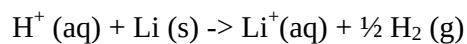


תרגול 13 – אלקטרוכימיה

שאלה 4:



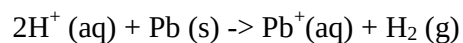
התגובות הדרושות הן :

$$\text{H}^+ + \text{e}^- = \frac{1}{2} \text{H}_2 (\text{g}) \quad E^\circ_{\text{R}} = 0$$

$$\text{Li}^+ + \text{e}^- = \text{Li} \quad E^\circ_{\text{L}} = -3.045\text{V}$$

$$E^0 = E^\circ_{\text{R}} - E^\circ_{\text{L}} = 3.045\text{V}$$

$$K = e^{\frac{|v_e|FE^\circ}{RT}} = e^{\frac{1.96485 \frac{\text{C}}{\text{mol}} \cdot 3.045\text{V}}{8.314 \frac{\text{J}}{\text{Kmol}} \cdot 298\text{K}}} = 3.16 \cdot 10^{51}$$



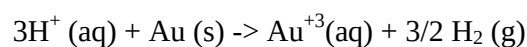
התגובות הדרושות הן :

$$2\text{H}^+ + 2\text{e}^- = \text{H}_2 (\text{g}) \quad E^\circ_{\text{R}} = 0$$

$$\text{Pb}^{+2} + 2\text{e}^- = \text{Pb} \quad E^\circ_{\text{L}} = -0.126\text{V}$$

$$E^0 = 0.126\text{V}$$

$$K = e^{\frac{|v_e|FE^\circ}{RT}} = e^{\frac{2.96485 \frac{\text{C}}{\text{mol}} \cdot 0.126\text{V}}{8.314 \frac{\text{J}}{\text{Kmol}} \cdot 298\text{K}}} = 1.83 \cdot 10^4$$



התגובות הדרושות הן :

$$2\text{H}^+ + 2\text{e}^- = \text{H}_2 (\text{g}) \quad E^\circ_{\text{R}} = 0$$

$$\text{Au}^{+3} + 3\text{e}^- = \text{Au} \quad E^\circ_{\text{L}} = 1.5\text{V}$$

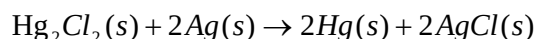
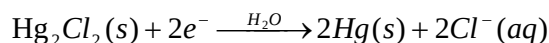
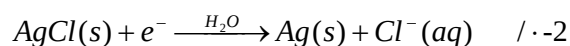
$$E^0 = -1.5\text{V}$$

$$K = e^{\frac{|v_e|FE^\circ}{RT}} = e^{\frac{3.96485 \frac{\text{C}}{\text{mol}} \cdot -1.5\text{V}}{8.314 \frac{\text{J}}{\text{Kmol}} \cdot 298\text{K}}} = 7.8 \cdot 10^{-77}$$

שאלה 5:

התא הינו: $Pt|Ag(s)|AgCl(s)|K^+, Cl^-, H_2O|Hg_2Cl_2(s)|Hg(l)|Pt$

א. התגובה בתא הינה:



ב. ניתן לראות כי KCl אינו מופיע בתגובת הנטו ולכן הכוח האלקטרומניע של התא אינו

תלוי בו.

ג. נתון:

$$[KCl] = 1M$$

$$E^\circ = 0.0455V$$

$$T = 298K$$

$$|v_e| = 2$$

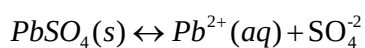
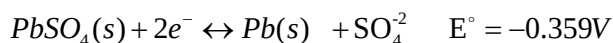
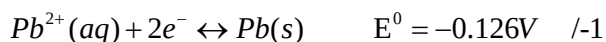
$$\left(\frac{\partial E^\circ}{\partial T}\right)_p = 3.38 \cdot 10^{-4} \text{ Volt } K^{-1}$$

$$\Delta_r G^\circ = -|v_e|FE^\circ = -2 \cdot 96458 \frac{C}{mol} \cdot 0.0455V = -8777.7 \frac{J}{mol} = -8.8 \frac{KJ}{mol}$$

$$\Delta_r S^\circ = |v_e|F\left(\frac{\partial E^\circ}{\partial T}\right)_p = 2 \cdot 96458 \frac{C}{mol} \cdot 3.38 \cdot 10^{-4} \text{ Volt } K^{-1} = 65.2 \frac{J}{Kmol}$$

$$\Delta_r H^\circ = \Delta_r G^\circ + T\Delta_r S^\circ = -8777.7 \frac{J}{mol} + 298K \cdot 65.2 \frac{J}{Kmol} = 10.652 \frac{KJ}{mol}$$

שאלה 6 :



$$E^\circ = -0.359V - (-0.126V) = -0.233V$$

$$\Delta_r G^\circ = -RT \ln K = -|v_e|FE^\circ$$

$$K_{sp} = \exp\left\{\frac{|v_e|FE^\circ}{RT}\right\} = \exp\left\{\frac{-2 \cdot 96458 \frac{C}{mol} \cdot 0.233V}{8.314 \frac{J}{K \cdot mol} \cdot 298K}\right\} = 1.32 \cdot 10^{-8}$$