Problem Set 3

Organic Chemistry 1 (Greenberg)

Fall 2025

Roadmap:

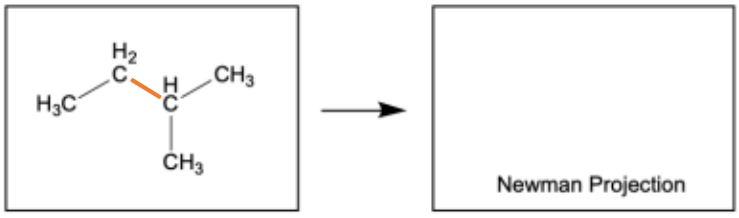
A. Conversion between: Newman projections, skeletal models, chairs

B. Energy to barrier of rotation for Newman projections: gauche/eclipses

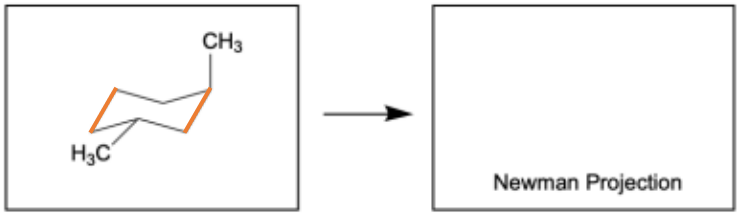
C. Stability of chair conformer: diaxial and gauche interactions

1. Please convert each molecule to the form indicated. Use the indicated bonds in orange to draw the Newman projections. For B and D, please name the relationship between the alkane groups (trans/cis).

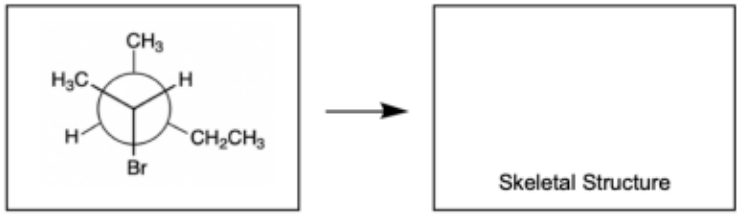
A



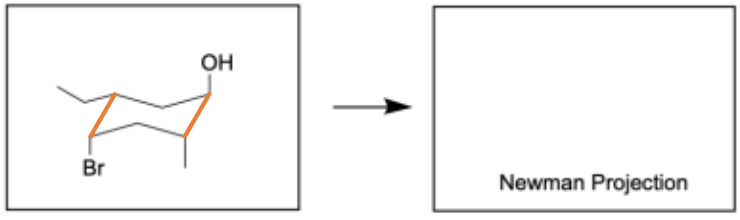
B



C

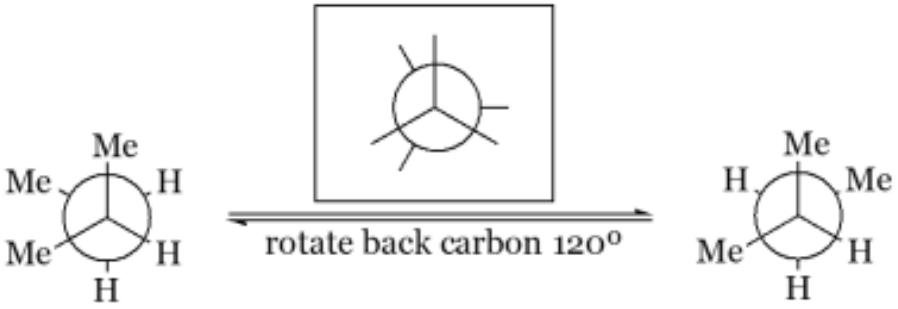


D

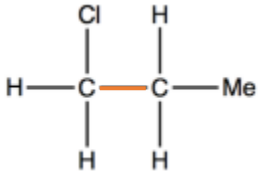


2. Draw the eclipsed intermediate, produced upon 60° rotation, and calculate the barrier rotation for the following transformation (i.e., the energy required to rotate from the given staggered conformation to the eclipsed conformation).

Interaction	kJ/mol
Me-Me gauche	3. 8
H-H eclipsed	4.0
Me-H eclipsed	6.0
Me-Me eclipsed	11.0

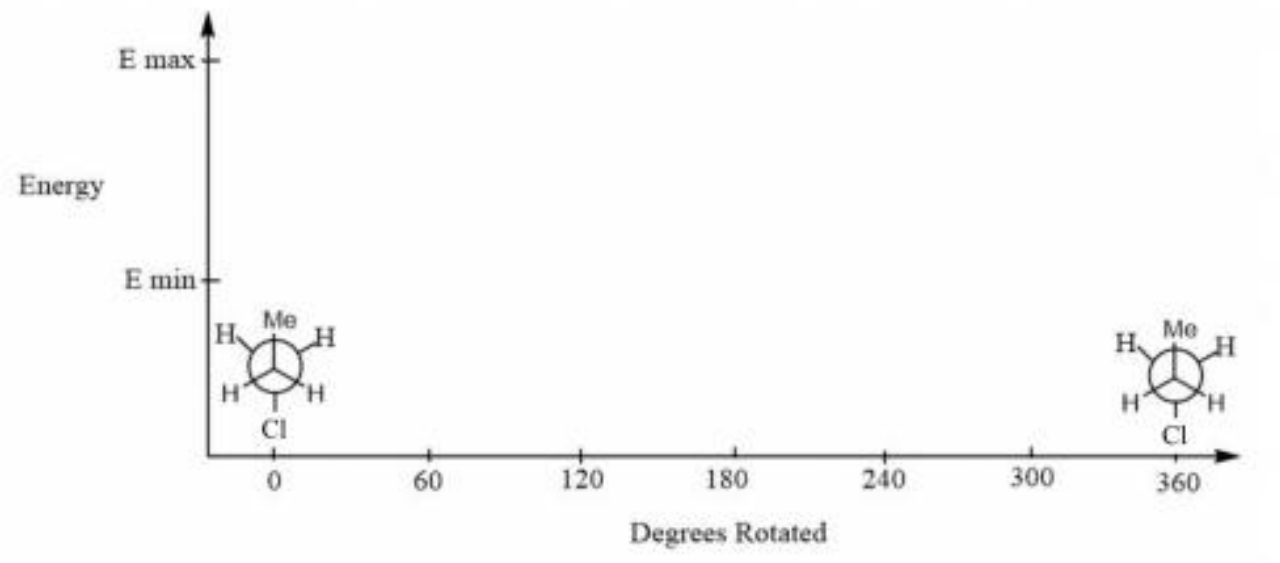


3. If you rotate along a single bond in a molecule, you can produce several different conformers, called rotational conformers.
   a. Draw all three staggered rotational conformers for the molecule, using the orange bond of interest (C1-C2) as the axis of rotation.

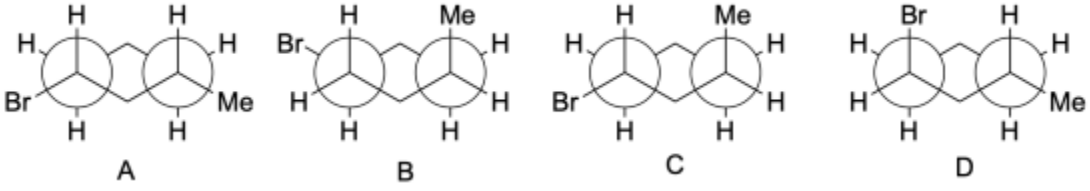


   b. Circle the most stable conformation of the ones you drew above. What is this conformation called?

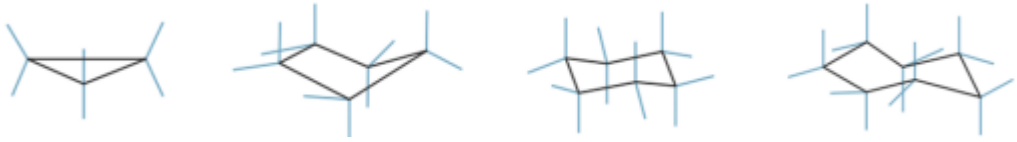
   c. On the provided graph, draw all the rotational conformers (staggered and eclipsed) on the graph at the indicated angles of rotation (0° and 360° have been provided). Draw the curve that reflects the energy differences between these conformers.



4. Which of the following Newman projects represents (1R,3R)-1-bromo-3-methylcyclohexane in its lowest energy conformation?



5. Please label the cyclopropane, cyclopentane, cyclohexane, and cycloheptane. Which molecule is the most stable? Explain using your knowledge of hybridization and angle strain.



Clubs and Orgs Bulletin:

Promote your club! https://forms.gle/V19BipzLyuAaWMyz8

APO:
Want to earn community service hours? JOIN APO! We are a Co-Ed Service Frat that engages in leadership development, service in the Baltimore area, and brotherwide fellowships. Also, we are the largest volunteering org (5000+ hours in SP25)!
Interest form: https://forms.gle/gPt9LwKM9z93QmqHA

Hopkins Political Union:
Interested in politics or debate? Join the Hopkins Political Union—JHU's largest forum for robust, cross-ideological dialogue. In collaboration with the SNF Agora Institute, we will host two debates on 9/19 & 11/14. Welcoming all views!
Sign up here: https://jhu.campusgroups.com/HPU/club_signup

Tip of the Week:

Tip of the Week The Hopkins Food Pantry is a free resource for JHU affiliates facing food insecurity. Located at the LaB (right next to Homewood Apartments), it's open weekly on Mondays and Tuesdays to registered shoppers.
Click here to learn more: https://studentaffairs.jhu.edu/student-life/student-outreach-support/hopkins-food-pantry/.