**Pressure Swing Distillation Of Isobutanol And N-Heptane**

**Background:**

Here simulation is carried out for separation of Isobutanol and N-heptane which generated during production of triisobutyl vanadate. This mixture is separated for the reuse of the reactants to reduce cost of raw material. For the separation of this mixture special distillation techniques may used like Azeotropic distillation, Extractive distillation, Pressure Swing distillation etc. Pressure Swing Distillation is commonly used for azeotrope separation in which based on changing pressure the separation makes easier as pressure is changed the composition of mixture also changes which then form minimum or maximum azeotrope.

**Description of flowsheet:**

Here two flowsheet are simulated for the separation of Isobutanol and N-heptane. The feed composition is 0.8 mole fraction Isobutanol and 0.2 mole fraction N-heptane flowing at a rate of 27.777778 mol/s. The feed stream will have a temperature of 313.15K. LPC (low pressure column) operates at 101325 Pa pressure in which Isobutanol is separated at the bottom of the column at a rate of 22.23 mol/s and top product of the column is sent to HPC (high pressure column) which operates at 405300 Pa pressure from this column N-heptane is obtained as bottom product.

| **Stream** | **Bottoms 1** | **Bottom 2** | **Distillate 1** | **Distillate 2** | **Feed** | **Recycle** | **Units** |
|---|---|---|---|---|---|---|---|
| **Temperature** | 380.797 | 426.821 | 374.374 | 425.921 | 313.15 | 376.18588 | K |
| **Pressure** | 101325 | 405300 | 101325 | 405300 | 101325 | 101325 | Pa |
| **Molar Flow** | 22.2167 | 5.53332 | 6.34248 | 6.33695 | 27.777 778 | 13.632687 | mol/s |
| **Molar Fraction(Mixture)/ Isobutanol** | 0.999 | 0.001 | 0.330828 | 0.464835 | 0.8 | 0.4648350 2 | |
| **Molar Fraction(Mixture)/ N-heptane** | 0.001 | 0.999 | 0.669172 | 0.545619 | 0.2 | 0.5351649 8 | |

**References:**

[1] Wang, Y., Zhang, Z., Xu, D., Liu, W., & Zhu, Z. (2016). Design and control of pressure-swing distillation for azeotropes with different types of boiling behavior at different pressures. Journal of Process Control, 42, 59-76.