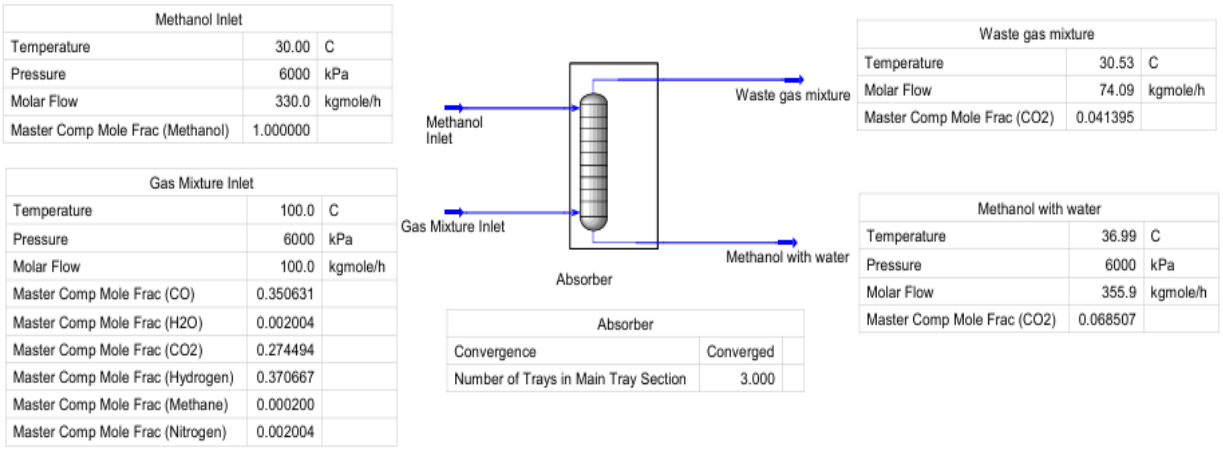
1. **Carbon dioxide absorption mechanism**

   Data: Feed flow molar fractions 0.35 CO, 0.002 H2O, 0.274 CO2, 0.37 H2, 0.002 CH4, and 0.002 N2. Total flow 100 kgmol/h, Temperature 100 degree Celsius and pressure 6000 kPa clean with methanol. Total flow 330 kgmol/h, 30 degrees Celsius and 6000 kPa.

   Query: Find the fluid package? Determine the minimum number of equilibrium stages in order to reach a CO2 molar fraction in the exit flow lower than 0.06.

   Answer: Fluid package is PRSV. The minimum number of equilibrium stages is 3 in order to reach a CO2 molar fraction in the exit flow lower than 0.06. The figure is given below.



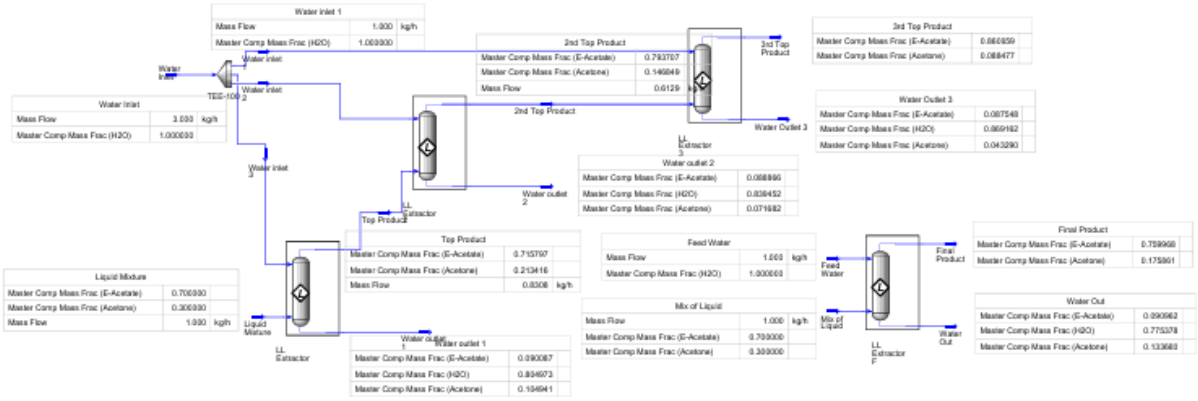
2. **Simulation for liquid-liquid extraction**

   In a certain process, a mixture of acetone and ethyl acetate with 30% by weight of the former is obtained. For this, it is extracted with water at 30 degree Celsius.

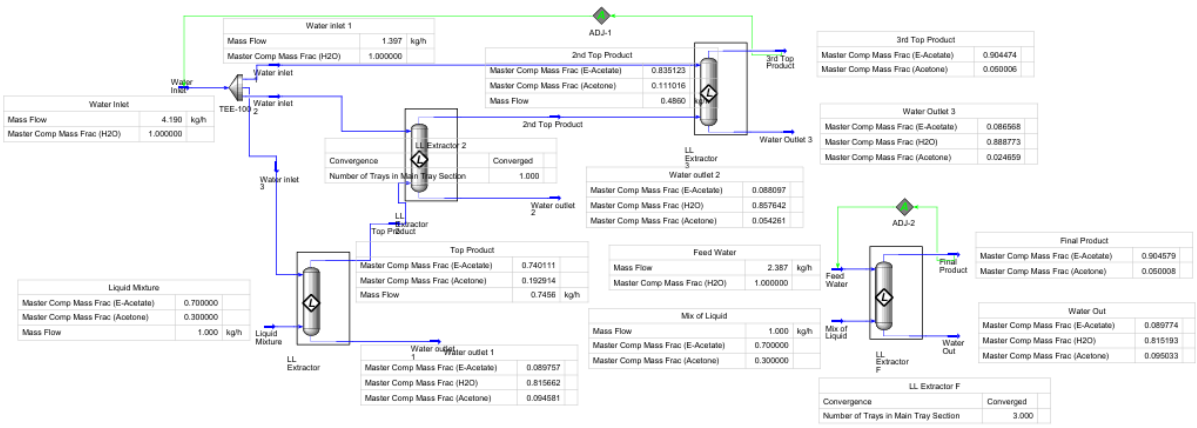
   Calculate:

   (a)The amount of water needed per kg of feed in a simple extraction repeated three times where equal amounts of the solvent are introduced.

   (b) The amount of the water needed per kg of feed in an extraction performance in a 3 stages countercurrent column.



Now, The goal is to obtain ethyl acetate containing less than 5% by weight of acetone to recirculate it back into the process.



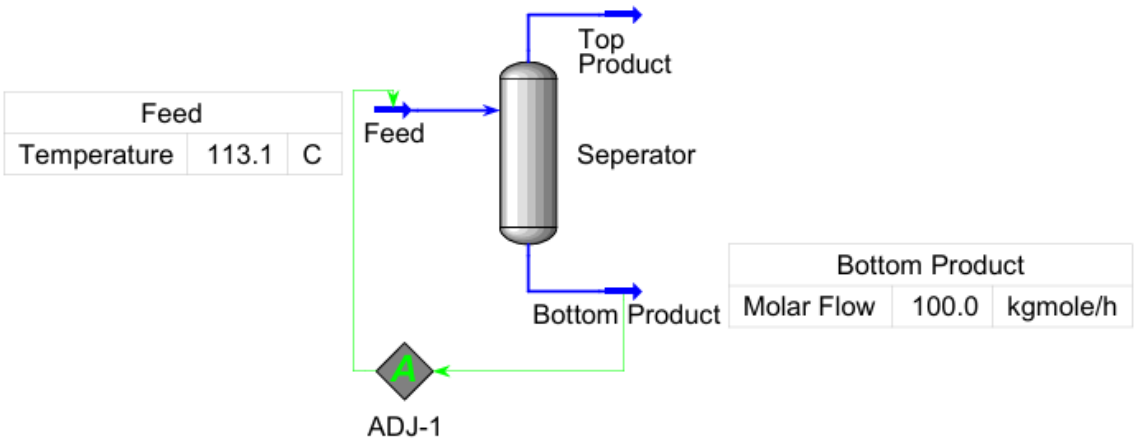
For the amount of water needed per kg of feed in a simple extraction repeated three times are needed 4.190 kg/h. and the amount of the water needed per kg of feed in an extraction performance in a 3 stages countercurrent column is needed for 2.387 kg/h. So, overall, we can say, the 3 stages countercurrent liquid-liquid extraction is better than a simple extraction repeated three times.

3. Adjust in simulation in flash separator

Data:

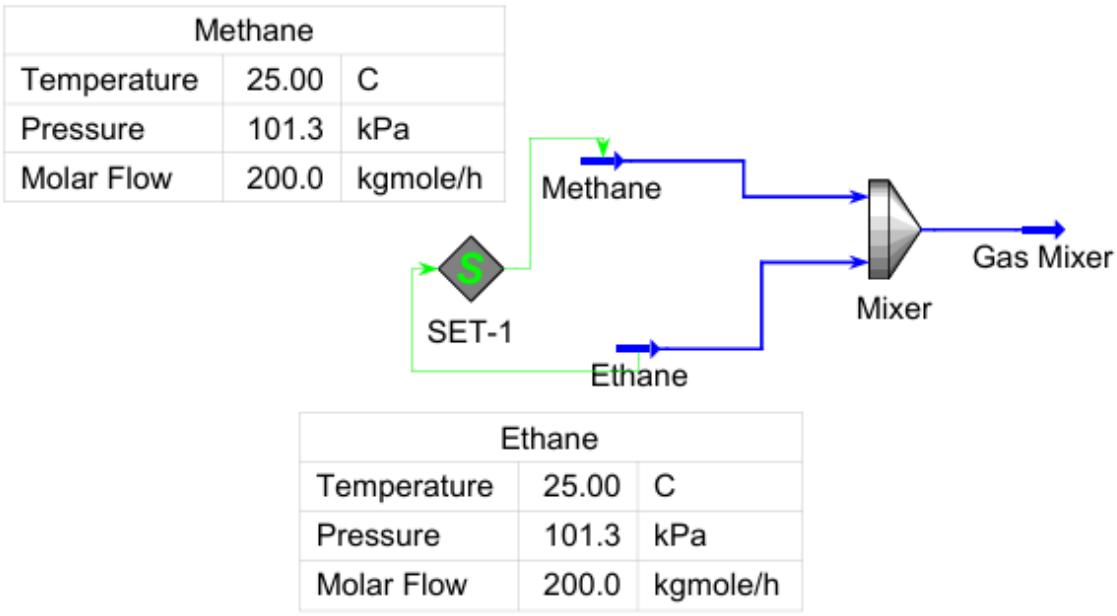
- Temperature: 15 degree Celsius
- Pressure: 4137 kPa
- Molar flow: 144 kgmol/h
- Mole fraction of methane: 0.1, ethane: 0.1, propane:0.2, i-butane: 0.3, n-butane: .1, and n-pentane: 0.2.
- Bottom product molar flow 144 kgmole/h

Calculate feed temperature so that the molar flow rate of L = 100 kmol/h.



4. Set in Simulation

Data: Methane temperature 25 degree Celsius, 1 atm pressure and 25 degree Celsius temperature, 1 atm pressure and 200 kgmol/h molar flow rate gas mix together. How can the molar flow set in same flow rate. Apply set in simulation.



5. Distillation Parameter Analysis.

It is desired to carry out the distillation in a column of 9 equilibrium stages (+2) under a pressure of 120 psi of a liquid mixture at its bubble point consisting of the flow rates of the following alkanes in kmol/h: C2: 2 , C3: 8, iC4: 15, nC4: 20, iC5: 10, nC5: 45; which enter on stage 5 counting from the condenser (total in this case). Knowing that the distillate flow is 48.9 kmol/h and that the liquid flow that is returned to the column

is 126.1 kmol/h. Determine, using the UNIQUAC correlation, the flow rates and compositions of the resulting product streams; the heat flows released and supplied (in W) in the condenser and boiler, respectively, and the external reflux ratio.