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A LITERATURE REVIEW ON STUDY OF ALCCOFINATED CONCRETE INCORPORATED WITH POLYPROPYLENE FIBER AS PARTIAL REPLACEMENT OF CEMENT IN CONVENTIONAL CONCRETE

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Abstract : The cement industry is one of the main producers of carbon dioxide (CO2).for production of one ton of cement approximately one ton of CO2 is released into the atmosphere. To reduce the cement content different supplementary Cementitious materials (SCM's) like fly ash, silica fume, alccofine, metakaolin, rice husk ash, ground granulated blast furnace slag were used. To prevent exhaustion of natural resources such as natural stone, natural sand etc. an attempt is made to replace the natural materials by using waste crushed material along with Alccofine powder and Ground granulated blast furnace slag (GGBS) as well as Polypropylene Fiber .By using the waste and chemical compound with different proportions along with cement and with proper water cement ratio the suitability and performance of the above said materials is measured in this project.

Keywords – Alccofine, Compressive strength (CS), Flexural Strength (FS), Polypropylene Fiber (PPF)

1. INTRODUCTION

The development business is the second huge industry in India after agribusiness. It gives work to huge number of individuals and makes huge commitments to the public economy. For the development of any construction the more significant material required is concrete. Concrete is the second most involved material on the planet after water. The primary fixings required for readiness of cement will be concrete, sand, total and water. Contamination and A dangerous atmospheric devation are the two generally significant issues the world is confronting today. The overabundance utilization of normal assets, for example, Regular sand, totals and concrete for the development of any construction is influencing the Climate. India has radiated around 2,299 million tons of carbon dioxide in 2018 with increment of 4.8% contrasted with a year ago. The production of concrete adds to 7% of worldwide CO2 outflows. The natural substances utilized for creation of concrete are Lime stone and Mud, these materials are removed from quarries, which additionally brings about natural debasement Over the most recent couple of years it has been seen that accessibility of good regular sand for the development is diminishing, abundance utilization of normal sand is prompting natural corruption which influences the climate, additionally the expense of the Normal sand is expanding step by step because of its shortage. To beat these issues, utilization of waste materials like Ground Granulated Impact Heater Slag (GGBS), squashed sand and Alccofine can be utilized in Concrete. Alccofine, a new generation micro-fine concrete material for high strength, is significant in terms of both workability and strength. Alccofine is very simple to use and may 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.

2. LITERATURE REVIEW

Raviteja Ganganapalli , Nagalakshmi Yerramsetti , Deepak Cherukuri , Rajyalakshmi Gaddam(2023) investigate that the workability of concrete mixes with silica fume and alccofine showed on significant improvement in workability when compared to conventional concrete. The compressive strength of the mix containing 7.5%silica fume and 10%alccofine was increased by 34.63% when compared to conventional concrete.The flexural and split tensile strength of the mix containing 7.5%silica fume and 10%

alccofine was increased by 16.08% and 16.05% when compared to conventional concrete.The mix with 7.5% sililca fume and 10% alccofine exhibited lesser sorptivity when compared to conventional concrete.

J. Sree Naga Chaitanya, Dr. K. Chandramouli, M. Chaitanya Nava Kumar,T. Swaroop Kumar(2022) investigate that the compressive strength of normal concrete at 28,56 and 90 days is 52.30, 56.73 and 61.13 N/mm2 . The split tensile strength of normal concrete at 28,56 and 90 days is 5.07 , 5.52 and 5.96 N/mm2 . At 7.5% of Alccofine 1203 with partial replacement of cement the compressive strength result is 60.32 , 65.62 and 70.45 N/mm2 for 28,56 and 90 days. At 7.5% of Alccofine 1203 with partial replacement of cement the split tensile strength result is 5.76 , 6.26 and 6.72 N/mm2 for 28,56 and 90 days. At 1.5% of Polypropylene fibres in concrete the compressive strength result is 62.68 , 68.12 and 73.19 N/mm2 for 28,56 and 90 days. At 1.5% of Polypropylene fibres in concrete the split tensile strength result is 5.98 , 6.51 and 6.98 N/mm2 for 28,56 and 90 days.

Balamuralikrishnan and Saravanan (2021) used 0%, 5%, 10%, 15% and 20% of alccofine-1203 to replace cement to investigate the effect of alccofine-1203 on the compressive strength of cement mortar. By replacing 10% cement with alccofine-1203, the mortar specimen has shown the highest compressive strength in all stages of curing, and specifically, at 28 days, it has attained a compressive strength of 53.12MPa, whereas the specimen with 100% cement attained only 44.74 MPa.

Kavyateja, Guru Jawahar, and Sashidhar (2020) investigated the mechanical properties of SCC, developed by partial replacement of cement using 25% fly ash with 0%, 5% 10% and 15% alccofine-1203 combinations. The developed mixes were designated as NM, SCC0, SCC1 SSC2, and SCC3 concerning the alccofine-1203 replacement percentages. From Figure 4, it was reported that at 3, 7, 28, and 90 days, the specimens of SCC2 (65% cement + 25% fly ash + 10% alccofine-1203) have shown the highest compressive and split tensile strengths and modulus of rupture than the control mix (NM) specimens and other alccofine-1203 incorporated mix specimens. Based on this, it was concluded that 25% fly ash and 10% alccofine-1203 is an optimum percentage to partially replace cement to achieve SCC with superior strength properties.

Sanjeev Kumar et al. (2019) investigated to enhance the strength properties of lightweight aggregate concrete using alccofine-1203. In this study, the authors attempted to obtain the strength decreased to the lightweight concrete due to partial replacement of coarse aggregates with coconut shells by using partial replacement of cement with alccofine-1203. Cement replaced with 6%, 8%, 10% and 12% of alccofine-1203. It was concluded that compared to coarse aggregate based control mix, the concrete mix with 8% alccofine-1203 has 18% lowest density and it is least among all the developed mixes. The 28 days test results showed that the partial replacement of coarse aggregates with coconut shells reduced the compressive strength of concrete from 44.8MPa to 35.49MPa, and by replacing cement with 8% alccofine-1203, the compressive strength of lightweight concrete increased to 42.41MPa.

P. R. Kalyana Chakravarthy, R. Rathan Raj (2017) The main objective of this work focuses on the compressive strength of concrete with partial replacement of cement with Alccofine. The project focuses on the experimental investigation on concrete by replacing cement with Alccofine on varying percentage. 0%, 4%, 8%, 16%, 17%, 20%, 25%, 50%, 75% and 100% for 7 and 28 days. The design mix carried out throughout the experiment was M25. The increase in percentage of compressive strength for 7 days and 28 days curing was found to be maximum at 16% replacement exhibiting the value of 50.95 % and 60.95% when compared with conventional.

S. Kavitha and T. Felix Kala (2016) have explained about the use of alccofine within the SCC as the strength enhancer. They found the improvement in strength properties with increase in alccofine dosage and the results of their investigation proved that alccofine can be used as a strength enhancer within the SCC.

D. Sharma, S. Sharma and Ajay. G (2016) conducted experimental investigation about the strength improvement of concrete using foundry slag as an alternative for conventional fine aggregate and alccofine as substitute for cement. They concluded that reasonably high strength concrete can be achieved by means of substituting fine aggregate with10% to 45% of foundry slag and replacement of cement with 15% of alccofine.

M.V. Sekhar Reddy, K. A. Latha and K. Surendra (2016) had done experimental work on partial replacement of cement with fly ash and alccofine for M40 Grade concrete. The fly ash and alccofine are replaced at 5%, 10%, 15%,20% with cement. The conclusion summarizes that the addition of alccofine indicates an early strength gaining capacity and is ecofriendly to nature. Alccofine showed greater results then compared with fly ash in long term Strength Properties.

K. Gayathri, K. R. chandran and J. Saravanan (2016) performed research on performance of alccofine replacing the cement in concrete at 5%, 10%, 15% and 20%. It is found that 15% replacement of cement by alccofine is yielding good strength when compared to other percentages and also alccofine increases the cementing efficiency at earlier ages of concrete.

3. CONCLUSION

The review of earlier studies related to partial replacement of Cement with Alccofine and Polypropylene Fiber reveals that there is a significant change in the strength properties of concrete such as compressive strength, flexural strength. These experiments were carried out in various grade concrete to find out the result. From the above literature reviews optimum percentage of Alccofine varies from 0% to 20% and Polypropylene Fiber varies from 0% to 2%. Up to these Percentage Replacement improvement in the strength of concrete has been observed in terms of Compressive Strength, Flexural Strength and Tensile Strength on partial replacement of Cement with Alccofine and Polypropylene Fiber.

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