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Experimental Study on Concrete Using Alccofine

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Abstract: This paper deals with experimental investigation on mechanical properties of M20 grade concrete with the aid of using alccofine in the mix. Alccofine of 0%, 5%, 10%, 15%, 20%, 25% and 30% by weight of cement are replaced with cement in the concrete mix. A comparative analysis has been completed for conventional concrete to that of the alccofine used concrete on the subject of compressive and split tensile strength. As in previous studies alccofine content material will increase compressive and split tensile strengths are proportionally increasing. It is found that as much as 25% of alccofine replaced with cement by weight of cement will increase the strength of concrete and later starts reducing the strength.

Keywords: Alccofine, Cement, Concrete, Compressive Strength and Spilt Tensile Strength.

I. INTRODUCTION

Infrastructure improvement is a key driving force for growing Indian economy. Due to growth in urbanization speedy boom in one of a kind sectors of infrastructure industry is growing with the increase in involvement of overseas investments on this field. In India construction is the second one biggest activity which make a contribution to financial system after agriculture consequently it's miles crucial the infrastructure improvement have to happens in green and sustainable manner.. Sustainable and Environmental pleasant excessive overall performance concrete is a call for in our new generation. However, the maximum vital component used in the production of concrete is cement that is one of the number one manufacturers of CO₂ and contributes to greenhouse gas. Climate extrade and international warming are modern-day and number one concerns for humanity. Due to scarcity of natural sources or growing problem over greenhouse gases or both, time will come even as production of cement will ought to be curtailed or can't be progressed to have the ecological balance. Therefore it's miles essential to locate answers for sustainable manufacturing of green concrete. SCOPE The bulk use of cement is important in achieving a better compressive electricity. The use of alccofine substances via way of means of alternative of a percent of binding fabric cement can cause a upward push in the compressive strength of the concrete in addition to a take a look at to pollution. The use of a totally minute amount of alccofine can have an effect on the houses and man or woman of concrete largely, a proper examine of its microstructure is critical in know-how the reactions and the impact of the micro quality particles. This test is attempt to give an explanation for the effect of a alccofine at the compressive electricity man or woman of concrete via way of means of explaining its microstructure.

II. OBJECTIVE

- 1) To study the effect of alccofine on workability of concrete.
- 2) To study the effect of alccofine on the strength of concrete.

III. LITERATURE REVIEW

Alka Paul and Binu. P stated Alccofine is a brand new era, micro quality cloth whose particle length is a whole lot higher than different electric substances which includes cement, ash, silica fume etc. herbal stability hence lowering cement consumption. Similarly, brick dust is a powder from a brick klin acquired in tones. Similarly the goals of the venture is to decide the premiere blend ratio of the alccofine bricks which receives better electricity characteristics and to get much less weight brick. Shamshad Ahmad stated 5 mixes have been organized wherein one blend turned into managed with undeniable PPC and 4 mixes have been organized with 5, 10, 15 and 20% alternative via way of means of ultrafine slag (Alccofine 1203). Thus end result suggests that because of specific particle length distribution of Ultrafine slag improves the electricity as much as 20% alternative. Deval Soni stated The venture paintings offers with the introducing of a brand new era cloth ALCCOFINE-1203 of a Supplementary Cementitious Material (SCM) of an ultrafine particle length as an additive into the everyday fly ash brick. So which this Alccofine bricks has better electricity traits than the everyday fly ash brick stated via way of means of. Rahul. R et.al. Variation in shear electricity parameters and compaction parameters of the soil is studied via way of means of including exceptional chances of alccofine 1101 which includes 1%, 2%, 3%, 4%, and 5%. Test consequences discovered that on the most excellent charge of alccofine 1101, the shear electricity function is expanded via way of means of 53.71 after a curing duration of three days.

By Abhijith L et.al (2019) SUMMARY The evaluate of some of literatures suggests the significance of this area of research. The findings suggests that some of micro substances like alccofine, SiO₂, TiO₂, Al₂O₃, colloidal nano silica, metakaolin and others may be integrated to enhance the homes of concrete. Alccofine is used upto 20% of cement via way of means of weight. The Researches suggests the stepped forward traits of the mixed concrete in phrases of compressive electricity and tensile electricity past 25% of cement the usage of plasticizer.

IV. MATERIAL AND METHODOLOGY

Ordinary Portland Cement (OPC) of grade 53 conforming to IS:12269 became used for the studies. Locally available quartzite combination with a most length of combination of 20mm down length, and sand have been used as coarse combination and quality combination respectively. Following are the fabric used in the paper. CEMENT: Ordinary Portland cement (OPC) is via way of means of some distance the maximum vital form of cement. Cement is synthetic through a carefully managed chemical mixture of calcium, silicon, aluminum, iron and different ingredients. FINE AND COARSE AGGREGATE: During crushing it's miles attempted to hold to provide the most length of combination in among 20mm to 4.75mm. It have to have fineness modulus 2.50-3.50 and silt contents have to now no longer be greater than 4%.

Table 2: Properties of coarse aggregate and fine aggregate

Property	Coarse Aggregate	Fine Aggregate
Specific Gravity	2.72	2.65
Bulk Density (kg/L)	1.408	-
Loose Bulk Density (kg/L)	1.25	-
Water Absorption (%)	4.469	0.0651
Impact Value	26.910	-
Crushing Value	26.514	-
Fineness Modulus	3.38	2.84

Super-plasticizers: 0.5% of Sulphonated Naphthalene super plasticizer is used in this paper.

A. Alccofine

Alccofine 1203 is manufactured in India and is one in all the imminent micro exceptional substances of particle size finer than cement, fly ash, silica fume etc. Alccofine 1203 has specific properties in influencing the overall performance of concrete in each green and hardened state because of its effective particle size distribution.

Table 3.Properties of Alccofine

Properties	Rest Result
Specific gravity	2.9
Bulk density (kg/m ³)	700-900
Fineness (cm ² /g)	>1200

B. Methodology

The utility of alccofine particles in concrete saves the assets and strength because it protects the surroundings from the pollutants with the reduction of waste material and reduction of CO₂ emission. The observation of this paper subjects with the usage of alccofine in concrete and to enhance the compressive strength of concrete of M20 with water cement ratio 0.5. This paper indicates the partial alternative of cement with the Alccofine with distinctive doses like 0%, 5%, 10%, 15%, 20%, 25% and 30% through weight and boom the strength property of concrete the usage of extremely good plasticizer and additionally indicates that the comparative observe among the concrete with out addition of alccofine and with addition of alccofine. The end result of this studies paper is to enhance the strength of concrete through the application of alccofine.

V. RESULT AND ANALYSIS

A. Test Specimen And Testing Procedures

This paper indicates the partial replacement of cement with the Alccofine with unique doses and 0.5% of super plasticizer to increase the strength property of concrete and additionally indicates that the comparative have a look at among the concrete with out addition of alccofine and with addition of alccofine. The end result of this studies paper is to enhance the strength of concrete through the utility of alccofine.

B. Cement Test

Type of Test	Result
Fineness Test	5.8%
Consistency Test	32%
Specific Gravity	2.64
Initial Setting Time	33 Min
Final Setting Time	10 Hours 32 Min

C. Test on Alccofine

Type of Test	Result
Fineness Test	6.47%
Consistency Test	36%
Specific Gravity	2.94

D. Workability

Slump cone test was performed to determine the slump of the mixes. The slump values for various mixes. That as the percentage of fiber content increases slump values are decreasing.

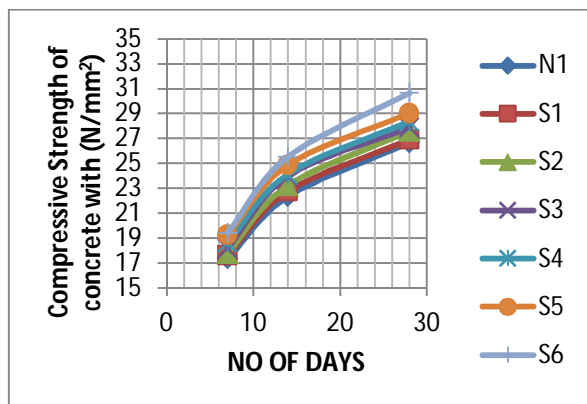
Table 2: Slump Cone Result

Sample	N	S1	S2	S3	S4	S5	S6
Slump Value	25.4	25.9	26.5	27.3	27.9	28.4	27.1

E. Results of Compressive Strength

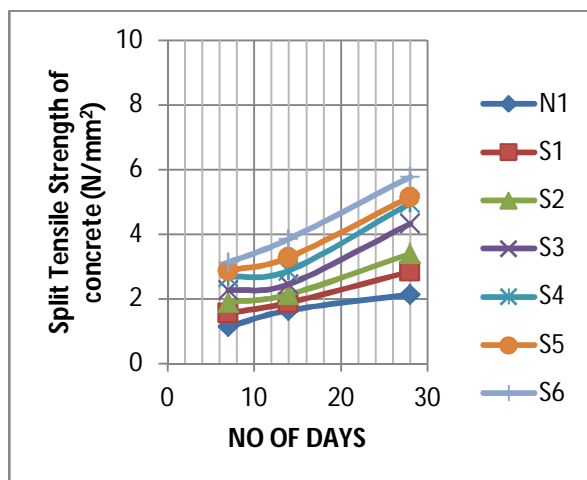
Sample	Compressive strength (N/mm ²)		
	3rd day	7th day	28th day
N	17.34	22.34	26.67
S1	17.59	22.76	26.92
S2	17.79	23.24	27.58
S3	18.18	23.97	27.91
S4	18.63	24.14	28.37
S5	19.26	24.87	29.05
S6	19.43	25.54	30.65

The proportions of alccofine replaced cement are taken as 0%, 0.5% 1.0%, 1.5%, 0.20%, 2.5% and 3.0% and compressive test result is 26.67N/mm², 26.92 N/mm², 27.58 N/mm², 27.91 N/mm², 28.37 N/mm², 29.05 N/mm², 30.65 N/mm² respectively on 28th day of curing. The compressive strength of concrete using alccofine increases as content of silica increases. The maximum result is by replacing 25% of cement by alccofine



F. Results of Split Tensile Strength

Sample	Split Tensile Strength (N/mm ²)		
	3rd day	7th day	28th day
N	1.13	1.64	2.13
S1	1.55	1.88	2.84
S2	1.89	2.13	3.39
S3	2.26	2.45	4.32
S4	2.67	2.87	4.96
S5	2.87	3.28	5.15
S6	3.12	3.85	5.77



The proportions of alccofine replaced cement are taken as 0%, 0.5% 1.0%, 1.5%, 0.20%, 2.5% and 3.0% and Split Tensile test result is 2.13N/mm², 2.84 N/mm², 3.39 N/mm², 4.32N/mm², 4.96N/mm², 5.15 N/mm², 5.77 N/mm² respectively on 28th day of curing. The Split Tensile strength of concrete using alccofine increases upto use of 3% replacement of cement. The maximum result is by replacing 3% of cement by alccofine is 3.12N/mm², 3.85N/mm² and 5.77 N/mm² on 7th, 14th and 28th day of curing.

VI. CONCLUSIONS

- 1) With the use of 25 % of Alccofine concrete gives the maximum result in compression as 19.26MPa, 24.87MPa and 29.05MPa at 7th day, 14th day and 28th day of curing respectively.
- 2) With the use of 25% of Alccofine gives the maximum result in Split Tensile Strength as 2.87MPa, 3.28MPa and 5.55MPa at 7th day, 14th day and 28th day of curing respectively.



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