

## CONCRETE WITH USE OF NANO-SILICA AND SILICA FUME

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### ABSTRACT

The use of nano materials over other SCMs is high reactivity, less quantity required, resulting in less cement replacement and cost efficiency. nano technology has taken over the world of 'concrete' in a significant way and have generally been found to improve Thus, with improved nanostructure, manufactures may be able to redevelop materials which would work wonders for varied applications and usages. Without doubt it would be befitting to say that using such materials would also help save our natural resources. In addition, the use and effect of nanosilica and silica fume are still not fully understood. Observations are made after studying the literature.

**Keywords:** cement, concrete, nanosilica and construction

### 1. INTRODUCTION:

#### 1.1 GENERAL

In the recent times, nano technology has taken over the world of 'concrete' in a significant way and have generally been found to improve Thus, with improved nanostructure, manufactures may be able to redevelop materials which would work wonders for varied applications and usages. Without doubt it would be befitting to say that using such materials would also help save our natural resources.

Lot of research has gone into identifying the best alternative for replacement of cement by various SCM's and their probable percentage replacement of cement. However, most of these developments have been mostly limited to replacing cement with macro to micro-fines. The use of these materials have no doubt chnages significant amendment to the characteristics of resulting member, but to improve packing density, it is imperative to keep searching for materials which can fill the voids at still finer level.

#### 1.2 NANO – SILICA

Nano-Silica has similar effect on mastic cement as silica fume, however, higher specific surface of nano-SiO<sub>2</sub> and higher content silicon oxide makes them more marked. Nano-SiO<sub>2</sub> has been found to increase the strength of bond between aggregate and mastic cement and forms even denser structure with even smaller pores; reacts with crystals of Portlandite.

### PROPERTIES OF FRESH CONCRETE

Addition of silica fumes makes fresh concrete more cohesive and keep sufficient workability level and lesser amount of water in cement. As such addition of super plasticizers is fine. Bleeding occurs with concrete of thin consistency (wrong design of SCC). Higher dosage of silica fumes considerably decreases bleeding as high watered specific surface leaves only little water for bleeding.

## 2. LITERATURE REVIEW:

Maghsoudi et al. (2010) explained accumulation silica having micro silica causes the augment the compressive, durability of 90 day. Therefore, improved serviceability circumstances can be expected while using nano silica in structural concrete.

Koohdaragh and Mohamadi (2011) reported that in current years, recognition particularly hydration is of importance so as to examine amendment of concrete. This skill is used in artificial pozzolan fabrication e.g. nano-silica. Various mechanical and strength testes of concretes having additives for strength was found.

Rahmani et al. (2012) mentioned that the samples of different grouping of nano-silica of concrete were casted with inconsistent w/c ratio and the 7, 28 and 91 days of compressive strength was examined. The aim of the study was to examine the importance water cement ratio on compressive strength and abrasion resistant of concrete having micro silica.

Tavakoli and Heidari (2013) studied the examines the joint utilization. Cement was replaced with silica fume 5 and 10 % and nano silica 0.5 and 1 % for doing the compressive strength. The improvement in the qualities of concrete has been found with joint use of such materials and the increase of 42.2% in compressive strength in comparison to control sample was found with replacement of level 10% silica fume and 1% nano silica.

Mohan and Saranya (2016) reported that Conventional concrete enhanced with nanotechnology aims to create a new, intelligent and ecological construction material for green structure. In this study, the 7th and 28th day concrete compressive strength and slump values for various test mixes are determined and the mix ratios are determined. Current study investigate nanosilica to mechanical properties along with modulus of elasticity of high-performance concrete. For this reason, different trail mixtures with different amounts of nanosilica additives were considered. The results confirmed that nanosilica has better mechanical properties than conventional concrete.

Nanda et.al (2018) investigated by performing strength tests on various samples. In the study, Ultratech Ordinary The W/C of concrete was kept at 0.42 and the workability was maintained in the medium range i.e. 0.85 to 0.95 compaction factor. Results show that the strength criteria of the concrete having additives were improved than earlier combinations.

## OBSERVATIONS

After reviewing the literature, Its found that use of nano silica and silica fume in concrete should be preferred. A few of the following observations are enlisted as below:

- i. The resistance of concrete against chloride penetration is increased with the addition of nanoparticles
- ii. Nano-SiO<sub>2</sub> has a large specific area, so it is more sticker and also has better water penetration resistance as compared to normal concrete.

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