

Transient Multi-stage Binary Mixture Distillation

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An unsteady state analysis and experiments of multi-stage distillation of ethanol-water mixture were carried out. Using the material balances, energy balances and thermodynamic relations of component liquids and vapors, together with transport coefficients, we computed transient behavior of the top and bottom products compositions, flow rates and temperature distribution for given sets of experimental parameters. The parameter space consists of heat power, coolant flow rate, feed heating, reflux heating and reflux ratio. As the parameter subspace is varied, different transient behaviors were observed, which was measured experimentally and computed using numerical methods for differential equation models. We compared the computed results with experimental results to validate the models and assumptions therein.