

CHAPTER OVERVIEW

7: ALKYL HALIDES- NUCLEOPHILIC SUBSTITUTION AND ELIMINATION

Learning Objectives

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

- classify alkyl halides - refer to section 7.1
- predict relative boiling points and solubility of alkyl halides - refer to section 7.1
- discuss the common uses of alkyl halides - refer to section 7.2
- specify the reagents for the most efficient synthesis of alkyl halides using free-radical halogenation of alkanes (Chapter 5) or allylic halogenation of alkenes with NBS - refer to section 7.3
- apply the alpha and beta labels to alkyl halides for substitution and elimination reactions - refer to section 7.4
- determine the rate law & predict the mechanism based on its rate equation or reaction data for S_N1 , S_N2 , E1 & E2 reactions - refer to sections 7.5, 7.6, 7.8, 7.13, and 7.15
- use Zaitsev's rule to predict major and minor products of elimination reactions including halocyclohexanes - refer to sections 7.14, 7.15, and 7.16
- predict the products and specify the reagents for S_N1 , S_N2 , E1 and E2 reactions with stereochemistry - refer to sections 7.6, 7.7, 7.9, 7.14, 7.15, 7.19
- propose mechanisms for S_N1 , S_N2 , E1 and E2 reactions - refer to sections 7.5, 7.6, 7.7, 7.8, 7.9, 7.13, 7.14, 7.15, 7.19
- draw, interpret, and apply Reaction Energy Diagrams for S_N1 , S_N2 , E1 and E2 reactions - refer to sections 7.5, 7.6, 7.7, 7.8, 7.9, 7.13, 7.14, 7.15, 7.19
- predict carbocation rearrangements in 1st order reactions - refer to section 7.10
- explain and apply Hammond's Postulate to substitution reactions - refer to section 7.11
- explain how the kinetic isotope effect (KIE) can be used to elucidate reaction mechanisms - refer to section 7.17
- distinguish 1st or 2nd order substitution and elimination reactions - refer to sections 7.12 and 7.18
- discuss the importance of leaving groups in biological substitution reactions - refer to section 7.20
- discuss enzymatic elimination reactions of histidine - refer to section 7.21

[7.1: Alkyl Halides - Structure and Physical Properties](#)

[7.2: Common Uses of Alkyl Halides](#)

[7.3: Preparation of Alkyl Halides](#)

[7.4: Reactions of Alkyl Halides- Substitution and Elimination](#)

[7.5: The \$S_N2\$ Reaction](#)

[7.6: Characteristics of the \$S_N2\$ Reaction](#)

[7.7: Stereochemistry of the \$S_N2\$ Reaction](#)

[7.8: The \$S_N1\$ Reaction](#)

[7.9: Characteristics of the \$S_N1\$ Reaction](#)

[7.10: Rearrangements of the Carbocation and \$S_N1\$ Reactions](#)

[7.11: The Hammond Postulate and Transition States](#)

[7.12: Comparison of \$S_N1\$ and \$S_N2\$ Reactions](#)

[7.13: Characteristics of the E2 Reaction](#)

[7.14: Zaitsev's Rule](#)

[7.15: Characteristics of the E1 Reaction](#)

[7.16: E2 Regiochemistry and Cyclohexane Conformations](#)

[7.17: The E2 Reaction and the Deuterium Isotope Effect](#)

[7.18: Comparison of E1 and E2 Reactions](#)

[7.19: Comparing Substitution and Elimination Reactions](#)

[7.20: Biological Substitution Reactions](#)

[7.21: Biological Elimination Reactions](#)

[7.22: Additional Exercises](#)

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