

The Effects of Silica Fume on Microwave Curing of Coal Bottom Ash-based Geopolymer

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Geopolymer is an inorganic material with a 3-D aluminosilicate structure, and is manufactured by utilizing industrial byproducts containing silica and alumina. The influence on various additives or curing techniques that increase the porosity of the geopolymer has been studying to improve the thermal insulation performance. Free silicon in silica fume generates hydrogen forming a porous structure by reaction with water in the alkaline environment, so silica fume is used as a foaming agent to the geopolymer. The application of microwave in the synthesis of the geopolymer promotes the reactivity through rapid and volumetric heating, enabling the synthesis of the foam geopolymer in a short time. In this study, the effects of silica fume on the characteristics of geopolymer fabricated under the microwave energy were investigated. Geopolymer were prepared by irradiating 400 W microwave to the mixture consisting of coal bottom ash, silica fume, 14 M NaOH solution, and sodium silicate solution. The geopolymer specimens were analyzed by FTIR and SEM-EDS, and their physical and mechanical properties such as compressive strength, density and thermal conductivity were investigated.