

Homework/Problem Set
Chapter 2 (IR) and Chapter 9 (NMR)

1. A compound with a molecular formula C_8H_9BrO gave the following 1H NMR spectra:
Triplet at 1.4 ppm
Quartet at 3.9 ppm,
multiplet, at 7.0 ppm (with integration showing 4 Hydrogens)

There was no evidence of an -OH band in IR spectrum. A possible structure for the compound is:

- A) $C_6H_5OCH_2CH_2Br$; B) *p*- $CH_3C_6H_4OCH_2Br$; C) *p*- $BrC_6H_4OCH_2CH_3$
D) $C_6H_5OCH(Br)CH_3$; E) *p*- $CH_3OC_6H_4CH_2Br$

2. Listed here are 1H NMR absorption peaks and very characteristic IR absorption band for the compound with molecular formula C_4H_8O . Propose a structure which is consistent with the data:

1H NMR triplet, δ 1.05 (3 H) IR 1720 cm^{-1} cm (strong)
 singlet, δ 2.13 (3 H)
 quartet, δ 2.47 (2 H)

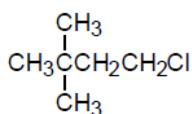
3. Predict the splitting you would observe for the proton at C-3 of 2,3-dimethyl-2-phenylbutane:

- A) Doublet B) Singlet C) Quartet D) Septet E) Octet

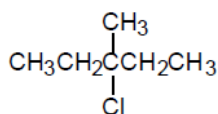
4. How many ^{13}C signals would 4-chloro-1-ethylbenzene give?

- A) 2 B) 3 C) 4 D) 6 E) 7

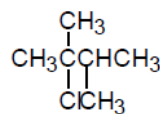
5. The broad band proton-decoupled ^{13}C NMR spectrum of a hexyl chloride exhibits five signals. Which of these structures would be the correct one for the compound?



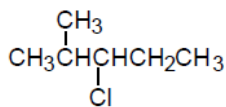
A



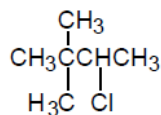
B



C

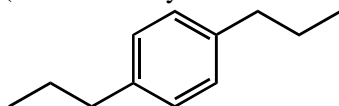


D



E

6. For the following compound how many different signals would you see in the proton NMR?
(Assume that you can see them all.)



- A) 4 B) 5 C) 6 D) 7 E) 8