Yupin Wongnuch 2007: Effect of the Position of the Catalyst Bed in a TAP Reactor on the Uniformity of the Catalyst. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering.
Thesis Advisor: Associate Professor Phungphai Phanawadee, D.Sc. 66 pages.

Uniformity of change in surface concentration during a multi-pulse TAP experiment with porous catalyst was theoretically analyzed for a TAP reactor with the ratio of the catalyst bed thickness to the reactor length of 1/30. The analysis was performed by simulation of an irreversible adsorption process. The surface concentration change is described by the change in the fractional surface coverages. The intraparticle uniformity is indicated by a small magnitude of $\Delta\theta_{p,\max}$, the maximum difference between the occupied fractional surface coverages at the outermost and the innermost of the catalyst pellet during the multi-pulse experiment. In the interparticle region, the indicating quantity is $\Delta\theta_{b,\max}$, the maximum difference between the pellet-outermost fractional surface coverages at the inlet and the outlet of the catalyst bed. It was found that the position of catalyst zone does not affect the magnitude of $\Delta\theta_{p,\max}$, which generally depends only on the effectiveness factor in the first pulse experiment, η. For $\eta \geq 0.94$, $\Delta\theta_{p,\max} \leq 0.05$. In the interparticle region, if the catalyst zone is close to the reactor entrance (the coordinate of 1/10 of the reactor length), $\Delta\theta_{b,\max} = 0.05$ when X = 0.86. At the same conversion, the magnitudes of $\Delta\theta_{b,\max}$ are 0.07 and 0.28 when the catalyst zone position are in the middle and close to the outlet (the coordinate of 9/10 of the reactor length) respectively.

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