BEHAVIOUR ON COIR FIBRE CONCRETE BY PARTIAL REPLACEMENT OF CEMENT WITH ALCCOFINE 1203

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Abstract

Concrete is most adaptable, durable and dependable construction material over the world and it's the most important introductory material in all civil engineering structures. The constituents of concrete are cement, fine, coarse summations and water, which are mixed in a particular proportion to get needed strength. Increase in demand of cement around the globe seeks high intention in chancing some druthersto cement in concrete. The commencement of new indispensable limits the CO2, a major hothouse effect causing gas. Research is taking place on all corners of the globe in hunt of different material options. To meet the needs of population increase, river sand is extracted from riverbeds and used to construct homes and massive infrastructure. The preservation of river sand used as a fine aggregate in concrete production has become a serious problem due to globalisation and the enhanced technology needed to fulfil local and international economic demands. In this study, a small trial is conducted to modify the properties of concrete by partially replacing the cement with alccofine 1203 at different percentages of 0%, 5.1%, 10.1%, 15.1%, and 20.1% and fine aggregate with coir fibres of length 15mm at various percentages of 0%, 1.1%, 2.1%, 3.1%, and 4.1%. To assess the concrete's compressive and split tensile strengths, various tests are conducted. Every specimen is utilised for 7 and 28 days and tested for compressive and split tensile strength .

Keywords: *Alccofine (1203), coir fibre, compressive strength , split tensile strength.*

1.Introduction

There are specifications that must be maintained in order to make and use concrete as a building material. Concrete is made composed of cement, fine and coarse aggregate, water, and additives. Concrete will be created by combining these components. In a few unusual circumstances, high strength concrete was required, thus extra supplies were provided while certain concrete parts were partially rebuilt.Alccofine-1203 is a microfine substance with a high glass content and high reactivity that is also low in calcium silicate and ecologically safe. As a result of its addition to concrete, the workability, segregation, heat of hydration,

permeability, hydration speed, and pozzolanic reaction have all increased.To attain high strength in the early stages of curing. Economic coir fibre, found in surplus, is stronger and more elastic than plastic. As our existing situation gradually became dirtier, the demand to replace designed filaments with normal fibre for composite construction grew. Coir fibre reinforced polymer composites are appropriate for use in transient open-air applications as well as for major inside components in housing.The optimum strategy is low-cost accommodations for recovery and transportation. Jute is used in car entryways, roof boards, and boards between the motor and passenger compartments because of its protective properties. The effects of cycle boundaries, such as fibre size, condition, and percentage, on the elasticity of jute fibre supported thermoplastic composites have been studied.

2. Objectives

a) To maximise the use of cement with alumofine.

b) To maximise the use of coir fibre in concrete (1203)

c) To assess the concrete's compressive and split tensile strength.

3. MATERIALS

3.1 Cement: The properties of cement are presented in Table 1.

Table 1 Physical properties of cement

S. No.	Property	Cement (53 grade)
1	Specific gravity	3.14
2	Fineness	9.85%

3.2Fine Aggregate: Crushed stone or natural sand must be used as the fine aggregate in concrete. The fine aggregate density has a considerable impact on the hardened characteristics of the concrete.

3.3 Coarse aggregate: Coarse aggregate is defined as aggregate that is maintained over IS Sieve 4.75 mm. According to IS 383:1970, the typical maximum size is progressively 10–20 mm.

3.4. Water: One of the most crucial materials in construction, water is needed for a variety of tasks like making mortar, mixing cement concrete, and curing work. The strength of the motor and cement concrete in the building project is directly influenced by the quality of the water utilised.

3.5.Alccofine: Alccofine 1203, preferably CAMg (CO3)2, is an anhydrous carbonate mineral made of calcium magnesium carbonate. Additionally, a sedimentary carbonate rock mostly made of the mineral dolomite is referred to by this name. The trigonal-rhombohedral system is how the mineral dolomite crystallises. Crystals made of it might be white, brown, grey, or pink. With an alternate structural arrangement of calcium and magnesium ions, Alccofine 1203 is a double carbonate. It does not dissolve quickly unless it is in the form of a fine powder.

3.6. Coir fibre:The long, delicate, shiny vegetable fibre known as coir may be spun into thick, dense cords. The Corchorus olitorius plant is the primary source of the fibre, albeit it is recognised as inferior to Corchorus capsularis. Corchorus olitorius was originally classified as a member of the tiliaceae family, and more recently with malvaceous. The plant or fibre that is used to create burlap, hessian, or gunny cloth is known as "jute." Cellulose and lignin are two components of plants that make up the majority of coir fibre. Along with kenaf, industrial hemp, flax (linen), ramie, and other fibres derived from the

plant's bast, or phloem, it is classified as a bast fibre. The fibres range from brown to off-white.

4. EXPERIMENTAL RESULTS

4.1Compressive strength

The compressive strength conducted in compression testing machine for the cast and cured specimens and the results are furnished in table 2 to 4.

Table2:Strength results of concrete by partial replacement of Alccofine with cement.

S.No.	Alccofine	Compressive Strength, N/mm²		Split tensile Strength, N/mm²	
		7 days	28 days	7 days	28 days
1	0%	28.03	40.12	2.68	3.89
2	5.1%	32.34	47.29	3.18	4.62
3	10.1%	34.46	49.87	3.42	4.93
4	15.1%	39.97	58.45	4.35	6.25
5	20.1%	38.99	54.88	3.73	5.26

Table3:Strength results of concrete by partial of coir fibre in concrete .

S.No.	Coir fibre	Compressive Strength, N/mm²		Split tensile Strength, N/mm²	
		7 days	28 days	7 days	28 days
1	0%	28.03	40.12	2.68	3.89
2	1.1%	28.65	40.99	2.78	3.99
3	2.1%	29.19	41.72	2.85	4.08
4	3.1%	30.67	43.33	3.30	4.67
5	4.1%	28.91	42.59	2.04	2.93

Table 4: Strength of Combined replacement of AF+CF

S. No.	AF+CF	Compressive Strength, N/mm²		Split tensile Strength, N/mm²	
		7 days	28 days	7 days	28 days
1	0%	28.03	40.12	2.68	3.89
2	15.1%AF+3.1 %CF	42.43	60.02	4.68	6.63

5.Conclusions:

1.The normal concrete compressive strength results for 7 and 28days is 28.03 N/mm^2 and 40.12 N/mm^2.

2.The normal concrete split tensile strength results for 7 and 28days is 2.68N/mm^2 and 3.89 N/mm^2.

3. The compressive strength results of 15.1% partial replacement of alccofine with cement for 7 and 28days is 39.97 N/mm^2 and 58.45 N/mm^2.

4. The split tensile strength results of 15.1% partial replacement of alccofine with cement for 7 and 28days is 4.35 N/mm^2 and 6.25 N/mm^2.

5.The compressive strength results of 3.1% partial replacement of coir fibre concrete for 7 and 28days is 30.67 N/mm^2 and 43.33N/mm^2.

6. The split tensile strength results of 3.1% partial replacement of coir fibre concrete for 7 and 28days is 3.30 N/mm^2 and 4.67 N/mm^2.

7. By the combination of 15.1%AF+3.1%CF with concrete the compressive strength result for 7 and 28days is 42.43 N/mm^2 and 60.62 N/mm^2.

8. By the combination of 15.1%AF+3.1%CF with concrete the split tensile strength result for 7 and 28days is 4.68 N/mm^2 and 6.63 N/mm^2.

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