B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

Periodic Test-1 Chemistry (043)

SET-1 Answer Key

Class : XII | Duration: 1 Hr
Date : 12/06/2026 | Max. Marks: 25
Admission No.: | Roll No.:

SECTION-A

1. (d) 63.5 gram

2. (d) Leclanche cell

3. (b) The overall rate (rate-determining step)

4. (a) sec^{-1}

5. (c) 2

SECTION - B

6. (i) 4 times (ii) ¼ times 2

7 2

(i) It is the sum of powers of molar concentrations of reacting species in the rate equation of the reaction. 2

(ii) the number of particles participated in a chemical reaction is known is molecularity.

$$\text{Conductivity } (K) = \frac{1}{\text{Resistance } (R)} \times \text{Cell constant}$$

$$\text{Molar Conductivity } (\Lambda_m) = \frac{\text{Conductivity } (\kappa) \times 1000}{\text{Molarity } (M)}$$

OR

$$\Lambda_m = \frac{K \times 1000}{M} = \frac{\Lambda_m \times M}{1000}$$

8. $$K = \frac{138.95\ \text{cm}^2\ \text{mol}^{-1} \times 1.5\ \text{mol L}^{-1}}{1000\ \text{cm}^3\ \text{L}^{-1}} = 0.208355\ \text{cm}^{-1}$$

2

9.

6. K^+/K = -2.93 V, 1. Ag^+/Ag = 0.80 V, 2. Cu^{2+}/Cu = 0.34 V, 5.Mg^{2+}/Mg = -2.37 V, 4. Cr^{3+}/Cr = -0.74 V, 3. Fe^{2+}/Fe = -0.44 V. 2

SECTION C

10

$$\log \frac{k_2}{k_1} = \frac{E_a}{2.303\,R}\left[\frac{T_2 - T_1}{T_1 \times T_2}\right]$$

$$\Rightarrow \log \frac{4R}{R} = \frac{E_a}{2.303 \times 8.314}\left[\frac{313 - 293}{293 \times 313}\right]$$

$$\Rightarrow \log 4 = \frac{E_a}{19.1471}\left[\frac{20}{91709}\right]$$

$$\Rightarrow 0.6021 = \frac{E_a}{19.1471}\left[\frac{20}{91709}\right]$$

$$\Rightarrow \frac{0.6021 \times 19.1471 \times 91709}{20} = E_a$$

$$\Rightarrow E_a = 52863.2177 \text{ J mol}^{-1}$$
$$= 52.863 \text{ kJ mol}^{-1}$$

3

11. (a) (i) 4 times

(b) $t_{\frac{1}{2}} = \frac{0.693}{k}$ $t_{\frac{1}{2}} = 30$ minutes $k = \frac{0.693}{30}$ min^{-1}

$k = 0.0231 \text{ min}^{-1}$

$k = \frac{2.303}{t}\log\frac{[A_0]}{[A]}$

$t = \frac{2.303}{0.0231}\log\frac{100}{10}$ $t = \frac{2.303}{0.0231}$ min

$\therefore$ $t = \mathbf{99.7\ min}$

12.

Mechanism of Rusting of Iron Electrochemical Theory of Rusting

The overall rusting involves the following steps,

(i) Oxidation occurs at the anodes of each electrochemical cell. Therefore, at each anode neutral iron atoms are oxidised to ferrous ions.

At anode : $Fe(s) \longrightarrow Fe^{2+}(aq) + 2e^-$.

Thus, the metal atoms in the lattice pass into the solution as ions, leaving electrons on the metal itself. These electrons move towards the cathode region through the metal.

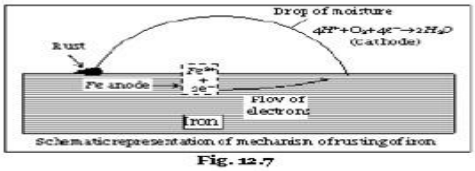

Fig. 12.7

(ii) At the cathodes of each cell, the electrons are taken up by hydrogen ions (reduction takes place). The H^+ ions are obtained either from water or from acidic substances (e.g. CO_2) in water

$H_2O \longrightarrow H^+ + OH^-$ or $CO_2 + H_2O \longrightarrow H^+ + HCO_3^-$

At cathode : $H^+ + e^- \longrightarrow H$

The hydrogen atoms on the iron surface reduce dissolved oxygen. $4H + O_2 \longrightarrow 2H_2O$

Therefore, the overall reaction at cathode of different electrochemical cells may be written as,

$4H^+ + O_2 + 4e^- \longrightarrow 2H_2O$

(iii) The overall redox reaction may be written by multiplying reaction at anode by 2 and adding reaction at cathode to equalise number of electrons lost and gained i.e.

Oxi. half reaction : $Fe(s) \rightarrow Fe^{2+}(aq) + 2e^-]\times 2$ $(E = -0.44\,V)$

Red. half reaction : $4H^+ + O_2 + 4e^- \rightarrow 2H_2O$ $(E = 1.23\,V)$

3

13.

$$= \frac{\text{[illegible]}}{0.05 \text{ mol L}^{-1}} = 229.6 \text{ S cm}^2 \text{ mol}^{-1}$$

Q. 8. From the following molar conductivities at infinite dilution, calculate Λ°_m for NH_4OH.

Λ°_m for $Ba(OH)_2 = 457.6\ \Omega^{-1}\ cm^2\ mol^{-1}$

Λ°_m for $BaCl_2 = 240.6\ \Omega^{-1}\ cm^2\ mol^{-1}$

Λ°_m for $NH_4Cl = 129.8\ \Omega^{-1}\ cm^2\ mol^{-1}$

Ans.

$$\Lambda^\circ_{m(NH_4OH)} = \lambda^\circ_{NH_4^+} + \lambda^\circ_{OH^-}$$

$$= (\lambda^\circ_{NH_4^+} + \lambda^\circ_{Cl^-}) + \frac{1}{2}(\lambda^\circ_{Ba^{2+}} + 2\lambda^\circ_{OH^-}) - \frac{1}{2}(\lambda^\circ_{Ba^{2+}} + 2\lambda^\circ_{Cl^-})$$

$$= \Lambda^\circ_{m(NH_4Cl)} + \frac{1}{2}[\Lambda^\circ_{m(Ba(OH)_2)}] - \frac{1}{2}[\Lambda^\circ_{m(BaCl_2)}]$$

$$= 129.8 + \frac{1}{2} \times 457.6 - \frac{1}{2} \times 240.6$$

$$= \mathbf{238.3\ ohm^{-1} cm^2 mol^{-1}}$$

----------ALL THE BEST----------