

## Exo 1:

Molarity: mol/l

$$C = \frac{n}{V} = \frac{m}{M \cdot V}$$

$$C = \frac{459.54}{159.14 \times 1} = 1 \text{ mol/l}$$

Normality:

$$N = \frac{n'}{V} = \frac{\alpha \cdot n}{V} = 2 \frac{n}{V}$$

$$N = 2 \times C = 2 \text{ N}$$

$$C_m: \frac{\alpha}{V} = \frac{159.54}{1} = 159.54 \text{ g/l}$$

$$\text{Molality: } \frac{m_{\text{solute}}}{m_{\text{solvant (kg)}}$$

$$1.172 \text{ g/cm}^3 = 1.172 \text{ g/ml} \\ = 1.172 \text{ Kg/l}$$

$$m_{\text{solute}} = m_{\text{solvant}} + m_{\text{soluble}}$$

$$m_{\text{solvant}} = 1172 - 159.54 \\ = 1012.64 \text{ g}$$

$$\text{molality: } \frac{1}{1.01264} = 0.988 \text{ mol/kg}$$

Molar fraction:

$$n_1 = \frac{m_1}{M_1}$$

$$m_{H_2O} = \frac{m_{H_2O}}{M_{H_2O}} = \frac{1012.64}{18} = 56.25 \text{ mol}$$

$$n_1 = 56.25 + 1 = 57.25 \text{ mol}$$

$$\alpha = \frac{57.25}{57.25} = 0.017$$

$$C = \frac{N}{2} = \frac{0.03}{2} = 0.015 \text{ mol/l}$$

$$C = \frac{m}{M \cdot V} \Rightarrow m = C \cdot M \cdot V$$

$$m = 0.015 \times 74.08 \times 60 \cdot 10^{-3} \\ = 0.066 \text{ g}$$

## Exo 2:

	C (mol/l)	anion	Cation
CuSO <sub>4</sub>	0.08	0.08	0.08
BaCl <sub>2</sub>	0.12	0.24	0.12
K <sub>2</sub> SO <sub>4</sub>	0.05	0.05	0.1
Na <sub>2</sub> PO <sub>4</sub>	0.24	0.24	0.48
AlCl <sub>3</sub>	0.057	0.17	0.057

## Exo 3:

1) The operation: dissolution

$$2) C_m = \frac{m}{V} = \frac{56 \times 6}{1} = 33.6 \text{ g/l}$$

$$3) M_c = 12 \times 12 + 22(1) = 11.16 \\ = 342 \text{ g/mol}$$

$$C = \frac{n}{V} = \frac{m}{M \cdot V} = \frac{33.6}{342} = 0.098 \text{ mol/l}$$

4) Second operation: dilution

$$5) \frac{3}{4} \times 1 \text{ l} = 0.75 \text{ l} \rightarrow$$

$$1 - 0.75 = 0.25 \text{ l}$$

$$N_1 V_1 = N_2 V_2$$

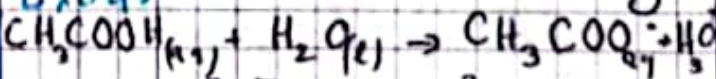
$$C_1 V_1 = C_2 V_2 \Rightarrow C_2 = \frac{C_1 V_1}{V_2}$$

$$C_2 = \frac{0.098 \times 0.25}{1} = 0.0245 \text{ mol/l}$$

$$C_m = C \cdot M$$

$$= 0.0245 \times 342 = 8.379 \text{ g/l}$$

## Exo 4:



$$K_a = \frac{[\text{H}_3\text{O}^+][\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$$

$$[\text{CH}_3\text{COOH}] = \frac{10^{-3}}{1} = 10^{-3} \text{ mol/l}$$

$$K_a = \frac{[\text{H}_3\text{O}^+]^2}{[\text{CH}_3\text{COOH}]} \cdot [\text{H}_3\text{O}^+] = \sqrt{K_a \times [\text{CH}_3\text{COOH}]} \\ = \sqrt{1.8 \times 10^{-5} \times 10^{-3}} \\ = 1.34 \times 10^{-4} \text{ mol/l}$$

$$\alpha_1 = \frac{\alpha}{C} \times 100 = 13.4\%$$