Effect of sodium hydroxide concentration on the activation of coal bottom ash-based geopolymers with different particle size distribution

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Recently, million tons of coal combustion by-products (CCPs) are generated each year from the coal fired power plants. Among these CCPs, fly ash has been used as a substitute for Ordinary Portland cement (OPC) in order to reduce CO_2 emission. However, the bottom ash has been mainly disposed in landfill because of its large and heavy particle with irregular coarse shape and that could cause harmful environmentally effects. Hence, we have investigated the geopolymerization of bottom ash under alkali-activated conditions after grinding the received bottom ash to improve its activation quality. We have four kinds of particle size according to its particle diameter (d) through sieving the ground bottom ash: d<75μm, 75μm≤d<150μm, 150μm≤d<300μm, and 300μm≤d<600μm. In this research, the bottom ash from Yeongheung coal power plant was used as a source material of alumino-silicate minerals to synthesize geopolymer with the sodium silicate and sodium hydroxide. We have obtained many useful results of physical properties (e.g., compressive strength and thermal conductivity) with variations of bottom ash particle sizes and sodium hydroxide molarities.