CHEM 234, Spring 2011 | Third Midterm | Ian R. Gould

PRINTED **FIRST** NAME ANSWER | *PRINTED* **LAST** NAME KEY | *ASU ID or 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!***

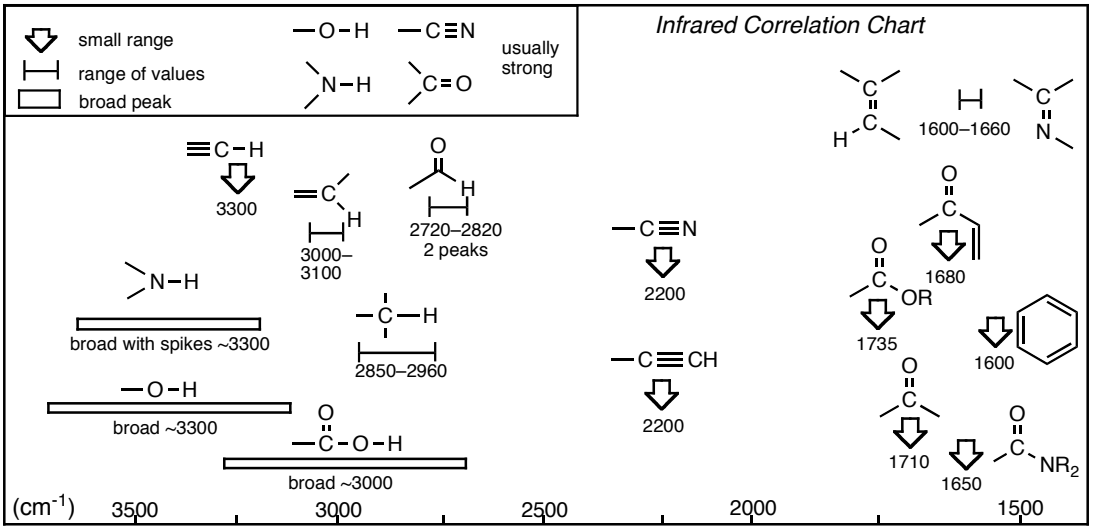
1 Nomen /10 .....
2 acidity /17.....
3 prods /32.....
4 retro1 /38.....
5 retro2 /18 .....
6 mxn1 /40.....
7 mxn2 /20.....

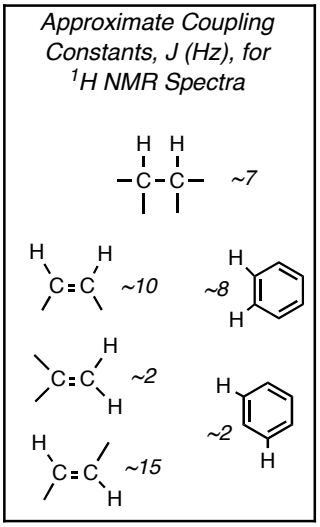
Extra Credit_____/5 **Total (incl Extra)**_____/175+5

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn

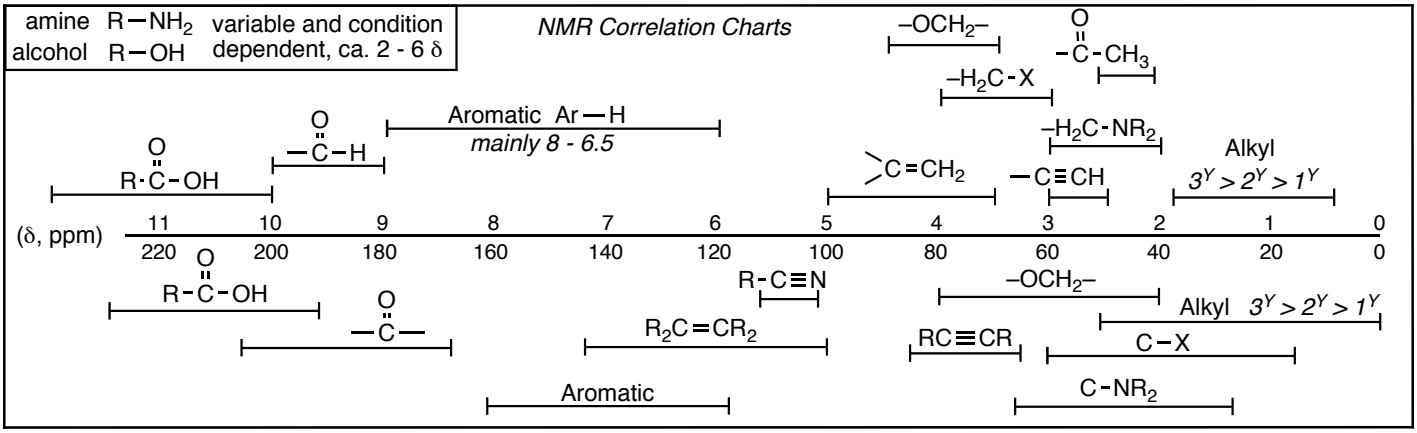
Interaction Energies, kcal/mol

Eclipsing		Gauche	
H/H	~1.0	Me/Me	~0.9
H/Me	~1.4	Et/Me	~0.95
Me/Me	~2.6	i-Pr/Me	~1.1
Me/Et	~2.9	t-Bu/Me	~2.7

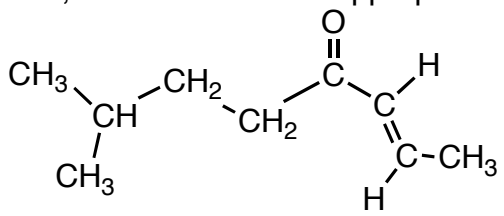




amine R—NH_2 variable and condition
alcohol R—OH dependent, ca. 2 - 6 δ

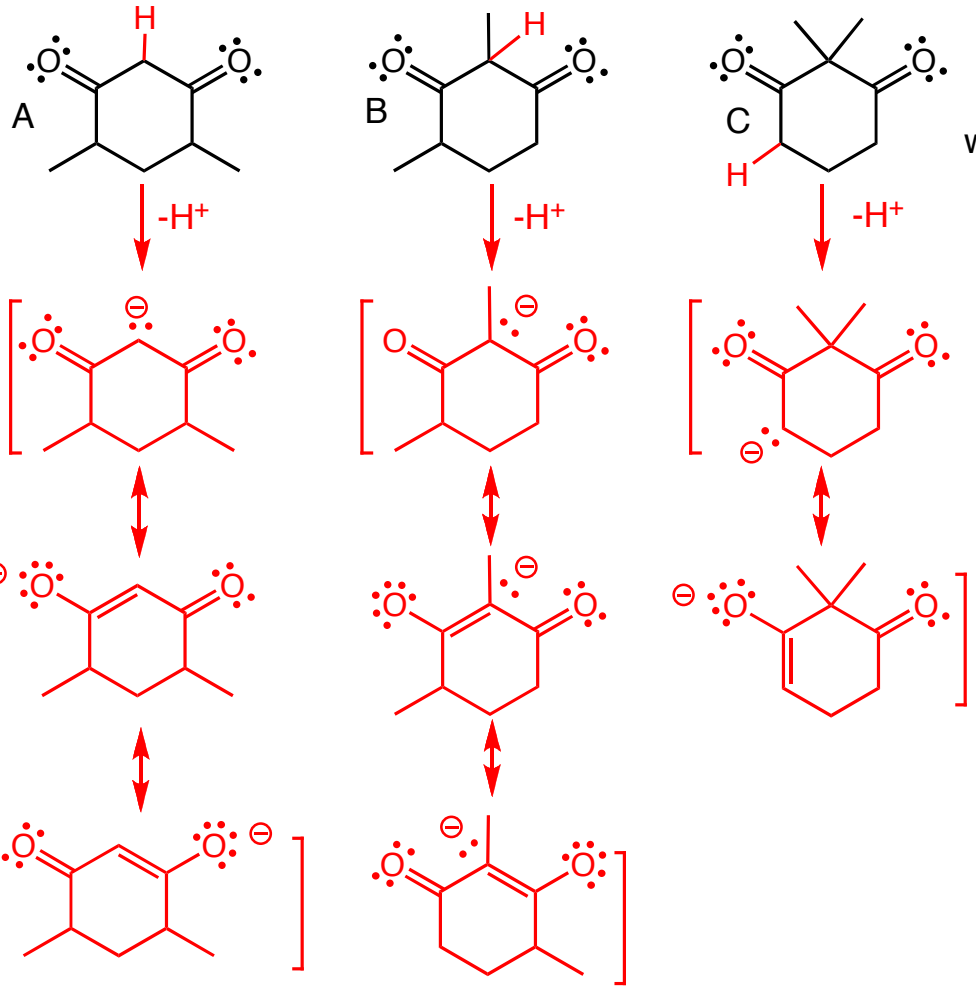


Question 1 (10 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.



7-methyloct-(2E)-en-4-one

Question 2 (17 pts.) Rank the following in order of increasing Bronsted acidity. Provide drawings of the conjugate bases in each case, ***include ALL resonance contributors as appropriate***, and support your assignment of the acidity order with a **BRIEF explanation**, that MUST include the phrase **"*energy of the electrons*".**



C < B < A

weakest strongest

Bronsted acidity is related to the stability of the conjugate base anion, the lower the energy of the electrons in the conjugate base, the more stable the base, the stronger the acid. The base in C is stabilized by only 2 resonance contributors compared to 3 in A and B, thus C is the weakest acid. The base in B is less stable than that in A because the charge is on a tertiary carbon compared to secondary in A, more alkyl substituted carbon anions are less stable than less alkyl substituted carbon anions

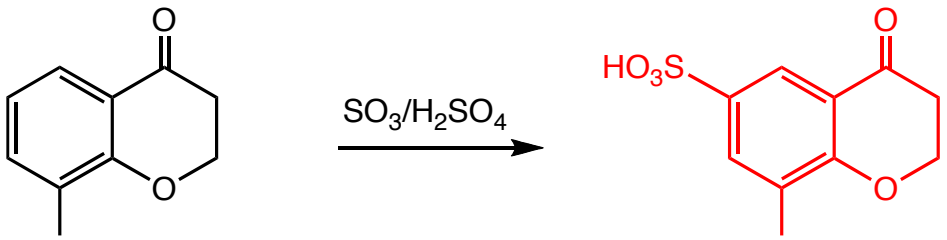
Extra credit question (5 pts). β-carotene is synthesized using which reaction?

Clemmenson Grignard (Wittig) Aldol

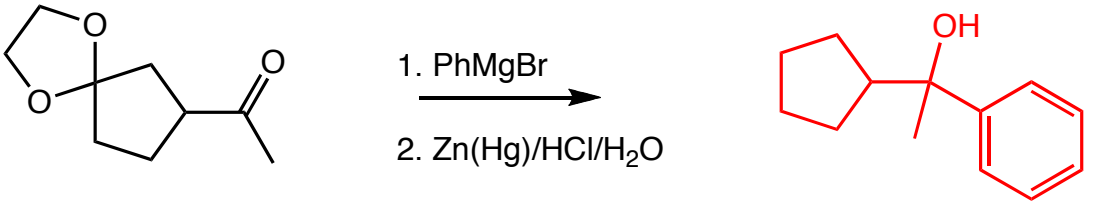
from weekly work #12

Question 3 (32 pts.) Provide the missing major organic products or reagents/conditions, you can IGNORE stereochemistry in these problems

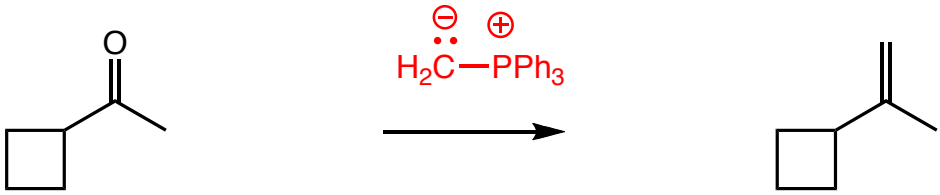
a)



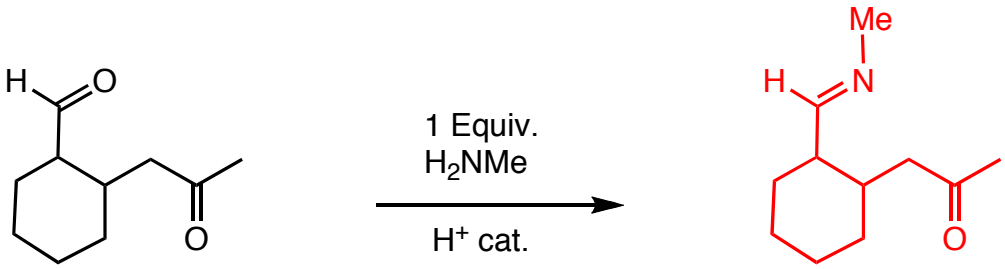
b)



c)



d)



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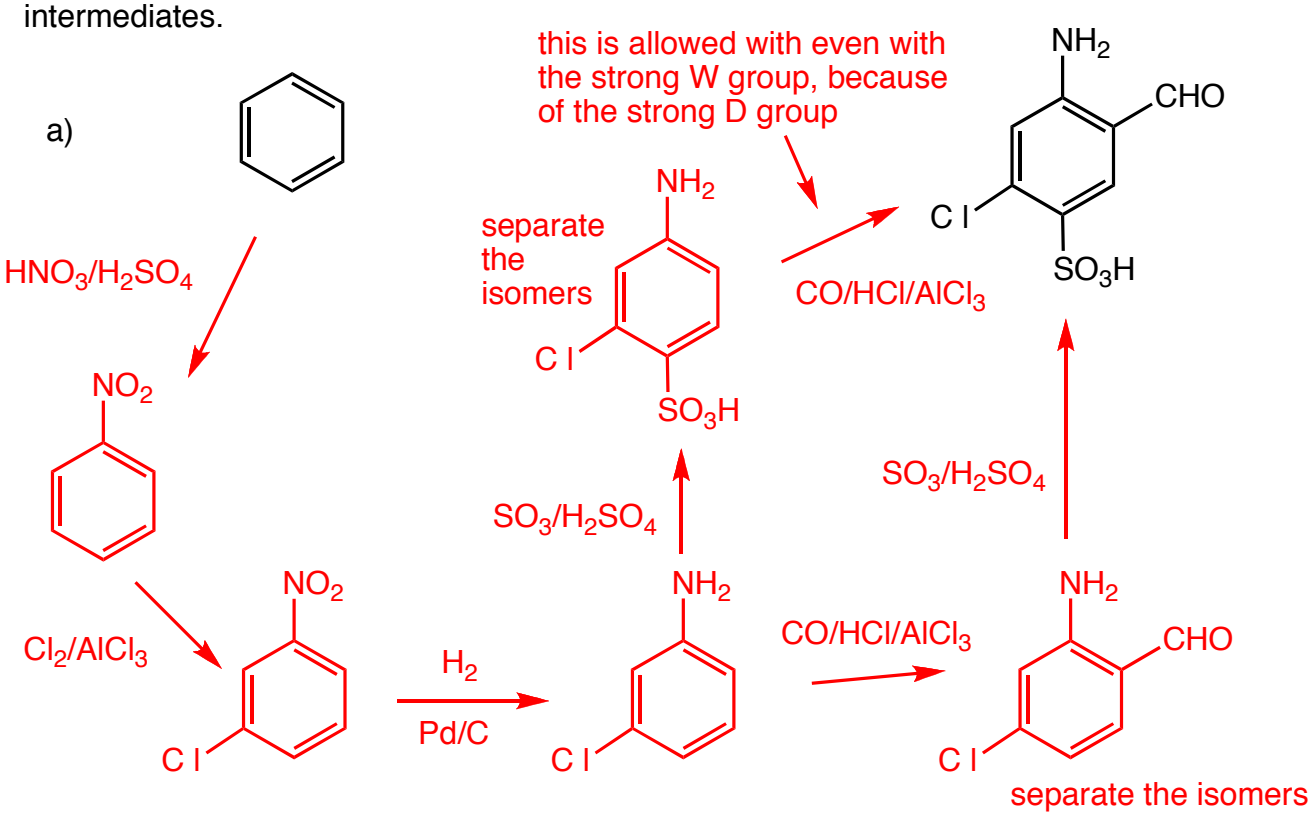
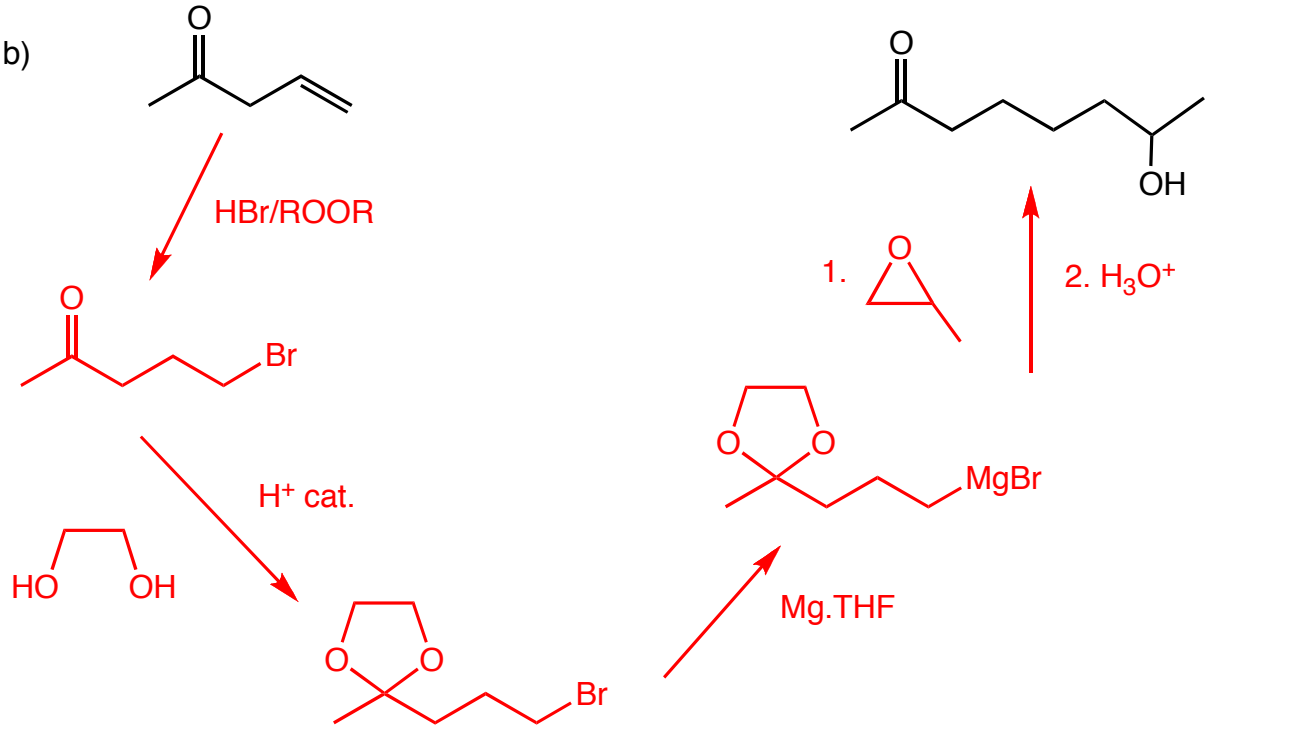
Question 4 (38 pts.) In each case, synthesize the (target) molecules on the right from the starting molecules the left. this can not be done in one reaction. Give reagents and conditions and the intermediate molecules at each step. Do not show any mechanisms or transient intermediates.

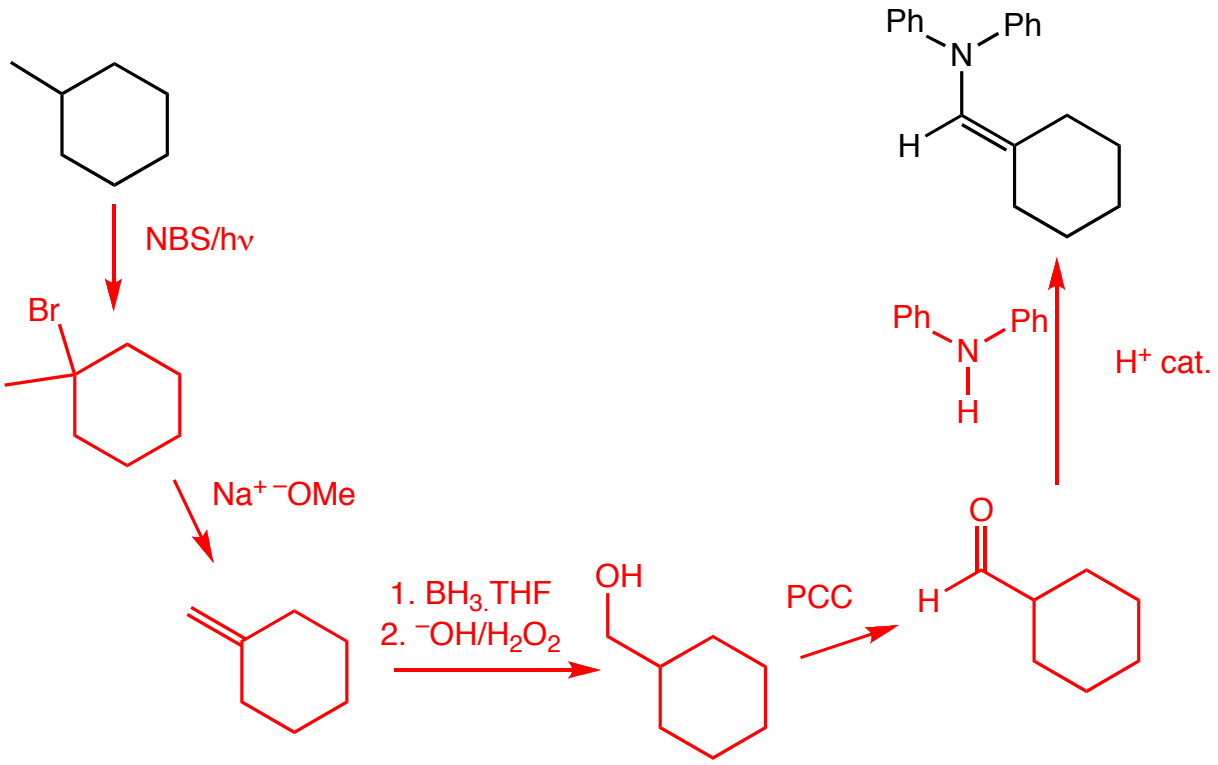
a)



b)



Question 5 (18 pts.) Synthesize the (target) molecule on the right from the starting molecule the left. this can not be done in one reaction. Give reagents and conditions and the intermediate molecules at each step. Do not show any mechanisms or transient intermediates.



Question 6 (40 pts.) For the following TWO reactions a) and b):

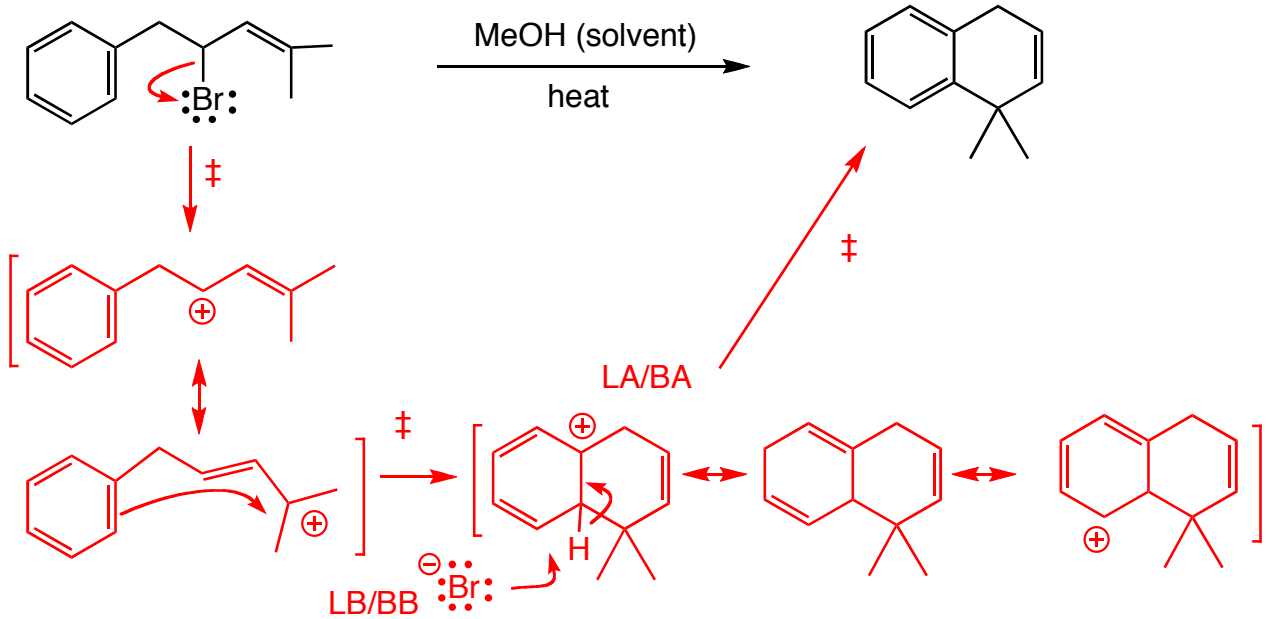
1) Give a complete arrow-pushing mechanisms

2) Indicate the lewis acid/base for each INTERmolecular step (LB or LA) and whether they are also Brønsted bases/acids (LB/BB or LA/BA)

3) Show wehere every proton comes from and goes to (i.e., no $+H^+$ or $-H^+$)

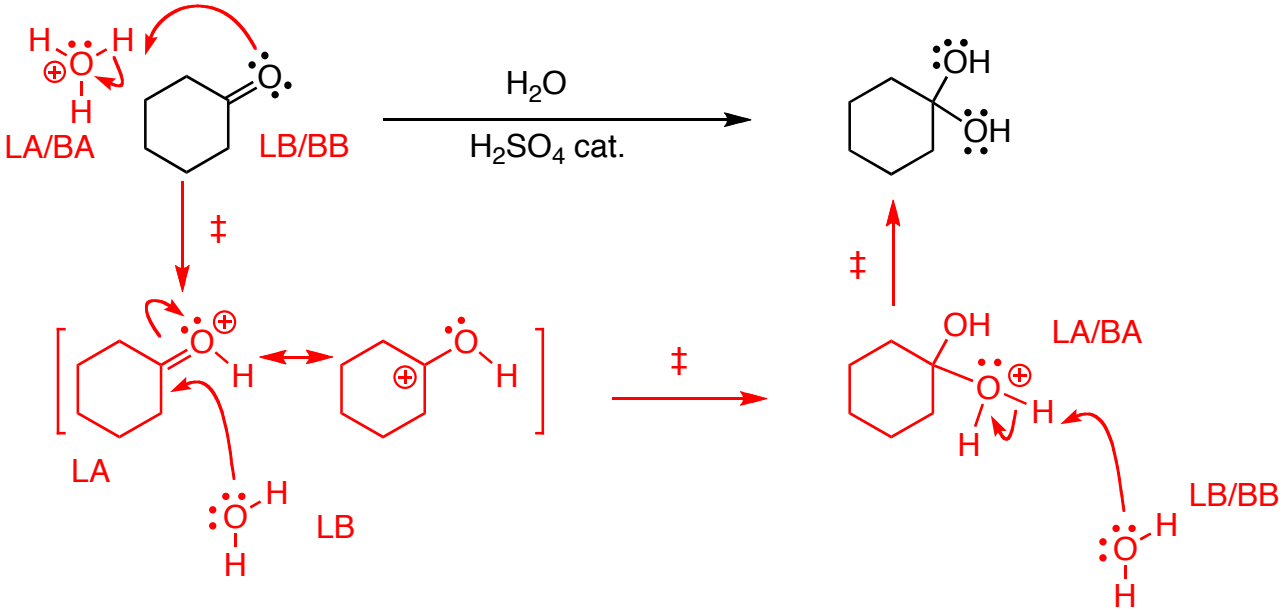
4) DRAW ALL RELEVANT RESONANCE CONTRIBUTORS FOR THE INTERMEDIATES

a)



Give the number of transition states in your mechanism for reaction a) 3

b)



Give the number of transition states in your mechanism for reaction b) 3

Question 7 (20 pts.) Give a complete arrow-pushing mechanisms for the following reaction.

1) You can use the abbreviated +H+ and -H+ to indicated protonation and deprotonation

2) DRAW ALL RELEVANT RESONANCE CONTRIBUTORS FOR THE INTERMEDIATES