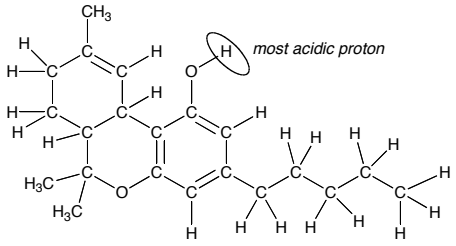
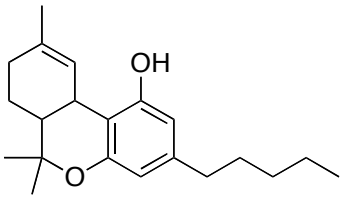
CHE 171
Fall, 2005
Quiz 2

Name_____
Section: **101** **102** **103**
M W F
(circle one)

1. Tetrahydrocannabinol (THC) is the most psychotropic of the more than 400 chemicals found in the cannabis sativa plant (marijuana). A Lewis structure of THC is shown below. Answer questions a-c in the spaces provided.

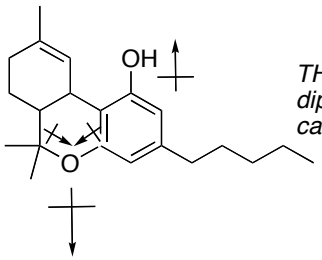


(a) Draw the skeletal structure (bond-line form) of THC below. (5 pts)



(b) Which is the most acidic proton in the THC molecule? Circle it in either the Lewis structure provided or in your skeletal structure. (5 pts)

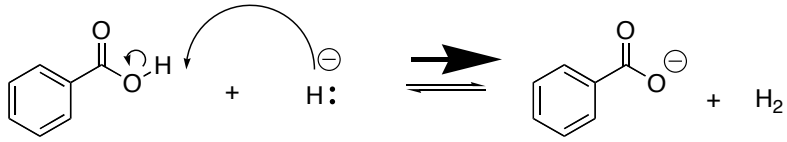
(c) Is THC a polar or non-polar molecule? Explain. (5 pts)



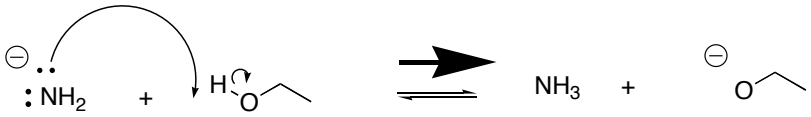
THC is non-polar. The individual dipole moments within the molecule cancel to give NO net dipole moment.

2. Draw the products of each of the following acid-base reactions and predict whether the equilibrium favors the starting materials or products (draw an arrow above the equilibrium arrows either towards products or reactants to show this; a pK_a table is on the next page). Use curved-arrow notation to show electron flow. (5 pts each)

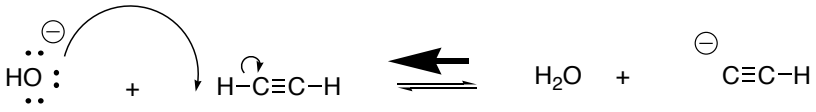
(a)



(b)

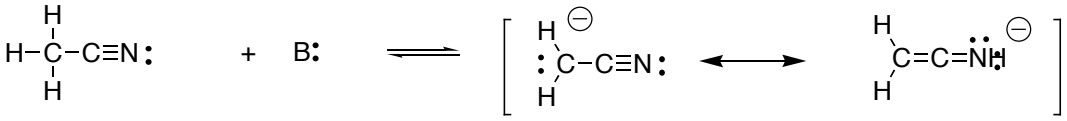


(c)



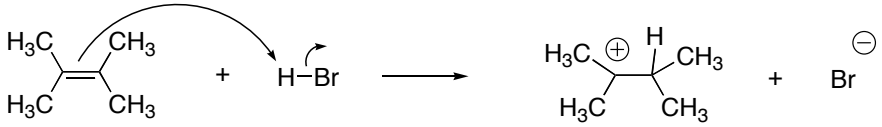
3. Acetonitrile (CH_3CN) has a pK_a of 25, making it more acidic than many other compounds having only C-H bonds. Draw Lewis structures for acetonitrile and its conjugate base. Use resonance structures to account for the acidity of acetonitrile. (5 pts)

See Smith Problem 2.16



acetonitrile

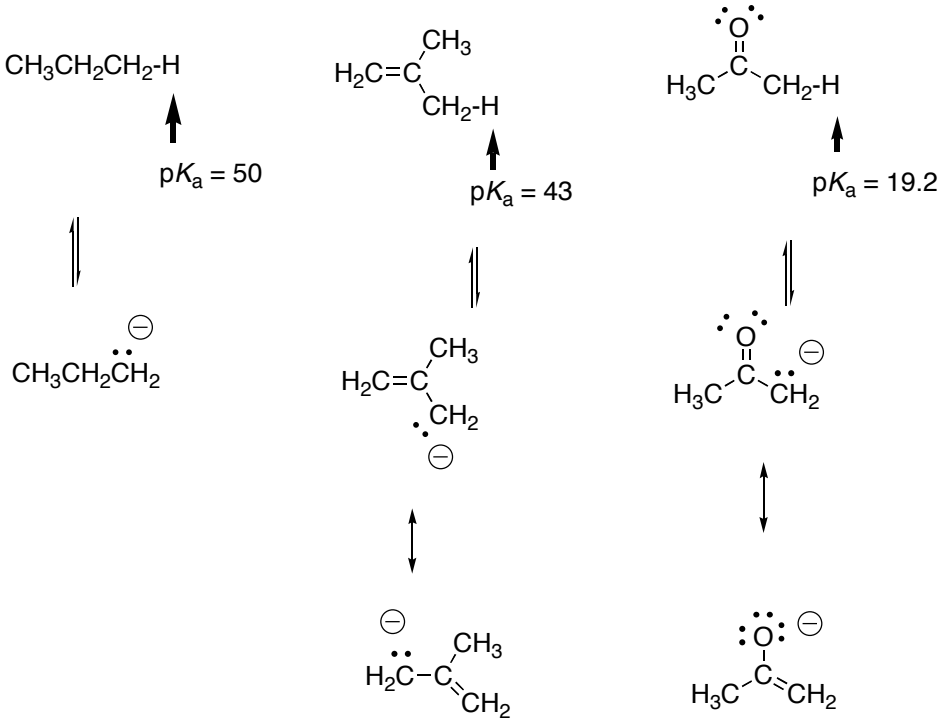
4. In the reaction shown below, label the nucleophile and electrophile. Used curved arrows to show the movement of electron pairs. (6 pts)



nucleophile (Lewis base)

electrophile (Lewis acid)

5. The pK_a of three different C-H bonds is given below. (9 pts)
   (a) For each compound, draw the conjugate base, including all possible resonance structures.
   (b) Explain the observed trend in pK_a.



The most acidic compound has a conjugate base that is resonance stabilized, where the electron density is shared by the electronegative oxygen atom. See Smith Problem 2.39.