

Restrain the Evaporation of Heavy Metals during Sintering of MSWI Fly Ash by Milling with Proper Additives

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Municipal solid waste incinerator (MSWI) fly ash is used to be treated by solidification followed by secure landfill, due to the hazardous characteristics of the leaching of heavy metals and contained dioxin, while the long term risk is still worried. Stabilizing the MSWI fly ash and recover it as a product could eliminate the need of landfilling. The abundant of Ca and Si constituents of MSWI fly ash are the majority of the elements during brick or ceramic manufacturing, the dioxin could be destroyed and residual heavy metals will be stabilized in the product after sintering operation. Nevertheless, most of the heavy metals, especially for Pb, will evaporate to the flue gas at high temperature, and caused another environmental problem.

The milling operation could stabilize the heavy metals and decrease the leaching based on the phenomenon of mechano-chemistry, which could overcome the evaporation problem during the recovery of MSWI fly ash as the feedstock of sintering. The aim of the study is to restrain the heavy metals by wet ball-milling operation before sintering. The water treatment sludge (WTS) and cullet were used as the additives to adjust the composition of the elements in order to enhance the physical properties of the sintering product. Samples were sintered at different temperatures. The results showed that, milling operation could increase the compressive strength of the product and reducing the evaporation of Pb, Cd, Cu, Cr and Zn effectively. The XRD analyze showed an amorphous phase was formed after wet-ball-milling for a few hours, which is the key mechanism to enhanced the compressive strength of the product and prevent the evaporation of heavy metals during the sintering operation.