

STRENGTH STUDIES OF CONCRETE BY PARTIAL REPLACEMENT OF FINE AGGREGATE WITH SAWDUST

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Abstract

This study examines the use of sawdust as a waste product to replace sand and Alccofine (1203) as a partial replacement for cement to alter the properties of concrete. The effects of the alteration on the concrete were investigated after sand was weight for cement in the concrete mixtures. By incorporating sawdust into concrete, waste (sawdust) may be disposed of while also reducing the weight of the concrete. Alccofine (1203) is applied as an admixture to replace cement in various amounts of 0%, 4%, 8%, 12%, 16%, and 20%, while sawdust is added as an admixture to replace fine aggregate in various amounts of 3%, 6%, 9%, and 12%. Compressive and split tensile strengths at 7 and 28 days were taken into consideration for determining the test findings.

Key words :Alccofine(1203), sawdust, compressive strength, split tensile strength.

Introduction

Concrete is a composite material made of coarse aggregate joined by a fluid cement that gradually becomes harder. The most common types of concrete are those created with hydraulic cements or lime-

based concretes like Portland cement concrete. Composite, a new generation micro-fine concrete material for high strength, is significant in terms of both workability and strength. Additionally, Alccofine is simple to use and can be mixed right into cement. Alccofine is also simple to use and can be mixed right in with cement. Alccofine's ultrafine particles produce a superior, smoother surface finish. Due to its adjusted particle size distribution, Alccofine offers special qualities that improve the "performance of concrete" in both the fresh and hardened stages. The construction and building business is not accustomed to using sawdust. This is either because to the fact that it is not readily available as sand or gravel, or it is because their use for such purposes has not been promoted. Recently, there have been requests for the building industry, particularly in developing nations, to employ local resources to reduce construction costs. Sawdust is a

term for loose particles or wood chips that are produced as byproducts when timber is cut into uniform, usable pieces.

2. OBJECTIVES

- a) To use cement with Alccofine (1203) in concrete as efficiently as possible.
- b) To use fine aggregate and sawdust as efficiently as possible.
- c) To assess the concrete's compressive and split tensile strength.

3. Materials

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	9.75%

3.1 Alccofine

A supplement cementitious material called alccofine 1203 can effectively replace the silica fume used in high performance concrete. It is derived from the iron ore industry's raw materials. Alumina and silica are present in larger percentages in the alccofine's chemical composition. According to the demands of concrete performance, ALCCOFINE1203 offers lower water demand for a given workability, even up to 70% replacement level.

3.2 Sawdust

It is made up of tiny wood particles. These tasks can be carried out with hand tools, portable power equipment, or woodworking machinery. Sawdust is

created when wood logs are cut into various sizes, either as small, irregular chips or little fragments of wood.

4. EXPERIMENTAL INVESTIGATIONS

4.1 Compressive strength results

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

Table 2: Compressive strength of concrete with Alccofine (1203)

Sl.no	Alccofine	Compressive strength results, N/mm ²	
		7 days	28 days
1	0%	34.54	49.63
2	4%	40.43	59.11
3	8%	44.91	64.26
4	12%	46.29	68.28
5	16%	51.47	72.44
6	20%	47.43	68.65

Table 3: Compressive strength of concrete with Sawdust

Sl.no	Sawdust	Compressive strength results, N/mm ²	
		7 days	28 days
1	0%	34.54	49.63
2	3%	30.01	31.12
3	6%	24.13	34.86
4	9%	22.08	32.14
5	12%	15.52	23.74

Table 4 :Compressive strength of concrete with Alccofine(1203)and Sawdust

Sl.no	AF+SD	Compressive strength
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		results,N/mm ²	
		7 days	28 days
1	0%	34.54	49.63
2	16%AF+6%SD	45.99	65.06

		strength results,N/mm ²	
		7 days	28 days
1	0%	3.38	4.85
2	16%AF+6%SD	5.17	7.41

4.2 Split tensile strength results

The split tensile strength conducted in compression testing machine for the cast and cured specimens and the results are furnished in table 5 to 7.

Table 5: Split tensile strength of concrete with Alccofine (1203)

Sl.no	Alccofine	Split tesile strength results,N/mm ²	
		7 days	28 days
1	0%	3.38	4.85
2	4%	3.97	5.84
3	8%	4.41	6.36
4	12%	4.77	6.82
5	16%	5.12	7.78
6	20%	4.23	6.17

Table 6: Split tensile strength of concrete with sawdust

Sl.no	Sawdust	Split tesile strength results,N/mm ²	
		7 days	28 days
1	0%	3.38	4.85
2	3%	3.10	3.96
3	6%	2.40	3.44
4	9%	2.15	3.18
5	12%	1.56	2.34

Table 7 : Split tensile strength of concrete with Alccofine &Sawdust

Sl.no	AF+SD	Split tesile
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5. CONCLUSION:

- 1.At 16% partial replacement of Alccofine (1203) with cement the compressive strength of concrete at 7 and 28 days are 51.47 and 72.44 N/mm².
- 2.At 16% partial replacement of Alccofine with cement the split tensile strength of concrete at 7 and 28 days are 5.12 and 7.78 N/mm².
- 3.At 6% partial replacement of sawdust with fine aggregate the compressive strength of concrete at 7 and 28 days are 24.13 and 34.86 N/mm².
- 4.At 6% partial replacement of sawdust with fine aggregate the split tensile strength of concrete at 7 and 28 days are 2.40 and 3.44 N/mm².
- 5.By the combination of 16% Alccofine +6% sawdust with cement and fine aggregate the compressive strength of concrete at 7 and 28 days are 45.99 and 65.06 N/mm².
- 6.By the combination of 16% Alccofine +6% sawdust with cement and fine aggregate the split tensile strength of concrete at 7 and 28 days are 5.17 and 7.41 N/mm².

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