Binary Mixture Batch Distillation with Optical Measurements

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A series of experiments of batch distillations of binary mixture are carried out to study non-equilibrium behaviors of liquid-vapor phases. Optical measurements of refractive indices of the distillates gave accurate measurements of the transient compositions. We use transient mass and energy balances with a thermodynamic model to compute the top and bottom products compositions and flow rates under a given heating history to obtain the target ethanol concentration with optimum power consumption. We compare the computation results with experimental results. The optimum heating and cooling condition together with reflux strategy are analyzed.