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CFD Study on the Effect of Primary Air on Combustion of Simulated MSW Process in the Fixed Bed

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Abstract : Incineration of municipal solid waste (MSW) is one of the key scopes in the global clean energy strategy. A computational fluid dynamics (CFD) model was established. In order to reveal these features of the combustion process in a fixed porous bed of MSW. Transporting equations and process rate equations of the waste bed were modeled and set up to describe the incineration process, according to the local thermal conditions and waste property characters. Gas phase turbulence was modeled using k-ε turbulent model and the particle phase was modeled using the kinetic theory of granular flow. The heterogeneous reaction rates were determined using Arrhenius eddy dissipation and the Arrhenius-diffusion reaction rates. The effects of primary air flow rate and temperature in the burning process of simulated MSW are investigated experimentally and numerically. The simulation results in bed are accordant with experimental data well. The model provides detailed information on burning processes in the fixed bed, which is otherwise very difficult to obtain by conventional experimental techniques.

Keywords : computational fluid dynamics (CFD) model, waste incineration, municipal solid waste (MSW), fixed bed, primary air
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