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INVESTIGATION ON WASTE GLASS MATERIAL USED IN A CONCRETE

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Abstract: The increasing waste of glass recycling speeds up inspections on the use of waste glass with different forms in various regions. One of its significant used is to the construction field where the waste glass was reused for value-added concrete production. The survey indicates that the use of waste glass as aggregates in concrete was first used over 50 years ago. The alkali-silica reaction (ASR) by using glass in concrete and its unique aesthetics properties have been discovered since then. However, no one complete solution to ASR has been found and the application of glass in concrete still needs improving. Laboratory experiments were conducted in the University further explore the use of waste glass as coarse and fine aggregates for both ASR alleviation as well as the ornamentally purpose in concrete. This paper presents mainly the latter aspect, in which study, both fresh and hardened properties of the concrete were tested.Result and conclusion that the use of waste glass as aggregate provided the development of concrete at high level and high performances.

KeyWords: aesthetic properties, glass aggregate

INTRODUCTION:

Waste glass is a major component of the solid waste in many countries 1. It has various forms, like as container glass, flat glass, windows, bulb glass and cathode ray tube glass etc. Glass has been recycle and reused, a significant ratio, which is about 81% of the waste glass generated in world and is send to filling in the land. Glass is a totally recyclable material with high performance and unique properties which make it suitable for high level uses. The use of glass as partial replacement aggregates in concrete has great performance for future high quality concrete development. However, tThe quantity of waste glass is gradually increased over the years due to an growing use of glass products. There is huge potential for using waste glass in the concrete construction sector. Waste glass recycle in making concrete products.There is huge potential for using waste glass in the concrete construction sector. When waste glasses are reused in making concrete products, the production cost of concrete will go down In order to make concrete industry sustainable, the use of waste materials in place of natural resources is one of the best approaches. An enormous quantity of waste glass is generated all around the world. In India, 0.7% of total urban waste generated comprises of glass. 1. investigated ASR in concrete using certain suppressants; 2. To develop concrete using glass as a coarse aggregate replacement; and to obtain a high level by using glass as ornamentl aggregates. The first stage ASR study confirms the effectiveness of certain suppressants in mitigating ASR of glass concrete. Based on this research finding, assumptions are made where the ASR effect has been reduced to a certain extent that could be outside the consideration in the second stage architectural study.

OBJECTIVES:

1. For sustainable development of structural engineering
2. To reduce or utilize the waste generated from structure
3. To use waste material in construction unit
4. To find the alternative for basic material which are used in construction from past many year.

EXPERIMENTAL WORK:

As above articles within the experiments, the glass concrete study is main concern in this paper, where, glass used both as coarse and fine aggregates with the purpose of giving a high performance and aesthetic level of concrete.

MATERIALS:

1. Cement

In the glass concrete study, ordinary Portland cement (OPC) was used. This cement has alkali content.

2. Coarse aggregate (CA)

Different types of glass of varying sizes and colors were used instead of the 5-10mm normal aggregate (NA) in. The specific gravity of glass is 2.50.

3. Fine aggregate (FA)

Dolomite, which has a pure white color, was widely used in the architectural concrete development. Its shape and size have potential benefit in obtaining a good particle size distribution in glass concrete. 1.0-3.0mm glass particles were also use as fine agg, in glass concrete to make a suitable color distribution in mix.

TEST METHODS:

1. Fresh concrete property tests

Three tests were carried out to examine the fresh concrete workability, air content as well as the density. Among them, the workability of fresh concrete was examined by the slump test. The test set-up is conducted as recommended in IS code. In the density test, fresh concrete is compacted into a rigid and watertight container of known volume and known mass and is then weighed .

2. Hardened concrete property tests

The compressive strength test adopts the method specified in IS code 456-2000.Specimens were loaded to failure in a compression testing machine and the maximum load was recorded. The water absorption test at observe the capability of the concrete to absorb water.

RESULTS AND DISCUSSIONS:

A number of colored glass concretes using different colors and particle sizes of glass aggregates, cement with CRM materials and pigments were developed at laboratory and some of the samples were given in Fig. 1. These samples demonstrate the achievements of the use of colored glasses in improving aesthetic standard for concrete.

Table 1 - Fresh test results concrete Slump (mm)	Air Content (%)	Density (kg/m3)
48.00	**1.00**	**2.30**
56.00	**3.60**	**2.22**
110.00	**2.10**	**2.26**
120.00	**1.50**	**2.29**

2. Air Content Test Results

As specified in IS code, the air content should be in the range of 0% to 10% . The test results in Table 1 shows that the results conform to the specified range and the test is satisfactory.

3. Density Test Results

The densities are approx 2300 kg/m3 and conform to the assumption of mix design.

ardened concrete tests

1. Compressive strength test

1) Failure mode The four exposed faces were cracked approximately equally, with little damage to faces in contact with the platens.

2) Compressive strength development

The sets of glass concrete block were use for each mix calculation, the mean compressive strength was measured and calculate at 14 and 28 days as fallows

Compressive strength for 14 days

S.NO	Glass Percentage	GRADE	COMPRESSIVE STRENGTH (N / mm2)	COMPRESSIVE STRENGTH (N / mm2)
1	Replacing 10% of FINE AGG with glass.	M20	17.42	18.07
			18.72	
2	Replacing 20% of FINE AGG with glass.	M20	16.98	16.76
			16.55	
3	Replacing 10% of COARSE AGG with glass.	M20	13.93	13.31
			13.5	
4	Replacing 20% of COARSE AGG with glass.	M20	18.29	17.63
			16.98	

Compressive strength after 28 days

S.NO	Glass Percentage	GRADE	COMPRESSIVE STRENGTH (N / mm2)	COMPRESSIVE STRENGTH (N / mm2)
1	Replacing 10% of FINE AGG with glass.	M20	24.42	25.56
			26.72	
2	Replacing 20% of FINE AGG with glass.	M20	23.46	23.56
			23.76	
3	Replacing 10% of COARSE AGG with glass.	M20	20.59	21.36
			22.17	
4	Replacing 20% of COARSE AGG with glass.	M20	23.74	24.75
			25.76	

CONCLUSION: The paper presents is describing utilization of waste glass as aggregates in a range of concretes and their properties tests. The result conduct in this experiment confirms that the properties of those special mixed concretes are satisfactory. The properties tested include workability, air content, density, compressive strength, water absorption. It is found that water absorption is related to the compressive strength of the concrete. Ultimately, glass is found to be a material as a decorative aggregate in concrete with its satisfactory performances and property improvement.

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