

1. The conductivity of a 0.0312 M solution of acetic acid is 1.53×10^{-4} S/cm. If the limiting ionic conductance (infinite dilution) for CH_3COO^- is $100 \text{ S}\cdot\text{cm}^2/\text{mol}$, and $137 \text{ S}\cdot\text{cm}^2/\text{mol}$ for H^+ ,

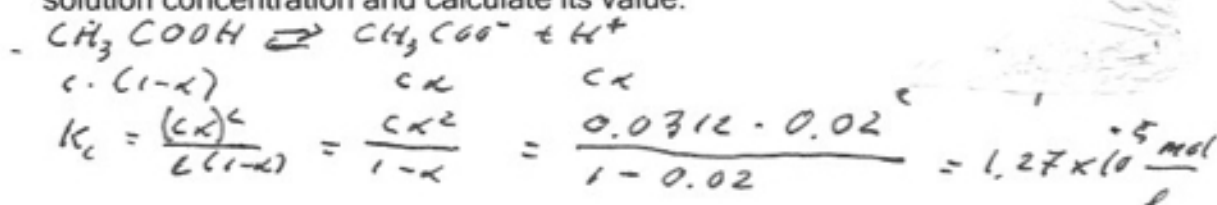
a. What is the degree of dissociation α ?

$$\Lambda_0 = \Lambda_0 [\text{CH}_3\text{COO}^-] + \Lambda_0 [\text{H}^+] = 237 \text{ S}\cdot\text{cm}^2/\text{mol}$$

$$\Lambda = \frac{\kappa}{c} = \frac{1.53 \times 10^{-4} \text{ S/cm}}{0.0312 \times 10^{-3} \text{ mol/cm}^3} = 4.90 \frac{\text{S}\cdot\text{cm}^2}{\text{mol}}$$

$$\alpha = \frac{\Lambda}{\Lambda_0} = \frac{4.90}{237} = 0.02$$

b. Write down the dissociation constant K_c in terms of α and the solution concentration and calculate its value.



2. The ratio l/A of a conductance cell with an electrolytic solution is called the cell constant.

a. Find its value for a conductance cell in which the conductance G of a 0.100 M KCl solution is 0.01178 S at 25°C. The molar conductivity of KCl at this concentration and temperature is $\Lambda = 128.96 \text{ S}\cdot\text{cm}^2/\text{mol}$.

$$\Lambda = \frac{\kappa}{c} \Rightarrow \kappa = \Lambda \cdot c = 128.96 \text{ S}\cdot\text{cm}^2/\text{mol} \cdot 0.1 \times 10^{-3} \text{ mol/cm}^3$$

$$= 1.2896 \times 10^{-2} \text{ S/cm}$$

$$G = \kappa \cdot \frac{l}{A} \Rightarrow \frac{l}{A} = \frac{G}{\kappa} = \frac{0.01178 \text{ S}}{1.2896 \times 10^{-2} \text{ S/cm}} = 0.9147 \frac{\text{l}}{\text{cm}}$$

b. Using the same cell, what is the molar conductivity of an electrolyte if a 0.0500 M solution of this electrolyte has a measure conductivity of 0.00824 S?

$$\Lambda = \frac{\kappa}{c} = \frac{G \cdot \left(\frac{l}{A}\right)}{c} = \frac{0.00824 \text{ S} \cdot 0.9147 \frac{\text{l}}{\text{cm}}}{0.0500 \times 10^{-3} \text{ mol/cm}^3}$$

$$= 180 \frac{\text{S}\cdot\text{cm}^2}{\text{mol}}$$

3. Write down the net-reaction for the electrolysis of $\text{Au}(\text{NO}_3)_3$

