

Immobilization of a metallurgical waste using fly ash-based geopolymers

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ABSTRACT

The stabilization/solidification (S/S) of electric arc furnace (EAF) dust containing hazardous metals such as Pb, Cd, Cr or Zn by means of geopolymerization technology is described in this paper. Firstly, different samples of geopolymeric material has been prepared using a class F coal fly ash and different reagents as sodium hydroxide, potassium hydroxide, sodium silicate and kaolinite. After that, mixtures of EAF waste and the geopolymeric material have been processed, for studying the potential of geopolymers as waste stabilizing agents. To this aim, the effects of curing conditions, composition and waste content have been tested. S/S solids are submitted to different physical and chemical tests to evaluate the results obtained and to ascertain the efficiency of the process. Compressive strength values in the range 12-25 MPa were easily obtained at 28 days. S/S solids have been submitted to different leaching tests. As conclusion of the leaching study we can say that the concentrations of the metals leached from S/S products were strongly pH dependent, showing that the final leachate pH was the most important variable for the immobilization of metals. Comparison of fly ash-based geopolymer systems with classical Portland cement stabilization methods has also been accomplished.

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