

Dechlorination of incineration fly ash by fluidized capacitive deionization for utilization

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Abstract

Most of non-recyclable municipal solid wastes have been treated by incineration for energy recovery and stabilization. However, the fly ash (FA) discharged from air pollution control devices contains toxic metals and chlorides as well as leachable dioxins that make it considered as hazardous wastes. Chlorides in FA that was washed with water can be removed by electrosorption using the new fluidized capacitive deionization (FdCDI) method. Ions including Cl^- in water can be stored in the electrical double layer (EDL) of electrodes, and deionized water (<50 mg/L) can be recycled and reuse under low voltages (0.8-1.2 V). Note that the regeneration of FdCDI can be achieved by applying a zero or reversed voltage. In the FdCDI process, no chemical is needed, resulting no sludge to be discharged and treated. In addition, the effects of Cl^- counter ions during FdCDI was also studied. The Cl^- removal efficiency (51% approximately) with the salt adsorption capacity of 10 mg /g was obtained in the FdCDI process. This work illustrates that fly ash can be dechlorinated by the FdCDI method for utilization such as civil engineering fillers.

Keywords: *Municipal solid waste incinerator fly ash, fluidized capacitive deionization, water washing, chloride electrosorption, zero waste*