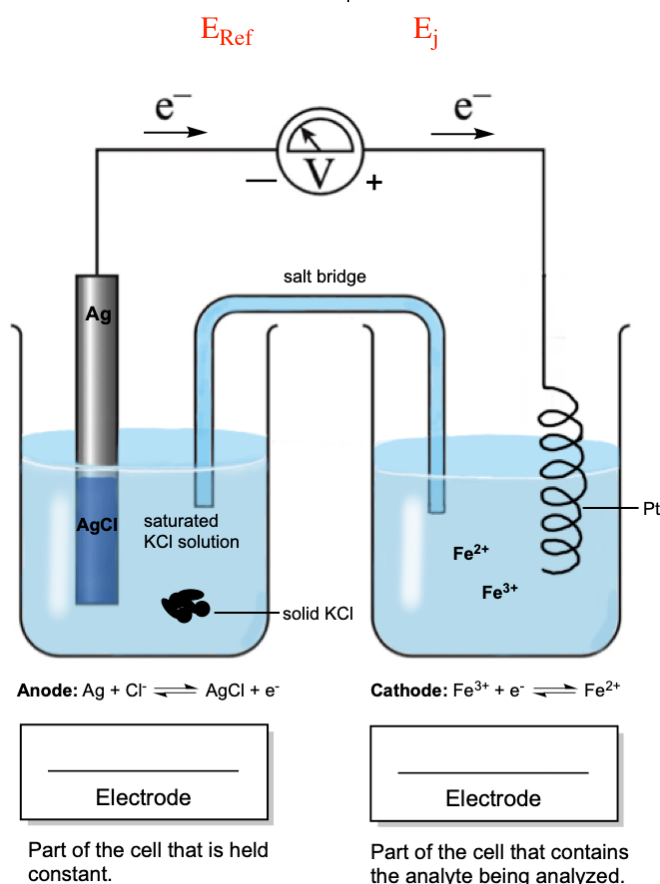


CONCEPT: POTENTIOMETRY

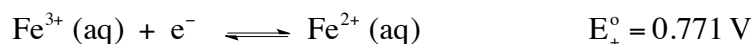
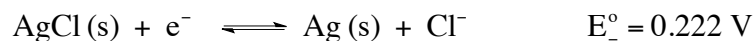
Potentiometry uses electrodes to measure voltages that also provide vital chemical information on their solutions.

- The difference in potential between the two electrodes provides an analysis for the composition of the analyte.
- The measurement of the voltage at an electrode relative to the reference is done in the absence of current flow.

$$E_{\text{Cell}} = E_{\text{Ind}} - E_{\text{Ref}} + E_j \quad \text{Reference Electrode} \mid \text{Salt Bridge} \mid \text{Analyte Solution} \mid \text{Indicator Electrode}$$



The half-cell reactions are given as:



The Nernst equation provides a mathematical relationship between the electrode's potential and an analyte's reduced and oxidized forms.

- The difference in potential is based on only one of the half-cell concentrations.

$$E_{+} = E_{+}^{\circ} - \frac{0.05916 \text{ V}}{n} \log \left(\frac{[\text{Fe}^{2+}]}{[\text{Fe}^{3+}]} \right) = 0.771 \text{ V} - \frac{0.05916 \text{ V}}{1 \text{ mole e}^-} \log \left(\frac{[\text{Fe}^{2+}]}{[\text{Fe}^{3+}]} \right) \quad E_{-} = E_{-}^{\circ} - \frac{0.05916 \text{ V}}{n} \log [\text{Cl}^-] = 0.222 \text{ V} - \frac{0.05916 \text{ V}}{1 \text{ mole e}^-} \log [\text{Cl}^-]$$