OBJECTIVE QUESTIONS
ELECTROCHEMISTRY

1. For the cell reation : $2Fe^{3+}_{(aq)} + 2I^{-}_{(aq)} \rightarrow 2Fe^{2+}_{(aq)} + I_{2(aq)}$

E^{0}_{cell} = 0.24 V at 298 K. The standard Gibbs energy for the cell reaction is:

(i)23.16 kJ/mol (i) -46.32 kJ/mol (i) -23.16 kJ/mol (i)46.32 kJ/mol

2. For a cell involving one electron, E^{0}_{cell} = 0.59 V at 298 K, the equilibrium constant for the cell reaction is[given that 2.303RT/F = 0.059Vat T =298 K]

(i) 1.0×10^{30} (ii) 1.0×10^{2} (iii) 1.0×10^{5} (iv) 1.0×10^{10}

3. During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 amperes is

(i) 55 minutes (ii) 110 minutes (iii) 220 minutes

(iv) 330 minutes

4. Zinc can be coated on iron to produce galvanized iron but the reverse is not possible . It is because

(i) Zinc is lighter than iron. (ii) zinc has lower melting point than iron

(iii) zinc has a lower negative electrode potential than iron.

(iv) zinc has a higher negative electrode potential than iron.

5. A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as

(i) dynamo (ii) Ni – Cd cell (iii) fuel cell (iv) electrolytic cell

SOLUTION

1. Why is increase in temperature observed on mixing chloroform with acetone ?
2. Sugar is covalent compound but it is soluble in benzene. Explain.
3. What are antifreeze solution? Which substance is generally used in it?
4. The intermolecular forces between solute and solvent particles becomes less than solute-solute or solvent-solvent particles. This solution form which type of azeotropic solution ? Give one example.
5. Why solubility of solid and liquids not affected by pressure but solubility of gas affected. Explain.
6. A sea water fish cannot survive in fresh water . Give reason.
7. Heptane and octane form ideal solution but nitric acid and water not form ideal solution explain.
8. Write the physical states of solute and solvent in the following solutions:

(i) coloured gems (ii) Hydrated salts.

9. Give reason for the following

When mercuric iodide is added to an aqueous solution of KI, the freezing point is raised.

10. Define the following terms: (i)Solubility (i). lowering in vapour pressure

SOLUTION

Given below are two statements labelled as Assertion (A) and Reason (R)Select the most appropriate answer from the options given below:(i). Both A and R are true and R is the correct explanation of A

(ii). Both A and R are true but R is not the correct explanation of A. (iii). A is true but R is false.

(iv). A is false but R is true. (v). Both A and R are false.

1. Assertion: Molarity of a solution in liquid state changes with temperature.
Reason: The volume of a solution changes with change in temperature.

2. Assertion: The solubility of a gas in a liquid increases with increase of pressure.
Reason: The solubility of a gas in a liquid is directly proportional to the pressure of the gas.

3. A solution of amalgam of mercury with sodium contains
(i)Solid solute and solid solvent (ii) Solid solute and liquid solvent
(iii) liquid solute and solid solvent (iv) Solid liquid and liquid solvent

4. One kilogram of sea water sample contains 6 mg of dissolved O_2. The concentration of O_2 in ppm is:
(i)0.06 (ii) 60 (iii) 6 (iv) 0.6

5. 50 mL of anaqueous solution of glucose contains 6.02 X 10^{22} molecules. The concentration of the
solution will be:
(i) 0.1 M (ii)0.2 M (iii) 1 M (iv) 2 M

6. On dissolving sugar in water at room temperature solution feels cool to touch. Under which of the
following case dissolution of sugar will be most rapid?
(i) sugar crystals in cold water (ii) sugar crystals in hot water
(iii) powdered sugar in cold water (iv) powdered sugar in hot water.

7. at equilibrium the rate of dissolution of a solid solute in a volatile liquid solvent is :
(i) less than the rate of crystallization (ii) greater than the rate of crystallization
(iii) equal to the rate of crystallization (iv) zero

8. calculate (i) molality (ii) molarity (iii)mole fraction of 30% (m/m) solution of KNO_3 which has density 1.025 g/ml.

9. Write the name of solute and solvent in the following solutions(i) alloy (ii) milk (iii)fog

10. A solution is obtained by mixing 300 g of 25% solution and 400 g of 40% solution by mass. Calculate the
mass percentage of the resulting solution.

Electrochemistry h

1.Why does the conductivity of a solution decreases with dilution?

2.The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 Scm^{-1}. Calculate its molar conductivity.

3.The resistance of a conductivity cell containing 0.001 M KCl solution at 298 K is 1500 ohm . What is the cell constant if conductivity of 0.001 M KCl at 298 K is 0.146 x 10^{-3} S cm^{-1} ?

4.Conductivity of 0.00241 M acetic acid is 7.896 Scm^{-1}. Calculate its molar conductivity . If Λ^0_m for acetic acid is 390.5 $Scm^{-2}mol^{-1}$, what its dissociation constant?

5.How much charge is required for the following reduction:

(i) 1 mol of Al^{3+} to Al. (ii) 1 mol of Cu^{2+} to Cu (iii) 1 mol of MnO_4^{-1} to Mn^{2+} ?

6.Three electrolytic cells A, B and C containing solutions $ZnSO_4$, $AgNO_3$ and $CuSO_4$ respectively were connected in series . A study current of 1.5 amperes was passed through them until 1.45 g og silver deposited at the cathode of cell B . How long did the current flow? What mass of copper and zinc were deposited?

7. Predict the products of electrolysis in each of the following:

(i) an aqueous solution of $AgNO_3$ with silver electrodes.

(ii) A dilute solution of H_2SO_4 with platinum electrodes.

8.In a lead storage battery :

(i) PbO_2 is reduced to $PbSO_4$ at cathode. (ii) Pb is oxidized to $PbSO_4$ at the anode

(iii) both electrodes are immersed in the same aqueous solution of H_2SO_4 . (iv) all the above are true.