

Chapter 5

Stereochemistry: Chiral Molecules

Isomerism: Constitutional Isomers and Stereoisomers

Isomers are different structures with the same molecular formula.

Constitutional isomers, already examined, are isomers with different **bond connectivities**.

Examples of Constitutional Isomers

formula

constitutional isomers

C_3H_8O

$CH_3CH_2CH_2OH$

$CH_3\overset{OH}{\underset{|}{CH}}CH_3$

C_4H_{10}

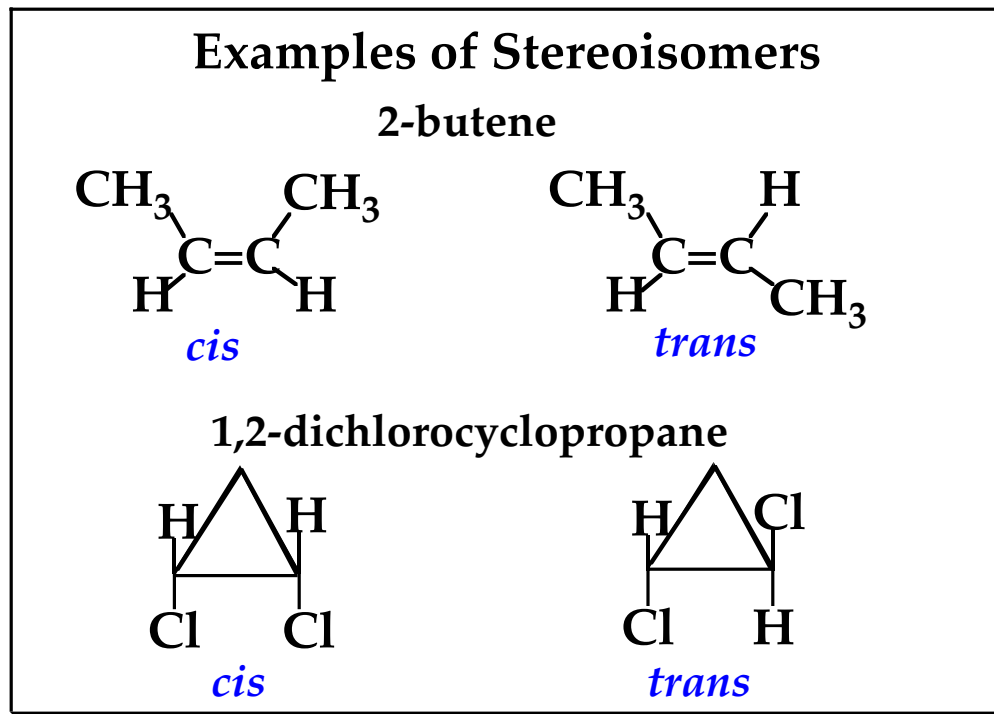
$CH_3CH_2CH_2CH_3$

$CH_3\overset{\underset{CH_3}{|}}{CH}CH_3$

Stereoisomers

Stereoisomers are not constitutional isomers.

They have the same general atom connectivity, but they **differ in the arrangement of atoms in space**. The *cis-trans* isomers of alkenes and cycloalkanes are examples of stereoisomers.



Enantiomers and Diastereomers

Stereoisomers are divided into two general categories: **enantiomers** and **diastereomers**.

Enantiomers are stereoisomers that are **mirror image related**, and are **not superimposable upon one another**.

Diastereomers are stereoisomers that are **not enantiomers**. They are not mirror images of one another.

ISOMERS

(different compounds with the same formula)

CONSTITUTIONAL ISOMERS

(different atom connectivities)

STEREISOMERS

(same atom connectivities,
different arrangement in space)

ENANTIOMERS

(mirror images, not superimposable)

DIASTEREOMERS

(not mirror image isomers)