

2023

Time : 3 hours

Full Marks : 60

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer any five questions in which Q. No. 1 is compulsory.

1. Select the correct answer of the following :

1×12 = 12

(a) The potential of an electrode changes with change in :

- (i) Concentration of ion in solution
- (ii) Position of electrode
- (iii) Voltage of cell
- (iv) All of these

(b) Molar conductivity of the ionic solution depends on :

- (i) Pressure
- (ii) Distance between electrode
- (iii) Concentration of electrolytes in solution
- (iv) Surface area of electrodes

(c) The cell constant of conductivity cell :

- (i) Changes with change of electrolyte
- (ii) Changes with change of concentration of electrolyte
- (iii) Changes with temperature of electrolyte
- (iv) Remains constant for a cell

(d) The internationally recommended unit for conductance is :

- (i) Poise
- (ii) Dyne
- (iii) Ohm
- (iv) Siemens

(e) On dilution the specific conductance of the electrolyte :

- (i) Increase
- (ii) Remain same
- (iii) Decrease
- (iv) None of these

(f) Dilution means an increase in the amount of :

- (i) Salute
- (ii) Solvent
- (iii) Electrolyte
- (iv) None of these

(g) The half cell reaction is the one that :

- (i) Takes place at one electrode
- (ii) Consumes half a unit of electricity
- (iii) Involves half a mole of electrolyte
- (iv) Goes half way to completion

(h) The salt bridge in electrochemical cell serves to :

- (i) Increase the rate at which equilibrium is attained

(ii) Increase the voltage of the cell

(iii) Maintain electrical neutrality

(iv) Increase the oxidation / reduction rate

(i) What statement is true for an electrochemical cell ?

(i) Oxidation occurs at the anode only

(ii) Reduction occurs at the anode only

(iii) Oxidation occurs at both the anode and cathode

(iv) Reduction occurs at both the anode and cathode

(j) The strong electrolyte is :

(i) HCl

(ii) Acetic acid

(iii) Propionic acid

(iv) None of these

(k) As temperature increases electrolytic conduction :

(i) Increases

(ii) Decreases

(iii) Remains unaffected

(iv) None of these

1. An electrolyte is a substance which :

✓(i) Conducts electricity

(ii) Decomposes on heating

(iii) Is acidic in nature

(iv) When desolved in water, dissociate in to ions <https://www.jharkhandstudy.com>

2. ✓(a) State and explain the Arrhenius theory of electrolysis.

(b) What is Specific conductance ? How does specific conductance vary with dilution of electrolyte. $6+6 = 12$

3. (a) Define ionic mobility. Explain the factors affecting ionic mobility. How is it related to transport number ?

(b) Mention two applications of EMF measurement. $6+6 = 12$

4. (a) What is single electrode ? Classify the single electrode with suitable example.

(b) Define and explain the standard electrode potential. $6+6 = 12$

5. (a) What do you mean by transport number ?

(b) Describe the determination of transport number by Hittorf's method. $4+8 = 12$

6. (a) Discuss the determination of solubility product and hydrolysis constant of salts by conductance measurement.

(b) At 25°C the equivalent conductance of 0.1N CH_3COOH is $5.20\text{ ohm}^{-1}\text{ cm}^2\text{ equiv}^{-1}$ and λ° is $3\text{gl ohm}^{-1}\text{ cm}^2\text{ equiv}^{-1}$. Find out the degree of ionisation and dissociation constant of CH_3COOH . $8+4 = 12$

7. (a) Explain the term Liquid junction potential.

(b) Discuss the effect of concentration and temperature on transport number. $6+6 = 12$

✓ Write short notes on any two of the following :

$6 \times 2 = 12$

✓(a) Faraday's Law

(b) Moving boundary method

(c) Concentration cell without transference

(d) Electromotive force

9. Derive Nernst equation for measuring EMF of a cell. 12

10. Write short notes on any **two** of the following :
6×2 = 12

(a) Kohlrausch's Law

(b) Reversible and irreversible cell

(c) Conductometric titration of weak acid and strong base

(d) Equivalent conductance and molar conductance

