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QUESTION BANK CHAPTER – 3 –ELECTROCHEMISTRY

Very short answer type questions – One mark each :

Q1 :   What are the products obtained during electrolysis of copper sulphate using copper electrodes.

Q2 :   State Kohlrausch's law of independent migration of ions.

Q3 :   What is cell constant and what are its units ?

Q4 :   Predict the products of electrolysis of dilute solution of sulphuric acid with inert electrodes.

Q5 :   To deposit one mole of aluminium from an aqueous solution of aluminium sulphate, what is the amount of electricity required?

Q6 :   Write Nernst equation for single electrode potential.

Q7 :   Write the relation between cell potential and equilibrium constant.

Q8 :   Define specific conductance. What are its units?

Q9 : What is the effect of decrease in concentration on the molar conductivity of weak electrolyte?

Q10 : Write down the expression for equivalent conductance of an electrolyte.

Short answer type questions. Two marks each

Q1 : How is molar conductivity related to concentration of an electrolyte?

Q2 : How will you explain a weak and a strong electrolyte based on their conductivity values?

Q3 : What do you understand by standard potential of a half cell? How is the electrode potential of a half cell determined?

Q4 : Iron does not corroded even if the zinc coating is broken in a galavnised iron pipe, but rusting occurs much faster, if the tin coating over iron is broken. Explain.

Q5 : Explain the working of H_2- O_2 fuel cell with the help of a diagram.

Q6 : The measured resistance cell of a conductance cell was 100 ohms. Calculate the specific conductance and the molar conductance of the solution. (cell constant = 1.25 cm^{1-})

Q7 : Define molar conductivity and give its units. The conductivity of0.20M solution of KCl at 298K is 0.0248S cm^{-1}. Calculate its molar conductivity.

Q8 : Write the cell reactions which occur in lead storage battery when battery is in use and when the battery is on recharging.

Q9 : How many coulombs of electric charge must be passed through a solution of silver nitrate to coat a copper sheet of area 100cm^2 on both sides with a .005cm thick layer.(Density of silver is 10.5gm/cm^3, At. Mass of silver is 108u.)

Q10 : Predict the products of electrolysis of aq. Solution of NaCl using inert electrodes.

Short answer type questions. Three marks each

Q1 : How much electricity is required in coulomb for oxidation of
    a) 1 mol of H_2O to O_2
    b) 1 mol of FeO to Fe_2O_3

Q2 : Molar conductivities at infinite dilution for NH_4Cl, NaOH and NaCl solutions at 298K are 129.8, 217.4 and 108.9 Scm^{2}mol^{-1} respectively and the molar conductivity of a 10^{-2}M solution of NH_4OH is 9.33 Scm^{2}mol^{-1}. Calculate degree of dissociation and ionization constant of NH_4OH in this solution

Q3 : The resistance of 0.01M NaCl solution at 25*C is 200 ohm. The cell constant of the conductivity cell used in unity. Calculate the molar conductivity of the solution.

Q4 : The electrical resistance of the column of 0.05M NaOH solution of diameter 1cm and length 50cm is 5.55 x 10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.

Q5 : What do you understand by electrochemical series? How does it help in predicting whether a redox reaction is feasible in a given direction or not? Q6 : (a) Define the term cell potential.
    (b) What is the meant by the statement that "the reduction electrode potential of zinc is -0.76V.

Q7 : (a) Name the depolarizer used in dry cell.
    (b) What is meant by cathodic protection of ion? We can use Al in place of zinc for cathodic protection of rusting. Comment.

Q8 : Predict the products of electrolysis in each of the following :
    (a) An aqueous solution of $AgNO_3$ with silver electrode.
    (b) An aqueous solution of $AgNO_3$ with platinum electrodes.
    (c) A dilute solution of H_2SO_4 with platinum electrodes

Q9 : Calculate the electrode potential of silver electrode dipped in 0.1M solution of $AgNO_3$ at 298K assuming that $AgNO_3$ to be completely dissociated. The standard electrode potential of Ag$^+$/Ag is 0.8V at 298K. At what concentration of silver ions, will this electrode have a potential of 8V?

Q10 : How can the electrode potential of an electrode be increased? How much electricity in terms of Faraday is required to produce 20gm of Ca from molten $CaCl_2$ and 40gm of Al from molten Al_2O_3 ?

Long answer type questions. Five marks each

Q1 : (a) Conductivity of 0.00241M Acetic acid solution is 7.896×10^{-5} Scm^{-1}. Calculate its molar conductivity in the solution. If limiting molar conductivity for acetic acid is 390.5 Scm^2mol^{-1}, what would be its dissociation constant?

(b) The resistance of a conductivity cell containing 0.001 molar KCl solution 298K is 1500 ohm. What is its cell constant, if the conductivity of 0.001 molar KCl solution at 298K is 0.146×10^{-3} Scm^{-1}.

Q2 : (a) State Faradays first law of electrolysis. How much charge in temrs of Faraday is required for the reduction of one mole of Cu^{2+} to Cu?

(b) Define limiting molar conductivity. Resistance of a conductivity cell filled with 0.1M per litre KCl solution is 100 ohm. If the resistance of the same cell when filled with 0.02 moles per litre KCl solution is 520 ohm, calculate the conductivity and molar conductivity of 0.02 moles per litre KCl solution. The conductivity of 0.01 moles per litre KCl solution is 1.29×10^{-2} $ohm-cm^{-1}$.

Q3 : (a) The standard electrode potential for Daniel cell is 1.1V. Calculate the standard Gibbs energy for the cell reaction.

(b) A voltaic cell is set up at 25*C with the half cells

Ag^+ (0.001M) /Ag and Cu^{2+} (0.1M)/Cu

What should be its cell potential? ($E^0 = 0.46V$)

(c) Define the terms conductivity and molar conductivity for the solution of an electrolyte. Comment on their variation with temperature.