

Partially Replacement of Silica Sand with Excellent Aggregate by Increasing Stability and Lack of Natural Aggregates

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Abstract: The one of the most important material in the construction material is concrete. That is used in the worldwide for all engineering works includes the infrastructures. It becomes as a cheap material and widely available by using it for infrastructures developments all over the world. That causes the shortage of the natural aggregates. Those materials are available in high cost, so to reduce the needs of those fine and course aggregates. This project work replaces the sand in partially with silica sand in percentages (10, 15 and 20%) in the concrete of M₂₅ grade. The specific mixes are tested and then it is compared with the conventional concrete. The compressive test is recorded.

Key words: Silica sand, compressive test, natural aggregates, natural, material, engineering

INTRODUCTION

Effect of micro silica on the strength of concrete with ordinary Portland cement has been explained by Ajay *et al.* (2012) and molecular modeling and structure analysis of S-ribose homocysteinase from aeromonas hydrophilia have been detailed by Yuvarani *et al.* (2014). Study of hard formation drilling and the strength of the concrete with Multiple Control Micro Detonation (MCMD) were proposed by Julius and Vishnu (2014).

A non-linear optical materials with excellent second order optical non-linearity owing to their probable submission is considered. This Non-linear Optics (NLO) is at the front position of recent study since, the significance in providing the key functions of frequency shifting, optical modulation, optical switching, optical logic and optical memory (Azeezaa *et al.*, 2015).

MATERIALS AND METHODS

Silica sand: Silica sand is produced by crushing the quartzite (stone). Silica flour (Louis, 2010; Attar and Gupta, 2010; Mastan *et al.*, 2017) is produced by crushing and washing the high-grade quartz rocks or by grinding the white silica sand. It may get into grains by the work of water, the wind, temperature changes, etc. (Fig. 1).

Grades: The manufacture of high-grade color glass like crystal glasses, tableware and decorated wares (Jignesh and Vaniya, 2015).

- Grade 1: decolorized glassware like lamp ware, container ware
- Grade 2: lass whereas the slight tint
- Grade 3: glasses like sheet glass, iron-sulfur amber glass



Fig. 1: Silica sand

Uses:

- Silica sand is mostly used to purify the water and to manufacture the glasses
- It is used as acid heat resistant ceramics, pottery glaze, etc
- About 150 mesh of silica sand is used for sawing stone, surfacing the glass and polishing the marbles
- It is also used as the fillers in the paint and as the wood paste
- Experimental study on core analysis for determination of sandstone resistivity and study of hard formation drilling by multiple control micro detonation has been explained

RESULTS AND DISCUSSION

The compressive strength for cube at the different percentages (5, 10, 15%) at the days of 7, 14, 28. The

Table 1: Test results cubes for compressive strength (INN/mm²)

Curing	Control concrete	Silica sand concrete (%)		
		5	10	15
7	16.88	15.23	16.71	14.66
14	21.24	22.01	20.45	18.98
28	37.72	41.36	39.24	36.19

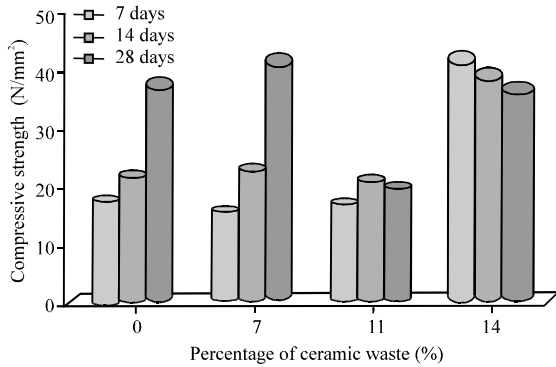


Fig. 2: Comparison of compressive strength of cubes

results are noted and it is compared to the control concrete. The three distinct rates of the halfway substitution of concrete by silica sand for example 5, 10 and 15% alongside the control examples. The compressive strength of the examples are shown in Table 1 and results are plotted.

The graphical representation in Fig. 2 shows the compressive strength of silica sand. The mix design was prepared for the M₂₅ grade concrete and the concrete was cast and tested with partial replacement of fine aggregate by silica sand with various percentages of 7, 11 and 14%. About 7% of silica sand achieve the maximum compressive strength for partial replacement of fine aggregate with silica sand is found to be greater than the conventional concrete. So, the 7% of silica sand replacement gives the maximum compressive strength than the conventional.

CONCLUSION

The concrete has prepared for the M₂₅ grade concrete with partial replacement of sand (fine aggregate) by silica

sand by various percentages of 5, 10 and 15%. The testing specimens were cast for 7, 14, 28 days and then those samples are tested.

- The maximum flexural strength for partial replacement of fine aggregate with silica sand is achieved by 7% is found to be greater than the conventional concrete
- It achieved maximum compressive strength when there is the partial replacement of fine aggregate with silica sand (7%)

So, the optimum percentage of replacement of silica sand is 7%.

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