Resonance®
Educating for better tomorrow

TARGET : NEET (UG) 2024

Course : SARANSH (Youtube Live CRASH COURSE)

I-CHEMISTRY

DPP

DAILY PRACTICE PROBLEMS

DPP NO. 2

Physical Chemistry : ELECTROCHEMISTRY

DPP No. : 2

1. For the cell reaction :

$2Fe^{3+}(aq) + 2I^{-}(aq) \longrightarrow 2Fe^{2+}(aq) + I_2(aq)$

E^{Θ}_{cell} = 0.24 V at 298 K. The rstandard Gibbs energy ($\Delta_r G^{\Theta}$) of the cell reaction is :

[Given that Faraday constant F = 96400 C mol^{-1}]

(1) 23.16 kJ mol^{-1} (2) –46.32 kJ mol^{-1}

(3) –23.16 kJ mol^{-1} (4) 46.32 kJ mol^{-1}

2. The three cells with their $E^{\circ}_{(cell)}$ values are given below :

Cells	$E^{\circ}_{(cell)}$ / V
(1) $Fe \mid Fe^{2+} \parallel Fe^{3+} \mid Fe$	0.404
(2) $Fe \mid Fe^{2+} \parallel Fe^{3+}, Fe^{2+} \mid Pt$	1.211
(3) $Fe \mid Fe^{3+} \parallel Fe^{3+}, Fe^{2+} \mid Pt$	0.807

The standard Gibbs free energy change values for three cells are, respectively

(F represents change on 1 mole of electrons)

(1) +2.424 F, +2.422 F, +2.421 F

(2) –0.808 F, –2.422 F, –2.421 F,

(3) –2.424 F, –2.422 F, –2.421 F,

(4) –1.212 F, –1.211 F, –0.807 F,

3. Standard electrode potential for the cell with cell reaction :

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ is 1.1 V. calculate the standard gibbs energy change for the cell reaction.

(Given F = 96487 C mol^{-1})

(1) –200.27 kJ mol^{-1} (2) –212.27 kJ mol^{-1}

(3) –212.27 J mol^{-1} (4) –200.27 J mol^{-1}

4. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : In equation $\Delta_rG = -nFE_{cell}$, value of Δ_rG depends on n.

Reasons R : E_{cell} is an intensive property and Δ_rG is an extensive property.

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

(1) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A.**

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true.

(4) Both **A** and **R** are true and **R** is the correct explanation of **A.**

5. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wiere at one atm pressure. The oxidation potential of electrode would be?

(1) 0.59 V (2) 0.118 V (3) 1.18 V (4) 0.059 V

6. The pressure of H_2 required to make the potential of H_2-electrode zero in pure water at 298 K is :

(1) 10^{-4} atm (2) 10^{-14} atm (3) 10^{-12} atm (4) 10^{-10} atm

7. In the electrochemical cell :

Zn l $ZnSO_4$ (0.01 M) ll $CuSO_4$ (1.0 M) Cu, the emf of this Daniel cell is E_1. When the concentration of $ZnSO_4$ is changed to 1.0 M and that of $CuSO_4$ changed to 0.01 M, the emf changes to E_2. From the followings which one is the relationship between E_1 and E_2 ? (Given, $\frac{RT}{F} = 0.059$

(1) $E_1 = E_2$ (2) $E_1 < E_2$ (3) $E_1 > E_2$ (4) $E_2 = 0 \neq E_1$

8. Find the emf of the cell in which the following reaction takes place at 298 K p

$Ni(s) + 2Ag^+ (0.001\ M) \rightarrow Ni^{2+} (0.001\ M) + 2\ Ag(s)$

(Given that $E^0_{cell} = 1.05$ V, $\frac{2.303\,RT}{F} = 0.059$ at 298 K)

(1) 0.9615 V (2) 1.05 V (3) 1.0385 V (4) 1.385 V

9. When 0.1 mol MnO_4^{2-} is oxidised the quantity of electricity required MnO_4^{2-} to MnO_4^- completely to is

(1) 96500 C (2) 2 × 96500 C (3) 9650 C (4) 96.50 C

10. The weight of silver (at.wt. = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be -

(1) 5.4 g (2) 10.8 g (3) 54.0 g (4) 108.0 g

11. The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 seconds is (charge on electron = 1.60×10^{-19} C)

(1) 7.48×10^{23} (2) 6×10^{23} (3) 6×10^{20} (4) 3.75×10^{20}

Answer Key

1.	(2)	**2.**	(3)	**3.**	(2)	**4.**	(4)	**5.**	(1)	**6.**	(2)	**7.**	(3)
8.	(1)	**9.**	(3)	**10.**	(4)	**11.**	(4)				