

EFFECT OF SUGAR ON THE COMPRESSIVE STRENGTH OF CONCRETE

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Abstract:

Concrete blocks are mostly used for covering or coating on a structure or material, load bearing purposes all around the world. This paper gives special importance or value to the effect of sugar on strength of concrete. This experiment determines the effect of admixtures (sugar) on the compressive strength of concrete block. Based on books and literature the main function of sugar to increase the initial setting time of concrete. Usually three different percentage of sugar admixtures are taken as 0.0, 0.06, and 0.08% by weight of cement. Finally compressive strength and workability of concrete. The compressive strength of concrete blocks increasing it by 16.02% at 28 days as compared to ordinary concrete blocks.

Keywords: - Compressive strength, Admixture, Sugar and Workability.

I. INTRODUCTION

Concrete is most widely used man made construction material in the world and obtain by mixing cement, sand, aggregates and water, and sometime admixtures is required in suitable proportions. The strength, durability and other characteristics of concrete depends up on the properties of its ingredients, on the proportion of mix, the method of compaction and other control during placing, compaction and curing. Concrete block has its superior properties like binding, strength and durability, but it cannot be used in all places due to different weather conditions in different countries. Variation in weather condition and sessions causes changes in the initial setting time of concrete. Retarder and Accelerator are used to increase and decrease the initial setting time of concrete specially in winter sessions and summer sessions respectively. With the help of different type of admixture used such as Retarder-sugar and gypsum etc. and Accelerator- calcium chloride ($CaCl_2$) etc.

According to various review papers and research papers sugar is good admixture to retard (or increase) the initial setting

time. Sugar is a carbohydrate, a substance composed of carbon, oxygen and hydrogen. It is that in old monuments in Gandikota at Kadapa district Andhra Pradesh, where holding the stone was achieved by mortar with combination of lime, sand and jiggery juice. It can be useful when concrete used in hot weather, when the normal setting time of concrete is shortened by the higher surrounding temperature such as Gujarat, Rajasthan etc. Very small dosage of the order of 0.05 to 0.1 per cent of the mass of the concrete is enough. 0.05 per cent of sugar can delay initial setting time by about 4 hours. Usually three different percentage of sugar admixtures were taken as 0.0, 0.06, and 0.08% by weight of cement.

II. LITERATURE REVIEW

Bazid khan (2004) He added sugar as a admixture in cement paste into three different type of cements. The test result show that the effects of sugar on setting time of cement paste depends upon the dosages and different type of cements used. According to his investigation the one type of cement it accelerated the initial setting time and retarded the final setting time when dosages higher than 0.25% were used.

G. L. Oyekan (2007) Successful worked on improving the compressive strength of concrete block by the addition of sugar. 0.1% sugar content (by weight of cement) increased the compressive strength of the blocks by nearly 17% at 28 days. At 0.2% sugar content (by weight of cement) the 28 – day strength of the blocks was increased by only 9% but the 14-day strength of the blocks was increased by 56.6%.

Akogu Elijah Abalaka (2011) a successful work on sugar at concentration of 0.05% by weight of sugar content were taken on the cement past with C33 concrete curing at 3,7,14,and 28 days was investigated by use of ordinary Portland cement. The compressive strength test results show some marginal strength gains at all ages but peaks at 11.84% at 3 days at 0.05% sugar content.

Giridhar.V (2013) based on the test results, as percentage of admixture increases from 0 to 0.1% the compressive strength of concrete also increased. Maximum strength of concrete was related on workability of concrete and it can be achieved by high degree of workability. The compressive strength of concrete measured for both admixtures after 7 and 28 days. After 28 days, the percentage of variation between the ordinary concrete and concrete with 0.1% of sugar added as admixture was 12.0%.

III. MATERIAL USED

3.1 Cement: 43Grade Ordinary Portland Cement (ACC Limited) IS: 8112 (1989) was used. The specific gravity of cement was 3.15, the initial setting time was found 30 minutes and the final setting time was 600 minutes.

3.2 Fine Aggregates: locally available river sand passing through 4.75 mm IS Sieve was used. The specific gravity of sand was found as 2.65 IS 383-1970.

3.3 Coarse Aggregates: Crushed stone obtain from local sources has been used. The aggregates retain in 4.75 mm IS Sieve was used. The specific gravity was 2.80.

3.4 Water: the strength of well compacted concrete with good workability is dependent only on water-cement ratio. A drinking water should be used to provide adequate strength and workability. Generally the water-cement ratio is taken 0.50 in whole experiments.

3.5 Admixture: sugar was used in the concrete production. A white crystalline solid easily soluble in water and easily available in market and used in the experimental works. Sugar was added in concrete mix with three different dosages as 0.0, 0.06 and 0.08% by weight of cement.

3.6

IV. EXPERIMENTAL PROGRAMME

The proportion of sugar used along with the cement in the study are 0.0%, 0.06%, 0.08% respectively. In order to determine consistency, initial setting time and final setting time, vicat apparatus with plunger, square needle and annular collar used respectively. The workability and compressive strength were done with slump test and compressive testing machine respectively.

V. RESULTS AND DISCUSSION

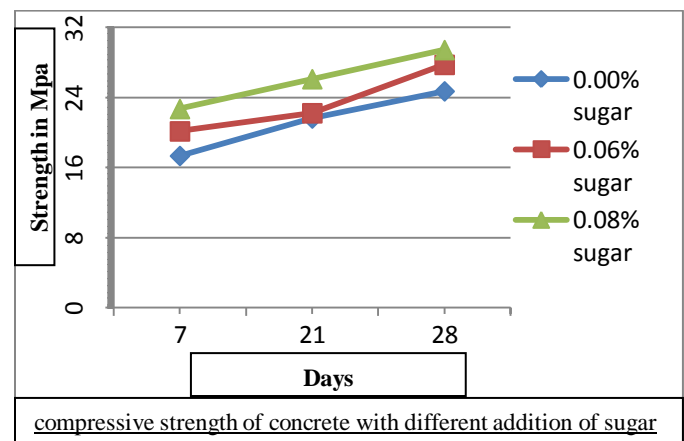
A series of laboratory tests (initial setting time, final setting time, workability and compressive strength) have been performed with mortar and concrete by adding different percentage of sugar.

TABLE 1
Initial, final and workability.

S.NO	% of sugar	sample	Value
1	0.0	Initial setting time	30 minutes
		final setting time	600 minutes
		Workability (slump test)	110 mm
2	0.06	Initial setting time	50 minutes
		final setting time	600minutes
		Workability (slump test)	150 mm
3	0.08	Initial setting time	85 minutes
		final setting time	600minutes
		Workability (slump test)	190 mm

TABLE 2
Compressive strength

S.No	% of sugar	7 days MPa	21 days MPa	28 days MPa
1	0.0	17.36	21.64	24.74
2	0.06	20.17	22.24	27.77
3	0.08	22.72	26.13	29.46



VI. CONCLUSION

From the result it is clear that a change in the properties of concrete take place. When sugar is mixed with concrete.

- The setting time of concrete increase sugar with increase the percentage of sugar.
- Workability increases with increase the percentage of sugar.

- The compressive strength increases 16.02% at 28 days as compared to ordinary concrete.

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