Tutorial 3

CSO203: Inorganic Molecules, Materials & Medicines

1. Explain the complete catalytic cycle of the Monsanto process, including oxidation states of the rhodium center, and electron counts in each step.

2. What is the geometry of the active catalyst?

3. Write an overall chemical reaction for Monsanto acetic acid preparation.

4. What is the rate-determining step of the rhodium-catalyzed reaction? Explain why it is the slowest step.

5. Explain the working principle of the Daniel cell. Draw the cell structure and show the half-cell reaction.

6. Explain the roles of electrolytes for any electrochemical reactions. Name a few electrolytes (organic and inorganic).

7. What is the driving force in a Daniel cell to generate electricity? How to calculate an equilibrium constant for an electrochemical reaction that occurs in the Daniel cell?

8. A bipolar electrode can perform both oxidation and reduction. Explain how.

9. Define a conductor, a semiconductor, and an insulator in light of the band gap. Show an example of each.