

CHAPTER OVERVIEW

4: STRUCTURE AND STEREOCHEMISTRY OF ALKANES

LEARNING OBJECTIVES

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

- distinguish between the different hydrocarbon functional groups - refer to section 4.1
- explain & predict the physical properties of alkanes including relative bp and solubility in a mixture - refer to section 4.2
- interpret and draw the rotation about a carbon-carbon single bond using Newman projections and sawhorse structures - refer to section 4.3 - 4.5
- correlate energies of conformations with rotational energy diagrams and predict the most stable conformations for butane, higher alkanes, cyclohexane, mono-substituted cyclohexanes, and disubstituted cyclohexanes - refer to sections 4.3, 4.3, 4.4, 4.5, and 4.7, 4.8, and 4.10 respectively
- explain the partial rotation of carbon-carbon single bonds in rings - refer to section 4.6
- explain ring strain and its relationship to cycloalkane stability - refer to section 4.6
- draw cyclohexane conformations (chair & boat) - refer to section 4.7
- draw mono-substituted cyclohexane conformers (chair only) - refer to section 4.8
- identify & draw the geometric (cis/trans) isomers of cycloalkanes - refer to section 4.9
- draw di-substituted cyclohexane conformers (chair only) - refer to section 4.10
- recognize and draw the three ways to join two rings - refer to section 4.11
- describe the uses and sources of alkanes - refer to section 4.12
- recognize and distinguish between the two major reactions of alkanes (combustion and halogenation) - refer to section 4.13

[4.1: Hydrocarbon Functional Groups](#)

[4.2: Physical Properties of Alkanes](#)

[4.3: Structure and Conformations of Alkanes](#)

[4.4: Conformations of Butane](#)

[4.5: Conformations of Higher Alkanes](#)

[4.6: Cycloalkanes and Ring Strain](#)

[4.7: Cyclohexane Conformations](#)

[4.8: Conformations of Monosubstituted Cyclohexanes](#)

[4.9: Cis-trans Isomerism in Cycloalkanes](#)

[4.10: Conformations of Disubstituted Cyclohexanes](#)

[4.11: Joined Rings](#)

[4.12: Uses and Sources of Alkanes](#)

[4.13: Reactions of Alkanes - a Brief Overview](#)

[4.14: Additional Exercises](#)

[4.15: Solutions to Additional Exercises](#)

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