

Homework #1; CHM 310S; 2007;
Due February 15, 2007

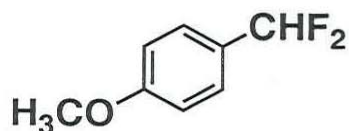
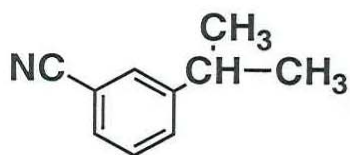
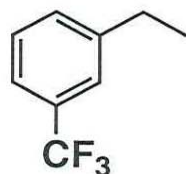
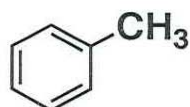
name:

Work is to be your own...alone!

1. (15 points). Please give the ratio of OH addition to H-Abstraction for each of the following compounds. You are to normalize to 1 for the slowest component.

Calculation

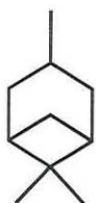
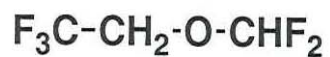
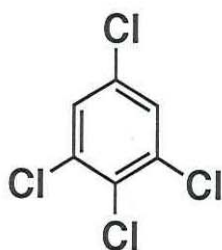
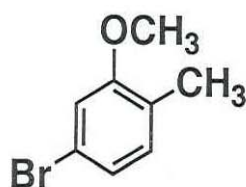
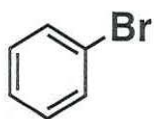
H-Abstraction:
Addition



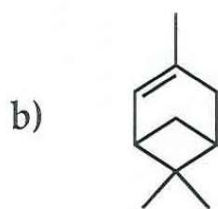
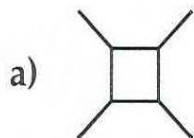
2. (15 points). Please give the atmospheric lifetime (in days) with respect to OH reaction for each compound below and use 1×10^6 molecules/cm³ as your OH concentration.

Calculation

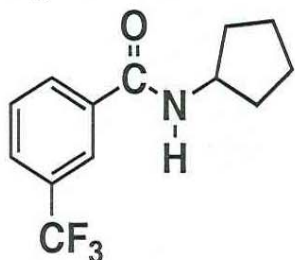
Lifetime



3. (6 points). Please indicate the following OH driven oxidations by showing the reagents, any intermediates (be thorough), and the first stable product that is isolatable from the following structures (some are arguably odd!).



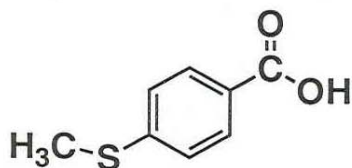
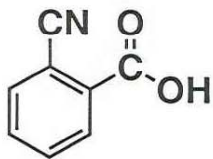
4. (4 points). Please discuss mechanistically the stability for the following compound with respect to hydrolysis under environmental conditions. Use chemical sketches, etc as you see fit. Do give a sense of how persistent you think this compound will be.



5. (6 points). Carbofuran, show below, is a widely used carbamate insecticide, though it is rather hazardous to nontarget organisms. A few years ago, it was the causative agent in the Withrow Park dog poisonings that gripped my Riverdale neighborhood. From what you've learned in class so far involving environmental photochemistry and hydrolysis, please **explain** (in chemical detail) why when we look for this compound in surface waters downstream of its use in corn fields we typically find the following three carbofuran degradation products: a) an alcohol, b) a ketone; and c) a product that has both alcohol and ketone functionality. [do provide the three structures as well]



6. (4 points). Please use appropriate chemical structures/figures to explain why one of the two benzoic acids derivatives is more acidic than the other.



Score