

To Study the Flexural Strength of Concrete with Recycle Concrete Aggregates In The Presence Of Met kaolin.

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Abstract- Concrete is such a costly material but Now a day's waste concrete is only being used as a landfill material instead of recycling the concrete as a recycled concrete aggregate (RCA) to use for the construction purposes. . Concrete recycling gains importance because it protects natural resources and eliminates the need for disposal by using the readily available concrete as an aggregate source for new concrete or other applications. . The states that do use recycled concrete aggregate (RCA) in new concrete report that concrete with RCA performs equal to concrete with natural aggregates. Urbanization growth rate of india is very high due to industrialization , growth rate of india reaching 9% of GDP, The construction industry is a major contributor towards India's GDP, both directly and indirectly. Cement demand in India is expected to increase due to government's push for large infrastructure projects, leading to 45 million

tonnes of cement needed in the next three to four years.

Central Pollution Control Board has estimated current quantum of solid waste generation in India to the tune of 48 million tons per annum out of which, waste from construction industry only accounts for more than 25%. Management of such high quantum of waste puts enormous pressure on solid waste management system.

The main object of our work is to use the Recycle coarse aggregates with Metakaolin and to study the effect on flexural strength of concrete for different ratios of RCA and Metakaolin.

Keyword:- Metakolin, flexural strength ,recycle concrete

Introduction-Modern concrete is a man made composite material in its simplest form concrete is the mixture of paste and aggregates, The paste compose of cement and water, coats the surface of fine and coarse aggregates. There are other materials such as chemical or mineral

admixtures including super plasticisers, water reducers and air entrainers that can be used to modify the characteristics of concrete. There is also a new trend an increase in the use of pozzolanic materials like fly ash ,metakaolione,granulated blast furnace slag etc. A new trend of the use of various alternatives fine and coarse aggregates in the production of concrete have been investigated including the use of recycle concrete aggregates as coarse aggregates

In this work recycle concrete aggregate is used as a substitute to previous natural coarse aggregate.

Materials and experimental work

Metakaolin- Metakaolin is refined kaolin clay that is fired (calcined) under carefully controlled conditions to create an amorphous aluminosilicate that is reactive in concrete. Like other pozzolans (fly ash and silica fume are two common pozzolans), metakaolin reacts with the calcium hydroxide (lime) byproducts produced during cement hydration. Calcium hydroxide accounts for up to 25% of the hydrated Portland cement, and calcium hydroxide does not contribute to the concrete's strength or durability.

Recycle concrete aggregates-recycle aggregates originate from construction and demolition debris and consist mainly of crushed concrete. When structures made of concrete are demolished or renovated, concrete recycling is an increasingly common method of utilizing the rubble. Recycling of concrete is a relatively simple process. It involves breaking, removing, and crushing existing concrete into a material

with a specified size and quality. The quality of concrete with RCA is very dependent on the quality of the recycled material used

Physical Properties of RCA-

Recycled concrete aggregate look like crushed stone however crushed stone has many physical properties that vary from those of natural aggregates . In general crushed concrete particles are more angular have a rough surface texture than natural aggregates .roughly textured ,angular and elongated particles required more water to produce workable concrete than smooth rounded aggregate.

Due to attached cement mortar which is porous and lightweight recycled concrete aggregates have lower specific gravity and higher water absorption therefore RCA also shows lower compacted unit weight.

Chemical properties of RCA

RCA which is obtained from demolished concrete may be contaminated by sulfates from plaster and gypsum $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ which creates possibility of sulfate attack if RCA used in marine structure or structure which are directly in contact of moisture and may be very easily affected by chlorine water. In the presence of sulfate and chlorine ions reinforcing steel will react and iron oxide and rust may be induced.

Experimental Details- The main objective of this work is to study the effect of replacing natural coarse aggregates by Recycle concrete aggregate

(0%,5%,10%,15%,20%,25%,30%,35%,40%)

with use of metakaolin 5% or10% adding by weight of cement as a mineral admixture and to study the effect on flexural strength of concrete.

Flexural Strength-Flexural strength is one measure of the tensile strength of concrete. It is a measure of an unreinforced concrete beam or slab to resist failure in bending. It is measured by loading 6 x 6 inch (150 x 150-mm) concrete beams with a span length at least three times the depth the flexural strength is expressed as Modulus of Rupture.

The Flexural strength of concrete was determined by casting of 150x150x750mm

Flexural Strength of Concrete

specimen for different percentage of RCA and metakaolin

The flexural strength were calculated by following equation

$$Fr = PL/bd^2$$

Where

Fr= modulus of rupture N/mm²

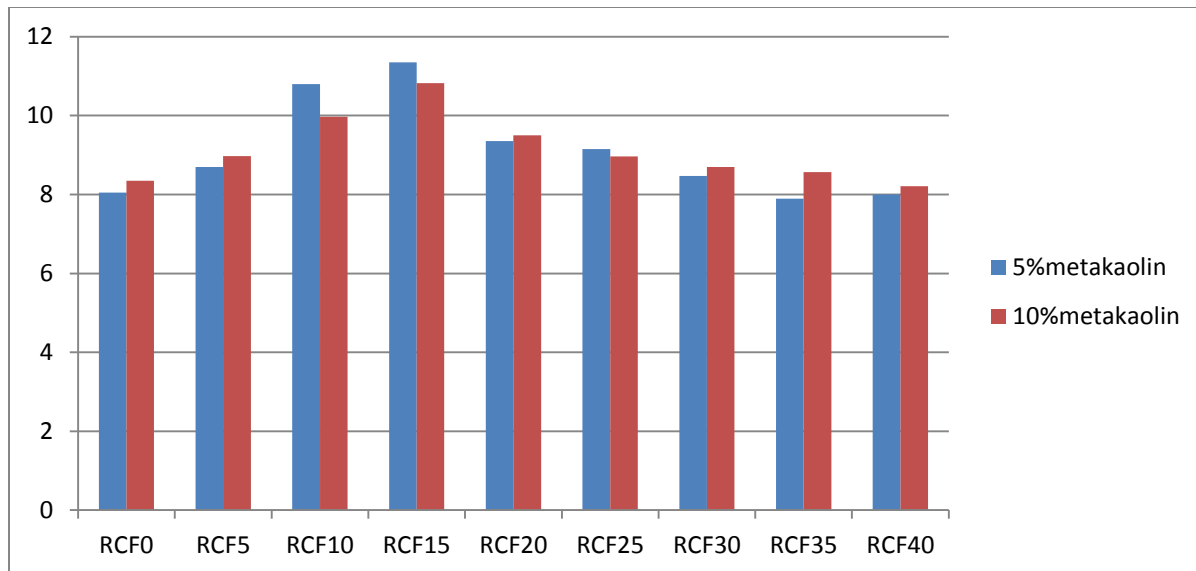
P= maximum applied load

L= span length

b= width of specimen in mm.

d= depth of specimen in mm

Sr.no.	Mould No.	28 days Flexural strength in n/mm ²	
		Adding 5%metakaolin	Adding 10% metakaolin
1.	RCF0	8.05	8.35
2.	RCF5	8.70	8.97
3.	RCF10	10.80	9.97
4.	RCF15	10.88	11.02
5.	RCF20	9.35	9.50
6.	RCF25	9.15	8.96
7.	RCF30	8.47	8.70
8.	RCF35	7.89	8.57
9.	RCF40	8.0	8.21



in case of flexural strength for combination of 10% metakaolin as admixture and 15% replacement of natural coarse aggregates by recycle coarse aggregates for this combination there is a 36% increase in strength .

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