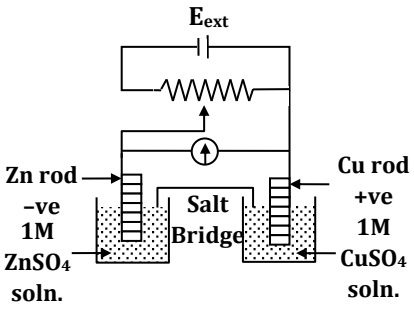
Nishant Jindal

1. **[Jee Main, 2020]**



$E^{\circ}_{Cu^{2+}|Cu} = +0.34V$

$E^{\circ}_{Zn^{2+}|Zn} = -0.76V$

Identify the incorrect statement from the options below for the above cell :

(1) If E_{ext} > 1.1 V, e^- flows from Cu to Zn

(2) If E_{ext} > 1.1 V, Zn dissolves at Zn electrode and Cu deposits at Cu electrode

(3) If E_{ext} < 1.1 V, Zn dissolves at anode and Cu deposits at cathode

(4) If E_{ext} = 1.1 V, no flow of e^- or current occurs

2. Calculate the standard cell potential (in V) of the cell in which following reaction takes place :

$Fe^{2+}(aq) + Ag^{+}(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$

Given that **[Jee Main, April 2019]**

$E^{\circ}_{Ag^{+}/Ag} = x\ V$

$E^{\circ}_{Fe^{2+}/Fe} = y\ V$

$E^{\circ}_{Fe^{3+}/Fe} = z\ V$

(1) x – z (2) x + 2y – 3z

(3) x – y (4) x + y – z

3. Consider the following reduction processes : [Electrochemistry]

$Zn^{2+} + 2e^- \rightarrow Zn(s)$; $E^{\circ} = -0.76$ V

$Ca^{2+} + 2e^- \rightarrow Ca(s)$; $E^{\circ} = -2.87$ V

$Mg^{2+} + 2e^- \rightarrow Mg(s)$; $E^{\circ} = -2.36$ V

$Ni^{2+} + 2e^- \rightarrow Ni(s)$; $E^{\circ} = -0.25$ V

The reducing power of the metals increases in the order : **[Jee Main, Jan 2019]**

(1) Ca < Mg < Zn < Ni (2) Zn < Mg < Ni < Ca

(3) Ni < Zn < Mg < Ca (4) Ca < Zn < Mg < Ni

4. The standard electrode potential E^{Θ} and its temperature coefficient $\left(\frac{dE^{\Theta}}{dT}\right)$ for a cell are 2V and -5×10^{-4} VK^{-1} at 300 K respectively. The cell reaction is $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$

The standard reaction enthalpy $\left(\Delta_r H^{\Theta}\right)$ at 300 K in kJ mol^{-1} is,

[Use R = 8 JK^{-1} mol^{-1} and F = 96,000 C mol^{-1}] [Electrochemistry]

(1) 192.0 (2) –384.0 (3) 206.4 (4) –412.8

[Jee Main, Jan 2019]

5. Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R

Assertion (A): Permanganate titrations are not performed in presence of hydrochloric acid.

Reason (R): Chlorine is formed as a consequence of oxidation of hydrochloric acid.

In the light of the above statements, choose the correct answer from the options given below

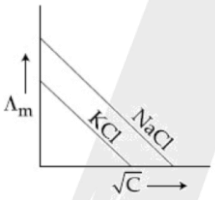
(1) Both A and R are true and R is the correct explanation of A **[JEE Main, July 2022]**

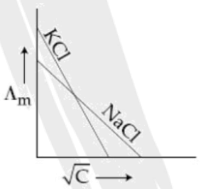
(2) Both A and Rare true but R is NOT the correct explanation of A

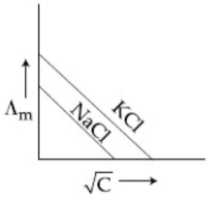
(3) A is true but R is false

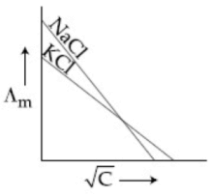
(4) A is false but R is true

6. Which one of the following graphs between molar conductivity (Λ_m) versus $\sqrt{C}$ is correct ?

(1) 

(2) 

(3) 

(4) 

[Jee Main, April 2019]

7. For the disproportionation reaction $2Cu^{+}(aq) \rightarrow Cu(s) + Cu^{2+}(aq)$ at 298 K,

In K (where k is the equilibrium constant) is _____ $\times 10^{-1}$.

Given : $(E^{0}_{Cu^{2+}/Cu^{+}} = 0.16V \; E^{0}_{Cu^{+}/Cu} = 0.52V \; \frac{RT}{F} = 0.025)$ **[Jee Main, 2020]**

Nishant Jindal

8. The magnitude of the change in oxidising power of the MnO_4^- / Mn^{2+} couple is x × 10^{-4} V, if the H^+ concentration is decreased from 1 M to 10^{-4} M at 25°C. (Assume concentration of MnO_4^- and Mn^{2+} to be same on change in H^+ concentration). The value of x is _____. (Rounded off to the nearest integer)

$\left[\text{Given}: \frac{2.303}{F} = 0.059\right]$ **[JEE Main, Feb 2021]**

9. For an electrochemical cell

$Sn(s)|Sn^{2+}(aq, 1M)||Pb^{2+}(aq, 1M)|Pb(s)$

the ratio $\frac{[Sn^{2+}]}{[Pb^{2+}]}$ when this cell attains equilibrium is _____.

$\left(\text{Given}: E^0_{Sn^{2+}|Sn} = -0.14V, E^0_{Pb^{2+}|Pb} = -0.13V, \frac{2.303RT}{F} = 0.06\right)$ **[Jee Main, 2020]**

10. The cell potential for the given cell at 298 K

$Pt \mid H_2(g,1\ bar) \mid H^+(aq) \mid\mid Cu^{2+}(aq) \mid Cu(s)$

is 0.31V. The pH of the acidic solution is found to be 3, whereas the concentration of Cu^{2+} is 10^{-x} M. The value of x is ____.

(Given: $E^{\Theta}_{Cu^{2+}/Cu} = 0.34\,V$ and $\frac{2.303RT}{F} = 0.06V$) **[JEE Main, June 2022]**

11. The amount of change in F (Faraday) required to obtain one mole of iron from Fe_3O_4 is_____(Nearest Integer) **[JEE Main, July 2022]**

12. A KCl solution of conductivity 0.14 S m^{-1} shows a resistance of 4.19 Ω in a conductivity cell. If the same cell is filled with an HCl solution, the resistance drops to 1.03 Ω. The conductivity of the HCl solution is ____× 10^{-2} S m^{-1}. (Round off to the Nearest Integer) **[JEE Main, March 2021]**

13. The solubility product of a sparingly soluble salt A_2X_3 is 1.1 × 10^{-23}. If specific conductance of the solution is 3 × 10^{-5} S m^{-1}, the limiting molar conductivity of the solution is x × 10^{-3} S m^2 mol^{-1}. The value of x is _____. **[JEE Main, June 2022]**

Nishant Jindal

ANSWERS KEY

1.	(2)	**2.**	(2)	**3.**	(3)	**4.**	(4)	**5.**	(1)	**6.**	(3)
7.	(144.00)			**8.**	(3776)	**9.**	(2.13 to 2.16)			**10.**	(7)
11.	(3)	**12.**	(57)	**13.**	(3)						