Experimental Study On Cement Concrete By Using Crumb Rubber As A Partial Replacement For Coarse Aggregate

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Abstract

Concrete is one of the highest produced man-made a material. It covers almost 30% of construction cost. The strength of the concrete is mainly due to cement and quality of coarse aggregate. Naturally available broken rock pieces are widely used as coarse aggregate, at present materials like crushed coconut shells, eps balls, crushed glass pieces are used as an alternative for coarse aggregate. In this project, an attempt has been made to evaluate the crumb rubber as a partial replacement for coarse aggregate which incorporating 5%, 10%, 15%, 20%, 25% of discarded crumb rubber from the tire for partial replacement of coarse aggregate. The compression test is made and the compressive strength of concrete has been evaluated. Based on the test results, the efficiency of the crumb rubber as coarse aggregate was addressed.

Keywords: crumb rubber, cement, coarse aggregate, compressive strength.

I. INTRODUCTION

Concrete is one of the most common materials used in the construction industry. In the past few years, many research and modification concrete which has the desired characteristics. search for concrete with high strength and durability. In this matter, concrete has been introduced to suit the current requirements.

used as concrete constituents, in addition to Portland cement. Originally the term pozzolanic was associated with natural ashes and calcined temperature in the presence of water.

Cement is the binding material which in the preparation of concrete. It binds the and fine aggregate with the help of water, a monolithic matter. And also fills the fine voids in the concrete. There are two intrinsic requirements for any cement mix design

In this work, the binder, instead of Portland or any other hydraulic cement paste, to produce concrete. The fly ash based paste binds the loose coarse aggregates, fine aggregates, and another form the concrete, with of admixtures. Concrete is the most widely used composite material today. The constituents of concrete are fine aggregate, binding material, and water. The rapid increase in construction activities leads to acute conventional materials.

Aggregate is a since occupies about 70-75% volume concrete, relatively its quality affects the durability and structural behavior of concrete members. A fine aggregate which passed through 2.36mm sieve and retained in 1.18mm sieve was used. The mineralogical natural of sand is important, especially in all sands are composed of quartz particles. Although quartz is frequently major constituent pure silica sand than the rule.

The crushed granite metal obtained from a was used as a coarse aggregate which passed through 12.5mm sieve and retained in 10mm sieve was used. It gives strength to the concrete and constituents about 70 to 75 percent volume of concrete. Coarse aggregate is generally derived by crushing naturally available. There are three varieties of rock available. Almost any natural water that is drinkable and has no pronounced taste or odor can be used as mixing water for making concrete. Some water is not suitable may still be mixing concrete. It is a concrete look not so spectacular. Here are some of the top advantage of Green Concrete.

It has a high compressive strength that showed higher Compressive strength than that ordinary concrete. Green concrete has high tensile strength. Green concrete requires special handling need and is extremely difficult to create. It requires the use of chemicals such as sodium hydroxide, that can be harmful to humans. Green concrete is sold only as precast or premix material due to the danger associated with creating it.

II. LITERATURE REVIEW

M.Giasuddin et al,(2013), sequestration of atmospheric CO2 to be viable, it is important of a stored gas long period.

C.Y.Heaha et al,(2011), Depending on the green concrete can exhibit a wide variety of properties and characteristics. Curing profile serves as a crucial parameter in the synthesis of green concrete. In this paper, the influence of curing temperature and curing ash-based concrete was studied.

Komnitsasa et al,(2011), Sustainable cities of the future apart from having consumption and greenhouse gas emissions should also adopt the "zero waste" principle. Green concrete is a cementations materials with Al and Si-containing solid materials at relatively low temperatures.

D.M.J.Sumajouw et al,(2012), The objectives of this paper are to present analysis on the behavior and the concrete slender columns. The compressive strength of concrete is 70Mpa.

B.Vijaya Rangan et al,(2010), A compressive summary of studies conducted on fly ash concrete is presented. These results are utilized the simple proposed method for the design of green concrete mixtures.

Alireza Mokhtarzadeh and Catherine French et al,(2015), They studied the used of fly ash and silica not necessarily translate into higher strengths. benefits from inclusion dust in the production of HSC depends on the factor such as mix proportions, type of aggregate of curing.

III. PROPOSED WORK

The chemical fly ash from all batches, as determined by X-Ray Fluorescence (XRF) analysis, are given in Table 4.1. from table 4.1, that the three batches of fly ash contained a very low percentage of carbon. It is important occupies about 70–75% volume concrete, relatively cheap as its quality affects the durability and structural behavior of concrete members. It is said that the concrete is of its aggregate. It is a considerable extent as this is the strength to the concrete...

This experimental study presents the variation in the strength of concrete when dust from 0% to 100%. M20 grade of concrete is studied keeping a constant slump of 60mm. The cubes at the age of 7, 14 and 28 days were obtained at room temperature.

To the fresh green concrete, a superplasticizer, a Conplast SP 430 liquid form, supplied by KVN Technologies, Thanjavur, was also tried. However, this type of superplasticizer was not used due to the cost.

Table 1 Specimen Details

MATERIAL NAME	MATERIAL TYPE	UNIT WEIGHT (kg/)	SPECIFIC GRAVITY
CEMENT	OPC (43 GRADE)	1440	3.15
FLY ASH	CLASSC	1500	2.1
FINE AGGREGATE	NATURAL SAND	2000	2.507
REPLACING FINE AGGREGATE	stone DUST	1900	2.688
COARSE AGGREGATE	20mm AGGREGATE	2000	2.703
SUPER PL[ASTICIZER	SNF (CONPLAST 430)	-	1.2

Strength development of the reactions of water with cement particles. with the cement available at the surface of the particles. Thus larger the reaction greater the rate of hydrations. strength requires greater degree fineness. However, too much fineness is also considerable. Finer cement deteriorates more quickly when exposed to air and is likely to cause more shrinkage, but less prone to bleeding. Strength development of concrete is the result of the reactions of water with cement particles. The reactions always start with the cement available at the surface of the particles. Thus larger the surface area available for reaction greater the rate of hydration.

Total weight (w1) = 10g Retained weight (w2) = 0.4g

Fineness of cement = (w2 / w1) *100 = 4%

For ordinary Portland cement fineness should not be more than 10% of the original weight. The specific gravity of cement is the ratio of the weight of a given volume of a substance to the weight of an equal volume of water. It is a mere number and it denotes how many times a substance is heavy as water.

3.1 PROCEDURE

Clean dry and weight specific gravity bottle. Take a certain quantity of cement (about one-fourth of the bottle) in the bottle and weight. Pour kerosene over the cement to fill the bottle and find the total weight. Clean the bottle thoroughly with kerosene and fill the bottle with kerosene and weight. Finally, clean the bottle with water and weight.

Empty Weight ofdensitybottle (W1) = 28g

Weight of Cement withdensitybottle (W2) = 37g Weight of Cement with kerosene anddensitybottle (W3) = 74g

Weight of density bottlewithkerosene (W4) = 70 g

Specific Gravity of Cemen = (W2-W1) / [(W2-W1) - (W3-W4)] = 3.15

For convenience, initial setting time is regarded as the time elapsed between the moments that the water is added to the cement, to the time that the paste starts losing its plasticity.

3.2 PROCEDURE

Start a stop-watch at the instant when water is added to the cement.

i. Fill the Vicat mold with a cement paste gauged as above, the mold resting on a nonporous plate.

ii. Fill the mold completely and smooth off the surface of the paste making it level with the top of the mold.

iii. Immediately after molding, place the test block in the moist closet or moist room and allow it to remain there except when determinations of time of setting are being made

iv. Repeat this procedure until the needle, when brought in contact with the test blockandreleasedasdescribedabove,failstopiercetheblockbeyond5.0±

0.5 mm measured from the bottom of the mould shall be the initial setting time. Determination of Final Setting Time - Replace the needle (C) of the Vicat apparatus by the needle with an annular attachment (F).

v. The cement shall be considered as finally set when, upon applying the needle gently to the surface of the test block, the needle makes an impression thereon, while the attachment fails to do so. Initial setting time: 35 minutes. Final setting time: 9.30 hours

This is the name given to the operation of dividing a sample of aggregate into various fractions each consisting of particles of the same size. The sieve analysis is conducted to determine the particle size distribution in a sample of aggregate.

1V. WORKABILITYTEST

The concrete slump test measures the consistency of fresh concrete before it sets. It is performed to check the workability of freshly made concrete, and therefore the ease with which concrete flows.

Height: 300 mm, Top Diameter: 100 mm, Bottom Diameter: 200 mm

.Table 2 Value of Slump test

% OF stone DUST & FLY ASH ADDED TO THE CONCRETE	SLUMP FLOW
Concrete have no replacement	26mm
100% of stone dust added to concrete	25.5mm
100% of stone dust & 10% of fly ash added to concrete	27.5mm
100% of stone dust & 15% of fly ash added to concrete	28mm
100% of stone dust & 20% of fly ash added to concrete	30mm

This difference in height in mm is the slump of the concrete.

V. CONCLUSION

In the experimental investigation, conventional concrete replacement of fly ash 10%, 15% and 20% by cement have been studied and the results are presented. 100% of natural river sand is replaced by stone rock dust from quarries gives equal or better result than the conventional concrete which increases the compressive and flexural strength. Fly ash is the product to obtain durability and environmental benefits. used as an admixture which increases the strength, durability, and workability of the concrete. decrease the workability, the use of fly ash may decrease the strength. For balancing these properties we plasticizer - Sulphonic Naphthalene Formaldehyde as an admixture. Thus stone dust as the full replacement and partial replacement of cement with fly ash is possible.

VI .REFERENCE

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