

Microwave treatment of electric arc furnace dust with PVC: Dielectric characterization and pyrolysis-leaching

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Abstract: Microwave treatment of electric arc furnace dust (EAFD) with poly(vinyl chloride) (PVC) was studied in this work. A comprehensive characterization of the dust as well as assessing the suitability of using the thermal de-chlorination of the common plastic (PVC) under inert atmosphere was carried out to assess the possibility of Zn and other heavy metals extraction (Pb and Cd) from EAFD. The dielectric and thermal properties of EAFD, PVC and their mixtures were measured. Once combined and heated the metal oxides present in the dust reacted with HCl released from PVC during thermal de-chlorination, forming metal chlorides which were subsequently recovered by leaching with water. It was found that zinc chloride could be almost completely recovered in the leaching stage, with the overall recovery of Zn reaching 97% when the EAFD:PVC ratio was 1:2. The investigation highlighted that franklinite, the most refractory mineral to leaching, was completely destroyed. The leaching residue was found to compose mainly of magnetite and hematite.