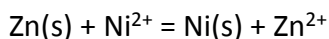


Answer on Question #55698 – Chemistry - Physical chemistry

Question:

Zinc granules are added in excess to 500ml of 0.1M Ni(NO₃)₂ solution at 25degree celcius until the equilibrium is reached.if standered reduction potential of Zn²⁺/Zn and Ni²⁺/Ni are -0.75 and -0.24volt respectively.find the concentration of Ni²⁺ ions in the solution of equilibrium.

Solution



$$\Delta E = -0.24 - (-0.75) = 0.51 \text{ V}$$

$$\Delta E = (RT/nF)\ln K$$

$$\ln K = nF\Delta E/(RT)$$

$$K = \exp(2 \times 96500 \times 0.51 / (8.31 \times 298)) = 1.829 \times 10^{17}$$

$$K = [\text{Zn}^{2+}] / [\text{Ni}^{2+}]$$

If x moles per liter of Ni²⁺ participated in the reaction, the equilibrium concentrations will be

$$[\text{Ni}^{2+}] = (0.1 - x)$$

$$[\text{Zn}^{2+}] = x$$

$$x / (0.1 - x) = 1.829 \times 10^{17}$$

$$[\text{Ni}^{2+}] = 0.1 - x = 1.829 \times 10^{-16} \text{ M}$$

$$\text{Answer: } [\text{Ni}^{2+}] = 1.829 \times 10^{-16} \text{ M}$$