

Engineering Chemistry (CT010701), CSE, Group II

Assignment -I

Electrochemistry

1. Calculate the EMF of the given cell at 298° K.
 $\text{Ag(s)} \mid \text{AgNO}_3 (0.018 \text{ m}) \parallel \text{AgNO}_3 (1.2 \text{ m}) \mid \text{Ag(s)}$.
2. The molar conductances at infinite dilutions for sodium acetate and hydrogen chloride at 30 °C are 91.0×10^{-4} and $426.16 \times 10^{-4} \text{ Sm}^2\text{mol}^{-1}$, respectively. Also, for H^+ ions in HCl, t_+ is 0.821 and for CH_3COO^- ion in CH_3COONa , t_- is 0.556. Assuming that $t_{\pm} = t_{\pm}^{\circ}$, calculate Λ_m° for CH_3COOH .
3. At 25 °C, the degree of dissociation (α) of pure water is 1.90×10^{-9} . Calculate the molar conductance (Λ_m°) and specific conductance (κ) of water at this temperature. The molar ionic conductance of H^+ and OH^- ions are 349.83×10^{-4} and 198.50×10^{-4} , $\text{Sm}^2\text{mol}^{-1}$, respectively.
4. For the strong electrolytes NaOH, NaCl and BaCl_2 , the molar ionic conductance at infinite dilution are 248.1×10^{-4} , 126.5×10^{-4} , and 280.0×10^{-4} , $\text{Sm}^2\text{mol}^{-1}$, respectively. Calculate Λ_m° for Ba(OH)_2 .
5. The molar ionic conductance at infinite dilutions of lithium halide (LiX) is found to be 89.2×10^{-4} , $\text{Sm}^2\text{mol}^{-1}$. What would be the molar ionic conductance of the halide ion if the molar ionic conductance of Li^+ is 38.70×10^{-4} , $\text{Sm}^2\text{mol}^{-1}$?
6. The specific conductance of 0.01 M solution of acetic acid was found to be 0.0163 Sm^{-1} at 25 °C. Calculate the degree of dissociation of the acid. Molar conductance of acetic acid at infinite dilution is 38.70×10^{-4} , $\text{Sm}^2\text{mol}^{-1}$ at 25 °C.
7. Calculate the transport number of Li^+ and Br^- ions when current flows through an infinitely dilute aqueous solution of LiBr at 25 °C, given the ionic mobility's of Li^+ and Br^- ions at infinite dilution are 4.01×10^{-8} and $8.09 \times 10^{-8} \text{ V}^{-1} \text{ s}^{-1}$, respectively.
8. Molar ionic conductance at infinite dilution of Na^+ and Cl^- ions are 50.11×10^{-4} and $76.34 \times 10^{-4} \text{ S m}^2 \text{ mol}^{-1}$, respectively. Calculate the transport number of Na^+ and Cl^- ions.
9. At 25 °C the specific conductance of carefully distilled water is $58.0 \times 10^{-7} \text{ S m}^{-1}$ and the λ_m° values for H^+ and OH^- ions are 349.8×10^{-4} and $198.5 \times 10^{-4} \text{ S m}^2 \text{ mol}^{-1}$, respectively. Assuming that Λ_m differs very little from Λ_m° , calculate the ionic product of water at 25 °C.