Chem 51A – SSI 2014
Discussion 6 Worksheet
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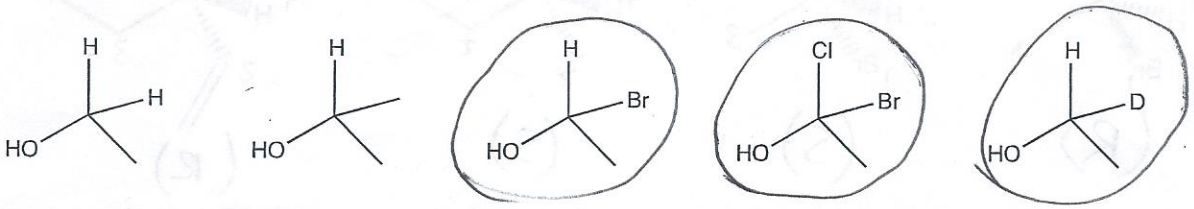
This worksheet will focus on concepts to be discussed or already discussed, in Chapter 5. Those concepts being 1) Stereoisomers 2) Assigning R & S 3) Multiple Stereocenters and 4) Stereoisomer properties.

We will begin talking about **stereochemistry**, or the relative spatial arrangement of atoms in a molecule. Understanding stereochemistry is crucial to understanding the reactions you will be learning about towards the end of this course and in future organic chemistry courses.

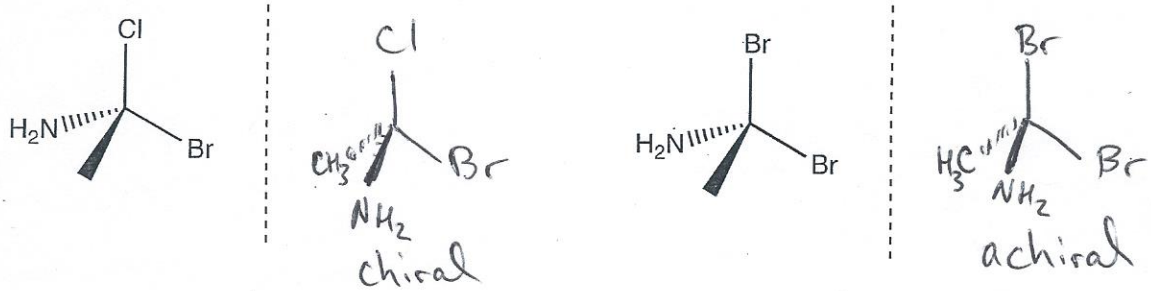
Circle each structure below that possesses a stereocenter.



If you have only one stereocenter, your molecule is also **chiral,** a term we will discuss next. To be **chiral** is to have a **non-superimposable** mirror image. An example is the pair of 2-bromobutane structures shown above. Another, perhaps easier to see, example is your pair of hands.

Draw mirror images of the following molecules.

Now draw the mirror image of the structures drawn below. Indicate whether the structure is chiral or not. Ensure you use wedges and dashes to indicate directionality.

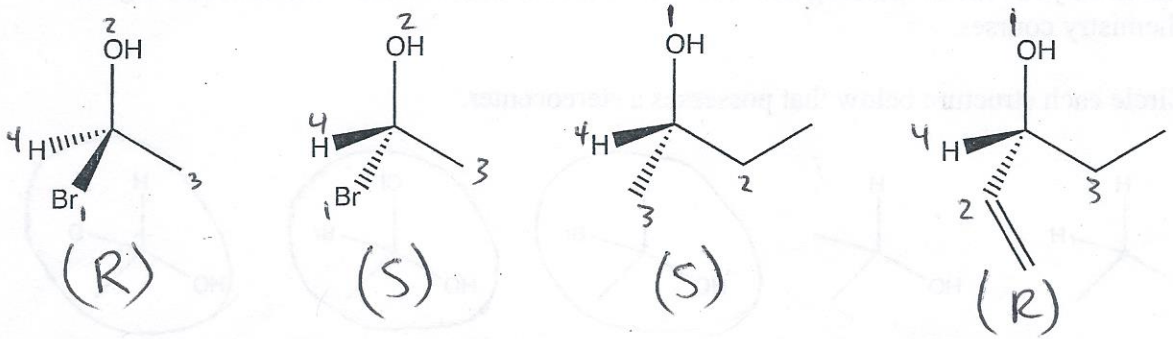


What do you call a pair of structures that are non-superimposable mirror images **of each other**? Enantiomers

To determine the **absolute configuration,** a special stereocenter nomenclature is used: the R and S system.

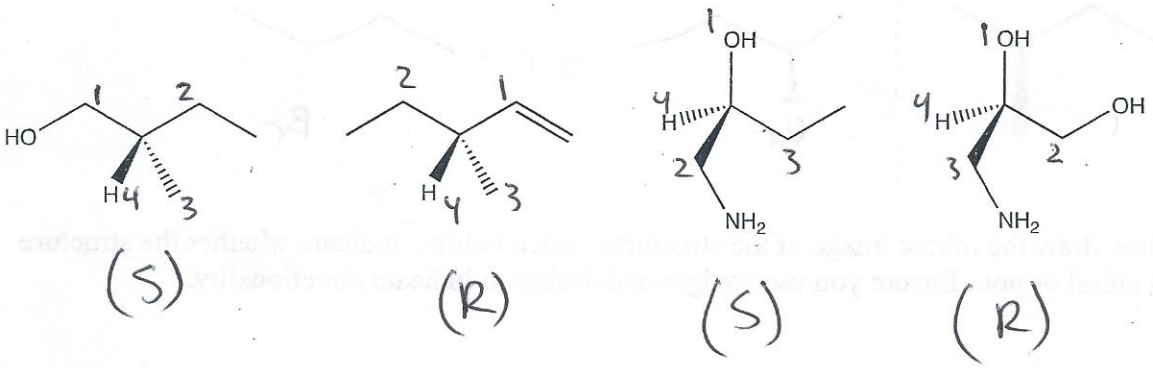
To assign R or S, **for every stereocenter in a molecule**, the substituents on any given stereocenter are prioritized. Prioritization is done by first looking at the atoms **directly bonded** to the stereocenter carbon. Atoms with higher atomic numbers are given higher priority. If two atoms on the stereocenter are identical, move one atom out and compare again.

Examine the below structures and work through prioritization.



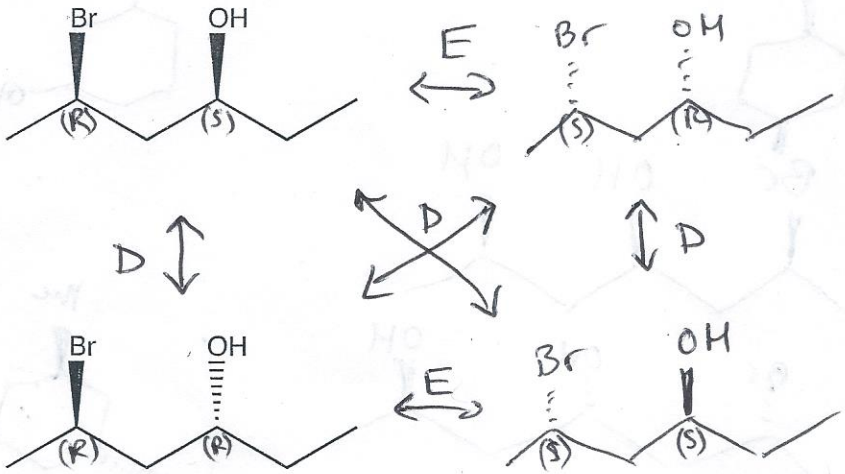
Once priorities are assigned and if the lowest priority substituent (usually H) is back (dash), R or S assignment is simply determining whether the priorities are moving clockwise (R) or counterclockwise (S). If the lowest priority substituent is forward (wedge), the molecule can either be rotated to put the substituent in the back or, *alternatively, the absolute configuration can be determined and then the opposite is taken i.e. with the hydrogen forward the stereochemistry is **S**, so the real stereochemistry is **R**.*

Determine the R or S configuration of the four structures above and of the structures below.



Draw the mirror image of each of the structures below using wedge and dash notation. Assign absolute stereochemistry to each stereocenter and determine the stereochemical relationship of each structure to the others.

E = enantiomer
D = diastereomer



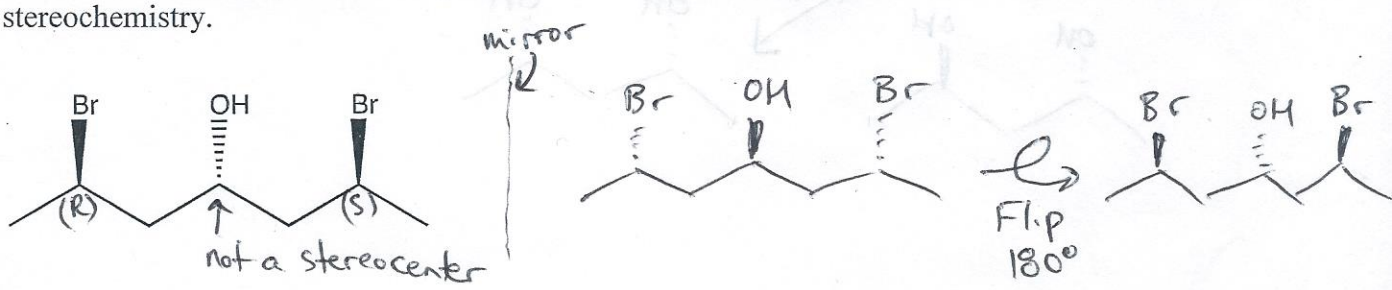
How are the absolute configurations of each stereocenter in the enantiomers related?

They are all reversed.

How are the absolute configurations of each stereocenter in the diastereomers related?

One is the same, the other is reversed.

Draw the mirror image of the compound shown below and assign absolute stereochemistry.



Is the molecule chiral? Why or why not?

Not chiral, because mirror image is the same molecule