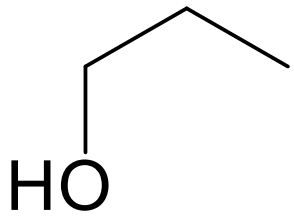
Stereoisomers:

Tutorial focuses on isomers. Compounds with the same molecular formula but different arrangement of atoms.

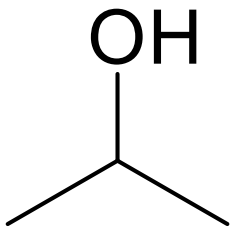
Constitutional Isomers:

Compounds with the same molecular formula but different bonding order.

1-propanol



2-propanol

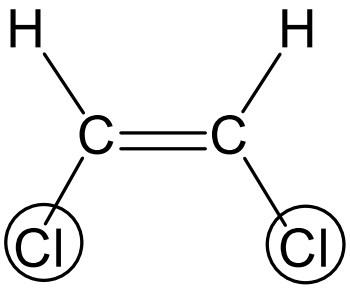


Stereoisomers:

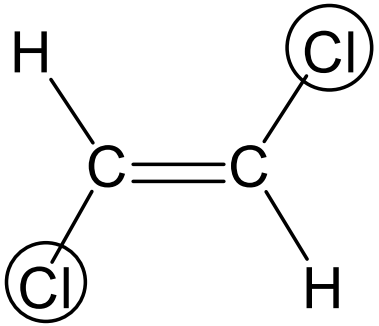
Compounds with the same molecular formula and bond order but different arrangement in three-dimensional space.

Example 1,2-dichloroethene

cis



trans



Chirality:

An object that can not be superimposed on its mirror image is said to be "chiral."

Ex: Your left and right hands.

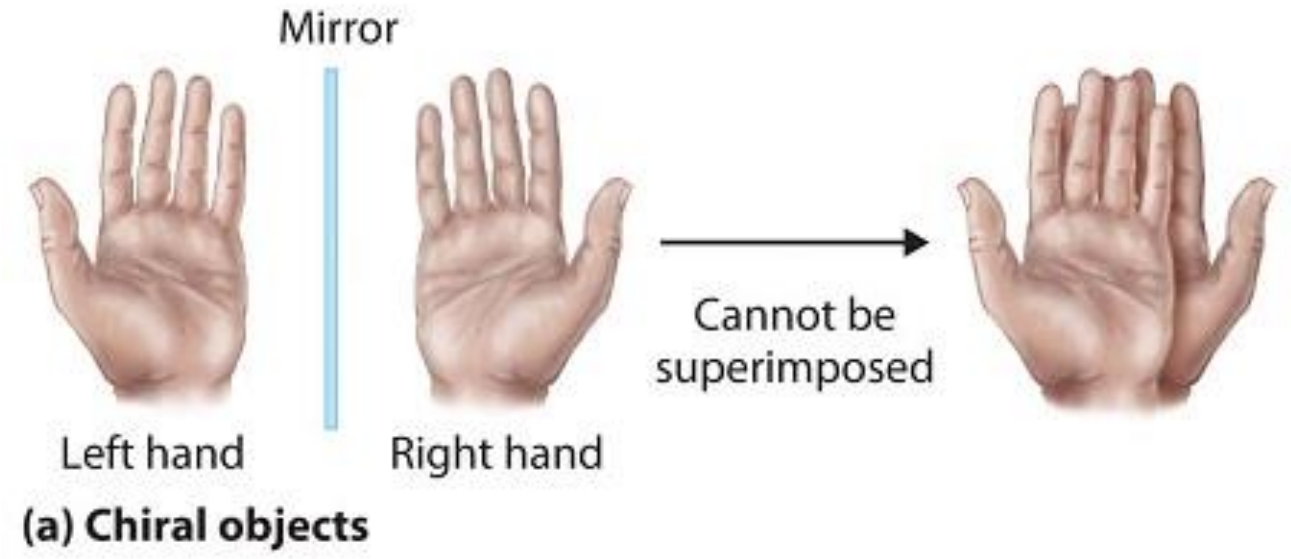
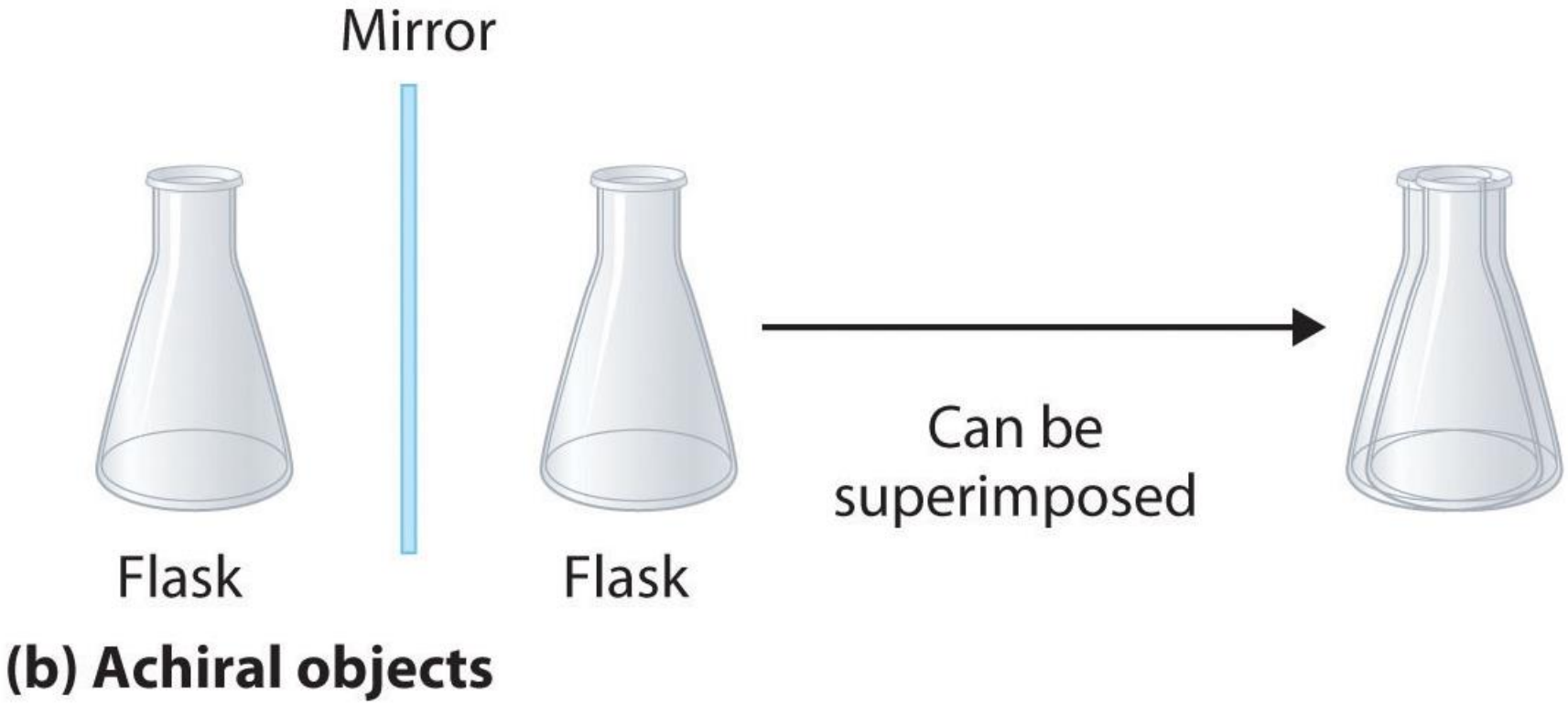


image from: jinavie.tumblr.com

Chirality cont…:

An object that can be superimposed on its mirror image is said to be "achiral."

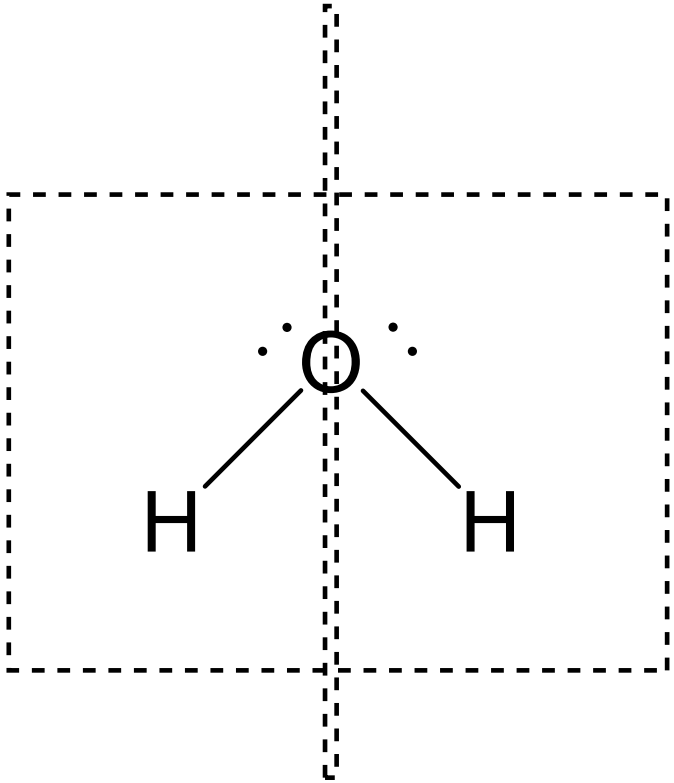


(b) Achiral objects

image from: jinavie.tumblr.com

Chirality cont…:

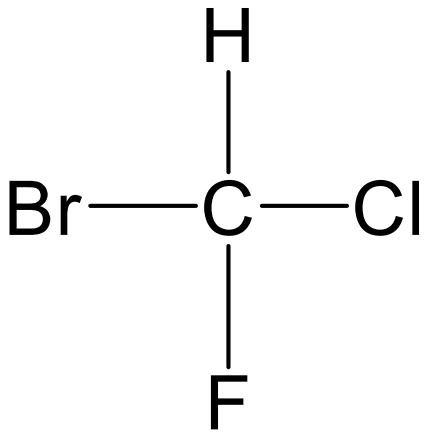
An achiral object contains a plain of symmetry that splits it into two equal halves. Consider the water molecule.



Chiral Carbons/Stereogenic Centers:

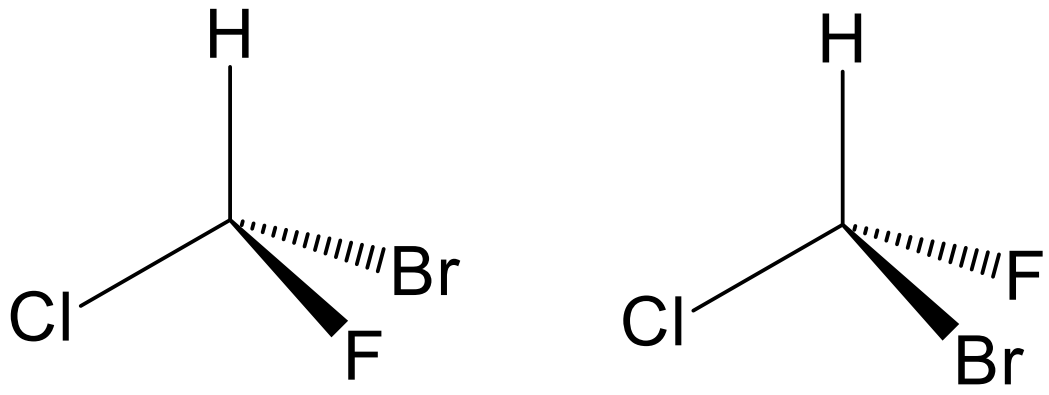
Consider halogenated methane. Contains 4 different substituents.

CHClFBr



Chiral Carbons/Stereogenic Centers:

When a carbon atom contains 4 different Substituents it has no plane of symmetry and is chiral. C has a stereogenic center and is refered to as a "chiral carbon."



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Chiral Carbons/Stereogenic Centers:

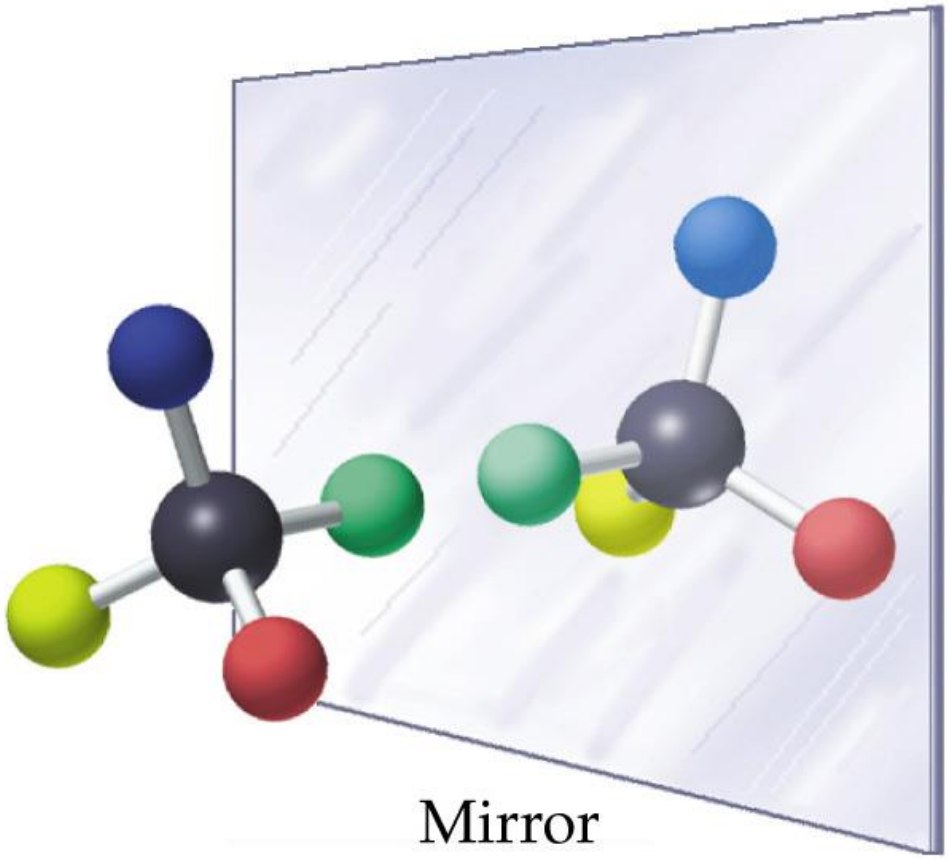
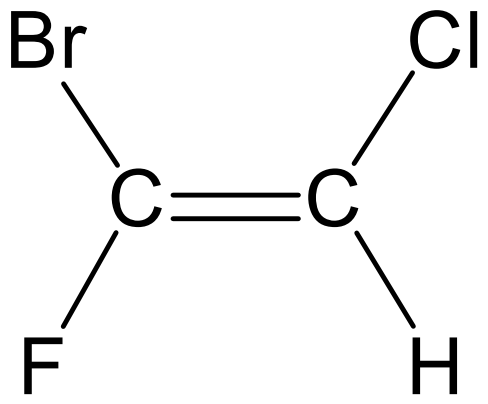


Image from: astrobiology.berkeley.edu

E-Z Notation for Geometric Isomers:

E-Z Notation used when you do not have identical substituents on the carbons across from the C=C bond.

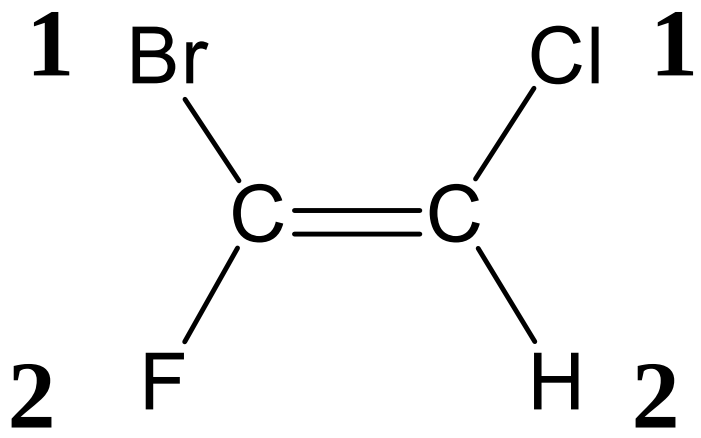


You compare the substituents attached to each of the carbons on the C=C bonds and assign a priority based on rules.

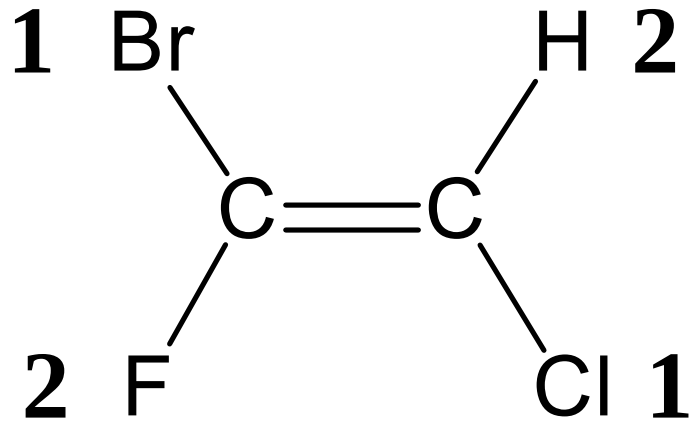
Cahn-Ingold-Prelog Priority Rules:

Assign a priority(1 or 2) to each atom bonded to the carbon substituent on the C=C bond. If there is two identical atoms attached to the carbons, look at the first point of difference.

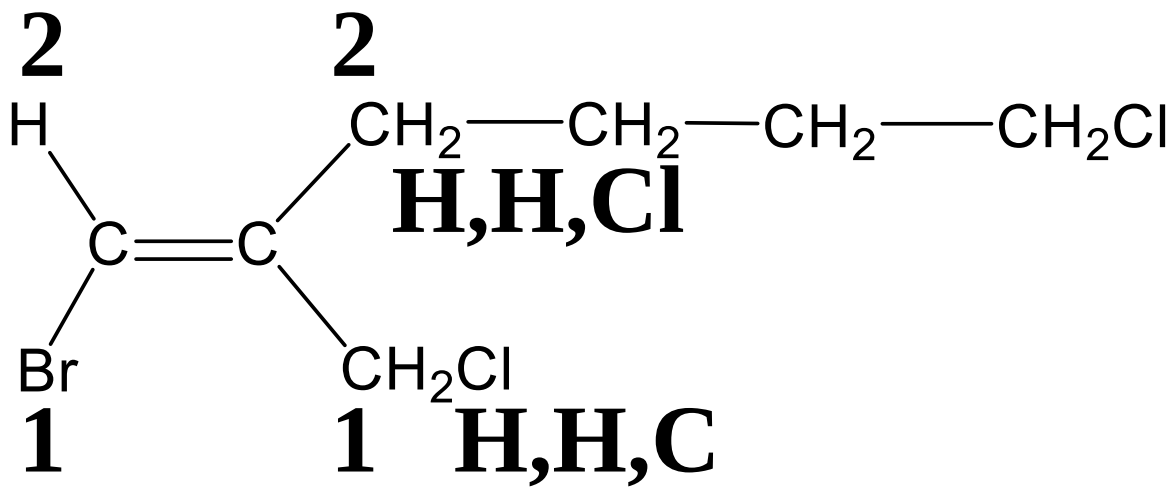
(E)- : the higher priority groups are on opposite sides of the double bond.
(Z)- : the higher priority groups are on the same side of the double bond.



(Z)-1-bromo-2-chloro-1-fluoroethene



(E)-1-bromo-2-chloro-1-fluoroethene



(Z)-isomer