

Effect of Unreacted Hydroxyl Ion on Release of Trace Metals from Geopolymer Concrete

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ABSTRACT

Geopolymers are alkali activated aluminosilicate binders that have the tendency to immobilize contaminants such as trace elements from waste residue. In this investigation, geopolymer concrete was produced from coal fly ash and aggregates that was activated by alkali metal silicate solution prepared from the dissolution of silica fume and sodium hydroxide (NaOH) in water. The amounts of NaOH added during the geopolymerization were 12.5%, 15%, 17.5%, and 20% of the fly ash mass. Batch leaching test was used to leach the geopolymer concrete, the collected leachates filtered and analyzed using an inductively coupled plasma mass spectrometer (ICP-MS) for Selenium (Se), Chromium (Cr), and Arsenic (As) to determine the maximum leachable amount of each element from the geopolymer matrix. The impact of free hydroxyl ions in the geopolymer on the leaching of oxyanion forming trace metals was investigated by determining the fraction of the elements leached from the geopolymer at different mix proportion of NaOH compared to what was initially in the coal fly ash.

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