## Intensive Organic for FreshmenC3045x

## **Some Definitions**

- 1. <u>Compound</u>: A "pure" substance in the sense that all attempts to separate it into two or more molecular components are unsuccessful at room termperature in fluid solution.
- 2. <u>Molecule</u>: A real object possessing a single and unique molecular, constitutional, and configurational formula. Each compound is composed of molecules of a single type.
- 3. <u>Structure</u>: An intellectual abstraction used to represent molecules. Structure is employed at the constitutional level ("structural" formulae) to show connectivity relations (but not spatial relations) or at the configurational level (configurational formula) to show the relative spatial arrangement of atoms in 3D that are connected to other atoms. Structure at the conformational level shows the different 3D arrangements of molecules due to rotations about single bonds (all conforments possess the same configuration about atoms).
- 4. <u>Isomers</u>: Different compounds having the same molecular formula.
- 5. <u>Structural Isomers</u>: Isomers whose molecules differ in the way atoms are joined or connected together.
- 6. <u>Stereoisomers</u>: Isomers whose molecules differ only in the way atoms are oriented in space and not in the way atoms are connected.
- 7. <u>Configurational Isomers</u>: Stereoisomers whose molecules differ in the relative spatial arrangement of atoms placed about a given atom. For carbon compounds we refer to the relative spatial arrangement of four groups (tetrahedral carbon) or three groups (trigonal carbon) about a carbon atom.

A. <u>Enantiomers</u>: configurational isomers whose molecules are related as mirror images.

B. <u>Diasteriomers</u>: configurational isomers whose molecules are not related as mirror images.

C. <u>Geometric isomers</u>: diasteriomers whose molecules differ because of the way certain groups lie on one side or the other of an arbitrarily defined plane. Geometric isomers are also called cistrans isomers.

- 8. <u>Chirality</u>: Property of any figure which cannot be superimposed (in the sense of geometry) upon its mirror image.
- 9. <u>Chiral Compound</u>: An optically active compound.
- 10. <u>Graph</u>: Set of points (vertices) connected by lines (edges). A molecule may be represented by a graph in which the molecule's atoms are the verticies of the graph and the bonds are the edges of the graph.
- 11. <u>Configurational Enantiomers</u>: Rapidly interconvertible at room temperature and not capable of exhibiting optical activity.
- 12. <u>Conformers</u>: Different conformations of a single molecule that correspond to energy minima.
- 13. <u>Chiral Atom</u> (chiral center): Carbon atom with four different groups (a, b, c, and d). Different means that a, b, c, and d have different constitutional or connectivity or configurational properties.
- 14. <u>Asymmetry:</u> In the strict sense, the absence of all elements of symmetry. For our purposes the lack of a mirror plane of symmetry in any accessible conformation.