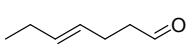
CHM 1321 – Problem set 7 - ANSWERS

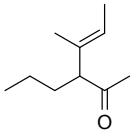
In this set:

- Nucleophilic addition to carbonyls and other pi bond electrophiles
- Acid/base chemistry

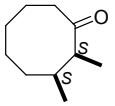
1. Name the following compounds

a) 

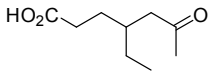
(*E*)-hept-4-enal

c) 

(*E*)-4-methyl-3-propylhex-4-en-2-one

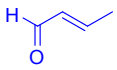
b) 

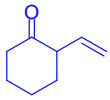
(2*S*,3*S*)-2,3-dimethylcyclooctan-1-one (best)
cis-2,3-dimethylcyclooctan-1-one (acceptable)

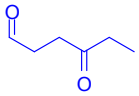
d) 

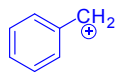
4-ethyl-6-oxoheptanoic acid

2. Draw the structure corresponding to the following names:

a. (E)-2-butenal 

b. 2-ethenylcyclohexanone 

c. 4-oxohexanal 

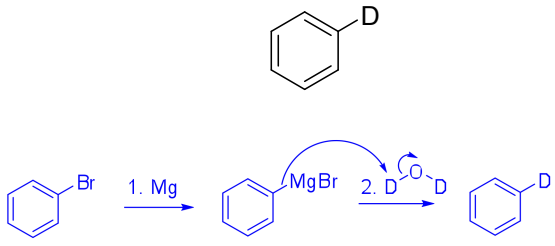
d. the benzyl carbocation 

e. 1-phenylethanone (acetophenone) 

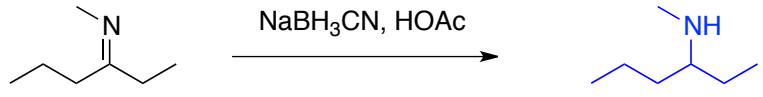
3. Can Grignard reactions be conducted in protic solvents? Explain.

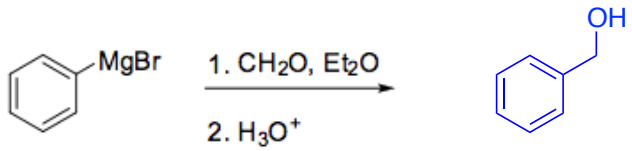
NO. The Grignard reagent, such as methylmagnesium bromide would be destroyed through an acid/base reaction with the solvent (such as methanol). See class notes for the mechanism.

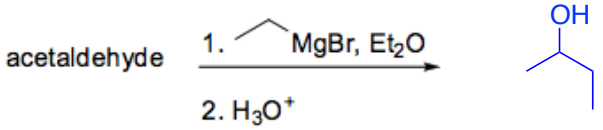
4. How could you synthesize the following deuterium-labeled compound from bromobenzene? Note: D_2O is readily available. D = ^2H, an isotope of ^1H

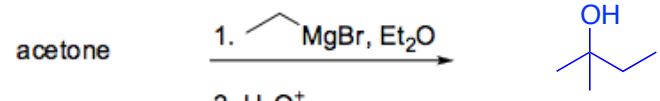


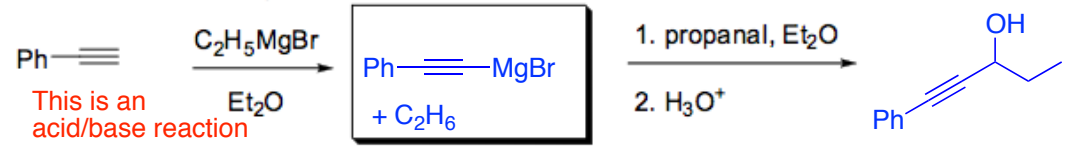
5. Give the product of each of the following reactions:

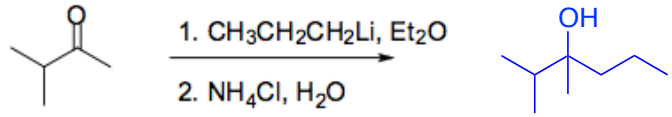
a) 

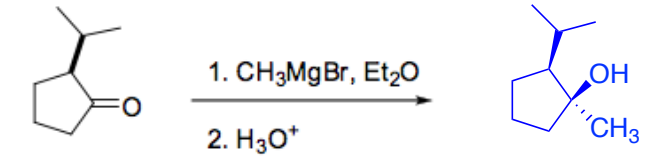
b) 

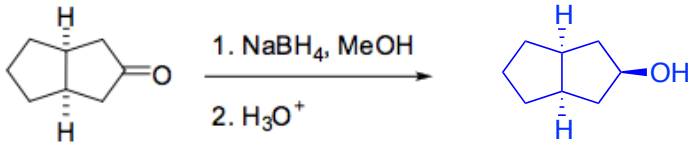
c) 

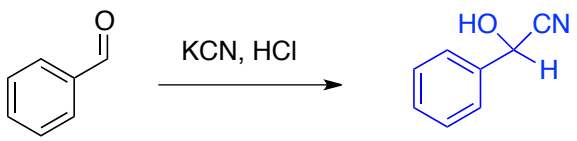
d) 

e) 

f) 

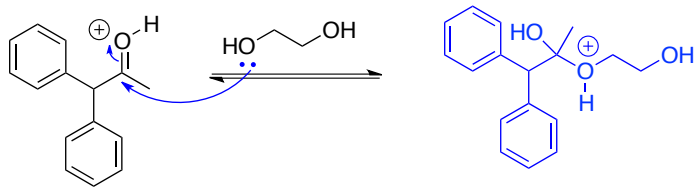
g) 

h) 

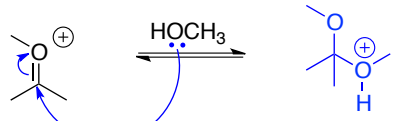
i) 

6. Provide a mechanism for the first step in each of the following reactions:

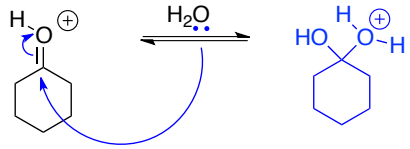
a)



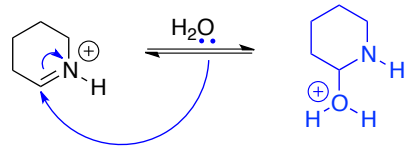
b)



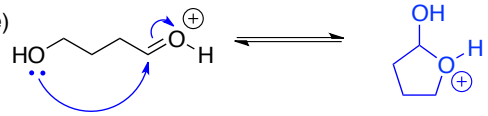
c)



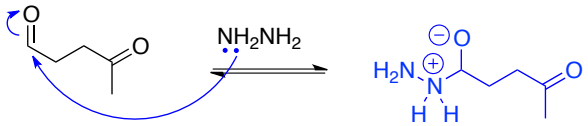
d)



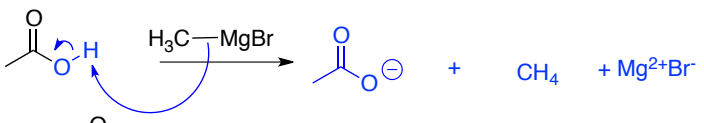
e)



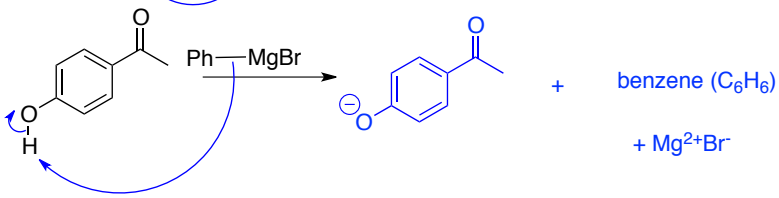
f)



g)



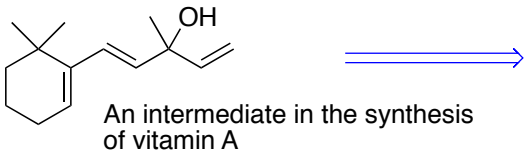
h)



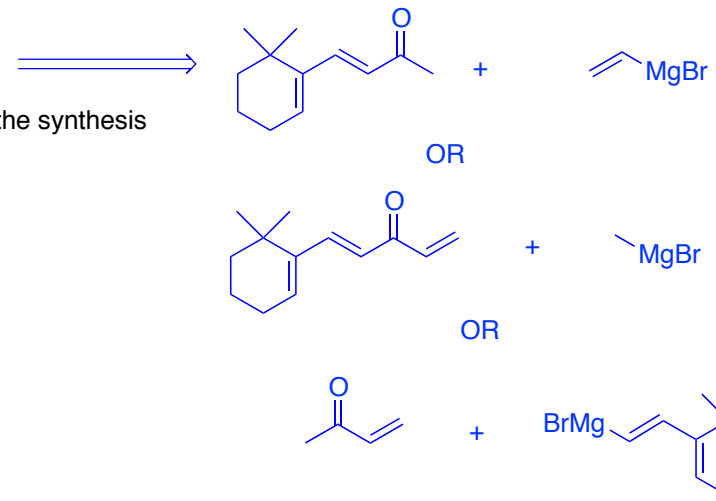
IMPORTANT!
Remember that acid/base reactions are fast!

7. Draw one set of starting materials (electrophile and nucleophile) for each of the following products (assume aqueous workshop):

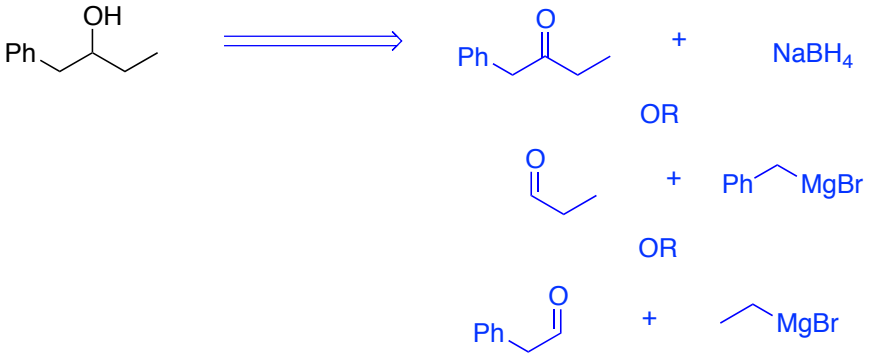
a)



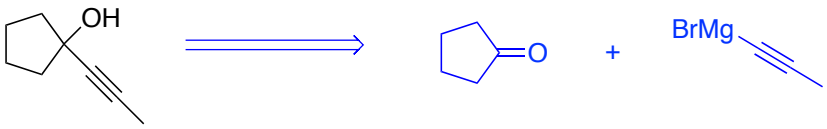
An intermediate in the synthesis of vitamin A



b)

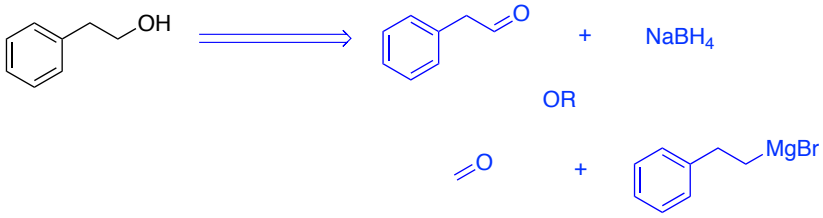


c)

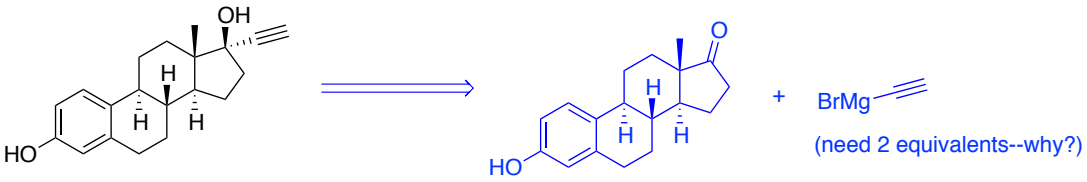


Question 7, continued:

d)



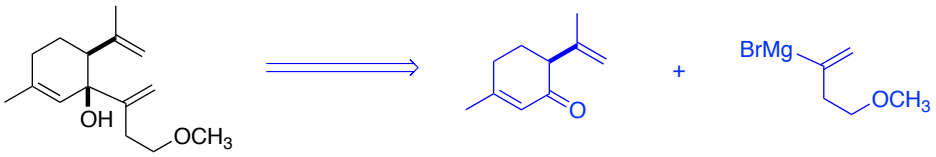
e)



(need 2 equivalents--why?)

Ethinyl estradiol-used in many birth control pills.

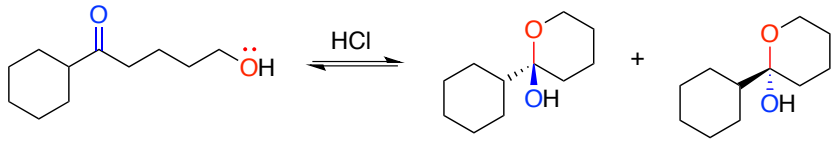
f)



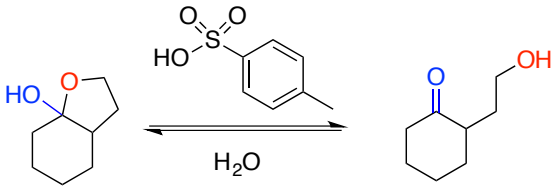
An intermediate generated in Professor Barriault's research group at uOttawa in the synthesis of a malaria drug.

8. See mechanisms for a-b, below.

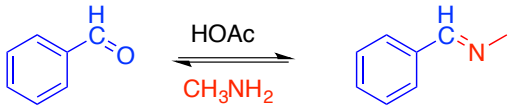
a)



b)



c)



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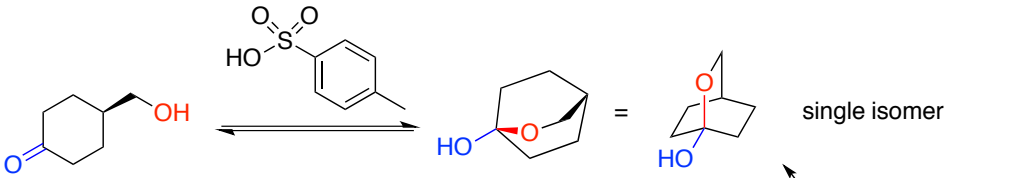
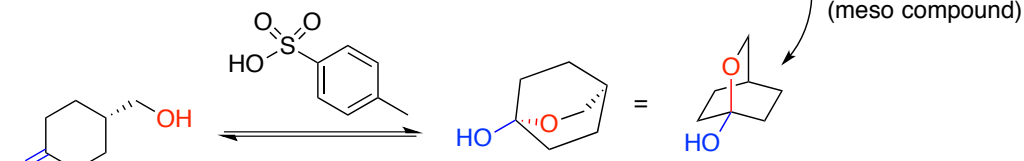
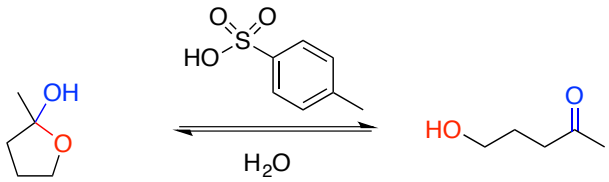


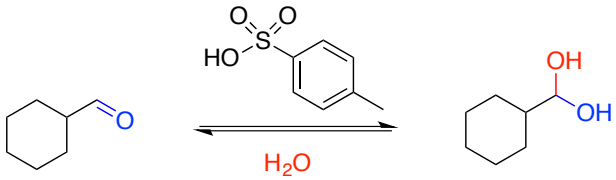
e)



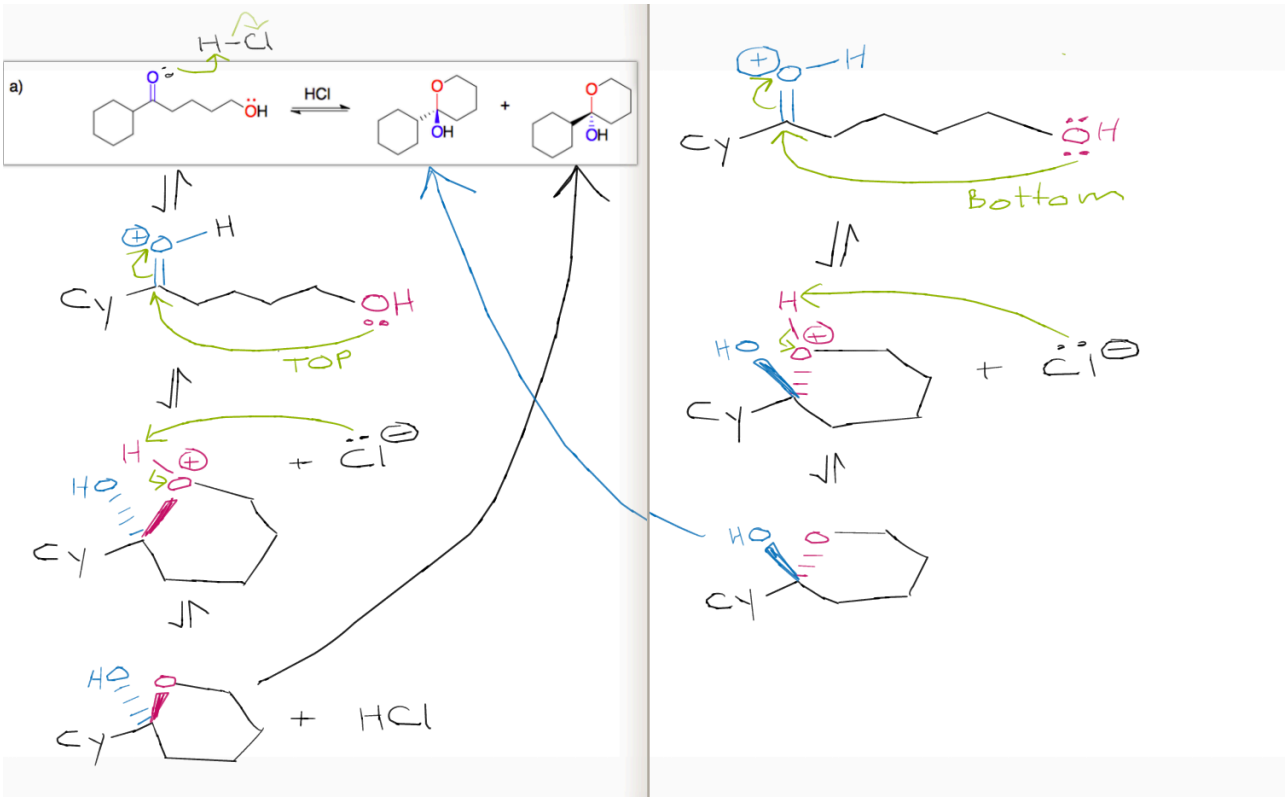
f)

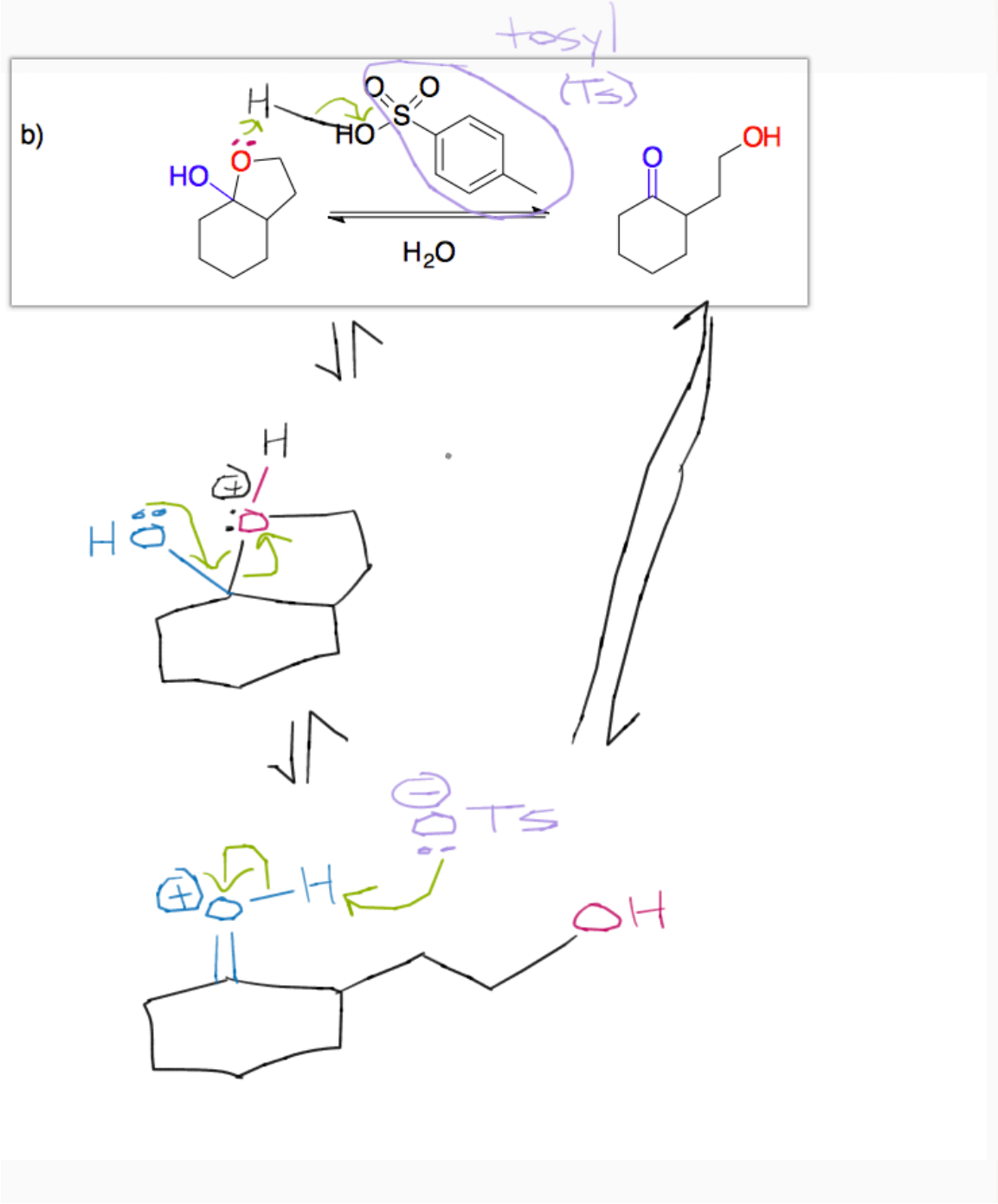


g)



Question 8, cont. Mechanisms




b)
tosyl
(Ts)
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OH