

Names of all students (please print) _____

Answer Key

CHEM 243 Organic Chemistry I

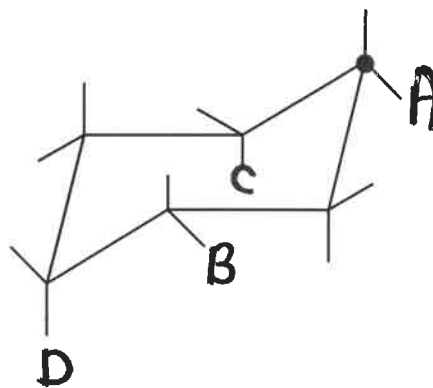
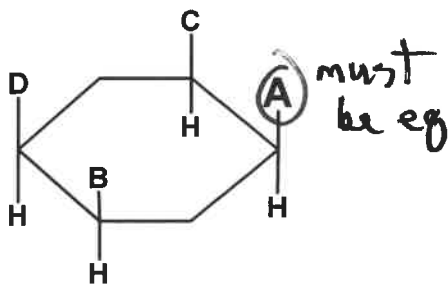
Points _____ (10 max)

Worksheet #9: September 29, 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.

My worksheets are designed with the assumption that you have (1) watched the videos, (2) taken notes, and (3) have your notebook open on your bench.

(1) Converting a "2D" Cyclohexane to a "3D" Cyclohexane "Chair" Structure: Axial vs Equatorial.

(a) Complete the chair conformer on the right by adding the *general substituents A, B, C, D* from the 2D structure. Be careful about proper position and geometry. Lets assume that **"A" is the largest substituent** and should be added first to the (●) carbon. All the axial and equatorial bonds have been drawn for you.

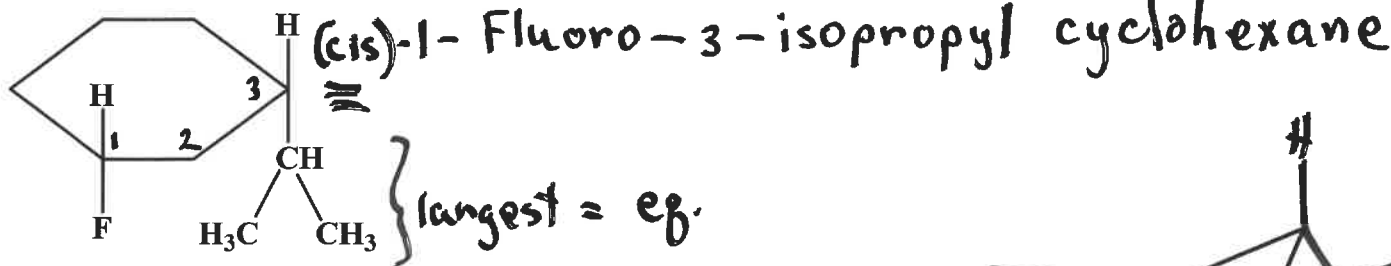


(b) Did you place substituent "A" on an axial or equatorial position? **EXPLAIN** your reasoning.

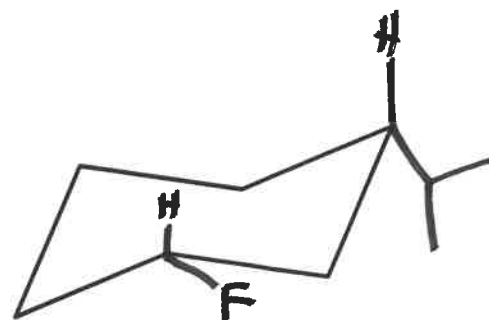
A is equatorial as it is the largest substituent, resulting in the least steric hindrance.

(2) Drawing Cyclohexane Ring Structures. The 2-D structure for a cyclohexane compound is drawn below.

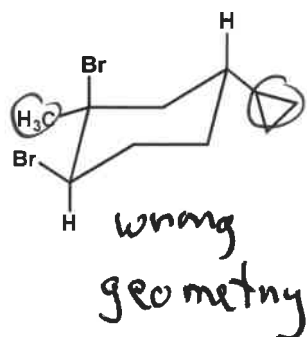
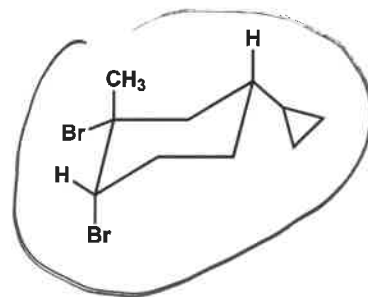
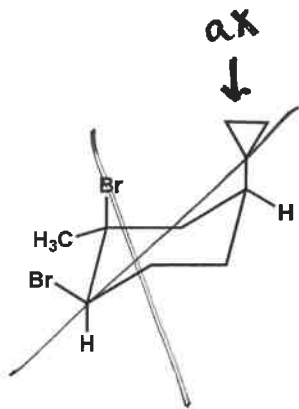
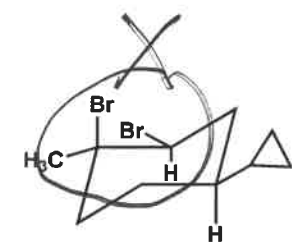
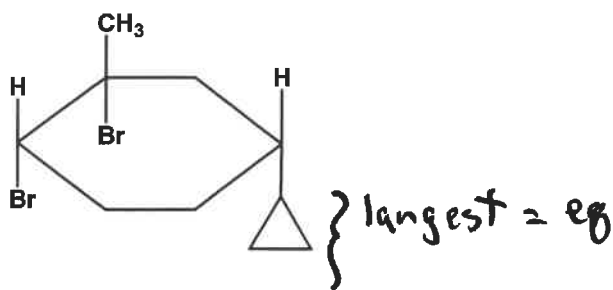
(a) Write an accurate IUPAC name. Don't forget to use *cis* or *trans* when you have two substituents on a ring.



(b) Using the chair template at the right, draw the **most stable** chair conformer for this compound. NOTE: You must include hydrogen atoms (H) on any ring carbon with a substituent!



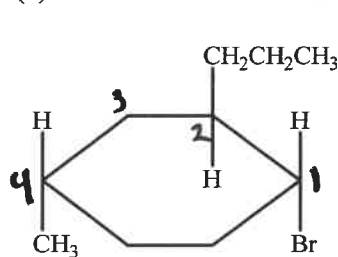
(3) Cyclohexane "Chair" Conformations. Which ONE of the following structures most accurately represents the most stable chair conformer of the 2D compound drawn to the right? CIRCLE your ONE answer.



wrong connections

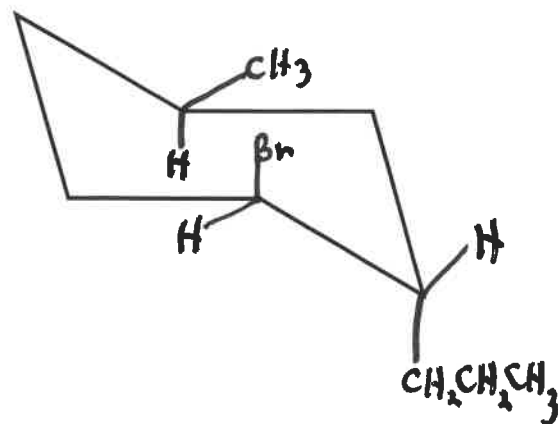
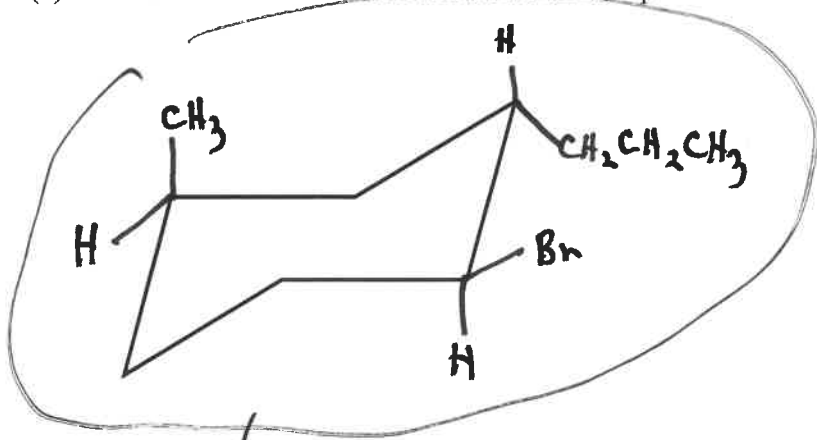
(4) Cyclohexane Nomenclature and Structure. Consider the 2D line structure drawn below.

(a) Give an accurate IUPAC name. Ignore cis/trans designations since we have more than two substituents.



← largest = eq
1-bromo-2-propyl-4-methyl cyclohexane

(b) Now draw the two chair conformers for the compound above. Use the chair templates below.



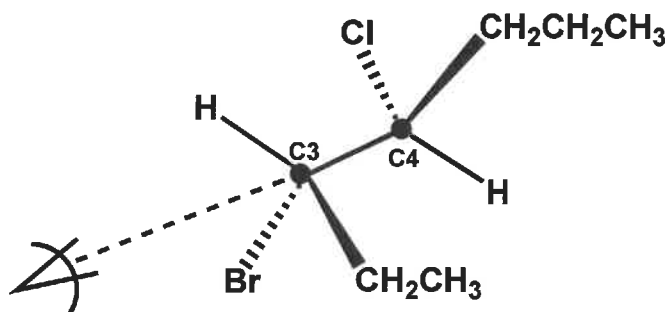
(c) CIRCLE the most stable conformer and EXPLAIN your reasoning.

←
this is the most stable conformer as the largest group (propyl) is in an equatorial position with the least steric hindrance.

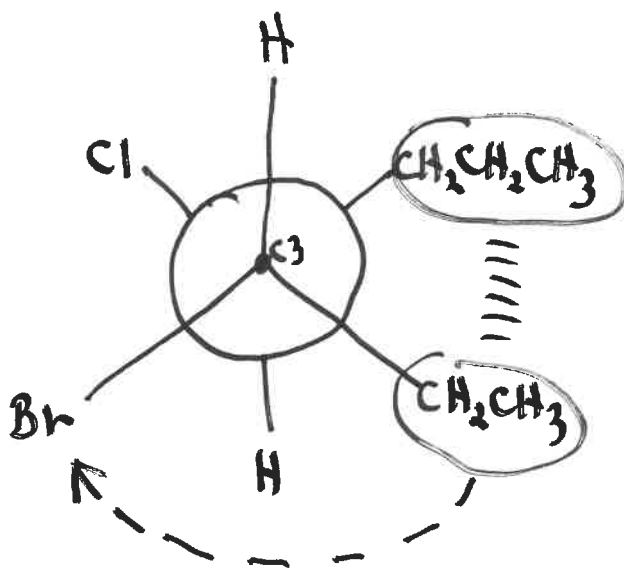
BONUS POINTS!

Each member of your group can earn up to **6 Bonus Points** for answering the questions below. **Please Note: You may NOT ask for help from Dr. Brush or the Peer Leaders.**

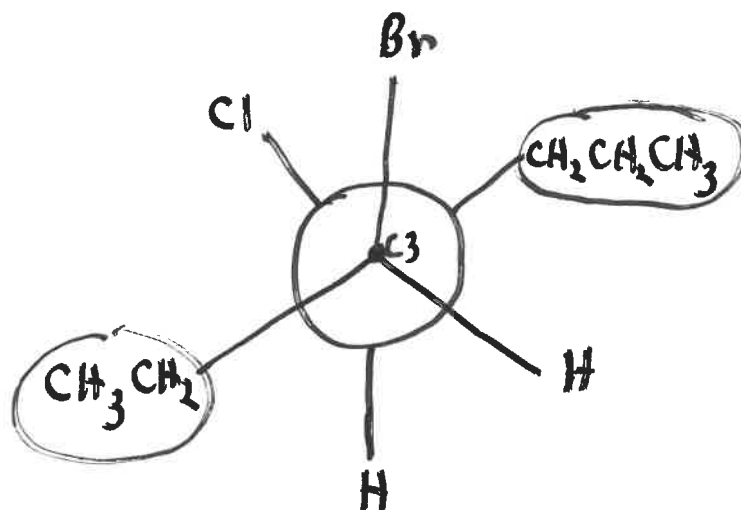
Alkane Conformations. Consider the molecule drawn at the right, and the view looking at the C3-C4 bond. **Feel free to use the molecular models provided.**



- (a) Based on the structure above, draw a Newman Projection looking at C3 and down the C3 - C4 bond:



- (b) Now, rotate your Newman Projection to make the more stable conformer (largest groups anti to each other):



- (c) Give an accurate IUPAC Name for this compound.

3-bromo-4-chloro heptane