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Serie No. 1

Exercice 1

A commercial sulfuric acid solution contains 93% by mass of H_2SO_4, and its density is 1.84 g/mL. Use the molar mass of H_2SO_4 = 98.08g/mol., and calculate the following for this solution :

1. Molar concentration (Molarity)
2. Normality
3. Molality
4. Mole fraction
5. Molar percentage

Exercice 2

A sodium chloride (NaCl) solution has a conductivity of 2.45 $mS \cdot cm^{-1}$ at 25°C.

1. Convert the conductivity **σ**, the conductivity, in $S \cdot m^{-1}$.
2. The ionic conductivities of Na^+ and Cl^- are given as : λ_{Na+} = 5.01 $mS \cdot m^2 \cdot mol^{-1}$,$\lambda_{Cl-}$ = 7.63 $mS \cdot m^2 \cdot mol^{-1}$.
   2.1. Convert these ionic conductivities to $S \cdot m^2 \cdot mol^{-1}$.
   2.2. Calculate the concentration C of the NaCl solution in $mol \cdot L^{-1}$.

Exercice 3

You mix a volume V_1=150 mL of a sodium chloride (Na^++Cl^-) solution with concentration $C_1 = 4.0\times10^{-3}$ mol/L with a volume V_2 = 500 mL of a potassium nitrate (K^++NO_3^-) solution with concentration $C_2 = 3.0\times10^{-3}$ mol/L.

1. What is the conductivity of the resulting solution ?

2. In the mixture, a conductometer cell is placed. The surface area of the electrodes is 1.5 cm^2, and the distance between them is 1.2 cm. What is the value of the conductance ?

Given :

$\lambda_{Na+} = 5.00\times10^{-3}$ $S \cdot m^2/mol$, $\lambda_{Cl-} = 7.00\times10^{-3}$ $S \cdot m^2/mol$, $\lambda_{K+} = 7.50\times10^{-3}$ $S \cdot m^2/mol$,
$\lambda_{NO3-} = 5.80\times10^{-3}$ S·m2/mol.