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Degradation characteristics of dioxin in the fly ash by washing and ball-milling treatment

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Abstract: In this study, samples were taken from different types of municipal waste incineration plants in the Pearl River Delta, China. Analyzing the distributive characters of elements and dioxin congeners in fly ash, the method of washing-ball milling was utilized to remove chloride and degrade dioxin in fly ash. The results showed that more than 90% of particles were in the range of 1~50 μm and most of dioxin and metals existed in 0.030~0.075 mm of particles. K, Na, Cl and Br in fly ash could be removed by washing efficiently, however dioxin and other metals remained in the solid phase. Washing and Fe/Ni-SiO₂ ball-milling method seemed to be the best choice as the dioxin removal rate could reach up to 93.20%. Dioxin could be degraded to low toxic compounds and heterochlorides with Fe/Ni as dechlorinating agent. In the process, PCDFs were partly transformed to PCDDs, while too long time of ball-milling was not benefited for dioxin removing. In addition, the phases of calcium such as Ca(OH)₂, CaCO₃ and CaSO₄ in fly ash could transform from crystal to amorphous.

Keywords: fly ash; dioxin; elements; washing; ball-milling

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