

NERNST EQUATION

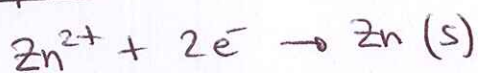


$$E_{\text{red}} = E_{\text{red}}^{\circ} - \frac{RT}{zF} \ln \frac{a_{\text{red}}}{a_{\text{ox}}} = E_{\text{red}}^{\circ} - 2.3 \frac{RT}{zF} \log \frac{a_{\text{red}}}{a_{\text{ox}}}$$

E_{red}° = standard half cell reduction potential
 $R = 8,314 \left(\frac{\text{J}}{\text{mol K}} \right)$
 T [in K]
 z = moles of electrons transferred in the reaction [mol⁻¹]
 $F = 96,485 \left(\frac{\text{C}}{\text{mol}} \right)$
 a_{red} = activity of the reduced form ($\approx C_{\text{red}}$ at low concentrations)
 a_{ox} = activity of the oxidized form ($\approx C_{\text{ox}}$ at low concentrations)

NOTE: the activity of pure substances (solid and liquids) is normally taken as equal to 1! You can consider only the concentration of the species dissolved in solution!

Example



$$E = E^{\circ} - \frac{RT}{2F} \ln \frac{1}{[\text{Zn}^{2+}]}$$

At Room Temperature

$$E = E^{\circ} - \frac{0,059}{z} \log \frac{a_{\text{red}}}{a_{\text{ox}}}$$

Dependence on pH

$$E = E^{\circ} - \frac{RT}{2F} \ln \frac{a_{\text{red}}}{a_{\text{ox}}} - \frac{2.3RT}{2F} \text{pH}$$

$\left[= 0.059 \right]$
at room temperature