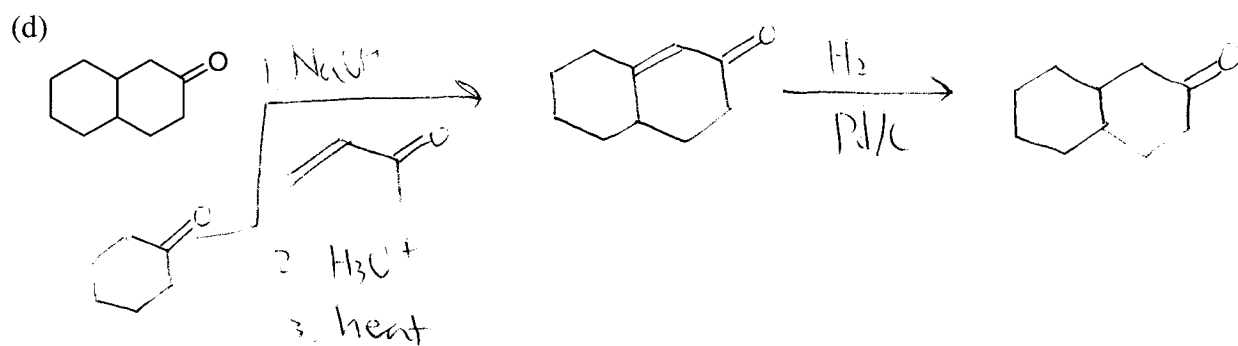
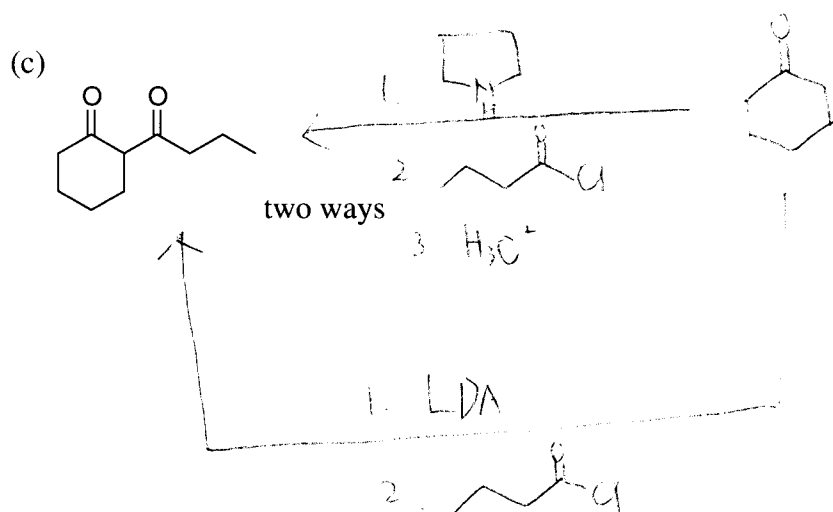
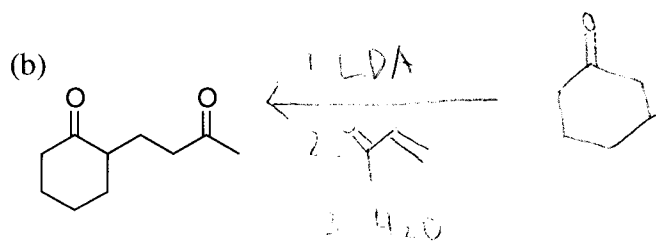
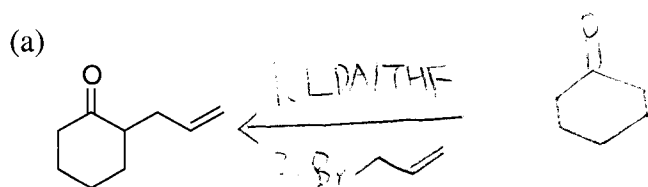


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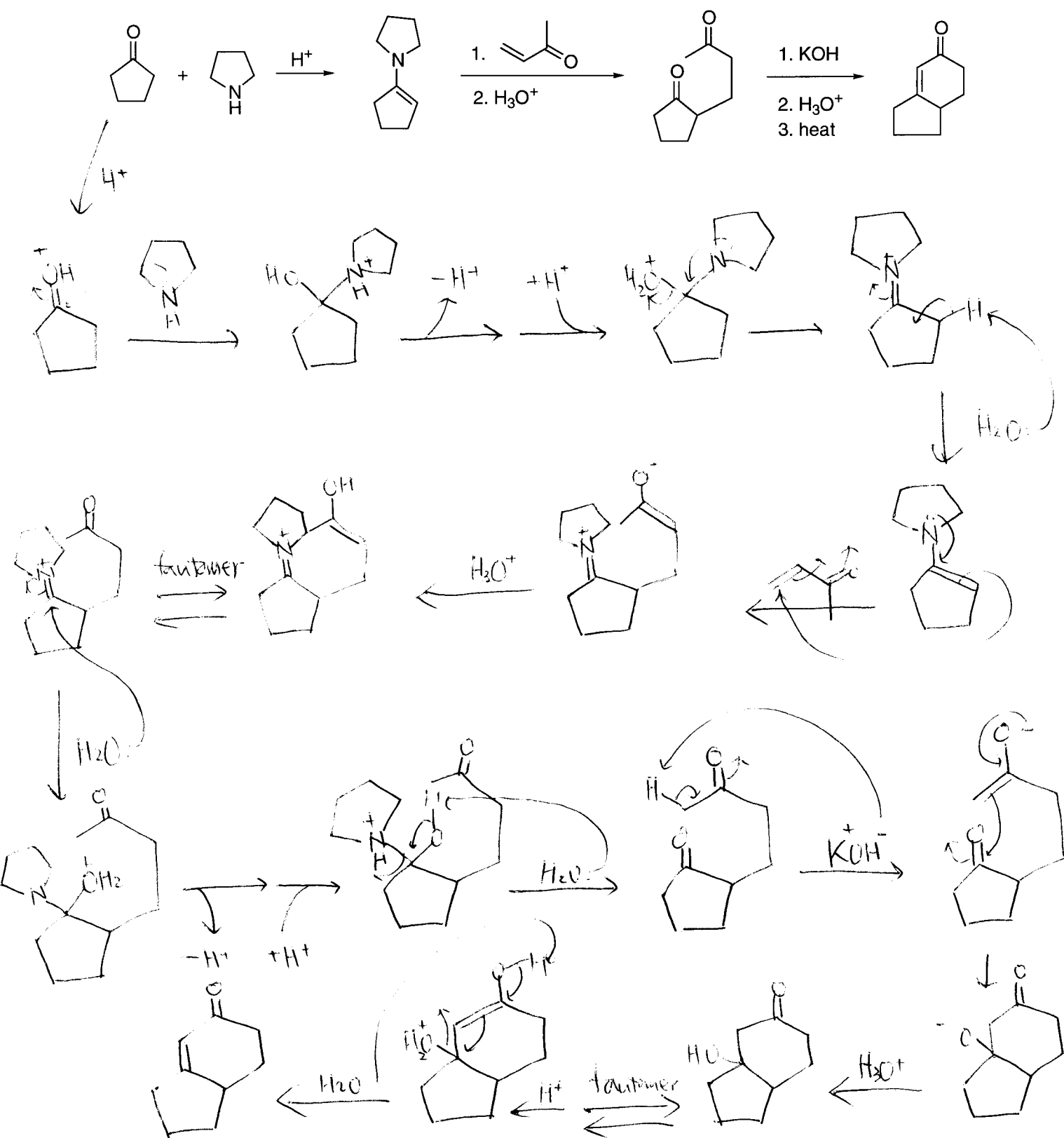
Problem Set #1

Answer Keys

1. Show how the following compounds could be synthesized from cyclohexanone and any other necessary reagents.

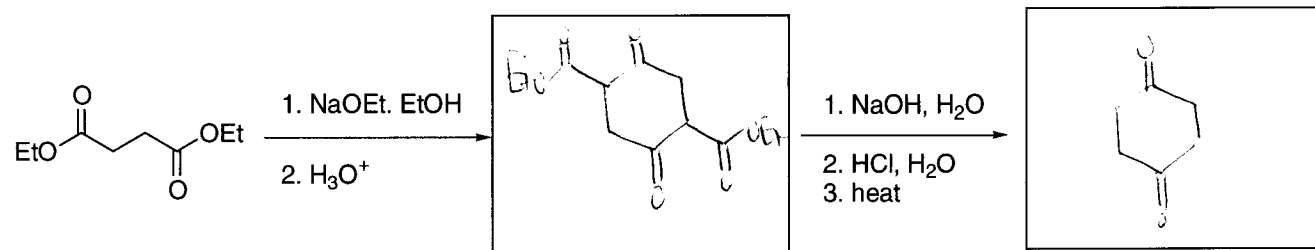


2. Propose a mechanism for formation of the bicyclic enone formed in the following reaction sequence.

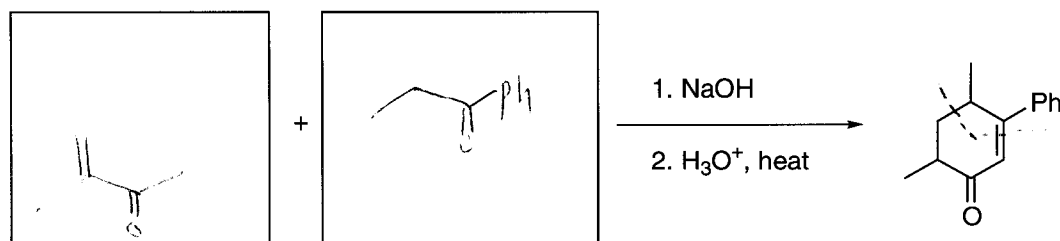


3. Provide starting material(s), reaction conditions or product for each transformation.

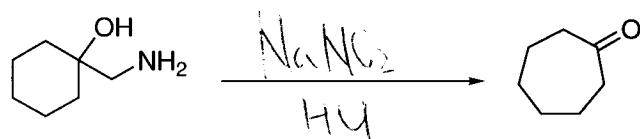
(a)



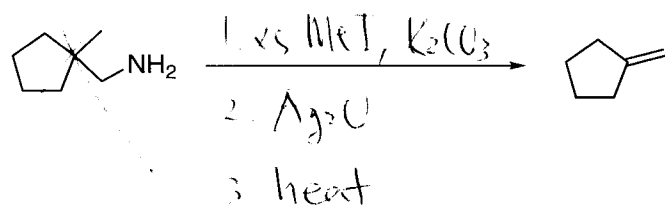
(b)



(c)

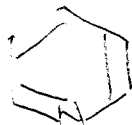


(d)

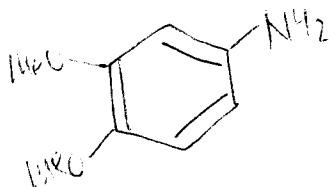


4. (a) (6 points) Draw structural formulas for these compounds.

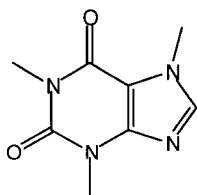
Pyridine



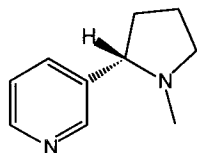
3,4-Dimethoxyaniline



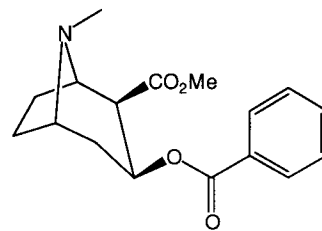
(b) (6 points) What are the common names of the molecules below?



Caffeine

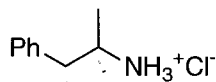


Nicotine

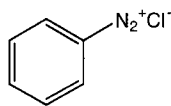


Cocaine

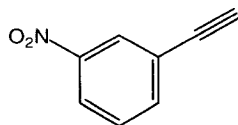
(c) (6 points) Name the following molecules and ions.



1-phenyl-2-propylammonium chloride



benzenediazonium chloride

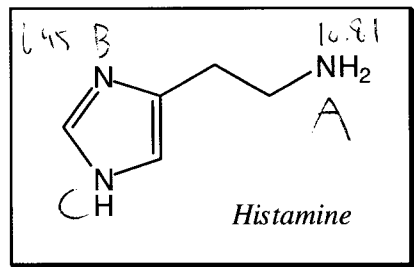


3-nitrophenylethyne

or

m-nitrophenyl acetylene

5. (15 points) *Histamine*, an important chemical in our bodies, functions as a neurotransmitter and a potent vasodilator. It is the agent that causes many symptoms of the common cold (hence antihistamine drugs being sold over the counter). Rank the basicity of each nitrogen in histamine and explain why.



$A > B > C$: basicity

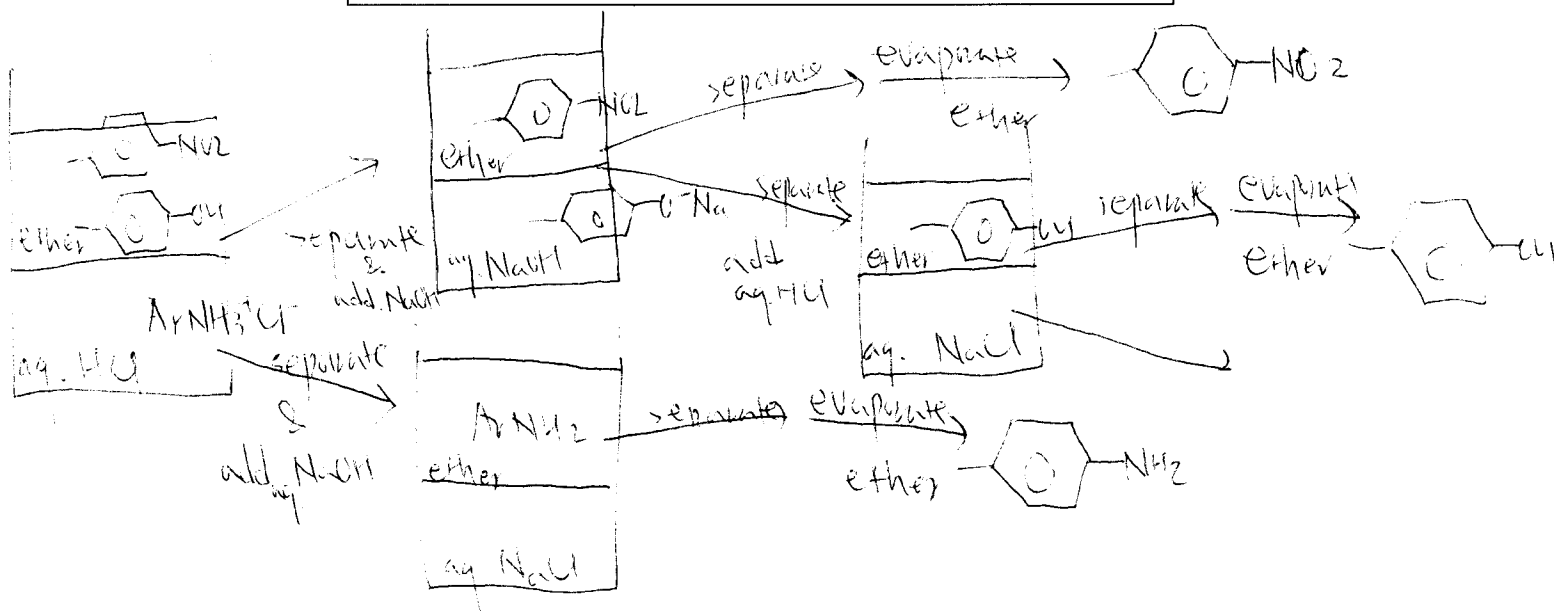
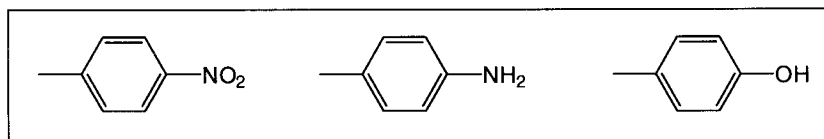
(A) is a normal, 1° amine

nitrogen is sp^3 hybridized & least electronegative

(B) lone pair electrons on this nitrogen is sp^2 hybridized therefore less prone to protonation

(C) lone pair electrons on this nitrogen is a part of aromatic (π) system and least available for protonation

6. Devise a chemical procedure based on their relative acidity or basicity and isolate each in pure form. Consult the pK_a values from the table attached at the end of the exam if necessary.



7. Provide structural formulars for compounds A, B, and C.

