

Abstract Submitted
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Nozzle Spray Delivery Studies for High-Viscosity Shear-Thinning Fluids SMITA AGRAWAL, MIKE CLOETER, YUXI ZHANG, JANA RAJAN, JAIME CURTIS-FISK, PUSPENDU DEO, BILLY SMITH, The Dow Chemical Company — Experiments were performed to explore the spray of shear-thinning polymer solutions through various nozzles. High speed images near the nozzle exit, drop size distributions, and spatial mass flux distributions were analyzed with the shear-thinning fluids and deionized water for comparison for seven different nozzles with pressure drops up to 40 psi. The nozzles tested include full cone, hollow cone, and flat fan nozzles. The aim was to identify suitable nozzles that would give droplet sizes in the range of 100-2000 μm for the shear thinning fluids. It was found in general that the shear-thinning fluids led to formation of ligament like structures whereas sheet perforation was more predominant with deionized water. The spray break up was delayed with the shear-thinning fluids. The spray of the shear-thinning fluids also led to an increase in the median drop size with the extent of increase being dependent on the nozzle type. The spray angle was found to be reduced by around 20° at a distance of 12" when compared to that of distilled water. This study lends fundamental insights into spray characteristics for a wide range of spray nozzles with high viscosity shear-thinning solution as compared to spraying deionized water with the same nozzles.

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