Parishram (2025)

Physical Chemsitry

Electrochemistry

DPP: 4

Q1 The measured voltage for the reaction with the indicated concentration is $1.50\ \mathrm{V}$.
Calculate E°.
$\mathrm{Cr(s)} + 3\mathrm{Ag}^{+}(\mathrm{aq}, 0.10\ \mathrm{M}) \rightarrow 3\mathrm{Ag(s)} + \mathrm{Cr}^{3+}(\mathrm{aq}, 0.30\ \mathrm{M})$
(A) 1.35 (B) 1.40
(C) 1.65 (D) 1.55

Q2 Consider the following four electrodes:
P = $\mathrm{Cu}^{2+}\ (0.0001\ \mathrm{M})\ /\ \mathrm{Cu}\ (\mathrm{s})$
Q = $\mathrm{Cu}^{2+}\ (0.1\ \mathrm{M})\ /\ \mathrm{Cu}\ (\mathrm{s})$
R = $\mathrm{Cu}^{2+}\ (0.01\ \mathrm{M})\ /\ \mathrm{Cu}\ (\mathrm{s})$
S = $\mathrm{Cu}^{2+}\ (0.001\ \mathrm{M})\ /\ \mathrm{Cu}\ (\mathrm{s})$
If the standard electrode potential of $\mathrm{Cu}^{2+}/\mathrm{Cu}$ is + $0.34\ \mathrm{V}$, the reduction potentials (in volts) of the above electrodes follow the order:
(A) P > S > R > Q
(B) P > S > R > Q
(C) $\mathrm{S} > \mathrm{R} > \mathrm{Q} > \mathrm{P}$
(D) $\mathrm{Q} > \mathrm{R} > \mathrm{S} > \mathrm{P}$

Q3 The value of equilibrium constant for feasible cell reaction is
(A) < 1 (B) Zero
(C) $= 1$ (D) > 1

Q4 The equilibrium constant of the following redox reaction at $298\ \mathrm{K}$ is 1×10^{8}

$$2\mathrm{Fe}^{3+}\ (\mathrm{aq.}) + 2\mathrm{I}^{-}(\mathrm{aq.}) \rightleftharpoons 2\mathrm{Fe}^{2+}\ (\mathrm{aq.}) + \mathrm{I}_2\ (\mathrm{s})$$

If the standard reduction potential of iodine becoming iodide is $+0.54\ \mathrm{V}$. What is the standard reduction potential of $\mathrm{Fe}^{3+}/\mathrm{Fe}^{2+}$?
(A) $+1.006\ \mathrm{V}$
(B) $-1.006\ \mathrm{V}$
(C) $+0.77\ \mathrm{V}$
(D) $-0.77\ \mathrm{V}$

Q5 The EMF of the cell: $\mathrm{Zn} \mid \mathrm{Zn}^{2+}(0.01\mathrm{M}) \| \mathrm{Fe}^{2+}(0.001\mathrm{M}) \mid \mathrm{Fe}$ at $298\ \mathrm{K}$ is $0.2905\ \mathrm{V}$, then the value of equilibrium constant for the cell reaction is
(A) $e^{\frac{0.32}{0.0295}}$
(B) $10^{\frac{0.32}{0.0295}}$
(C) $10^{\frac{0.26}{0.0295}}$
(D) $10^{\frac{0.32}{0.0591}}$

Q6 For the cell reaction: $4\mathrm{Br}^{-} + \mathrm{O}_2 + 4\mathrm{H}^{+} \rightleftharpoons 2\mathrm{Br}_2 + 2\mathrm{H}_2\mathrm{O}$; $\mathrm{E}^{\circ} = 0.18\ \mathrm{V}$. The value of $(\log \mathrm{K_C})$ at $298\ \mathrm{K}$ is $[2.303\ \mathrm{RT/F} = 0.06]$
(A) 12 (B) 6
(C) 18 (D) 3

Answer Key

Q1	(D)	Q4	(C)
Q2	(D)	Q5	(B)
Q3	(D)	Q6	(A)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Video Solution:

Q2 Video Solution:

Q3 Video Solution:

Q4 Video Solution:

Q5 Video Solution:

Q6 Video Solution: