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Strength Properties on Concrete by Partial Replacement of Cement with Dolomite and Fine Aggregate with M-Sand

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Abstract: This paper deals the fresh and hardening property of concrete made with M-Sand as sand and dolomite powder as cement replacement in different percentages of cement by dolomite powder is 0, 5, 10, 15 and 20% fine aggregate by M-Sand is 0, 10, 20, 30 and 40 by the weight of M40 grade concrete. The test specimens were cured and tested for compressive strength and split tensile strength in 7 and 28 days for concrete. The maximum strength is obtained for 30% replacement of M-Sand and 15% replacement of dolomite powder.

Keywords: Dolomite powder, M-sand, Compressive strength, Split tensile strength

I. INTRODUCTION

Prepared sand (M-sand) is an alternative to river sand for concrete construction. Manufactured sand is produced from hard granite stone by crushing. The crushed sand has cubic shape with grounded edges and is classified as washable construction material. Prepared sand volume (M-sand) 4.75mm less than. Since the prepared sand can be crushed from hard granite rocks, it is easily available at a nearby location, reducing the cost of transportation from a distant river sand bed. Therefore, construction cost can be controlled by using sand made as an alternative material for construction.

II. OBJECTIVES

1. To achieve the strength by using dolomite powder to partially replace cement in concrete.
2. Compression and split tensile strength of concrete of M40 grade concrete 7 and 28 days.

III.MATERIALS

3.1. CEMENT

The properties of cement are presented in Table 1.

Table 1. Properties of cement

S.No.	Property	Cement (53 grade)
1	Specific gravity	3.15
2	Fineness	3.5%
3	Consistency	33%
4	Initial setting time	33 min
5	Final setting time	510 n

3.2 M-SAND

Manufactured sand (M-Sand) is a substitute of river sand for concrete construction. Manufactured sand is produced from hard granite stone by crushing. The crushed sand is of cubical shape with grounded edges, washed and graded to as a construction material. The size of manufactured sand (M-Sand) is less than 4.75mm. Since manufactured sand can

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be crushed from hard granite rocks, it can be readily available at the nearby place, reducing the cost of transportation from far-off river sand bed. Thus, the cost of construction can be controlled by the use of manufactured sand as an alternative material for construction.

3.3 DOLOMITE

Dolomite is an anhydrous carbonate mineral containing calcium magnesium carbonate. Dolostone is an alternative name sometimes used for the dolomitic rock type. Dolomite is a decorative stone, a source of concrete aggregates and magnesium oxide, as well as used in the production of magnesium.Calcite limestone is unusual or very expensive; dolomite is sometimes used as a flux to smelt iron and steel in its place. Large amounts of processed dolomite are used in the production of float glass.

CONCRETE MIX DESIGN

The mix proportion used to prepare concrete is1:1.47:2:0.40.

IV. EXPERIMENTAL INVESTIGATIONS

4.1 COMPRESSIVE STRENGTH RESULTS

Table 2: Compressive strength of concrete with M-Sand as partial replacement for fine aggregates

Sl.No.	M-SAND	Compressive strength of concrete, N/mm^2	
		7days	28 days
1	0%	33.34	48.25
2	10%	36.45	52.38
3	20%	36.68	53.47
4	30%	38.55	54.08
5	40%	36.26	53.02

Table 3: Compressive strength of concrete with dolomite as partial replacement for cement

Sl.No.	Dolomite	Compressive strength of concrete, N/mm^2	
		7days	28 days
1	0%	33.34	48.25
2	5%	35.19	50.57
3	10%	35.88	52.31
4	15%	39.55	55.46
5	20%	36.00	52.64

4.2 SPLIT TENSILE STRENGTH RESULTS

Table 4: Split tensile strength of concrete with M-Sand as partial replacement for fine aggregates

Sl.No.	M-SAND	Split tensile strength of concrete, N/mm^2	
		7days	28 days
1	0%	3.23	4.68
2	10%	3.49	5.07
3	20%	3.59	5.10
4	30%	3.73	5.28

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5	40%	3.26	4.77

Table 5: Split tensilestrength of concrete with dolomite as partial replacement for cement

Sl.No.	Dolomite	Split tensile strength of concrete, N/mm^2	
		7days	28 days
1	0%	3.23	4.68
2	5%	3.37	4.96
3	10%	3.51	4.99
4	15%	3.83	5.41
5	20%	3.34	4.73

V. CONCLUSION

1. At 30% replacement of fine aggregate by M-Sand the achieved compressive strength of concrete is 38.55 and 54.08 N/mm^2 for 7 and 28days.
2. At 30% replacement of cement by M-Sand the split tensile strength of concrete is 3.73. and 5.28N/mm^2 at 7 and 28 days.
3. At 15% replacement of cement by Dolomite the achieved compressive strength of concrete is 39.55 and 55.46N/mm^2 for 7 and 28days.
4. At 15% replacement of cement by Dolomite the achieved split tensile strength of concrete is 3.83 and 5.41N/mm^2 for 7 and 28days.
5. The compressive strength of concrete with combined 30% of M-Sand with normal concrete is 12.08%for 28 days.
6. The compressive strength of concrete with combined 15% of dolomite with normal concrete is 14.94 %for 28 days.
7. The split tensile strength of concrete with combined 30% of M-Sand with normal concrete is 12.82% for 28 days.
8. The split tensile strength of concrete with combined 15% of dolomite with normal concrete is 15.59 %for 28 days.

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