

## CHAPTER OVERVIEW

### 5: AN INTRODUCTION TO ORGANIC REACTIONS USING FREE RADICAL HALOGENATION OF ALKANES

#### Learning Objectives

After reading the chapter and completing ALL the exercises and homework, a student can be able to:

- recognize and distinguish between the four major types of organic reactions (additions, eliminations, substitutions, and rearrangements) - refer to section 5.1
- accurately and precisely use reaction mechanism notation and symbols including curved arrows to show the flow of electrons - refer to section 5.2
- identify nucleophiles and electrophiles in polar reactions - refer to section 5.3
- perform calculations using the equation  $\Delta G^\circ = -RT \ln K = -2.303RT \log_{10} K$  and explain the relationship between equilibrium and free energy - refer to section 5.4
- calculate reaction enthalpies from bond dissociation energies - refer to section 5.5
- draw Reaction Energy Diagrams from the thermodynamic and kinetic data/information - refer to section 5.6
- use a Reaction Energy Diagram to discuss transition states,  $E_a$ , intermediates & rate determining step - refer to section 5.6
- draw the transition states & intermediates of a reaction - refer to section 5.6
- describe the structure & relative stabilities of carbocations, free radicals and carbanions - refer to sections 5.7 - 5.9 respectively
- Explain the mechanism & energetics of the free-radical halogenation of alkanes - refer to section 5.10
- Predict the products of chlorination & bromination reactions of alkanes based on relative reactivity and selectivity - refer to section 5.11
- describe the similarities and differences between reactions performed in the lab with biochemical reactions - refer to section 5.12

[5.1: Types of Organic Reactions](#)

[5.2: Reaction Mechanism Notation and Symbols](#)

[5.3: Polar Reactions- the Dance of the Nucleophile and Electrophile](#)

[5.4: Describing a Reaction - Equilibrium and Free Energy Changes](#)

[5.5: Homolytic Cleavage and Bond Dissociation Energies](#)

[5.6: Reaction Energy Diagrams and Transition States](#)

[5.7: Reactive Intermediates - Carbocations](#)

[5.8: Reactive Intermediates - Radicals](#)

[5.9: Reactive Intermediates- Carbanions and Carbon Acids](#)

[5.10: The Free-Radical Halogenation of Alkanes](#)

[5.11: Reactivity and Selectivity](#)

[5.12: A Comparison between Biological Reactions and Laboratory Reactions](#)

[5.13: Additional Exercises](#)

[5.14: Solutions to Additional Exercises](#)

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