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Effect of Rheological Properties on Liquid Curtain Coating.[1] ALIREZA MOHAMMAD KARIM, WIESLAW SUSZYNSKI, University of Minnesota, Twin Cities, WILLIAM GRIFFITH, SASWATI PUJARI, The Dow Chemical Company, MARCIO CARVALHO, PUC-Rio, LORRAINE FRANCIS, University of Minnesota, Twin Cities, THE DOW CHEMICAL COMPANY COLLABORATION, PUC-RIO COLLABORATION — Curtain coating is one of the preferred methods for high-speed precision application of single-layer and multi-layer coatings in technology. However, uniform coatings are only obtained in a certain range of operating parameters, called *coating window*. The two main physical mechanisms that limit successful curtain coating are liquid curtain breakup and air entrainment. The rheological properties of the liquid play an important role on these mechanisms, but the fundamental understanding of these relations is still not complete. The effect of rate-dependent shear and extensional viscosities on the stability of viscoelastic and shear thinning liquid curtains were explored by high-speed visualization. Aqueous solutions of polyethylene oxide (PEO) and polyethylene glycol (PEG) were used as viscoelastic liquids. Xanthan Gum in water and glycerol solutions with a range of compositions were used as shear thinning liquids. The critical condition was determined by examining flow rate below which curtain broke. In this work, we also analyze relative importance of rate-dependent shear and extensional viscosity on both curtain breakup and air entrainment.

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