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Stereochemistry Terms-review

Absolute configuration—the exact relative position of atoms in one enantiomer around a central point in the molecule. Can be assigned as *R* or *S*.

Achiral molecule—a compound that contains at least one mirror plane, and therefore is superimposable on its mirror image. The compound cannot rotate plane-polarized light.

Chiral carbon atom—a sp^3 hybridized carbon atom bonded to four different groups/substituents (aka a tetrahedral stereogenic center or chirality center)

Chiral compound—a compound that lacks an internal mirror plane

Conformation—the orientation of atoms in 3-dimensional space of a compound that has free rotation around a bond or bonds (i.e. boat or chair conformation)

Dextrorotatory (+,*d*)—a compound that rotates plane polarized light in a clockwise matter

Diastereomers—stereoisomers that are not enantiomers. Note: there must be two tetrahedral stereocenters (or an alkene that can be assigned *cis* or *trans*) in the molecule for it to have a diastereomer.

Enantiomer—a compound that has a non-superimposable mirror image

Enantiomeric excess (optical purity)—Percent of one enantiomer in a non-racemic mixture ([Major isomer–Minor isomer]/[Major isomer+Minor isomer] x 100)

Epimerize–in a reaction where a tetrahedral stereocenter with a single absolute configuration (*R* or *S*) is converted to a 50:50 mixture of *R* and *S* isomers at that particular stereocenter.

Levorotatory (–,*l*)-- a compound that rotates plane polarized light in a counter-clockwise matter

meso compound—a compound containing 2 or more individually chiral carbons, but so that the compound has an internal mirror plan. Therefore, the compound is achiral.

Optically active (not synonymous with chiral)—An unequal mixture of enantiomers. The mixture will rotate plane-polarized light in proportion to the excess amount of the major enantiomer

Optically pure—A single enantiomer isolated without contamination by the other enantiomer

Racemate—equal amounts of the *R* and *S* enantiomers, does not rotate plane-polarized light

Racemize—in a reaction where a single enantiomer is converted to a 50:50 mixture of enantiomers

Specific rotation—The number of degrees that a particular compound rotates light, taking into consideration the concentration and length of the sample tube, reported as $[\alpha]_D^{25}$ where 25 is the temperature and D is the wavelength of light (Na, D-line)

Stereocenter—a point in a molecule (often a tetrahedral carbon atom attached to 4 different groups or a double bond that can have cis/trans isomers) where an interchange of groups results in a different stereoisomer

Stereoisomer—when comparing two compounds, the compounds have the same physical attachment of atoms but a different 3-dimensional arrangement

Stereogenic carbon centers—a carbon atom attached to four different groups (aka a chiral carbon atom or chirality center)

2^n rule—maximum number of stereoisomers where n = number of stereocenters (tetrahedral+cis/trans alkene isomers)