

Homework 8

1. Nuclear Overhauser Effect, NOE, is:
 - a) the name given to the reason magnetic moment precess in a magnetic field.
 - b) the effective coupling between one nuclei and a neighboring nuclei.
 - c) the enhanced intensity one gets in a C-13 spectrum when the H attached to it is decoupled.
 - d) the effect one gets by giving a nuclei a 180 degree pulse.
2. For a proton spectrum on a 60 MHz instrument, 1 ppm corresponds to ____ Hz.

For problems 3-5. Consider the NMR of 3-pentanone ($\text{CH}_3\text{CH}_2\text{CO}$ [or $\text{CH}_3\text{CH}_2\text{C}(\text{O})\text{CH}_2\text{CH}_3$].

3. The proton spectrum will consist (from high chemical shift to low) :
 - a) a singlet, and a multiplet (splitting greater than 4) and a triplet
 - b) a quartet, and a triplet.
 - c) a two doublets and two triplets..
 - d) two triplets and two quartets
 - e) a triplet, and a doublet
4. From the highest chemical shift to the lowest, integration of the peaks in the proton spectrum will be:
 - a) 2:3
 - b) 2:2:3:3
 - c) 1:2:3
 - d) 3:2:2:3
 - e) none of these
5. The decoupled carbon spectrum will consist of ____ peak(s).
 - a) 2
 - b) 3
 - c) 4
 - d) 5
 - e) none of these
6. The proton frequency on a magnet with a field of 200 MHz is 46000 gauss. What is the field strength on an instrument when the proton frequency is 60 MHz?
 - a) 13800 gauss
 - b) 153333 gauss
 - c) 4140 gauss
 - d) none of these

Consider ethyl benzene; $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_3$

(a) (b) (c)

7. The **b** protons in the **proton** spectrum will be :
 - a) a 1:2:1 triplet
 - b) a 1:3:3:1 quartet
 - c) a 1:1:1 triplet
 - d) a 1:1 doublet
 - e) none of these
8. The **c** protons in the **proton** spectrum will be :
 - a) a 1:2:1 triplet
 - b) a 1:3:3:1 quartet
 - c) a 1:1:1 triplet
 - d) a 1:1 doublet
 - e) none of these
9. In the decoupled **C-13 spectrum** the 6 carbons of the phenyl ring will show up as :
 - a) 6 peaks of equal intensity
 - b) 5 peaks of equal intensity and one of low intensity
 - c) 4 peaks of equal intensity
 - d) 4 peaks- two of larger intensity and two of lower but not necessarily equal intensity

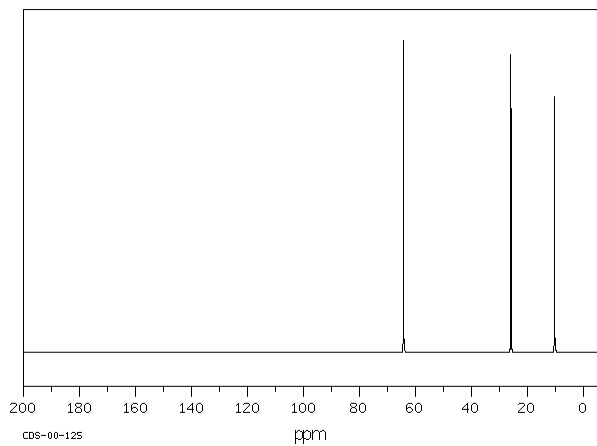
10-12 Match these alcohols and their C-13 spectra.

_____ $\text{CH}_3\text{CH}_2\text{OH}$ ethanol

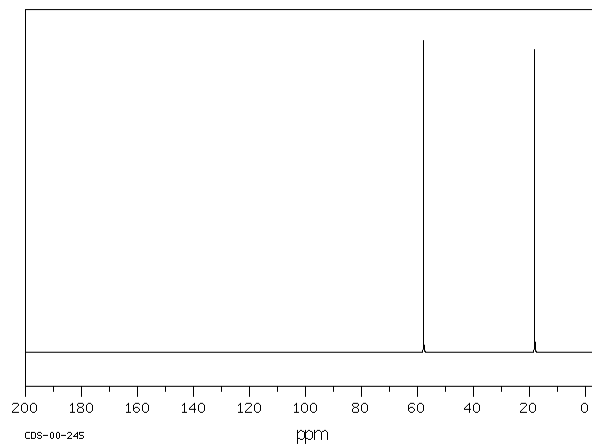
_____ $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ 1-propanol (*n*-propyl alcohol)

_____ $(\text{CH}_3)_2\text{CHOH}$ 2-propanol (*i*-propyl alcohol)

Spectrum A – all peaks of equal size



Spectrum C – peaks of equal size



Spectrum B – right peak twice height of left

