Control and optimization study on the extractive distillation of the Acetone-Chloroform system

manish pokhrel, 김동선[1], 조정호[1,†]
kongju national university; [1]공주대학교
(jhcho@kongju.ac.kr[†])

The acetone and chloroform forms the maximum boiling azeotrope which usually occurs by molecular attraction rather than by molecular repulsion as in minimum boiling azeotrope. The normal boiling point of acetone is 329.4 K while that of chloroform is 334.3 K but the azeotropic boils at 337.6 K at 1 atm pressure with a composition of 34.09 mol% acetone. Here, we have studied the control and design for the extractive distillation of acetone and chloroform using various solvents viz. benzene, di-methyl sulfoxide, methyl-n-pentyl ether and 2-methyl heptane. For the simulation we have used PRO/II version 9.2. The experimental Vapour-liquid equilibria (VLE) and Liquid-Liquid equilibria (LLE) data were regressed to obtain a new set of binary interaction parameters. We have used the NRTL liquid activity coefficient model for the thermodynamic modeling. The main objective of our study is to optimize the re-boiler heat duty by determining the best solvent feed flow rate, feed tray location and reflux ratio, and also to determine the best solvent for this system. The purity of both the components is set greater than 99 mole percent in the distillate streams from the two distillation columns.