International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 09 | Sep 2020 www.irjet.net p-ISSN: 2395-0072

A Research on Partial Replacement of Cement and Fine Mixture by Alternatives for Eco Friendly Concrete

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Abstract - *The target of analysis proposal area unit to review the influence of proportion of copper Scoria as partial replacement of cement. The main points scope of the study is, to research the unreal sand mixed concrete containing five-hitter, 10 percent, V-J Day and 2 hundredth of Cs as partial replacement of cement and to gauge the mechanical properties of concrete likes a compressive strength, split durability and flexural strength. This study has been administrated to analyse the potency of copper scoria by exchange cement within the proportion of 1/3 [while not copper scoria], 5 percent, 10 percent, 15 percent, and 2 hundredth with 100 percent artificial sand. Six concrete mixes [C0, C5, C10, C15, C20 and natural concrete Old North State] were created by exchange cement with five-hitter, 10%, V-J Day and twenty you look after copper scoria by mass severally. The water/cement quantitative relation all told the mixes was unbroken at zero.45. As per warming is concern, efforts area unit created toward reducing the emission of carbonic acid gas within the atmosphere. Cement industries area unit the foremost contributor within the emission of carbonic acid gas in addition as exploitation high level energy resources within the production of cement. Researchers from everywhere on the globe area unit specializing in the approach of utilizing industrial waste, as supplementary cement replacement materials. This waste exercise wouldn't solely be economical, however can also facilitate protective the atmosphere.*

Key Words: *Copper scoria, Artificial Sand, Compressive strength, Split durability and Flexural Strength , etc*

1. INTRODUCTION

Concrete may be a material composed of water coarse combination; Fine combination embedded in arduous matrix of fabric. Within the gift situation, as a result of continuous growth in population speedy industry and an incidental to technologies involving waste disposal, the speed discharge of waste into the atmosphere, copper dross is one among the commercial waste that comes out from the furnace throughout metal extraction method. The quantity concrete used worldwide, tone for tone, is doubly that of the steel. Wood, plastic, and aluminium combined. Once copper dross is introduced within the concrete as a replacement material it reduced, the atmosphere pollution, area downside and conjointly scale back value of the concrete. Artificial combination is factory-made by crushing the by appropriate boulders and rocks in crushing machine. As per atmosphere concern also are being raised against uncontrolled extraction of natural sand. These things for the development trade nowadays and most can agree that it'll not amendment dramatically within the predictable

Table -1: Sample Table format

Sr No	Sieve no (mm)	Cumulative Weight retained (grams)	Cumulative percentage Retained (%)	Percentage passing (%)	Zone -II as per Is-383
1	4.75	14	1.4	98.6	90-100
2	2.36	80	8.0	92.0	75-100
3	1.18	322	32.2	67.8	55-90
4	600	518	51.8	48.2	35-59
5	300	720	72.0	28.0	8-30
6	150	947	94.7	5.3	0-10

7	Pan	1000			
			∑F = 260.1		

Table -2: Sample Table format

Sr No	Characteristics of fine Aggregate	Value
1	Type	Natural and artificial sand
2	Specific gravity	2.60
3	Fineness modulus	2.60
4	Grading zone	Type-II
5	Water absorption	1.4%

Table -3: Sample Table format

SR NO	Sieve no (mm)	Cumulative weight retained (gram)	Cumulative percentage Retained (%)	Percentage passing (%)	Zone -II as per IS-383
1	40	0	0	100	100
2	20	44	1.47	98.53	95-100
3	10	1796	59.87	40.13	25-55
4	4.75	2835	94.5	5.5	0-10
5	Pan	3000	---------	--------	--------

Table -4: Sample Table format

Size of Aggregate	Specific Gravity	Water absorption	Fineness Modulus	Flakiness Index (%)	Elongation Index (%)	Impact Value (%)	Crushing value (%)
10(max)	2.788	0.5	7.26	27	24	15.27	18

Table -5: Sample Table format

Physical Properties	Copper Slag
Particle Shape	Irregular

Appearance	Black & glassy
Type	Air cooled
Specific gravity	3.91 ,3.68
Percentage of voids	43.2%
Bulk density	2.08g/cc, 1.70 to 1.90 g/cc
Particle size	0.075 mm to 4.75 mm
Hardness	Between 6 to 7

Table -6: Sample Table format

Chemical Component	**Chemical Component (%)**
SiO	25.85
Fe2O	68.29
Al2O	0.22
CaO	0.15
Na2O	0.58
K2O	0.23
Mn2O3	0.22
TiO2	0.41

2. MATERIAL AND METHODOLOGY

1) Cement - Portland –pozzolana cement of grade — fifty-three grades of immoderate school cement orthodox to Indian customary IS 1489 -1991 part-I is employed during this experimental work.
2) Fine combination — the mixture having size but four.75 mm is thought as fine combination. It may be acquired from bed rock. These fine combination ought to be freed from any foreign matter, clay, silt, and organic matter and may be onerous and sturdy. It ought to tell IS 383-1970.
3) Coarse combination - the mixture having sizes over four.75 mm then it's referred to a as coarse combination. It's acquired from bed rock. It's on the market in numerous sizes, and form like rounded, irregular, or part rounded, angular, flaky etc. It ought to be freed from organic impurities and dirt content.
4) Mix style, And Sample Preparation — Concrete mixtures with completely different proportion of copper scoria used as per partial replacement of cement and 100 percent replacement of artificial sand. These areas unit ready to research the result of copper scoria substitution on the strength traditional concrete. Concrete mixtures were ready with completely different proportion of copper scoria. The proportions by weight of copper scoria accessorial to concrete mixtures were as 1/3, 5%, 10%, V-day and two hundredth.

3. TESTING PROCEDURE

After curing subsequent result were administered on the concrete sample.

A. Compressive strength was conducted on sample at 7 days, 14 days and 28 days of curing.

B. Split lastingness was conducted on sample at 28 days of curing.

C. Flexural strength was held on sample at 28 days of curing.

4. RESULTS AND DISCUSSION

Table -7: Sample Table format

Sr.No.	Mix Type	Compressive strength (MPa)
1	P-100	16.43
2	CS-5-95	19.54
3	CS-10-90	19.85
4	CS-15	17.54
5	CS-80	13.20

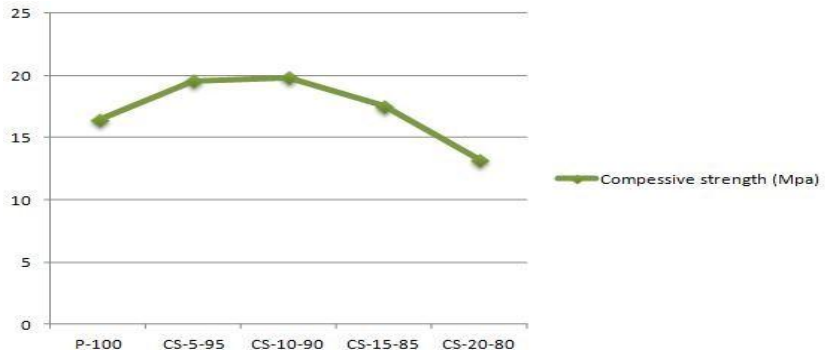


Table -8: Sample Table format

Sr No.	Mix Type	Compressive strength (MPa)
1	P-100	17.76
2	CS-5-95	21.75
3	CS-10-90	22.03
4	CS-15-85	18.92
5	CS-20-80	15.00

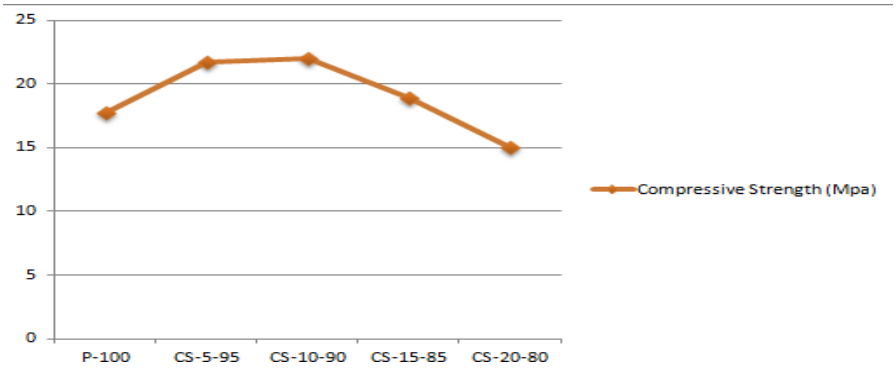
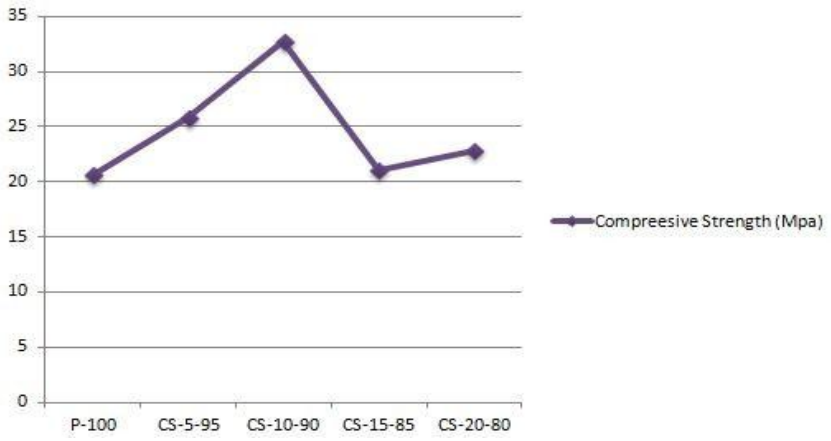


Table -9: Sample Table format

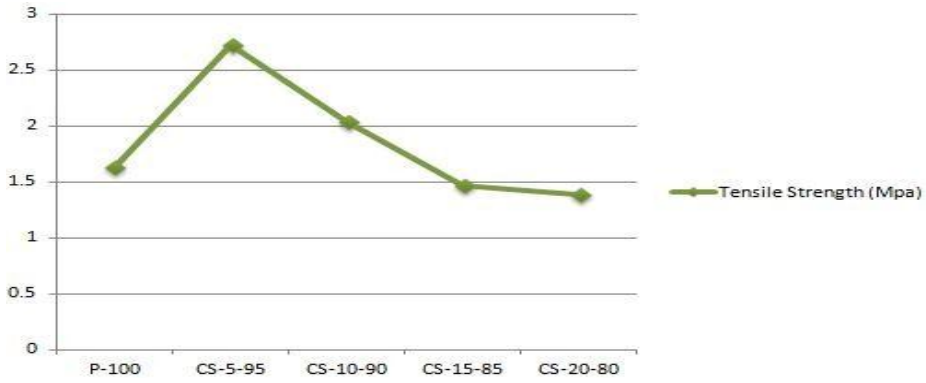
Sr No.	Mix Type	Compressive strength (MPa)
1	P-100	20.28
2	CS-5-95	25.83
3	CS-10-90	32.67
4	CS-15-85	21.01
5	CS-20-80	22.75



From the test result it was observed that the compressive strength of concrete mixtures with replacement of fine aggregate with artificial sand and replacement of cement with copper slag was higher at 10% replacement of copper slag with 100% replacement of artificial sand which was found to be 19.85 Mpa for 7 days, 22.03Mpa for 14 days and 32.67 Mpa for 28 days.

Table -9: Sample Table format

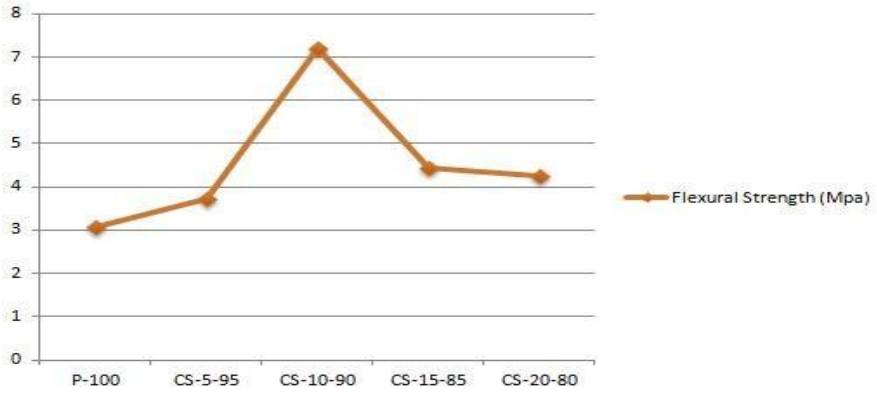
Sr No.	Mix Type	Tensile strength (MPa)
1	P-100	1.634
2	CS-5-95	2.728
3	CS-10-90	2.037
4	CD-15-85	1.462
5	CS-20-80	1.382



From the take a look at result it had been ascertained that the very best split nastiness was achieved by 100 percent replacement of copper dross. That was found to be two.037Mpa for twenty-eight days curing?

Table -10: Sample Table format

Sr No.	Mix Type (S.F.%)	Flexure Strength (MPa)
1	P-100	3.07
2	CS-5-95	3.74
3	CS-10-90	7.21
4	CS-15-85	4.45
5	CS-20-80	4.25



From the take a look at result it had been discovered that the best flexural strength was achieved by 100% replacement of copper dross. That was found to be seven.21Mpa for twenty-eight days curing?

5. CONCLUSIONS

1) The replacement of fine mixture exploitation copper dross in concrete increase the density of concrete thereby increase the self-weight of the concrete.

2) The use of copper dross in concrete provides extra environmental in addition as technical edges for all industries.

3) The compressive strength, split strength and flexural strength of concrete with 100% addition of copper dross at seven days,14days and twenty-eight days was more than style mixes (without replacement).

4) The suggested share replacement of cement by copper dross is 100% with 100% replacement of artificial sand.

5) By use of copper dross porous voids area unit get reduced.

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