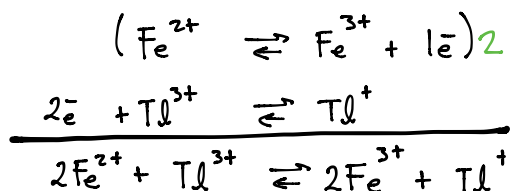
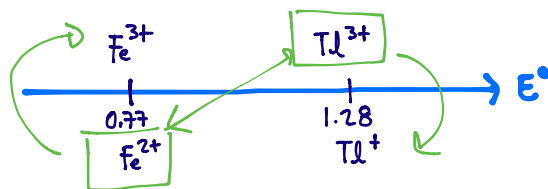


Se quiere deducir la fórmula para calcular K_{eq} utilizando la reacción de $Tl^{3+} + Fe^{2+}$ como ejemplo



$$E_{Fe^{3+}/Fe^{2+}} = 0.77 \text{ V}$$

$$E_{Tl^+/Tl^{3+}} = 1.28 \text{ V}$$

Ec. Nernst para cada semireacción

$$E_1 = 0.77 + \frac{0.06}{1} \log \frac{|Fe^{3+}|}{|Fe^{2+}|}$$

$$K_{eq} = \frac{[Fe^{3+}]^2 [Tl^+]}{[Fe^{2+}]^2 [Tl^{3+}]}$$

$$E_2 = 1.28 + \frac{0.06}{2} \log \frac{|Tl^{3+}|}{|Tl^+|}$$

$$2 \left(0.77 + 0.06 \log \frac{|Fe^{3+}|}{|Fe^{2+}|} \right) = 1.28 + \frac{0.06}{2} \log \frac{|Tl^{3+}|}{|Tl^+|}$$

$$2(0.77) + 2(0.06) \log \frac{|Fe^{3+}|}{|Fe^{2+}|} = 2(1.28) + 0.06 \log \frac{|Tl^{3+}|}{|Tl^+|}$$

$$2(0.77) + (0.06) \log \left(\frac{|Fe^{3+}|}{|Fe^{2+}|} \right)^2 = 2(1.28) + 0.06 \log \frac{|Tl^{3+}|}{|Tl^+|}$$

$$n \log x = \log x^n$$

$$0.06 \left[\log \frac{|Fe^{3+}|^2}{|Fe^{2+}|^2} - \log \frac{|Tl^{3+}|}{|Tl^+|} \right] = 2 [1.28 - (0.77)]$$

$$0.06 \left[\log \frac{|Fe^{3+}|^2 |Tl^+|}{|Fe^{2+}|^2 |Tl^{3+}|} \right] = 2 [1.28 - (0.77)]$$

$$\log A - \log B = \log \frac{A}{B}$$

$$\text{y } K_{eq} = \frac{[Fe^{3+}]^2 [Tl^+]}{[Fe^{2+}]^2 [Tl^{3+}]} \Rightarrow 0.06 (\log K_{eq}) = 2 [1.28 - (0.77)]$$

$$\log(K_{eq}) = \frac{2 [1.28 - (0.77)]}{0.06}$$

$$\text{Entonces } K_{eq} = 10^{\frac{2 [1.28 - (0.77)]}{0.06}}$$

$\Rightarrow 2 = \# e^-$ intercambiados en la reacción

$$1.28 = E_{Tl^{3+}/Tl^+}^{\circ} = E_{ox}^{\circ}$$

$$0.77 = E_{Fe^{2+}/Fe^{3+}}^{\circ} = E_{red}^{\circ}$$

$$\text{Forma general} \quad K_{eq} = 10^{\frac{n(E_{ox}^{\circ} - E_{red}^{\circ})}{0.06}}$$

Ejemplo:



$$K_{eq} = 10^{\frac{n(E_{ox}^{\circ} - E_{red}^{\circ})}{0.06}}$$

$$K_{eq} = 10^{17}$$

$$K_{eq} = 10^{\frac{2[1.28 - (0.77)]}{0.06}}$$