

## 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 1<sup>st</sup> 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 1<sup>st</sup> or 2<sup>nd</sup> 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

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

[7.3: Preparation of Alkyl Halides](#)

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

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[7.6: Characteristics of the  \$S\_N2\$  Reaction](#)

[7.7: Stereochemistry of the  \$S\_N2\$  Reaction](#)

[7.8: The  \$S\_N1\$  Reaction](#)

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[7.10: Rearrangements of the Carbocation and  \$S\_N1\$  Reactions](#)

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