Some Definitions

1. **Compound**: A "pure" substance in the sense that all attempts to separate it into two or more molecular components are unsuccessful at room temperature in fluid solution.

2. **Molecule**: A real object possessing a single and unique molecular, constitutional, and configurational formula. Each pure compound or pure substance is composed of molecules of a single type.

3. **Structure**: An intellectual, geometric 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 conformers represent a single compound and possess the same configuration about atoms).

4. **Isomers**: Different compounds having the same compositional molecular formula.

5. **Constitutional Isomers**: Isomers whose molecular structures differ in the way atoms are joined or connected together.

6. **Stereoisomers**: Isomers whose molecular structures differ only in the way atoms are oriented in space and not in the way atoms are connected.
   - A. **Enantiomers**: configurational isomers whose molecular structures are related as mirror images.
   - B. **Diastereomers**: configurational isomers whose molecular structures are not related as mirror images.
   - C. **Geometric isomers**: diastereomers whose molecular structures differ because of the way certain groups lie on one side or the other of an arbitrarily defined plane. Geometric isomers are also called cis-trans isomers.

7. **Stereogenic center**: a chiral center, a chiral carbon atom. A tetrahedral carbon atom that bears four different substituents is a stereogenic center.

8. **Chirality**: Property of any geometric figure which cannot be superimposed upon its mirror image.

9. **Chiral Compound**: A compound whose molecular structure possesses a non-superimposable mirror image.
10. **Chiral Atom** (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.

11. **Graph**: Set of points (vertices) connected by lines (edges). A molecule may be represented by a graph in which the molecule's atoms are the vertices of the graph and the bonds are the edges of the graph. The constitutional structure of a molecule is represented by a graph.

12. **Conformers**: Different conformations of a single molecule that correspond to energy minima.

13. **Conformational Enantiomers**: Rapidly interconvertible non-superimposable mirror images. A substance containing a racemic mixture of conformational enantiomers is optically inactive, even though the individual molecules are chiral.