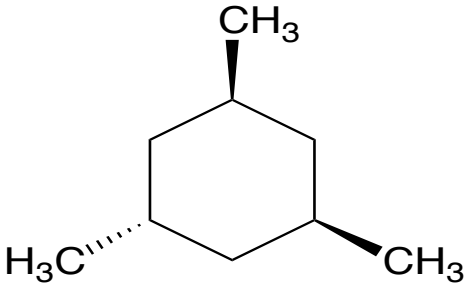
Oakton Community College

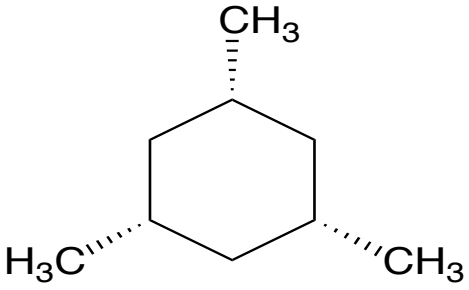
Skillbuilder 2

2

First, draw the most stable chair conformation for each of the following configurational isomers. **Second**, circle the configurational isomer with the highest potential energy (least stable).



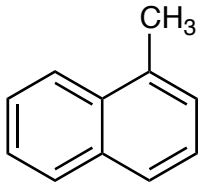
A

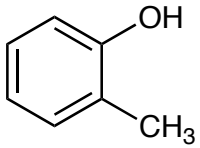


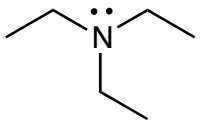
B

1

Circle the solutions that would be expected to dissolve each compound. More than one may apply. Circle all that apply.

	CH_2Cl_2 3.0 M NaOH (aq) 3.0 M HCl (aq) H_2O

	CH_2Cl_2 3.0 M NaOH (aq) 3.0 M HCl (aq) H_2O

	CH_2Cl_2 3.0 M NaOH (aq) 3.0 M HCl (aq) H_2O

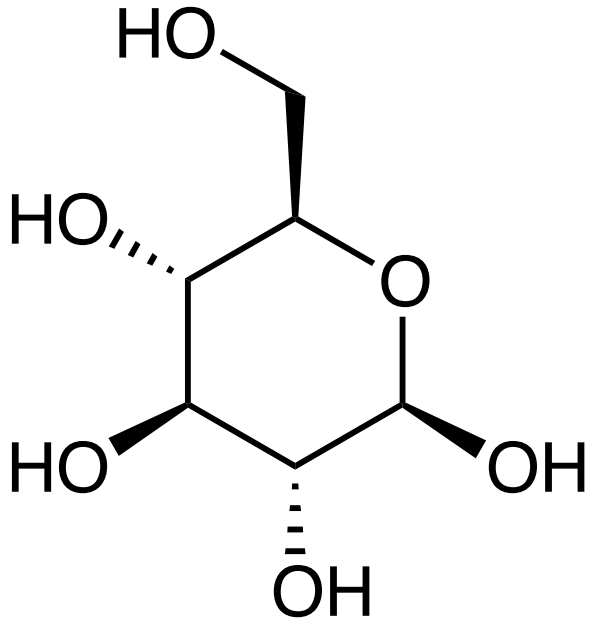
3

First, for the molecule below, draw a Newman projection for the most stable conformation that sights down C2-C3. **Second**, draw a Sawhorse projection of the least stable *staggered* conformation.

2-methylbutane

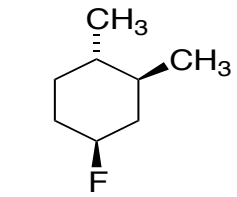
4

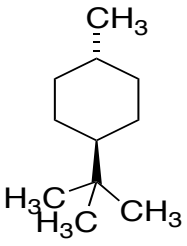
Below is the structure of β-D-glucose. In the most stable chair form, all groups are equatorial. Draw the chair form of glucose.



5

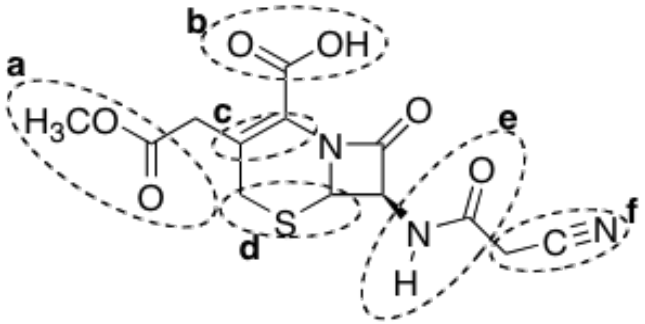
Draw the two chair conformations for each cycloalkane below. Then, circle the conformation for each configuration that is the most stable.





6

Below is a naturally occuring antiobiotic, a derivative of penicillin. Label each circled functional group.



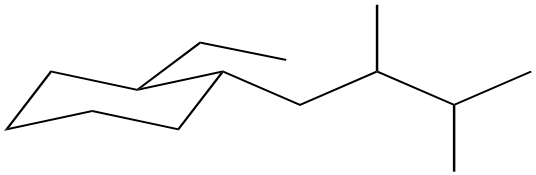
a _____ d _____

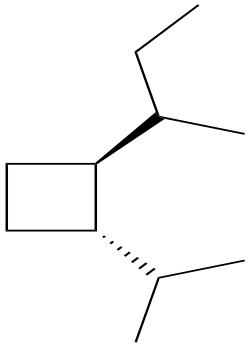
b _____ e _____

c _____ f _____

7

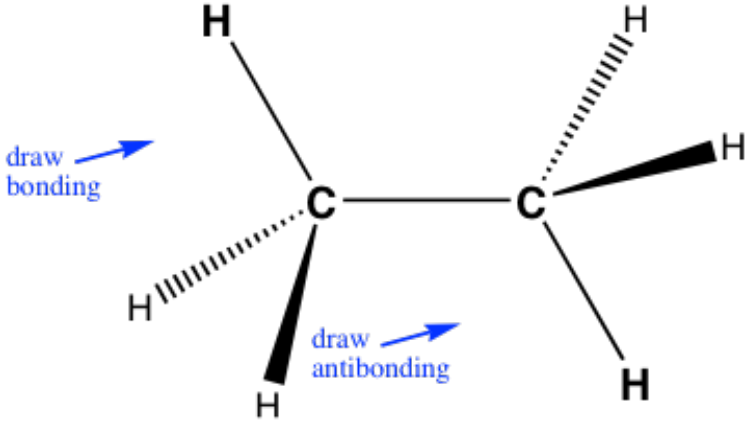
Provide an IUPAC name for each disubstituted cycloalkane. Your name should include *cis* or *trans* to describe the configurational relationship between the two groups on the ring.

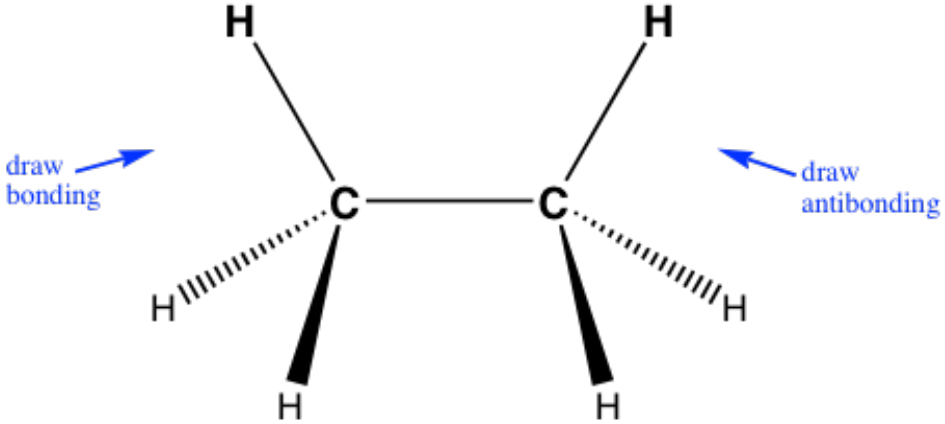




8

First, draw the bonding and antibonding molecular orbitals for each of the C-H bonds indicated on top of the given structural formulas. **Second,** circle the structural formula that has the most stabilization by hyperconjugation.





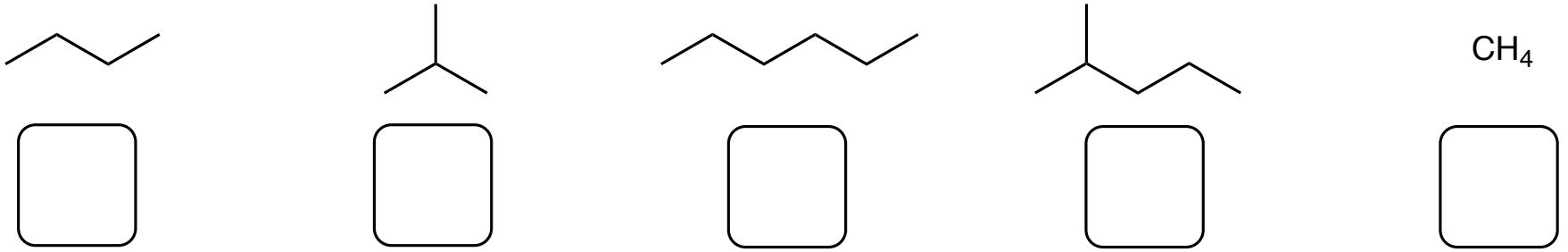
9

Using wedge-and-dash notation, draw the most polar and the least polar conformation of the following molecule.

1,2-dibromoethane

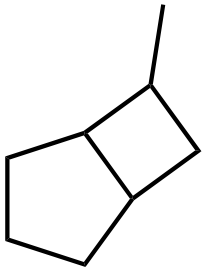
10

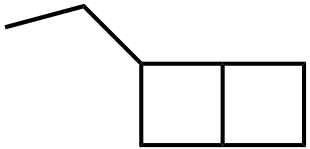
Redraw the diagram below. Then, rank the molecules in order of increasing heat of combustion (the amount of energy released upon burning) (1 = lowest; 5 = highest).

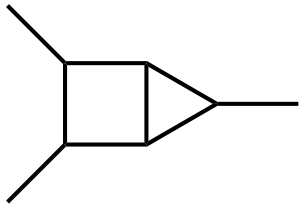


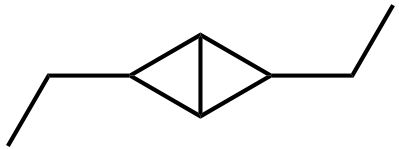
11

Redraw the figure below. Then, rank the following molecules in order of increasing heat of combustion (1 = lowest; 4 = highest).



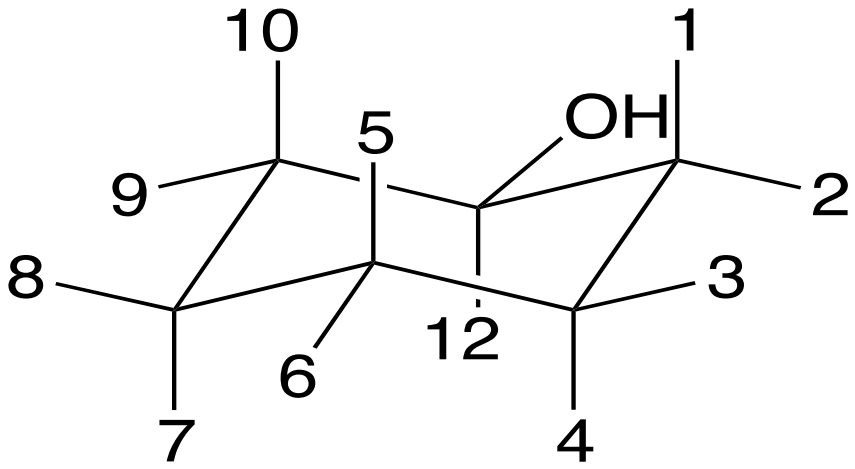






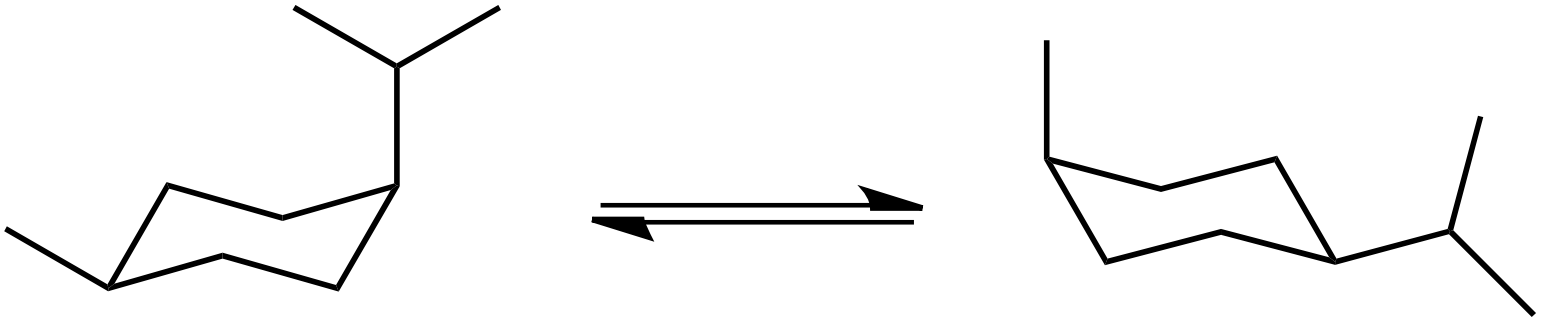
12

In ascending order, list the numbers that are *trans* to the hydroxyl (-OH) group in the cyclohexane molecule below.



13

Below is the ring-inversion equilibrium for cis-1-isopropyl-4-methycyclohexane. **First**, replicate these structures. **Second**, draw all hydrogen atoms in both conformers that experience 1,3-diaxial interactions with either the methyl group or the isopropyl group. **Third**, circle the most stable conformer.



Draw conformers of butane that fit the descriptions below.

Newman that maximizes torsional strain and minimizes steric strain.

Bond-line (dash-wedge) that maximizes torsional and steric strain.

15

Draw a picture of an p, sp, sp^2, sp^3 and s orbital. Label each. Make sure the relative size of the lobes indicates the %s-character in each orbital.