1. Half cells for the following redox half equations were connected using a wire and salt bridge.

\[
\begin{align*}
\text{Cu}^{2+} + 2e^- & \rightleftharpoons \text{Cu} \quad E^\circ = +0.34 \text{ V} \\
\text{Fe}^{2+} + 2e^- & \rightleftharpoons \text{Fe} \quad E^\circ = -0.41 \text{ V}
\end{align*}
\]

a. Write the standard cell notation (cell representation) for this cell. \( \text{Fe(s)} \mid \text{Fe}^{2+}(aq) \mid \mid \text{Cu}^{2+}(aq) \mid \text{Cu(s)} \)

b. Calculate the emf of this cell. \( +0.75 \text{ V} \)

c. Write a balanced equation for the reaction that takes place in this cell. \( \text{Cu}^{2+} + \text{Fe} \rightarrow \text{Cu} + \text{Fe}^{2+} \)

d. State three essential conditions in order for this cell to operate under standard conditions.

1. 298K

2. 1.0 mol dm\(^{-3}\) \( \text{Cu}^{2+} \)

3. 1.0 mol dm\(^{-3}\) \( \text{Fe}^{2+} \)

2. The electrode potential of the \( \text{Zn}^{2+} / \text{Zn} \) half cell was measured against the standard hydrogen electrode (SHE). In this cell, the SHE was placed on the left, and an emf of \(-0.76\) V was recorded.

a. Write the standard cell notation (cell representation) for this cell.

\( \text{Pt(s)} \mid \text{H}_2(g) \mid \text{H}^+(aq) \mid \mid \text{Zn}^{2+}(aq) \mid \text{Zn(s)} \)

b. Calculate the electrode potential of the \( \text{Zn}^{2+} / \text{Zn} \) half cell. \(-0.76\) V

c. Write a balanced equation for the reaction that takes place in this cell. \( \text{Zn} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2 \)

d. What is the role of the platinum in the SHE? to provide a surface for electron transfer