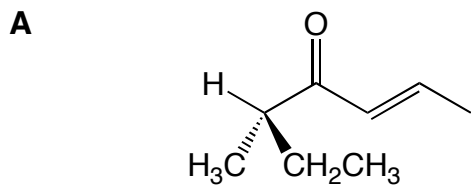
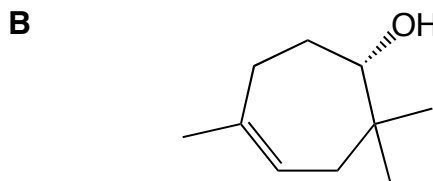


1. Both Filbertone (**A**) and Karahanaenol (**B**) are natural products responsible for the scents of the plants from which they are found. Filbertone smells of hazelnuts, while Karahanaenol smells minty. They were both named after people known to their discoverers. Provide IUPAC names for each. (10 pts)

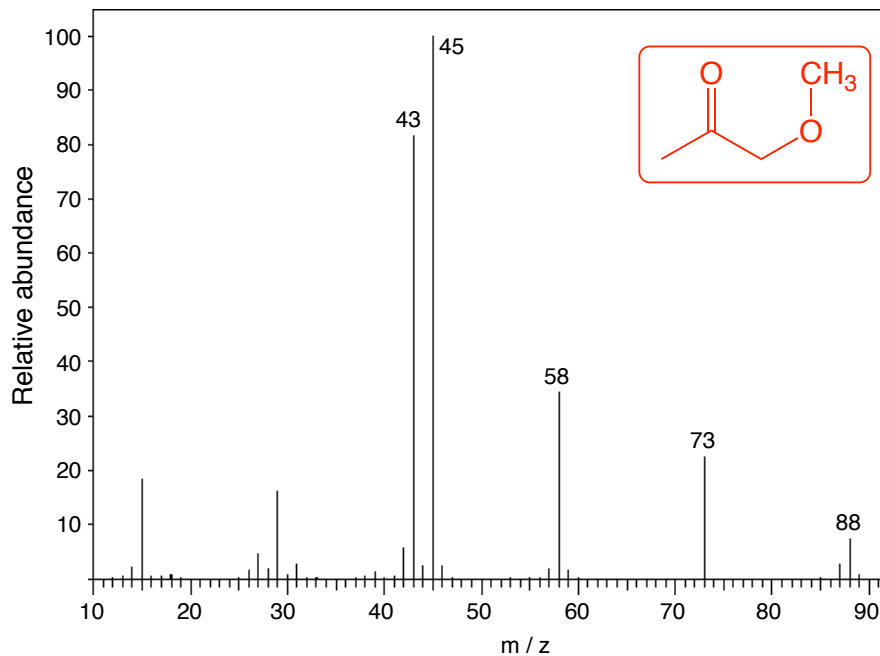


(S,E)-5-methyl-2-hepten-4-one



(S,Z)-2,2,5-trimethylcyclo-4-heptenol

2. An unknown compound shows a UV absorption peak at $\lambda_{\max} = 280$ nm and yields the MS below. It reacts with 1 equiv. of $\text{NaBH}_4/\text{EtOH}$, but does not react with weak bases such as NaHCO_3 . Provide a structure for the unknown (**circle it**), as well as for each numbered peak in the spectrogram. (15 pts)

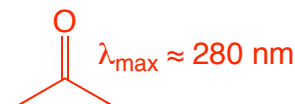
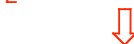


Possible M.F.s

$\text{C}_4\text{H}_5\text{FO}$ not likely since there are no fragments based on the # 19 (mass of F)

$\text{C}_5\text{H}_{12}\text{O}$ not possible because $\text{DU} = 0$ and UV data indicates a double bond

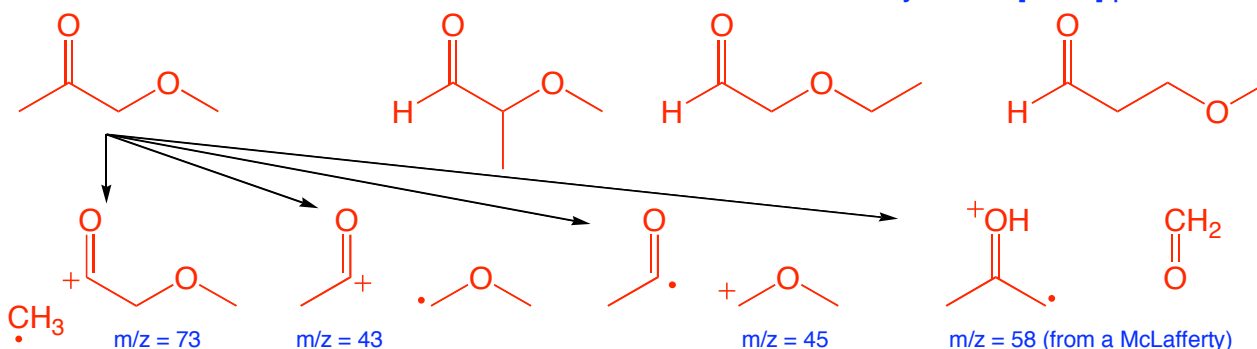
$\text{C}_4\text{H}_8\text{O}_2$ $\text{DU} = 1$



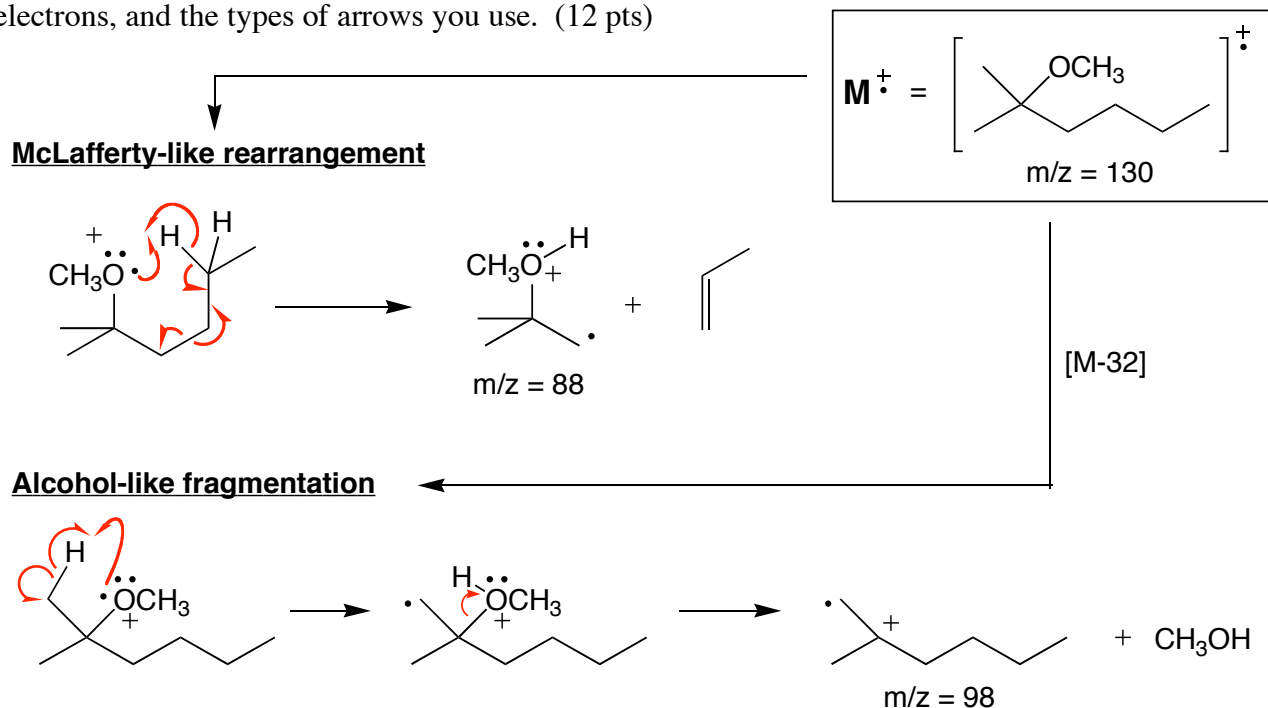
The other "O" must be an ether or alcohol.

not likely b/c no [M-18] peak

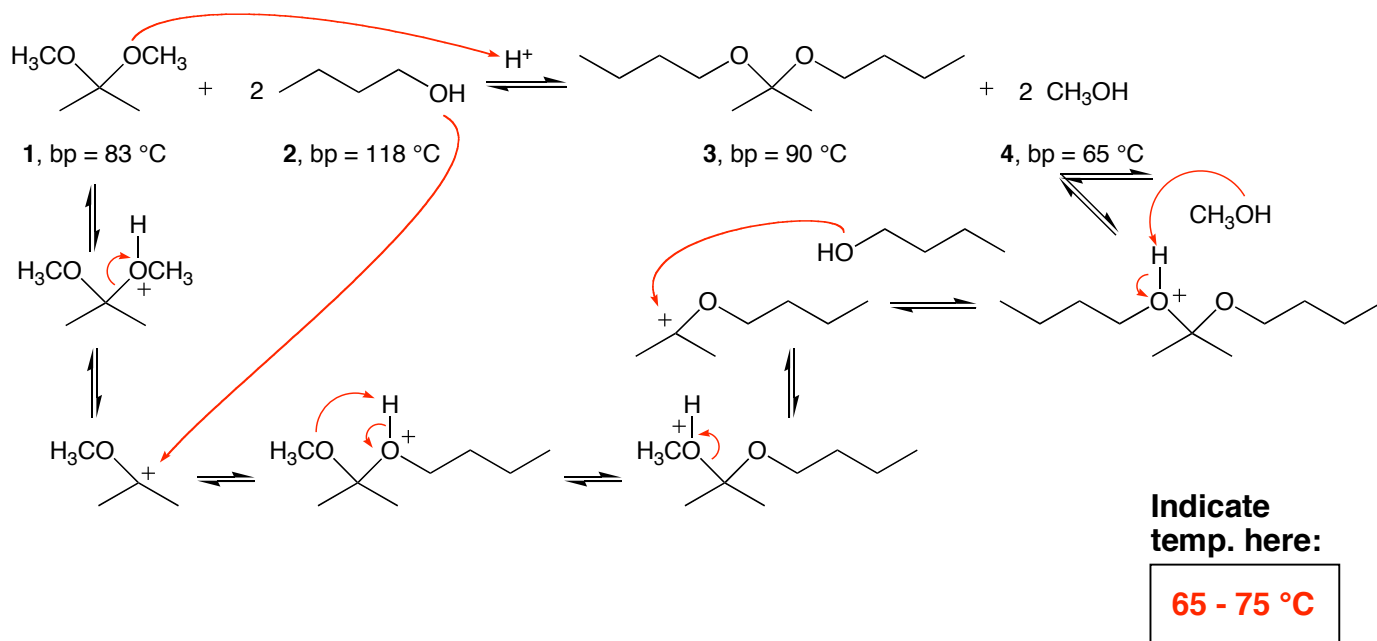
Possible ethers...



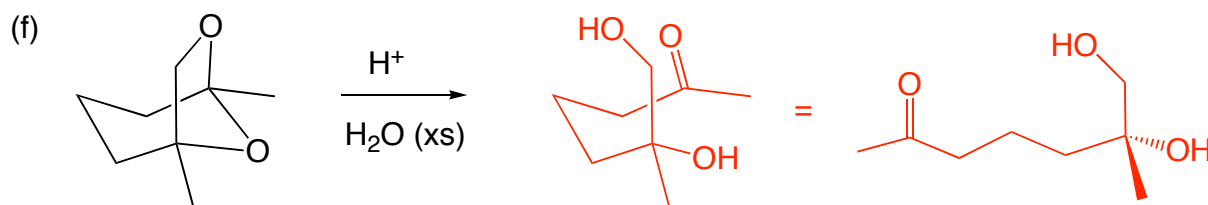
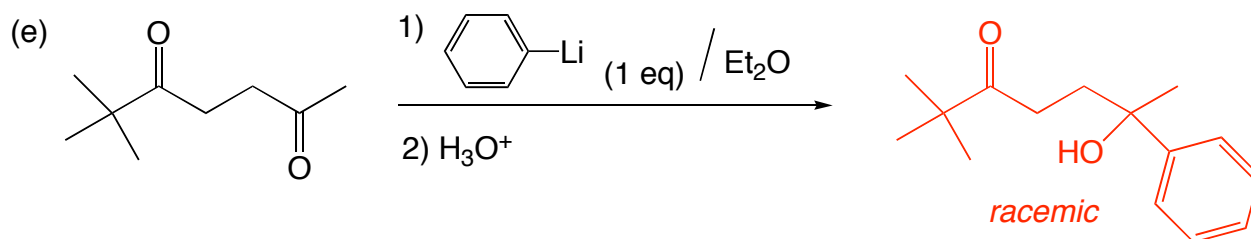
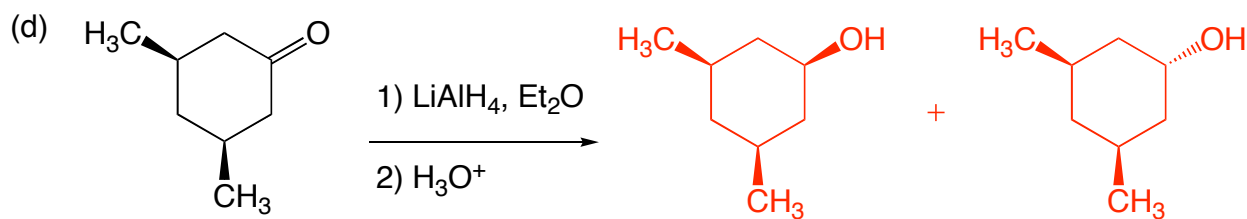
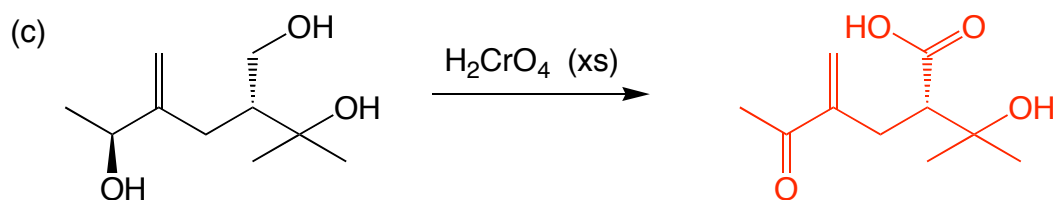
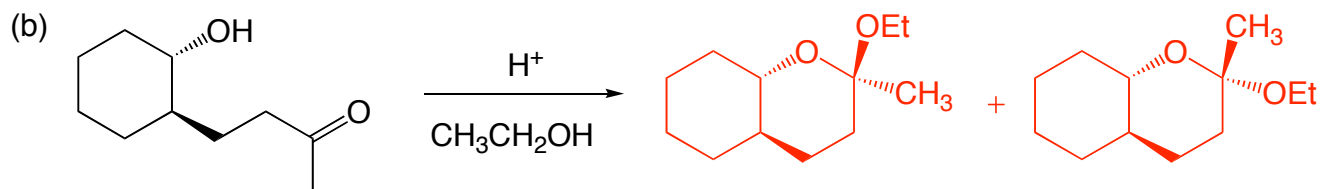
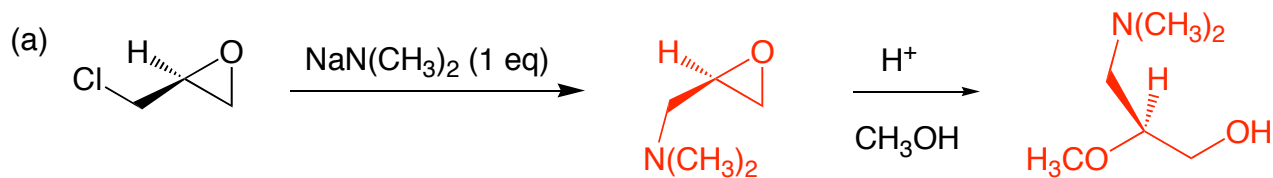
3. We have seen how certain functional groups undergo characteristic fragmentations when subjected to mass spectrometry. The ether shown in the box undergoes two curious fragmentations. One is similar to the McLafferty rearrangement that carbonyls undergo. The other is similar to the process whereby alcohols lose water, except the ether loses a stable piece that has a mass of 32. Show mechanisms for each fragmentation, along with the fragments for each process. Be mindful of your charges, nonbonded electrons, and the types of arrows you use. (12 pts)



4. Provide a mechanism for the reaction shown below. Be sure to show all intermediates and any formal charges in your structures. What temperature should the reaction be run at to get mostly **3**? (13 pts)



5. Draw the **major product(s)** of each of the following reactions and circle it/them. Be sure to show stereochemistry where appropriate. (30 pts)



6. Provide a synthesis for each of the following transformations. For full credit, be sure to draw all intermediary products along the way (except for steps in between workups). (8 and 12 pts)

starting with formaldehyde

