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JEE Mains 2020 Jan Chapter wise Question Bank

Electrochemistry

Q1

$E^{o}_{Cu^{2+}/Cu} = 0.34V$

$E^{o}_{Cu^{+}/Cu} = 0.522V$

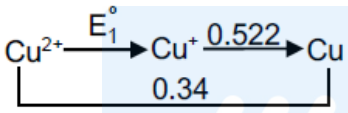
$E^{o}_{Cu^{2+}/Cu^{+}} = ?$

(1) 0.158V (2) –0.158 V (3) 0.182 V (4) –0.182 V

7th Jan Morning

Sol

(1)



$2 \times 0.34 = E_1^{\circ} + 1 \times 0.522$

$E_1^{\circ} = 0.68 - 0.522$

$E_1^{\circ} = 0.158$

Q2

Which of the following is incorrect?

निम्न में से कौनसा विकल्प गलत है ?

(1) $\Lambda_m^{\circ}NaCl - \Lambda_m^{\circ}NaBr = \Lambda_m^{\circ}KCl - \Lambda_m^{\circ}KBr$

(2) $\Lambda_m^{\circ}H_2O = \Lambda_m^{\circ}HCl + \Lambda_m^{\circ}NaOH - \Lambda_m^{\circ}NaCl$

(3) $\Lambda_m^{\circ}NaI - \Lambda_m^{\circ}NaBr = \Lambda_m^{\circ}NaBr - \Lambda_m^{\circ}KBr$

(4) $\Lambda_m^{\circ}NaCl - \Lambda_m^{\circ}KCl = \Lambda_m^{\circ}NaBr - \Lambda_m^{\circ}KBr$

7th Jan Evening

Sol

(3)

Theory based.

Q3

Given : $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$ $E^o = -1.23$ V

Calculate electrode potential at pH = 5.

8th Jan Morning

Sol

–00.93

$E = -1.23 - \frac{0.0591}{4} \log [H^+]^4$

$= -1.23 + 0.0591 \times pH = -1.23 + 0.0591 \times 5$

$= -1.23 + 0.2955 = -0.9345\ V = -0.93\ V$

Q4

Given : $E^0_{Sn^{2+}/Sn} = -0.14\ V$; $E^0_{Pb^{2+}/Pb} = -0.13\ V$

Determine $\frac{[Sn^{2+}]}{[Pb^{2+}]}$ at equilibrium

For cell reaction $Sn \mid Sn^{2+} \parallel Pb^{2+} \mid Pb$

take $\frac{2.303\ RT}{F} = 0.06\ V$

8th Jan Evening

Sol

02.15

At Equilibrium state. $E_{cell} = 0$; $E^o_{cell} = 0.01\ V$

साम्य अवस्था पर $E_{सेल} = 0$; $E^o_{सेल} = 0.01\ V$

$Sn + Pb^{2+} \longrightarrow Sn^{2+} + Pb$

$0 = 0.01 - \frac{0.06}{2} \log \left\{\frac{[Sn^{2+}]}{[Pb^{2+}]}\right\}$

$0.01 = \frac{0.06}{2} \log \left\{\frac{[Sn^{2+}]}{[Pb^{2+}]}\right\}$

$\frac{1}{3} = \log \left\{\frac{[Sn^{2+}]}{[Pb^{2+}]}\right\} \Rightarrow \frac{[Sb^{2+}]}{[Pb^{2+}]} = 10^{1/3} = 2.1544$

Q5

Amongst the following which has minimum conductivity.

(1) Distilled water (2) Sea water

(3) Saline water used for intra venous injection (4) Well-water

9th Jan Evening

Sol

(1)

Theory based.

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