Study of N-100 As A Cemet Reducer

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Abstract- *Silica Fume (Microsilica), also known as silica fume, is formed by oxidation at high temperature. The particles are very fine, the shape of the glass sphere under the microscope, non-crystalline, amorphous, with excellent physical and chemical properties. Then the Silica Fume (Microsilica) can be fully dispersed and enriched into the gaps of cement particles after being added to the concrete, making the concrete more compact, especially for the calcium chloride dihydrate after cement hydration, which has a great absorption power, which can form silicon Calcium acid gel greatly improves the characteristics of concrete, thus solving the difficult problems of concrete density, strength, abrasion resistance, and frost resistance.*

Keywords- N100, silica, hydration, cement, strength.

I. INTRODUCTION

Silica Fume (Microsilica) is a mineral composed of ultra-fine amorphous spheres of silicon dioxide (SiO2), Produced during the manufacture of silicon or ferrosilicon. Silica Fume (Microsilica) appearance is grey black powder and average particle size is 0.15 micron in diameter.Specific surface area is ranging from 15,000 to 20,000 m2/kg,has dynamic surface activity. Silica Fume (Microsilica)'s bulk density is 150-300kg/m3 in natural(undensified)form. In order to transport easily, Bulk density can be increased to 600-700kg/m3 through densification process. Therefore, Silica Fume (Microsilica) is mostly used as fillers and modified additives.

- Used for high-performance concrete, improve concrete strength, improve performance, and extend concrete life.
- Used for refractory materials, enhance fluidity, reduce water consumption, and improve product strength and durability.
- Used for dry mortar and grouting to improve early strength.
- Used for wear-resistant floor, increase fluidity and improve wear resistance.
- Used in paint, coating, resin, rubber and other polymer material filler.

AIM & Objectives

The main aim of this project is to use of N-100 solution as a cement reducer.

Objectives are as followed:-

[1] Using N-100 solution as a cement reducer.
[2] To find compressive strength of concrete with and without using N-100 solution.
[3] Compared compressive strength of concrete with and without using N-100 solution.

II. LITERATURE REVIEW

1. **Lakhbirsingh, Arjun Kumar, Anil singh their journal entitled "Study of partial replacement of cement by silica fume''**

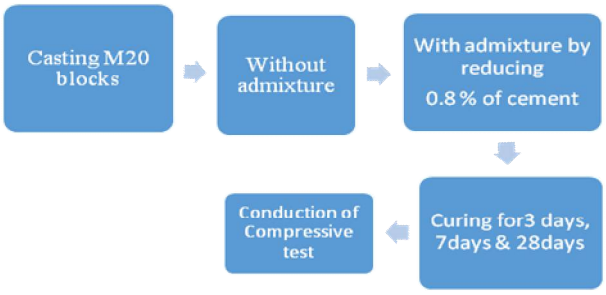
Authors state that, the use of silica fume had major impact on industries. This study is an experimental on the nature of silica fume and its influences on the properties of fresh concrete. First the strength parameters of concrete without any partial replacement were studied then strength parameters by partial replacement with silica fume have been studied by placing cube and cylinder on compression testing machine. Silica fume were used to replace 0% to 15% of cement, by weight at increment of 5% for both cube and cylinder. The result showed that partial replacement of cement with silica fume had significant effect on the compressive strength of the cube. The strength of cube increased rapidly as they increases the silica fume content and optimum value of compression strength is obtained at 10% of replacement.

2. **Hanumesh B.M., B.K.Varun, Harish B.A. their journal entitled " The mechanical properties of concrete incorporating silica fume as partial replacement of cement''**

Observes the mechanical properties of concrete incorporating silica fume as partial replacement of cement. The main aim of this work is to study the mechanical properties of M20 grade control concrete and silica fume

concrete with different percentage (5, 10, 15 and 20%) of silica fume as a partial replacement of cement. The result showed that the compressive strength of concrete is increased by the use of silica fume up to 10% replacement of cement. Form 10% there is a decrease in compressive strength and the split tensile strengthof concrete is increased by the use of silica fume up to 10% replacement of cement. From 10% there is decrease in split tensile strength. The optimum percentage of replacement of cement by silica fume is 10% for M20 grade of concrete.

III. METHODOLOGY



The process of selecting suitable ingredients for concrete:

The process of selecting suitable ingredients of concrete and determining their relative amounts with the objective of producing a concrete of the required, strength, durability, and workability as economically as possible, is termed the concrete mix design. The proportioning of ingredient of concrete is governed by the required performance of concrete in 2 states, namely the plastic and the hardened states. If the plastic concrete is not workable, it cannot be properly placed and compacted. The property of workability, therefore, becomes of vital importance. The compressive strength of hardened concrete which is generally considered to be an index of its other properties, depends upon many factors, e.g. quality and quantity of cement, water and aggregates; batching and mixing; placing, compaction and curing. The cost of concrete is made up of the cost of materials, plant and labour. The variations in the cost of materials arise from the fact that the cement is several times costly than the aggregate, thus the aim is to produce as lean a mix as possible. From technical point of view the rich mixes may lead to high shrinkage and cracking in the structural concrete, and to evolution of high heat of hydration in mass concrete which may cause cracking.

Batching and Mixing Concrete:

The correct measurement of the various materials used in the concrete mix is called batching. It has been observed that batching errors are partly responsible for the variation in the quality of concrete. This operation can be properly and better controlled than other factors responsible for the variation in the quality of concrete.

It has been observed that poor batching is responsible for more variation than any other factor, but good control can reduce this part of variation to an insignificant amount. Thus batching operation is a very important operation.

Batching can be done in two ways as follows:

1. Volume batching.
2. Weight batching.

Fig.3.1 Mixing of Ingredient

Transporting Concrete:

Transporting the concrete mix is defined as the transferring of concrete from the mixing plant to the construction site. Keep in mind that not all concrete is mixed on the actual construction site and could require some significant travel. This is most common for ready-mixed concretes. The main objective in transporting concrete is to ensure that the water-cement ratio, slump or consistency, air content, and homogeneity are not modified from their intended states.

Results of Improper Vibrations of Concrete:

There are various problems and defects that could arise when concrete is not vibrated adequately.

1) Honeycomb
2) Sand streaks
3) Cold joints

4) Excessive amount of entrapped air voids that most of the times called bug holes.
5) Subsidence cracking
6) Placement lines

Fig.3.2 Remould

Curing:

The curing of concrete is the process of keeping the concrete damp or moist and warm after the initial setting of concrete or removal of formwork. Proper curing of concrete maintains the satisfactory moisture content and favourable temperature inside the concrete so that hydration of cement may continue until the desired properties are developed. The curing of concrete must be continued for a reasonable period of time to achieve its desire strength and durability.

Fig.3.3 Curing

Compressive strength:

Compressive strength of concrete depends on many factors such as water-cement ratio, cement strength, quality of concrete material and quality control during the production of concrete, etc.

Test for compressive strength is carried out either on a cube or cylinder. Various standard codes recommend a concrete cylinder or concrete cube as the standard specimen for the test.

Fig.3.4 Compressive test under CTM

IV. SCOPE OF PROJECT

1. Production of high performance concrete.
2. Production of liquid impermeable concrete, including crude oil.
3. Fineness and corrosion resistant precast concrete.
4. Abrasion and salt resistant trafficable.

V. RESULT

	Admixture N100			
	0.70%	0.80%	0.90%	without admixture
3days	7.60	8.87	9.00	7.98
7days	10.92	11.028	12.52	10.95
28days	12.034	15.62	21.32	19.99

VI. CONCLUSION

1. After adding 0.7% and 0.8% N100 in the mix, there is no increase in the strength of cube after 3days, 7 days and 28days as compared to concrete without replacement.
2. By adding 0.9% N100, there is large amount of increase in strength after 3, 7 and 28 days respectively.

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