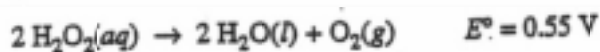


2. Answer the following questions that relate to electrochemical reactions.

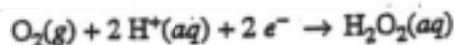
(a) Under standard conditions at 25°C, Zn(s) reacts with Co²⁺(aq) to produce Co(s).

- Write the balanced equation for the oxidation half reaction.
- Write the balanced net-ionic equation for the overall reaction.
- Calculate the standard potential, E°, for the overall reaction at 25°C.

(b) At 25°C, H₂O₂ decomposes according to the following equation.

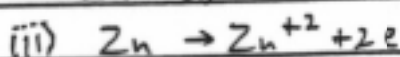
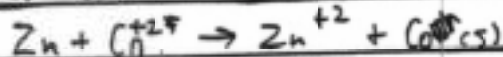
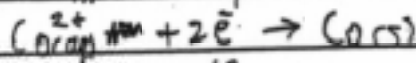
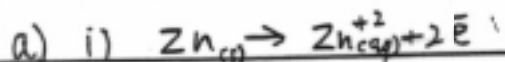


- Determine the value of the standard free energy change, ΔG°, for the reaction at 25°C.
- Determine the value of the equilibrium constant, K_{eq}, for the reaction at 25°C.
- The standard reduction potential, E°, for the half reaction O₂(g) + 4 H⁺(aq) + 4 e⁻ → 2 H₂O(l) has a value of 1.23 V. Using this information in addition to the information given above, determine the value of the standard reduction potential, E°, for the half reaction below.



(c) In an electrolytic cell, Cu(s) is produced by the electrolysis of CuSO₄(aq). Calculate the maximum mass of Cu(s) that can be deposited by a direct current of 100. amperes passed through 5.00 L of 2.00 M CuSO₄(aq) for a period of 1.00 hour.

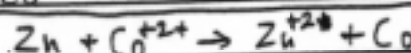
2



$$E^\circ = 0.76 \text{ (V)}$$



$$E^\circ = -0.28 \text{ (V)}$$



$$\Delta E^\circ = 0.48 \text{ (V)}$$

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