

Influence of dolomite on the mechanical properties of boiler ash geopolymer paste

Abstract

The waste material from palm oil industry has been increasing since Malaysia was the world largest exported of palm oil mill. The waste such as palm fibers, nut shells, palm kernel and empty fruit bunches are the solid waste the obtained from palm oil processing for oil extraction. When these wastes were incinerated, the waste from the burning process known as boiler ash was obtained at the lower compartment of the boiler. The production of boiler ash was estimated to be over 4 million tones/ year. This paper investigates the influence of dolomite on the mechanical properties of boiler ash based geopolymer pastes. The boiler ash was calcined at 800oC for 1 hour. After that, the dolomite was replaced in boiler ash at 1, 2, 3, 4 and 5% wt where the geopolymer samples were cured 80 oC. Sodium silicate and sodium hydroxide (NaOH) with concentration 12 Molar has been used as alkaline activator to synthesis the boiler ash to produce geopolymer paste. The ratio of solid/liquid and sodium silicate/NaOH was 1 and 2.5 for all geopolymer paste. The result showed the addition of dolomite has decrease the strength of boiler ash based geopolymer. The geopolymer sample without addition of dolomite showed the maximum compressive strength (19.4 MPa) at 28 days testing. Meanwhile the addition of 4% of dolomite into geopolymer paste has the maximum compressive strength (7.3 MPa) compared to others. Additions of dolomite into boiler ash based geopolymer have reduced the compressive strength at 28 days of testing.

Keywords; Boiler Ash, Dolomite, Geopolymer, Strength