Abstract Submitted
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**In-line spectroscopic diagnostics to investigate mixing-limited consecutive-competitive reaction systems**[1] GOKUL PATHIKONDA, MICHAEL AHMAD, MUSTAFA USTA, Georgia Institute of Technology, IRFAN KHAN, Dow Company, CYRUS AIDUN, DEVESH RANJAN, Georgia Institute of Technology — Many complex industrial processes involve mixing-limited reaction chemistry in highly turbulent and complex environments. The proportions of reaction products ('reaction yield') involving consecutive-competitive reactions have long been known to depend on characteristics of turbulent mixing, necessitating the need for better injector designs for turbulent control. The relevant experimental studies frequently require the ability to measure the chemical reaction products in complex turbulent environments. We present a novel in-line spectroscopic measurement to study the reaction between 1-Napthol and Diazotized Sulfanilic acid. The concentrations of mono- (primary) and di-azo (secondary) reaction products averaged diametrically are measured using visible-light absorption spectroscopy at various distances from the injector. The diagnostic is characterized using bench-top measurements of known concentrations, and implemented on a co-flowing jet injector facility. Preliminary results demonstrating the effect of viscosity gradients on reaction yield is presented. It was noticed that an increase in the viscosity gradients in the reaction environments (owing to disparity in viscosity of inlet liquids) significantly alters the selectivity of the overall reaction.

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