EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF CEMENT WITH DOLOMITE POWDER

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ABSTRACT

In a developing nation like India a tremendous measure of modern waste are contaminating the natural. With a view to the abovementioned, this examination focuses on use of such mechanical side-effect for esteem included application. What's more the waste can improve the properties of development materials. The dolomite has been utilized as powder. The dolomite powder was tried with cement and mortar. Concrete was supplanted by the dolomite powder in the extent of 0%, 10%, 20%, 30%, 40% and half. The compressive quality, split rigidity, consistency and flexural quality were directed for the above substitutions. The outcome demonstrated dolomite powder improves the mechanical properties. The benefits of this venture are that the substitution of dolomite powder is financially modest just as a predominant cement can be made.

Keywords: *Experimental Study, Concrete, Using Cement, Dolomite Powder*

I INTRODUCTION

Concrete is one of the world's most utilized development material because of its flexibility, solidness and economy. India utilizes about 7.3 million cubic meters of prepared blended cement every year. It discovers application in roadways, boulevards, spans, elevated structures, dams and so on. Green house gas like CO2 prompts an unnatural weather change and it adds to about 65% of an Earth-wide temperature boost. The worldwide concrete industry discharges about 7% of green house gas to the climate. To diminish this ecological effect elective folios are acquainted with make concrete.

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Concrete is a mix of concrete, sand, coarse total and water. The key factor that increases the value of cement is that it very well may be intended to withstand harshest conditions noteworthy job. Today an unnatural weather change and natural demolition have become show hurts lately, worry about ecological issues, and a changeover from the mass-squander, mass utilization, large scale manufacturing society of the past to a zero-radiation society is currently seen as huge. Typically glass doesn't hurt nature in any capacity since it doesn't emit poisons, however it can hurt people just as creatures, if not managed cautiously and it is less neighborly to condition since it is non-biodegradable. Subsequently, the advancement of new innovations has been required. The term glass contains a few substance assorted varieties including soft drink lime silicate glass, antacid silicate glass and boro-silicate glass. Until this point in time, these sorts of glasses glass powder have been generally utilized in concrete and total blend as pozzolana for common works. The presentation of waste glass in concrete will build the soluble base substance in the concrete. It likewise help in blocks and clay assembling and it jam crude materials, diminishes vitality utilization and volume of waste sent to landfill. As helpful reused materials, glasses and glass powder are mostly utilized in fields identified with structural designing, for instance, in concrete, as pozzolana(supplementary cementitious

materials), and coarse total. Their reusing proportion is near 100%, and it is additionally utilized in concrete without unfavorable impacts in solid toughness. Subsequently, it is viewed as perfect for reusing Recently, Glasses and its powder has been utilized as a development material to diminish natural issues. The coarse and fine glass totals could cause ASR (soluble base silica response) in concrete , yet the glass powder could smother their ASR propensity, an impact like advantageous cementations materials (SCMs). In this manner, glass is utilized as a substitution of advantageous cementitious materials.

Applications & Properties of Dolomite

- Dolomite is a uniform amorphous solid material, which is generally produced when the viscous molten material cools very rapidly to below its glass transition temperature, without giving sufficient time for a regular crystal attice to form.
- The most familiar form of dolomite is the silica-based material used for windows, containers and decorative objects.
- Dolomite falls in the category of biologically inactive material that can be formed with very smooth and impervious surfaces.

Physical properties

Physical properties	Cement	Dolomitepower
Fineness % passing (sieve size)	3 - 3.2	2.42 – 3.01
Specific gravity	< 90 µm	< 75 µm
Colour	Gray	White

EFFECT OF CHEMICAL COMPOSITION OF CEMENT ON STRENGTH OF CONCRETE:-The raw materials utilized for assembling of concrete comprise predominantly of lime, silica, alumina and iron oxide. These oxides communicate with each other in the furnace at high temperature to frame more oxide compound. The overall extents of these oxide arrangements are liable for impacting the different properties of concrete. The oxides present in the crude materials when exposed to high clinkering temperature join with one another to frame complex mixes which are named as Bogue's compound. Tricalcium silicate and dicalcium silicate are the most significant compound answerable for early quality and late quality of cement all the while. In present day concrete together they establish 70-80% of concrete while substance of C3A and C4AF have diminished marginally. The determined amount of the compound in concrete differs enormously in any event, for a generally little change in the oxide creation it turns out to be completely important to intently control the oxide piece of the crude materials. High C3S content (low C2S content) lead to a lot quicker hydration rate adds to higher early quality addition. In this manner, concrete with higher extent of C3S, just like the case in a large portion of the present concrete, will in general have a higher early quality, and take into account early structure expulsion or post tensioning. C3A free a lot of warmth during the initial scarcely any long stretches of solidifying and together with C3S and C2S may to some degree increment the early quality of solidifying concrete. Low % of C3A concrete is progressively impervious to sulfates. C4AF contributes somewhat to quality pick up and add to the shading impacts that makes concrete dark

II EXPERIMENTAL PROCEDURE

2.1 MATERIALS:-Portland slag cement [1] of Ultra-Tech brand available in the local market was used in the present studies. The coarse aggregate used were 20 mm and 10 mm down size. Natural river sand has been collected from River, and conforming to the Zone-III as per IS-383-1970 [2].Cement was replaced by the

dolomite powder in the proportion of 0%, 10%, 20%, 30%, 40% and 50%.

2.2 DOLOMITE POWDER:-The mineral dolomite crystallizes in the trigonal-rhombohedral system. It forms white, tan, gray, or pink crystals. Dolomite is a double carbonate, having an alternating structural arrangement of calcium and magnesium ions. Unless it is in fine powder form, it does not rapidly dissolve or effervesce (fizz) in cold dilute hydrochloric acid as calcite does. Crystal twinning is common.

Solid solution exists between dolomite, the iron-dominant ankerite and the manganese-dominant kutnohorite. Small amounts of iron in the structure give the crystals a yellow to brown tint. Manganese substitutes in the structure also up to about three percent MnO. A high manganese content gives the crystals a rosy pink color. Lead, zinc, and cobalt also substitute in the structure for magnesium. The mineral dolomite is closely related to huntiteMg3Ca(CO3)4.

Because dolomite can be dissolved by slightly acidic water, areas of dolomite are important as aquifers and contribute to karst terrain formation.

It was sieved by IS-90 micron sieve before mixing in concrete.Dolomite is a carbonate material composed of calcium magnesium carbonate CaMg (CO3)2. The term is also used to describe the sedimentary carbonate rock dolostone. Dolostone (dolomite rock) is composed predominantly of the mineral dolomite with a stoichiometric ratio of 50% or greater content of magnesium replacing calcium, often as a result of digenesis.

MIX DESIGN:-

Material	Cement	Fine aggregates	Coarse aggregates	dolomite powder	water
Quantity	276.81 kg	668.88 kg	959.76	92.91 kg	154.8 litres

III RESULT & DISCUSSION

No. of specimens to be casted

s. no	% of replacement	Compressive strength			Split tensile strength		Flexural strength	
		7	14	28	7	28	7	28
1	0 %	3	3	3	3	3	3	3
2	10 %	3	3	3	3	3	3	3
3	20 %	3	3	3	3	3	3	3
4	30 %	3	3	3	3	3	3	3
5	40 %	3	3	3	3	3	3	3
6	50 %	3	3	3	3	3	3	3
Total		54 cubes			36 cylinders		36 prisms	

Slump cone test

% of replacement of dolomite powder	Slump value
0%	33
10%	50
20%	60
30%	70
40%	75
50%	100

Compaction factor test

s. no	% of replacement of dolomite powder	Compaction factor test
1	0%	0.932
2	10%	0.948
3	20%	0.965
4	30%	0.968
5	40%	0.972
6	50%	0.980

Compressive strength for M30 grade of concrete

% of replacement of dolomite powder	Compressive strength in N/mm^2		
	7 days	14 days	28 days
0%	21.98	29.64	31.08
10%	18.47	30.89	33.06
20%	19.28	28.5	32.06
30%	16.64	27.04	30.96
40%	16.38	25.46	28.86
50%	15.98	25.30	27.90

Split Tensile strength for M30 grade of concrete

% of replacement of dolomite powder	Spilt tensile strength in N/mm^2	
	7 days	28 days
0%	3.46	3.93
10%	3.28	4.04
20%	2.37	4.49
30%	2.21	3.91
40%	2.18	3.84
50%	2.10	3.56

Flexural strength for M30 grade of concrete

% replacement of dolomite powder	Flexural strength	
	7days	28 days
0%	2.48	3.15
10%	2.25	3.39
20%	2.38	4.01
30%	2.11	3.06
40%	2.3	3.04
50%	2.05	2.98

IV CONCLUSION

The following conclusions are made based on the above study:

i. The 7 days, 14 days and 28 days compressive qualities of solid increment at first as the supplanting rate ofcement with dolomite powder increments, and become most extreme at about 20% and later declines.

ii. The flexural quality of solid builds at first as the supplanting level of concrete with dolomite powder increases and gets most extreme at about 20% and later abatement.

iii. The split rigidity of solid builds at first as the supplanting level of concrete with dolomite powder increments and gets greatest at about 20% and later reduction.

iv. The droop of solid decline monotonically as the substitution

v. Percentage of concrete with dolomite powder increments. The functionality diminishes when concrete is supplanted in part with dolomite powder

vi. The present investigation shows that there is an incredible potential for the usage of dolomite powder concrete as halfway replacementof concrete. About 20% of concrete might be supplanted with dolomite powder with no penance on the compressive quality

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