

# Experiment On Concrete Containing Activated Carbon

Prof. Mr Ganesh Choughule<sup>1</sup>, Mr. Sachin Rathod<sup>2</sup>, Mr. Sumit Shimpale<sup>3</sup>,

Mr. Kapil Sutar<sup>4</sup>, Ms. Sujata Gosavi<sup>5</sup>

<sup>1, 2, 3, 4, 5</sup> Dept of Civil Engineering

<sup>1, 2, 3, 4, 5</sup> Sinhgad Institute of Technology and Science, Pune

**Abstract-** Concrete is a versatile material having many advantages. Hence it is the most widely used material in the construction industry. Many researchers made attempts to use waste materials with the objective of eliminating the disposal problems and at the same time improving the properties of concrete. An attempt has been made to improve the compressive strength of concrete with activated carbon, fly ash (FA) a. In this work, the concrete mix was prepared by replacing cement with 20%(FA) Further, the concrete mix is added with 0.4%, 0.8%, 1.2%, 1.6% of activated carbon. The compressive strengths of cement were evaluated after 28days of curing. It is observed that the concrete mix added with 1.2% of activated carbon exhibited the maximum strength. The maximum increase in the strength was found more than that of the concrete without Activated Carbon.

**Keywords-** Activated Carbon, Fly-ash, concrete, compressive

## I. INTRODUCTION

One of the widely and popularly used construction materials is concrete. Quality of human civilization. In terms of infrastructure, habitation and transportation had greatly been affected by this construction Material. Cement concrete is commonly used in buildings and other important engineering works where strength and durability are of prime importance. Its huge popularity is a consequence of several advantages, such as general availability, wide applicability and high compressive strength. These advantages are also accompanied by a great environmental burden. At present, for a variety of reasons, the concrete construction industry is not sustainable. Firstly, it consumes huge quantities of virgin materials which cannot be remained for the next generations. Secondly, the principal binder in concrete is Portland cement, the production of which is a major contributor to greenhouse gas emissions that are implicated in global warming and climate change. The billions of tons of raw materials mined and processed each year leave a mark on the environment. The environmental load of concrete can be reduced by the partial replacement of Portland cement with other cement alternatives or additives. These Cement replacing materials could be fillers or waste products.

## II. RESEARCH AND IDEA

Melvin T Moses, Lloyd Benet Thomas, Joel Scaria and Goutham V Dev.

An exhaustive study of available literature on use of activated carbon in cement Composites was done. Absorptive nature of activated carbon can be effectively used to Remove toxic air pollutants such as nitrogen oxide, volatile organic compounds by Adsorbing to concrete elements (chimneys, tunnels etc.). Experimental research work Carried out on cement composites containing activated carbon revealed its potential Ability to improve physical, mechanical and durability properties of cement composites. A comprehensive review of selected literature was carried out and the significant Findings are presented in this paper. Researchers across the globe had experimentally Showed that presence of activated carbon eat 1 to 4Influence various properties of cement composites. Reported research works shows that activated carbon had less effect on the strength of concrete, however, they have greater influence on the construct ability and durability of concrete.[2] Powdered activated carbon decreased the air void content and affected the specific surface area and the spacing factor. The addition of a small amount of activated carbon considerably increased the adsorption of harmful gases; which limited environmental pollution. Activated carbon could provide pollutants showed adsorbing properties and improved fire resistance of concrete. The addition of activated carbon in the fly ash cement mortar improved compressive strength.

## T. MARGARET PRINCY

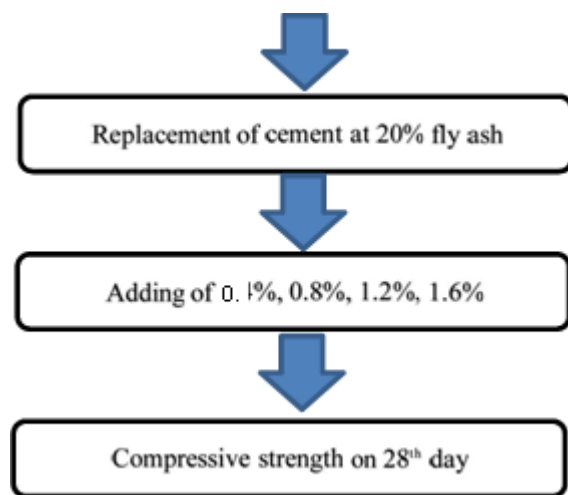
Along with the above mentioned, we also carried out an exhaustive study of available use of ACTIVATED CARBON in cement composition. Absorptive nature of activated carbon can effectively use to remove toxic air pollutants such as Nitrogen Oxide (NO), volatile organic compounds by adsorbing to concrete elements. This experimental research work carried out on cement composition containing activated carbon reveals its potential ability to improve physical, mechanical and durability properties of cement composites and also results in effectively

eliminating the problem of moisture retention due to void formation during mixing and atmospheric moisture uptake. In this study, M20 grade of concrete was produced by replacing cement with activated carbon and sand with plastic powder. Sixty cubes were casted and their compressive strengths and workability were evaluated at 3, 7, 14 28 days. Compressive and split tensile tests are conducted for the casted cubes.

### III. WRITE DOWN YOUR STUDIES AND FINDINGS

#### METHODOLOGY:

The methodology adopted for the current experimental investigation is:



#### EXPERIMENTAL INVESTIGATION:

##### Compression Test:



Activated Carbon was purchased from construction Industry. Nano fly ash (NF,) 20%(NF) cement 80% ordinary Portland cement ratio was obtained. In a comparative study with ordinary Portland cement performance, while first using a

Nano fly ash (NF) then mix by adding of activated carbon to a portion of cement. These materials were mixed together to form cubes of sizes 150x150x150xmm were cured after removal, cement test block at room temperature water conservation respectively 28days measuring its compressive strength.



Activated Carbon was purchased from construction Industry. Nano fly ash (NF), 20%(NF) 10%(NM) cement 80% ordinary Portland cement ratio was obtained. In a comparative study with ordinary Portland cement performance, while first using a Nano fly ash (NF) then mix by adding of activated carbon to a portion of cement. These materials were mixed together to form cubes of sizes 150x150x150xmm were cured after removal, cement test block at room temperature water conservation respectively 28days measuring its compressive strength.



##### Procedure:

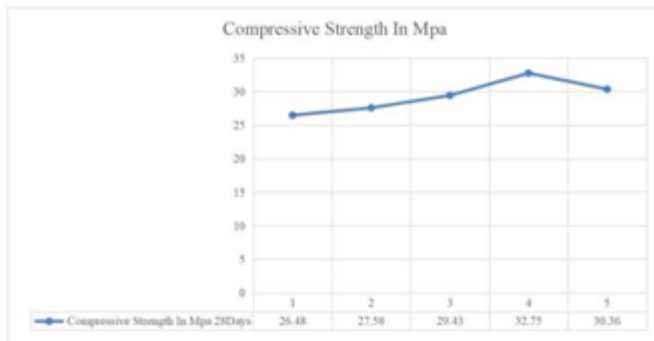
- Cubes were weighed before loading.
- The cubes are placed in the compressive testing machine and the load was applied gradually.

- The digital machine shows the amount of load applied on the display.
- Care was taken that the load is applied at a uniform rate.
- The load reaches a maximum point and starts reducing thereafter. The maximum load is the ultimate load and that reading was note

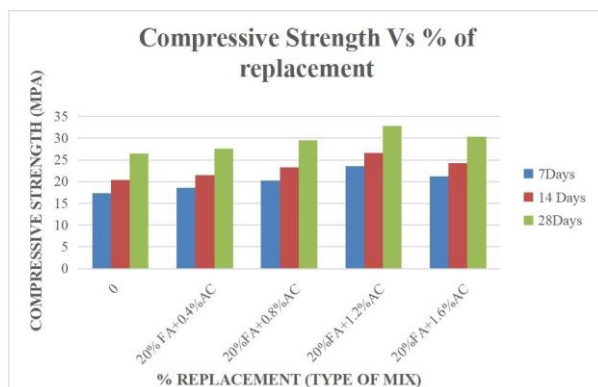
**IV. RESULT AND DISCUSSIONS:**

The results of compressive strength test measurements a of M20 grade concrete specimens mixed with the combination of Nano fly ash and activated carbon.

Type Of Mix	Percentage Replacement Of Fly Ash & Activated Carbon	Compressive Strength In Mpa		
		7Days	14Days	28Days
Conventional Concrete	0	17.3	20.36	26.48
Replacement of Cement with Fly Ash & Activated Carbon	20% FA+0.4%AC	18.54	21.55	27.58
	20%FA+0.8%AC	20.23	23.29	29.43
	20%FA+1.2%AC	23.58	26.64	32.75
	20%FA+1.6%AC	21.22	24.26	30.36



**Compressive strength of concrete specimencured for 28days.**



**Compressive strength of activated carbon fly ash**

**V. CONCLUSION**

An experimental investigation was carried to study the significance of the conclusion. The results M20 show that the addition of activated carbon for fly ash in the cement can improve compressive strength of the concrete. The strength increases with 20% fly ash 1.2% of activated carbon cement highest 28th days compressive strength value 32.75 Mpa of the optimum value of significant. Incorporation of 20% fly ash and 0.4% activated carbon addition of mixes in the cement the 28th day compressive strength 26.48 Mpa. Based on above discussion combination of fly ash and activated carbon can improve compressive strength of concrete is more compared to reference specimen.

**REFERENCES**

- [1] Aldea, C.; and Shah, S. ;( 2011) “Durability enhancements of cracked concrete by fibers” ACISpec. Publ., No.276, pp.1–14.
- [2] Chowdhury, Investigations in to the role of Activated Carbon in a moisture blocking cement formulation, Journal of Thermal Analysis and Calorimetry, Vol 78 (2004) 215-226. [10]
- [3] ChaocanZheng: Compressive strength and microstructure of activated carbon fly-ash cement composites, year (2017)
- [4] Chang T.P., Shih J.Y., Yang K.M., 2007, Material properties of Portland cement paste with nano montmorillonite, Journal of Materials Science
- [5] [https://en.wikipedia.org/wiki/Activated\\_carbon](https://en.wikipedia.org/wiki/Activated_carbon)