Chemistry 220b, Section 1
Quiz 1 (25 pts)
Tuesday, January 22, 2008

Write and sign the VU Honor Pledge:

I pledge my honor that I have neither given nor received aid on this quiz

I. M. Honest
signature

This Quiz is closed book and closed notes

NOTE: It is difficult for me to give you partial credit if you do not show your work!

Neatness counts

Good Luck !!
1. The mass spectrum of 2-phenylethanol is shown below (electron-impact ionization). Label the base peak, and molecular ion peak. The mass of 2-phenylethanol is 122. What is the source of the peak at $m/z = 123$? (6 pts)

![Mass Spectrum of 2-phenylethanol](image)

Base peak $\rightarrow m/z = 91$

Molecular ion ($M^+$) $m/z = 122 \rightarrow (M+1)$ is from the isotopic abundance of $^{13}C$

$m/z = 123$

2. An example of a UV, IR, and $^1$H NMR spectrum is shown below. The absorption of EM radiation (photon) by the molecule results in specific signals in each spectrum. Indicate which signals denoted by the arrows, corresponds to the absorptions of the highest and lowest energy photons. (6 pts)

![UV, IR, 1H NMR Spectra](image)

highest energy photon

lowest energy photon

highest energy photon

lowest energy photon

highest energy photon

lowest energy photon
3. How many proton resonances would you expect for the compound below. Justify your answer by identifying all sets of equivalent protons. (5 pts)

![Chemical structure of the compound](image)

These are diastereomers therefore the protons are chemically non-equivalent.

4. Predict the approximate chemical shift, multiplicity and integration of each set of non-equivalent protons for the following. (8 pts)

![Chemical structure of the compound](image)

protons 1: \( d \approx 0.9 - 1.5 \) ppm, triplet (2 equivalent H's on the adjacent C), 3H
protons 2: \( d \approx 3.5 - 4.5 \) ppm, quartet (2 equivalent H's on the adjacent C), 2H
protons 3: \( d \approx 4.5 - 5.5 \) ppm (in between an ether O and a C=O), singlet, 2H
protons 4: \( d \approx 3.0 - 4.0 \) ppm, singlet, 3H