Chemistry | NEET

Class 12 Chemistry - Electrochemistry

NEET track | Short Notes + 5 CBSE-based questions + 5 NEET PYQ-based questions with solutions

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Format: Quick revision + solved practice	Chapter scope: Class 12 Chemistry

1. Quick Short Notes

- A galvanic cell converts chemical energy into electrical energy through a spontaneous redox reaction.
- Anode is the electrode where oxidation occurs; cathode is the electrode where reduction occurs.
- Standard cell potential: Ecell = E(cathode) - E(anode).
- Gibbs energy relation: deltaG = -nFEcell and deltaG0 = -nFE0cell.
- Nernst equation at 298 K: E = E0 - (0.0591/n) log Q.
- Conductance G = 1/R. Conductivity kappa = G x (l/A) = G x cell constant.
- Molar conductivity Lambda_m = kappa x 1000 / C when C is in mol per litre.
- Molar conductivity increases on dilution because ions move more freely and ion-ion interactions reduce.
- Kohlrausch's law: at infinite dilution, limiting molar conductivity is the sum of individual ionic contributions.
- Board tip: in cell notation, anode is written on the left and cathode on the right.

2. CBSE-based Board Practice

Q1. Calculate the standard emf of the cell Zn | Zn2+ || Cu2+ | Cu. Given E0(Cu2+/Cu) = +0.34 V and E0(Zn2+/Zn) = -0.76 V.

Solution: E0cell = E0cathode - E0anode = 0.34 - (-0.76) = 1.10 V.

Q2. Write the Nernst equation for the Zn-Cu cell and calculate cell emf when [Zn2+] = 1 M and [Cu2+] = 0.01 M at 298 K.

Solution: Cell reaction: Zn + Cu2+ -> Zn2+ + Cu, so n = 2 and Q = [Zn2+]/[Cu2+] = 100. E = 1.10 - (0.0591/2)log100 = 1.10 - 0.0591 = 1.0409 V.

Q3. State the relation between standard Gibbs energy change and standard cell emf. Calculate deltaG0 for a 2-electron cell with E0 = 1.10 V.

Solution: deltaG0 = -nFE0. So deltaG0 = -2 x 96500 x 1.10 = -2.123 x 10^5 J mol^-1 approx -212.3 kJ mol^-1.

Q4. Define molar conductivity. Why does it increase on dilution?

Solution: Molar conductivity is the conductivity of the volume of solution containing one mole of electrolyte between electrodes 1 cm apart. It increases on dilution because ions move more independently and total ionic mobility increases.

Q5. How much silver is deposited when 965 C of electricity is passed through AgNO3 solution?

Solution: For Ag+, 96500 C deposits 108 g Ag. Therefore 965 C deposits (108 x 965/96500) = 1.08 g Ag.

3. NEET PYQ-based Practice

Q1. At which electrode does oxidation occur in a galvanic cell?

Solution: Oxidation occurs at the anode.

Q2. State one common unit of conductivity.

Solution: Conductivity is commonly expressed as S m^-1 or S cm^-1 depending on the unit system used.

Q3. What is the standard electrode potential of the standard hydrogen electrode?

Solution: By convention, the standard hydrogen electrode has E0 = 0.00 V.

Q4. For a cell with E0 = 1.5 V and n = 2, calculate deltaG0.

Solution: deltaG0 = -nFE0 = -2 x 96500 x 1.5 = -2.895 x 10^5 J mol^-1 approx -289.5 kJ mol^-1.

Q5. How much silver is deposited when 1930 C of charge is passed through AgNO3 solution?

Solution: Since 96500 C deposits 108 g, 1930 C deposits 108 x 1930 / 96500 = 2.16 g.

Practice tip: First revise the short notes, then attempt CBSE board questions in written format, and finally solve the exam-specific section in timed mode.