

## Impact of uncertainty in vapor–liquid equilibrium data on distillation process design and economics

Alyssa Marie Fulgueras, 강정원†

고려대학교

(jwkang@korea.ac.kr†)

Vapor–liquid equilibrium (VLE) data is an essential basis for the conceptual design of a distillation column. A small deviation in VLE predictions could lead to a great misconception in column design and severe economic losses. This study investigates the impact of uncertainty in VLE data of close-boiling and azeotropic systems on the column design for the distillation process and its economics. Several ideal and non-ideal binary systems with low relative volatilities were selected for analysis. We generated fake data to investigate the impact of uncertainties, which satisfies thermodynamic consistency and deviates from the experimental observations. The column design in terms of the number of stages, reflux ratio, and total energy consumption was compared for several cases to evaluate the impact of uncertainties in VLE data. The economic evaluation was performed for each simulation case to generate a conceptual capital/operating cost estimate. The sensitivity of VLE data on the economics of distillation processes is analyzed.