Review of the characterization and processing of palm ash as a geopolymer composite

Abstract

Malaysia is the world's largest producer and exporter of palm oil and it produces a million tons of palm oil waste annually. Palm ash is a by-product from the use of palm oil shells and palm oil bunches, which are used to power electricity generation plants. The characterization of palm ash showed that it has high amorphous content with silicon dioxide (SiO_2) as the main constituent. Using SEM, it was determined that the microstructure of palm waste is a porous texture that is spongy with irregular and angular particles. Research related to the use of palm ash in the production of geopolymer composites is very limited. The only geopolymer composites that have been studied extensively are mortar and concrete. In the production of geopolymers, the source material must have a high content of silicon dioxide (SiO_2) and aluminum oxide (Al_2O_3). However, palm ash is rich only in SiO_2, which results in low-strength geopolymer concrete and mortar. Hence, another raw material that is rich in Al_2O_3, such as metakaolin or fly ash, is required to successfully produce geopolymer composites.

Keywords; Palm ash, Palm oil waste, Geopolymer composite