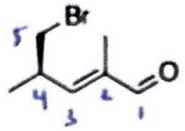
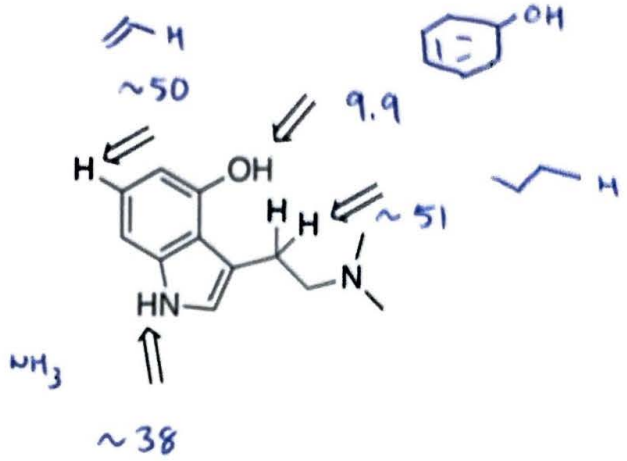
CHM 2120 DGD MT 1 Review Package

1. Name the following molecule.

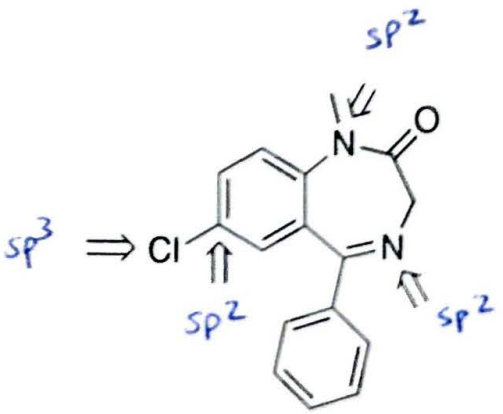


5-bromo-2,4-R-dimethyl pent-2(E)ene-1-al

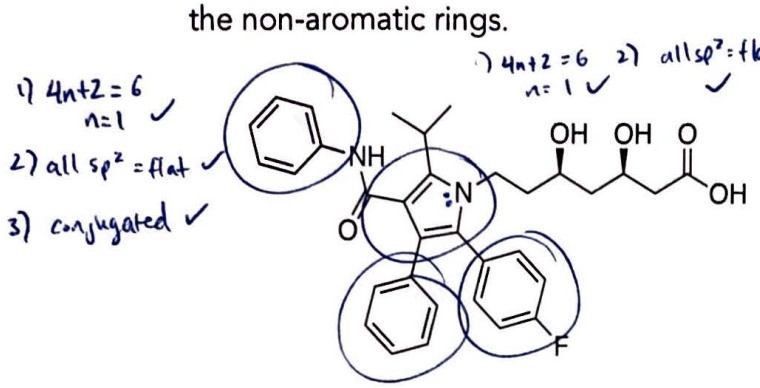
2. Estimate the pK_a value of each of the indicated protons. The molecule below is psilocin, one of the active molecules in psychedelic mushrooms.



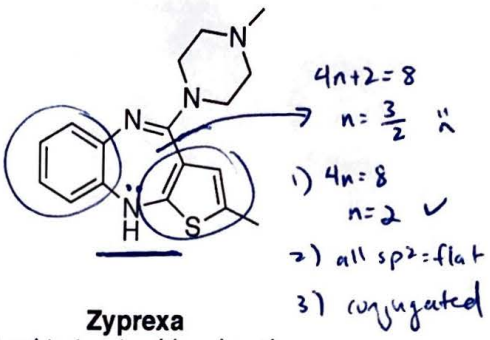
3. What is the hybridization of each of the indicated atoms? The molecule below is diazepam, an anti-anxiety medication.



4. Circle the aromatic rings, underline the anti-aromatic rings, and do nothing for the non-aromatic rings.



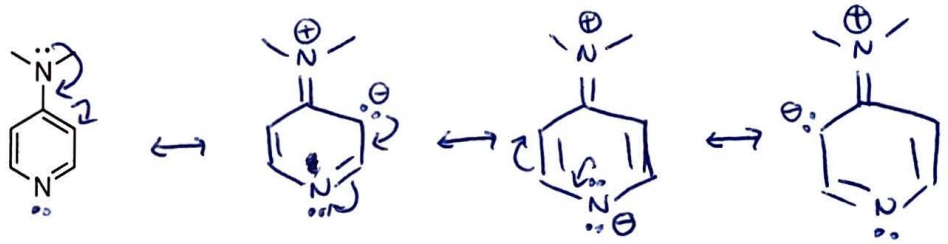
Lipitor
Used to prevent cardiovascular disease
for people with high lipid levels



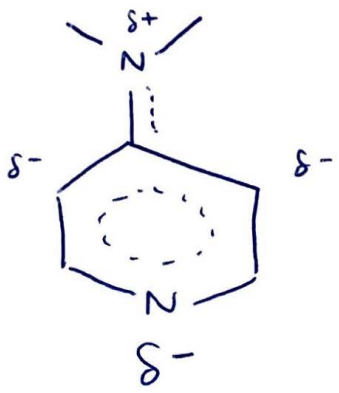
Zyprexa
Used to treat schizophrenia
and bipolardisorder

5. For the compound below:

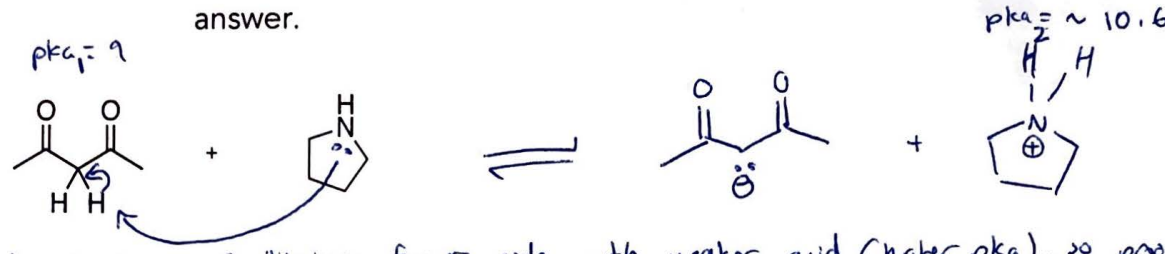
   a. Draw the resonance structures.
   b. Rank the structures in order of their contribution to the resonance hybrid (1 = greatest contribution)



   c. Draw the resonance hybrid structure.



6. For the following reaction:
   a. Draw the mechanism and products.
   b. Determine the direction of the equilibrium.
   c. Justify your answer in part b using pK_a data and chemical reasons in your answer.



pka₁ < pka₂. Equilibrium favours side with weaker acid (higher pka), so products favoured. Also, base on product side is more stable b/c of resonance, so products favoured.

Acid | Base | Base | Acid

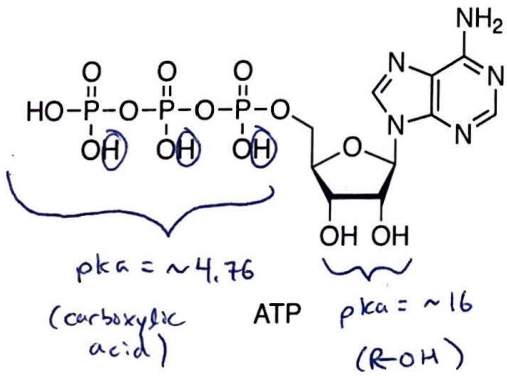
7. For the following reaction:
   a. Draw the mechanism and products.
   b. Determine the direction of the equilibrium.
   c. Justify your answer in part b using pK_a data and chemical reasons in your answer.

pka = ~~25~~ 24

pka = 36

See above (Q6)

8. Draw the predominant form of the following compound in a solution at ~~pH 7~~.

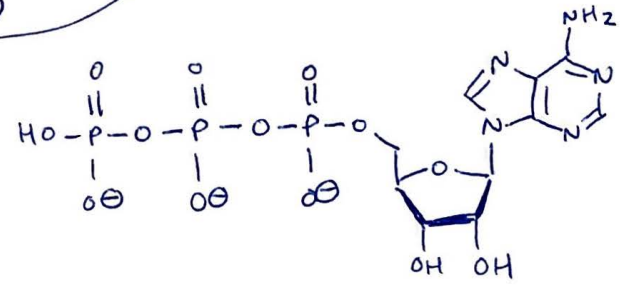


pka = ~4.76 (carboxylic acid)

ATP

pka = ~16 (R-OH)

pka = ~38 (NH_3)

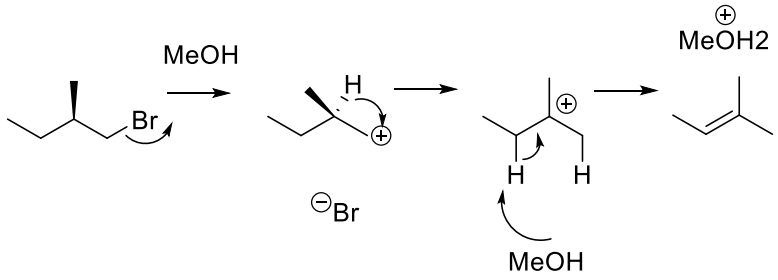


pka < pH : base favored

pka = pH : equal acid-base

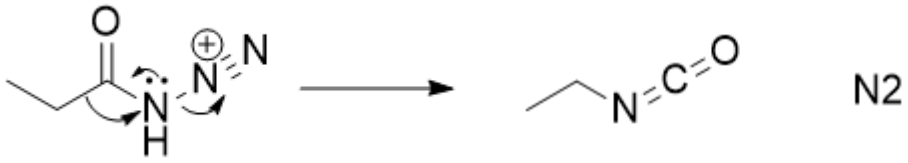
pka > pH : acid favoured.

10. Add curved arrows to describe the mechanism for the following reaction. Expand bonds and draw non-bonding electrons as needed. All reagents and intermediates have already been shown. Show all electrons.



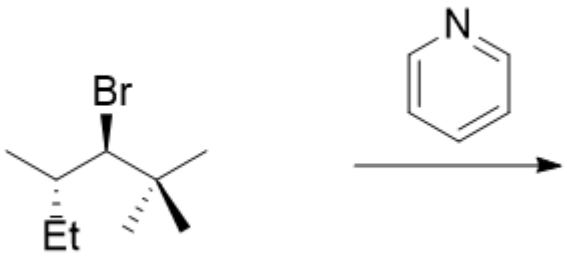
Note: Stereochemistry is removed due to SP2 Carbon (Flat)

11. Draw the product(s) of the reaction step shown below.



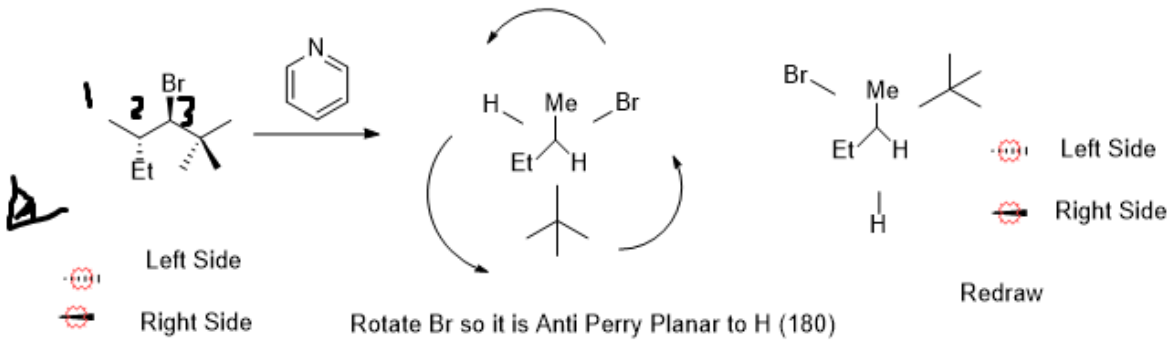
12. A) Draw the electrophile in the Newman projection of its reactive conformation

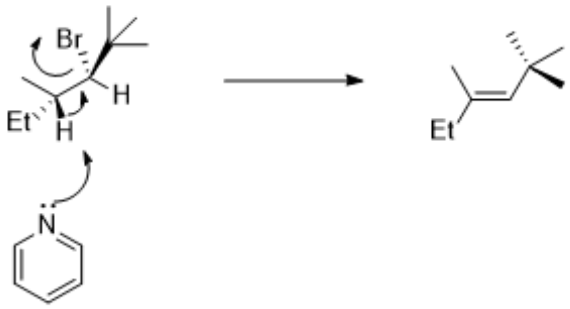
B) Draw the mechanism and the major organic product



Looking down C2-C3

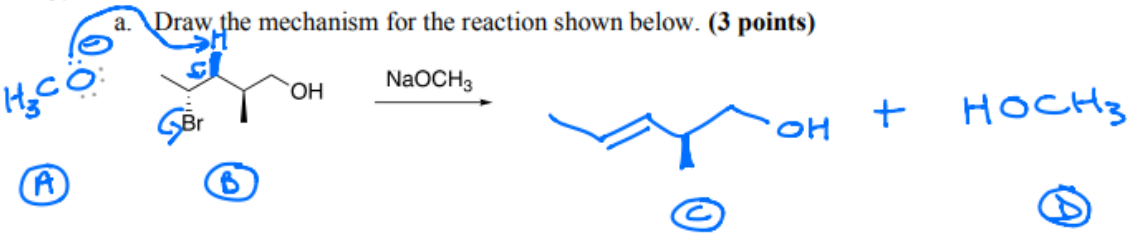
This is the most reactive conformation



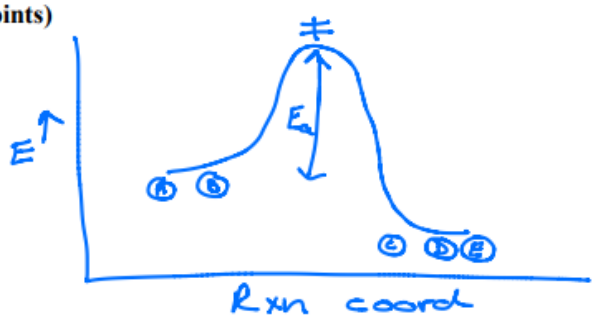


13.

a. Draw the mechanism for the reaction shown below. **(3 points)**



b. Draw the reaction coordinate diagram for the reaction above and label: the axes, transition state, activation energy of the rate determining step, reactants, intermediate(s), and product(s). **(5 points)**



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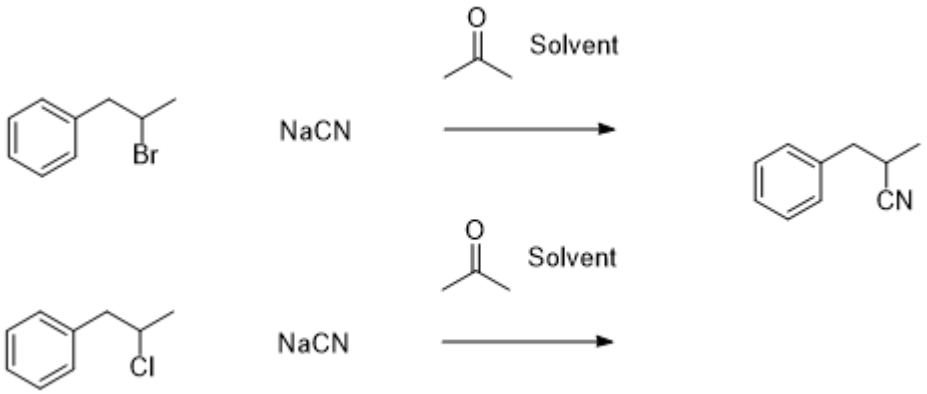
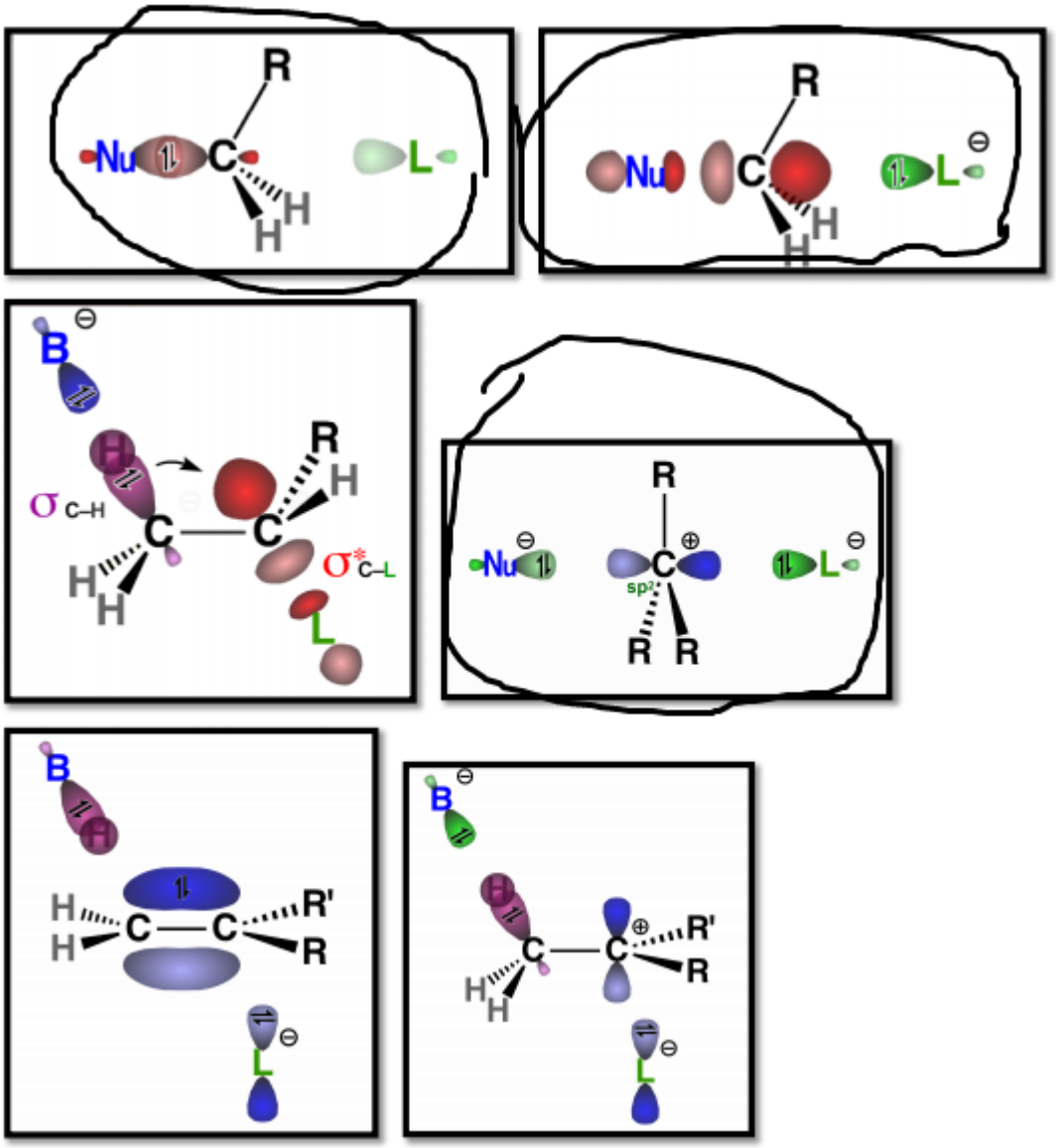
14. A) Draw the major organic product of the first reaction below.

B) Which of the two reactions would proceed more quickly?

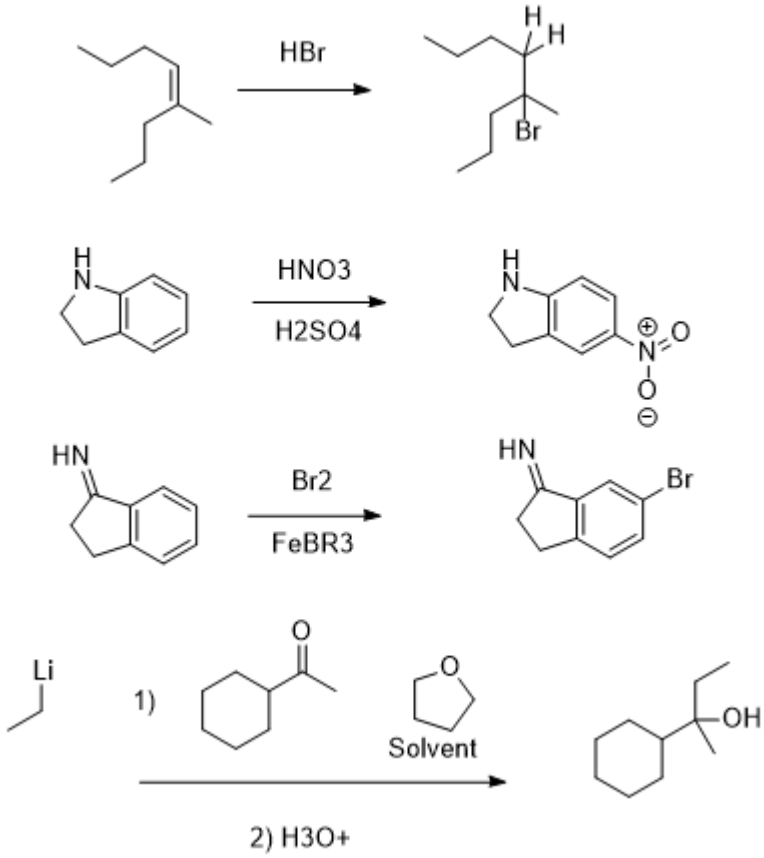
c) Justify your answer in part B



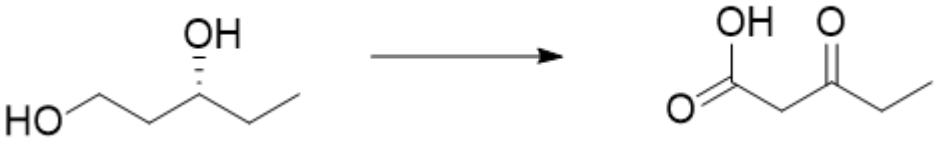
15. Circle the image(s) below that can represent steps in an SN2 Substitution Reaction



16. Draw the major organic product(s) for the following reactions.

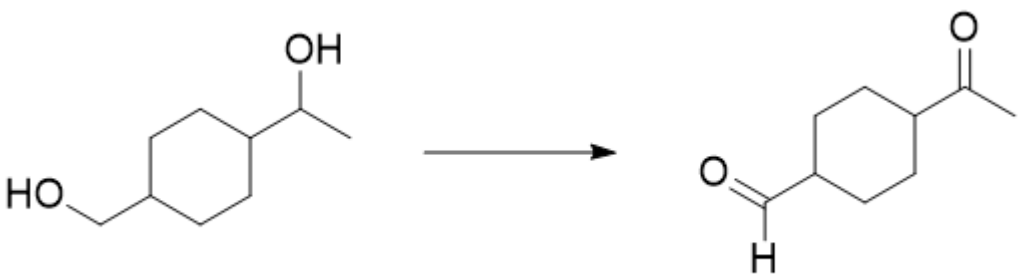


17. Add the appropriate reagents to effect the following transformations. Solvent required for C,D,E

A) 

JONES reagent

B)

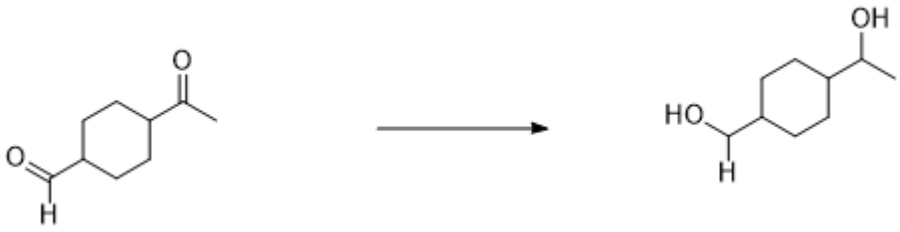


PCC

LiAlH4 – Lithium aluminum hydride

C)

D)



NaBH4 - Sodium borohydride or LiAlH4

E)

NaBH4 - Sodium borohydride or LiAlH4

Oops question D and E are the same!