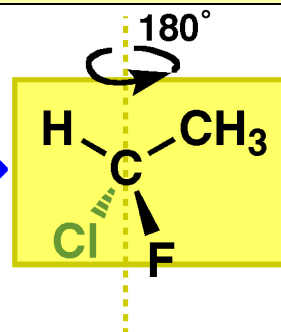


# What Kind of Stereoisomer?

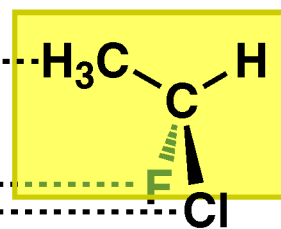
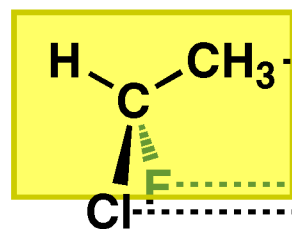
Once we know that a pair of structures is related as stereoisomers, we would then like to know what kind of stereoisomers they are. The two main classes of stereoisomers called enantiomers and diastereomers. The example below illustrates the case of **enantiomers** – stereoisomers related as mirror images.

These isomeric structures are not superimposable, yet they have the same pattern of bonding connectivity. Thus, they are stereoisomers. But how are they related? To find out, flip the plane of the structure on the right, one side to the other (i.e., rotate by  $180^\circ$ ). Then compare. The structures are nonsuperimposable mirror images.



A racemic mixture has equal quantities of both enantiomers.

flip plane, one side to the other



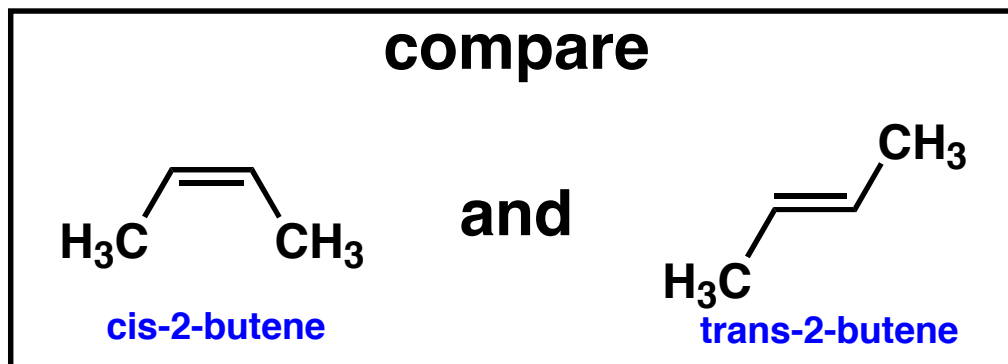
these two structures are related as an object and its nonsuperimposable mirror image

**Mirror images?** By mirror image relationship we mean that each atom projected through a plane will find the equivalent atom on the opposite side and at an equidistant. Stereoisomers that do not have a mirror image relationship are **diastereomers**.

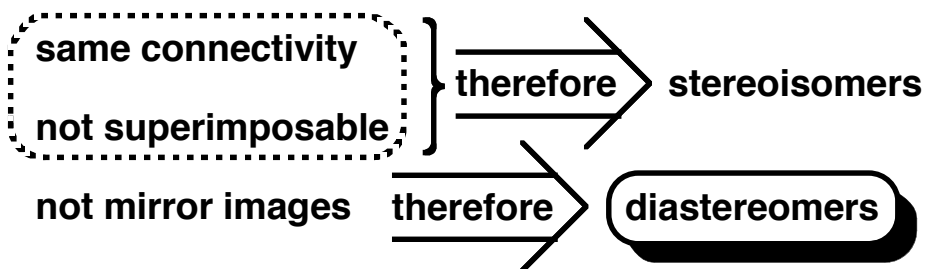


# An Example of Diastereomers

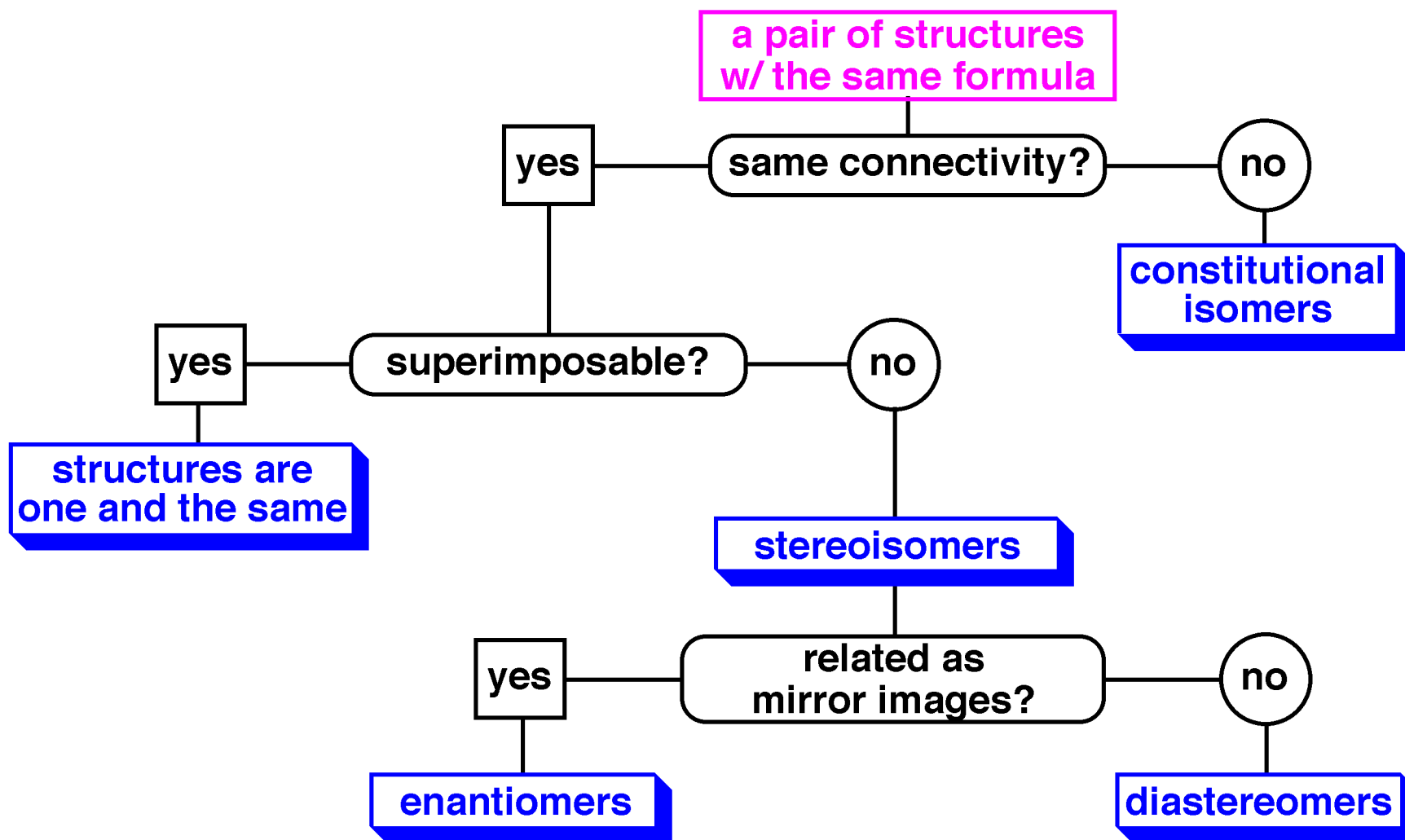
To summarize, compare the cis and trans isomers of 2-butene. How are they related? They have the same connectivity, yet they are not superimposable; therefore, they are stereoisomers. However, they are not related as an object and its mirror image. Therefore, they are diastereomers.



## isomer classification tests

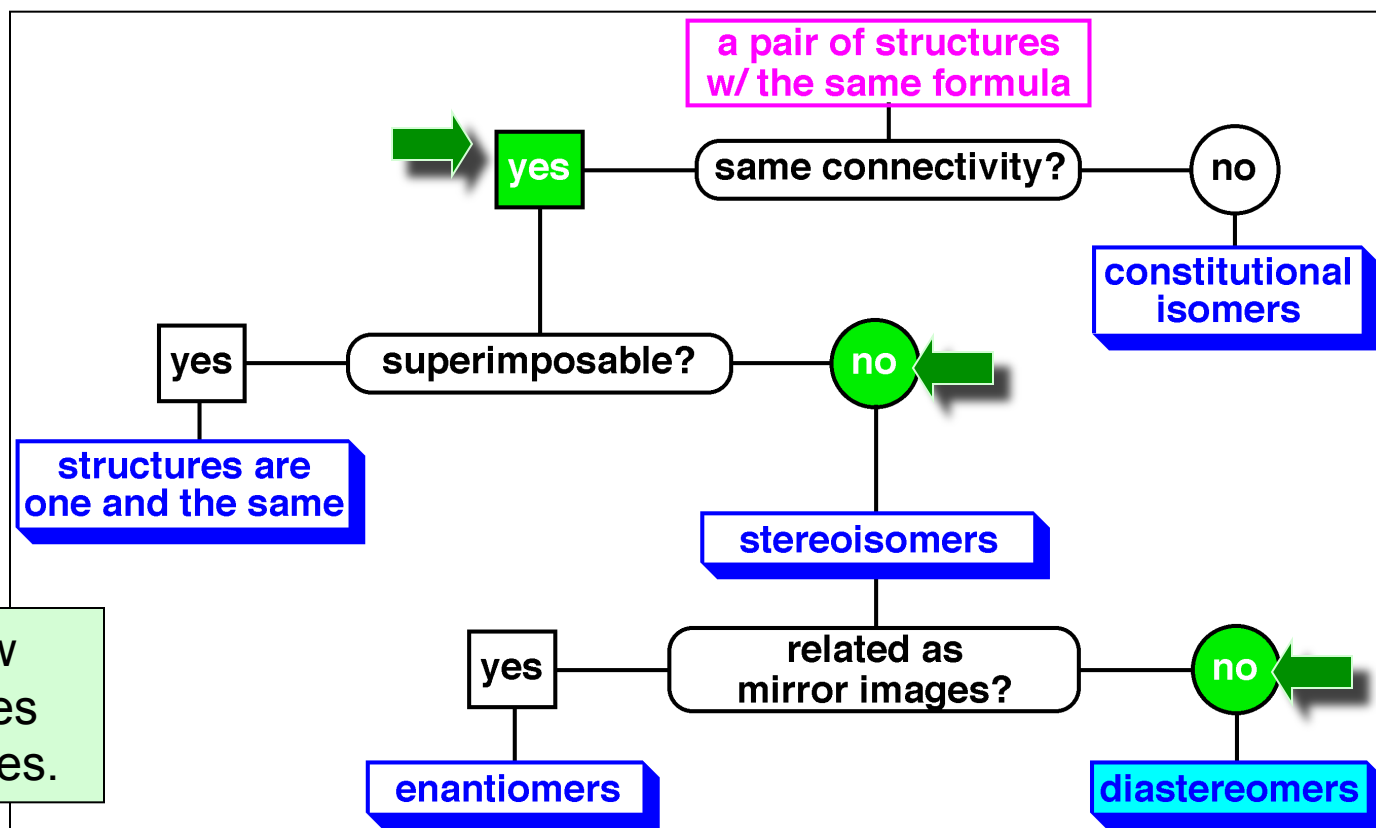
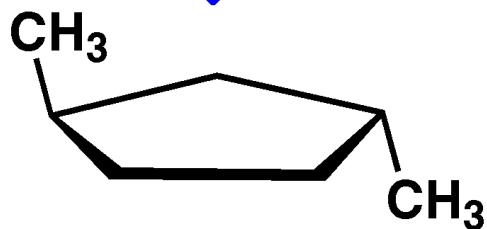
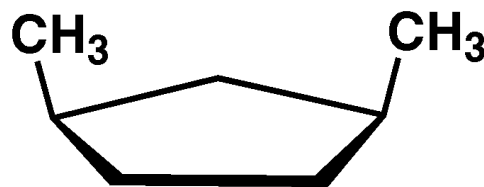


# Isomers - A Flowchart Systematization



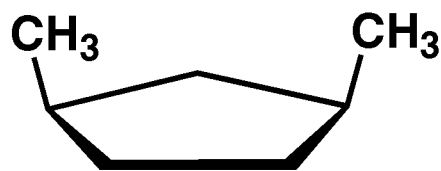
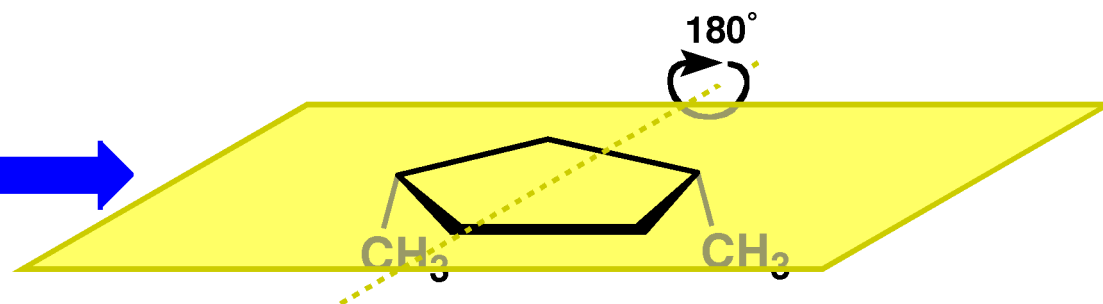
# Examples Using the Flowchart

These structures cannot be superimposed and they are not related as mirror images. They are diastereomers.

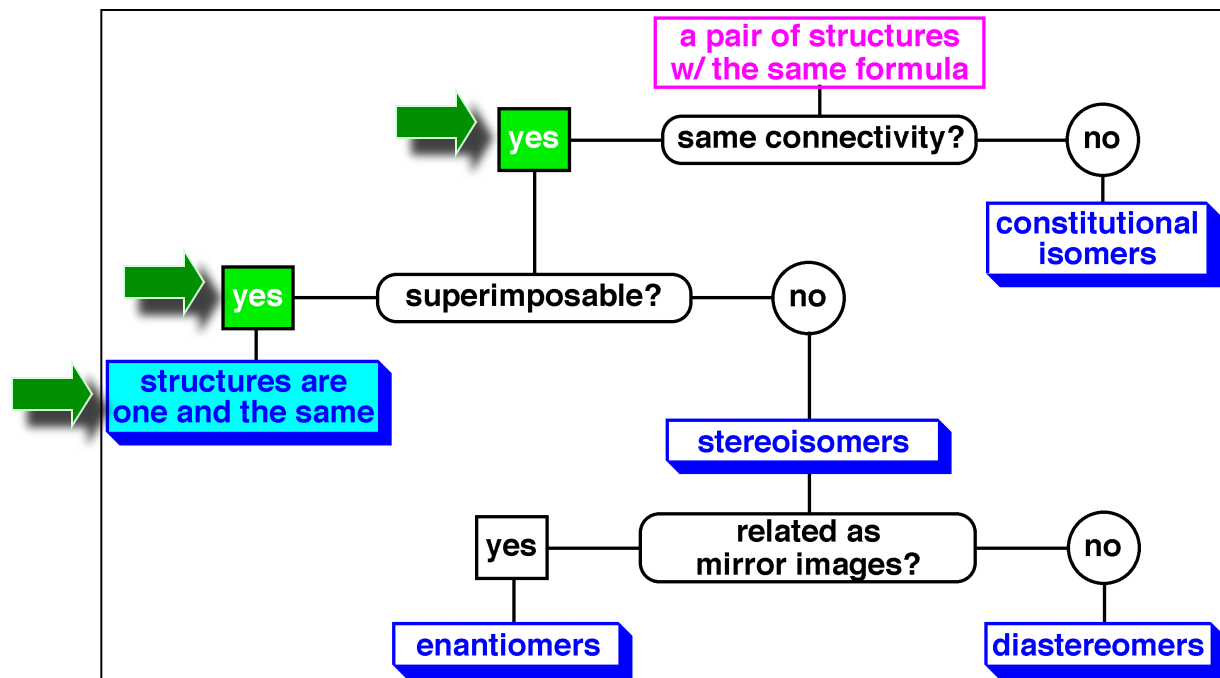
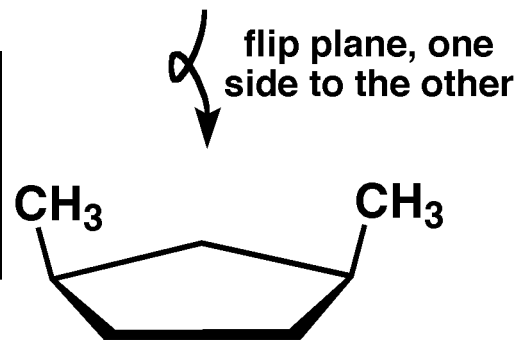


The green boxes show the flowchart responses for this pair of structures.

These structures can perfectly be superimposed on one another. To see this, flip the plane of the structure on the right, one side to the other (i.e., rotate by 180°). Then compare. The drawings are simply different representations of the same structure.

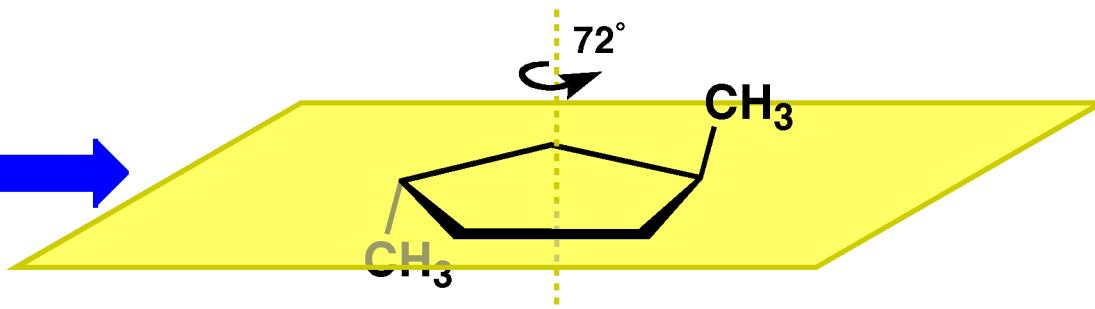


these two structures are related as superimposable objects - they are one and the same

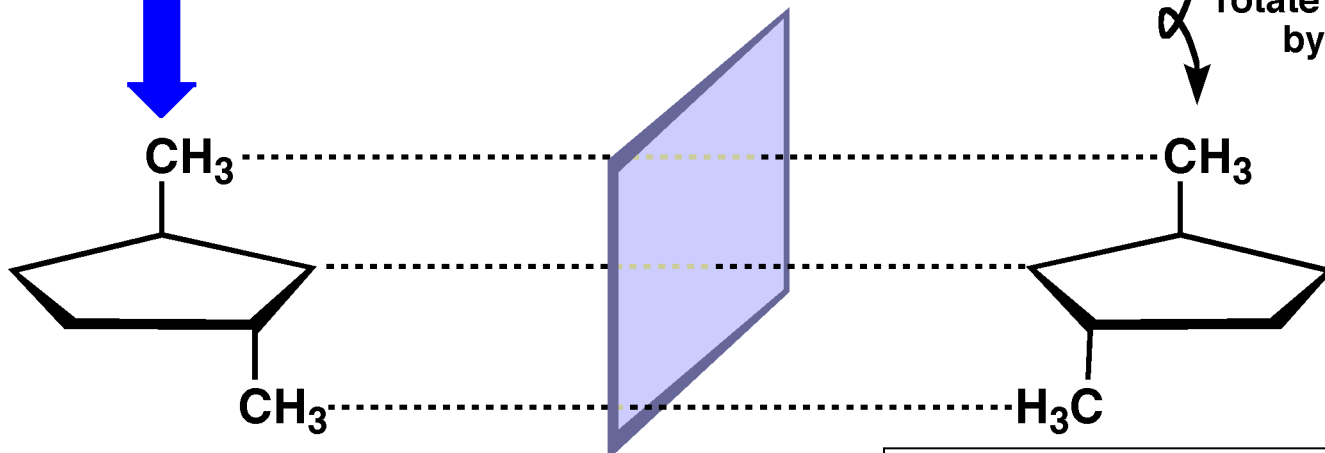


The green boxes show the flowchart responses for this pair of structures.

These structures cannot be superimposed on one another (make a model)! To see that they are mirror image related, rotate the structure on the right by 1/5 turn in the plane. Then compare.



rotate in the plane by 1/5 turn



these two structures are related as object and nonsuperimposable mirror image; they are enantiomers

The green boxes show the flowchart responses for this pair of structures.

