Problems for Practice

3.36. A cell with N/50 KCl solution offered a resistance of 550 ohm at 298 K. The specific conductance of N/50 KCl at 298 K is 0·002768 ohm^{-1} cm^{-1}. When this cell is filled with N/10 $ZnSO_4$ solution, it offered a resistance of 72·18 ohm at 298 K. Find the cell constant and molar conductance of $ZnSO_4$ solution at 298K. [Ans. 1·522 cm^{-1}, 4·22 × 10^2 S cm^2 mol^{-1}]

3.37. The specific conductivity of N/50 KCl solution at 298 K is 2·768 × 10^{-3} mho per cm. The resistance of this solution at 298 K when measured in a particular cell is 250·2 ohm. The resistance of M/100 $CuSO_4$ solution at 298 K measured with the same cell was 8331 ohm. Calculate the molar conductivity of copper sulphate solution. [Ans. 8·31 S cm^2 mol^{-1}]

3.38. Calculate the specific resistance of a 0·02 N solution of an electrolyte having equivalent conductance 103 ohm^{-1} cm^2 (g eq.)$^{-1}$. [Ans. 485·4 ohm cm]

3.39. The resistance of a decinormal solution of an electrolyte in a conductivity cell was found to be 245 Ω. Calculate the equivalent conductance of the solution if the electrodes in the cell were 2 cm part and each has an area of 3·5 sq. cm. [Ans. 23·32 Ω^{-1} cm^2 (g. eq.)$^{-1}$]

3.40. Electrolytic conductivity of 0·20 mol L^{-1} solution of KCl at 298 K is 2·48 × 10^{-2} Ω^{-1} cm^{-1}. Calculate its molar conductivity. [Ans. 124 S cm^2 mol^{-1}]

3.41. Electrolytic conductivity of a solution containing 1 gram of anhydrous $BaCl_2$ in 200 cm^3 has been found to be 0·0058 mho cm^{-1}. What are the molar conductivity and equivalent conductivity of the solution ?

(At. mass of Ba = 137; Cl = 35·5). [Ans. 241·67 S cm^2 mol^{-1} ; 120·83 S cm^2 (g eq.)$^{-1}$]

3.42. Calculate the equivalent conductivity of 1M H_2SO_4 solution, if its conductivity is 26 × 10^{-2} ohm^{-1} cm^{-1}.

(Atomic weight of sulphur is 32). *(A.I.S.B. 1991)* [Ans. 130 ohm^{-1} cm^2 (g eq.)$^{-1}$]

3.43. The resistance of 0·01 N NaCl solution at 25°C is 200 ohms. Cell constant of the conductivity cell is unity. Calculate the equivalent conductance of the solution. *(A.I.S.B. 1992)* [Ans. 500 ohm^{-1} cm^2 (g eq.)$^{-1}$]

3.44. Electrolytic specific conductance of 0·25 mol L^{-1} solution of KCl at 25°C is 2·56 × 10^{-2} ohm^{-1} cm^{-1}. Calculate its molar conductance. *(A.I.S.B. 1992)* [Ans. 102·4 S cm^2 mol^{-1}]

3.45. Which of the following solutions has larger molar conductance ?

(a) 0·08 M solution having conductivity equal to 2·0 × 10^{-2} ohm^{-1} cm^{-1}.

(b) 0·10 M solution having resistivity equal to 58 ohm cm. [Ans. Solution *(a)*]

3.46. The specific conductance of a 0·12 N solution of an electrolyte is 2·4 × 10^{-2} S cm^{-1}. Calculate its equivalent conductance. *(A.I.S.B. 2003)* [Ans. 200 S cm^2 (g eqiv)$^{-1}$]

3.47. When a certain conductance cell was filled with 0·1 mol L^{-1} KCl solution, it had a resistance of 85 ohm at 298 K. When the same cell was filled with an aqueous solution of – 0·052 mol L^{-1} of an electrolyte, the resistance was 96 ohm. Calculate the molar conductance of the electrolyte at this concentration. (Specific conductance of 0·1 mol L^{-1} KCl solution is 1·29 × 10^{-2} ohm^{-1} cm^{-1}). *(A.I.S.B. 2004 Supp)*

[Ans. 220·2 S cm^2 mol^{-1}]