

Use of different geopolymeric agents for the Stabilization/Solidification (S/S) of a metallurgical waste

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ABSTRACT

The stabilization/solidification (S/S) of a carbon steel electric arc furnace (EAF) dust containing hazardous metals such as Pb, Cd, Cr or Zn using coal ash based-geopolymerization technology is described in this paper. On the basis of the results obtained in other studies about the leaching behavior of the EAF dust S/S solids, it has been decided to go deeply into the study of the influence of different variables on the solids prepared using various geopolymeric agents: the amounts of metakaolin and blast furnace slag (BFS) in the mixes; the grain size of the fly ash and the amount of potassium silicate, also using KOH in order to increase the potassium oxide/silicon oxide molar proportion from 0.5 to 0.8; and finally, the replacement of BFS by other slag coming from a stainless steel plant. Mixtures of EAF waste with this kind of geopolymeric materials and class F fly ash have been processed for studying the potential of geopolymers as waste immobilizing agents. Compressive strength test and different leaching tests for determining the efficiency of heavy metal immobilization have been carried out. The amounts of potassium silicate and KOH are the parameters most important to reach the highest compressive resistance. The best results for acid leaching were showed for samples with higher amounts of potassium silicate, however, for basic leaching, blast furnace slag was the best option.

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