

507c Breakthrough Curves for Solid-Acid Catalyzed Liquid-Phase Alkylation Reactions

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The use of environmentally benign solid acid catalysts for liquid phase isoparaffin/olefin alkylation has been investigated since early 1970's. The major drawback of this process is rapid deactivation of solid-acid catalysts because of fouling by hydro-carbonaceous deposits. Recent study has shown in carbon-dioxide expanded solvent under high pressure and /or temperature the pore cleaning may be achieved (Lyon et al 2004). So it is important to know the adsorption, desorption and reaction parameters on solid-acid catalyst to enhance the product selectivity and decrease the rate of deactivation. By studying the breakthrough curves in packed-bed reactor one can determine this parameters. Two methods can be used to determine these parameters; model dependent numerical algorithm and model independent method of moments. In current work both this methods are used for solid-acid catalyzed alkylation reactions. It is found that Method of Moments provides approximates expression for the break through curve that are useful for scale-up and reactor design.

Reference Lyon. C., Sarsani. V., Subramaniam B "1-Butene + Isobutane Reactions on Solid Acid Catalysts in Dense CO₂-Based Reaction Media: Experiments and Modeling" Ind. Eng. Chem. Res. 2004, 4, 480-481.