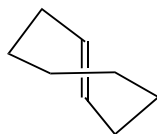
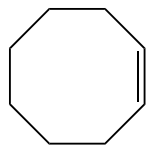
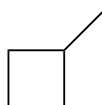


Stereoisomer Practice Problems - **Answers**

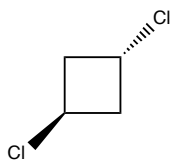
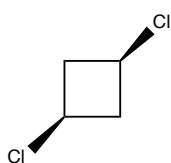
1. Indicate whether each pair of compounds are enantiomeric (E), diastereomeric (D), constitutional isomers (C), or the same (S).



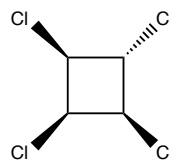
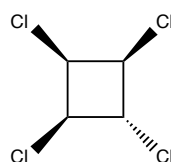
_____ D _____



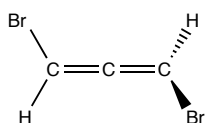
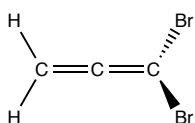
_____ C _____



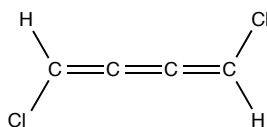
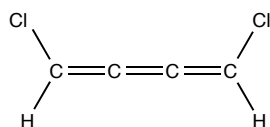
_____ D _____



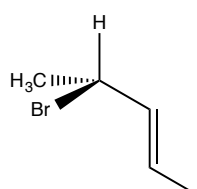
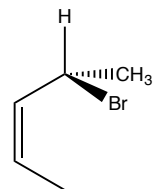
_____ S _____



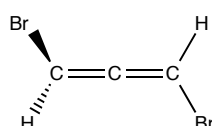
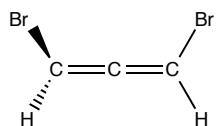
_____ C _____



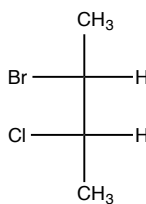
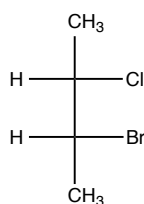
_____ D _____



_____ D _____

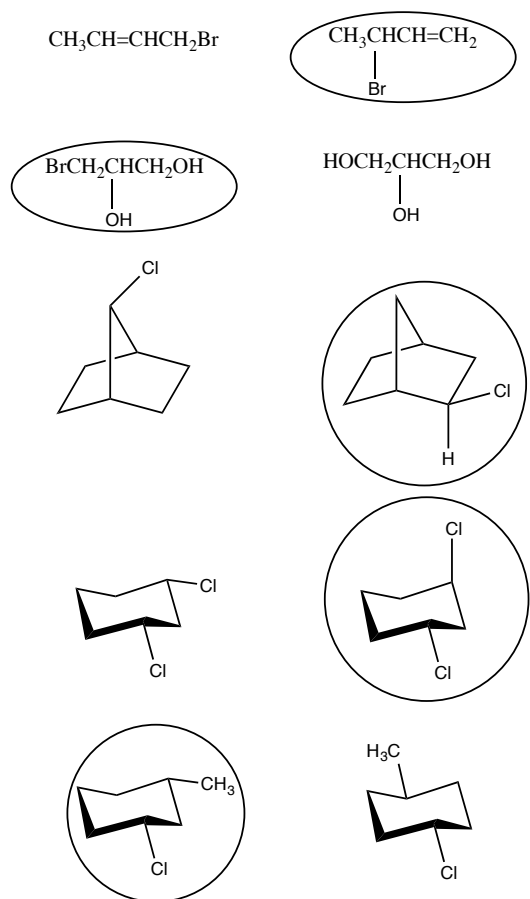


_____ E _____



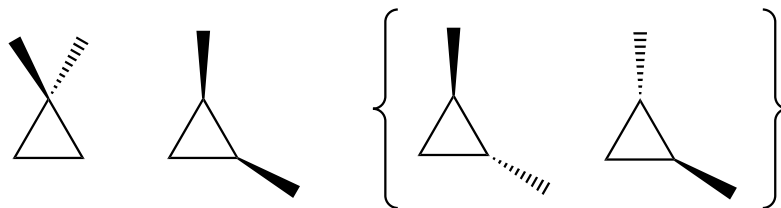
_____ S _____

2. In each of the following pairs of compounds one is chiral and the other achiral. Circle the chiral.



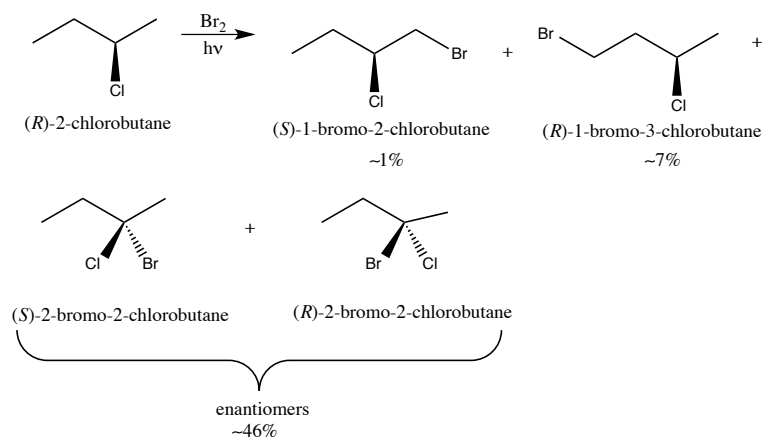
3. A sample made up of equal amounts of all the isomers of dimethylcyclopropane is injected into a gas chromatography (GC) instrument with an achiral column. The GC separates 3 components, none of which shows any optical rotation.

- a) Draw all distinct isomers of dimethylcyclopropane and explain the findings.

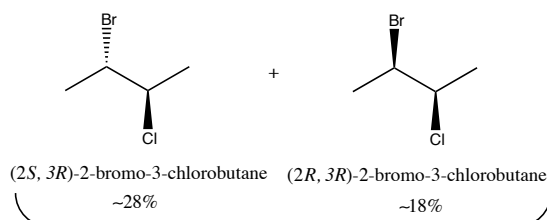


These two compounds represent a pair of enantiomers that cannot be separated using an achiral chromatography column. Because the mixture possess equal amounts of both they constitute a racemic mixture.

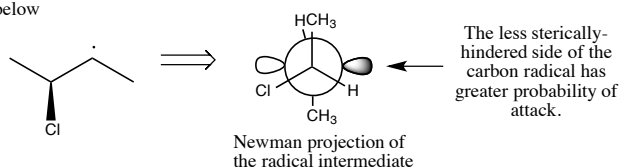
4. The alkyl halide, (R)-2-chlorobutane, undergoes bromination through a radical mechanism. The monobromination products are: 1-bromo-2-chlorobutane, 1-bromo-3-chlorobutane, 2-bromo-3-chlorobutane, and 2-bromo-2-chlorobutane.
- The 1-bromo-2-chlorobutane compound is about 1% of all the monobrominated products. What is the absolute configuration of this product?
 - The 1-bromo-3-chlorobutane constitutes about 7% of the monobrominated products. What is the absolute configuration of this product?
 - The 2-bromo-2-chlorobutane monobrominated product consists of a racemic mixture in about 46% of the total products. Explain the occurrence of this mixture.
 - The 2-bromo-3-chlorobutane is a mixture of 2 diastereomers. Careful separation of the components shows the (2S, 3R) diastereomer is about 28% of the mixture and the (2R, 3R) about 18%. Provide a brief explanation as to why these two diastereomers are not produced in equal amounts. Hint: Use the Newman projection of the intermediate to represent the formation of each diastereomer.



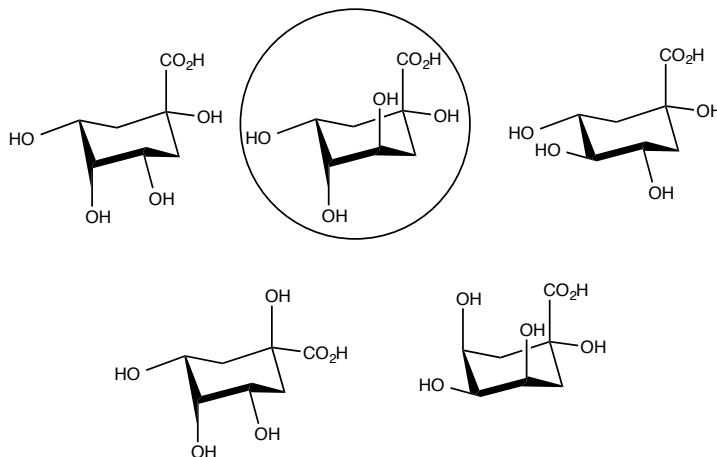
These 2 enantiomers come from the 2-chlorobutyl radical. The carbon radical is hybridized sp^2 with trigonal planar geometry. The probability of attack from either side of the plane is the same.



The 2-bromo-3-chlorobutane diastereomers are generated by the 2-chloro-3-butyl radical. The Newman projection of this radical through C_2-C_3 is shown below



5. Quinic acid, $C_7H_{12}O_6$, can be extracted from coffee beans. It gives coffee the bitter taste. The specific rotation of quinic acid is $[\alpha]_D^{20} = -43.9^\circ$. Which of the proposed structures, drawn below, is more likely to be correct? Briefly explain your choice.



The molecule is chiral according to the data provided. Therefore the molecule should not have a plane of symmetry.

6. Circle the structure that represents the ozonolysis product under reducing conditions of (*trans*)-3,4-dimethylcyclopentene.

