

ABSTRACT

Compressive Strength of Geopolymer Concrete with Chicken Egg Shell Powder as Partial Substitution of Fly Ash

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This research discusses the compressive strength of geopolymer concrete using chicken eggshell powder as a partial substitute for fly ash. This research aims to analyze the effect of chicken eggshell powder mixture on geopolymer concrete in terms of slump test, concrete specific gravity, and compressive strength. The method used involved a concrete quality of 25 MPa, and the manufacture of 45 cylindrical specimens with a size of 10 x 20 cm. The specimens were treated using the oven method at a constant temperature of 60°C for 4 hours. Measurements of the compressive strength of the specimens were taken at 7, 14, and 28 days of age. Research on geopolymer concrete with partial substitution of chicken eggshell showed optimal results at 10% substitution. At this level, the compressive strength of the concrete reached 25.25 MPa, a 1% increase from the planned compressive strength of 25 MPa. The slump value of the concrete decreased as the percentage of substitution increased, from 6 cm (0%) to 2 cm (25%). The highest specific gravity was recorded at 10% substitution at 2409.55 kg/cm³, while the lowest weight was 2251.59 kg/cm³. The greatest compressive strength was achieved at 10% substitution for 28-day-old concrete, with an increase of 12.77% over no substitution. However, increasing the substitution from 10% to 25% decreased the compressive strength by 34.18%. This study shows that 10% chicken eggshell substitution gives the best results for the strength of geopolymer concrete, while higher percentages tend to decrease the performance of concrete.

Keywords: Geopolymer concrete, chicken eggshell powder, fly ash, concrete quality, slump test, density of geopolymers, compressive strength.