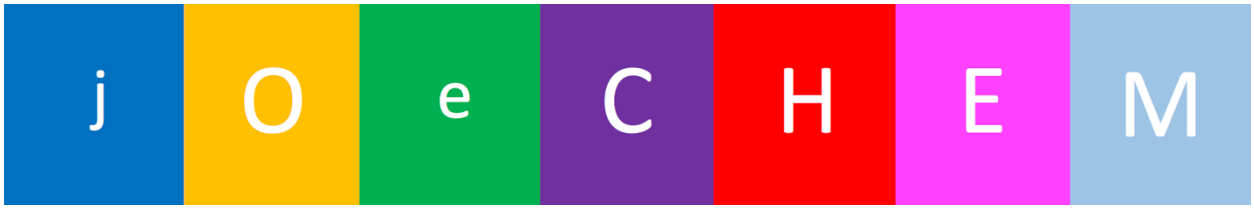
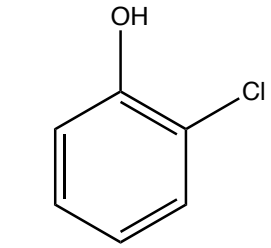
Organic Chemistry II

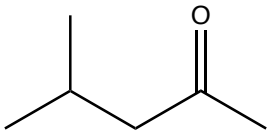
Final Exam

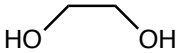


1.) The many reactions below are shown missing their **final product**. For each problem below, correctly predict the final product. If you believe no product is formed/no reaction occurs, write "**NR**".

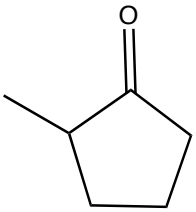


Br_2 , $FeBr_3$



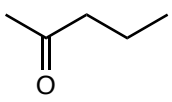


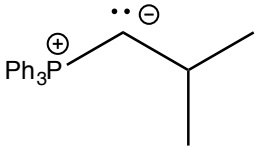
H^+, $-H_2O$

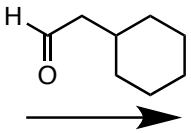


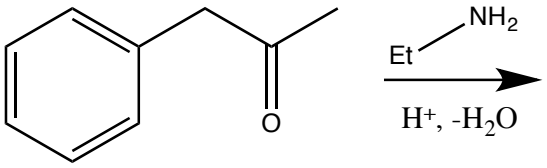
1.) LDA, -78 °C, THF

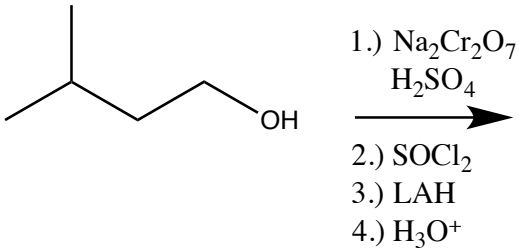
2.)

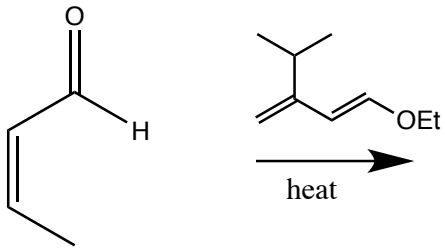


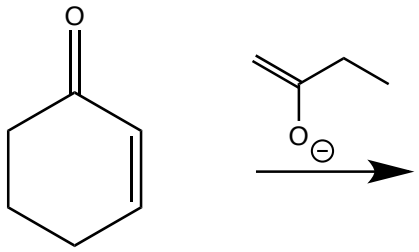




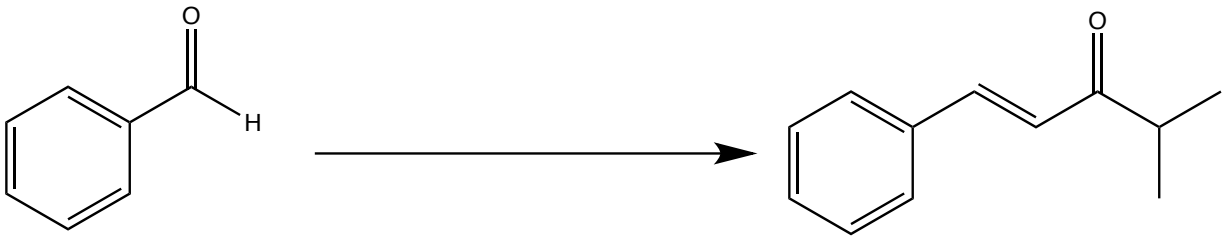

NH2
Et
O
H+, -H2O

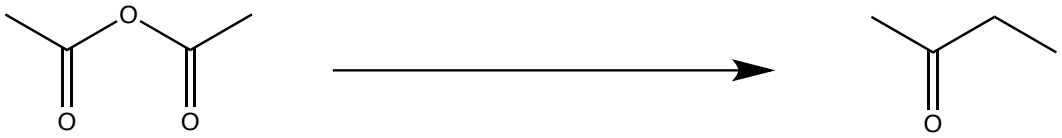

OH
1.) Na2Cr2O7
H2SO4
2.) SOCl2
3.) LAH
4.) H3O+

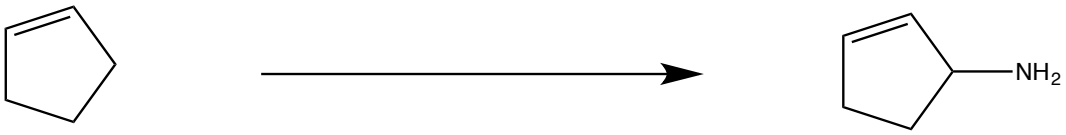

O
H
OEt
heat


O
O

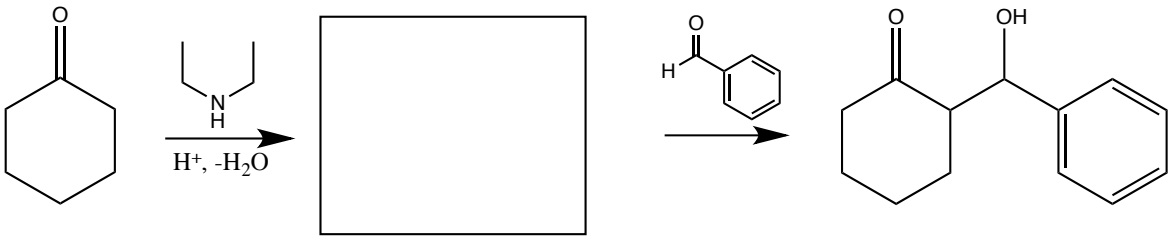
2.) Below various reactants and products are shown. In each reaction, provide the necessary reagents to make the given transformations occur. **Note:** The reactions can possibly require multi-step reagents.







3.) Shown below is an aldol reaction where the nucleophile in the reaction is an enamine.



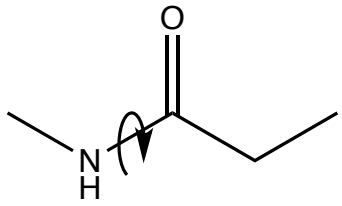
(enamine)

a.) Draw the structure of the enamine that is made in this reaction before it performs the aldol reaction.

b.) Draw the full arrow-pushing mechanism that illustrates the aldol reaction above. You **DO NOT** need to provide the mechanism for the formation of the enamine (you can go ahead and start with the enamine already made.)

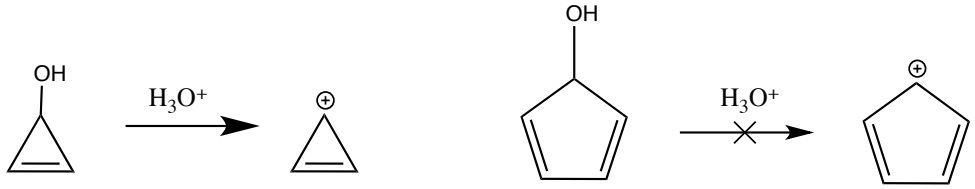
4.)

a.) In all amides, it is observed that the carbon-nitrogen sigma bond has limited rotation about the bond axis. Using structures **and a brief explanation**, illustrate why this hindered bond rotation is observed, given the amide below.

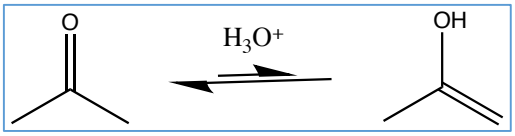


(Hindered)

b.) Cycloprop-2-en-1-ol undergoes carbocation formation very easily and quickly in the presence of acid, while cyclopenta-2,4-dien-1-ol does not. BRIEFLY explain why this phenomenon is observed.



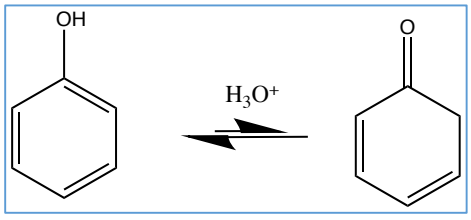
5.) It is known that the **keto** form is favored in Keto-Enol Tautomerism. Shown below is the keto-enol equilibrium exhibited by acetone in an **acidic** environment.



a.) Draw the arrow pushing mechanism that illustrates how acetone's keto form tautomerizes to the enol form (aka, show how the ketone transforms into the enol) in acidic conditions.

b.) Provide a **BRIEF explanation** as to why the keto form is favored over the enol form.

c.) Knowing all of this, BRIEFLY explain why phenol exists as a **stable enol** as opposed to tautomerizing to its keto form.



6.) Propose an efficient synthesis of the given target molecule (on the right hand side of the page) with benzene, ethyl chloride, and propyl chloride as your only sources of carbon. You may use whatever inorganic reagents (including ammonia) you may need to complete the transformation.

NH_3