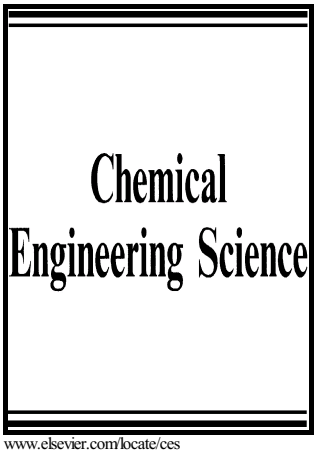


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# Hydrodynamic Effects on Three Phase Micro-Packed Bed Reactor Performance – Gold-Palladium Catalysed Benzyl Alcohol Oxidation

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**Abstract**

The hydrodynamics of a three-phase micro-packed bed reactor and its effect on catalysed benzyl alcohol oxidation with pure oxygen were studied in a silicon-glass microstructured reactor. The microreactor was operated at 120°C and 1 barg and contained a channel with a 300 μm x 600 μm cross section, packed with 1wt% Au-Pd/$TiO_2$ catalyst 65 μm in average diameter. Improvements in the conversion of benzyl alcohol and selectivity to benzaldehyde were observed with increasing gas-to-liquid ratio, which coincided with a change in the flow pattern from a liquid-dominated slug to a gas-continuous regime. The observed enhancement is attributed to improved external mass transfer, associated with an increase in the gas-liquid interfacial area and reduction in the liquid film thickness that occur with gradual changes in the flow pattern. A maximum selectivity of 93% to benzaldehyde was obtained under partial wetting - which introduced the added benefit of direct gas-solid mass transfer - outperforming the selectivity in a conventional glass stirred reactor. However, this was at the expense of a