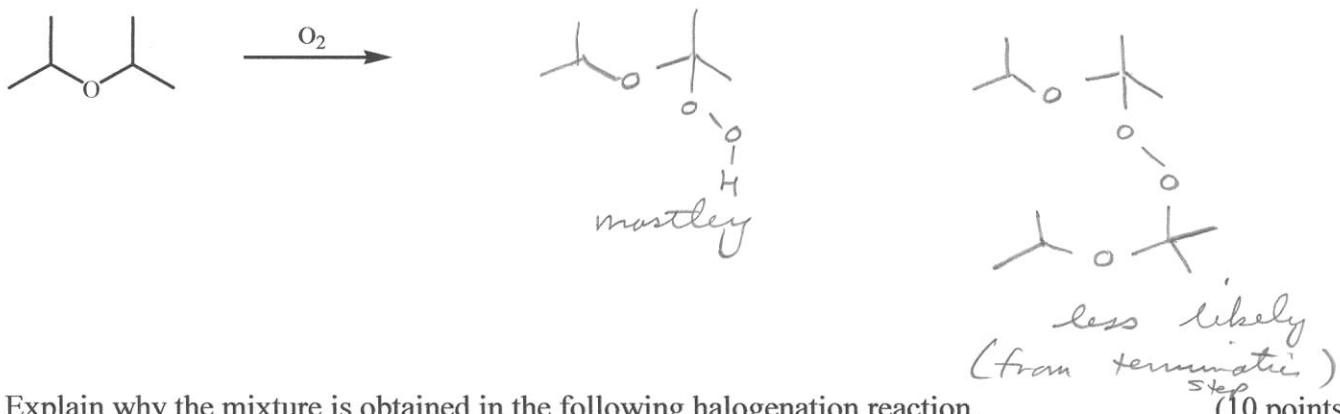
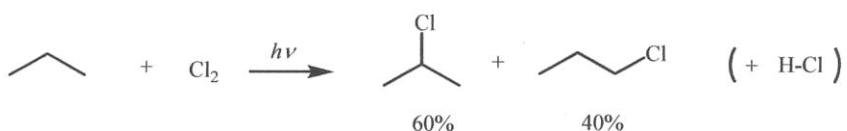


Name Key

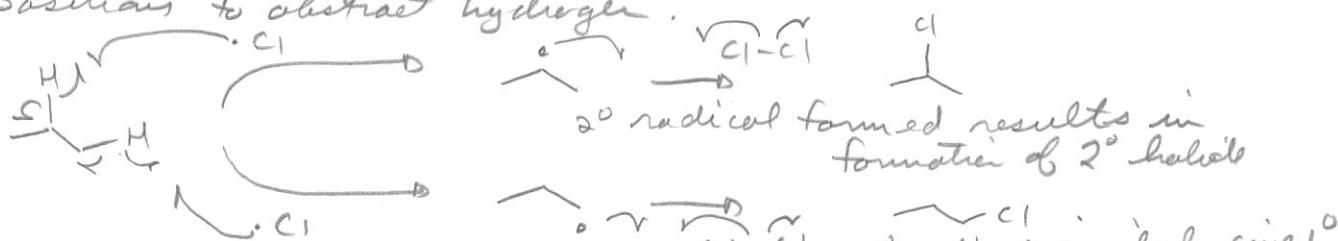
1. Show the product (or products) from the autoxidation of diisopropyl ether. (10 points)



2. Explain why the mixture is obtained in the following halogenation reaction. (10 points)



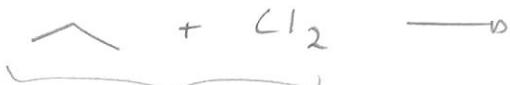
when the  $\cdot\text{Cl}$  radical reacts w/ propane there are two positions to abstract hydrogen.



3. For the reaction in Question 2, given that  $\Delta H$  for 2-chloropropane and 1-chloropropane are -127 kJ/mol and -118 kJ/mol, respectively, suggest whether the reaction is spontaneous as written (Hint: both alkyl chlorides are liquids at room temperature) (10 points)

$$\Delta G = \Delta H - T\Delta S$$

2 moles



- both are liquids

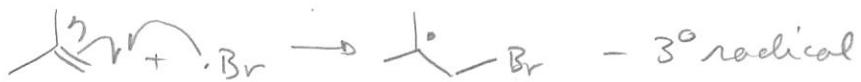
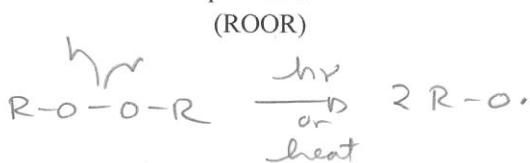
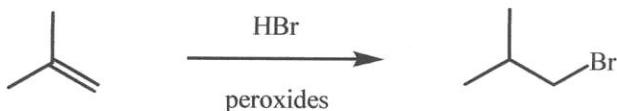
whatever the ratio of alkyl halides produced, the total moles is 1 mole per 1 mole of propane.

So, 2 moles of reactants give 2 moles of product - no real  $\Delta S$  for this. only change in  $\Delta S$  is 2 moles of gases gives 1 mol liquid + 1 mol gas. which is small

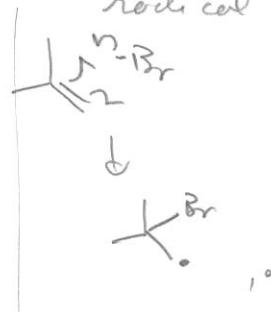
$$\Delta G = \Theta \text{ expected}$$

↑ should be small  $\Theta$   
room temp. is not very large value  
dominates equation

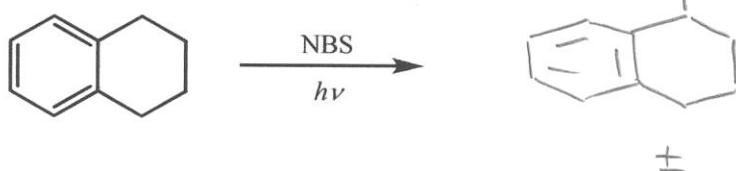
4. Show the complete mechanism of the anti-Markovnikov addition shown below. (10 points)



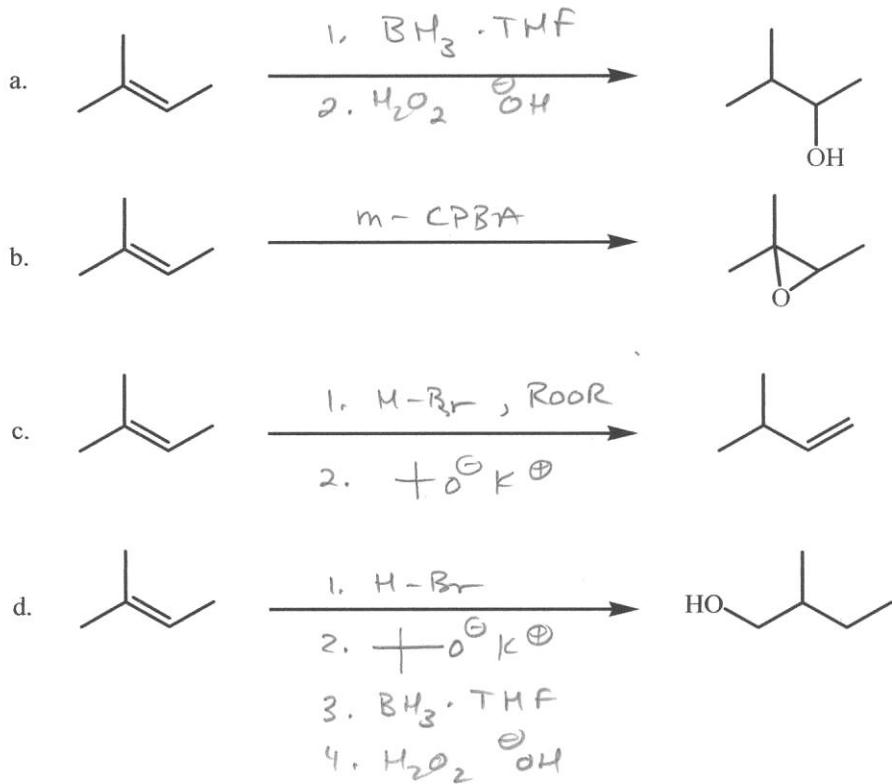
Note: The other bromine addition leads to the less stable  $1^\circ$  radical



5. Show all of the products from the following reaction and be very clear about the stereochemistry of the possible products. (10 points)



6. Show how to make the following compounds from the given starting materials. Some of the transformations require more than one step. (20 points)

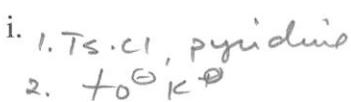
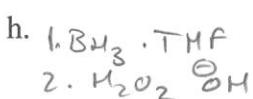
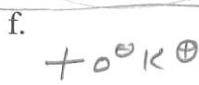
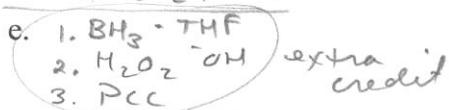
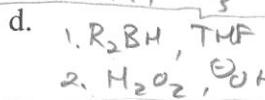
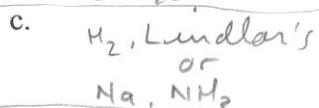
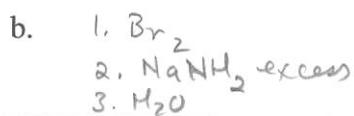
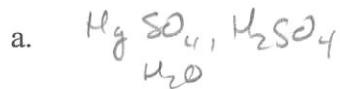




9. For the following diagram of reactions, fill in the reagents necessary to accomplish each transformation (some of them require more than one step – be sure to use 1. reagent 1, 2. reagent 2, etc. format when necessary). You do not need to show any intermediates. Transformation e is possibly the most challenging.

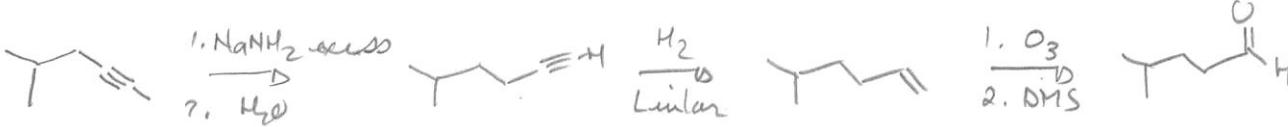
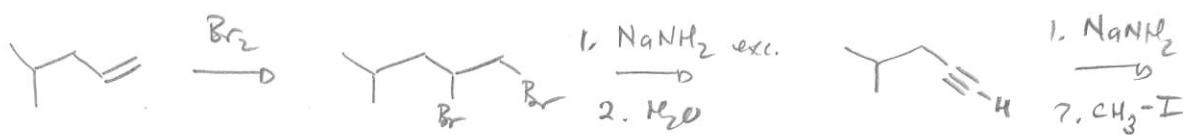
Fill in your answers here:

(55 points)



very  
a, long, but ok, answer for e.

or do step b., then d,



10. CHALLENGE PROBLEM. Show how to transform acetylene to the product using *only* acetylene as the source of carbon. (10 points)

