Redox Reactions Overview

Here is a detailed topic tree for Redox Reactions based on the content extracted from the documents:

Redox Reactions Topic Tree:

1. **Introduction to Redox Reactions**
   - Definition and importance of redox reactions
   - Role in biological, industrial, and environmental processes
2. **Classical Concept of Oxidation and Reduction**
   - Oxidation as the addition of oxygen or removal of hydrogen
   - Reduction as the addition of hydrogen or removal of oxygen
3. **Modern Definition**
   - Oxidation as the loss of electrons
   - Reduction as the gain of electrons
4. **Types of Redox Reactions**
   1. **Combination Reactions**
      - Two substances combine to form one compound
      - Example: $C + O_2 \rightarrow CO_2$
   2. **Decomposition Reactions**
      - A compound breaks down into two or more components
      - Example: $2H_2O \rightarrow 2H_2 + O_2$
   3. **Displacement Reactions**
      - An ion or atom in a compound is replaced by another
      - Subtypes:
        - **Metal Displacement**: $CuSO_4 + Zn \rightarrow Cu + ZnSO_4$
        - **Non-Metal Displacement**: $2Na + 2H_2O \rightarrow 2NaOH + H_2$
   4. **Disproportionation Reactions**
      - A single substance undergoes both oxidation and reduction
      - Example: $2H_2O_2 \rightarrow 2H_2O + O_2$
5. **Oxidation Number**
   - Concept of oxidation number and rules for calculation
   - Use of oxidation number in determining oxidants and reductants
6. **Balancing Redox Reactions**
   1. **Oxidation Number Method**
      - Steps to balance redox reactions using oxidation numbers
   2. **Ion-Electron Method (Half-Reaction Method)**
      - Steps to balance by separating oxidation and reduction half-reactions
7. **Applications of Redox Reactions**
   - Electrochemical cells and redox couples
   - Redox titrations

This structure offers a comprehensive overview of the topic "Redox Reactions," covering fundamental concepts, types, mechanisms, and practical applications.