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Dynamics of drop formation of surfactant-containing liquids HARIPRASAD JANAKIRAM SUBRAMANI, YING-CHIH LIAO, ELIAS FRANSES, OSMAN BASARAN, School of Chemical Engineering, Purdue University — Surfactants are used to control the breakup of jets and drops in applications as diverse as inkjet printing, pesticide spraying, and DNA microarraying. While the breakup of surfactant-free jets/drops has been exhaustively studied, little is known by comparison about interface rupture when the jet/drop liquids contain surfactants. High speed imaging is employed here to gain insights into differences between the dynamics of formation of drops of pure liquids, such as water, diethylene glycol, a 50 wt % solution of 20 cSt and 50 cSt polydimethyl siloxane, and those of solutions consisting of different concentrations of a nonionic surfactant, pentaethylene glycol monododecyl ether $C_{12}E_5$ in mixtures of 75 wt % (GW75) and 90 wt % (GW90) glycerol/water, from a capillary tube. Equilibrium surface tensions of solutions of $C_{12}E_5$ are fitted with the Langmuir-Szyskowski equation and the critical micelle concentrations (cmc) are found to be 0.25 and 0.40 mM. Changes in dynamics of drop breakup are studied by varying surfactant concentration (below and above cmc), flow rate, tube radius, and liquid viscosity.

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