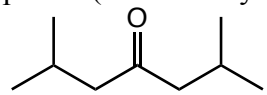
Organic Chemistry for Life Sciences: CHM 223 Section A

Problem Set Chapter 15/16

Name_____

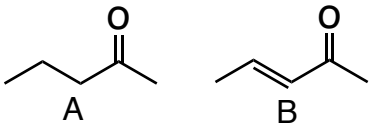
DUE: Wednesday Oct 18 @ 8am

1. Which answer contains stretches that are expected in the IR spectrum of the following compound (answer may not have ALL of the expected stretches)?



A. 1710, 1080 cm^{-1}
B. 3520, 1705 cm^{-1}
C. 3010, 1730 cm^{-1}
D. 2950, 1720 cm^{-1}

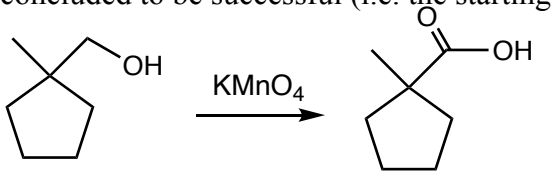
2. Which region in the IR spectrum could be used to differentiate the following two compounds?



A. 3010 cm^{-1} region would be present in A but not B
B. 2950 cm^{-1} region would be present in A but not B
C. 3010 cm^{-1} region would be present in B but not A
D. 2950 cm^{-1} region would be present in B but not A

3. An IR spectrum contains stretches at 2950, 1720 and 1169 cm^{-1}. Most likely, what class (type) of organic compound is it?

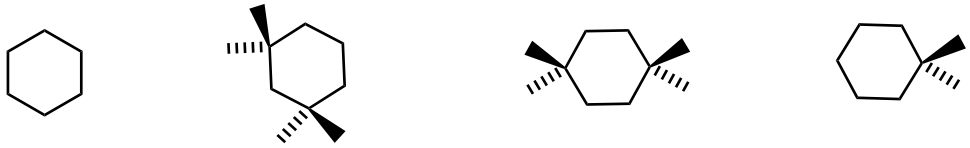
4. The following reaction is run. An IR spectrum is collected on the ***product.*** The reaction can be concluded to be successful (i.e. the starting material has been converted to product) if:



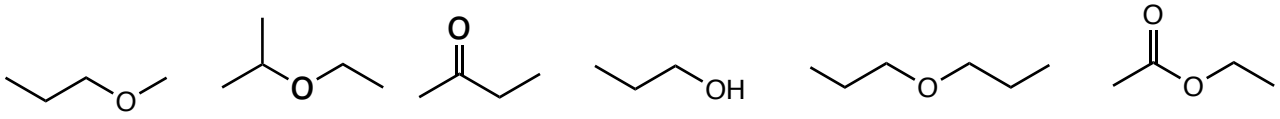
starting material **product**

A. There is an at 1220 cm^{-1}
B. There is an absorption at 2940 cm^{-1}
C. There is an absorption at 1045 cm^{-1}
D. There is an absorption at 1702 cm^{-1}

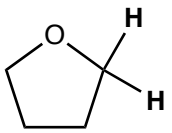
5. How many different chemical environments are present for the following molecules?

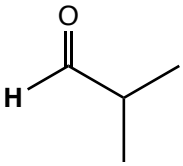


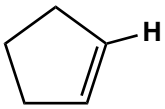
6. A molecule with molecular formula has important IR absorptions at 2960 and 1100 cm -1 only. From the NMR spectrum there are 3 chemical environments. Which one of the following is consistent with this information?



7. For the bold proton(s) located in each of the following molecules, provide the expected chemical shift range and expected multiplicity (HINT: draw in missing H's and consider symmetry where appropriate):







8. A ketone containing 5 carbons has a septet at 2.5 ppm. What is its structure?

9. The IR of a compound shows it to be an ether. The mass spectrum shows an M+ peak = 60. What is the structure of the compound?

10. A compound is analyzed by 1H NMR and found to exhibit *only* a singlet at 1.2 ppm. The IR spectrum only shows saturated C-H stretches. The mass spectrum is provided below. What is the structure of the compound?