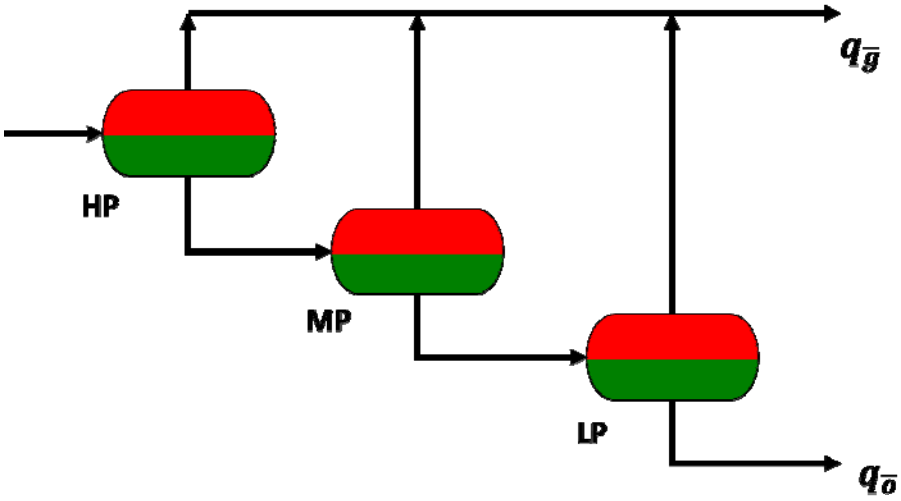
Exercise set 01 (Deadline: 31 Jan, 2019)

Problem 1: Calculations of a three-stage separation process

The following three-stage separation process is provided:



With the following operational conditions:

Stage	[-]	1-HP	2-MP	3-LP
p	[bara]	50	35	1.01325
T	[oC]	70	50	15.56
z-C1	[-]	0.5		
z-C3	[-]	0.2		
z-N-C10	[-]	0.3		

The molar flow at the inlet of the first stage is 1 kmol/s.
Compute the following:

- Compositions of separator liquid and gas and vapor molar fraction (fv) of each stage (Use the modified Wilson equation to estimate the equilibrium ratios Ki and the Rachford-Rice equation)
- Estimate the flowrate (in Sm^3/d) of surface oil and gas and the producing GOR. For this you will have to: 1. Calculate the composition of surface oil and gas, 2. calculate the molar flow of gas and oil and 3. Calculate the density of surface oil and gas. (To calculate densities use the Peng Robinson Equation of State).

All information and equations required to perform your calculations are provided in the excel sheet attached. Perform your calculations on the excel sheet.