Abdelhafid Boussouf University Center - Mila **Academic year 2024–2025**
Institute of Sciences and Technology
Department of proceeds engineering
3RD LMD Proceeds Engineering **Macroscopic Assessment module**

Series N° 1

Exercise 1:

A 0.5 M of aqueous solution of sulfuric acid enters to a process with a flow rate of 1.25 m^3/min , if the density of the solution is 1.03, calculate:

1- The mass concentration of H_2SO_4 in Kg/m^3

2- The mass flow of H_2SO_4 in Kg/s

3- The mass fraction of H_2SO_4 in the solution if we have a flow rate of the solution is 2.73 m^3/min

Exercise 2:

A liquid mixture of n-butane, n-pentane and n-hexane, in mass composition is as follow:

N- Butane 50%

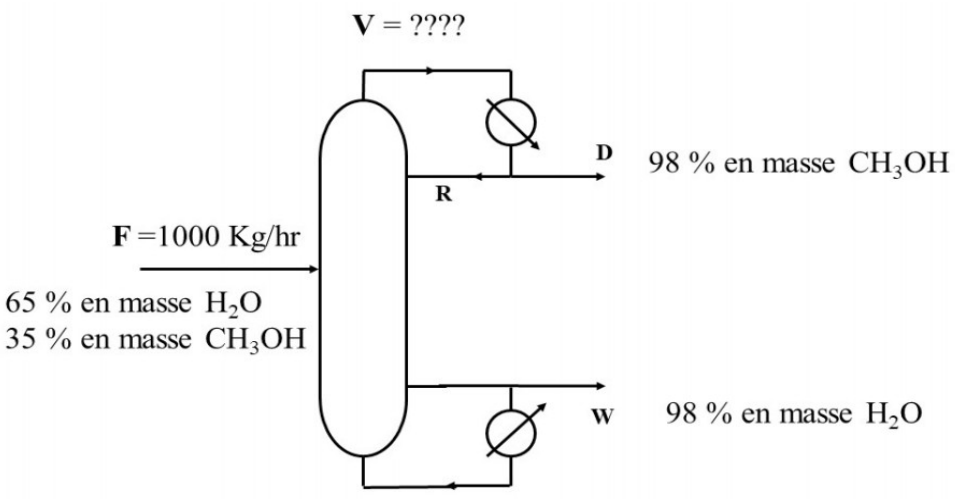
N- Pentane 30%

N- Hexane 20%

Calculate the molar fraction for each constituent of the mixture, as well as the average molar mass of the mixture.

Exercise 3:

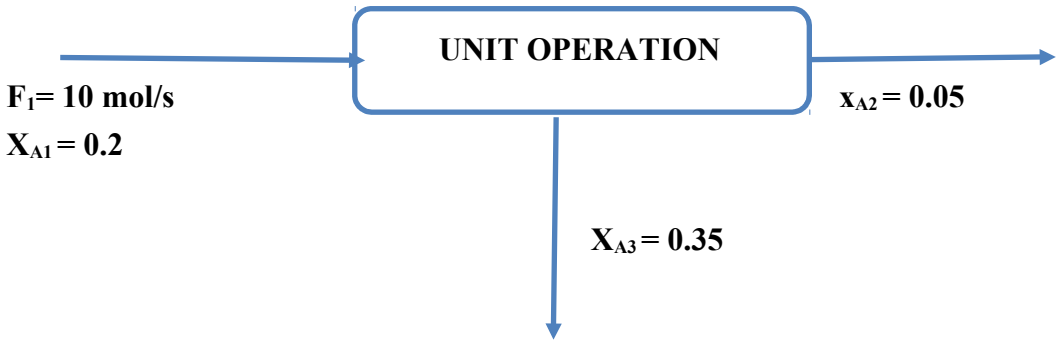
Let be the following distillation column:



- Caclculate D and W

Exercise 4:

A unit operation involving a binary mixture (A,B) and operating in stationary mode and without any chemical reaction such as:



Complete the following table :

1		2		3	
Molar fraction	**Molar flow (mol/s)**	**Molar fraction**	**Molar flow (mol/s)**	**Molar fraction**	**Molar flow (mol/s)**
$X_{A1} = 0.2$	F_{A1}	$X_{A2} = 0.05$	F_{A2}	$X_{A3}= 0.35$	F_{A3}
X_{B1}	F_{B1}	X_{B2}	F_{B2}	X_{B3}	F_{B3}
X_1	$F_1 = 10$	X_2	F_2	X_3	F_3

Exercise 5:

A distillation column is continuously fed with 1200 Kg/h of an ethanol- water mixture at 11% by mass in ethanol. At the outlet of the installation , a flow of water no longer containing ethanol is recovered, and a flow whose mass content in ethanol is 95%

- Make a block diagram indicating the principles notations
- Calculate the mass and molar output flows of the installation

Dr H. Boussafsaf