Tutorial 1

Chemistry 3

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 :

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

$N = 2 \times C = 2N$.

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

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

$1.172 \text{ g/cm}^3 = 1,172 \text{ g/ml}$

$= 1,172 \text{ kg/l}$

$m_{solution} = m_{solvant} + m_{soluté}$

$m_{solvant} = 1172 - 159,54$

$= 1012,64 \text{ g}$

molality : $\frac{1}{1,012,64} = 0,988 \text{ mol/kg}$

Molar fraction :

$n_i = \frac{m_i}{m_T}$

$m_{H_2O} = \frac{m_{H_2O}}{M} = \frac{1012,46}{18} = 562 \text{ mol}$

$n_T = 56,22 + 1 = 57,22 \text{ mol}$

$x = 57,22 \frac{1}{57,22} = 0,017$

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

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

$m = 0.015 \times 74.08 \times 60.10^{-3}$

$= 0.066 \text{ g}$

Exo 2:

	C (mol/l)	anion	cation
$CuSO_4$	0.08	0.08	0.08
$BaCl_2$	0,12	0,24	0.12
K_2SO_4	0.05	0.05	0.1
Na_2SO_4	0.24	0.24	0,72
$AlCl_3$	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) $M_{C_{12}H_{22}O_{11}} = 12 \times 12 + 22(1) + 11.16$

$= 342 \text{ g/mol}$

$C = \frac{n}{V} = \frac{m}{M.V} = \frac{33.6}{342.1} = 0.098$

4) second operation : dilution

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

$1 - 0.75 = 0.25 l$

$N_1 V_1 = N_2 V_2$

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

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

$C_m = C.M$

$= 0.0245 \times 342 = 8,379 \text{ g/l}$

Exo 4:

$CH_3COOH_{(aq)} + H_2O_{(l)} \rightarrow CH_3COO^- + H_3O^+$

$K_a = [H_3O^+] \frac{[CH_3COO^-]}{[CH_3COOH]}$

$[CH_3COOH] = \frac{10^{-3}}{1} = 10^{-3} \text{ mol/l}$

$K_a = \frac{[H_3O^+]^2}{[CH_3COOH]} \cdot [H_3O^+] = \sqrt{K_a \times [CH_3COOH]}$

$= \sqrt{1.8 \times 10^{-5} \times 10^{-3}}$

$= 1.34 \times 10^{-4} \text{ mol/l}$

$\alpha_1 = \frac{x}{C} \times 100 = 13,4\%$