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Research Paper

Experimental Study by Cubes of Concrete Made With Crushed Glass as Fine Aggregates

Engineering

KEYWORDS : Concrete, fine aggregate, recycled bottles, sustainable, waste materials, compressive strength,

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ABSTRACT

This experimental study aimed to arrive at a concrete mixture with recycled bottles as an alternative fine aggregates for mass housing projects that will meet and contribute to the industry in saving the environment, to encourage the government to find solutions regarding the disposal to landfills of waste materials and provide new knowledge to the contractors and developers on how to improve the construction industry methods and services by using recycled bottles, and to sustain good concrete performance and meet recycling goals. A conventional concrete product was compared to concrete with recycled bottles of the same proportions. Observations from the tests performed were conducted in the laboratory of KCT Engineering College Gulbarga. In the normal concrete compressive strength study is made and in another concrete in the normal concrete fine aggregates are totally replaced by crushed waster glass products. Where precise data were gathered and completely attained From the concrete Grade of M20 concrete cubes were cast of size 15x15x15 cms size, and they are cured for 3,7,14, and 28 days in the concrete technological laboratory tank of KCT Engineering College Gulbarga.

Introduction

As time goes by, human civilization is continuously becoming more industrialized. More factories are built, vehicles are continuously growing in number, and buildings were built all around. As a result of these, our natural environment was permanently changed from what it has been twenty years or more.

Over, the last several decades, sociologists have investigated the public's increasing concern about the environment, but they have had little success explaining attitudes . toward the environment or the adoption of pro-environment behaviors like recycling The researcher examine the role of social context in the link between individual attitudes about the environment and recycling behavior by comparing communities that vary in their access to recycling programs. Results show that people with access to a structured recycling program have much higher levels of recycling than do people lacking such access. Furthermore, individual attitudes toward the environment affect recycling behavior only in the community with easy access to a structured recycling program. Individual concern about the environment enhances the effect of the recycling program, but does not overcome the barriers presented by lack of access.

The human population is continuously growing in number, because of this; there is a great demand of constructing more structures to facilitate the n eeds of the community. Quarry operations become rampant to satisfy the need for gravel and sand for construction. As a consequence there are massive destruction of mountains which has been one of the major costs of landslides, and flashfloods during earthquakes and typhoons resulting to loss of thousands or even millions of lives.

The results of this study are expected to benefit the following: (1) the students of other fields could be provided with a reference and can give them knowledge about recycled glass bottles as an alternative fine aggregate for concrete mix. This study will encourage them to study other materials that can be used as a construction material and awaken their minds regarding environmental protection [(2)] the contractors and home builders will be provided with knowledge and information to improve the method of construction using other materials as fine aggregate to concrete cement for construction [(3)] the government and non-government sectors are given new ideas of maximizing their resources on construction projects. This study will also make them knowledgeable that junk materials can be used as construction material and urge them to finance further studies for the development of this study.

A number of attempts have been made to successfully use glass as an additive in concrete compositions. Certain compositions proposed have been successful in accomplishing specific goals.

II OBJECTIVES

The objectives of this study is to investigate compressive strength of the concrete made with crushed waste glass as fine aggregate

- To study the compressive strength development of concrete made with the crush glass as fine aggregate.
- To study the development of compressive strength in the normal concrete prepared by using good quality river bedded sand.
- To compare the compressive strength development of concrete prepared by using crushed glass as fine aggregate and good quality river bedded sand.

MIX DESIGN OF M20 GRADE CONCRETE

A. Mix Proportions:

Cement = 350.0 kg/m3

Water = 192.0 liters

Fine Aggregates = 688.0 kg/m3

Coarse Aggregates = 1295.0 kg/m3

Admixtures = 0 kg/m3

Water Cement Ratio = 0.55

Therefore,

Water: Cement: Fine Aggregate: Coarse Aggregate

0.55: 1: 1.965: 3.70

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III MATERIALSAND METHODOLOGY

CEMENT

The common OPC 53 grade cement is used. The physical properties of the cement tested according to standard procedure conform to the requirement of IS 12269:1989

Table 1 Physical properties of Cement.

S.No	Characteristics	Value obtained experimentally
1	Standard Consistency	33%
2	Fineness (90 micron sieve)	3%
3	Initialsetting time	30 minutes
4	Specific gravity	3.0

FINE AGGREGATES

Locally available good quality river sand passing through 4.75mm sieve conforming to the recommendation of IS383-1970 was used.

Table 2 Physical properties of Fine Aggregate River bedded sand

S. No	characteristics	Value obtained experimentally
1.	Fineness modulus	2.9
2.	Specific gravity	2.63

FINE AGGREGATES

Crushed waste glass made at KCT Engineering Collage Gulbarga

Table 2 Physical properties of Fine Aggregate as crushed waste glass.

S. No	characteristics	Value obtained experimentally
1.	Fineness modulus	3.14
2.	Specific gravity	1.71

COARSE AGGREGATE (Basalt): Locally available coarse aggregate retaining on 4.75mm sieve of basalt stone is used.

Table 3 Physical properties of Coarse Aggregate (Basalt stone)

S.NO	characteristics	Value obtained experimentally
1.	Fineness modulus	7.73
2.	Specific gravity	2.59

Water

Potable water suitable for drinking purpose available in the campus of KCT Engineering college is utilised in the preparation of concrete.

Methodology

The basic tests required on the ingredients of concrete were carried out. Thereafter the mix design of the concrete is done. Then in the material testing laboratory and concrete technology laboratory of KCT Engineering college Gulbarga the mixing of the concrete is done. Concrete cubes of 15cmx15cmx15cm sizes were prepared and cured for 3,7,21, and 28 days of curing is carried out. Then these blocks are removed from the curing tank and tested for compressive strength in Compression testing machine of building material testing laboratory of KCT Engineering college Kalburgi. The results of compressive strength are tabulated in proper tabular columns.

Concrete is prepared is of two types.

1. By using sand of good quality in concrete in place of fine aggregates in concrete, which is termed by the authors over here as the Normal concrete.
2. The concrete prepared by using the Crushed waste glass in place of fine aggregates in concrete.

IV RESULT AND DISSCUSION

Table 5 Compression strength of Concrete cubes in N/mm²

% of different sands in concrete	3 days	7days	21 days	28days
Good quality sand	10.54	17.78	24.02	26.34

From the above tabular Colum we can notice that the strength development of normal concrete that is concrete made with the utilization of good quality sand which is available in Gulgarga area are 10.54 N/mm²,17.78 N/mm²,24.02 N/mm² and 26.34 N/mm² at 3,7,21,28 days of curing respectively.

Table 5 Compression strength of Crushed waste glass as fine aggregate in Concrete cubes in N/mm²

% of different sands in concrete	3 days	7days	21 days	28days
Good quality sand	8.94	14.53	20.10	22.10

From the above tabular Colum we can notice that the strength development of concrete that is made with the utilization of Crushed waste glass which is available in Gulbarga area are 8.94 N/mm²,14.53 N/mm²,20.10 N/mm²,22.10N/mm² at 3,7,21,28 days of curing respectively.

V. CONCLUSIONS

From the above tabular column values the following conclusions are drawn

In the concrete the strength development of normal concrete that is concrete made with the utilization of good quality sand which is available in Gulgarga area are 10.54 N/mm²,17.78 N/mm²,24.02 N/mm² and 26.34 N/mm² at 3,7,21,28 days of curing respectively.

From the above we can notice that the strength development of concrete that is made with the utilization of Crushed waste glass which is available in Gulbarga area are 8.94 N/mm²,14.53 N/mm²,20.10 N/mm²,22.10N/mm² at 3,7,21,28 days of curing respectively.

A number of attempts have been made to successfully use glass as an additive in concrete compositions. Certain compositions proposed have been successful in accomplishing specific goals.

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