A Model-Based Framework for Advanced Optimal Operation of Polymerization processes: Application to Emulsion Copolymerization of Styrene/MMA

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Abstract

A model-based framework is being developed for advanced/optimal operation of polymerization/copolymerization processes and tested using our pilot facilities running under Industrial Distributed Control System. Since the model is a core component of the overall methodology, a comprehensive mathematical model was first developed and validated to simulate the emulsion copolymerization of styrene (St) and Methyl-Methacrylate (MMA). An on-line calorimetry procedure has also been developed and implemented allowing obtaining real time conversion data for control purposes. Optimization of the process for desired particle size distribution (PSD), molecular weight distribution (MWD) and conversion, using the model developed are also presented together with experimental validations along the optimal dynamic trajectories of the main process variables. The whole strategy is being developed within a gPROM-Excel/OPC-DCS environment

Keywords: Dynamic Modelling, Particle size, Conversion, PSD, MWD