

A NUMERICAL MODEL FOR PACKED BED COMBUSTION OF CHAR PARTICLES

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Abstract - This paper presents a numerical model for the combustion of char particles in an overfed packed bed. The processes included in the model comprise: heterogeneous reactions for the production of CO, the oxidation of CO in the gas phase, heat transfer in the gas and solid phases as well as between phases, particle motion and shrinkage within the bed, heat transfer in the grate, and the behaviour of ash. The bed is assumed to be one-dimensional - radial variations of temperature and composition are neglected. The model is shown to agree well with published data. Typical results are presented for steady-state operation, including the conditions for extinction. Back-diffusion, grate design, and ash layer buildup, hitherto neglected, are shown to have significant effects.

Keywords: packed beds, solid fuel combustion, incineration

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