Chapter 7: Complex Reaction Mechanisms

Department of Chemistry

1 Types of Mechanisms

- **Parallel (competing) Reactions:** A reacts via multiple pathways.
- **Consecutive (sequential) Reactions:** Product of one reaction becomes reactant in the next.

2 Steady-State Approximation

Used to simplify the kinetics of intermediate species, assuming their concentration remains constant during the reaction.

3 Chain Reactions

A reaction mechanism involving a step generating a reactive intermediate which propagates the chain.

- Initiation: Generates the reactive species.
- Propagation: Maintains the cycle.
- Termination: Reactive species combine and stop the chain.

4 Example

Decomposition of hydrogen peroxide:

$$H_2O_2 \rightarrow 2H_2O + O_2$$

Occurs via radical intermediates.

5 Summary

Complex mechanisms can be analyzed using approximations such as the steady-state to derive practical rate laws.

References

1. Housecroft, C. *Chemistry*, 4th Ed.

2. Atkins, P., de Paula, J. *Atkins' Physical Chemistry*.