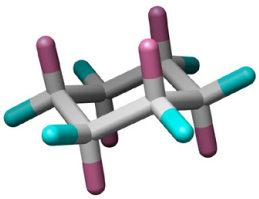


Chem 341 • Organic Chemistry I

Lecture Summary 06 • September 05, 2007

Chapter 2 - Polar Covalent Bonds; Acids and Bases

Structure Representation

It is critically important to have a method of communicating structural information in an easy and efficient way. Organic chemists represent chemical structures in a variety of different ways.

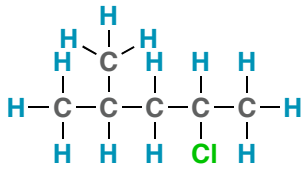
Lewis Dot Structures - all electrons are represented by dots around the atoms. This is tedious.

Kekulé Structures - The atoms are drawn and lines represent shared electrons (covalent bonds). We often draw these a little more condensed with the number of H's around the carbons.

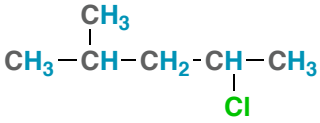
Condensed Structures - No bonds are shown and side substituents are attached to the carbon before it. This is useful for expressing structures in a written line form, but is a little difficult to read.

Skeletal Line Structures - This is the easiest and most efficient method for representing organic molecules. Carbons and Hydrogens are not show. Each end of a line and intersection between lines represents a carbon atom. All other atoms are shown. The number of hydrogens is implied based on the number of other bonds to the carbons (to make up a total of 4 bonds). Hydrogens on other atoms besides carbon are indicated.

2-chloro-4-methylpentane ($C_6H_{13}Cl$)

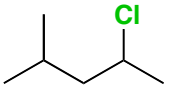


Kekulé Structure



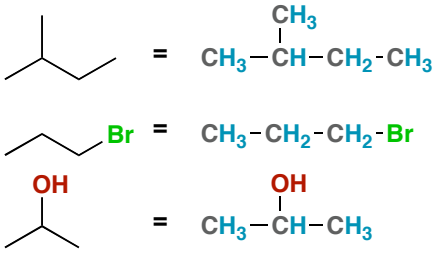
Condensed Kekulé Structure

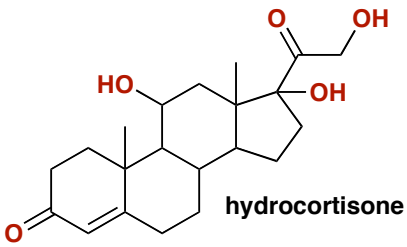
Condensed Structure



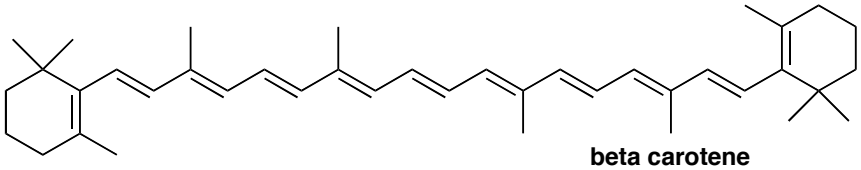
Line Structure

More examples of skeletal line structures. Some molecules are large and complex and it would take forever to draw these using full Kekulé structures.





hydrocortisone



beta carotene

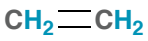
Chapter 3 - Organic Compounds: Alkanes and Cycloalkanes

Functional Groups

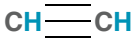
Structural features in a molecule that have characteristic reactivity. They dictate the chemistry of organic molecules. A functional group has similar behavior in every molecule that contains it. Below are several different kinds of functional groups. We will discuss them in detail as we move along in the chapters. You should become familiar with the differences and similarities of the functional groups in organic molecules

Carbon-Carbon Multiple Bonds

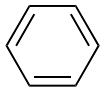
Alkenes - double bonds



Alkynes - triple bonds

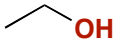


Arenes - aromatic rings



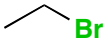
Carbon-Other atom Single Bonds

Alcohols

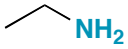


Ethers

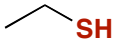
Hallides



Amines



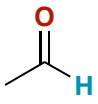
Thiols



Sulfides

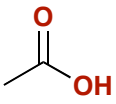
Carbon-Oxygen Double Bonds (Carbonyls)

Aldehyde

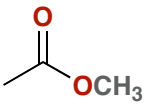


Ketone

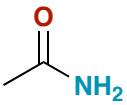
Acid



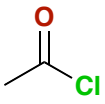
Ester



Amide



Acid Halide



Alkanes

Saturated hydrocarbons - Compounds made up of Carbon and Hydrogen and all single bonds.

Alkanes C_nH_{2n+2}

Name	MF	Condensed	Line
Methane	CH_4	CH_4	
Ethane	C_2H_6	CH_3CH_3	
Propane	C_3H_8	$CH_3CH_2CH_3$	
Butane	C_4H_{10}	$CH_3CH_2CH_2CH_3$	
Pentane			
Hexane			
Heptane			
Octane			
Nonane			
Decane	$C_{10}H_{22}$	$CH_3CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_3$	

Linear Alkanes - Also referred to as 'normal' alkanes are carbons linked in a straight chain.

Branched Alkanes - some carbons are attached as a branch off of the main chain.

Isomers - Compounds that have the same number and kind of atoms, but are different in the way they are arranged. There are many kinds of isomerism that we will discuss this semester.

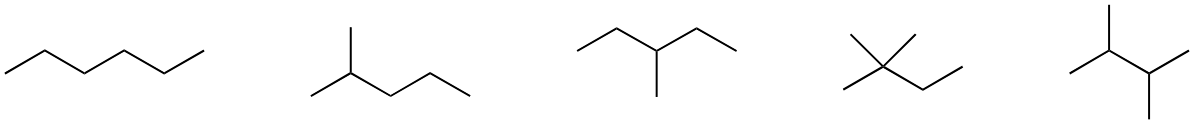
Constitutional Isomers - isomers that differ in how atoms are connected (bonded) to each other.

Constitutional Isomers of Butane C_4H_{10}

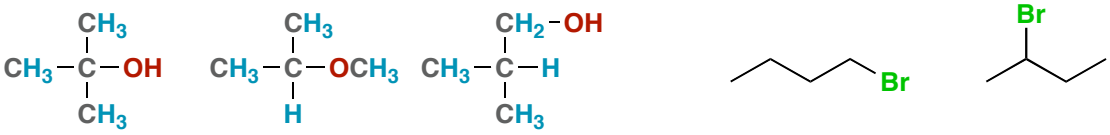
normal butane

*iso*butane

Constitutional Isomers of Hexane C_6H_{14}



Changes in other functional groups can result in constitutional isomerism - either by rearrangement of the carbon skeleton or by simply changing the position of the group.



Quiz of the day

Q:	
Which of the following molecules would you expect to be a **LEWIS BASE**?	
☐ 1:	BF_3
☐ 2:	$AlCl_3$
☑ 3:	$(CH_3)_3N$
☐ 4:	$CH_3CH_2CH_2CH_3$