

## Structural Strength Potentials of Nigerian Groundnut Husk Ash as Partial Cement Replacement in Mortar

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**Abstract :** This study investigates the strength potentials of groundnut husk ash as partial cement replacement in mortar and also develops a predictive model using Artificial Neural Network. Groundnut husks sourced from Ogbomoso, Nigeria, was sun dried, calcined to ash in a furnace at a controlled temperature of 600<sup>o</sup> C for a period of 6 hours, and sieved through the 75 microns. The ash was subjected to chemical analysis and setting time test. Fine aggregate (sand) for the mortar was sourced from Ado Ekiti, Nigeria. The cement: GHA constituents were blended in ratios 100:0, 95:5, 90:10, 85:15 and 80:20 %. The sum of SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, and Fe<sub>2</sub>O<sub>3</sub> content in GHA is 26.98%. The compressive strength for mortars PC, GHA5, GHA10, GHA15, and GHA20 ranged from 6.3-10.2 N/mm<sup>2</sup> at 7days, 7.5-12.3 N/mm<sup>2</sup> at 14 days, 9.31-13.7 N/mm<sup>2</sup> at 28 days, 10.4-16.7 N/mm<sup>2</sup> at 56days and 13.35- 22.3 N/mm<sup>2</sup> at 90 days respectively, PC, GHA5 and GHA10 had competitive values up to 28 days, but GHA10 gave the highest values at 56 and 90 days while GHA20 had the lowest values at all ages due to dilution effect. Flexural strengths values at 28 days ranged from 1.08 to 1.87 N/mm<sup>2</sup> and increased to a range of 1.53-4.10 N/mm<sup>2</sup> at 90 days. The ANN model gave good prediction for compressive strength of the mortars. This study has shown that groundnut husk ash as partial cement replacement improves the strength properties of mortar.

**Keywords :** compressive strength, groundnut husk ash, mortar, pozzolanic index

**Conference Title :** ICEET 2021 : International Conference on Civil, Environmental Engineering and Technology

**Conference Location :** London, United Kingdom

**Conference Dates :** April 22-23, 2021