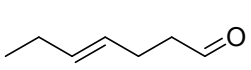
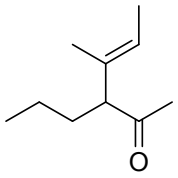
CHM 1321 – Problem set 7

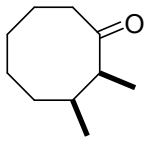
In this set:

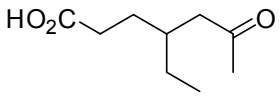
- Nucleophilic addition to carbonyls and other pi bond electrophiles
- Acid/base chemistry

1. Name the following compounds

a) 

c) 

b) 

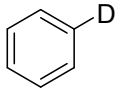
d) 

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)

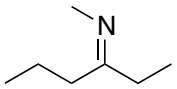
3. Can Grignard reactions be conducted in protic solvents? Explain.

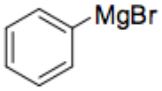
4. How could you synthesize the following deuterium-labeled compound from:
   a. Benzene?
   b. Bromobenzene?

   Note: D_2O is readily available. D = ^2H, an isotope of ^1H



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

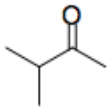
a)  $NaBH_3CN$, HOAc

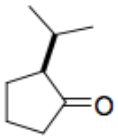
b)  1. CH_2O, Et_2O; 2. H_3O^+

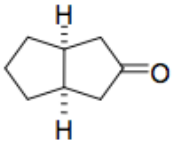
c) acetaldehyde 1.  $MgBr$, Et_2O; 2. H_3O^+

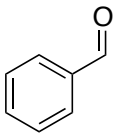
d) acetone 1.  $MgBr$, Et_2O; 2. H_3O^+

e) C_2H_5MgBr, Et_2O;  1. propanal, Et_2O; 2. H_3O^+

f)  1. $CH_3CH_2CH_2Li$, Et_2O; 2. NH_4Cl, H_2O

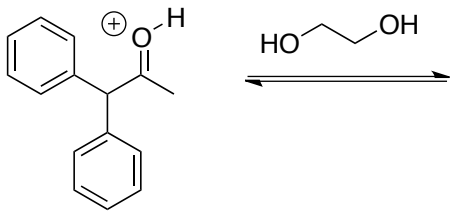
g)  1. CH_3MgBr, Et_2O; 2. H_3O^+

h)  1. $NaBH_4$, MeOH; 2. H_3O^+

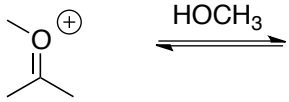
i)  KCN, HCl

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

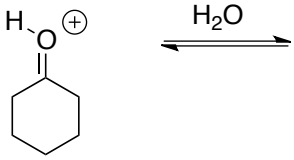
a)



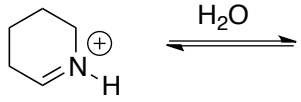
b)



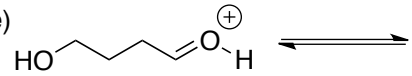
c)



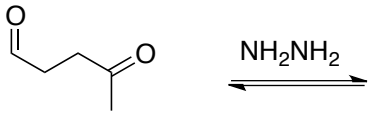
d)



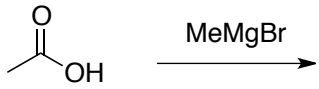
e)



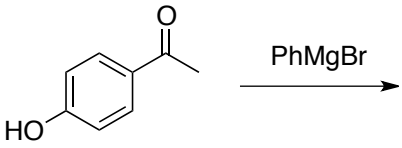
f)



g)



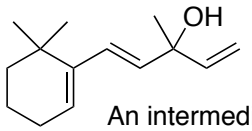
h)



Synthesis question

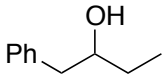
7. Draw one set of starting materials (electrophile and nucleophile) for each of the following products (assume aqueous workshop)::

a)

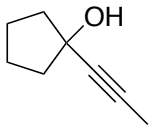


An intermediate in the synthesis of vitamin A

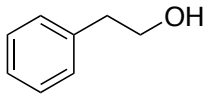
b)



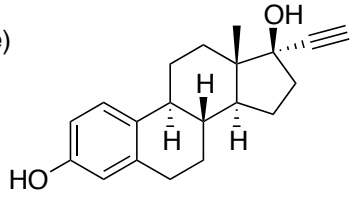
c)



d)

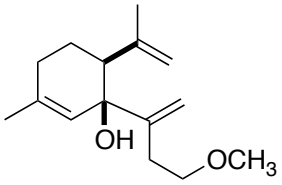


e)



Ethinyl estradiol-used in many birth control pills.

f)

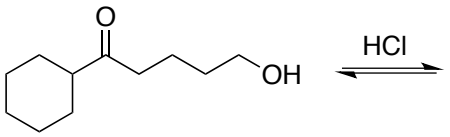


An intermediate generated in Professor Barriault's research group at uOttawa in the synthesis of a malaria drug.

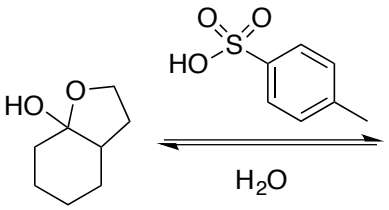
Not on midterm 2 in 2015

8. Give the mechanism and products. State the isomeric relationship between products, if applicable.

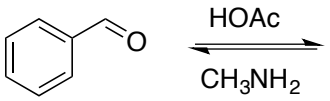
a)



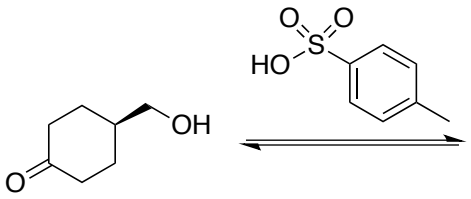
b)



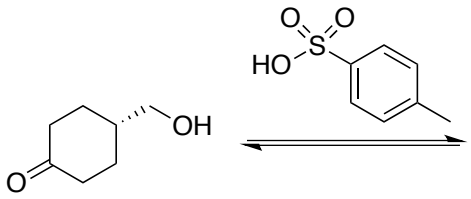
c)



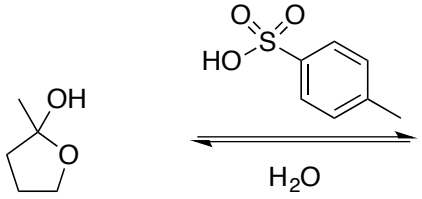
d)



e)



f)



g)