

HW 8 – Fenske Equation

A distillation column with a partial reboiler and a total condenser is being used to separate a mixture of benzene, toluene, and cumene. The feed is 40 mol% benzene, 30 mol% toluene and 30 mol% cumene and is input as a saturated vapor. We desire 95% recovery of the toluene in the distillate and 95% recovery of the cumene in the bottoms. The reflux is returned as a saturated liquid, and CMO can be assumed. Pressure is 1.0 atm.

Equilibrium can be represented as constant relative volatilities.

Use $\alpha_{\text{ben-tol}} = 2.25$, $\alpha_{\text{cum-tol}} = 0.21$.

1. Find the number of equilibrium stages required at total reflux .
2. Determine the distillate product composition and flow.
3. Determine the bottoms product composition and flow.
4. Determine the approximate feed stage location.