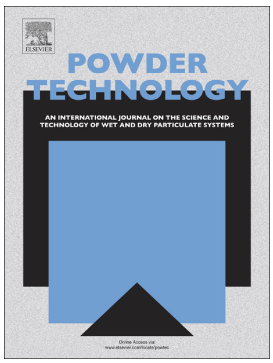

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Adsorption of heavy metal ions using zeolite materials of municipal solid waste incineration fly ash modified by microwave-assisted hydrothermal treatment

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Abstract: In this work, microwave-assisted hydrothermal process was applied to modify the municipal solid waste incineration (MSWI) fly ash and get zeolitic production. The condition of hydrothermal process was fixed at 200 ℃ and 30 min. The 1mol/L Na_2HPO_4 was selected as the additive, and the liquid to solid ratio was 3 ml/g. X-ray diffraction results revealed that analogous zeolite crystals formed by the MSWI fly ash during the hydrothermal process. The cation exchange capacity (CEC) was 0.498 meq/g of the modified fly ash, which increased about 22 times compared to the raw MSWI fly ash. To obtain the adsorption mechanism of the modified fly ash, the experiments of adsorption isotherm and kinetics were researched. The adsorption isotherms of heavy metal cations in mixed solution could be described by Langmuir isotherm equations, with a high correlation coefficient value. The experimental products were better fitted by the pseudo second-order kinetics rather than the pseudo first-order kinetics. Although the adsorption capacity of the modified fly ash needs to be promoted, it is a potential utilization for MSWI fly ash to be the original materials as adsorbents.

Keywords: adsorption; MSWI fly ash; hydrothermal treatment; microwave; heavy metals