

Chemistry 210 NMR Quiz
October 21, 2013

Name: _____

This quiz is due back on Wednesday, October 23, 2013 lab. To receive credit, you must do the following:

1. Turn in this coversheet with your name on it, and
2. The entire quiz, including all pages, with indication that you solved the problem, not just writing down the answers, must be shown..

You will not receive credit for this quiz, unless you meet both criteria above. Alright?

Answers:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

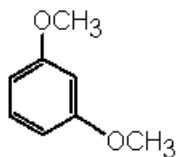
NOTE: Sometimes the Greek lettering does not always convert over to a pdf document, so I inserted the names for the appropriate Greek letters throughout the quiz. Good luck.

1. What does the integral trace on an NMR spectrum indicate?
 - a. the total number of protons in the compound
 - b. the relative number of protons coupled to adjacent nuclei
 - c. the size of the magnetic field
 - d. the absolute number of protons in each magnetic environment
 - e. the relative number of protons in each magnetic environment

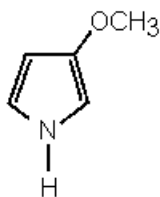
2. Why do the protons on an aromatic ring occur downfield in an NMR spectrum?
 - a. a shielding effect by the σ -electrons
 - b. a deshielding effect by the σ -electrons
 - c. ring current shielding
 - d. a deshielding effect by the π -electrons
 - e. an anisotropy of the π -electrons

3. What does the (n + 1) rule state?
 - a. a multiplet containing n peaks implied n + 1 equivalent protons on the adjacent atom
 - b. a proton with n + 1 equivalent neighbors will have its resonance split into n peaks.
 - c. for n protons in a compound the number of different chemical shifts will be n + 1
 - d. spin-spin coupling between n protons can only occur through up to n + 1 bonds
 - e. a proton with n equivalent neighbors will have its resonance split into n + 1 peaks

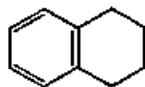
4. What is the number of chemical shift equivalent groups of hydrogen atoms on this substance?
 - a. 3
 - b. 4
 - c. 2
 - d. 6
 - e. 5



5. What is the number of chemical shift equivalent groups of hydrogen atoms on this substance?
- a. 3
 - b. 2
 - c. 5
 - d. 4
 - e. 6



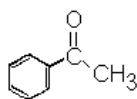
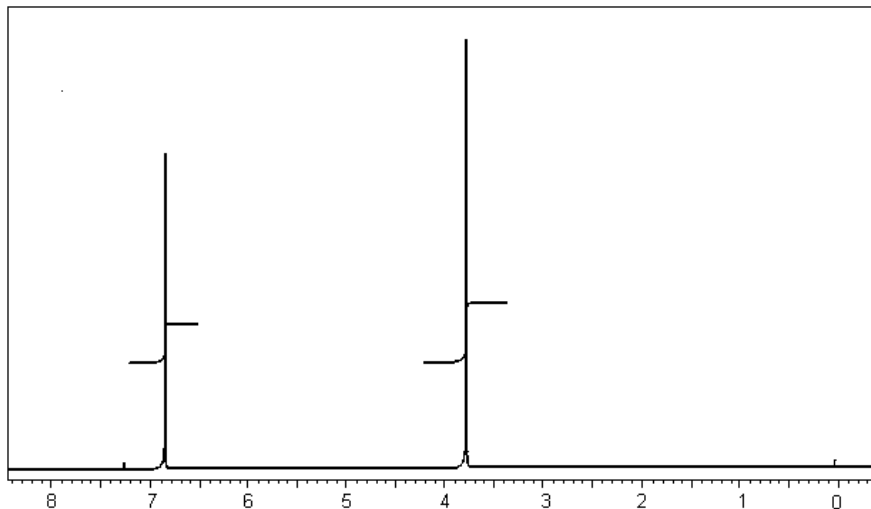
6. What is the number of chemical shift equivalent groups of hydrogen atoms on this substance?
- a. 2
 - b. 3
 - c. 6
 - d. 5
 - e. 4



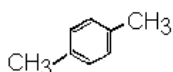
7. The ¹H-NMR spectrum of 1-bromo-2,2-dimethyl propane ((CH₃)₃CCH₂Br) contains which of these sets of resonances?
- a. singlet, quartet, triplet
 - b. quartet, triplet
 - c. singlet, doublet, quartet
 - d. triplet, decet
 - e. singlet, singlet
8. The ¹H-NMR spectrum of 1,3-dichloro-2-methyl propane ((ClCH₂)₂CHCH₃) contains which of these sets of resonances?
- a. doublet, pentet, quartet
 - b. doublet, octet, doublet
 - c. octet, pentet, doublet
 - d. triplet, doublet, quartet
 - e. quartet, octet, doublet

9. To which of these substances does the following $^1\text{H-NMR}$ spectrum correspond?

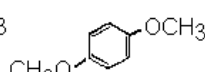
- a. see graph a
- b. see graph b
- c. see graph c
- d. see graph d
- e. see graph e



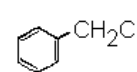
a.



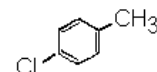
b.



c.



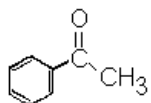
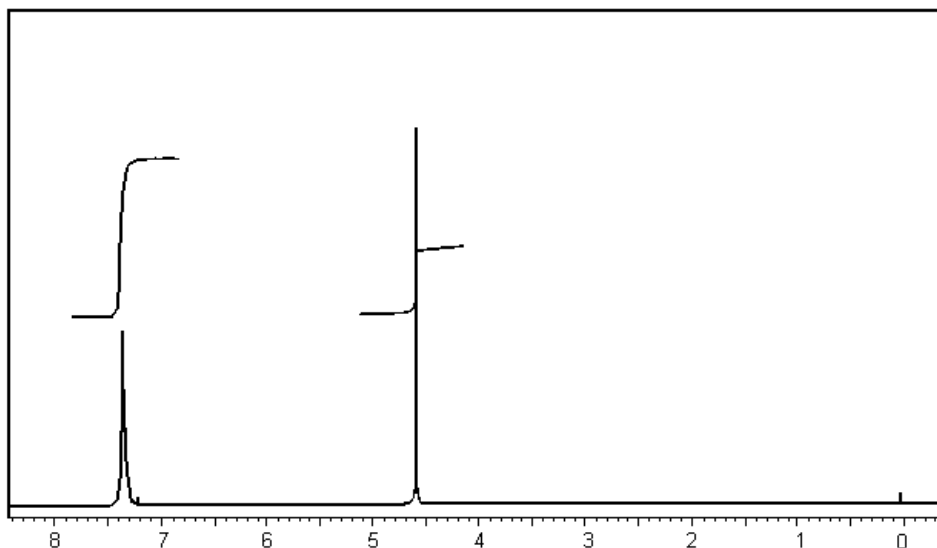
d.



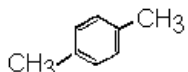
e.

10. To which of these substances does the following $^1\text{H-NMR}$ spectrum correspond?

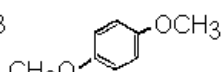
- a. see graph a
- b. see graph b
- c. see graph c
- d. see graph d
- e. see graph e



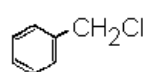
a.



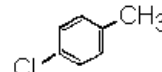
b.



c.



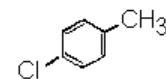
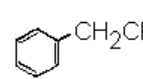
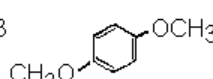
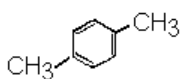
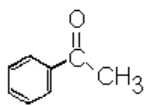
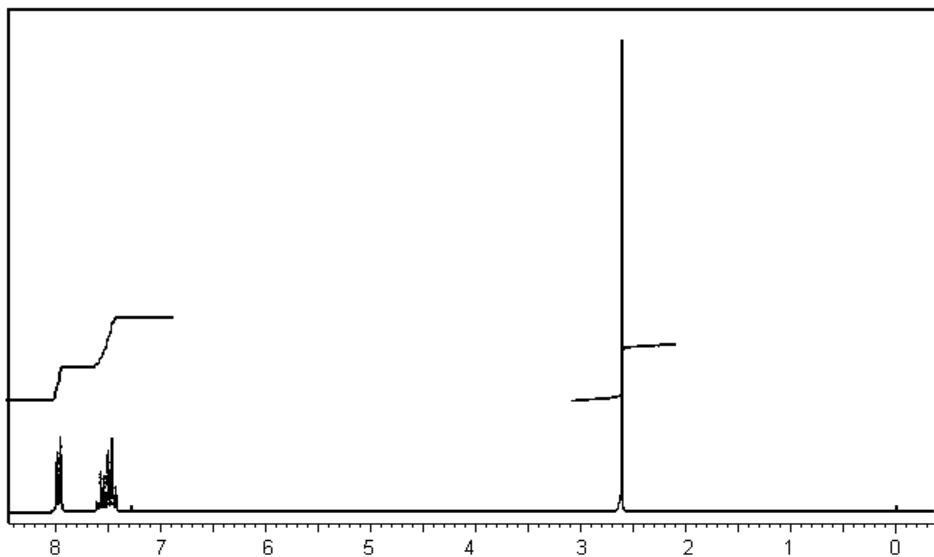
d.



e.

11. To which of these substances does the following $^1\text{H-NMR}$ spectrum correspond?

- a. see graph a
- b. see graph b
- c. see graph c
- d. see graph d
- e. see graph e



a.

b.

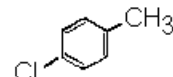
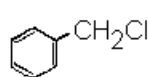
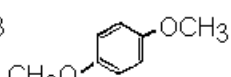
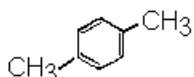
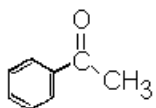
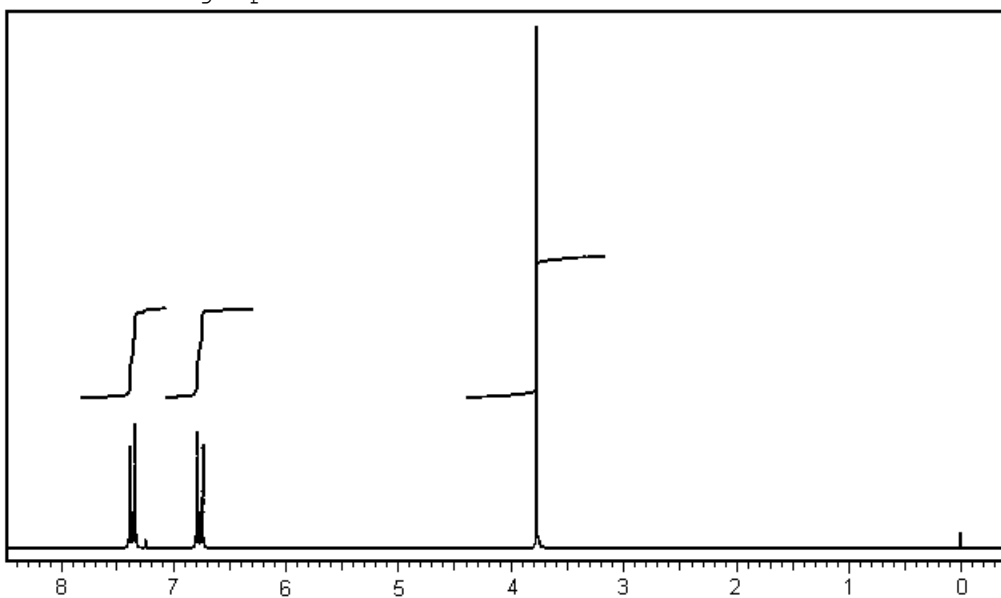
c.

d.

e.

12. To which of these substances does the following $^1\text{H-NMR}$ spectrum correspond?

- a. see graph a
- b. see graph b
- c. see graph c
- d. see graph d
- e. see graph e



a.

b.

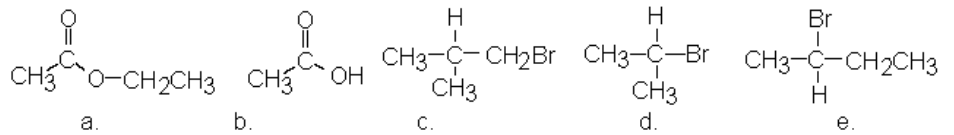
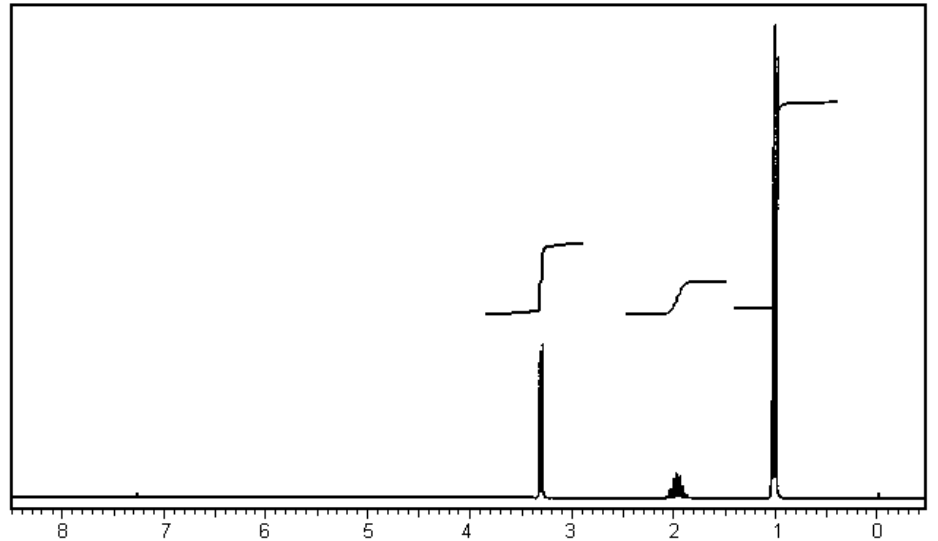
c.

d.

e.

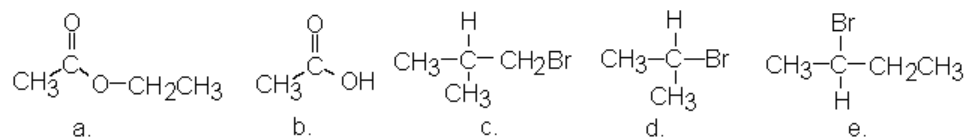
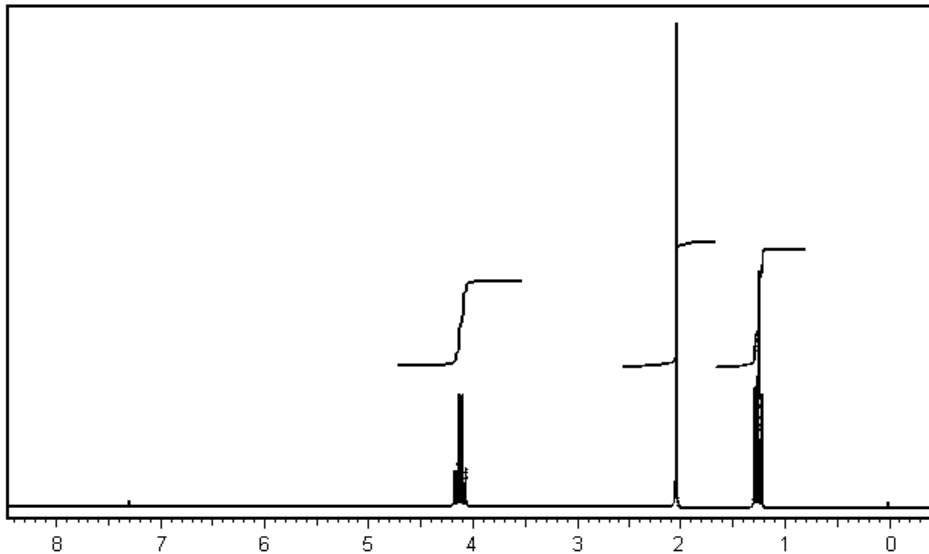
13. To which of these substances does the following $^1\text{H-NMR}$ spectrum correspond?

- a. see graph a
- b. see graph b
- c. see graph c
- d. see graph d
- e. see graph e



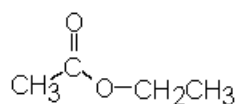
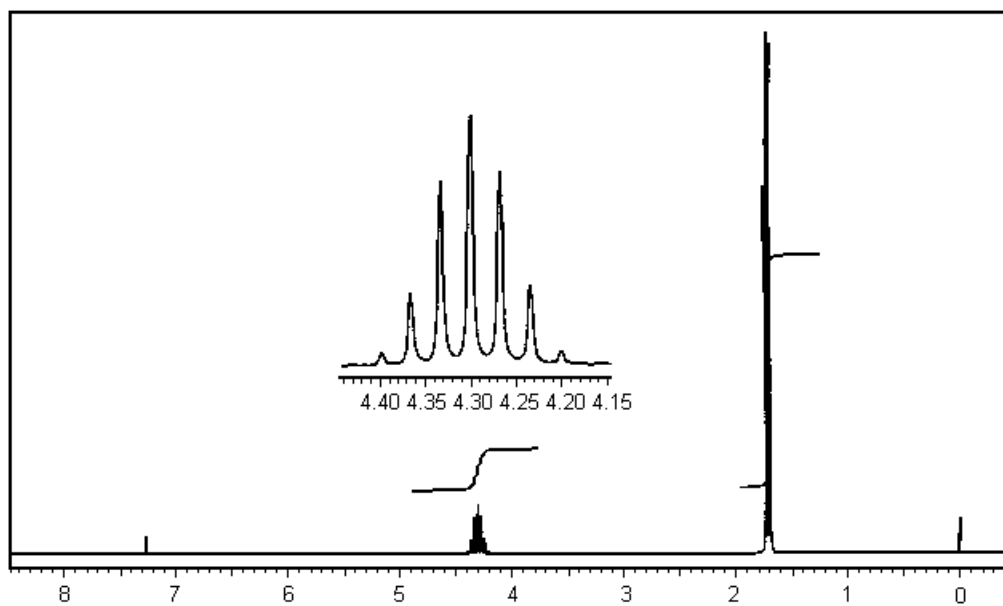
14. To which of these substances does the following $^1\text{H-NMR}$ spectrum correspond?

- a. see graph a
- b. see graph b
- c. see graph c
- d. see graph d
- e. see graph e

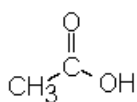


15. To which of these substances does the following $^1\text{H-NMR}$ spectrum correspond?

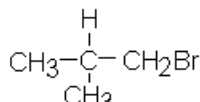
- a. see graph a
- b. see graph b
- c. see graph c
- d. see graph d
- e. see graph e



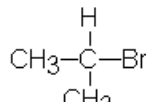
a.



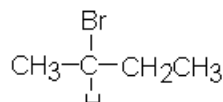
b.



c.



d.



e.