

CORRELATION OF REACTION YIELD ON SUSPENDED CATALYSTS

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The yield of a complex chemical reaction (two or more reactions in parallel or series) occurring on a suspended catalyst in stirred liquid phase depends on the relative rates of the chemical reactions and the mass transfer rates of the reactants to the catalyst and of the products away from the catalyst. If the blending rate of a fed reactant into a preexisting mixture of a resident reactant and the suspended catalyst is much faster than interphase mass transfer onto the catalyst and the chemical reactions in the liquid phase are very slow relative to those on the catalyst, then a Damkoehler number based on the characteristic times for mass transfer and chemical reactions should serve to correlate yield of the primary reactant. Numerical experiments have shown that for a fed-batch reactor the feed time of the fed reactant is a more important variable than the characteristic reaction rate, probably because in such a system feed rate determines the actual rate of reaction on the catalyst. Higher feed rates induce higher solution reactant concentrations, resulting in higher mass transfer rates and higher surface concentrations of the fed reactant. A higher reaction rate on the catalyst results. Numerical results show the likely effectiveness of such a correlation method, but actual experimental data are needed to confirm the results.



