

Question #49807, Chemistry, Other

Calculate the e.m.f. of a copper-zinc voltaic cell working with the following electrolytes 0.001 M CuSO₄ and 0.001 M ZnSO₄?

Answer:

$$EMF = E_1 - E_2$$

$$EMF = E_{\text{Cu}^{2+}/\text{Cu}} - E_{\text{Zn}^{2+}/\text{Zn}}$$

$$E_{\text{Cu}^{2+}/\text{Cu}} = E^{\circ}_{\text{Cu}^{2+}/\text{Cu}} + \frac{RT}{nF} \ln a_{\text{Cu}^{2+}} = 0.34 + \frac{RT}{nF} \ln 0.001$$

$$E_{\text{Zn}^{2+}/\text{Zn}} = E^{\circ}_{\text{Zn}^{2+}/\text{Zn}} + \frac{RT}{nF} \ln a_{\text{Zn}^{2+}} = -0.76 + \frac{RT}{nF} \ln 0.001$$

$$EMF = 0.34 + \frac{RT}{nF} \ln 0.001 - (-0.76 + \frac{RT}{nF} \ln 0.001) = 1 \text{ V}$$