30	29.37	34.42	38.34	35.68
Split tensile Strength (N/mm2)	3.21	3.74	4.15	3.83	3.65
Flexural Strength (N/mm2)	4.96	6.98	7.23	7.64	6.42

2.3. COMPRESSIVE STRENGTH TEST

For compressive strength test, cube specimens of dimensions 150 mm x 150 mm x150 mm were cast for M30 grade of concrete. The compressive strength test was carried out conforming to IS 516-1959 to obtain compressive strength for M30 grade of concretes. The compressive strength of concrete with ordinary Portland cement and ground granulated blast furnace slag concrete at the age of 7days, 14 days and 28days are conducted.

earth from the cup is transferred to the dish containing the earth paste and mixed thoroughly after adding a little more water. Repeat the test.

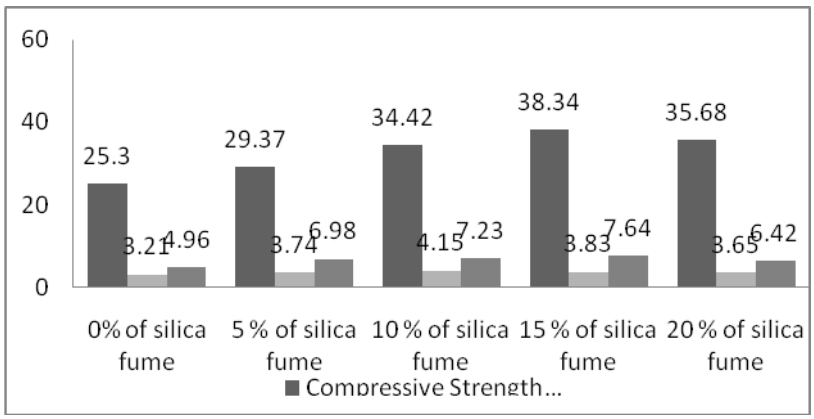

Chart -1: Graph for 7 days

Fig -1: Sample Preparation

Slump cone test was conducted to find workability, Universal Testing Machine (UTM) and compressive testing machine (CTM) was used to carry test on concrete mix. Tests were carried out for finding the compressive, flexural and split tensile strength. A standard test procedure is followed for each test and performance of concrete mix is studied.

3. CONCLUSIONS

Based on the experimental investigation carried out on concrete by using various percentages of silica fumes. Concrete mixtures with different extent of silica fume ranging from 0%, 5%, 10%, 15% and 20% for each three numbers of cube, cylinder and prism casted. 2. Compressive strength was increased in silica fume 15% at 7 days and 14 days. After more amount of silica fume greater than 15 % strength is reduced. 3. Split tensile strength was increased in silica fume 15% at 7 days and 14 days. 4. Flexural strength was increased in silica fume 15% at 7 days and 14 days.

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