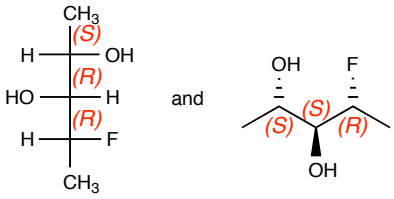
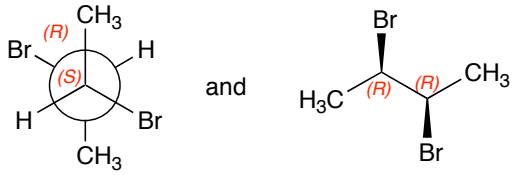
Chem 2061 Fall 2005 Name: _____
Chapter 5 Assignment
Due Friday, October 14

If you did poorly on the stereochemistry section of the exam, here's your chance to redeem yourself. A 5/5 on this assignment will earn you extra credit (up to 5 points) towards that page of the exam.

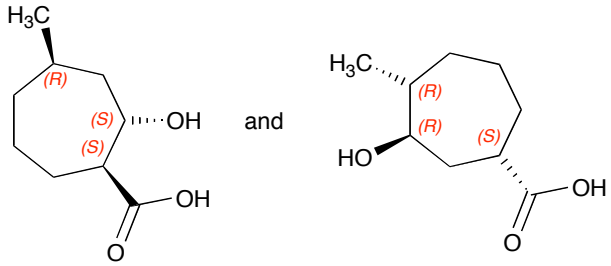
1. For each pair of compounds, identify the asymmetric carbons with stars, assign *(R)* or *(S)* configurations, and identify their relationship as same compound, enantiomers, diasteromers, or constitutional isomers (review these definitions!)



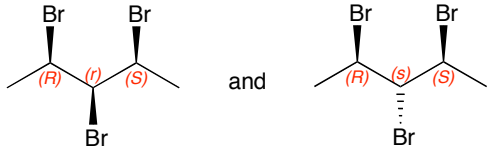

relationship: diastereomers




relationship: diastereomers




relationship: const. isomers




relationship: diastereomers

Extra credit (5 pts): On a separate sheet, show how C3 of both compounds to the left is stereogenic yet not an asymmetric carbon.

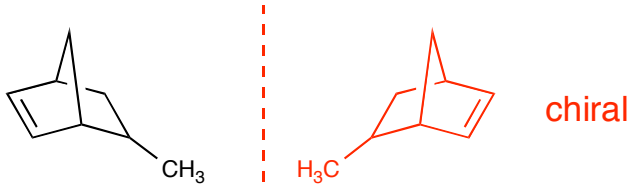
Extra credit: a carbon is stereogenic if the interchange of two of its connected groups makes a stereoisomer. A carbon is asymmetric if it has 4 different groups attached to it. This pair of molecules is interesting because two of the groups have the exact same atoms and bonding order, but differ only by their own stereochemical configurations. This makes it impossible for us to differentiate the groups in order to give them an *(R)* or *(S)* configuration in the standard way. This makes the center carbon non-asymmetric.

It is stereogenic, however. In the left compound, imagine interchanging the bromine and hydrogen on the center carbon - this will give the other drawn compound. The models of these compounds are definitely distinguishable from each other, and differ only in the orientation of certain groups, and therefore they are stereoisomers. This fits our definition of the center carbon being stereogenic.

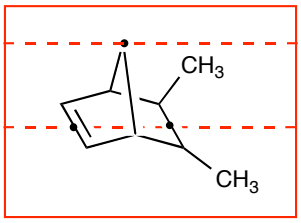
The two compounds are diastereomers of each other - since they are distinct stereoisomers but not enantiomers.

Note the configurations of the center carbons drawn above with lowercase r and s. This is a method to distinguish these confusing carbons. If two groups only differ by a stereochemical configuration, by convention the group with the *(R)* configuration takes the higher priority, and the configuration of the unknown stereocenter is determined as normally, this time with a lowercase r or s given.

2. For the following compounds, (**a**) indicate whether the following compounds are chiral or achiral and why. (**b**) For the chiral compounds, draw the enantiomer. (**c**) Draw any internal mirror planes and (**d**) indicate if any compounds are meso (use the strict definition of meso we used in class – a molecule does not need a mirror plane to be meso!)

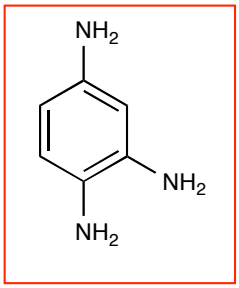



chiral



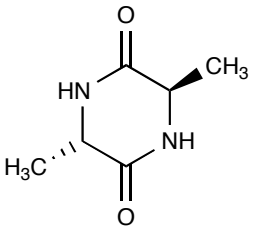

achiral
meso

σ

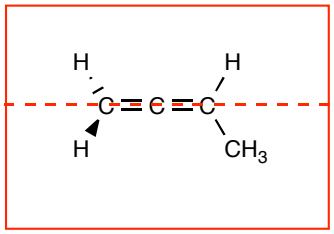



achiral
not meso (no C*)

σ in paper




achiral
meso




achiral
not meso (no C*)

σ in paper