

Instytut Inżynierii Chemicznej

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Analysis of Entropy Production in Structured Chemical Reactors: Optimization for Catalytic Combustion of Air Pollutants

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Optimization of structured reactors is not without some difficulties due to highly random economic issues. In this study, an entropic approach to optimization is proposed. The model of entropy production in a structured catalytic reactor is introduced and discussed. Entropy production due to flow friction, heat and mass transfer and chemical reaction is derived and referred to the process yield. The entropic optimization criterion is applied for the case of catalytic combustion of methane. Several variants of catalytic supports are considered including wire gauzes, classic (long-channel) and short-channel monoliths, packed bed and solid foam. The proposed entropic criterion may indicate technically rational solutions of a reactor process that is as close as possible to the equilibrium, taking into account all the process phenomena such as heat and mass transfer, flow friction and chemical reaction.

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