



STUDY AND PERFORMANCE OF STRENGTH AND DURABILITY TEST ON CEMENT WITH ADDITION OF CERAMIC WASTE AND MICRO SILICA



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DOI: <https://doi.org/10.29121/granthaalayah.v9.i1.2021.3163>

Article Type: Research Article

Article Citation: Dharmesh Kumar Vishwakarma, and Prof. Harsh Gupta. (2021). STUDY AND PERFORMANCE OF STRENGTH AND DURABILITY TEST ON CEMENT WITH ADDITION OF CERAMIC WASTE AND MICRO SILICA. International Journal of Research - GRANTHAALAYAH, 9(1), 222-226. <https://doi.org/10.29121/granthaalayah.v9.i1.2021.3163>

Received Date: 03 January 2021

Accepted Date: 31 January 2021

Keywords:

Silica Fume
Compressive Strength
Tensile Strength
Micro Silica

ABSTRACT

In this paper, we are studying about properties of cement and concrete such as strength and durability. Crushed ceramic-based waste and silica instead of sand and cement. In this way, we are performing tests such as Compressive Strength Testing and Durability Test. In this study, the cement fraction is replaced by 5% and 10% with micro-silica and sand from 0%, 15%, 30% and 50% with ceramic waste.

1. INTRODUCTION

We are studying about properties such as durability of compressive strength and test suspension which is of size 150mm X 150mm X 150mm. The property of composition is commonly used as compressive strength and durability. We recommend mixing (M1, M2, M4, M5, M6, M7, M8, M10, M11, M11, M12, M13, M15 and M16), which is being made with the help of calcined kaolin, sand, aggregate, composition, ceramic vest and micro silica.

2. PROCEDURE

We first made a cube with dimensions 150mm X 150mm X 150mm for the proposed experiment. All samples after 7 and 28 days curing, we are tested by testing machine. The load is applied to the specimen 300 Kg / cm² per minute, gradually upto fail.

3. PREPARATION

The material in the dry state is mixed in a mortar mixer for about two minutes, then little water is added and mixed. This is followed by adding the super plasticizer and mixing the entire material for about 5 minutes. Care should be taken while mixing the materials, they should be mixed well and should not stick to the inner surface of the mixing container. Finally, the mortar is placed in the mold. All samples will be cured for 7 and 28 days.

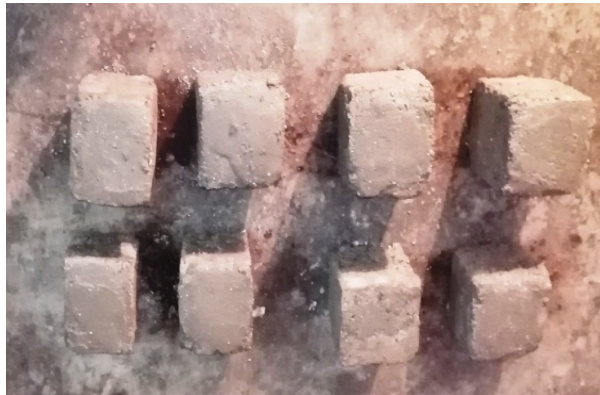


Figure 1: First to Eight Specimens



Figure 2: Ninth to Sixteen Specimens

4. RESULTS AND DISCUSSION

4.1. COMPRESSIVE STRENGTH TEST

Table 1: Compressive Strength test using micro silica 0 %

Sl. No.	Mix	Ceramic waste %	Compressive Strength (Kg/ cm ²) during 7 days	Compressive Strength (Kg/ cm ²) during 28 days
1	M1	0	32.66	33.65
2	M2	10	33.95	34.89
3	M3	15	35.22	36.88
4	M4	20	36.14	37.69

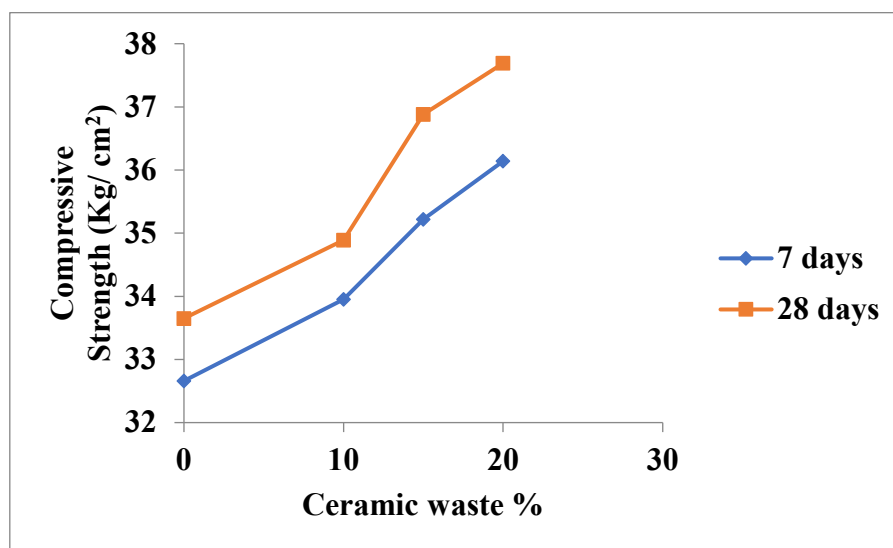


Figure 3: Compressive Strength test using micro silica 0 %

Table 2: Compressive Strength test using micro silica 5 %

Sl. No.	Mix	Ceramic waste %	Compressive Strength (Kg/ cm ²) during 7 days	Compressive Strength (Kg/ cm ²) during 28 days
1	M5	0	33.65	34.56
2	M6	5	29.55	30.66
3	M7	10	31.22	36.98
4	M8	15	36.88	37.58

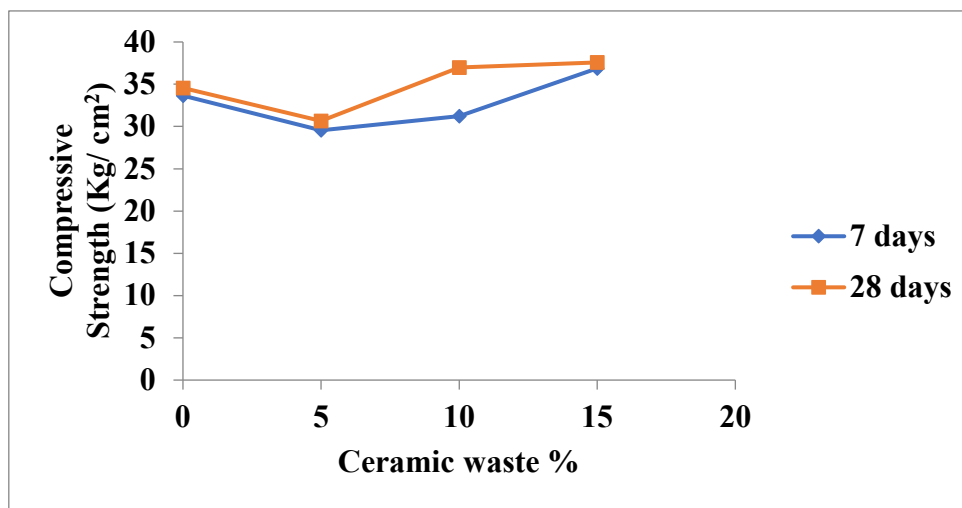


Figure: 4 Compressive Strength test using micro silica 5 %

Table 3: Compressive Strength test using micro silica 10 %

Sl. No.	Mix	Ceramic waste %	Compressive Strength (Kg/ cm ²) during 7 days	Compressive Strength (Kg/ cm ²) during 28 days
1	M9	0	40.22	41.55
2	M10	5	41.66	42.66
3	M11	10	42.99	44.56
4	M12	15	45.66	47.88

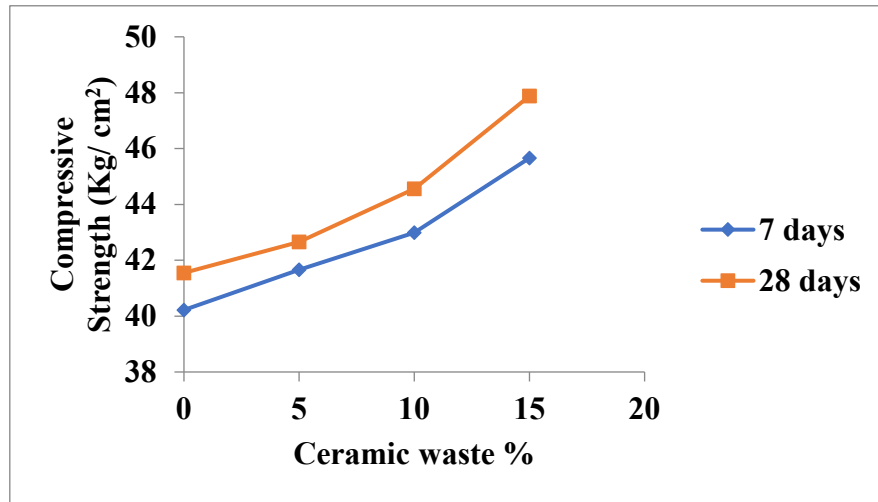


Figure 5: Compressive Strength test using micro silica 10 %

Table 4: Compressive Strength test using micro silica 15 %

Sl. No.	Mix	Ceramic waste %	Compressive Strength (Kg/ cm ²) during 7 days	Compressive Strength (Kg/ cm ²) during 28 days
1	M13	0	36.22	37.88
2	M14	5	38.55	38.97
3	M15	10	39.54	39.55
4	M16	15	38.99	40.22

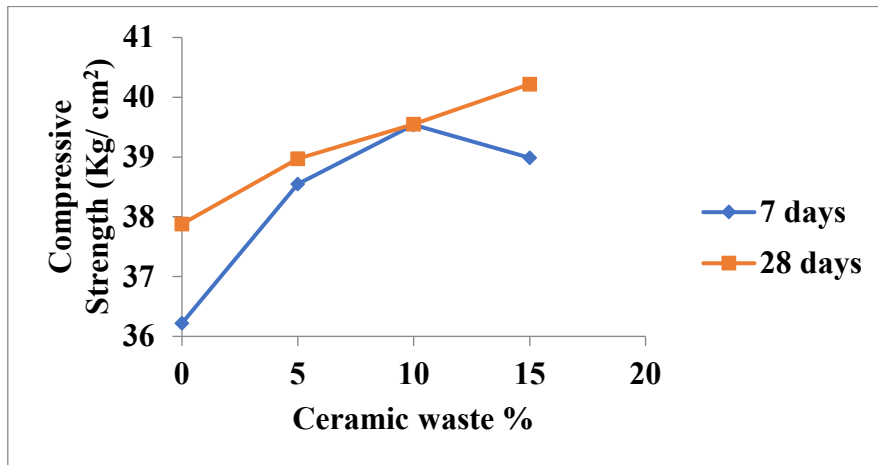


Figure 6: Compressive Strength test using micro silica 15 %

4.2. DURABILITY TESTS

Table 5: Water absorption of different mixes

Sl. No.	Mix	Mix Time (minutes)	Water absorption, At (g/100cm ²)
1	M1	20	200
2	M4	80	306
3	M8	320	406
4	M12	1280	702
5	M16	5120	688

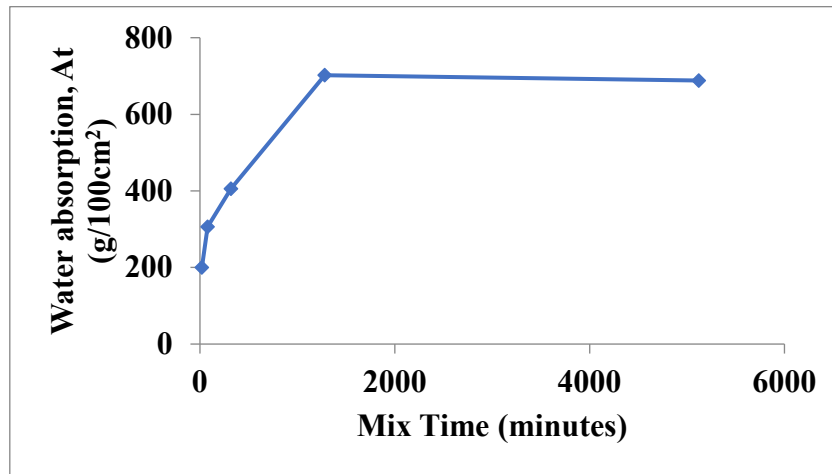


Figure 7: Water absorption of different mixes

5. CONCLUSIONS

We are tested the specimen size of 150mm X 150mm X 150mm to observe the compressive strength and durability test using of ceramic waste and micro silica. The various results are obtained with the help % of ceramic waste addition. These specimens are tested using compression strength testing machine after 7 days and 28 days. It is found out the maximum compressive strength using micro silica 15 % during 7 days and 28 days are 45.66 Kg/cm² and 47.88 respectively which is shown in Table 3 and Figure 5. It is also found that in M12 Water absorption at 702 g/100cm² at the time of 1280 Minutes using water absorption of different mixes, which is Table 5 and Figure 7.

SOURCES OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST

The author have declared that no competing interests exist.

ACKNOWLEDGMENT

None.

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