Separation Of Acetone-Water With 3-Methylhexane As The Solvent.

Tarang Ashokbhai Sherathiya.

R.N.G. Patel Institute of Technology.

Background and Description:

Water has a high latent heat (heat of vaporization) compared to many other components. For the separation of a water-acetone mixture (50 wt-% each), it may be more energy efficient to use extraction instead of direct distillation.
In this case we use a 3-methyalhexane as a solvent for separation of water and acetone mixture, and recover at the end of operation for multi time use.

Process:

Here the feed containing Mixture of Acetone-water (50-50%) .which is passed through the inlet stream (S-01) at 30 °C and 1 atm (101.325 kpa) pressure. For the easy separation 3-methyalhexane(S-02)is used as a solvent at 40 °C and 1 atm pressure.

Stream S-01 & S-02 transfer into the Extractor. Here water is separate through stream S-04 and 3-methyalhexane and acetone mixture separate through stream S-05.

Then Stream S-05 is transfer into the distillation column for further separation. here Acetone separate from the top of the column through stream S-06 and 3-methyalhexane separate from the bottom of the column through stream S-07.

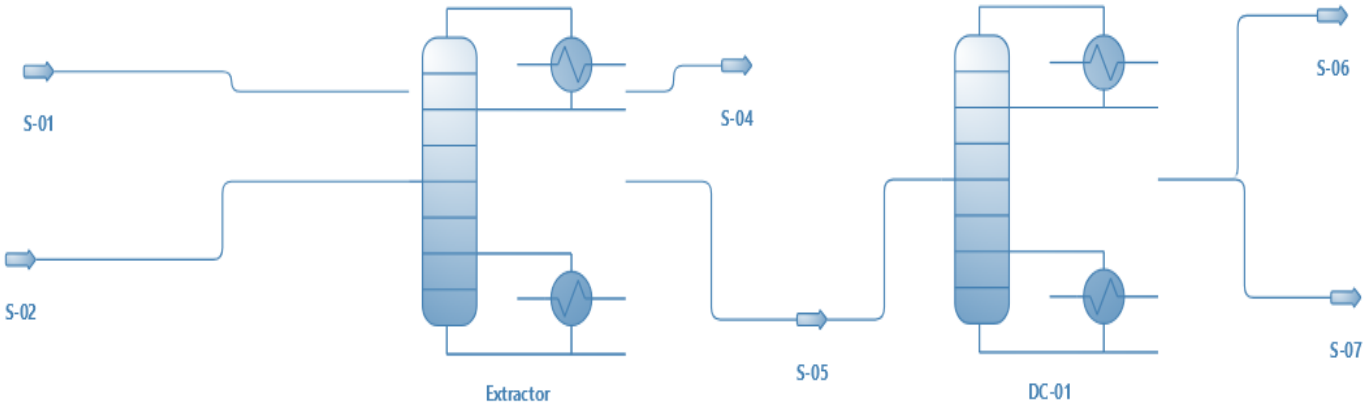
Acetone Mole fraction from top of distillation column :- 1 in (S-06)

:- 0.13 in (S-07)

3-methyalhexane mole fraction from Bottom of distillation column:- 0.86in(s-07)

:- 1.64×10^{-9} in (S-06)

Flow sheet :



Result table:

Master Property Table					
Object	**S-07**	**S-06**	**S-05**	**S-04**	
Temperature	83.9148	56.1396	30	30	**C**
Pressure	101.325	101.325	101.325	101.325	**kPa**
Mass Flow	163.673	100.978	264.651	35.3495	**kg/h**
Molar Flow	988.513	988.513	1977.03	1115.62	**m3/d @ SC**
Volumetric Flow	6.07118	1127.43	8.64153	0.852739	**m3/d**
Molar Fraction (Mixture) / Acetone	0.133789	1	0.566894	0	
Molar Fraction (Mixture) / Water	0.00520043	4.2944E-18	0.00260022	1	
Molar Fraction (Mixture) / 3-methylhexane	0.861011	1.64912E-09	0.430505	0	