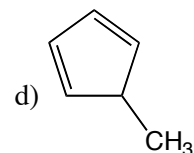
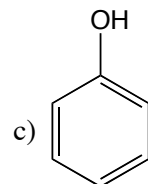
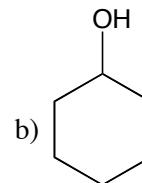
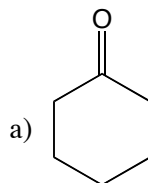
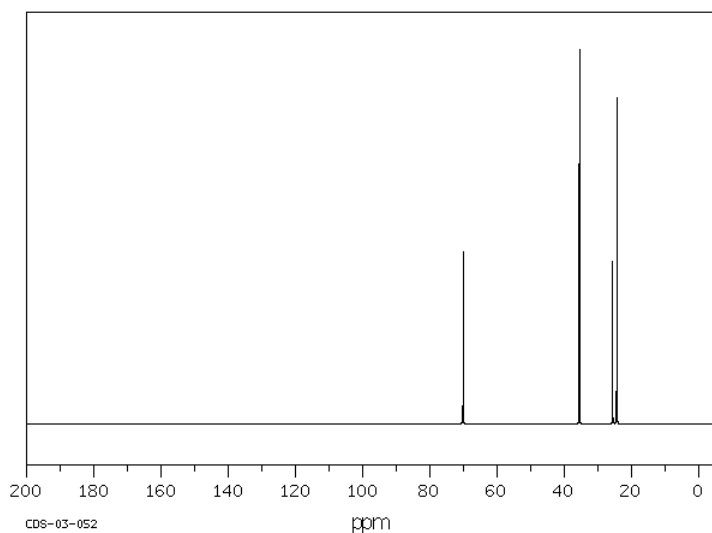
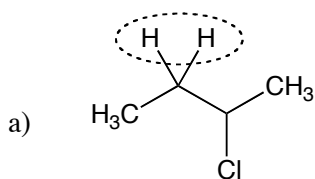


### CH241 Practice Exam 3

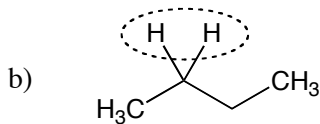
Question 1. Circle the compound that corresponds to the pictured  $^{13}\text{C}$  NMR spectrum.



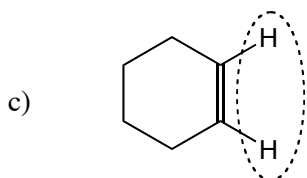
Question 2. For each compound below, identify whether the circled hydrogen atoms are homotopic, enantiotopic, or diastereotopic.



Your answer:

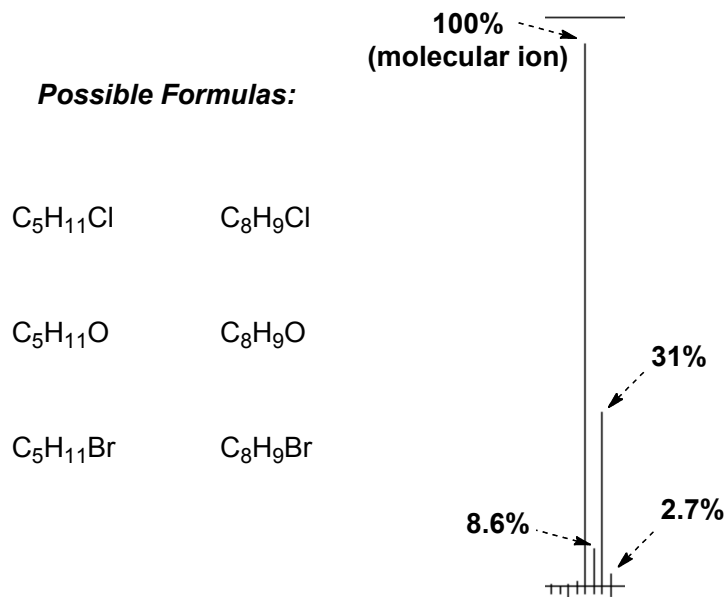


Your answer:

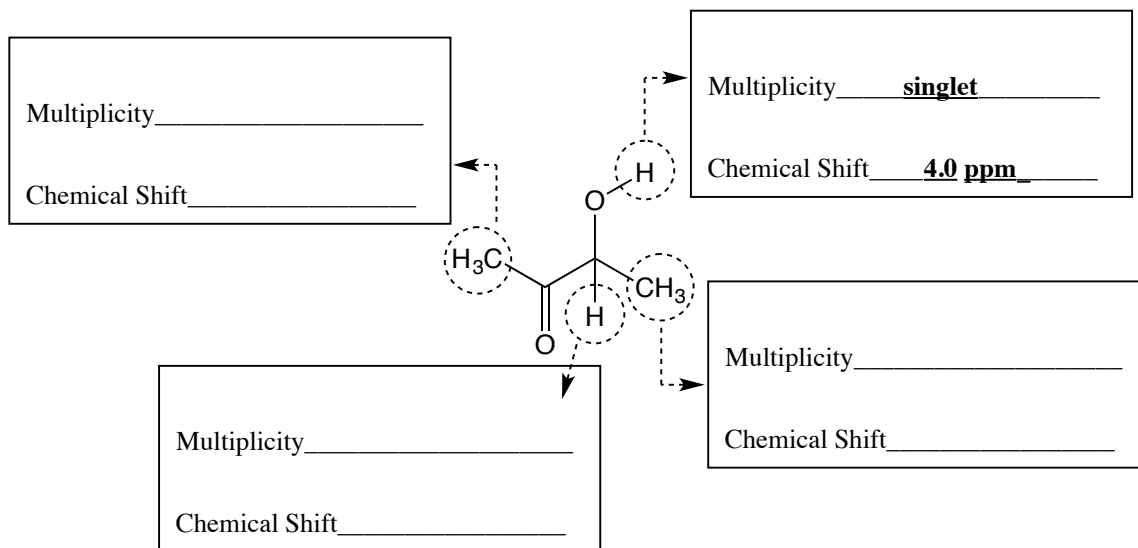


Your answer:

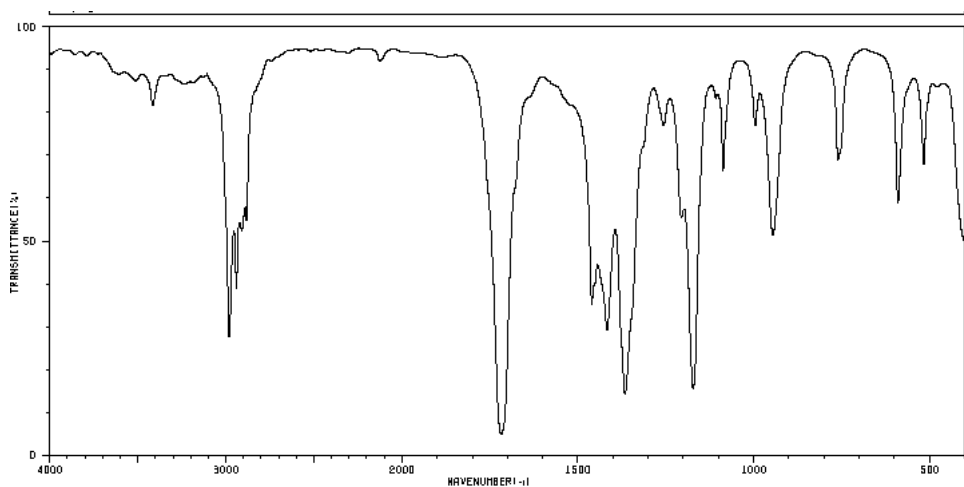
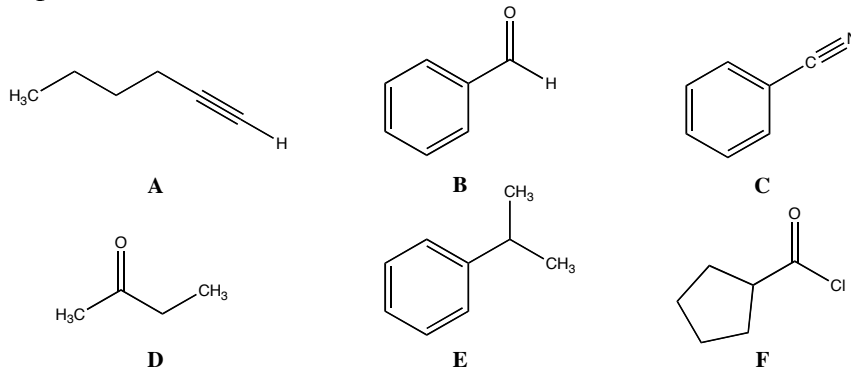
Question 3. Circle the chemical formula from the list below that most likely corresponds to the partial mass spectrum shown (only the molecular ion region is shown).



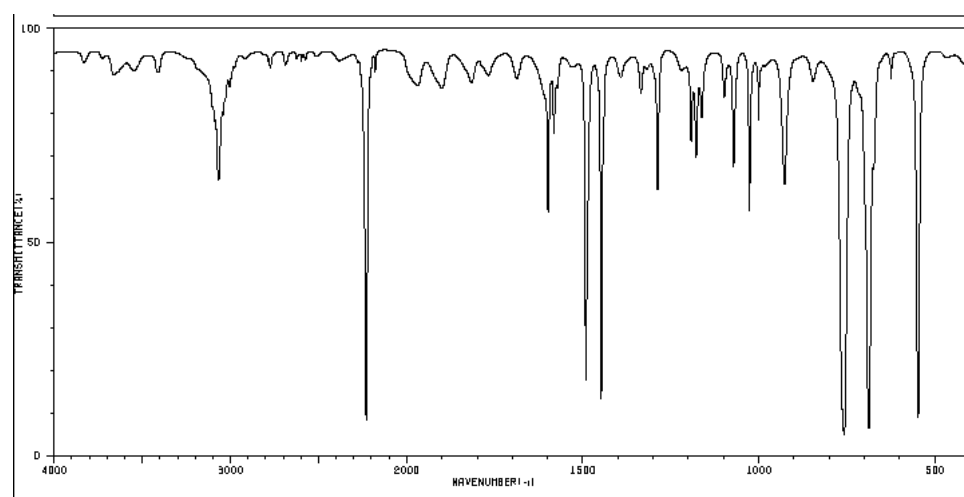
Question 4. The compound 3-hydroxy-2-butanone is shown below. In the spaces provided, indicate the multiplicities and approximate chemical shifts of the circled hydrogen atoms. Make sure that your chemical shifts are given as specific values, not ranges. As an example, the answers for the hydroxyl hydrogen atom are given. *Don't worry if you don't know the exact chemical shifts, just approximate as close as you can!*



Question 5. In each case, identify the pictured compound that most likely corresponds to the given IR spectrum.

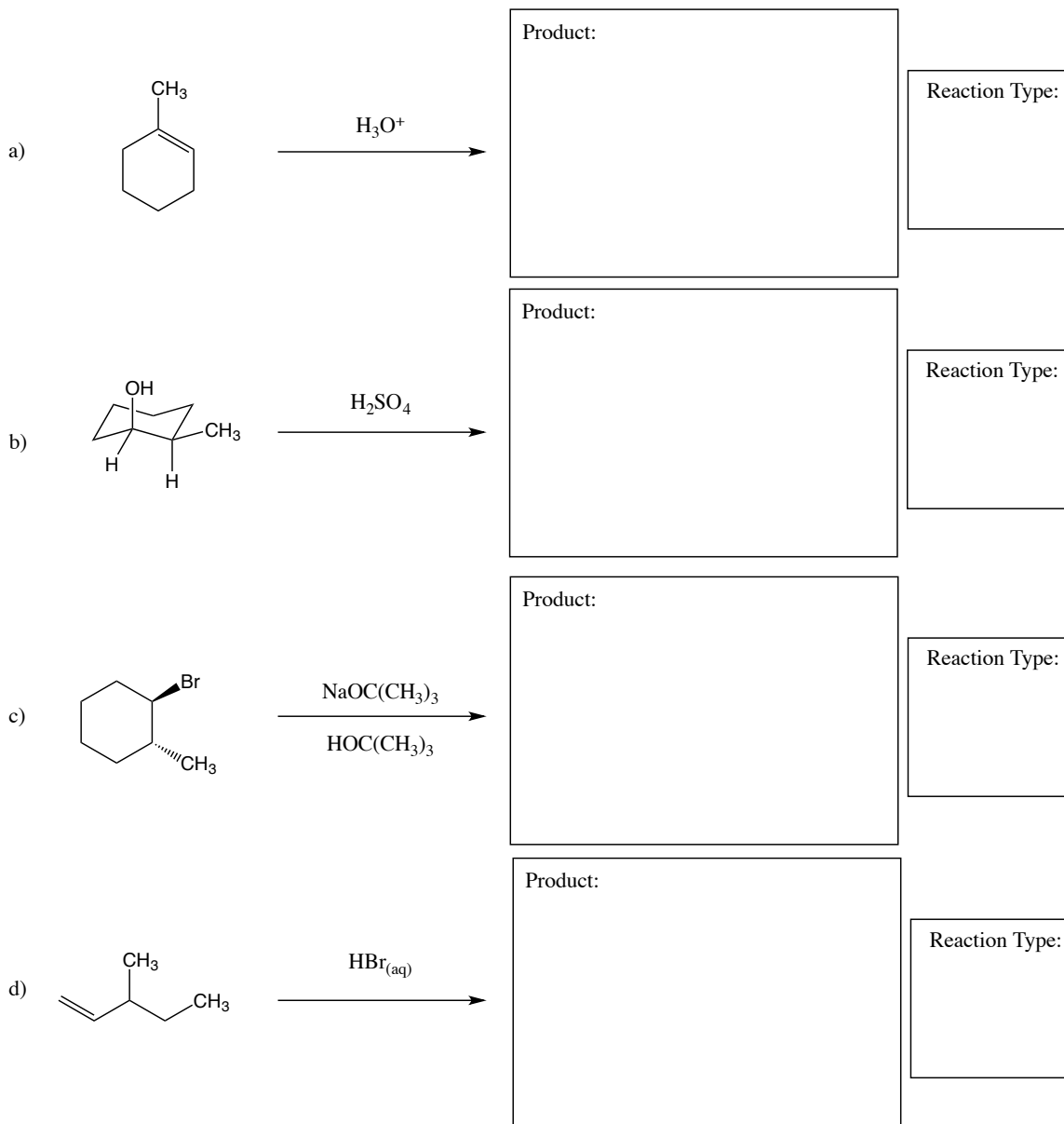


The above spectrum is most likely compound \_\_\_\_\_

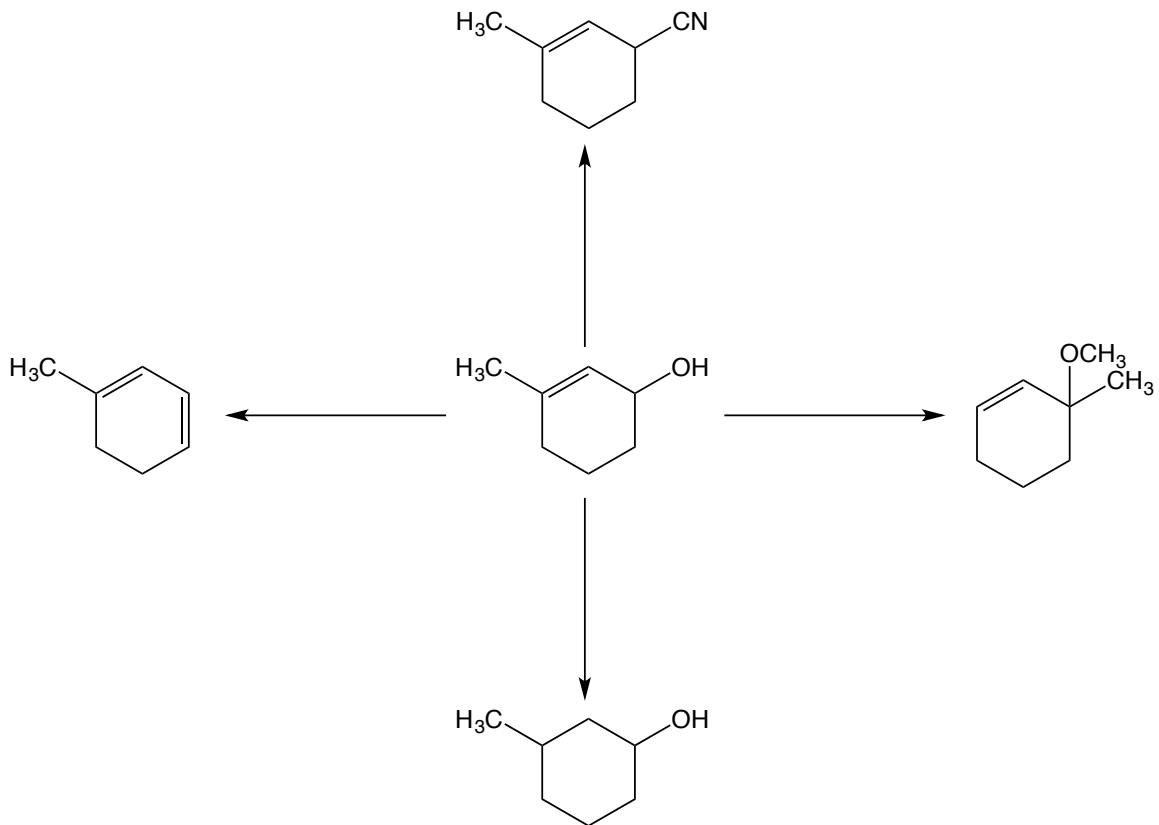


The above spectrum is most likely compound \_\_\_\_\_

Question 6. Identify the missing reagents and/or major product(s) of the following reactions. In the small box, identify the reaction type ( $S_N2$ ,  $S_N1$ , E2, E1, olefin Addition). Be sure to pay close attention to stereochemistry where appropriate.



Question 7. Add reagents to each reaction below to show how cyclohexylmethanol can be most efficiently converted to each of the following products. *Multiple steps may be needed.*



Question 8. Provide a complete mechanism for the following transformation. *Draw all relevant intermediates, including all resonance structures.*

