

Abstract Submitted  
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**The Effect Of Viscosity and Non-Newtonian Rheology On Reaction Enhancement Between Two Initially Distant Scalars**<sup>1</sup> FARROKH SHOA EI, JOHN CRIMALDI, University of Colorado, Boulder — The effect of viscosity and non-Newtonian (shear-thinning) rheology on mixing and reaction between two initially distant scalars has been investigated using a two-channel planar laser-induced fluorescence technique (2C-PLIF). The scalars are stirred and mixed in the mildly turbulent ( $Re=2000$ ) wake of a round cylinder. The scalars are released continuously upstream of the cylinder, with a separation that initially impedes the reaction. The ambient flow is pure water, but the scalar solutions include Xanthan gum to alter their rheology. Results indicate that mixing and reaction rates in the low-Damkohler limit between the two scalars plumes increase as the viscosity of the scalars is increased. The study also shows that the dominant contribution of total reaction derives from the scalar covariance associated with instantaneous flow processes, and depends strongly on viscosity and non-Newtonian rheology of the scalars in the domain. The results have broad implications for biological and ecological mixing processes involving non-Newtonian fluids.

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