

Exercice02.

$$a) u^* = \frac{\sum C_i u_i}{\sum C_i} = \frac{\sum C_i u_i}{C} = \sum \frac{C_i u_i}{C} = \sum x_i u_i = x_a u_a + x_b u_b \Rightarrow u_b = \frac{u^* - x_a u_a}{x_b}$$

$$\text{avec } u_a = (u_a - u^*) + u^* = 3 + 12 = 15 \text{ cm/s} \quad \text{et} \quad x_b = 1 - x_a = 1 - 1/6 = 5/6$$

$$u_b = \frac{12 - 1/6 \times 15}{5/6} = 11,4 \text{ cm/s}$$

$$b) u_b - u^* = 11,4 - 12 = -0,6 \text{ cm/s}$$

$$c) u = \frac{\sum \bar{C}_i u_i}{\sum \bar{C}_i} = \frac{\sum M_i C_i u_i}{\sum M_i C_i} = \frac{\sum M_i x_i C_i u_i}{\sum M_i x_i C} = \frac{\sum M_i x_i u_i}{\sum M_i x_i} = \frac{M_a x_a u_a + M_b x_b u_b}{M_a x_a + M_b x_b}$$

Exercice03.

$$a) M = \sum M_i y_i = 32 \times 0,4 + 44 \times 0,6 = 39,2 \text{ g/mol}$$

$$b) \bullet \bar{C}_A = \frac{m_A}{V} = \frac{M_A N_A}{V} = \frac{M_A y_A N}{V} = \frac{P}{RT} M_A y_A = \frac{1,519 \cdot 10^5}{8,314 \times 294} 32 \times 0,4 = 795 \text{ g/m}^3$$

$$\bullet \bar{C} = \rho = \bar{C}_A + \bar{C}_B = \frac{P}{RT} \sum M_i y_i = \frac{1,519 \cdot 10^5}{8,314 \times 294} (32 \times 0,4 + 44 \times 0,6) = 2436 \text{ g/m}^3$$

$$c) C_B = \frac{N_B}{V} = \frac{y_B N}{V} = \frac{y_B P}{RT} = \frac{0,6 \times 1,519 \cdot 10^5}{8,314 \times 294} = 37,3 \text{ mol/m}^3$$

$$\text{autre méthode } C_B = \frac{\bar{C}_B}{M_B} = \frac{\bar{C} - \bar{C}_A}{M_B} = \frac{2436 - 795}{44} = 37,3 \text{ mol/m}^3$$

$$d) \bullet u_A - u = u_A - \frac{\sum M_i y_i u_i}{\sum M_i y_i} = u_A - \frac{\sum M_i y_i u_i}{M} \\ = 0,8 - \frac{32 \times 0,4 \times 0,8 + 44 \times 0,6 \times (-0,02)}{39,2} = 0,067 \text{ m/s}$$

$$\bullet u_B - u^* = u_B - \sum y_i u_i = (-0,02) - [0,4 \times 0,8 + 0,6 \times (-0,02)] = -0,04 \text{ m/s}$$

$$e) \phi_A^* = C_A u_A = \frac{y_A P}{RT} u_A = \frac{0,4 \times 1,519 \cdot 10^5}{8,314 \times 294} \times 0,8 = 1,988 \text{ mol/m}^2 \text{s}$$

$$f) j_B = \bar{C}_B (u_B - u) = M_B C_B \left(u_B - \frac{\sum M_i y_i u_i}{M} \right) \\ = 44 \times 37,3 \times \left((-0,02) - \frac{32 \times 0,4 \times 0,8 + 44 \times 0,6 \times (-0,02)}{39,2} \right) = -53,5 \text{ g/m}^2 \text{s}$$