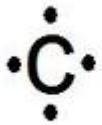
Introduction to Organic Chemistry

ORGANIC CHEMISTRY

- study of compounds that are based on carbon and have C-C bonds and C-H bonds



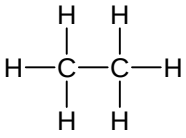
Carbon

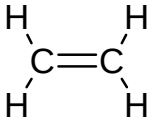
- each C forms a total of four covalent bonds
- forms covalent bonds that can be

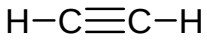
(1) single, (2) double or (3) triple bonds with other C atoms

saturated compound
- all C bonded to max. number of atoms → 4

unsaturated compound
- 1 or more C bonded to less than 4 atoms





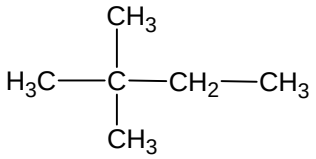


TWO DIMENSIONAL CHEMICAL STRUCTURES

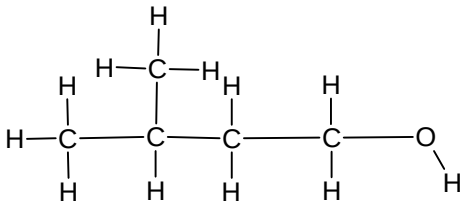
1. **Molecular Formulas** i.e. $C_6H_{12}O_6$
   - show number & types of atoms
   - no information on how atoms connect

2. **Expanded Molecular Formulas** i.e. CH_3CH_2OH or CH_3OCH_3
   - shows atoms in order that they appear in molecules
   - uses brackets to indicate groups attached to chains

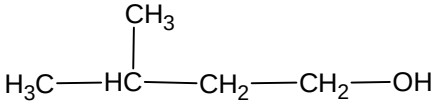
$CH_3C\mathbf{(CH_3)_2}CH_2CH_3$ →



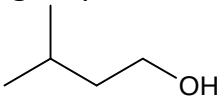
3. **Structural Drawings**
   a. Complete Structural Drawing
      - all atoms with straight lines for bonds



   b. Condensed Structural Diagram
      - more compact
      - does not show C-H bonds; assumed present



   c. Line Structural Diagram
      - the end of each line & meeting point represents a carbon atom
      - hydrogen not shown; assumed present
      - zig-zag pattern for single (-) and double (=) bonds
      - triple (≡)bonds in straight line
      - other atoms and groups written in full



ISOMERS

1. **Structural Isomers**

- compounds which have the SAME molecular formula, but different structures
- different shapes and bonding → different physical and chemical properties

i.e. C_2H_6O → a) CH_3CH_2OH b) CH_3OCH_3

2. **Geometric or Cis-Trans Isomers**

- compounds which have the SAME molecular formula
  but different arrangement of atoms around double C=C bond.

i.e. C_4H_8 a) *cis*-2-butene b) *trans*-2-butene

THREE DIMENSIONAL STRUCTURAL DIAGRAMS

- molecules with single bonds are NOT flat!
- Wedges: atom is coming forward, out of page
- Dashed/Dotted Line: atom is receeding or going back into the page

i.e. CH_2BrCl

Homework:

Read attached file from McGraw-Hill pp. xxxiv to xxxv
Answer questions **p. xxxv Q 37 & 38** and **p. xxxvi Q 39 & 40**
Read **Nelson textbook pp.8-10**
Answer **p.10 Practice Problem #2** and **Section Problems #1-2**