Ceramic Waste: Effective Replacement of Fine Aggregate

Rajan P Tank[1] Nimesh R Badiyani[2] Meet B Tank[3] Dhruv D Thakrar[4] Pinal B Adroja[5]
[1,2,3,4]D.E. Student [5]Assistant Professor
[1,2,3,4,5]Department of Civil Engineering
[1,2,3,4,5]DIETDS-Rajkot, Gujarat, India

Abstract— Concrete is use in each construction in every country. Concrete is very important material in civil engineering construction but in future the cement is a row material of concrete is less available in quantity because the quantity of natural san is low. Than we use the ceramic waste as a replacement of fine aggregate. In future we can use the ceramic waste as artificial sand in concrete. And we can try to improve the strength of concert.
Keywords: Ceramic Waste, Fine Aggregate, Concrete

I. INTRODUCTION

Concrete is very important material in civil engineering structuring. Concrete is use in every RCC structure lick slab, column, beam, bridge, etc. Concrete is mixture of cement, sand, water, coarse aggregate, and admixture in proper fraction. These are substance which we need is gift of nature.

Now Days River sand availability is become less therefore government has started the use of artificial sand is make from elongation and flaky particles. The major substance of concrete, Cement is also made from nature available element cement is made from lime

We can replace fine aggregate with the ceramic waste. Ceramics are generally made by taking mixtures of clay, earthen elements, powders, and water and shaping them into desired forms. Once the ceramic has been shaped, it is fired in a high temperature oven known as a kiln.

As we know that after completing the tiles work in construction, we through the broken and waste pieces of tiles in outside

II. OBJECTIVE

1) To increase the strength of concrete by using ceramic waste.
2) To used ceramic waste material in concrete with replacement of Fine aggregate.
3) To become economical concrete.
4) To promote the artificial sand

III. SCOPE

1) Soundness of cement
2) Field test of cement
3) Impact test of Aggregate
4) Crushing test of Aggregate
5) Sieve analysis
6) Compressive strength of concrete

IV. MATERIAL

1) Cement – cement is binder material and gives strength to the concrete.
2) Fine aggregate – Fine aggregate is use for fill up the voids between the Coarse aggregate.
3) Course aggregate – Coarse aggregate gives the strength and bulk of concrete

V. MIX PROPORTION

As per IS 10262:2009

Cement	492.5 kg
Fine Aggregate	197 liter
Coarse Aggregate	647 kg
Water	1099 kg
Water - Cement ratio	0.4

Table 1: (mix design of normal concrete)

Cement	492.5 kg
Fine Aggregate	197 liter
Coarse Aggregate	614 kg
Water	1099 kg
Water - Cement ratio	0.4
ceramic waste	33 kg

Table 2: (mix design with 5% of ceramic waste)

Cement	492.5 kg
Fine Aggregate	197 liter
Coarse Aggregate	582 kg
Water	1099 kg
Water - Cement ratio	0.4
ceramic waste	65 kg

Table 3: (mix design with 10% of ceramic Waste

Cement	492.5 kg
Fine Aggregate	197 liter
Coarse Aggregate	550 kg
Water	1099 kg
Water - Cement ratio	0.4
ceramic waste	97 kg

Table 4: (mix design with 15% of ceramic waste)

VI. DATA COLLECTION

No Of days	Load in KN (P)	Strength of concrete in N/mm2 (P/A)	Average strength of concrete in N/mm2
7days	500	22.22	23.79
	527	23.42	
	579	25.73	
14 days	612	27.2	26.84
	589	26.17	
	611	27.15	
28 days	712	31.64	31.5
	702	31.2	
	713	31.68	

Where A=150 x 150

Table 5: (strength of concrete)

No Of days	Load in KN (P)	Strength of concrete in N/mm2 (P/A)	Average strength of concrete in N/mm2
7days	459	20.4	21.55
	480	21.33	
	516	22.93	
14 days	705	31.33	29.7
	595	26.44	
	705	31.33	
28 days	768	34.13	34.35
	805	35.77	
	746	33.15	

Where A=150 x 150

Table 6: (strength of concrete with 5% of ceramic waste

No Of days	Load in KN (P)	Strength of concrete In N/mm2 (P/A)	Average strength of concrete in N/mm2
7days	497	22.08	21.31
	467	20.08	
	475	21.11	
14 days	678	30.13	28.66
	612	27.2	
	645	28.66	
28 days	805	35.77	36.58
	797	35.42	
	868	38.57	

Where A=150 x 150

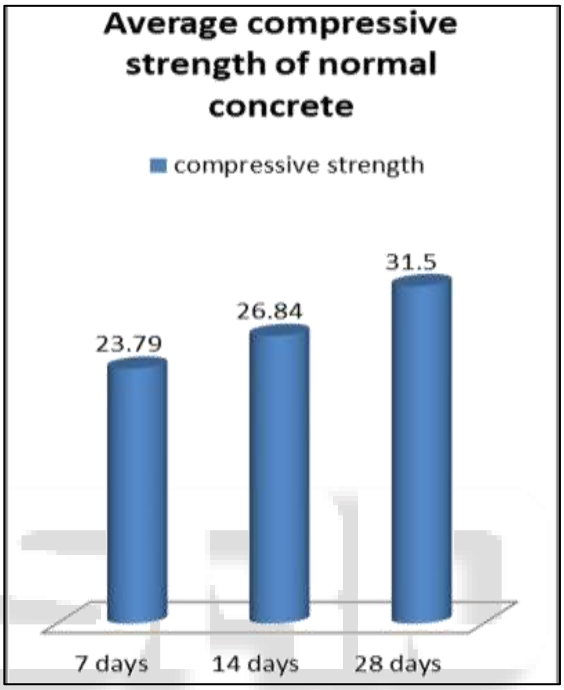
Table 7: (strength of concrete with 10% of ceramic waste)

	Load in KN (P)	Strength of concrete in N/mm2 (P/A)	Average strength of concrete in N/mm2
7days	511	22.71	23.51
	529	23.51	
	547	24.31	
14 days	650	28.88	29.96
	671	29.82	
	702	31.2	
28 days	908	40.35	39.16
	875	38.88	
	861	38.26	

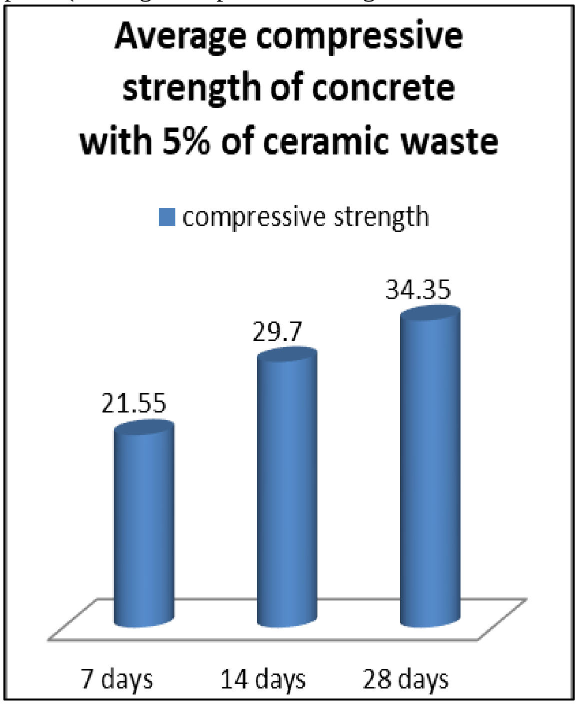
Where A=150 x 150

Table 8: (strength of concrete with 15% of ceramic waste)

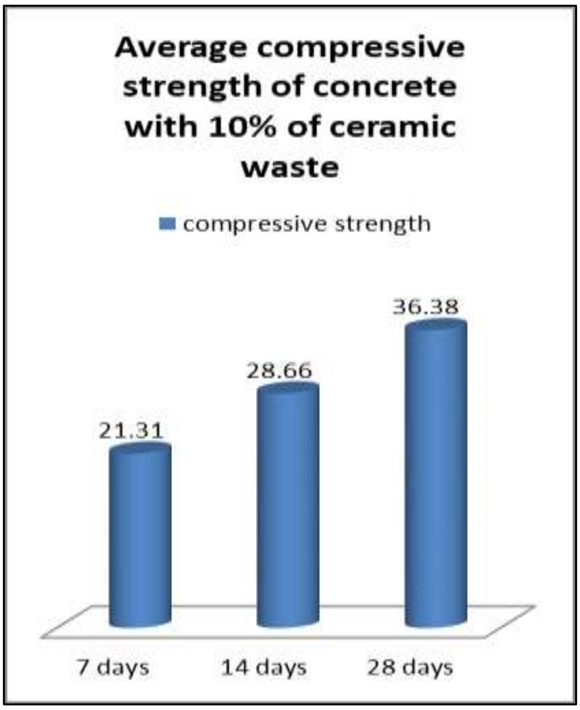
VII. DATA ANALYSIS



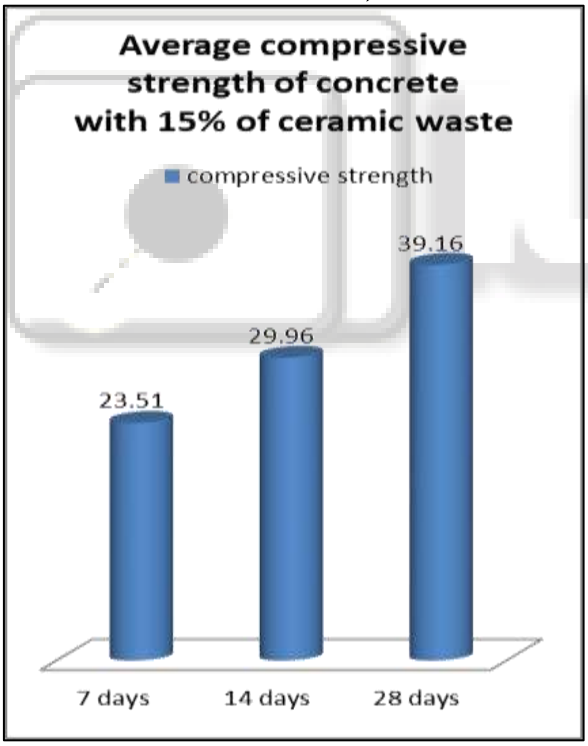
Graph 1: (Average compressive strength of normal concrete)



Graph 2: (average compressive of concrete with 5% ceramic waste)



Graph 3: (Average compressive of concrete with 10% ceramic waste)



Graph 4: (average compressive of concrete with 15% ceramic waste)

VIII. Conclusion

1) Hereby in our project we used ceramic waste as a waste material in concrete.
2) So, by casting so many cubes by using different percentage of ceramic waste like 5%, 10%, 15% by replacement of fine aggregate.
3) By experiment, strength of 5% ceramic waste cubes result is more than normal concrete at 28 days. And also strength of 10% ceramic waste concrete is more than 5% ceramic waste concrete.
4) By same strength of 15% ceramic waste concrete is more than strength of 10% ceramic waste concrete
5) So here we can clearly define that increasing the proportion of ceramic waste, the strength of concrete is increase & we made such an economical concrete.

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