

Partial replacement of coarse aggregates in concrete structures

S. Pradeep Saravanan*

Department of Civil Engineering, Bharath University, Chennai, Tamilnadu, India

*Corresponding author: E-Mail: s_pradeep@gmail.com

ABSTRACT

The usage of plastics in our day to day life have been increased gradually and this increased level causes substantial garbage which is unhealthy. Plastics can be recycled and can be used in many manners, in that case the recycled plastics are suitable for replacing coarse aggregates in the production of concrete structures. This paper discuss about the suitability and advantages of plastics in the production of concrete. Since 100% replacement is not feasible partial replacements are done with the percentage level were examined. The 30% of partial replacement was having the higher compressive strength.

KEY WORDS: Coarse, Structures, Partial.

1. INTRODUCTION

Concrete is the mostly used construction material in the world next to water since it is the most uses substance in the planet. In this study recycled plastics were used to replace the coarse aggregates which deals with the plastic waste. Failures occur among the concrete structures mostly due to the crushing of aggregates. So it is better to utilize the recycled plastics for construction instead recycling it repeatedly.

Plastic aggregate: Plastic waste will be collected and washed and crushed. Later then it will be heated to make it to attain its brittleness and then it will be allowed to cool down and it will be later crushed to get the shape of aggregates. The properties as per IS will be examined. Thus the PCA property is much lower than NCA property.

Table.1. Properties of Aggregate

Property	NCA	PCA
Specific gravity	2.74	0.9
Crushing value	28	2
Density	3.14	0.81

Experimental investigation: The properties of both NCA and PCA were detected by conducting test for compressive strength, compaction factor as per the IS and they are tabulated in table2.the workability of the 30% PCA concrete more because the PCA concrete absorbs less water due to the presence of plastics.

Table.2. Fresh properties of concrete

Particulars	Slump	Compaction Factor
NCA	30	0.90
30% replaced with pca	31	0.91

Volumetric substitution: In the volumetric substitution method the volume occupied by the PCA concrete is more than that of the NCA. The cube dimension is (150 x 150 x 150)mm and its compressive strength is obtained for various level of percentage in that case the 30% substitution PCA concrete has more better strength than the NCA.

Structural behavior: The concrete is molded in the means of cube and cylinder and various test were conducted to determine the compressive strength and tensile strength and elasticity modulus and their values are tabulated below.

Photographic view of tests conducted:



Figure. Photographic view of tests conducted

Table.3. Structural properties of concrete

Particulars	Cylinder Compressive Strength In Mpa	Splitting Tensile Strength In Mpa	Modulus Of Elasticity In Mpa
NCA	10.8	1.87	15190
30 % PCA	15.17	0.81	12638

2. CONCLUSION

To determine the suitability of PCA concrete for structural concrete tests were conducted and in that test NCA has more compressive strength based on the tensile strength and bonding strength of PCA. [18-21] PCA concrete showed reduction in tensile strength and elastic modulus.

3. ACKNOWLEDGMENT

My foremost gratitude goes to all that have contributed in the achievement of this study. I am Grateful to the Honorable Chancellor, Dr. J. Sandeep Anand, Bharath University, Chennai. I am Grateful to Mr.P.Dayakar, Head Of the Department, Civil Engineering, Bharath University, Chennai. I am sincerely grateful to my respondents who helped me to carry out my project successfully.

REFERENCES

- Anbazhagan R, Prabhakar S, Vanangamudi S, Thamocharan C, Electromagnetic engine, Middle - East Journal of Scientific Research, 20(3), 2014, 385-387.
- Anbazhagan R, Satheesh B, Gopalakrishnan K, Mathematical modeling and simulation of modern cars in the role of stability analysis, Indian Journal of Science and Technology, 6(5), 2013, 4633-4641.
- Brindha G, Krishnakumar T, Vijayalatha S, Emerging trends in tele-medicine in rural healthcare, International Journal of Pharmacy and Technology, 7(2), 2015, 8986-8991.
- Brintha Rajakumari S, Nalini C, An efficient cost model for data storage with horizontal layout in the cloud, Indian Journal of Science and Technology, 7, 2014, 45-46.
- Gopalakrishnan K, Prem Jeya Kumar M, Sundeeep Aanand J, Udayakumar R, Analysis of static and dynamic load on hydrostatic bearing with variable viscosity and pressure, Indian Journal of Science and Technology, 6(6), 2013, 4783-4788.
- IS: 2386-1963, Methods of test for aggregates of concrete, part I, III & IV, Bureau of Indian Standards, New Delhi, 1963
- IS: 383-1970, Specification for coarse and fine aggregate, Bureau of Indian Standards, New Delhi, 1970
- Jeyanthi Rebecca L, Susithra G, Sharmila S, Das MP, Isolation and screening of chitinase producing *Serratia marcescens* from soil, Journal of Chemical and Pharmaceutical Research, 5(2), 2013, 192-195.
- Kerana Hanirex D, Kaliyamurthie KP, An adaptive transaction reduction approach for mining frequent itemsets: A comparative study on dengue virus type1, International Journal of Pharma and Bio Sciences, 6(2), 2015, 336-340.
- Nabajyothi S, Jorge B, Use of plastic waste as aggregate in cement mortar and concrete preparation: A review, Construction and Building, Materials, 34, 2012, 385-401.
- plastics aggregate replacement (Plastiphalt), Cement and Concrete Composites, Vol 22, Issue 4, pp. 233-242, 2000
- Sachithanantham P, Sa Nkaran S, Elavenil S, Experimental study on the effect of rise on shallow funicular concrete shells over square ground plan, International Journal of Applied Engineering Research, 10(20), 2015, 41340-41345.
- Sharmila S, Jeyanthi Rebecca L, Das MP, Production of Biodiesel from *Chaetomorpha antennina* and *Gracilaria corticata*, Journal of Chemical and Pharmaceutical Research, 4(11), 2012, 4870-4874.
- Sharmila S, Jeyanthi Rebecca L, Naveen Chandran P, Kowsalya E, Dutta H, Ray S, Kripanand NR, Extraction of biofuel from seaweed and analyse its engine performance, International Journal of Pharmacy and Technology, 7(2), 2015, 8870-8875.
- Thamocharan C, Prabhakar S, Vanangamudi S, Anbazhagan R, Coomarasamy C, Hydraulic rear drum brake system in two wheeler, Middle - East Journal of Scientific Research, 20(12), 2014, 1826-1833.
- Vanangamudi S, Prabhakar S, Thamocharan C, Anbazhagan R, Collision control system in cars, Middle - East Journal of Scientific Research, 20(12), 2014, 1799-1809.
- Vanangamudi S, Prabhakar S, Thamocharan C, Anbazhagan R, Drive shaft mechanism in motor cycle, Middle - East

Journal of Scientific Research, 20(12), 2014, 1810-1815.

Vanangamudi S, Prabhakar S, Thamocharan C, Anbazhagan R, Dual fuel hybrid bike, Middle - East Journal of Scientific Research, 20(12), 2014, 1819-1822.

Vanangamudi S, Prabhakar S, Thamocharan C, Anbazhagan R, Turbo charger in two wheeler engine, Middle - East Journal of Scientific Research, v20(12), 2014, 1841-1847.

Zainab ZI, Enas A, AL-Hasmi, Use of waste plastic in concrete mixture as aggregate replacement, Waste Management, 28(11), 2008, 2041-2047.

Zoorob, S., E., Suparma, L., B., Laboratory design and investigation of the properties of continuously graded Asphaltic concrete containing recycled