# Chapter 17 (17.10 – 17.14): Nuclear Magnetic Resonance Worksheet

For each of the following compounds draw the structure and label each group of equivalent hydrogens with a, b, c, etc. showing the number of nmr signals and their relative positions (a = most upfield). Make table showing the integration and splitting pattern for each signal.

1. 1,4-dibromobutane

$$Br - CH_2 CH_2 | CH_2 CH_2 - Br$$

b a | a b

These can't see
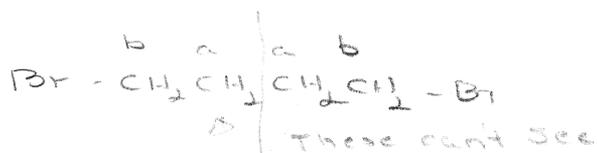
a. 4 H   triplet
b. 4 H   triplet
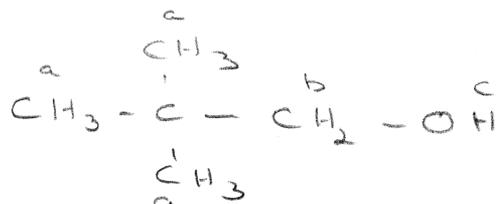
these.... because they are the same

2. neopentyl alcohol

$$CH_3 - C - CH_2 - OH$$

c CH_3

a CH_3

a. 9 H   singlet
b. 3 H   singlet
c. 1 H   singlet

3. 1-chloro-2-phenylethane

$$Cl - CH_2 CH_2 - \langle O \rangle$$

b a   c
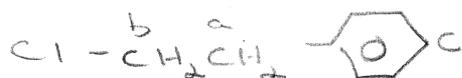
a. 2H   triplet
b. 2 H   triplet
c. 5 H   singlet

4. n-propyl methyl ether

$$CH_3 CH_2 CH_2 - O - CH_3$$

a   b   d   c
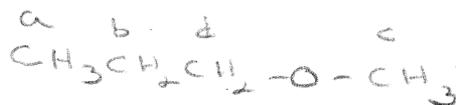
a. 3 H   triplet   (c.) d. 2H   triplet
b. 2 H   multiplet
(d.) c. 3H   singlet

Below are the summarized nmr spectra of three compounds with the formula $C_5H_{10}Br_2$. Identify each compound by drawing its structure next to its nmr.

$$[(5 \times 2) + 2 + 2]/2 = 0$$

Compound 1			
a	1.0 ppm	3H	triplet
b	1.4 ppm	2H	complex multiplet
c	1.7 ppm	3H	singlet
d	1.9 ppm	2H	triplet

$$CH_3 - C - CH_2 CH_2 CH_3$$
Br (top), Br (bottom), c, d, b, a
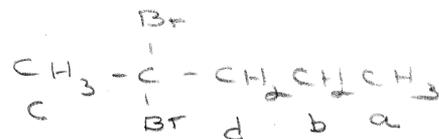
Compound 2			
a	1.2 ppm	6H	doublet
b	1.5 ppm	2H	triplet
c	3.1 ppm	2H	complex multiplet

$$CH_3 - CH - CH_2 - CH - CH_3$$
Br, Br, a, c, b, c, a
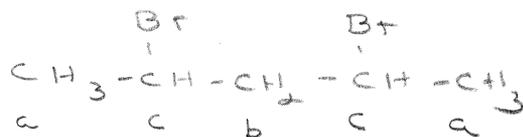
Compoundd 2			
a	1.0 ppm	3H	triplet
b	1.2 ppm	3H	singlet
c	1.5 ppm	2H	quartet
d	3.3 ppm	2H	singlet

$$CH_3 CH_2 - C - CH_2 - Br$$
b CH_3, a, c, Br, d