

CHEM HELP *ASAP*

Organic Chemistry Problem Set Solutions

Distinguishing Isomers based on ^1H NMR Spectra

Instructions: Each question below shows a ^1H NMR spectrum with four structural isomers. For each question, determine which compound matches the ^1H NMR spectrum shown. Briefly explain the reasons for your selection. Use the ideas of the number of signals, chemical shift, multiplicity, and integration in your reasoning. Spectra for these questions were generated by <https://www.nmrdb.org/>.

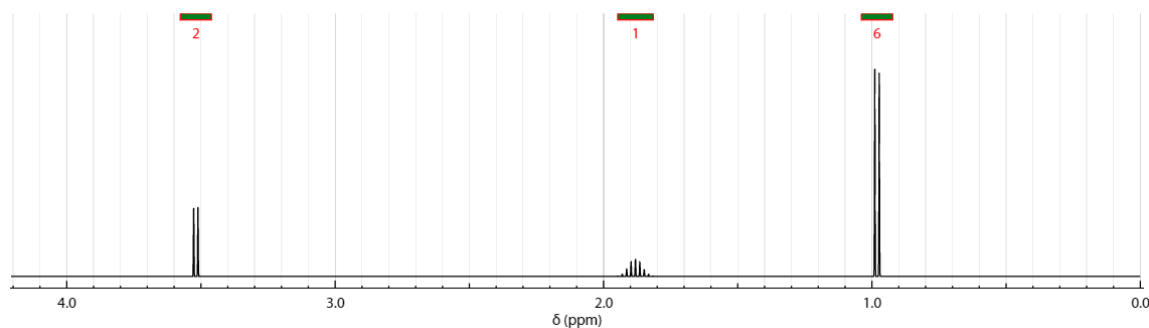
Suggested playlist

https://www.youtube.com/watch?v=g9aFR3slyQM&list=PLIzSRqjN72jfdP6_XzJ6IRS2yXsGNk_hZ (NMR spectroscopy)

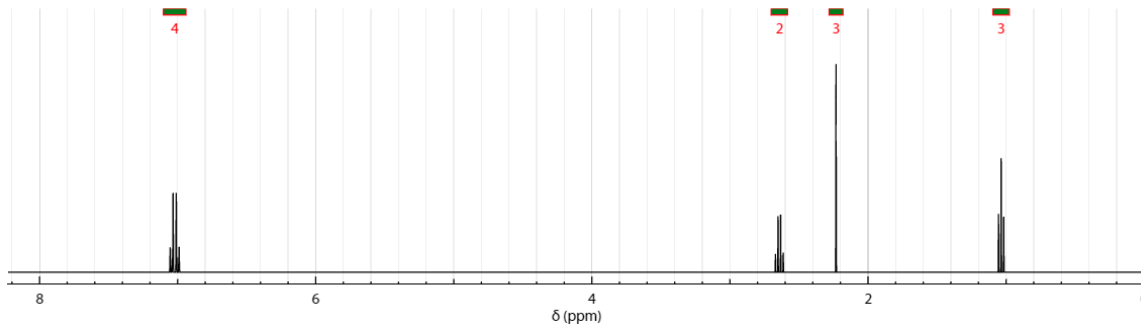
YouTube video of answered questions:

<https://youtu.be/HnjLsFKrrvc>

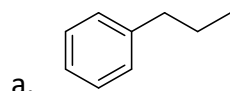
Questions:



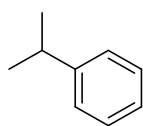
- a. CCCCl - 4 signals (too many) (incorrect)
- b. CC(C)CCl - 3 signals, two identical methyls for a 6H doublet (correct)
- c. CC(C)(C)Cl - just 1 signal (9H singlet) (incorrect)
- d. CC(Cl)CC - 4 signals (too many) (incorrect)
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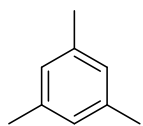
2.



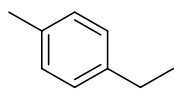
- 5 aromatic hydrogens (too many) (incorrect)



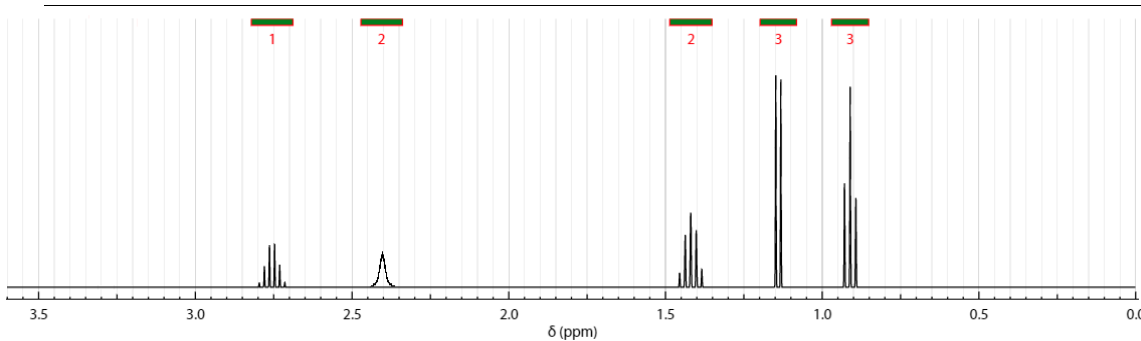
- 5 aromatic hydrogens (too many) (incorrect)



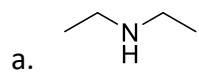
- 3 aromatic hydrogens (too few) (incorrect)



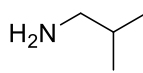
- 4 aromatic hydrogens, two different methyl groups (correct)



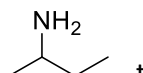
3.



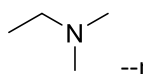
- just one NH (incorrect)



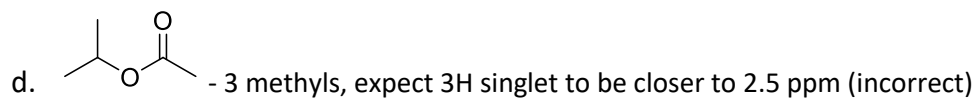
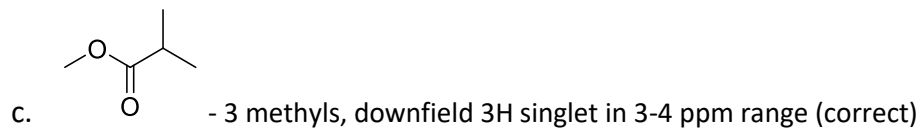
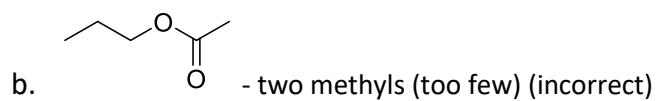
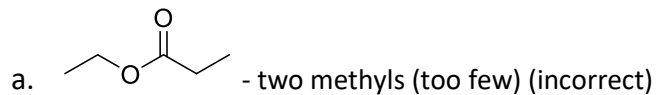
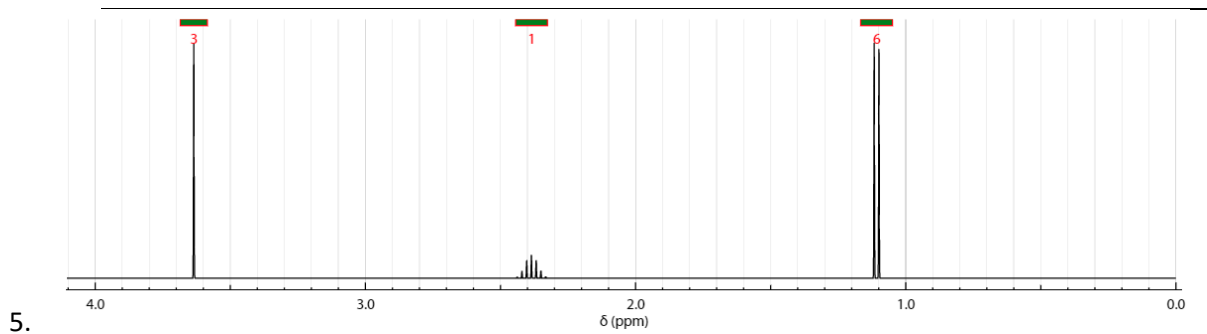
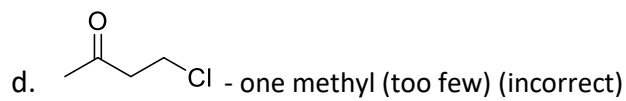
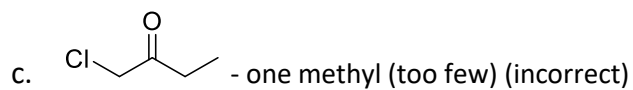
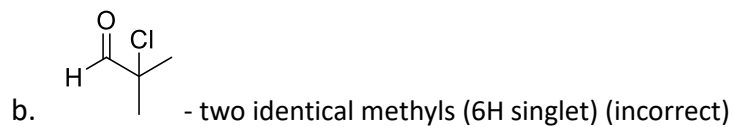
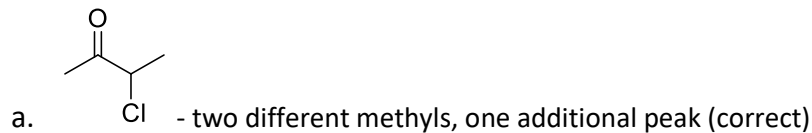
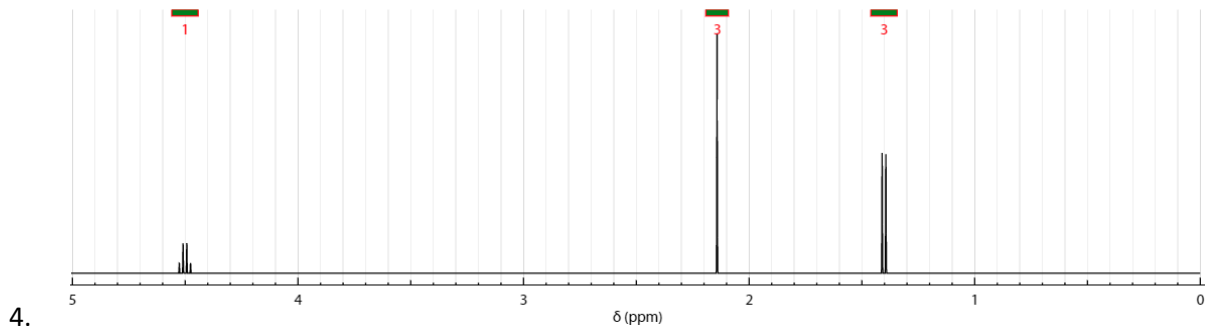
- two NHs, 3 additional signals (too few) (incorrect)

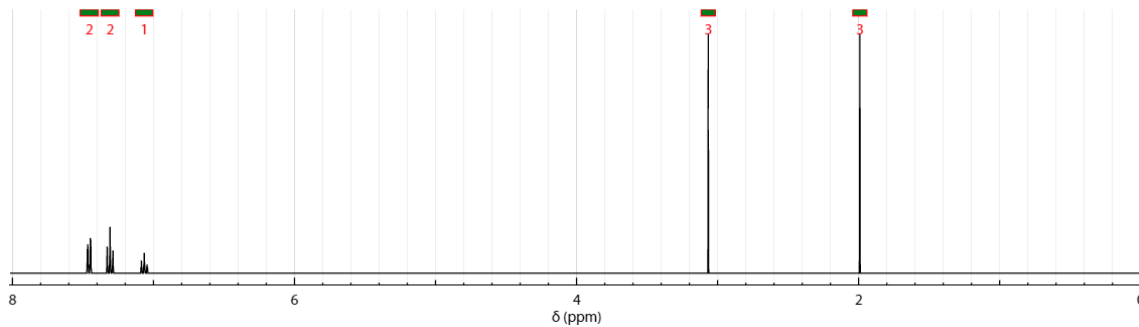


- two NHs, 4 additional signals, two different methyls (correct)



--no NHs (too few) (incorrect)





- a. CC(=O)Nc1ccccc1 - 5 aromatic hydrogens, 2 methyls (correct)
- b. CCNC(=O)c1ccccc1 - 5 aromatic hydrogens, 1 methyl (too few) (incorrect)
- c. CNC(=O)c1ccc(C)cc1 - 4 aromatic hydrogens (too few) (incorrect)
- d. CCNC(=O)c1ccccc1 - 5 aromatic hydrogens, 1 methyl (too few) (incorrect)
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