

Names of all students (please print) \_\_\_\_\_

Answer Key

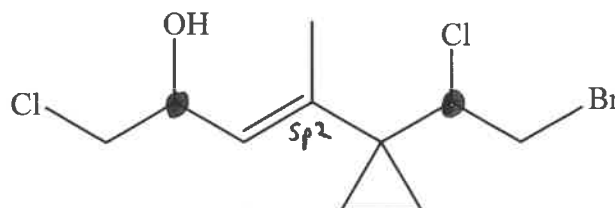
CHEM 243 Organic Chemistry I

Points \_\_\_\_\_ (10 max)

**Worksheet #10: October 1, 2021.** Complete the following worksheet by collaborating with a group of 3-4 students. You can use a text book or your lecture video notes. You must work together, with the names of all students included on **ONE** sheet and turned in for a group grade.

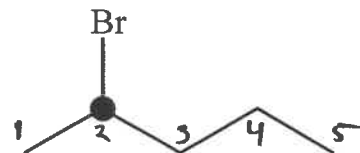
**Please take a few minutes of class time to complete the class survey using the URL link in Blackboard (also emailed to you). Let me know if you need to borrow a laptop in class (<https://forms.gle/1UxkySCWz78qLpDB8>).**

**(1) Chiral Carbons.** Place a dot (•) on each chiral carbon in the molecule drawn at the right. **REMEMBER:** Chiral carbons must be  $sp^3$  hybridized, and bonded to 4 different atoms or groups. **HINT:** Start by focusing on carbons where you "see" either 3 or 4 bonds in the zig-zag structure.



**(2) Stereoisomers – Introduction to Enantiomers.** In 2-bromopentane, are the following statements about this compound **TRUE** or **FALSE**?

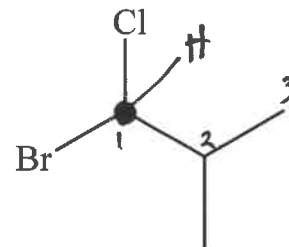
- F C-2 is  $sp^2$  hybridized and trigonal planar
- T 2-bromopentane has  $2 \times 1^\circ$  carbons, and  $3 \times 2^\circ$  carbons
- T C-2 is bonded to 4 different atoms or groups of atoms
- T C-2 is  $sp^3$  hybridized and a chiral carbon
- T 2-bromopentane has two, non-superimposable mirror images
- T the two mirror image molecules of 2-bromopentane are a type of stereoisomer called enantiomers
- T enantiomers have the same formula and connectivity, but differ in their 3D configurations
- F the two enantiomers will have different melting points and boiling points
- T a mixture of the two enantiomers is called a racemic mixture



**(3) Stereoisomers – Drawing Enantiomers and assigning R-S Configurations.**

(a) Place a dot (•) on the **ONE** chiral carbon in the compound drawn at the right, and give an IUPAC name.

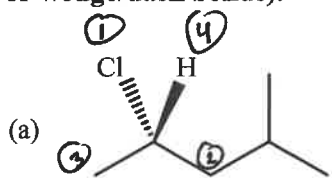
1-bromo-1-chloro-2-methyl propane



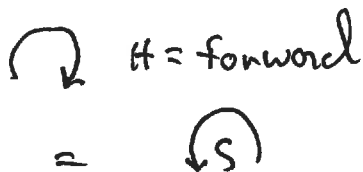
(b) In the boxes below, draw a zig-zag structure for each enantiomer, using **wedge and dash bonds** for the chiral carbon, AND assign the (R) and (S) configuration for each enantiomer.

<p style="text-align: center;">H is <u>back</u> clockwise</p> <p style="text-align: center;">Enantiomer #1. Configuration = <u>R</u></p>	<p style="text-align: center;">clockwise <u>BUT</u> H is <u>forward</u></p> <p style="text-align: center;">Enantiomer #2. Configuration = <u>S</u></p>
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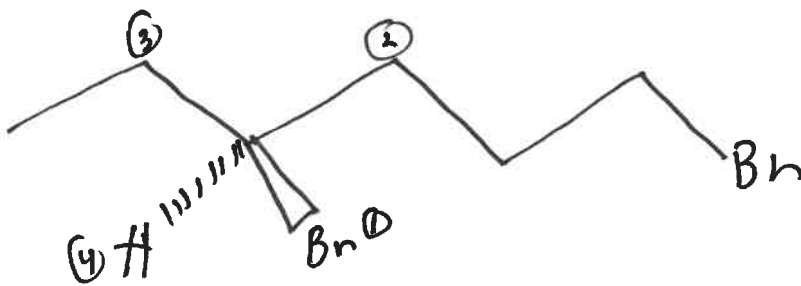
**(4) Nomenclature of Enantiomers.** If a name is given, draw the correct chemical structure. If a structure is given, give the IUPAC name. Don't forget to include the proper 3D configuration at each chiral carbon (using R/S designations, or wedge/dash bonds).



(S)-2-chloro-4-methylpentane

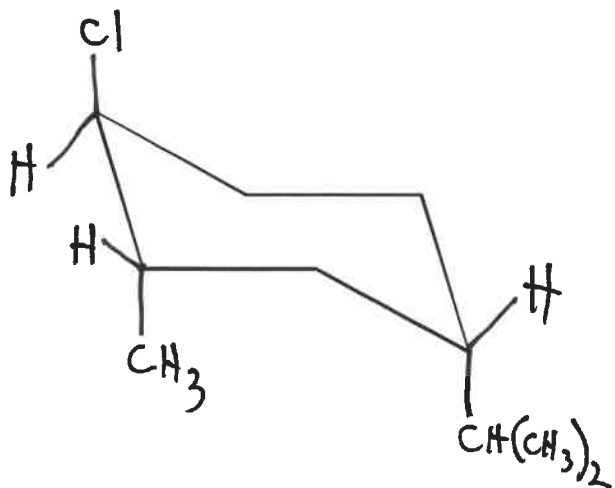
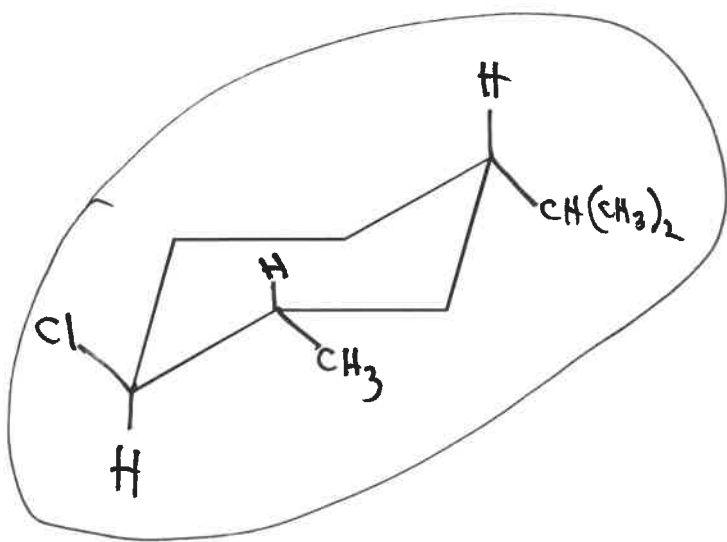
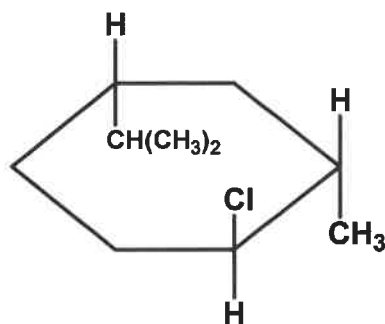


(b) (S)-3,6-dibromohexane



**(5) REVIEW - Cyclohexane Structure (2D → 3D).**

Consider the 2D line structure drawn at the right. Draw the two chair conformers for this compound using the chair templates below.



**CIRCLE** the most stable conformer.

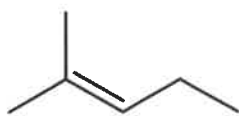
(6) Comparing Organic Structures. Are the following pairs of compounds:

Constitutional Isomers

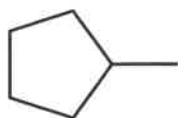
Identical

Conformers

Geometric Isomers  
(cis/trans)

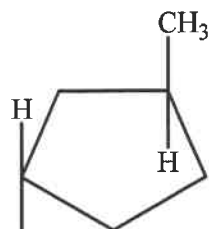


$C_6H_{12}$

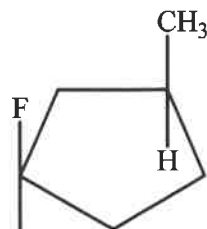


$C_6H_{12}$

Constitutional

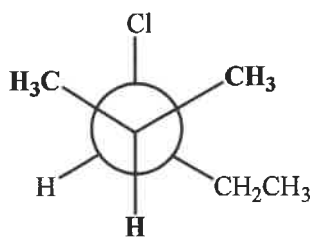
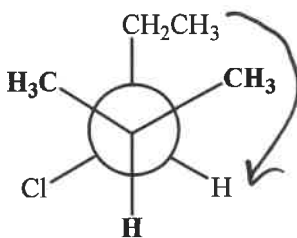


trans

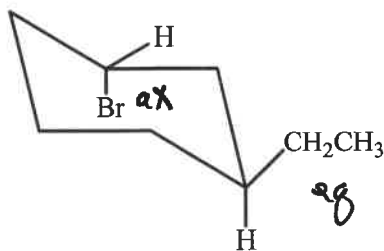
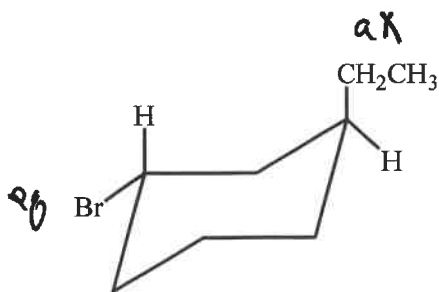


cis

Geometric



Conformers



Conformers