

Performance of mortar containing ground spent Bleaching earth ash against sulfate attack

ABSTRACT

Recently, spent bleaching earth ash (SBEA) which is extracted and calcined from spent bleaching earth waste from a palm oil refinery plant, has been used as partial cement replacement. In this study, the SBEA was ground into smaller particle sizes through a grinding process. The effect of unground spent bleaching earth ash (USBEA) and ground-spent bleaching earth ash (GSBEA) on the sulfate attack resistance of mortar was investigated in this study. The characterization of USBEA and GSBEA was determined in terms of particle size, specific surface area, chemical compositions, and microstructural properties. Their effects on pozzolanic activity were determined in terms of the strength activity index. Then, the expansion of the mortar bar containing 40% of USBEA and GSBEA due to sulfate attack was determined to investigate the sulfate attack resistance of mortar containing USBEA and GSBEA. The microstructural changes of mortar against sulfate attack were determined by using x-ray diffraction, scanning electron microscopy and thermogravimetric analysis. Results indicated that the strength activity index (SAI) value of mortar containing 40% of GSBEA was the highest among the specimens. Furthermore, the expansion of mortar bars containing 40% of GSBEA was the lowest, with 0.01% at 6 months. The microstructural results of mortar also confirmed that the incorporation of 40% of GSBEA with the compact microstructure with calcium silicate hydrate (CSH) and less ettringite was found compared to other specimens. This shows that the inclusion of GSBEA enhances the sulfate attack resistance of mortar