MANUFACTURE OF LOW-DENSITY GEOPOLIMER COMPOSITES BY THE INCORPORATION OF EXPANDED POLYSTYRENE BEADS

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Abstract: Geopolymers are considered to be eco-friendly materials, much more than ordinary Portland cement, in terms of reduced production and lower CO2 emissions. These binders also show faster curing settings when compared to ordinary Portland cement. In the civil industry, there is a constant search for light weight materials, of high specific strength. Among the materials of low specific gravity which can be used as aggregates in this type of concrete is expanded polystyrene (EPS), which is an artificial aggregate widely used for the production of lightweight concrete. The current work studies the fabrication a light weight composite material of a geopolymer matrix using expanded polystyrene beads as aggregate. Composites were prepared using 20vol.-% of polystyrene beads with diameter ranging between 0.71 and 1.0mm added. The results obtained show that adding polystyrene beads, the density of the composite materials decreases. The density of the geopolymer matrix has been 1.71 g/cm3. Adding 20% of beads the density decreased to 1.39 g/cm3, representing a decrease of 18.7%. At the same, time the composite strength also decreases significantly from initially 45 MPa to 16.7 MPa, representing a decrease 62.9%. However, the composite materials developed may still be interesting for non-structural applications and may provide better thermal and acoustic isolation properties.

Keywords: Geopolymer, low density composite, EPS beads, mechanical properties