

# Pressure Relief of Non-Ideal Mixtures: Composition Trajectories & Residue Curve Maps

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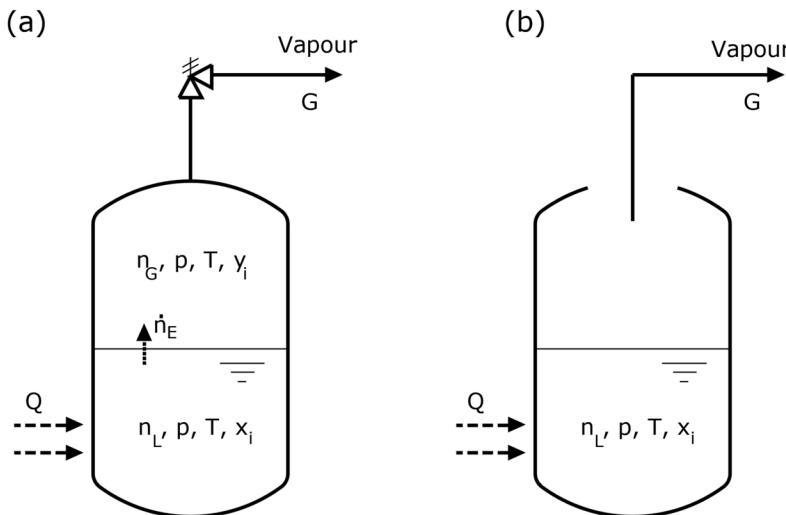
May 6, 2020

## Abstract

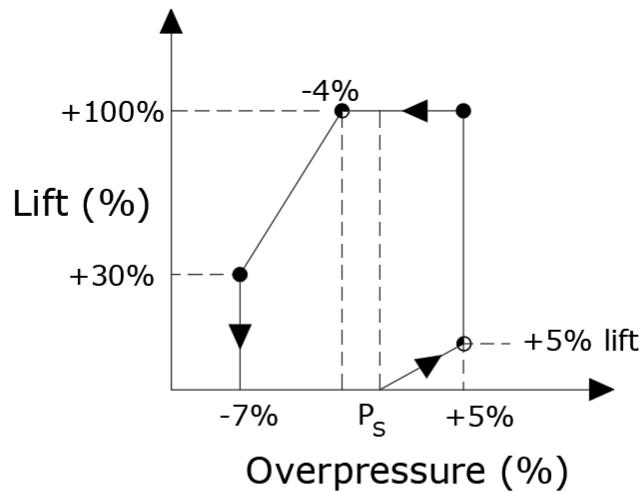
During the course of a pressure relief discharge from a vessel containing a multicomponent liquid mixture, composition changes occur that affect the properties vessel contents. In this work, a model of the dynamic relief process for ternary, non-ideal, homogeneous mixtures is developed, under the assumption of vapour-only venting. Opening/re-closing of the relief valve introduces state-events which require re-initialization of the model at each state transition. The relationship between the pressure relief model and the concept of residue curves, which describe simple-distillation processes, is demonstrated. It is known that the presence of azeotropes and distillation boundaries in mixtures restricts the composition trajectories of simple-distillation processes, as well as continuous distillation columns at total reflux. In this work, the residue-curve analogy is extended to vapour-only pressure-relief, where vapour composition changes directly affect the operation of the pressure-relief device. Examples of dynamic relief processes are developed for ternary mixtures with varying non-ideality.

## Hosted file

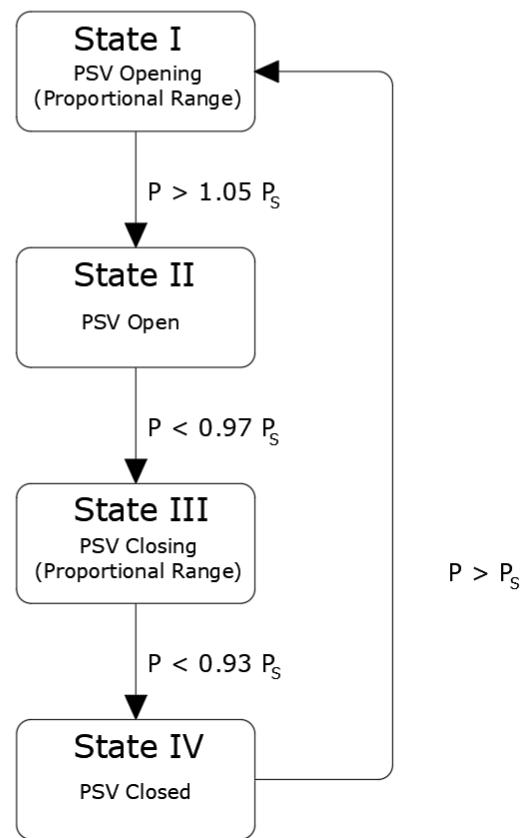
ReliefPaper.tex available at <https://authorea.com/users/317367/articles/448814-pressure-relief-of-non-ideal-mixtures-composition-trajectories-residue-curve-maps>

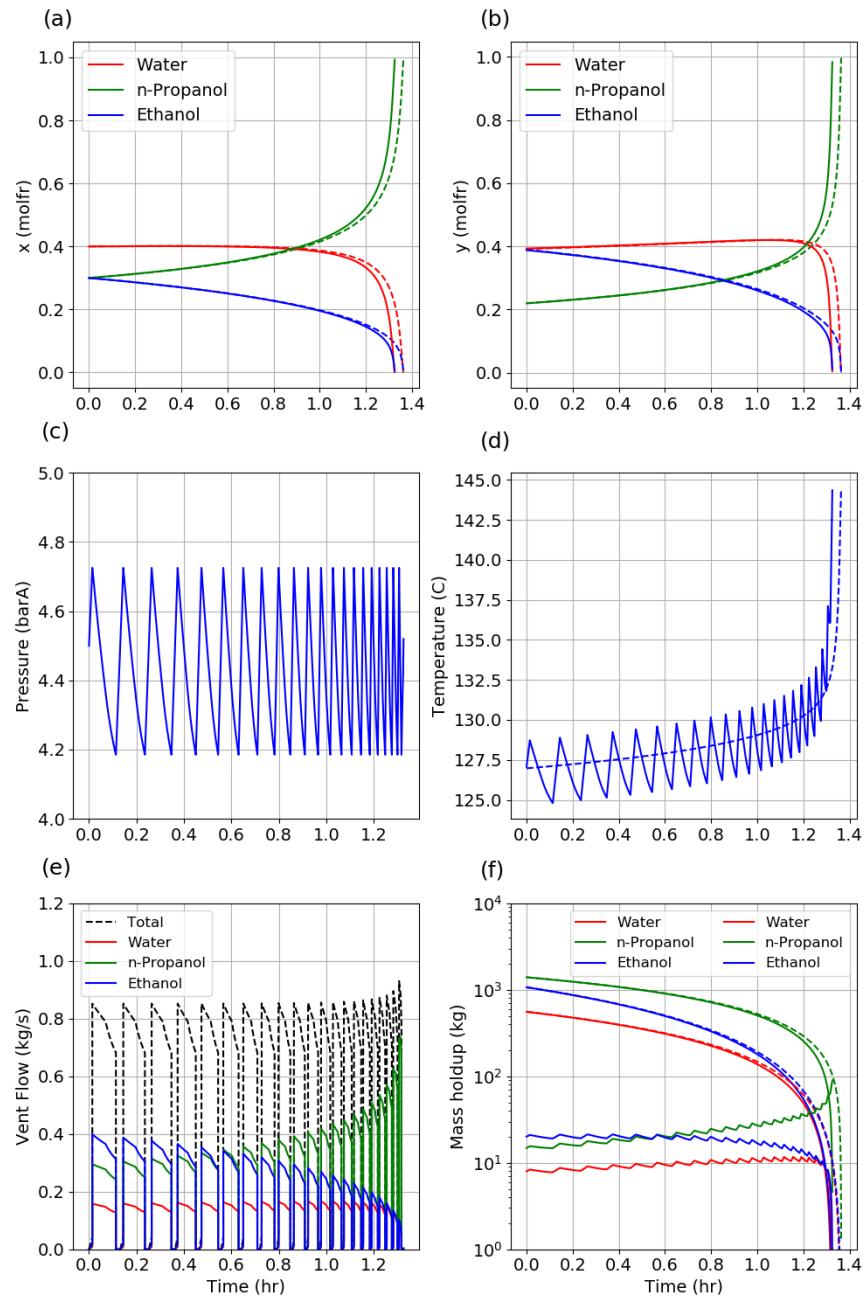


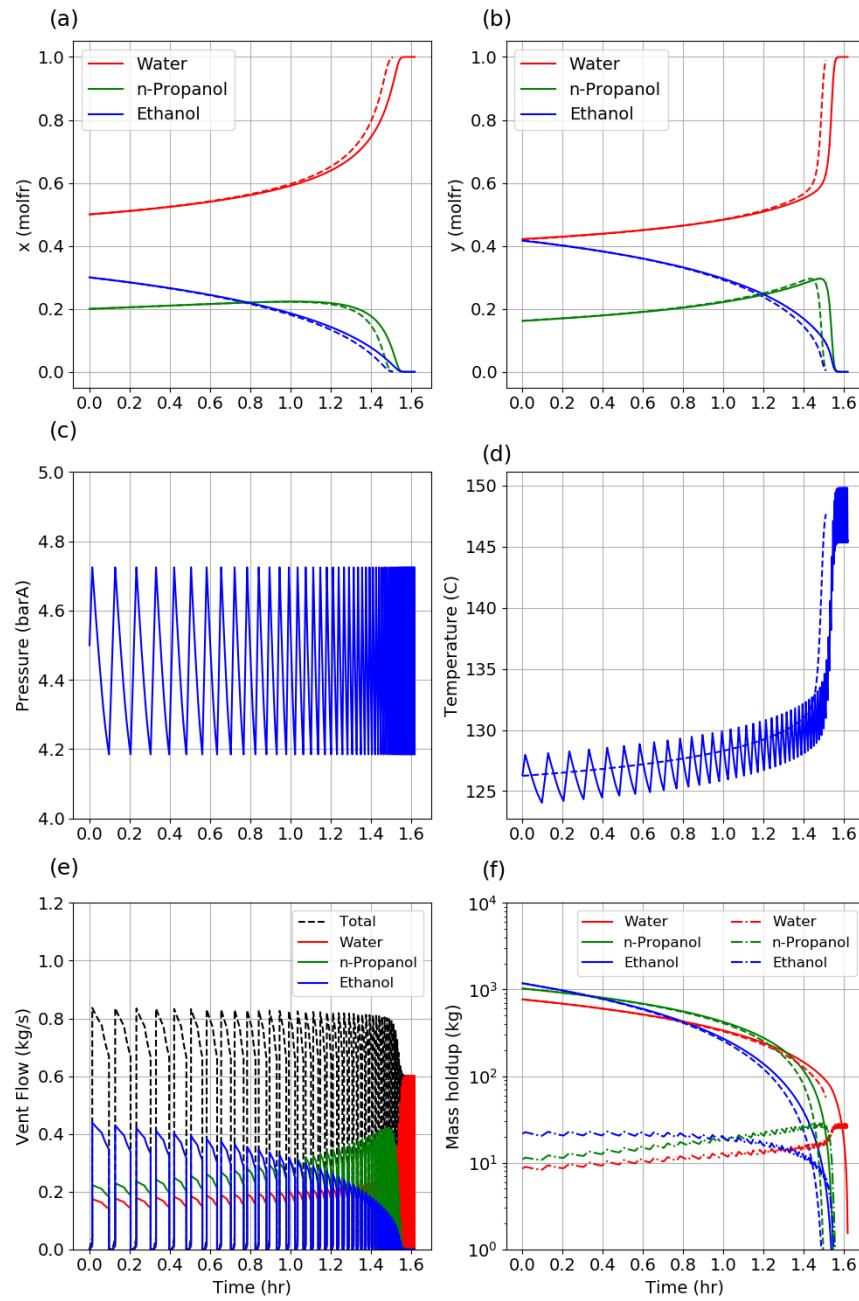
(a)

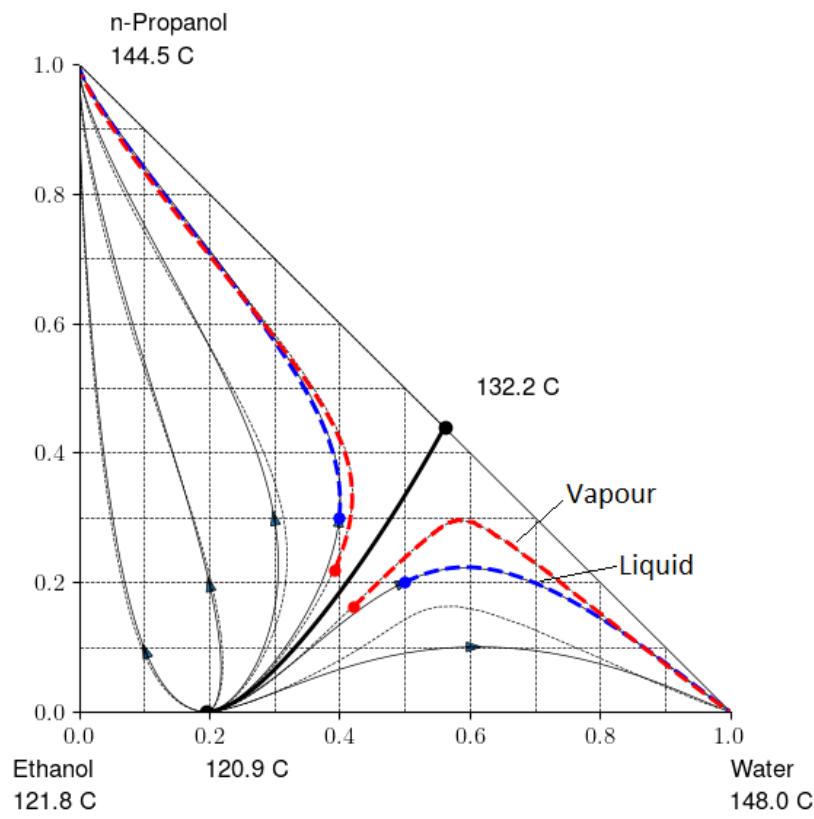


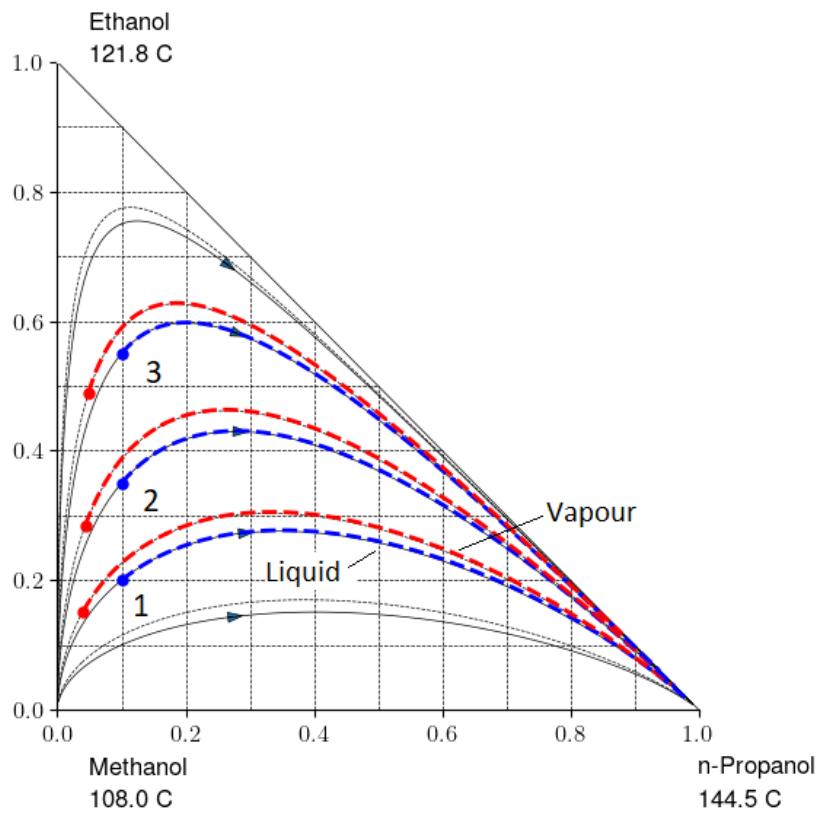
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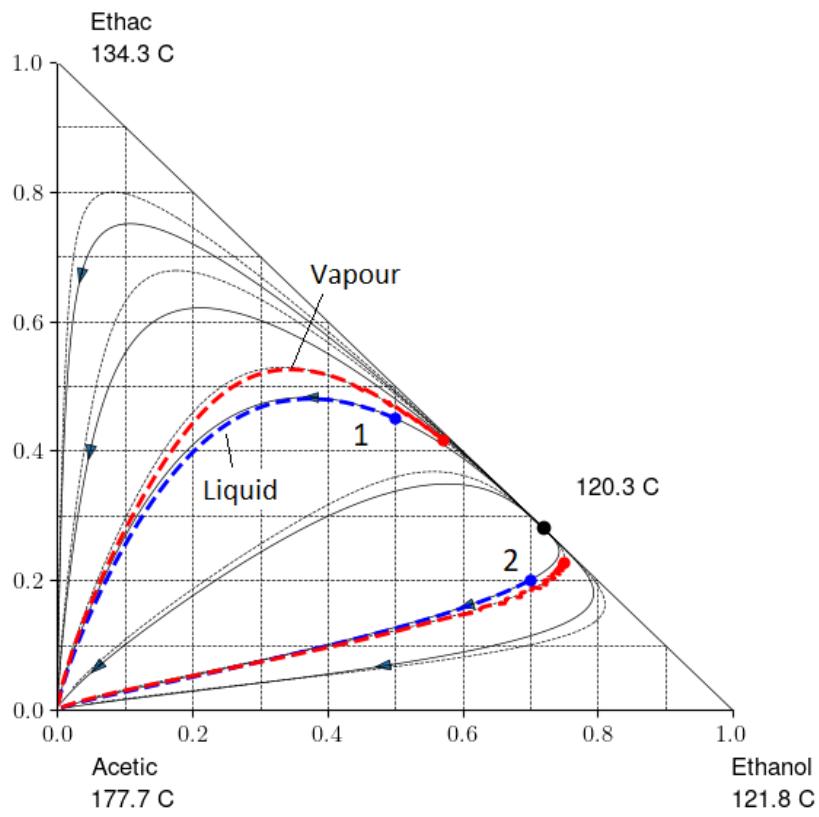


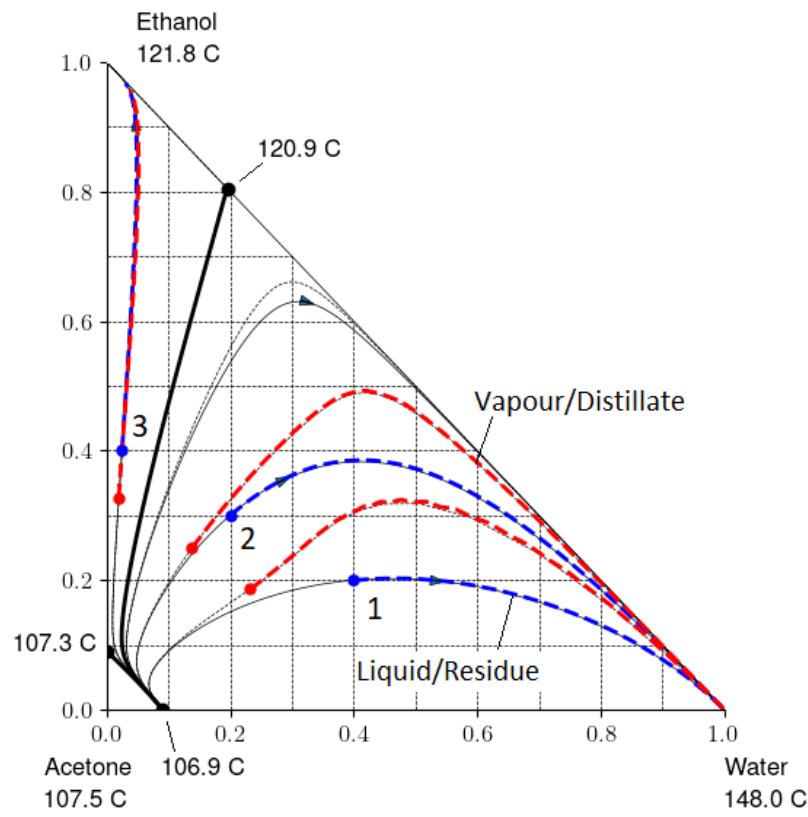


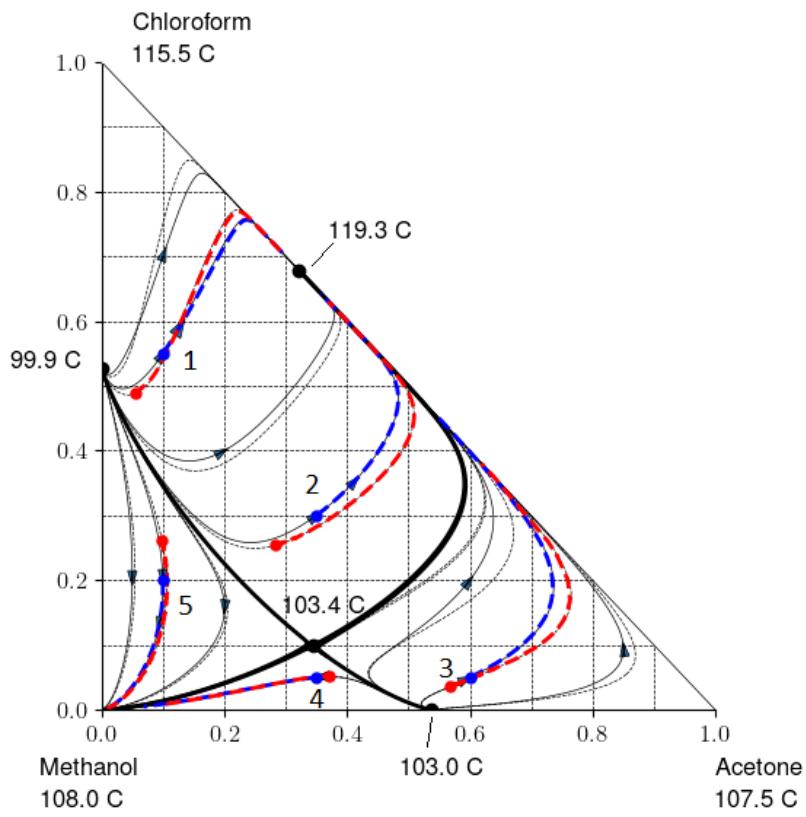


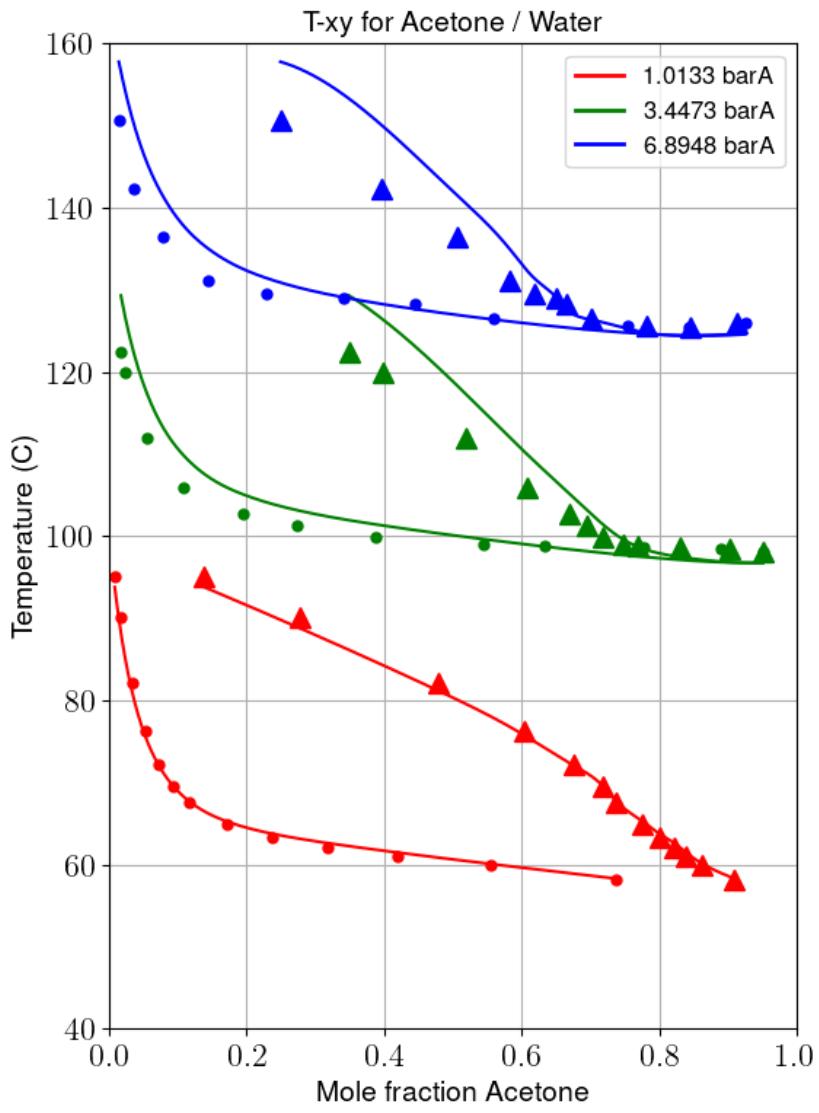












Chloroform

