Section A-Research paper

EXPLORATORY SURVEY ON DURABILITY CONCEPTS OF HIGH STRENGTH CONCRETE WITH COPPER SLAG AND CARBON FIBER

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Abstract

Due to increasein rapid advancement of infrastructure system the requirement of sustainable materials in construction is essential. It is very difficult to overstate the role of material (SAND) today as it plays a prominent role in concrete production. In recent years, due to excessive and gravel mining the dredging of river beds affects the structures spotted nearby. And also created a huge problem to human and environment. And also in order to protect the natural availability of resources like sand and gravel, My research study was intensively focused on replacement of fine aggregate with copper slag (In 0%,10%,20%,30%,40%and50%) proportions. Copper slag is an industrial waste from Copper industry .By using copper slag in construction work we can reduce the open land dumping there by protection of imprudent place as well as natural resources .Along with copper slag 0.25% carbon fibers were added as admixture constantly for all 5 mixes as they will increase crack healing capacity ,high durability and higher tensile strength . Main aim of present work is to show the effective usage of copper slag and to study the durability properties, Acid attack test, RCPT, Abrasion resistance test were conducted for all mixes with different copper slag percentages.% Loss in weight and compressive strength was 0.177and 2.03 and Amount of charge passed was 345.6mA having abrasion depth of 0.0093mm at 30% replacement of fine aggregate with copper slag while the Nominal mix having % Loss in weight and compressive strength was 2.52 and 11.205 and Amount of charge passed was 1043.1mA and abrasion depth of 1.65mm.

Key words: *Fine aggregate, Copper slag, Carbon fiber, Acid Attack , Rapid Chloride Permeability , Abrasion Resistance of concrete*

1. INTRODUCTION

There was a high requirement of natural sand in construction .To reduce the consumption of natural sand that show effect on the stability of nearby structures including the loss of marine and bio diversity ,the one alternate resource (copper slag) is used as a replacement of the fine aggregate ,as it is one of the material extracted from copper industry as an Industrial waste possessing binding nature.

Along with the copper slag ,the carbon fibers are added to the concrete as it plays a crucial role in arresting the cracks by

improving durability nature of concrete and its practice in construction as glue to the defected areas have shown a great improvement in reduction of cracks. There was a very high demand of natural sand as it is deficient material now a days for infrastructure development.In order to limit the usage of natural sand,the copper salg is one and only material with similar characteristics and properties which was utilized as replacing agent to fine aggregate .The main intention is to access the durability performance of concrete on designed proportions of various mixes through various laboratory investigations like Acid Attack ,RCPT and Abrasion resistance of concrete by partially replacing copper slag with fine aggregate at different percentages along with constant carbon fiber 0.25% carbon fiber for all the mixes In order to focus on utilization of Industrial waste and to reduce the usage of river sand and improve the endurance and stalwartness characteristics of the high strength concrete ,the fine aggregate was replaced with copper slag in several proportions(0%,10%20%,30%,40%and 50%)with carbon fiber admixture .To acquire the long lasting behaviour of concrete by fulfilling durable nature Acid attack test, Rapid Chloride permeability test and Abrasion Resistance of concrete test was conducted

2 Literature Review

Prashant Mule,Srikanth Ralpey,Rahul Ralwani(2018) Canvassed the chopped modern fabric for enhancement of concrete performance. The major goal of this have a look at is to evaluate workability and mechanical check assets check out comes with carbon fiber added concrete and no carbon fibers with the aid of using changing carbon fibers with special quantity fraction (0%, 0.25%,0.50%,0.75%,1%).There turned into a deep statement that the concrete with carbon fiber dosage there has been no splitting of cylinder after prevalence of first crack indicating the ductile nature. There turned in to lower in stoop parameter with the aid of using 10mm with a growth in 0.25% dosage as compared to the reference blend that turned in to and not using a fiber content material. There turned into a growth in electricity with the aid of using 19.4% at 1.00% concrete with carbon with the aid of usingq quantity fraction than managed blend. For every 0.5% growth in carbon content material boost of electricity turned into observed. By their studies have a look at 0.75% of 10 the carbon fibers had been apt for quicker boom of construction. The managed blend specimens exhibited speedy improvement of crack after load Application at the same time as fiber contained concrete proven intact and has capacity to take in electricity in submit cracking stage.

D.L chung(1999) have studied the overall performance on cement reinforced with brief fibers-a multifunctional material and stated that the quick fiber cement matrix have right tensile and flexure residences with immoderate electric powered conductance and corrosion resistance. The dia of 15micrometer carbon fiber is a more strength inhibiting fabric in evaluation to 0.1micrometer dia carbon filaments. As a reinforcing fabric in case of strain sensing, the carbon fiber composites are advanced to exclusive polypropylene and quick fibers.

Jing jingZhang,Janweicheng,Yuanmingdou,Qinxin (2007)performed mechanical and electrical tests. Durability testing on fibre reinforced concrete using a variety of fibres including carbon, aramid, and hybrid fibres. A total of 60 prisms were cast, each with varied diameters.In order to perform the experiments with different mixes, 150x150x300mm and 100x100x300mm were used.0.5 percent, 1 percent, 1.5 percent carbon fibres, aramid fibre, and hybrid fibres were added to the control mix.As an admixture, fibres with the same mix percentage as carbon fibre are added to each mix. Concrete of the M-40 grade is being prepared. In order to determine how long the product will last and how strong it will be, In the field, axial compressive strength, static elastic modulus, and carbonation tests were conducted. There was an improvement in strength gain when the fibre content was reduced. The environmental impact Carbon fibres with physical properties of 3530MPa tensile strength, 240GPa tensile modulus, length 2mm, dia 7 micrometers, and elongation of 1.5 percent were used, as well as aramid fibres with physical properties of 3150MPa,80GPa,3.6 percent tensile strength, tensile modulus, and elongation with fibre dia 12micrometer and length 2mm. In comparison to aramid and hybrid fibres, concrete with 1% fibre addition had the highest strength and the most lasting nature.

3.MATERIALS, MIX PROPORTIONS AND METHODS

3.1*Materials*

Cementis a binder that is formed by heating of limestone ,shells chalk or marl combined with shale, clay, slate, blast furnace slag, silica, sand, iron ore are heated at high temperature form a hard rock like substance that is ground into fine powder called cement. In my present research work ultratech cement of ordinary portland cement 53 grade was used for all concrete mixes.

Fine aggregate

The mixture of small particles of grains which pass through 4.75mm sieve comes under fine aggregate. The selection fine aggregate must be such that it should be free from all in organic material. In my present work locally available river sand belongs to zone-2 with fine characteristics. The Figure-1 shows fine aggregate and Table- 1 show properties of fine aggregate.

Figure 1 Fine Aggregate

Table -1 Properties of Fine Aggregate

S.NO	Properties	Attained Value
1	Relative Density	2.61
2	Finneess Modulus	2.67
3	Volumetric Density	3.0

Coarse aggregate

The gravel plays a key role in formation of solid mass matrix concrete .The size of Coarse particles greater than 4.75mm is termed to be coarse aggregate and for my progress of work coarse aggregate size of 12.5mm is used which was brought from quarrying site located in Hyderabad.Figure-2 shows coarse aggregate and Table-2 specifies properties of coarse aggregate .

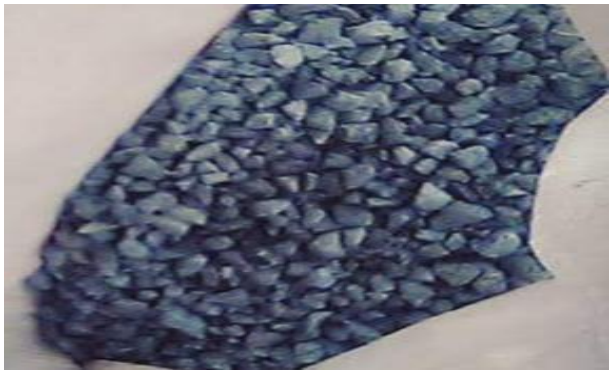

Figure 2 Coarse Aggregate

Table -2 Properties of Coarse Aggregate

S.NO	**Properties**	**Attained Value**
1	Relative Density	2.85
2	Fineness Modulus	7.35
3	Volumetric density(kg/m^3) and Water Abstraction	1680 and 0.30

Copper slag is an irregular, black, glassy, and granular in nature and its properties are similar to river sand. Now in my existing work copper slag is obtained from vivekananda fertilizers located in kukatpally.The chemicals present in copper slag does not show any health effects And most worthy advantage is it is having more benefits with similar properties that river sand have. Figure-3 indicate copper slag and Table-3 shows physical properties of copper slag

Figure 3 Copper Slag

Table -3 Properties of Copper slag

S.NO	Properties	Attained Value
1	Relative Density	3.74
2	Fineness Modulus	3.25
3	Volumetric Density (kg/m^3)	2.99

Carbon fiber

Chopped carbon fiber of size 6mm with 7 micrometer dia was used as an admixture which was obtained from vrukshacomposites ,Tenali.Figure-5 point out the carbon fiber.

Figure-4 CarbonFiber

Superplasticizer

Conplast SP430 superplasticizer was utilized as a plasticizing agent which was obtained from Vivekananda chemicals ,jagadgirigutta, Hyderabad .Figure 6 shows superplasticizer.

Figure-5 Super Plasticizer

Water

Potable tap water is used which is free from pathogenic and other deleterious materials.As water is crucial element in construction industry which starts bonding with every element during mixing and helps in hydration of mix.

3.2 ***Methods***

The decline of concrete structures is due to the effect of wear of reinforced concrete rodsoccurred due to chloride ingress. Therefore, it is necessary to examine the durability structure of concrete.

Acid Attack Test is conducted after immersing cube samples of 150mmx150mmx150mm for a whileNormal 28 days curing and It is left to dry without moisture 1 day before the test. Was carried out and after the drying period of the sample, the initial weights will be taken. Afterwards, the desired cubes should be placed in the prepared HCl solution. Hydrochloric acid (5%) was used in this test. The pH was periodically inspected and kept constant throughout the testing process and Weight loss and loss in compressive strength are calculated after 28.days, 56 days,90 days immersion in acid solution.

The Rapid Concrete Permeability Test (RCPT) is a rapid method for determining the permeability of concrete specimens. The test was carried out using RCPT specimens measuring 50mm in height and 100mm in diameter and diffusion cell has been filled with two different prepared NaCl and NaOH solutions in the necessary proportions, and silica gel has been utilized as a glue after the concrete specimen has been inserted between the two diffusion cells. The function of silica gel is to control the flow of solution out of the cells, or to control the flow of fluids out of diffusion cells. One compartment contains 2.4M NaCl and the other contains 0.3M NaOH. Chloride ion movement was allowed by a centrally placed vacuum saturated RCPT .If the interpretation is bigger than the coulomb after a six-hour exposure time, it implies that a substantial quantity of charge has travelled through the material. Because the value of this resistance can only be defined in terms of a test method, the procedure of this test method for measuring the resistance of concrete to chloride ion penetration has no bias. The method relies on the results of a test in which electrical current passes through a concrete sample during a six-hour exposure period. The interpretation is that the larger the Coulomb number or the charge transferred during the test, the greater the permeability.

Abrasion resistance of concrete refers to a material's capacity to withstand friction. This test was carried out in order to make the original construction appear as new, that is, without any structural ruptures or defects. Concrete's abrasion resistance is strongly related to its compressive strength. Different test techniques, such as under water method, sand blasting, revolving disc machine, dressing wheel machine, etc., may be used to assess the abrasion resistance of materials and the durability of structures. The procedure demonstrates the abrasion action of water carried particles (silt,sand,gravel, and other hard materials). This test was carried out in accordance with ASTM C1138-1997. Abrasion testing equipment with rotating device, container, and agitation paddle was utilized for the conductance of the test.

3.3 ***MIX DESIGN***

The first choice given in selecting distinct composites in order to fulfill the durability pecularity. In my present investigation mix

design of M60 is prepared as per ACI 211-1993 code5 .Different mix proportions are prepared i.e,0%,10%.20%,30%,40%,50% by fractional replacement of fine aggregate with copper slag. Figure(1)shows the combination of all materials at various proportions by replacement of fine aggregate with copper slag.

Figure 1 Mixing of materials for Cubic Metre of Concrete

Table-4 Blended Measures

Specifics	**Volume(Kg/m^3)**
Cement	516.81
Fine Aggregate	579.10
Coarse Aggregate	1094.5
Carbon Fiber	1.28
Water	172.79
Super Plasticizer	9.09

4 RESULTS AND DISCUSSIONS

4.1 ACID ATTACK TEST

5% HCl solution (by volume) was used in this test. After 56 days of normal curing, Weight and strength Deficit was measured at regular intervals after the end of 56 days of healing Period .Supervision of PH value of the solution was held regularly by maintaining constant levels throughout the test. The Spacing the Spatial Arrangement of Samples was done as per ASTM C 452. By increasing the copper slag content up to 30% there was decrease in % loss in weight and compressive strength and further addition of copper slag beyond 30% there was an increase in % loss in weight and strength but the loss was less compared to Reference mix. Figure -7 point out the specimens placed in HCl Acid Solution.Figure-8 and 9 shows the variation of Altering Proportions of Fine Aggregate with Copper Slag (vs) Deprivations in Weight.

Figure 7 Specimens in HCl solution

Table-5 Mean % Decrement in Mass of Specimens

S.NO	Class of Blend	Mean Mass of Specimens(Cubes)		Mean %Decrement in Mass
		Precedence Engulfment in HCl	Posterior Engulfment in HCl Over 56days	
1	Nominal Blend	7.850	7.652	2.52
2	CS10+0.25%CF	8.375	8.335	0.477
3	CS20+0.25%CF	8.380	8.360	0.230
4	CS30+0.25%CF	8.450	8.435	0.177
5	CS40+0.25%CF	8.800	8.690	1.250
6	CS50+0.25%CF	8.923	8.750	1.930

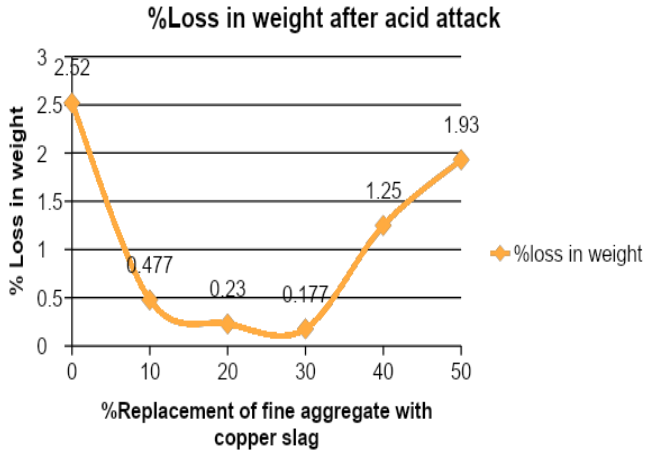

Figure 8 %Altering Proportions Of Fine Aggregate with Copper Slag (vs)% Deprivations in Weight

Table-6 Mean % Decrement in Constrictive Potency of Specimens after 56 days of Curing

S.NO	Class of Blend	Mean of Constrictive Potency of Specimens(Cubes) (N/mm^2)		Mean %Decrement in Constrictive Potency after 56days
		Preceding Potential of Compression of Specimenin HCl Solution	Poster Potential of Compression of Specimen in HCl Specimen	
1	Nominal Blend	70.5	62.60	11.24
2	CS10+0.25%CF	91.6	82.06	9.54
3	CS20+0.25%CF	103.54	96.07	7.214
4	CS30+0.25%CF	114.33	109.26	2.02
5	CS40+0.25%CF	96.61	93.02	3.71
6	CS50+0.25%CF	84	80.395	4.89

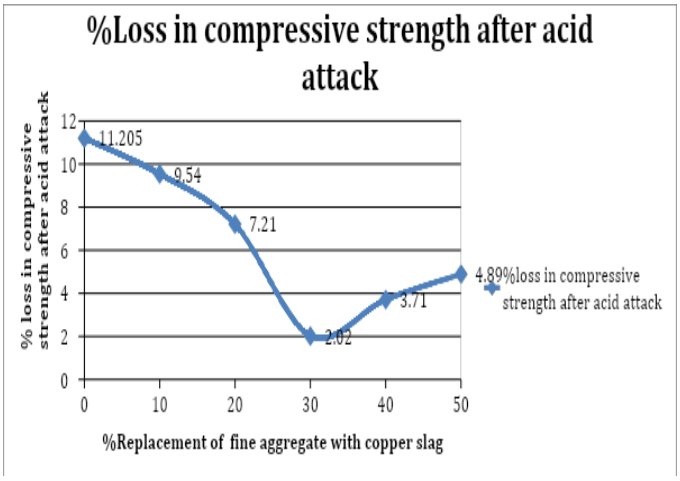

Figure 9 Altering Proportions Of Fine Aggregate With Copper Slag (vs) %Depreciation in Compressive Strength

4.2 RAPID CHLORIDE PENETRATION TEST (RCPT)

The specimen of size 100mm dia and 50mm height was used to determine the test. According to ASTM C 1202, the test was conducted and the values were evaluated .This method is quickest method used for quality control purposes. The Indication of voltage across the concrete specimen was arranged through digital LED display.

The diffusion cell was filled with 2 different solution in both chambers one is Nacl And NaOH with a concentration 2.4M and 0.3M .There was a movement of chloride ions through the centrally placed vacuum saturated concrete specimen under 60 volts DC voltage. Figure 4.12 present the RCPT set up. The test was conducted for six hour exposure period. The result will be indicated in the away higher the penetration of charge Greater permeability of the concrete. The Amount of charge passed for

reference mix was 1043.1mA and for CS-30 mix the amount of charge passed through specimen was 345.6mA and further increase in copper lag content the amount of charge passed through the specimen was decreased. Figure-10 represents the graph drawn between % Altering Proportions of copper slag and Quantity of Charge Passed.

Figure 10 Specimens under RCPT Test

Table-7 Amount of Charge Passage Through the Specimen

S.NO	Class of Blend	Quantity of circulation of charge	Mean %Decrement in Constrictive Potency after 56days
1	Nominal Blend	1043.1	Low
2	CS10+0.25%CF	921.6	Very low
3	CS20+0.25%CF	522.9	Very low
4	CS30+0.25%CF	345.6	Very low
5	CS40+0.25%CF	391.5	Very low
6	CS50+0.25%CF	802.8	Very low

Figure 10, %Altering Proportions Of Fine Aggregate with Copper Slag (vs) % Quantity of charge Passed in coulombs

4.3Abrasion resistance of concrete:

The Bearing capacity of material to discordancy is considered as Scuffing Impedance of concrete. The main aim of this test is to rejuvenate the damaged structure .As per ASTM C1138-1997 the test was performed .The concrete specimen of size 300mm diameter and 100mm height was placed in the abrasion testing machine containing rotating device, agitation paddle ,steel container with cylindrical hollow structure ,70 grade 100mm steel grinding balls with nominal sizes are arranged and test was conducted .There was an observation that abrasion depth was decreased with increase in copper slag content .In comparison to all the mixes CS-30 mix has very low Average depth of abrasion.

Figure 11 Abrasion testing of concrete

Table 8 Mean Far End of Scraping

S.NO	Duration(Hours)	Mean Far End of Scraping(mm)					
		CS0	**CS10**	**CS20**	**CS30**	**CS40**	**CS50**
1)	12	0.58	0.49	0.20	0.065	0.089	0.19
2)	24	0.76	0.56	0.32	0.068	0.088	0.26
3)	36	0.92	0.68	0.45	0.076	0.0096	0.32
4)	48	1.23	0.74	0.53	0.079	0.099	0.46
5)	56	1.32	0.86	0.65	0.082	0.28	0.58
6)	72	1.65	1.34	0.78	0.093	0.49	0.68

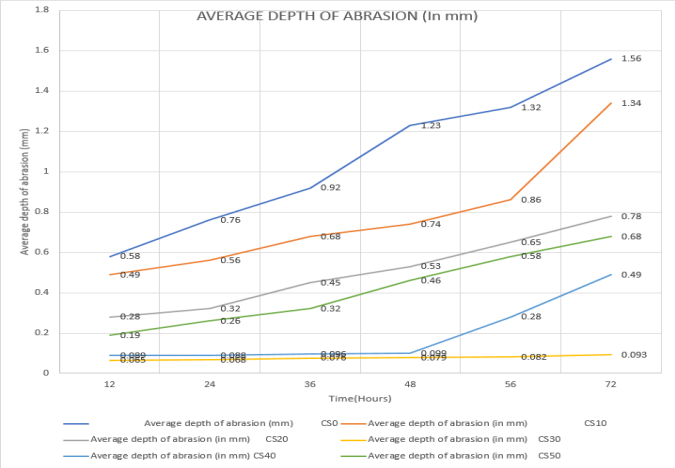

Figure 12 Degressive % of Copper slag with Mean of Abraded Blends

Table 9 Depth of abrasion specimen

S.NO	Type of mix	Abrasion depth(mm)
1)	CS0+0%CF	1.65
2)	CS10+0.25%CF	1.34
3)	CS20+0.25%CF	0.78
4)	CS30+0.25%CF	0.093
5)	CS40+0.25%CF	0.49
6)	CS50+0.25%CF	0.68

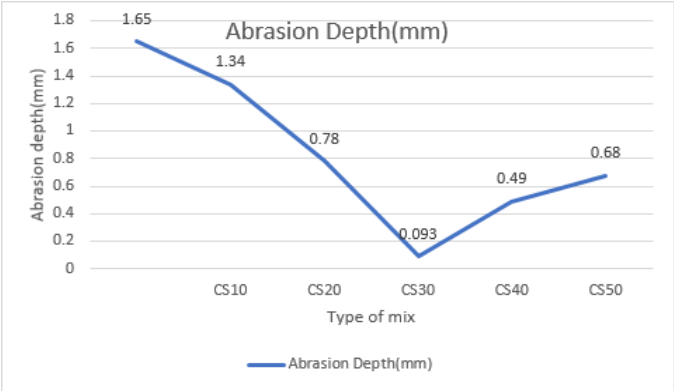

Figure 13. Change in Duration with Mean Depth of Abraded Specimen

5. CONCLUSIONS

The % loss of compressive strength for CS-30 mix was 2.02, while the nominal mix having 11.205% loss after 56 days of acid curing and the % loss in weights for CS-30 mix is 0.177while nominal mix having 1.27% loss in weight. .For CS10,CS20 ,CS30,CS40 the amount of charge was very low compared to nominal mix and Depth of Abrasion after 72 hours for CS-30 mix is 0.093mm while the nominal mix having 1.65mm.

CS-30 mix has possessed high durability characteristics compared to reference mix in all aspects. The mix which has been replaced by copper slag and carbon fiber admixture was not much subjected to a change in depth of abrasion and have shown resistance to abrasion. Among the Quantity of charge enactment for Nominal mix and other 5 mixes was low and the mix that was altered with copper slag by 30% achieve good outcome with Impermeability nature

6 REFERENCES

[1] P. K. Mehta and P. J. M. **Monteiro, Concrete: Microstructure, Properties, and Materials,** McGraw-Hill, New York, NY, USA, 2006.

[2].H. W. Kua and S. Kamath, "**An attributional and consequential life cycle assessment of substituting concrete with bricks,**" Journal of Cleaner Production, vol. 81, pp. 190–200, 2014.View at: Publisher Site | Google Scholar

[3].A. P. Gursel, "**Life-cycle assessment of concrete: decision-support tool and case study application,**" Ph.D. thesis, University of California, Berkeley, CA, USA, 2014.View at: Google Scholar

[5].K. Celik, C. Meral, A. PetekGursel, P. K. Mehta, A. Horvath, and P. J. M. Monteiro, "**Mechanical properties, durability, and life-cycle assessment of self-consolidating concrete mixtures made with blended portland cements containing fly ash and limestone powder**," Cement and Concrete Composites, vol. 56, pp. 59–72, 2015.View at: Publisher Site | Google Scholar

[6].A. P. Gursel, H. Maryman, and C. Ostertag, "**A life-cycle approach to environmental, mechanical, and durability properties of "green**" concrete mixes with rice husk ash," Journal of Cleaner Production, vol. 112, no. 1, pp. 823–836, 2016.View at: Publisher Site | Google Scholar

[7].C. Li, Z. Nie, S. Cui, X. Gong, Z. Wang, and X. Meng, "**The life cycle inventory study of cement manufacture in China**," Journal of Cleaner Production, vol. 72, pp. 204–211, 2014.View at: Publisher Site | Google Scholar

[8].D.-Y. Oh, T. Noguchi, R. Kitagaki, and W.-J. Park, "**CO2 emission reduction by reuse of building material waste in the Japanese cement industry**," Renewable and Sustainable Energy Reviews, vol. 38, pp. 796–810, 2014.View at: Publisher Site | Google Scholar

[9].J. Zhang, J. C. P. Cheng, and I. M. C. Lo, **"Life cycle carbon footprint measurement of Portland cement and ready mix concrete for a city with local scarcity of resources like Hong Kong,"** International Journal of Life Cycle Assessment, vol. 19, pp. 745–757, 2014.View at: Publisher Site | Google Scholar.

[10].J. Zhang, G. Liu, B. Chen, D. Song, J. Qi, and X. Liu, "**Analysis of CO2 emission for the cement manufacturing with alternative raw materials: a LCA-based framework,**" Energy Procedia, vol. 61, pp. 2541–2545, 2014b.View at: Publisher Site | Google Scholar.

[11].PCA, **Alkali-Aggregate Reaction, Portland Cement Association,** Skokie, IL, USA, 2018, https://www.cement.org/learn/concrete-technology/durability/alkali-aggregate-reaction.

[12].CSIRO and UNEP, **Resource Efficiency: Economics and Outlook for Asia and the Pacific, Division of Ecosystem Sciences, Commonwealth Scientific and Industrial Research Organisation (CSIRO),** United Nations Environment Programme (UNEP), Bangkok, Thailand, 2011.

[13].**WorldCement, World demand for construction aggregates to reach 51.7 billion t. World Cement,** Palladian Publications, Surrey, UK, 2016.

[14].**UN, Probabilistic Population Projections based on the World Population Prospects:** The 2015 Revision, United Nations-Population Division, Department of Economic and Social Affairs, New York NY, USA, 2015.

[15].W. Langer, "Sustainability of aggregates in construction," in Sustainability of Construction Materials, J. M. Khatib, Ed., Woodhead Publishing Limited, Cambridge, UK, 2009.View at: Google Scholar

[16] Mohandas, K & Elangovan, G 2015, '**Influence of polymeric resins on the enhancement of strengthening of reinforced concrete beam with phenolic resin bonded FRP'S'**, International Journal of Applied Engineering Research, ISSN0973-4562 vol. 10, no. 5,

[17] Dr.K.Mohan das, Dr.N.Sundar, S Harishankar, A Raj Kumar, SPM Kannan &Dr.K.Ramesh "**An experimental study on strength characteristics of replacement of fine aggregate with stone dust and coarse aggregate with demolished concrete waste**" YMER.Volume-21;Issue-2,Pages 683-700.

[18] Mohandas K, ElangovanG.2016 "**Influence of polymeric resins on the enhancement of strengthening of RC beam using CFRP laminates**" Asian journal of information Technology, Medwell publications, Article ID 25565

[19] Baskar K, Elangovan G,Mohandas K.2017"**flexural behaviuor of fibre reinforced concrete beams with different aspect ratios**" FIBRES & TEXTILES in Eastern Europe, Institute of Biopolymers and chemical fibres, Poland .Issue2018,pp 59-66

[20] Divaker.S,Dr.K.Arunachalam.Mohandas.K.2017 "**Selfcompacting concrete with copper slag as partial substitute for sand** " Journal of Computational and Theoretical Nanoscience,Americen scientific publishers. Volume 15, Number 3, March 2018,pp. 977-981(5)

[21] T Ananth, Mr Prasoon PP, Mr C Vijayakumar, K Mohan Das,"**Partial Replacement Of cement With Sugar Cane Bagasse Ash And Hybrid Fibers,**"Dogo Rangsang Research Journal UGC Care Group I Journal ISSN : 2347-7180 Vol-12 Issue-08 No. 04 August 2022.

[22] Rameshwari S, Mr.P.Thangamuthu, P.Karthik, A.Sathiyamoorthy, V.Yogeshwaran, PG Student, Dr.K.Mohan Das, P "**AN EXPERIMENTAL STUDY ON SLICA FUME CONCRETE WITH ADDITION OF FIBRES**", Dogo Rangsang Research Journal UGC Care Group I Journal ISSN : 2347-7180, Vol-12 Issue-11 No. 03 November 2022.