World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:14, No:10, 2020

Influence of Sodium Lauryl Ether Sulfate and Curing Temperature on Behaviors of Lightweight Kaolinite-Based Geopolymer

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Abstract : Lightweight geopolymer can be prepared by using some foaming agents, such as metal powders or hydrogen peroxide; however, it is difficult to control the generated cell size due to the high reactivity of the system. This study aims to investigate the influence of Sodium Lauryl Ether Sulfate (SLES) foam addition and curing temperature on the physical, mechanical, thermal, and microstructure behaviors of the lightweight kaolinite-based geopolymer. To provide porous structure, the geopolymer paste was mixed with 0-15 wt% of SLES foam before casting into the mold. Testing and characterizations were carried out after 28 days. The results showed that SLES foam generated the regular and spherical macropores, which were well distributed in the geopolymer samples. The total porosity increased as SLES foam increased, similarly as the apparent porosity and water absorption. On the other hand, the bulk density and mechanical strength decreased as SLES foam increased. Curing temperature was studied simultaneously due to it strongly affects the mechanical strength of geopolymer. In this study, rising of curing temperature from 27 to 50°C (at 75% relative humidity) improved the compressive strength of samples but deteriorated after curing at 60°C. Among them, the composition of 15 wt% SLES foam (NF15) presented the highest porosity (70.51-72.89%), the lowest density (0.68-0.73 g/cm^3), and very low thermal conductivity (0.172-0.197 W/mK). It had the proper compressive strength of 4.21-4.74 MPa that can be applied for the thermal insulation.

Keywords : lightweight, kaolinite-based geopolymer, curing temperature, foaming agent, thermal conductivity
Conference Title : ICGCGC 2020 : International Conference on Geopolymer Cement and Geopolymer Concrete
Conference Location : Tokyo, Japan
Conference Dates : October 05-06, 2020