

PRINTED **ANSWER** PRINTED **KEY** ASU ID or
 FIRST NAME _____ LAST NAME _____ Posting ID _____

Person on your **LEFT** (or Aisle)Person on your **RIGHT** (or Aisle)

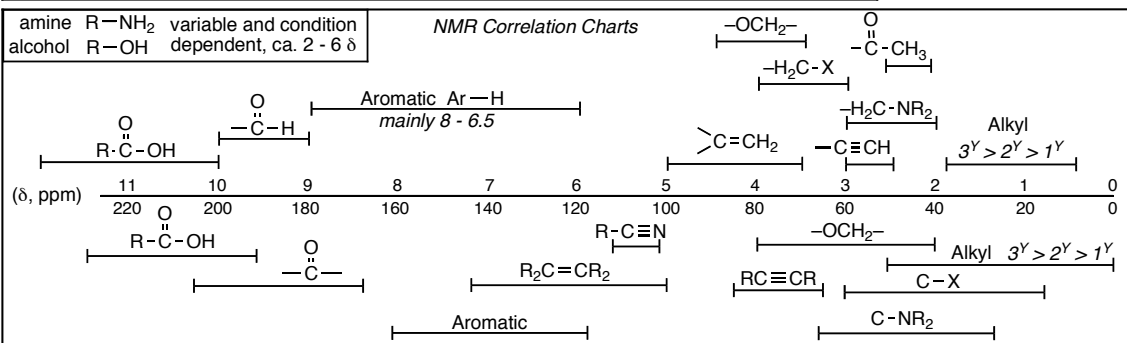
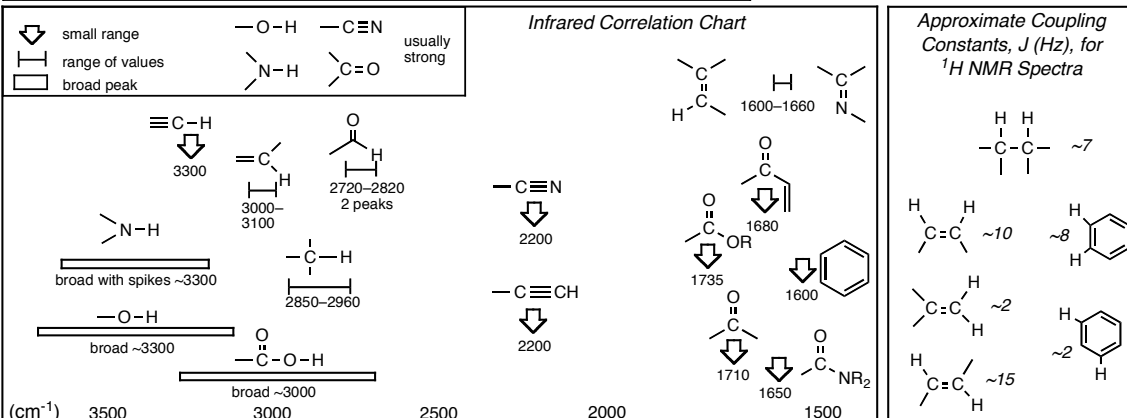
- PRINT YOUR NAME ON EACH PAGE!
- READ THE DIRECTIONS CAREFULLY!
- USE BLANK PAGES AS SCRATCH PAPER
work on blank pages will not be graded...
- WRITE CLEARLY!
- MOLECULAR MODELS ARE ALLOWED
- DO NOT USE RED INK
- DON'T CHEAT, USE COMMON SENSE!

1 **acidity** /252 **reactions** /353 **nomen** /124 **bonds** /275 **retro** /406 **mxns** /36

Extra Credit _____ /5

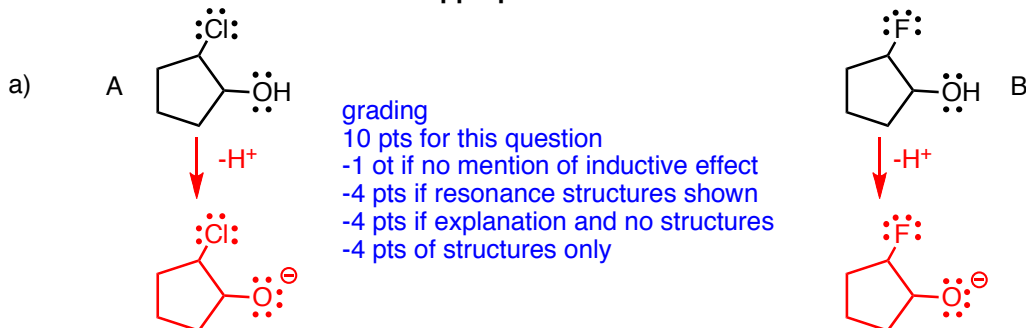
Total (incl Extra) _____ /175+5

H	He	Interaction Energies, kcal/mol	
Li Be	B C N O F Ne	Eclipsing	Gauche
Na Mg	Al Si P S Cl Ar	H/H -1.0	Me/Me -0.9
K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn	Ga Ge As Se Br Kr	H/Me -1.4	Et/Me -0.95
Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd	In Sn Sb Te I Xe	Me/Me -2.6	i-Pr/Me -1.1
Cs Ba Lu Hf Ta W Re Os Ir Pt Au Hg	Tl Pb Bi Po At Rn	Me/Et -2.9	t-Bu/Me -2.7

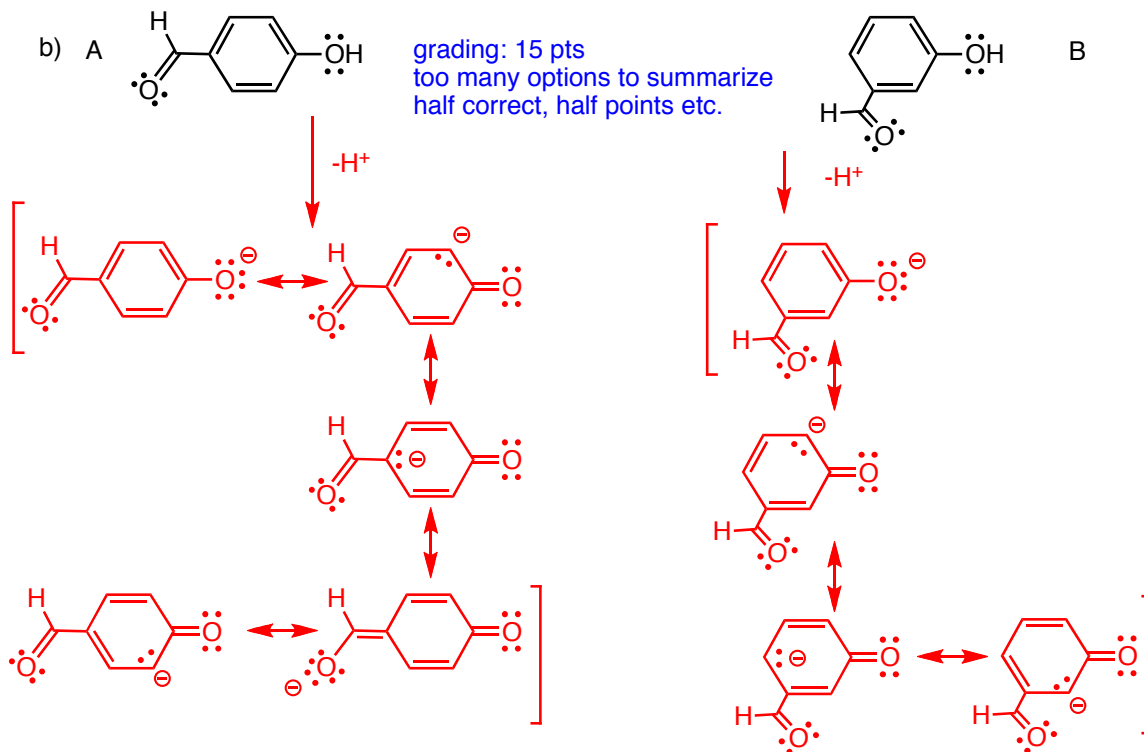


Question 1 (25 pts). For each of the following 2 pairs of alcohols A and B:

- 1) Indicate the stronger Bronsted acid **AND** which would have the stronger conjugate base
- 2) Explain your reasoning using drawings of all of the conjugate base anions, and **include ALL relevant resonance contributors as appropriate.**

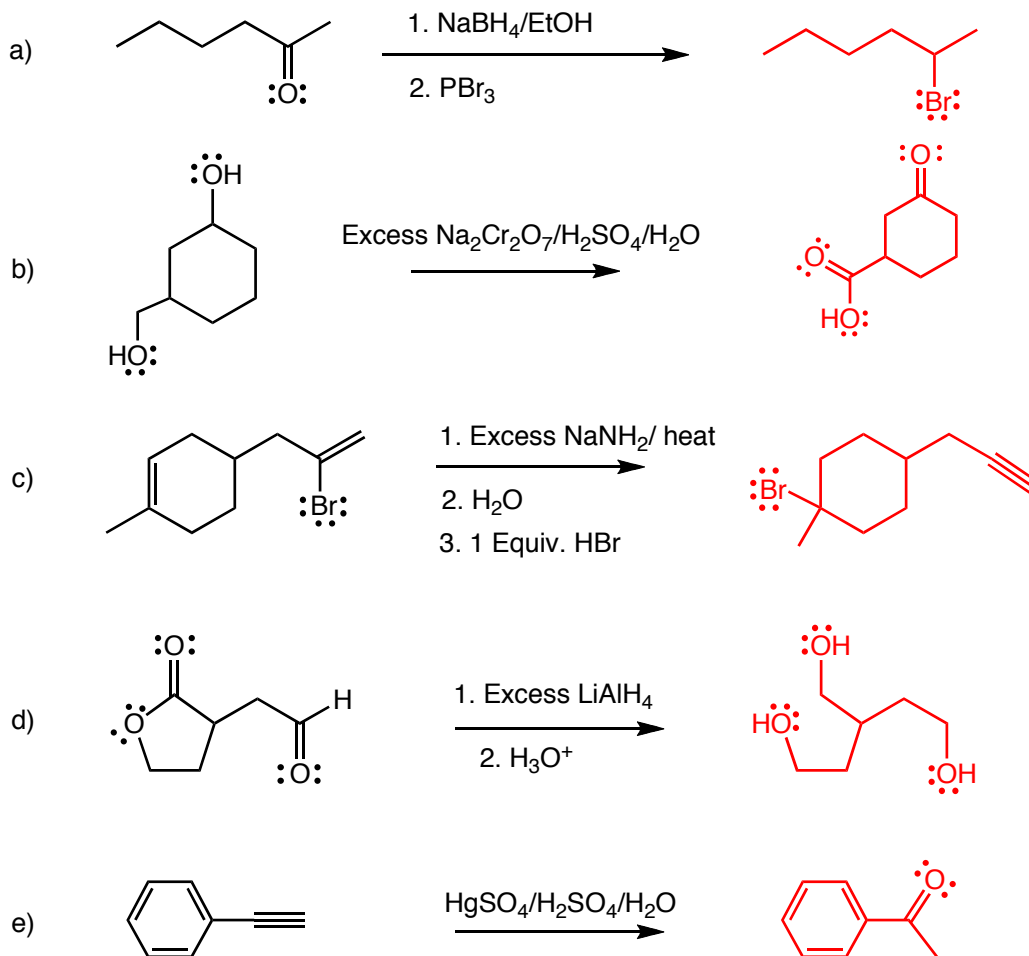


B is the stronger acid, A- is the stronger base, the non-bonding electrons in the anions are more stabilized (lowered in energy) by the stronger inductive effect of the more electronegative F in the conjugate base of B, lower energy electrons = weaker base = stronger conjugate acid

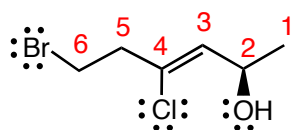


the substituent is electron withdrawing as a result mainly of the resonance effect and also somewhat due to the inductive effect of the oxygen, in A the non-bonding electrons of the conjugate base anion are directly stabilized by resonance (the anion from A has 1 extra resonance contributor), in B the anion is never directly stabilized by the substituent, the conjugate base anion from A is the weaker base, thus A is the stronger Bronsted acid, the conjugate base from B is the stronger base, thus B is the weaker Bronsted acid

Question 2 (35 pts.) Provide the missing **major organic products, ignore stereochemistry**
grading: 7 points each, too many grading options to list



Question 3 (12 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.



6-bromo-4-chlorohex-(3Z)-en-(2R)-ol

grading- subtract 2
points each error, do
not propagate errors

5 pts Extra Credit. Which functional group can be polymerized to form an organic metal?

alcohol

alkene

alkyne

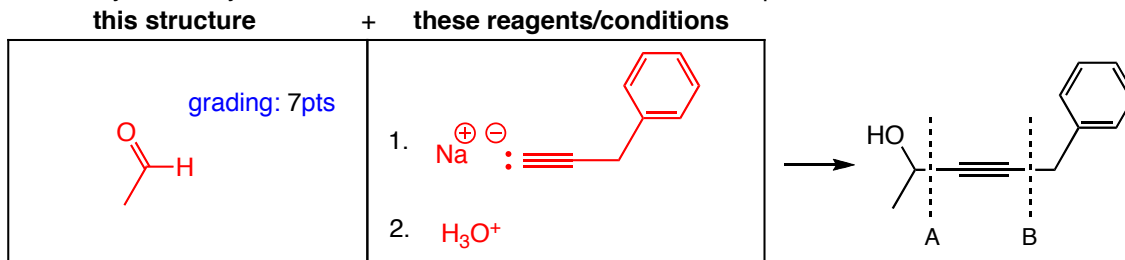
epoxide

grading- 5 pts or zero

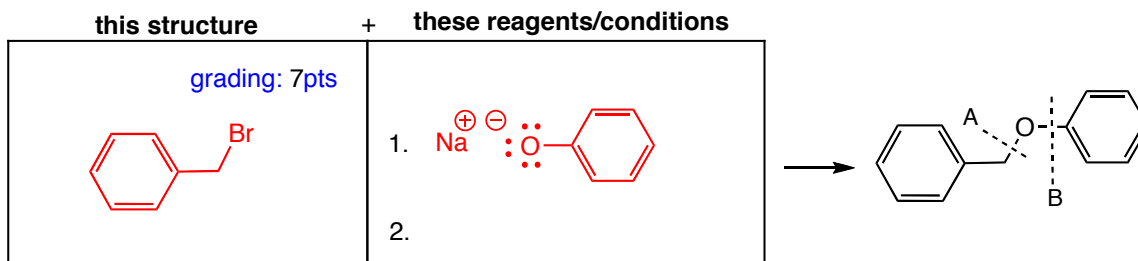
from "O-Chem in Real Life" page : organic metals, week #5

Question 4 (27 pts.) For each structure:

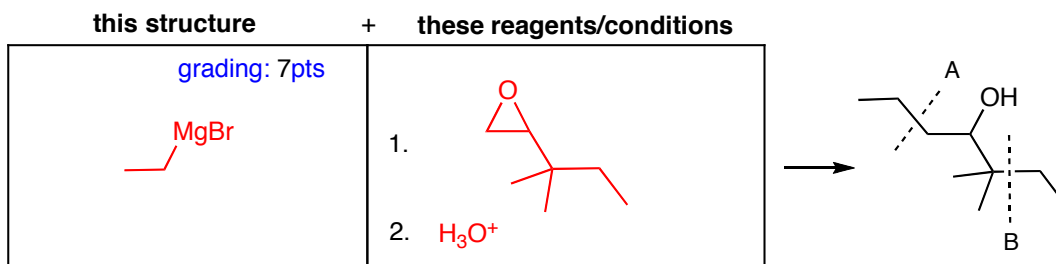
1. Decide which of the indicated bonds A and B is possible, or is preferred one, to make.
2. In the provided boxes, give the reactant/reagents/conditions you would use to make that bond (step 2 is for acid or water workup steps if they are necessary, if not, leave step 2 blank).
3. Briefly state why the other bond can not be made, or is not the preferred bond to make.



The problem with making bond B is: the acetylide anion would react with the -OH group
grading: 2pts

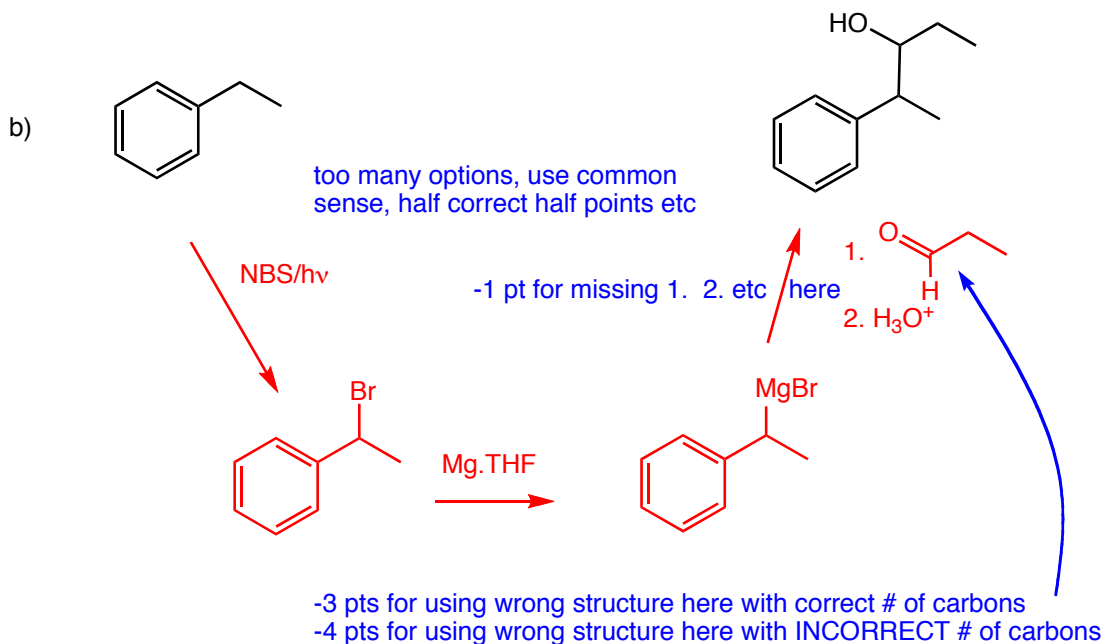
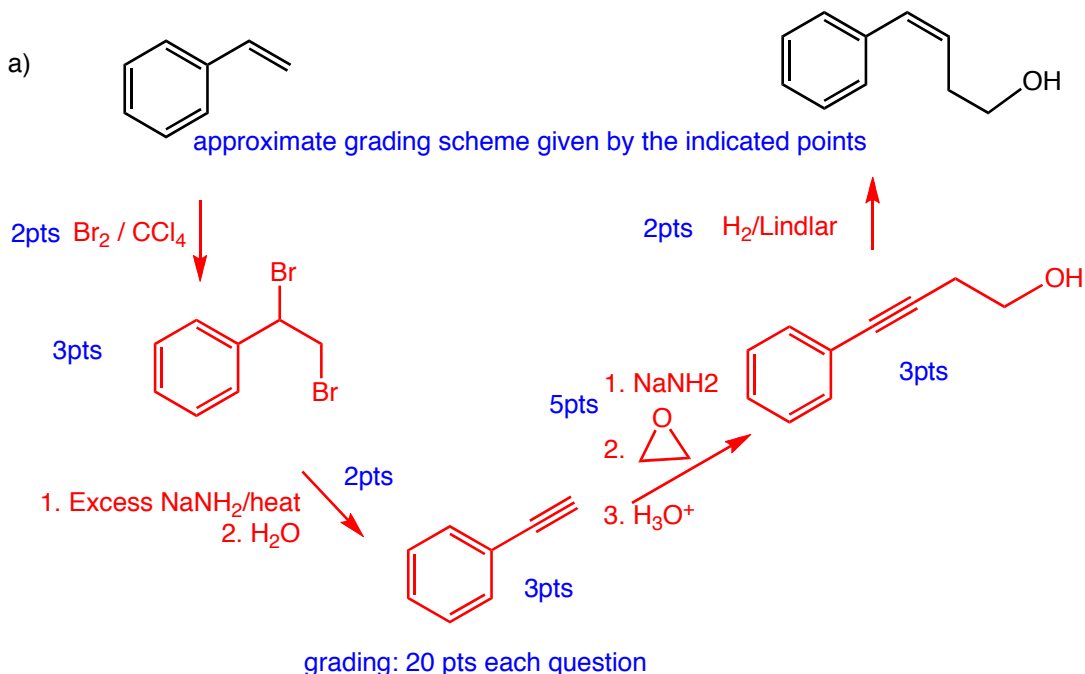


The problem with making bond B is: can't do an SN2 at an sp² hybridized carbon
grading: 2pts



The problem with making bond B is: the Grignard would have to attack the most substituted side of an epoxide
grading: 2pts

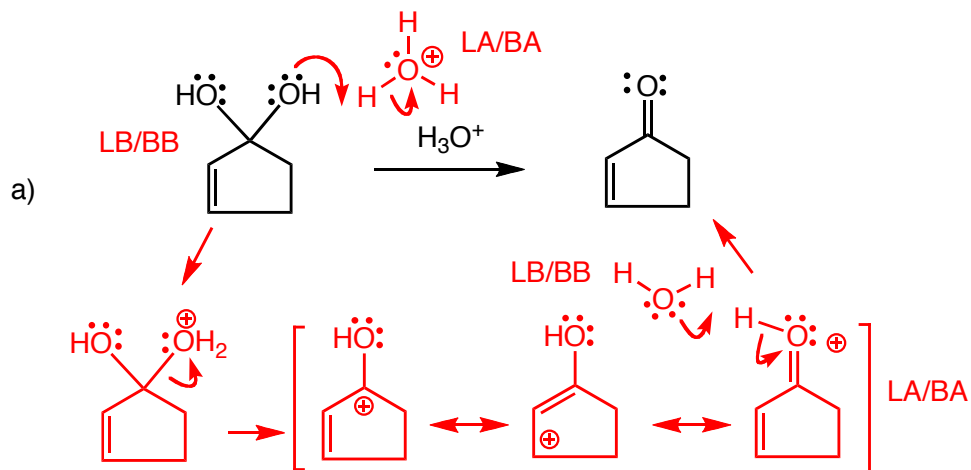
Question 5 (40 pts.) Show how you would synthesize the target compounds on the right from the starting compounds on the left. Show reagents and conditions, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms.



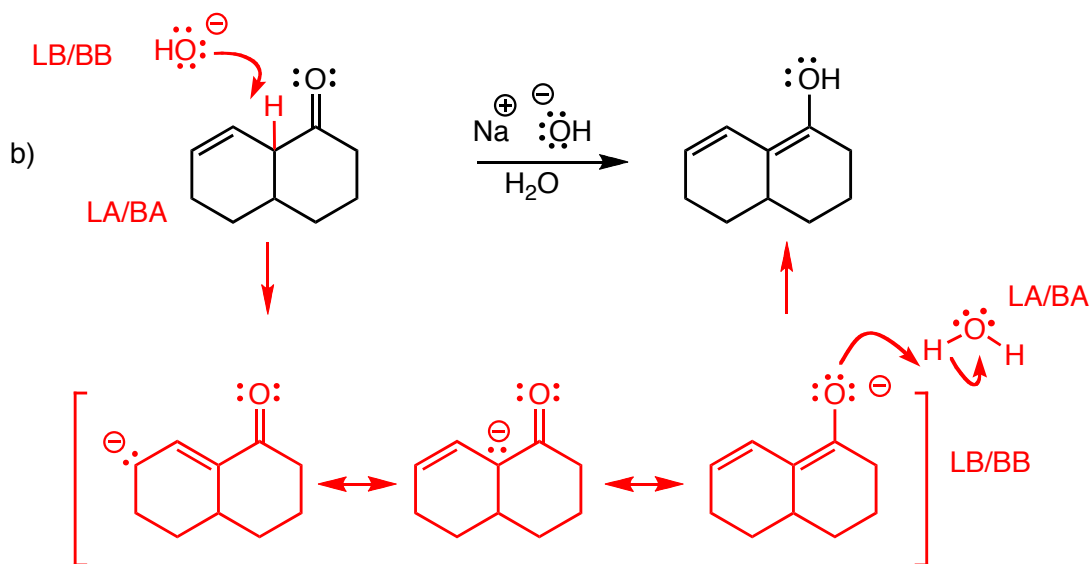
Question 6 (36 pts). **READ THIS QUESTION CAREFULLY!**For **EACH** reaction, give a complete arrow pushing mechanism, and...1) Show **ALL** important resonance contributors for all intermediates.

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).



grading 18 pts, too many options to list, half correct half points etc.



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