Experimental Studies on Utilize the Dry Precipitate as Fine Aggregate with M-sand in Concrete

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Abstract - *In recent days disposal of waste dry precipitate from sewage treatment plant is very important problem due to various environmental restrictions; so, many investigations are performed to solve those problem in environmental especially to use those waste dry precipitate in concrete mix designs. Dry participate is residue produced by the waste water treatment plant process. At the time of wastewater treatment liquids and solids are being separated. The constituents removed during various treatment process i.e., treatment include grit, screenings and precipitate. The dry precipitate is produced by very large volume after completion of all water treatment process. To removal of those precipitate create waste inner material after its biological component degradation. The disposal of those precipitate create some problem during waste disposal. The waste dumping on land creates land pollution. So, avoid that problem on environmental purpose the study was carried out. To Study the compression behavior of concrete by replacing of 0, 5, 15 and 20% as a fine aggregate with M-sand in M25 grade of concrete (M-sand used replacement of natural sand) to analysis the effect of concrete in compressive strength and tensile strength at different stages of curing 7 and 28 days will be analyzed.*

Key Words: Dry Precipitate, M-Sand, Compressive Strength, Tensile Strength.

1. INTRODUCTION

Waste is an inevitable component in every of human activity in all department. The result of every component finally creates any one of the environmental pollutions like water pollution, land pollution and air pollution. After any pollution creation the removal of those waste particles is essential due to environmental restrictions in many places. Mostly many dry particles created by many industries like electrical industries, spinning mill and etc., but, those materials are involving any one recycle process to obtain reasonable source from those waste materials. The water treatment process creates many biological and non biological wastes during its various treatment processes. After treatment process the waste inner material was created. The followings are popular method for removal of waste inner from environmental is incineration land dumping. Since land is very essential one for now a days and incineration also produce large amount of CO2 and large amount of ash; Environment Organization prohibited the use of dry precipitate as fertilizer due to dangers of heavy metals is presents; due to those restriction condition huge volume of dry precipitates are collected in various industries especially treatment plants. so, alternative methods are required. To avoid land dumping purpose this study was carried out at concrete mix design.

2. NEED FOR STUDY

The experimental investigations are planned to use effluent treated dry precipitate from treatment plant used as fine aggregate; as it will reduce the cost of construction. To avoid landfill and incineration process to save and avoid various environmental pollutions. The following investigations help to future removal process as well as identification of performance of dry precipitate. Minimize the maximum demand for natural sand purpose the following project was carried out.

3. MATERIALS USED

3.1 CEMENT (OPC)

Cement use as finding material in M25 grade of concrete mix design. This one is basic material in concrete making. The ordinary Portland cement of 53 grade conforming to IS 8112 used for this project.

3.2 FINE AGGREGATE

Fine aggregate is sand mostly obtained from lake or river. But this project carried out by using artificial sand (m-sand). Those fractions up to 150 microns are used based on standard. The sand passing through 2.36mm to 900 micron sieve is used. Generally the sand is used to fill voids in coarse aggregate purpose. In this work m-sand used as fine aggregate.

3.3 COARSE AGGREGATE

The coarse aggregate is major component of concrete making. Generally the coarse aggregate occupy 70-80% of volume in total concrete mix. The broken crushed stone was used as coarse aggregate in this project. The crushed stone passing from 40mm sieve and retained at 20 mm sieve was used. The specific gravity is 2.6.

3.4 WATER

Generally water is important ingredients of concrete as it's used for making chemical process in concrete mix. General guidance is water fit for drinking is suitable for concrete making. The water without high salt content used for concrete making. The water content was highly monitored for maintain workability of the concrete.

3.5 DRY PRECIPITATE

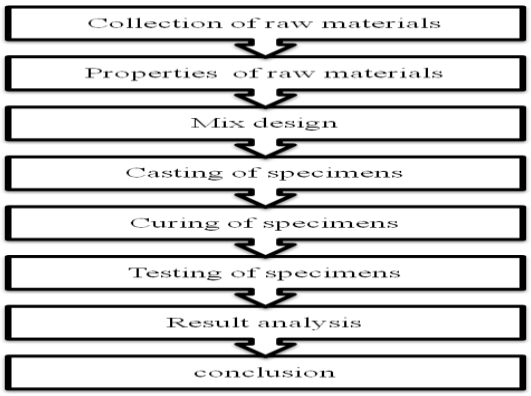
The waste inert material received from waste water treatment plant. After all biological component decomposition the inner material was obtained from treatment plant.

Picture 1: Wastewater Treatment Plant, Erode.

4. METHODOLOGY

The investigation effect of waste dry precipitate in concrete, three specimens were casted and tested at the interval of 7 and 28 days. After the test result with conventional strength was compared to find performance of this investigation. The cube size is 150x150mm. Template sample paragraph .Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

Flow Chart -1: Methodology



5. MIX DESIGN

The nominal mix ratio used for the investigation. The mix called as standard mix. IS 456-2000 has designed the nominal mix designs. The following ratio is standard M25 ratio by volume.

Proportion	**Of**	**M_{25}:**	**1:1:2**
Cement:	M-Sand:	Crushed stone:	water
1886 kg:	2462kg:	4300 kg:	792lt.
1:	1:	2:	0.48

6. PROPERTIES OF MATERIAL

6.1 SPECIFIC GRAVITY OF MATERIALS

Table 1-Specific Gravity

S.no.	Description	Specific gravity
1	Cement	2.6
2	Sand	2.47
3	Coarse aggregate	2.96
4	Dry precipitate	2.3

6.2 MIX PROPORTION AT DIFFERENT REPLACEMENT LEVEL

Table 2-Replacement level

S.no	Replacement in nominal mix ratio	FA	inert material
1	0%	1	0
2	5%	0.95	0.05
3	15%	0.85	0.15
4	20%	0.8	0.2

7. TEST RESULT

7.1 COMPRESSIVE STRENGTH

The cube compression test conducted on the concrete cubes shown in Table.3 and test results graphically shown in the Fig.1

Table.3 Compression Test Results

S. NO	REPLACEMENT (%)	COMPRESSIVE STRENGTH N/mm²	
		7days	28 days
1	0	17.3	24.87

2	5	18	24.6
3	15	15.6	21.3
4	25	14.7	20.9

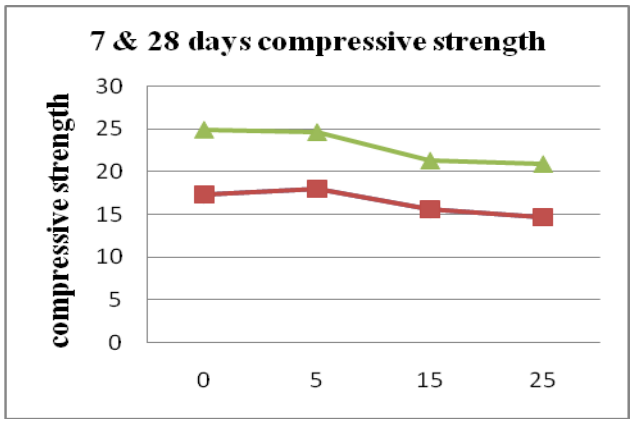


Fig.1 Compressive strength of dry precipitate in concrete

7.2 TENSILE STRENGTH

The cube tensile test conducted on the concrete cubes shown in Table.4 and test results graphically shown in the Fig.2

Table.4 Tensile Test Results

S. NO	REPLACEMENT (%)	TENSILE STRENGTH N/mm²	
		7days	28 days
1	0	1.7	2.19
2	5	1.85	2.18
3	15	1.75	2.14
4	25	1.12	2.11

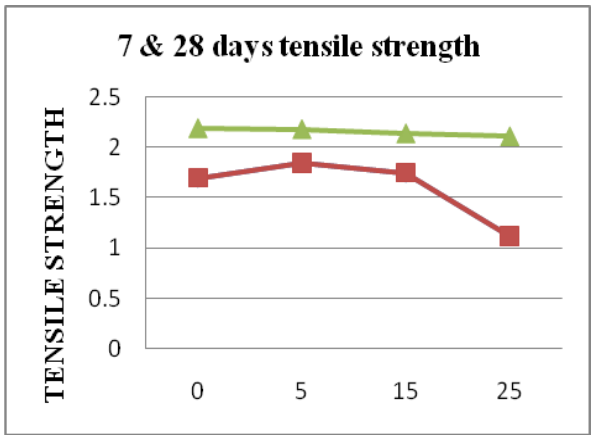


Fig.2 Tensile strength of dry precipitate in concrete

8. CONCLUSIONS

The research analysis experimentally establish the partial replacement of dry precipitate with m-sand as a fine aggregate source in concrete, studied compressive and tensile behavior and its compare to nominal concrete to obtain following results

a. The continuous adding dry precipitate reduces strength. But, up to 5% mix the strength nearly equal normal mix.

b. This method is suitable for mass concrete structure construction.

c. This is alternative method of dry precipitate removal.

d. This method suitable for precast structure construction.

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