

ASSIGNMENT-1

slot: F1

course: CHY1004

① Given that,

$$T = 22.3^\circ\text{C} = 295.3\text{K}$$

$$[\text{ZnSO}_4] = 0.191\text{M}$$

$$[\text{AgNO}_3] = 0.0289\text{ M}$$

$$E_{\text{cell}} = ?$$

$$E_{\text{cathode}}^{\circ} = -0.76\text{V}$$

$$E_{\text{anode}}^{\circ} = +0.8\text{V}$$

$$\begin{aligned} E_{\text{cell}}^{\circ} &= E_{\text{cathode}}^{\circ} - E_{\text{anode}}^{\circ} \\ &= 0.8 - (-0.76)\text{V} \end{aligned}$$

$$\underline{E_{\text{cell}}^{\circ} = 1.56\text{ V}}$$

$$\begin{aligned} * E_{\text{cell}} &= E_{\text{cell}}^{\circ} - \frac{RT}{nF} \ln Q \\ &= 1.56 - \frac{8.314(295.3)}{2(96500)} \ln \left(\frac{0.191\text{M}}{0.0289\text{M}} \right) \\ &= 1.56 - 0.012 \end{aligned}$$

$$\boxed{E_{\text{cell}} = 1.536\text{V}}$$

② Given that,

$$\Delta G = -143 \text{ kJ/mol}$$

$$T = 298 \text{ K}$$

$$E_{\text{cell}}^{\circ} = ? \quad K = ?$$

We know the formula:

$$K = e^{-\Delta G/RT}$$

$$= e^{-143/(8.314 \times 298)}$$

$$K = e$$

$$K = 1.059$$

At

$$E_{\text{cell}}^{\circ} = \frac{0.0592}{n} \log K$$

$$n = 2$$

$$n = 2$$

$$E_{\text{cell}}^{\circ} = \frac{0.0592}{2} \log(1.059)$$

$$= \frac{0.0592}{2} \times 0.024$$

$$E_{\text{cell}}^{\circ} = 7 \times 10^{-3} \text{ V}$$

③ a) Given that,

$$(A) [\text{Au}^{+3}] = 7 \times 10^{-4} \text{ M}$$

$$E_{\text{cell}} = ?$$

$$(B) [\text{Au}^{+3}] = 2.5 \times 10^{-2} \text{ M}$$

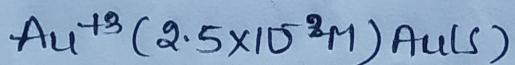
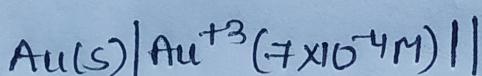
(A) is -ve \rightarrow anode

(B) is +ve \rightarrow cathode

* In concentration cells $E^{\circ} = 0$,

$$E_{\text{cell}} = -\frac{0.0592}{n} \log(\alpha)$$

$$E_{\text{cell}} = -\frac{0.0592}{3} \log\left(\frac{7 \times 10^{-4}}{2.5 \times 10^{-2}}\right)$$



$$E_{\text{cell}} = 0.03 \text{ V}$$

b) Given that,

$$m = 65.5 \text{ g}$$

$$\text{D} = C = 21 \text{ A}$$

$$A = 65.38$$

$$F = ?$$

$$* m = \frac{Act}{ZF}$$

$$65.5 = \frac{65.38 \times 21 \times t}{2 \times 96500}$$

$$t = \frac{65.5 \times 2 \times 96500}{65.38 \times 21} \text{ s}$$

$$t = 9,207.3 \text{ s}$$