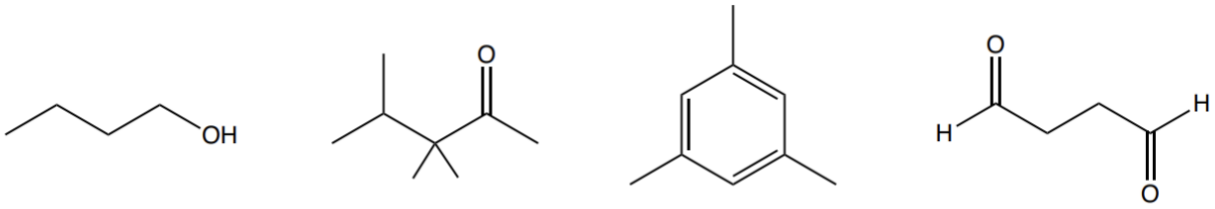
Problem Set 13

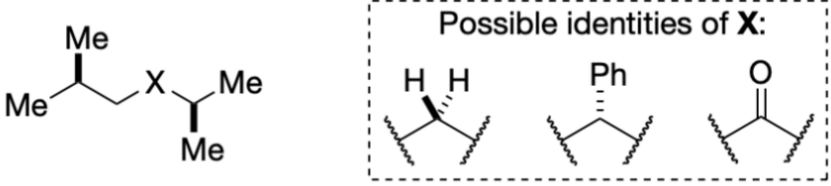
Organic Chemistry 1 (Greenberg)

Fall 2025

1. Hope everyone had a good Thanksgiving break. State the number of ^{13}C NMR and ^{1}H NMR peaks for each of the following molecules. Then predict the ^{1}H NMR splitting pattern and integration for each proton environment.



2. Let **X** be a functional group. Consider the molecule below. For all questions, explain why.



   a. Which identity of **X** leads to a peak at approximately 1715 cm^{-1} on the molecules IR spectrum?

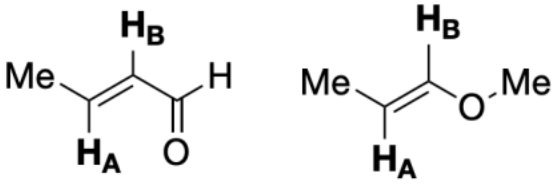
   b. Which identity of **X** minimizes the number of peaks on the molecules ^{13}C NMR spectrum?

c. Which identity of **X** leads to a pair of protons bonded to the same carbon producing different ^{1}H NMR peaks?

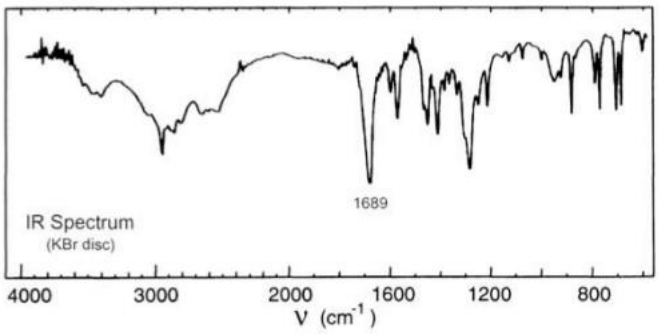
d. Which identity of **X** leads to peaks between 7 and 8 ppm on the molecules ^{1}H NMR spectrum?

e. Which identity of **X** leads to the largest number of doublets between 0 and 6 ppm on the molecule's ^{1}H NMR spectrum?

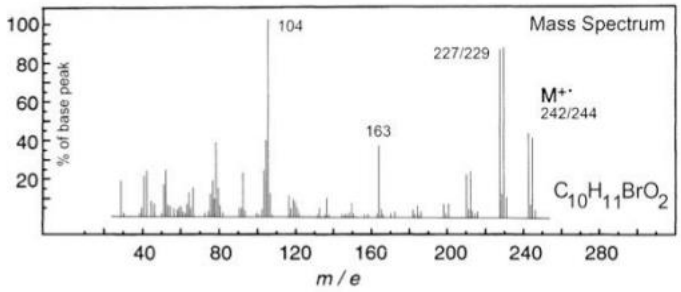
3. For each compound below, state whether H_A or H_B has a GREATER chemical shift and of course why.

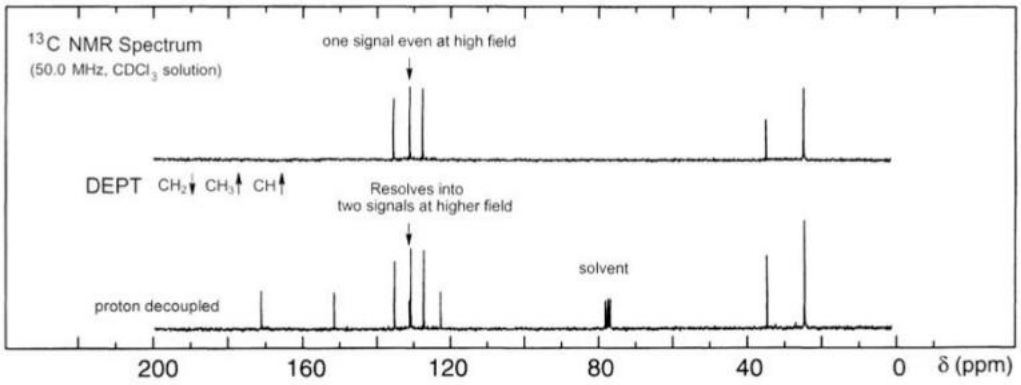


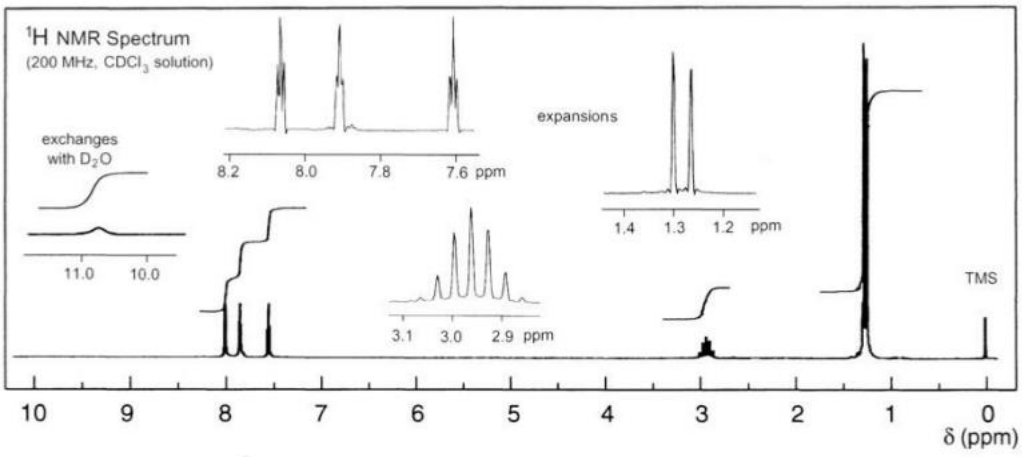
1. Provide a reasonable organic structure consistent with the following data. Do not worry about the DEPT Carbon NMR.



structure

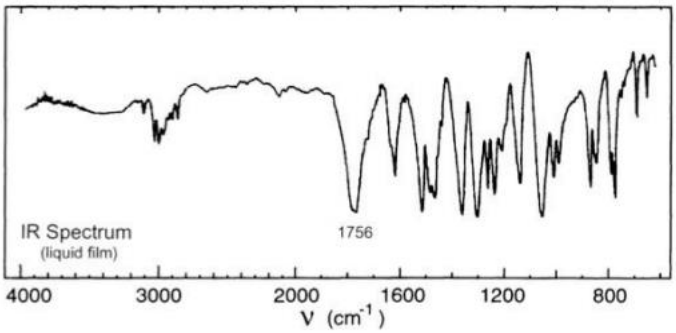




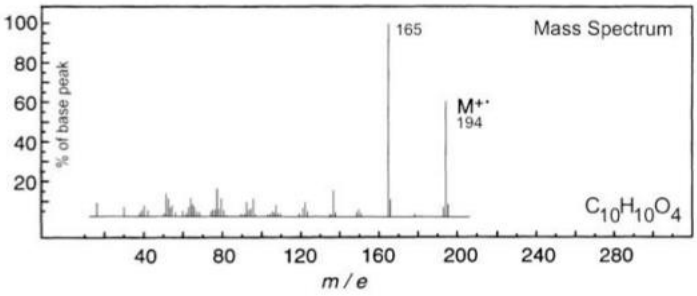


Integration: 1, 1, 1, 1, 1, 6
Splitting: bs, fine t, fine t, fine t, sep, d

2. Provide a reasonable organic structure consistent with the following data. Do not worry about the DEPT Carbon NMR.



structure

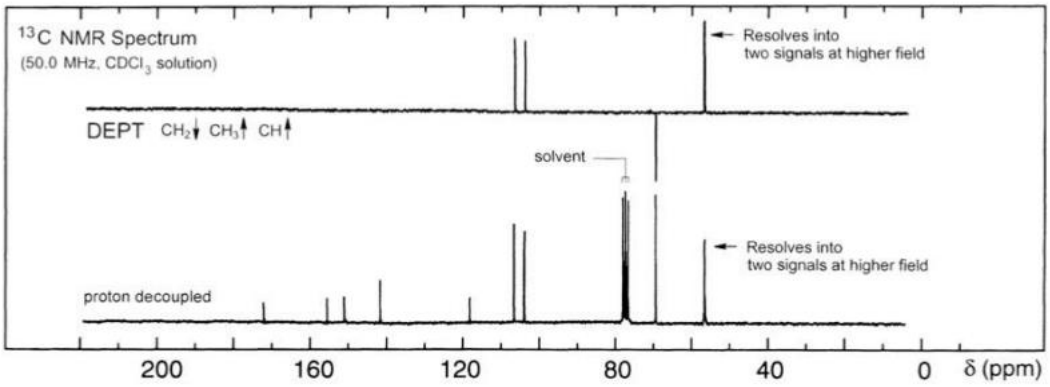


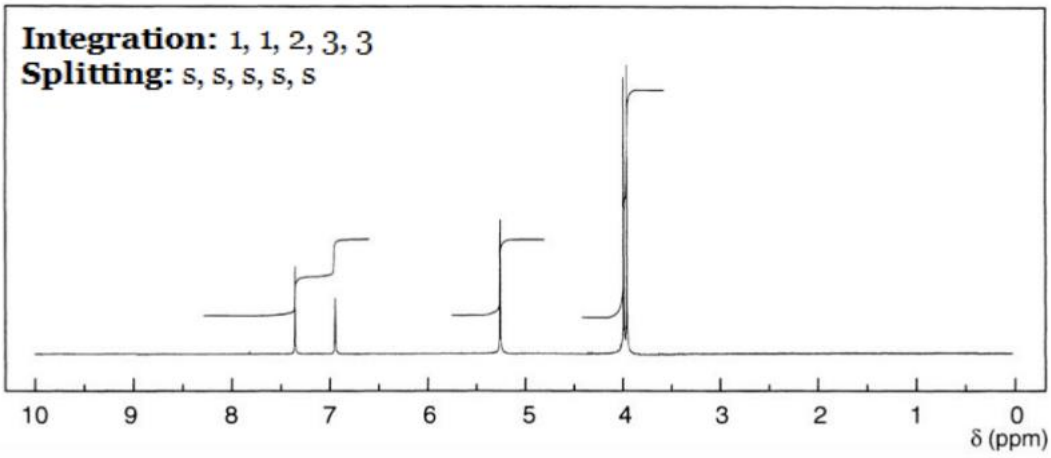
UV Spectrum

λ_{max} 232 nm ($\log_{10}\varepsilon$ 3.8)

λ_{max} 300 nm ($\log_{10}\varepsilon$ 3.6)

solvent : methanol





Clubs and Orgs Bulletin:

Studio North
Are you interested in gaining hands-on film production experience and want to meet other film fans? Come to Studio North, JHU's student-run production club! Join our slack at https://tr.ee/XGlXuc7Mcv for updates on GBMs and workshops, and follow our Instagram @studionorthmd!

Motorsports Society
Are you interested in motorsport, whether you're an F1 fan, becoming a mechanical engineer, or pursuing a career in sports journalism? Join Motorsoc! We foster a fun, inclusive environment for all kinds of motorsport fans. Follow our Instagram @motor_socjhu for more updates!

Tip of the Week: