^{1}H NMR Introductory Problems

1. How many ^{1}H NMR absorptions are expected for each compound? In other words, how many non-equivalent protons are in each compound? *Pro-tip: Draw the skeletal structure then add H's.*

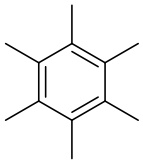
(a) CH_3CH_2Cl **(b)** $(CH_3)_2CHOCH_3$ **(c)** $NO_2CH_2CH_2CH_3$

(d) Benzene **(e)** 2-Methyl-1-butene **(f)** *trans*-3-hexene

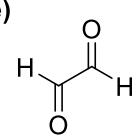
2. Each compound below has only 1 peak in its ^{1}H NMR spectrum. Use the NMR tables to predict the chemical shift range (ppm) where each compound should absorb.

(a) 

(b) 

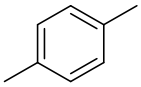
(c) 

(d) CH_2Cl_2

(e) 

(f) CH_3OCH_3

3. Consider the structure of ***p*-xylene** below to answer the following.



***p*-xylene**

(a) How many peaks (absorptions) should *p*-xylene have in its ^{1}H NMR spectrum?

(b) What ratio of peak areas would you expect on integration of the spectrum?

(c) Use the NMR tables to approximate the chemical shifts of the signals in ***p*-xylene**.

4. Summarize in your own words *how* to find the number of signals, integration, and chemical shift(s) in any given molecule.

5. Draw (invent) or look up a molecule you know by name online (ex. medicine). Draw that structure below. Predict the number of ^{1}H NMR signals, integration, and chemical shifts of that molecule! Share your findings to your labmates.