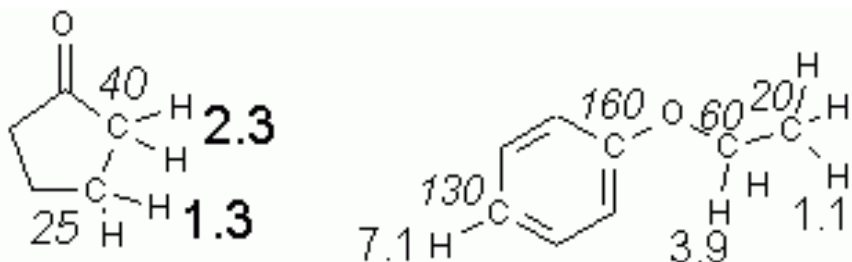


Chemistry 341 Lab

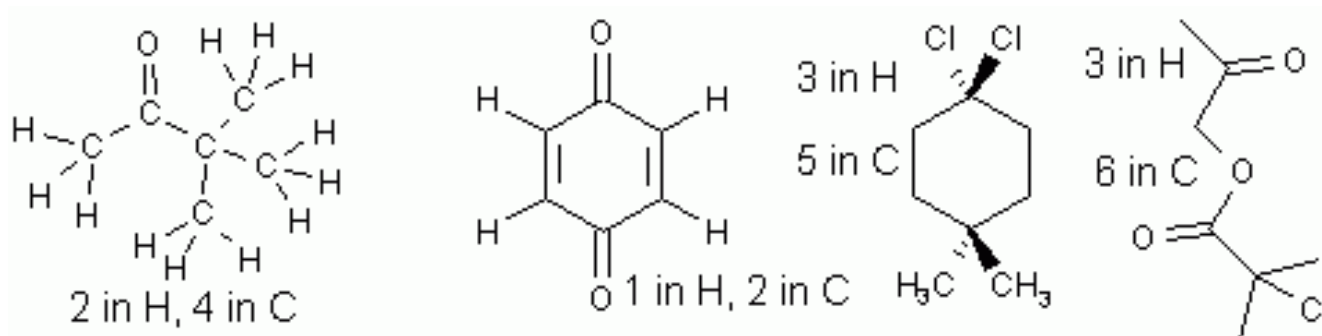
N.M.R. SPECTROSCOPY: Answers to exercises

Exercise 1. Predict approximate chemical shifts for all the carbon and hydrogen atoms which are explicitly shown in the following molecules:



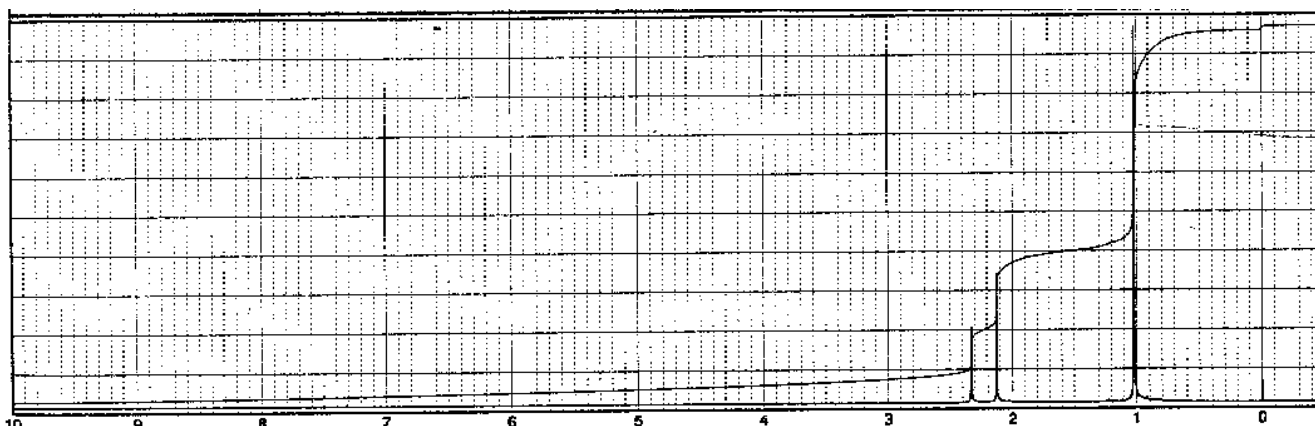
3. Equivalence

Exercise 2. Predict how many peaks you would expect to see in the ^1H and ^{13}C NMR spectra of the following molecules:



4. Integration

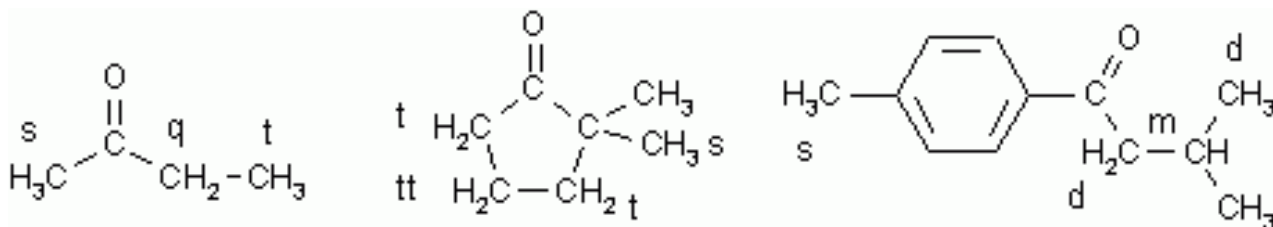
Exercise 3: What is the ratio of the hydrogens in the following ^1H spectrum?



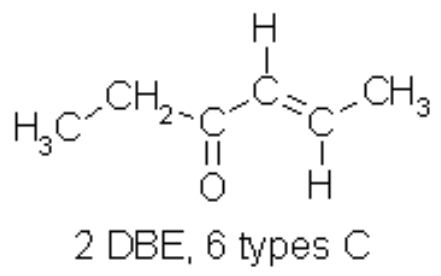
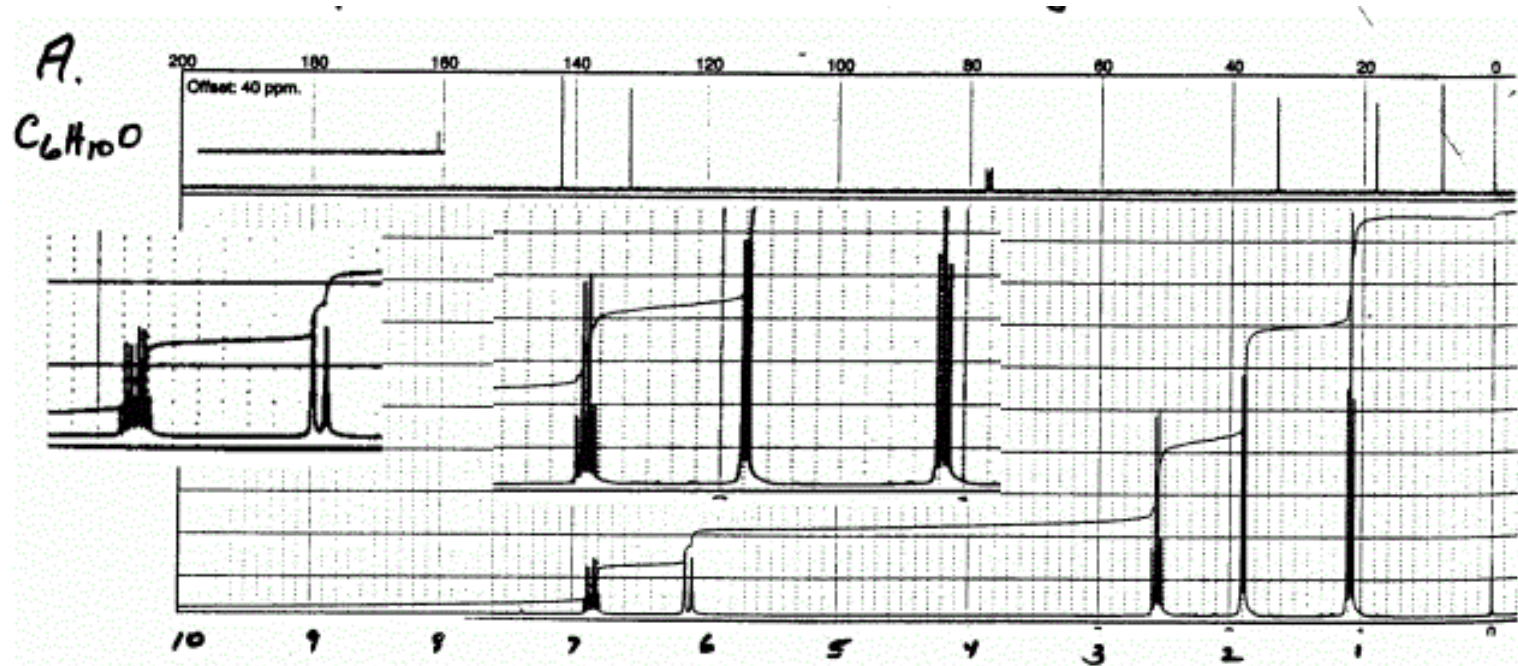
The ratio is 2:3:9. The compound is 4,4-dimethyl-2-pentanone.

5. Coupling (¹H only)

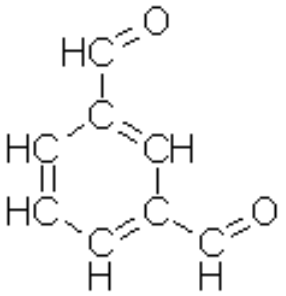
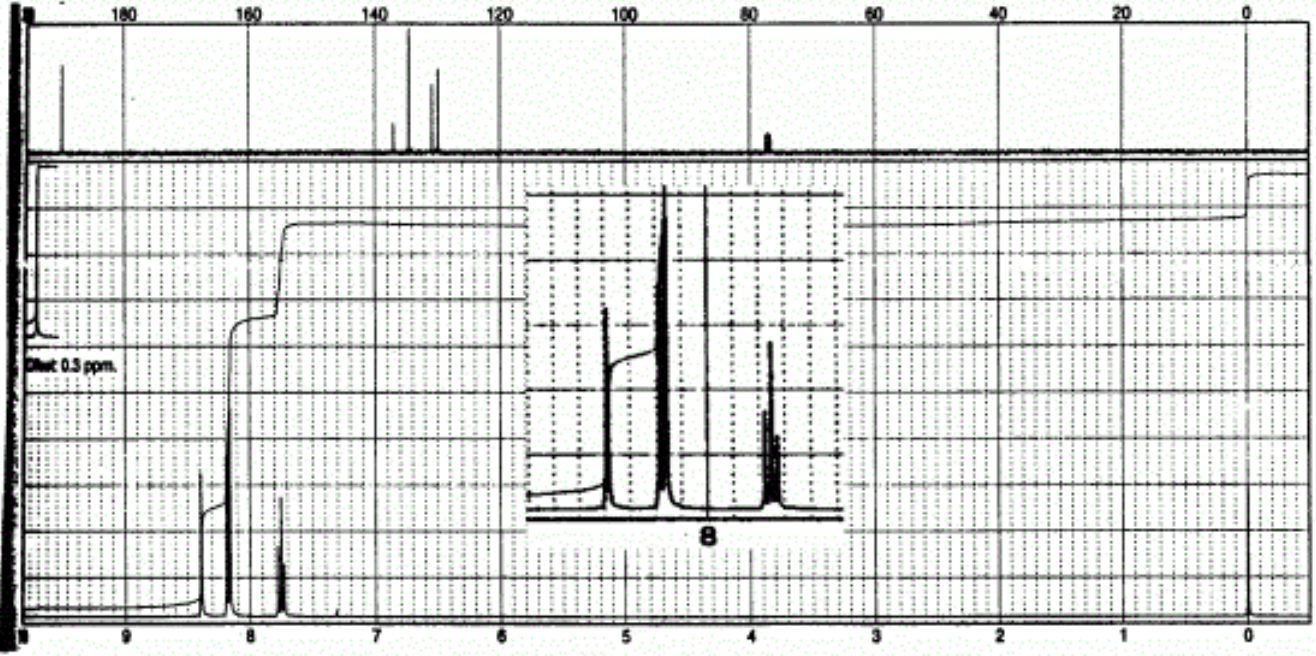
Exercise 4. Predict the coupling patterns in the following molecules:



Exercise 5. Try it out on these NMR spectra:



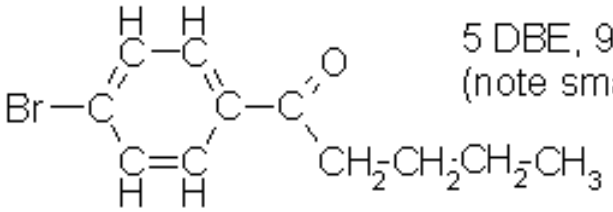
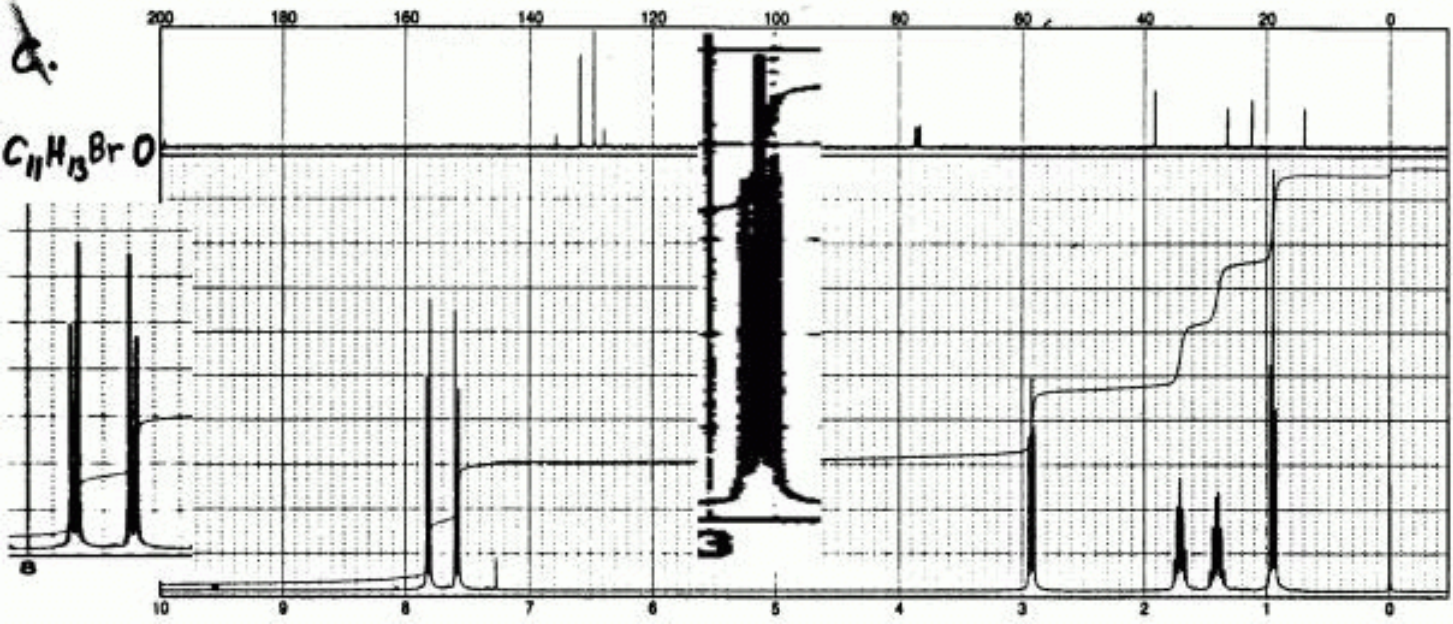
B.
C₈H₆O₂



Note that the aldehyde peak around 10 ppm integrates to 2H.

6 DBE, 5 types C

D.
C₁₁H₁₃BrO



5 DBE, 9 types C
(note small C=O peak at 198 ppm)