Badji Mokhtar University Annaba **2024/2025**
Faculty of Science
Department of Material Sciences

Series N°1
Parte 2

Exercise 01:

We have a mixture consisting of 0.150g H_2, 0.700g N_2 and 0.340g NH_3, at a total pressure of 1atm at a temperature of 27°C. Calculate:

1- The mole fraction of each gas.
2- The partial pressure of each gas.
3- The partial molar volume of each gas and the total volume of the mixture.

Exercise 02:

We wish to obtain a warm water bath at a temperature T= 37°C, with a total volume V= 250 liters, by mixing a volume V_1 of hot water at the initial temperature T_{i1}= 70°C and a volume V_2 of cold water at the initial temperature T_{i2}= 15°C.

- Determine V_1 and V_2, assuming negligible thermal leakage during mixing.

Data: Specific heat capacity: $c_e = 4184 J.Kg^{-1}.K^{-1}$.
volumic mass of water:: $\rho = 1000 Kg.m^{-3}$.

Exercise 03:

We want to cool a glass of fruit juice taken at 30°C. The heat capacity of the glass and the juice is 550 $J.K^{-1}$. A certain mass m of ice is introduced at 0°C. We want the final temperature of the mixture to be 10°C. It is assumed that heat is only exchanged between the ice and the glass of fruit juice.

- Calculate the mass of ice required.

Data: Specific heat capacity: $c_e = 4184 J.Kg^{-1}.K^{-1}$.

$L_{f\ ice} = 3.3.10^5 J.Kg$.

Exercise 04:

It takes 36450 calories to transform 50 g of water ice at -20°C into water vapor at 100°C.

Calculate the latent heat (L_v) of vaporization of the water.

Data: $c_{(water\ ice)}$ = 0.50 cal/g.K; Lf = 1440 cal/mol.