

Organic Chemistry – Structure and Properties Learning Objectives

As we study this chapter, you should...

- 1) Be able to apply all the concepts you learned in chapter 1 to topics in chapter 2
- 2) Be able to accurately draw and interpret the structure of any compound in any of the following formats and be able to comfortably go back and forth between them:
 - A) Lewis structures
 - B) Condensed structural formulas
 - C) Line-angle formulas (including chair drawings of cyclohexanes)
 - D) Perspective drawings
 - E) Newman projections
 - F) Chair forms of cyclohexane rings
- 3) Be able to determine whether a compound is polar, nonpolar, ionic, or anything in between.
- 4) Be able to determine whether a compound will dissolve in a polar or nonpolar solvent.
- 5) Be able to predict whether a compound melts/freezes at a higher or lower temperature than another, and be able to rationalize your prediction using pictures and words
- 6) Be able to predict whether a compound boils/condenses at a higher or lower temperature than another, and be able to rationalize your prediction using pictures and words
- 7) Be able to describe the intermolecular forces that exist between molecules (such as dipole-dipole interactions, H-bonding, van der Waals forces, etc.)
- 8) Be able to name any alkane, cycloalkane, haloalkane, alcohol, ether, or amine containing one or more substituents
- 9) Be able to draw any alkane, cycloalkane, haloalkane, alcohol, ether, or amine containing one or more substituents when given a systematic or common name
- 10) Be able to classify a carbon or hydrogen as 1°, 2°, 3° or 4°.
- 11) Be familiar with the various alkyl groups (e.g. isoalkyl, *tert*-butyl, *sec*-butyl, methylene, *n*-alkyl, etc.)
- 12) Be familiar with the terms of conformational analysis, and be able to recognize when these terms can be used to describe chemical phenomena:

A) Eclipsed	G) Syn
B) Staggered	H) Gauche
C) Sterics or steric strain	I) Axial
D) Torsional strain	J) Equatorial
E) Dihedral angle	K) 1,3-diaxial interaction
F) Anti	L) Angle strain
- 13) Be able to compare the energetics of molecules based on their conformations
- 14) Be able to determine the most and least stable conformations of a molecule
- 15) Be able to illustrate a chair-chair interconversion for any cyclohexane ring
- 16) Be able to draw an energy diagram for the conformational analysis of any organic compound
- 17) Be able to name any cycloalkane or substituted cycloalkane, including the use of *cis* & *trans*
- 18) Be able to calculate the ratio of one chair conformer to another given their difference in energy
- 19) Understand the differences between constitutional isomers, stereoisomers, geometric isomers, and *cis-trans* isomers