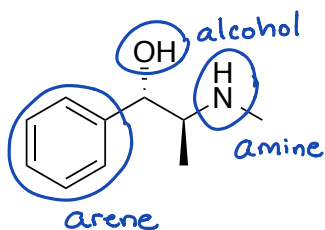


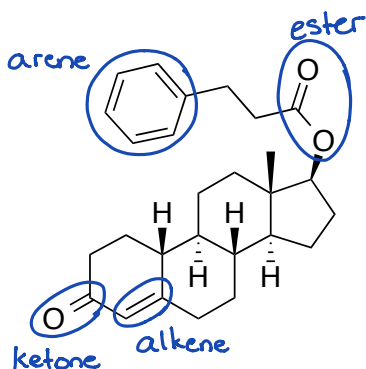
Answer Key

Chemistry 233 Chapter 3 Problem Set

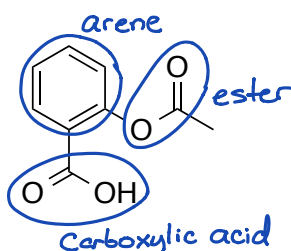
1) In each molecule below, circle and identify the functional groups.



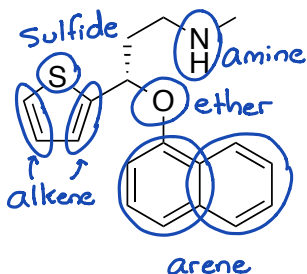
Pseudoephedrine is present in many over-the-counter decongestants. Pseudoephedrine is becoming increasingly less available because it is a common precursor for the illegal manufacture of methamphetamine.



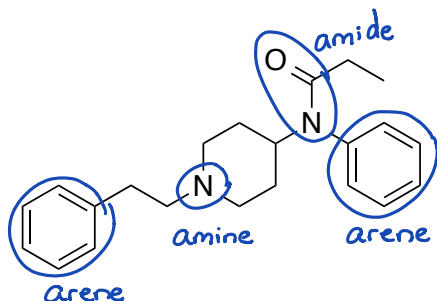
Durabolin is a commonly abused anabolic steroid. In addition to its illicit use, durabolin is also used medically for the treatment of osteoporosis in women.



Aspirin is a common anti-inflammatory drug. It also has a blood-thinning effect and is used in the prevention of heart attacks.

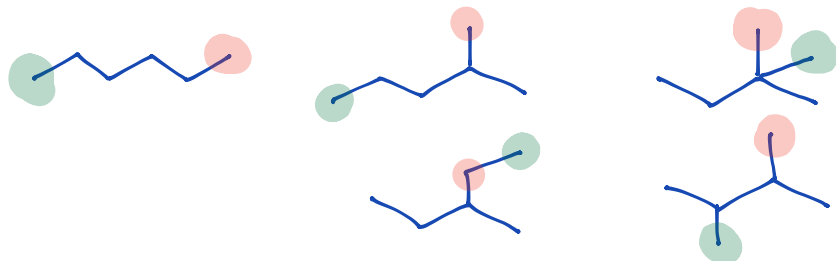


Duloxetine (Cymbalta) is an antidepressant and mood stabilizing drug manufactured by Eli Lilly. Cymbalta reached \$4.7 billion in sales in 2012.



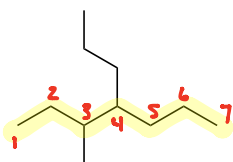
Fentanyl is a narcotic analgesic administered in the form of a transdermal patch. Mylan Labs based in Morgantown was the first company to receive approval for generic production of fentanyl. Fentanyl is one of the best selling generic drugs in the world.

2) Draw the five constitutional isomers for C_6H_{14} .

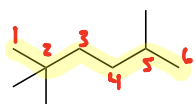


Because they are constitutional isomers, each will have a unique IUPAC name.

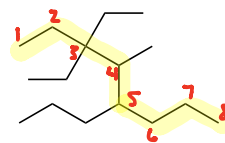
3) Determine the systematic (IUPAC) name for each alkane compound below.



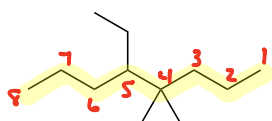
3-methyl-4-propylheptane



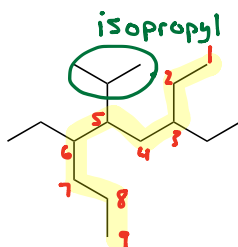
2,2,5-trimethylhexane



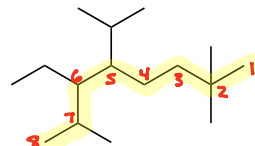
3,3-diethyl-4-methyl-5-propyloctane



5-ethyl-4,4-dimethyloctane



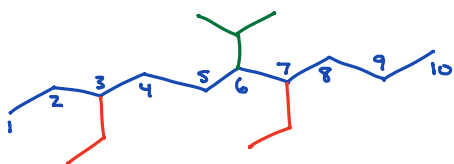
3,6-diethyl-5-isopropylnonane



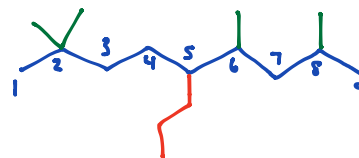
6-ethyl-5-isopropyl-2,2,7-trimethyloctane

4) Draw the structure that corresponds to each name below.

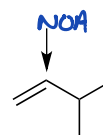
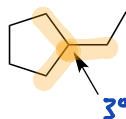
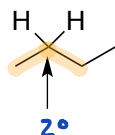
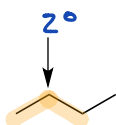
3,7-diethyl-6-isopropyldecane



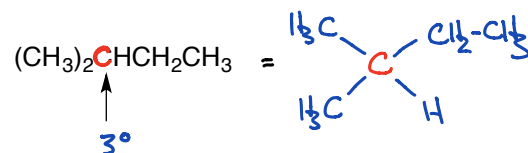
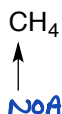
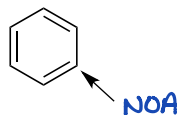
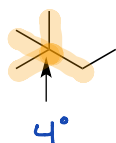
2,2,6,8-tetramethyl-5-propylnonane



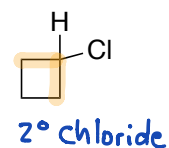
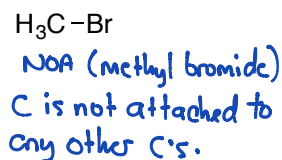
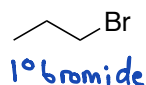
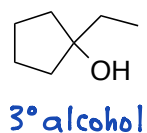
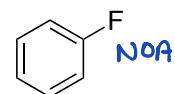
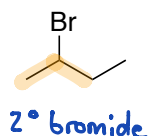
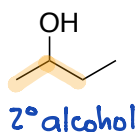
5) In each compound below classify the indicated carbon as primary, secondary, tertiary, quaternary, or none of the above (NOA).



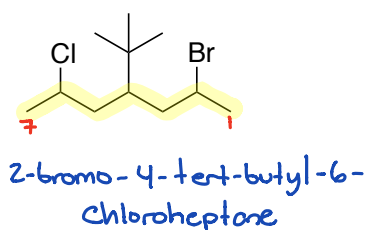
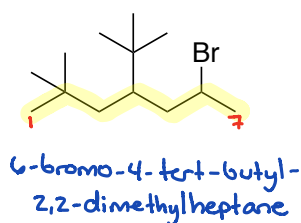
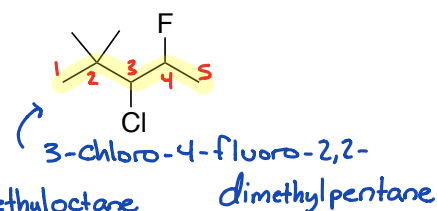
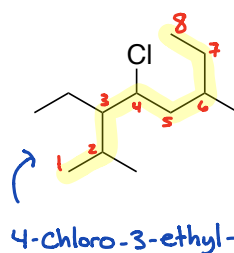
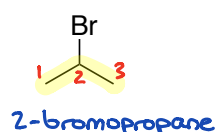
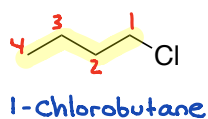
Can not classify double & triple bonded carbon using this system.



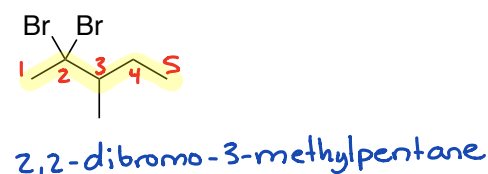
6) Classify each alkyl halide or alcohol as primary, secondary, tertiary, or none of the above (NOA).



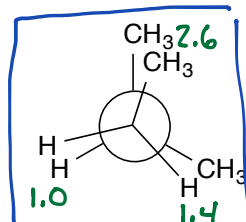
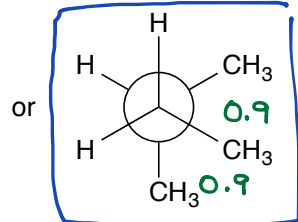
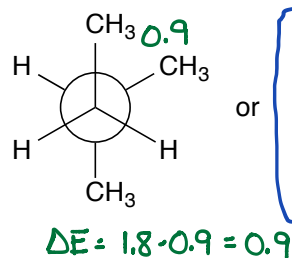
7) Determine the IUPAC name for each halogen-containing compound below. For the first two structures also list the common name.



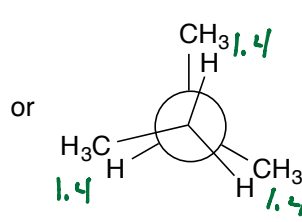
Numbering tie in both directions
So Br gets abc priority



8) Which conformation in each pair is higher in energy? Calculate the energy difference between the two conformations.

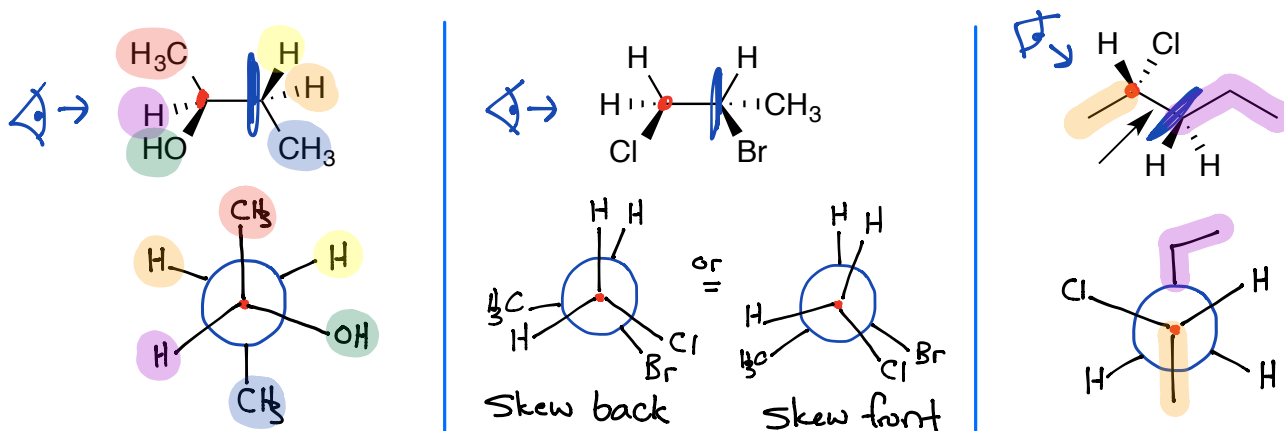


$\Delta E = 5.0 - 4.2 = 0.8$

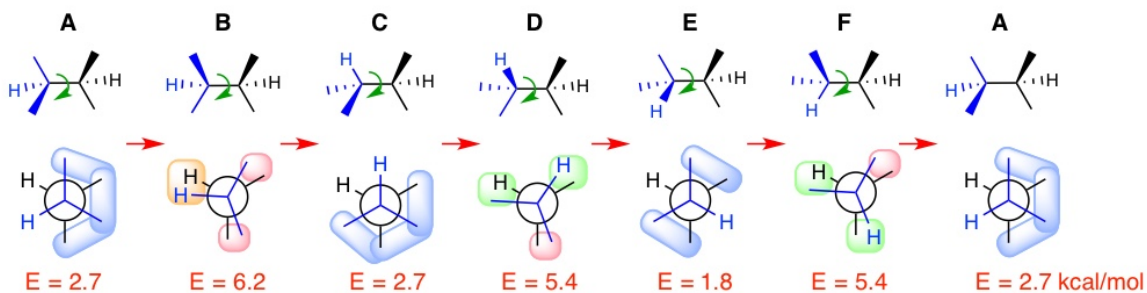


#'s are in
kcal/mol

9) Convert each structure to a Newman projection around the indicated bond.

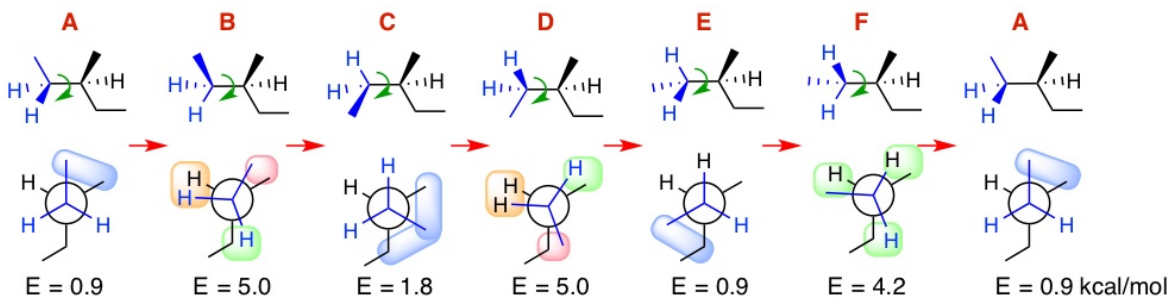


10) Focusing on the C2-C3 bond of 2,3-dimethylbutane, draw Newman projections for all possible staggered and eclipsed conformations. Rank the compounds in order of increasing stability.



Legend			
Every Step \rightarrow is a 60° Rotation			
CH ₃ /CH ₃ gauche 0.9 kcal/mol	H/H eclipse 1.0 kcal/mol	H/CH ₃ eclipse 1.4 kcal/mol	CH ₃ /CH ₃ eclipse 2.6 kcal/mol

11) Focusing on the C2-C3 bond of 3-methylpentane, draw Newman projections for all possible staggered and eclipsed conformations. Rank the compounds in order of increasing stability.



Legend			
Every Step \rightarrow is a 60° Rotation			
CH ₃ /CH ₃ or Et gauche \sim 0.9 kcal/mol	H/H eclipse 1.0 kcal/mol	H/C eclipse \sim 1.4 kcal/mol	C/C eclipse \sim 2.6 kcal/mol

Energy (Stability) Ranking:

A = E < C < F < B = D
 ↑ Lowest Energy Most Stable ↑ Highest Energy Least Stable