PERFORMANCE CHARACTERISTICS OF CONCRETE BYUSING BONE AND GRAPHENE

P.ARUN[1], M.BOOPATHI[2], T.SAJEEBAN[3], M.SIVARAJA[4], M.SURESH[5]
1,2.3 , UG Student,N.S.N. College of Engineering and Technology, Karur-639003.
4,Prof & Prinipal, N.S.N. College of Engineering and Technology, Karur-639003.
5,Assistant professor, N.S.N. College of Engineering and Technology, Karur-639003.

ABSTRACT

This paper presents the possibility of utilizing bone and graphene as a supplementary fine aggregate in concrete. Bone and graphene gives more strength to the concrete. Fine aggregate replaced with (10%,20%,30%,40%,50%,) of bone and graphene by weight. The compressive strengths of the concrete specimens were determined at 7 and 28 days respectively. Test result indicated that the normal strength of concrete is increased in the 10% of the bone and graphene in fine aggregate. bone and graphene will give better result to compare normal fine aggregate and cement Test results indicated that the normal strength of the concrete is increased in up to 10% percentage with replacement of fine aggregate and cement. Add bone and graphene Cement and Fine aggregate was replaced with 10%,20%,30%,40%,50%, of Bone and graphene by weight. M25 concrete mix ratio is used. The Compressive strength, Split tensile strength and Flexural of the concrete specimens was determined at 7 and 28 days respectively.

Key words: Concrete, Bone, Graphene, Fine aggregate, Coarse aggregate, Portland cement

INTRODUCTION

.Concrete is the important material in the construction other than steel .and timber. Its main constituents are cement, fine aggregates and coarse aggregates, and water. As there are several wastes coming from the industries we can use those wastes as the constituents of concrete by replacing or partially replacing the cement, sand or aggregates which makes it economical and also conserves the natural resources. Now a days many researchers are being carried out to find an alternative that could be used as a partial replacement of sand in concrete and mortar, since production of cement causes major environmental concerns.The cost of building construction is increasing daily as a

result of increasing in the cost of building materials such as cement, coarse and fine aggregates etc.Concrete is the most popular building material in the world construction bone and graphene has been used raw material.Nigeia and most of West African countries are blessed with large number of live stock including cows. The cow population in Nigeria is approximately 16 million. The bone and graphene partial replacement of cement in concrete it can help in reducing the amount of co_2 emission emitted during cement production

MATERIAL

Cement and Aggregates

The OPC is classified into three grades, namely 33 Grade, 43 Grade, 53 Grade depending upon the strength of 28 days. Ordinary Portland Cement (OPC) of 53 Grade (RAMCO cement) from a single lot was used throughout the course of the investigation. The physical properties of the cement as determined from various tests conforming to Indian Standard IS: 8112:1989

Physical Properties of Fine and Coarse Aggregate

Description	Fine Aggregate	Coarse Aggregate
Specific gravity	2.6	2.75
Water absorption	1.57%	2.3%
Fineness modulus	3.1(zone II)	6.4
Surface moisture	Nil	Nil
Bulk density	1450 kg/m^3	1765kg/m^3

SPECIMEN PREPARATION

Then weighed quantity of fine aggregates and coarse aggregate was added and mixed in dry state until homogenous mixture was obtained. Measured quantity of water was added and ingredients were mixed in the mixer. All the moulds were oiled before casting the specimens. Cube specimens of size 150 mm x 150 mm x 150 mm of each concrete mixture were cast to determine the compressive strength, splitting tensile strength, cylindrical specimens of size 150 mm x 300 mm were cast to measure the modulus of elasticity of concrete. Cylindrical specimens of size 100 mm x 200 mm were cast to determine the sorptivity, chloride ion penetration and water loss through air drying. Cube specimens of size 100 mm x 100 mm x 100 mm were cast to determine the resistance of concrete to external acid attack. Prism specimen of size 100 mm x 100 mm x 500 mm were cast to measure the length change when the specimens were exposed to air drying and Concrete tile specimens of size 150 mm x 300 mm were cast to determine the resistance to abrasion. The specimens were de-moulded after 24 ±1 hr of adding water to concrete mixture. After moulding the specimens were cured in water at room temperature.

MIX DESIGN, RESULT AND DISCUSSION

COMPRESSIVE STRENGTH TEST RESULTS

Test specimens of size 150 x 150 x 150 mm were prepared for testing the compressive strength concrete. The concrete mixes with varying percentages of energy optimizing furnace steel slag replacing to sand were casted into cubes and cylinders for subsequent testing.

Compression strength

mix	7 days	28 days
Nominal mix	26.83	26.68
Mix -1	30.60	30.51
Mix -2	27.70	28.50
Mix -3	26.93	27.70
Mix -4	27.70	28.70
Mix -5	26.35	26.93

From the test results, Bone,Graphene found to be better performance in workability and strength properties.

CONCLUSION

8.1 COMPRESSIVE STRENGTH ANALYSIS

From the compression test results it is found that the concrete mix with 10% replacement of fine aggregate with Bone, Graphene shows the higher compressive strength than the Reference concrete mix for both 7 days and 28 days curing.

From the analysis, it is concluded that Bone,Graphene mix, which is 10% replacement of Bone,Graphene, is found to be the most preferable one when compared with other mixes by analyzing its Compressive strength, Workability and Cost. It is recommended as favorable mix for Structural applications.

SPLIT TENSILE STRENGTH ANALYSIS

From the split tensile test results it is found that the concrete mix with 10% replacement of fine aggregate with Bone,Graphene shows the higher compressive strength than the Reference concrete mix for both 7 days 28 days curing.

From the analysis, it is concluded that Bone,Graphene mix, which is 10% replacement of fine aggregate , is found to be the most preferable one when compared with other mixes by analyzing its split tensile strength,

Workability and Cost. It is recommended as favorable mix for Structural applications.

FLEXURAL STRENGTH ANALYSIS

From the flexural test results it is found that the concrete mix with 10% replacement of Bone,Graphene shows the higher compressive strength than the Reference concrete mix for both7 days and 28 days curing.

From the analysis, it is concluded that Bone,Graphene mix, which is 10% replacement of Bone,Graphene is found to be the most preferable one when compared with other mixes by analyzing its flexural strength, Workability and Cost. It is recommended as favorable mix for Structural applications.

References

Akinyele J.O., Olateju O.T. and Oikelome O.K. (2015). "Rice husk as filler in the production of bricks using Gboko clay" Nigerian Juornal of Technology (NIJOTECH), Vol. 34 (4) 672-678.

American Standard for Testing and Materials, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete, ASTM C 618-94, 1994.

Aribisala, O. J. and Bamisaye, A. J., (2006). "Viability of Bone Powder As Partial Replacement forCement in Concrete." Botswana Journal of Technology, Vol 15, (1)

Gesoglu, M., Guneyisi, E., Oz, H.O. (2012). "Properties of light weight aggregate produced with cold –bonding pelletization of fly ash and ground granulated blastfurnace slag," Materials and Structures (45) 1535–1546.

Guneyisi E, Ozturan T, Gesoglu M. (2007). Effect of initial curing on chloride ingress and corrosion resistance characteristics of concretes made with plain and blended cement. Building and Ennvironment 42 (7) 2676-2685.

Habeeb G.A., Fayyadh M.M. (2009). "Rice husk ash concrete; The effect of RHA average particle size on mechanical properties and drying shrinkage." Australian journal of Basic and Applied Science (3) 1616-1622.

Joseph, G., Ramamurthy, K. (2008). "Effect of cold bonded aggregate on workability and mechanical properties of concrete," Institute of Engineering Journal, India. (89) 33–38.

Joseph, G. Ramamurthy, K. (2009). "Influence of fly ash on strength and sorptioncharacteristics of cold-bonded fly ash aggregate concrete," Construction and Building Materials, (23) 1862–1870.

Jo, B.W., Park, S.K, Park, J.B. (2007). "Properties of concrete made with alkali activated fly ash lightweight aggregate," Cement and Concrete Composite (29) 33–38.

Krammart, P.and Tangtermsirikul. S. (2004). "Properties of cement made by partially replacing cement raw materials with municipal solid waste ashes and calciumcarbide waste" Constructionand Building Materials (18) 579–583.

Neville A. M., 1995. Cementitious Materials of Different Types, Pearson Education Asia Pte. Ltd.,

Singh, M., and Siddique, R. (2014). "Strength properties and micro-structural properties of concrete containing coal bottom ash as partial replacement of fine aggregate." Construction and Building Materials (50) 246–256.

Thomas, J. and Harilal, B. (2015). "Properties of cold bonded quarry dust coarse aggregates and its use in concrete," Cement and Concrete Composites