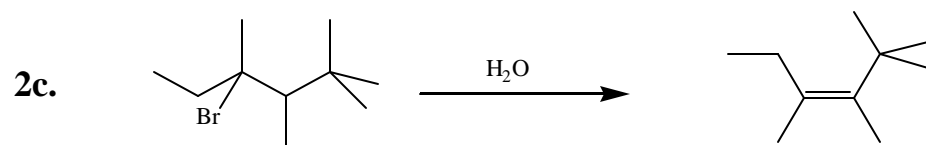
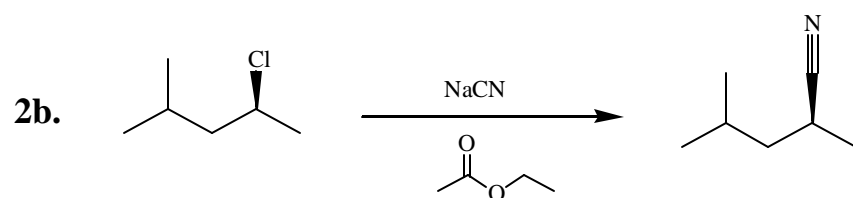
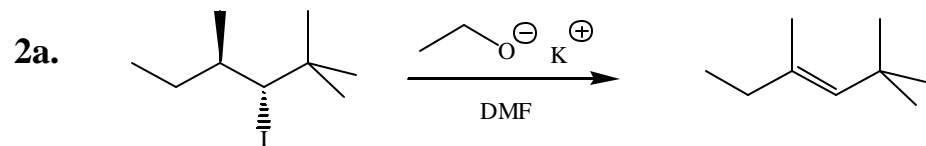
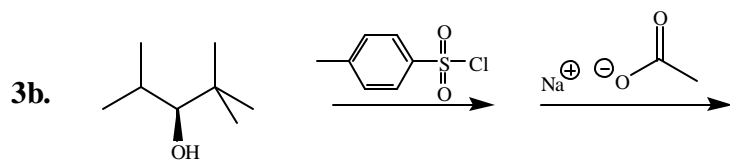
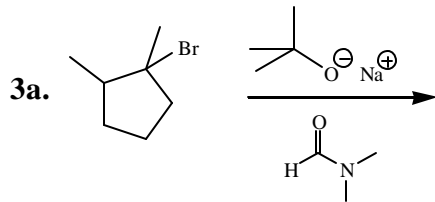




2. Consider the following reactions: Will the reaction occur as drawn or will some other product be formed? Explain. (36 points)



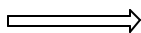
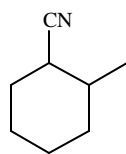
3. Provide products for the following reactions. Pay close attention to stereochemistry. If there are enantiomers, do not work the problem for each enantiomer, treat them the same (draw a single enantiomeric product and write "+ enantiomer"): (24 points)



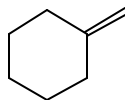
4. When 2-phenyl-2-bromopropane is heated in water, a mixture of 2-phenyl-2-propanol and 2-phenylpropene is formed. When increasing amounts of NaCN are added to the solution, increasing amounts of 2-phenyl-2-cyanopropane are formed, at the expense of the alcohol and the alkene. In spite of this, the rate of disappearance of 2-phenyl-2-bromopropane is unchanged by the addition of NaCN. (30 points)
- 4a. Draw the two separate reactions that are occurring.
- 4b. Explain the results from the two reactions.
- 4c. Draw an energy diagram that supports the observed results upon addition of NaCN to 2-phenyl-2-bromopropane.

5. Provide a retrosynthetic analysis of 1-cyano-2-methylcyclohexane from methylene cyclohexane. Reagents are not required but real reactions are. It may be advantageous to think about more than one way to make this molecule. (20 points)

**Make:**

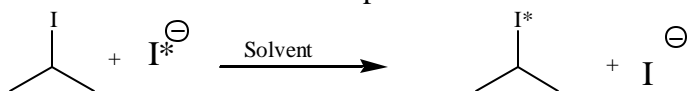



**From:**



Extra Credit: (10 points)

The rate of reaction of radioactive iodide ion ( $I^*$ ) with 2-propyl iodide varies dramatically with the structure of the solvent as depicted below:



Solvent	Time for reaction to be completed
H <sub>2</sub> O	40 hours
CH <sub>3</sub> OH	90 minutes
	144 seconds

H<sub>2</sub>O

40 hours

CH<sub>3</sub>OH

90 minutes



144 seconds

Explain the observed results.