Tutorial 5

CSO203: Inorganic Molecules, Materials & Medicines

1. Draw a schematic cyclic voltammogram for a reversible electrochemical process considering 1 mM of ferrocene solution. The potential can be considered with respect to Fc^+/Fc. Calculate the time required for 1 scan. How do you reduce the time required for 1 scan?

Properties ⏏|

CV staircase

Command name	Ferrocene test
Start potential	0 V_{REF} ▼
Upper vertex poten...	0.32 ✕ V_{REF} ▼
Lower vertex potent...	-0.2 V_{REF} ▼
Stop potential	0 V_{REF} ▼
Number of scans	1
Scan rate	0.05 V/s

2. Sketch concentration profiles (mM) for Fc^+ and Fc as a function of the distance from the electrode from the cyclic voltammogram. Explain the significance of $E_{1/2}$.

3. Derive the Nernst Equation for the 1-electron reduction of Fc^+ to Fc.

4. Write the conditions (at least three) for reversible, quasi-reversible, and irreversible cyclic voltammograms.

5. How can one determine if the electrochemical reaction is controlled by either diffusion or adsorption?

6. Explain the effect of scan rates on Faradaic current in an electrochemical reaction.