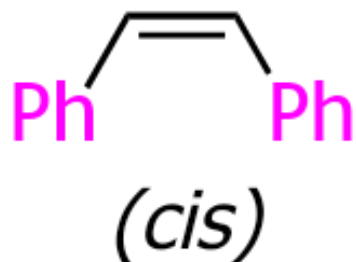


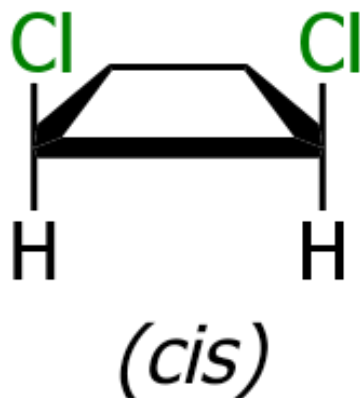
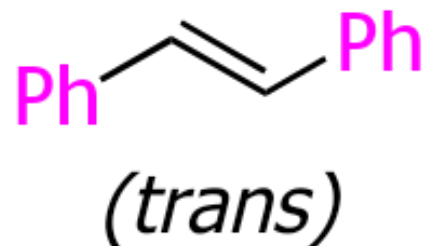
❖ Geometrical isomers
(*cis* & *trans* isomers) are:

- *Diastereomers*

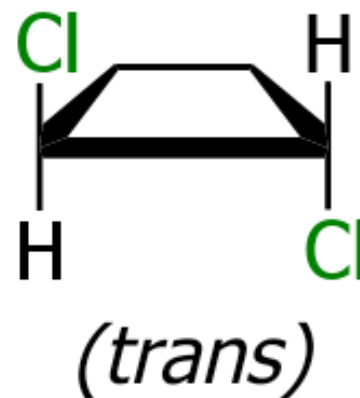
e.g.



and



and



Subdivision of Isomers

Isomers

(different compounds with same molecular formula)

Constitutional Isomers

(isomers whose atoms have a different connectivity)

Stereoisomers

(isomers that have the same connectivity but differ in spatial arrangement of their atoms)

Enantiomers

(stereoisomers that are nonsuperposable mirror images of each other)

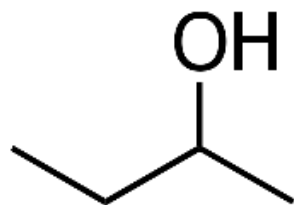
Diastereomers

(stereoisomers that are NOT mirror images of each other)

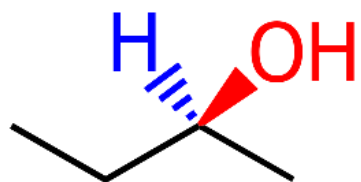
2. Enantiomers and Chiral Molecules

connect with 4 different molecules/atoms

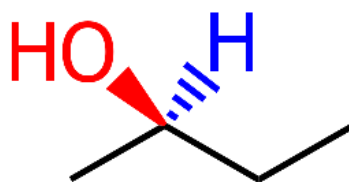
- ❖ Enantiomers occur only with compounds whose molecules are **chiral**
- ❖ A chiral molecule is one that is **NOT** superposable on its mirror image
- ❖ The relationship between a chiral molecule and its mirror image is one that is ***enantiomeric***. A chiral molecule and its mirror image are said to be enantiomers of each other



(2-Butanol)



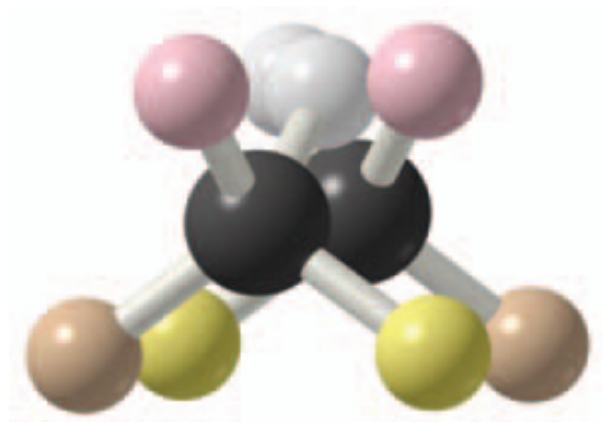
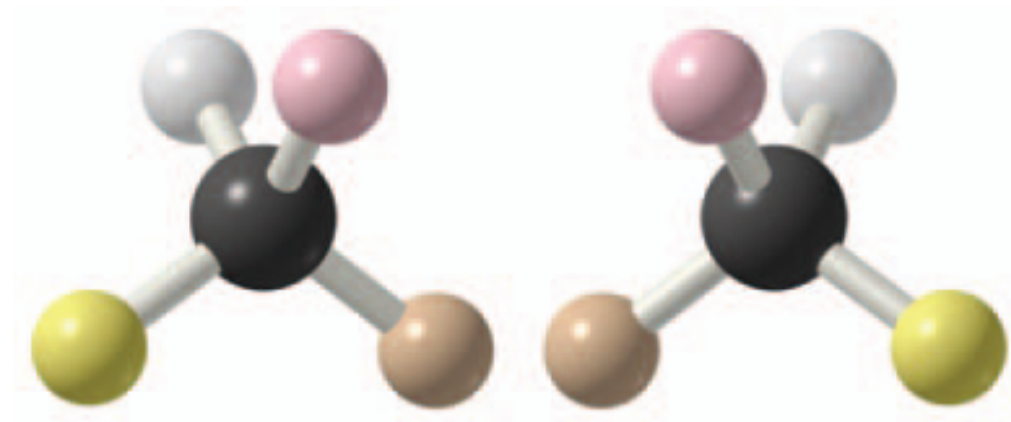
(I)



(II)

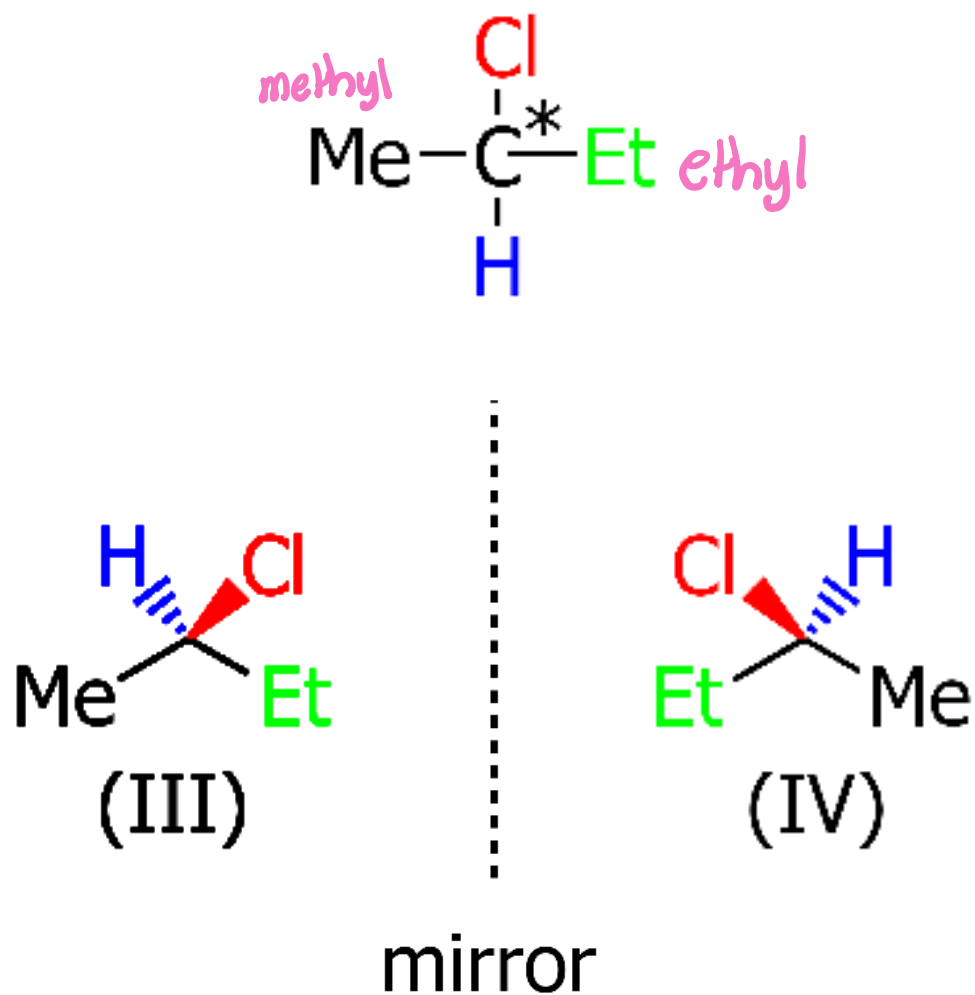
2 shapes

(I) and (II) are nonsuperposable mirror images of each other

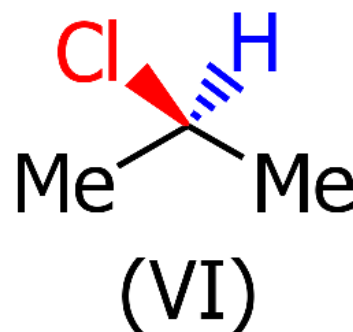
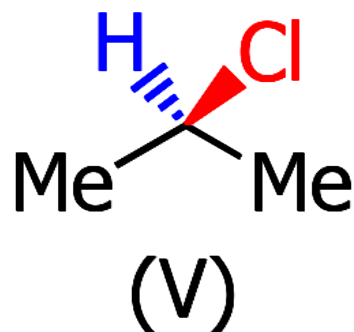
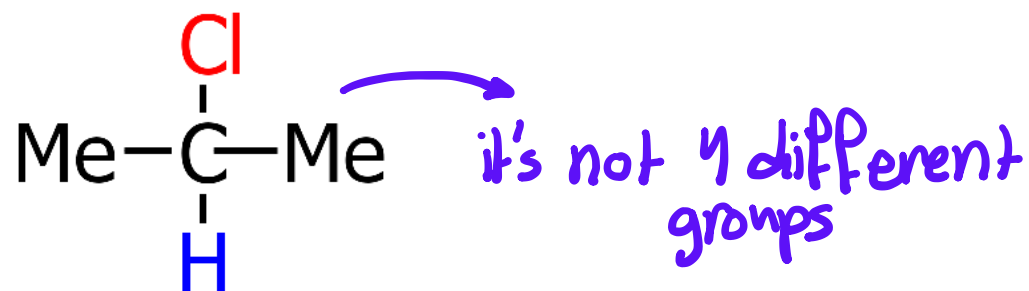


3. A Single Chirality Center Causes a Molecule to Be Chiral

- ❖ The most common type of chiral compounds that we encounter are molecules that contain a carbon atom bonded to *four different groups*. Such a carbon atom is called an *asymmetric carbon* or a **chiral center** and is usually designated with an asterisk (*)



(III) and (IV) are nonsuperposable mirror images of each other → each other

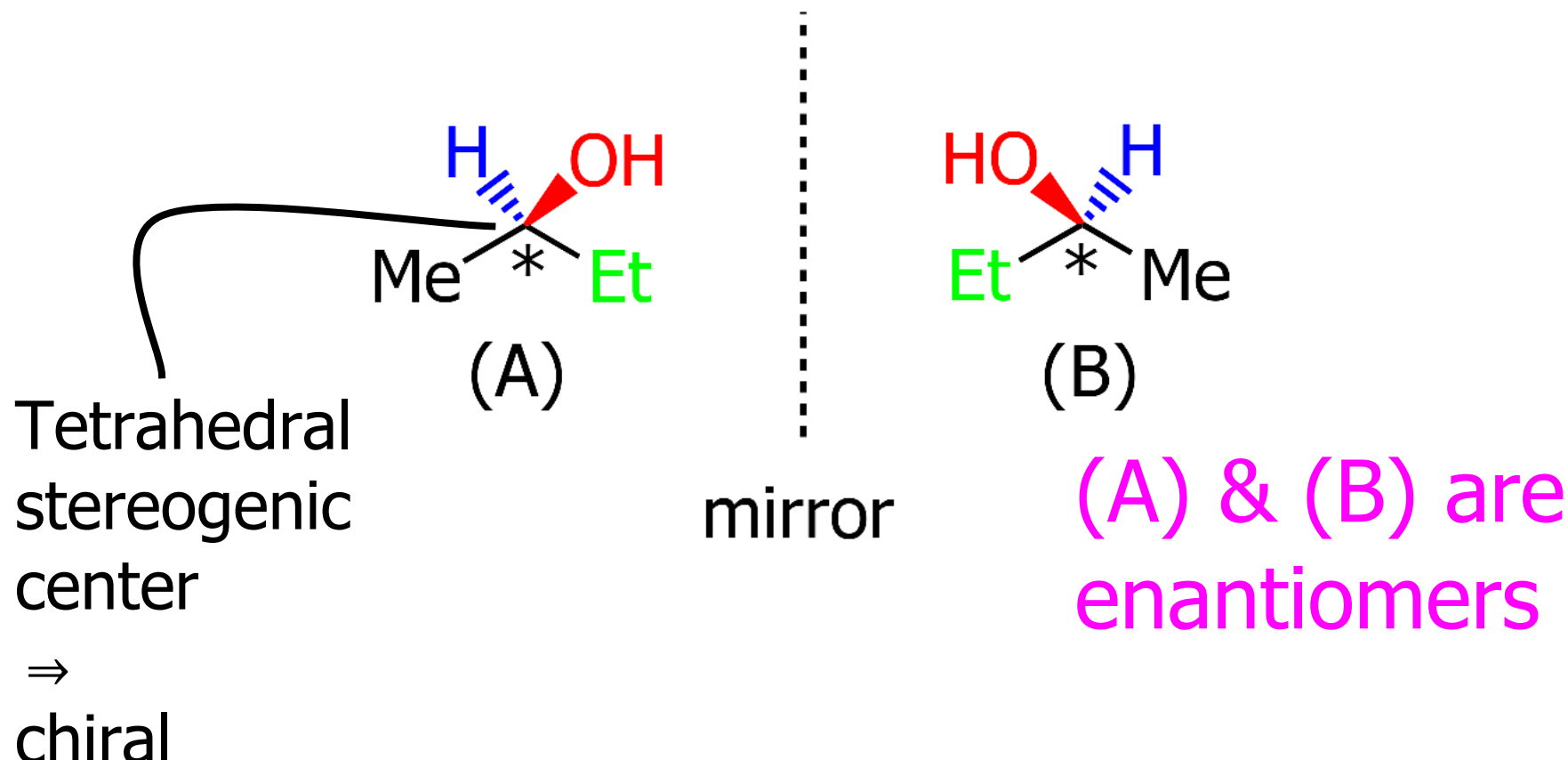


mirror

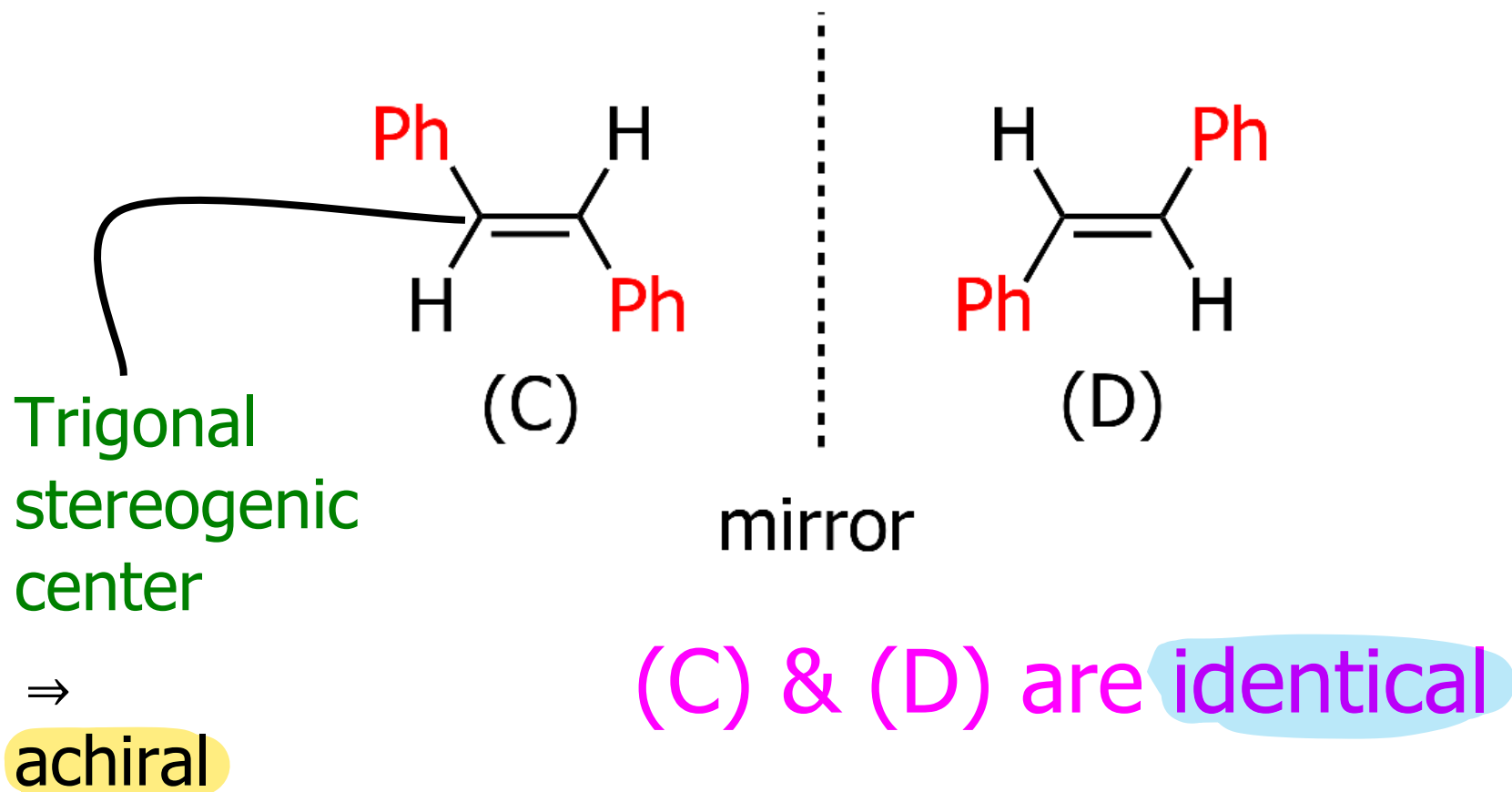
(V) and (VI) are superposable
⇒ not enantiomers ⇒ achiral

3A. Tetrahedral vs. Trigonal Stereogenic Centers

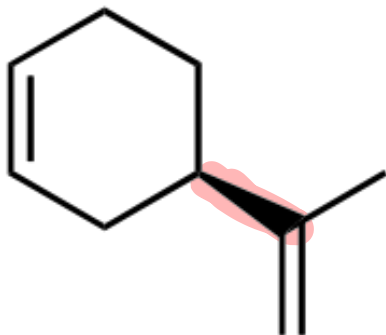
- ❖ Chirality centers are ***tetrahedral stereogenic*** centers



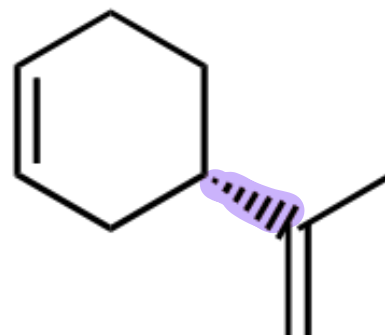
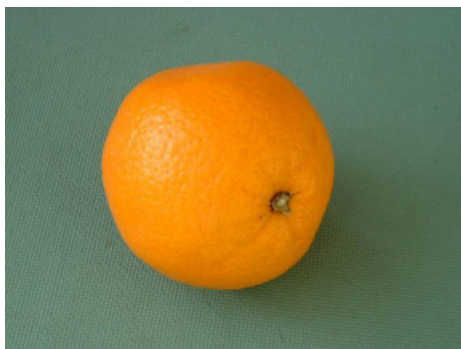
- ❖ *Cis* and *trans* alkene isomers contain trigonal stereogenic centers



4. More about the Biological Importance of Chirality



(+)-Limonene
(limonene enantiomer
found in oranges)



(-)-Limonene
(limonene enantiomer
found in lemons)



Thalidomide

- ❖ The activity of drugs containing chirality centers can vary between enantiomers, sometimes with serious or even tragic consequences
- ❖ For several years before 1963 thalidomide was used to alleviate the symptoms of morning sickness in pregnant women