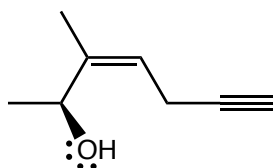
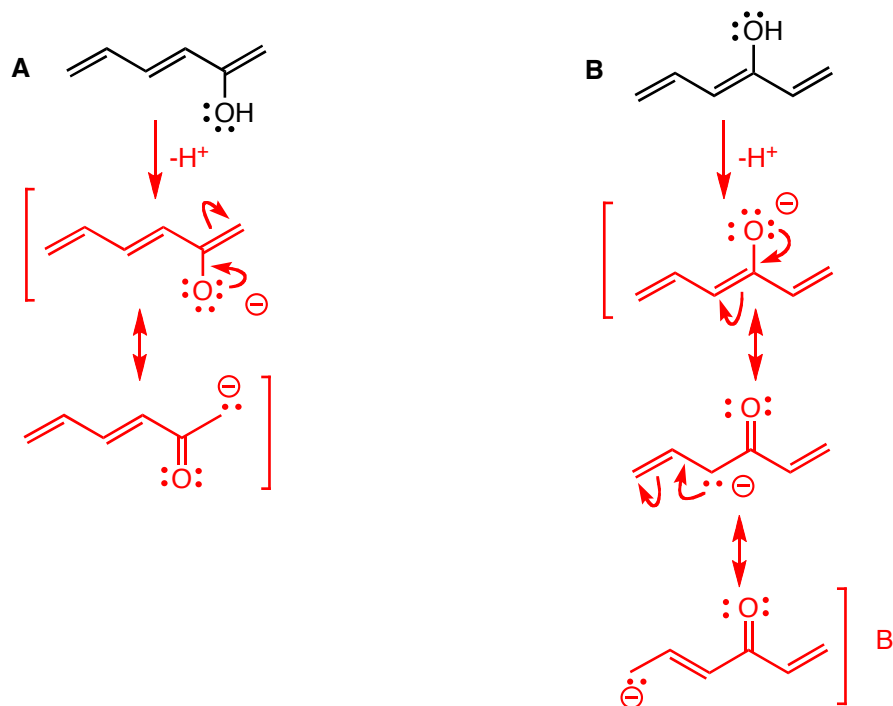


Question 1 (10 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.



3-methylhept-(3Z)-en-6-yn-(2S)-ol

Question 2 (17 pts). Which is the stronger Bronsted acid, A or B (ignore keto-tautomers). Give a BRIEF explanation and support your assignment using appropriate drawings of the conjugate base anions

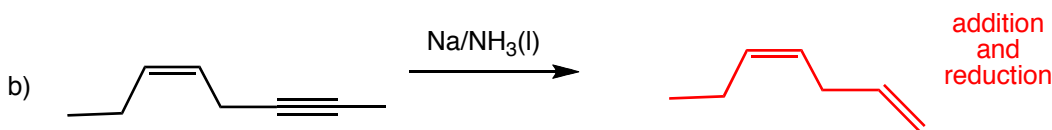
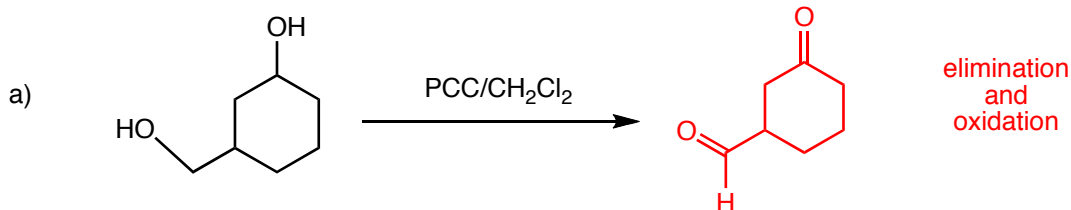


When deprotonated, the conjugate base alkoxide anion from A has fewer resonance contributors, the non-bonding electrons not as delocalized, they are higher in energy, the anion is less stable, this A is the weaker Bronsted acid.

The conjugate base alkoxide from B has more resonance contributors, the non-bonding electrons are more delocalized/stabilized, B is thus a stronger Bronsted acid

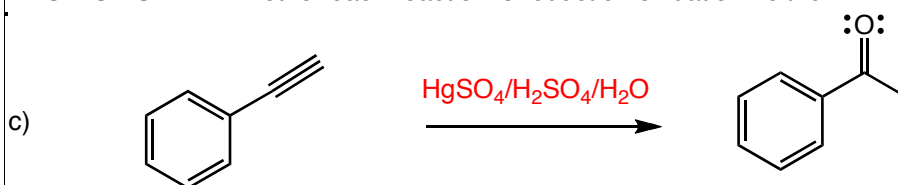
Question 3 (first part, 18 pts.) For each reaction

- 1) Provide the missing **major organic product**, **ignore stereochemistry at asymmetric centers**
- 2) **State** whether each reaction is an Addition, Eimination, Substitution or Rearrangement
- 3) **State** whether each reaction is Reduction, Oxidation or Neither

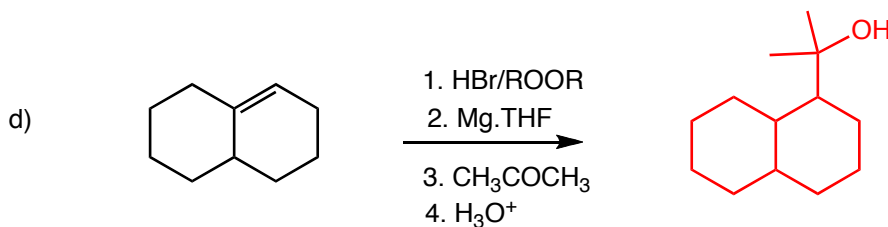
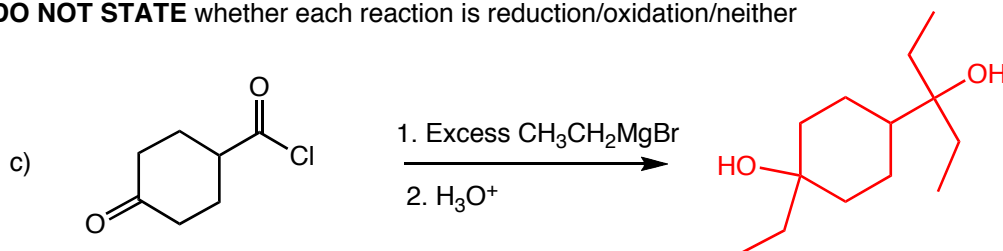


Question 3 (second part, 7 pts.) Provide the missing **reagents/conditions**

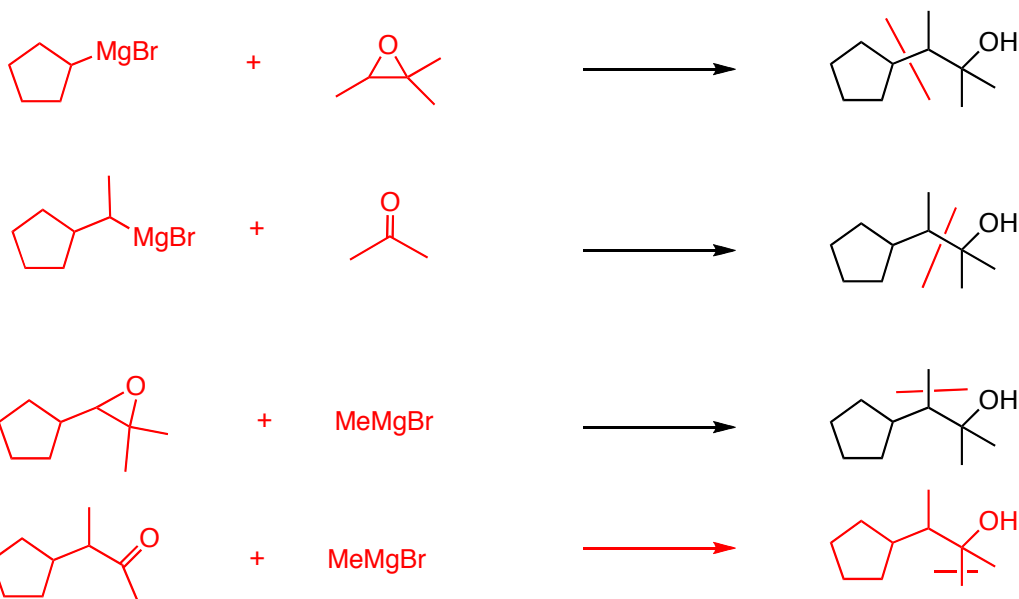
- DO NOT STATE** whether the reaction is Addition/Eimination/Substitution/Rearrangement
DO NOT STATE whether each reaction is reduction/oxidation/neither



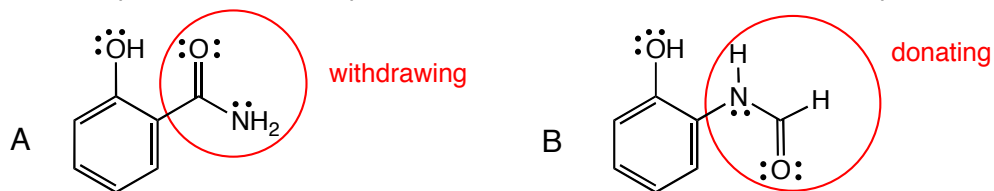
Question 3 (third part, 14 pts.) Give the major organic product of the following reactions
DO NOT STATE whether the reaction is Addition/Eimination/Substitution/Rearrangement
DO NOT STATE whether each reaction is reduction/oxidation/neither



Question 4 (21 pts.) Several of the C-C bonds in the provided structure can be made in a Grignard reaction. Provide the structure of the Grignard reagent AND the structure it would react with (assume an acid workup step. i.e. do not include the H_3O^+), and **indicate CLEARLY the C-C bond you are making in each reaction.**



Question 5 (12 pts). Which is the stronger Bronsted acid, A or B? Give a BRIEF explanation that includes a discussion of both the inductive and the resonance substituent effects. You do NOT need to draw any chemical structures or include any curved arrow-pushing unless you would like to, all points are for the explanation, words are sufficient to answer this question.



Bronsted acidity is determined in this case by the stability of the conjugate base anions. The substituent in A stabilizes the anion BOTH by the inductive effect and also by the resonance effect. The substituent in B stabilizes the base anion by the inductive effect, but destabilizes the anion via the resonance effect. The resonance effect dominates over the inductive effect, the base anion from B is less stable, is harder to form, the acid B is weaker and the acid A is stronger.

5 pts Extra Credit. The "slime" and "silly putty" polymers that are made by combining starch and white glue and similar compounds are held together by what kind of bonds? (circle one)

hydrogen-bonds

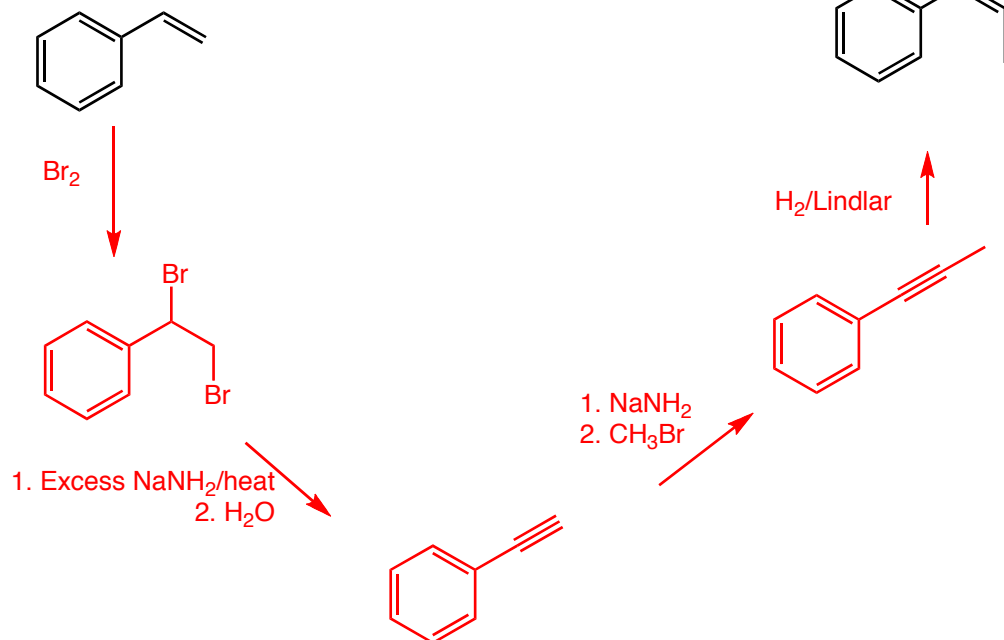
π -bonds

σ -bonds

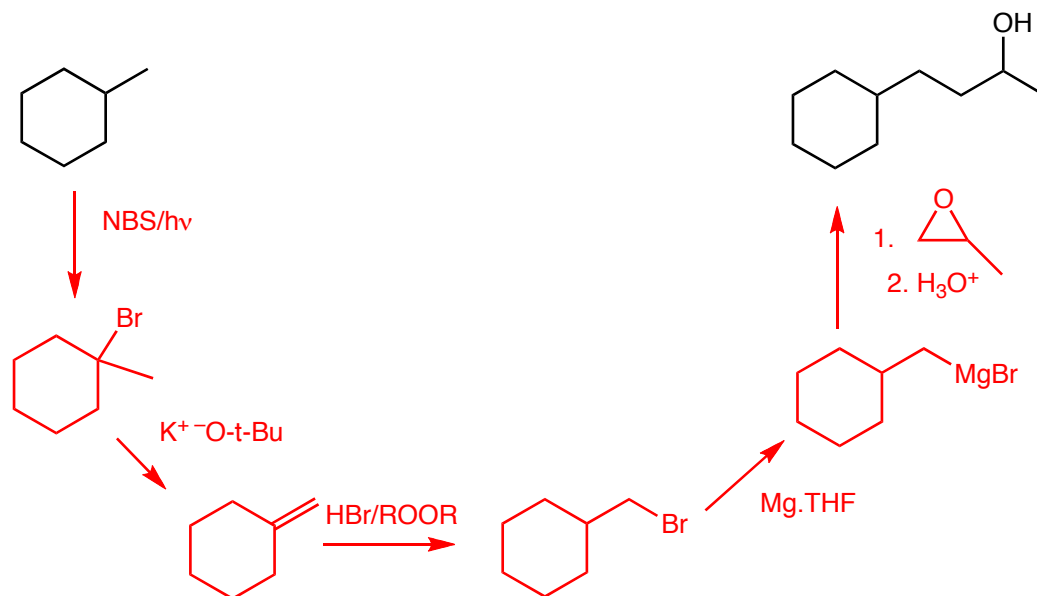
multiple-bonds

Question 6 (40 pts.) Show how you would synthesize the target compounds on the right from the starting compounds on the left. Show reagents and conditions, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms.

a)



b)



Question 7 (36 pts). **READ THIS QUESTION CAREFULLY!**For **EACH** reaction, give a complete curved arrow pushing mechanism, and...

- 1) Show **ALL** important resonance contributors for all intermediates.
- 2) Add non-bonding electrons and C-H bonds to the line-angle structures as required.
- 3) Indicate the Lewis acid/Lewis base (LA, LB) at each step as appropriate, and whether they are also Brønsted acids/bases (LA/BA, LB/BB).

