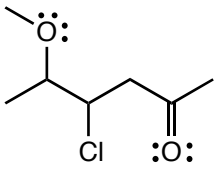
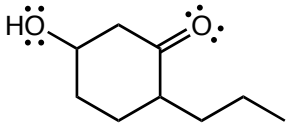
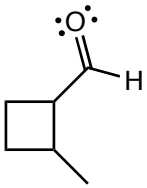
Homework - Chapter 19
Chem 2320

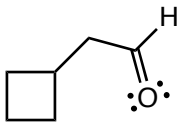
Name _____

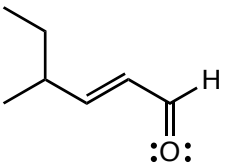
1. Name the following compounds.

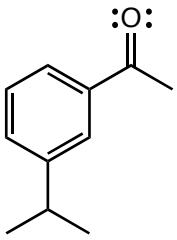
a) 

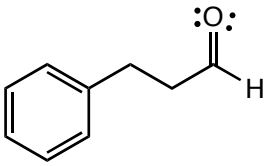
b) 

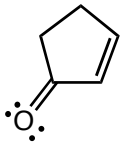
c) 

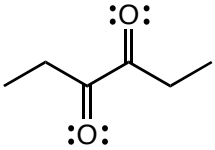
d) 

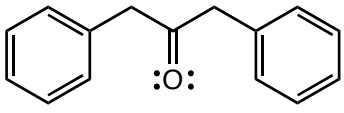
e) 

f) 

g) 

h) 

i) 

j) 

2. Draw structures for the following names.

a) 3-oxo-cyclopentanecarbaldehyde

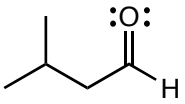
b) (2R,4S)-2,4-dibromo-1-cyclopentanone

b) cis-3,5-hexadien-2-one

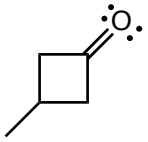
d) 2-hydroxy-pentanedial

3. Sketch the ^{1}H NMR structure for the following compounds. Include approximate chemical shifts.

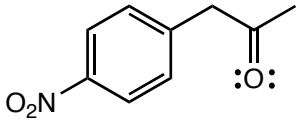
a)



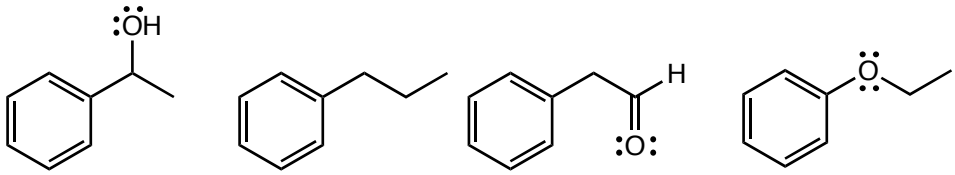
b)



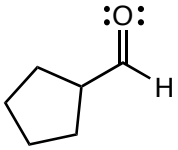
c)

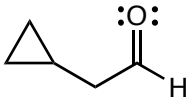


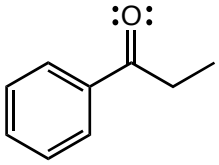
4. Put the following compounds in order of their boiling point, 1 being lowest and 4 being highest. Note that all are approximately the same molecular weight.

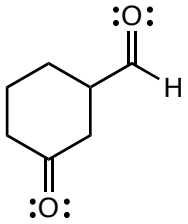


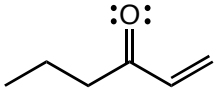
5. Predict the products of the following reaction sequences. All of these reactions are a review from previous chapters.

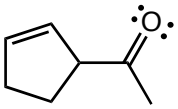
a)  $NaBH_4$, CH_3OH → 1. TsCl, 2. CH_3CH_2ONa

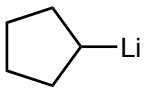
b)  1. $LiAlH_4$, 2. H_3O^+ → 1. NaH, 2. CH_3I

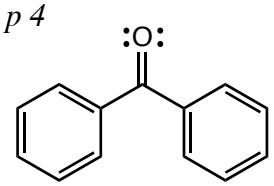
c)  $NaBH_4$, CH_3OH → H_2SO_4

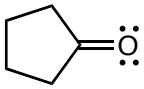
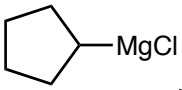
d)  1. $LiAlH_4$, 2. H_3O^+ → $SOCl_2$, pyridine

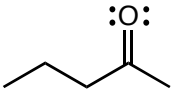
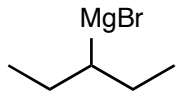
e)  $NaBH_4$, CH_3OH → H_2SO_4

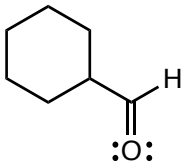
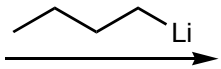
f)  Raney Ni → PBr_3

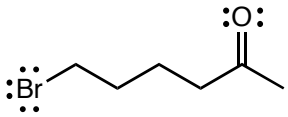
g)  1.  2. H_3O^+ → HCl

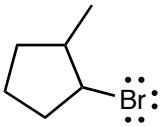
h)  1. CH_3CH_2MgBr / 2. H_3O^+ → HBr →

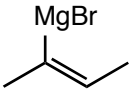
i)  1.  / 2. H_3O^+

j)   / 2. H_3O^+

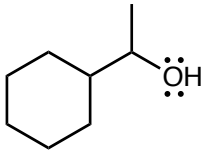
k)   / 2. H_3O^+

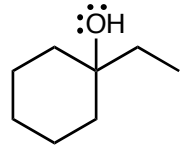
l)  1. Mg / 2. H_3O^+ → 1. K / 2. benzyl bromide

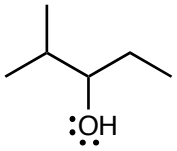
m)  1. Mg / 2. acetone

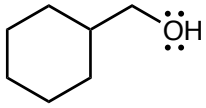
n)  +  / 2. H_3O^+ → H_2SO_4 →

6. Use 1) a reduction reaction and 2) a reaction with a Grignard or organolithium reagent to form each of the following alcohols from an aldehyde or ketone. If either one isn't possible, explain why.

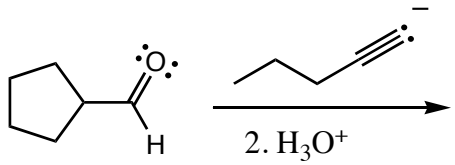
a) 

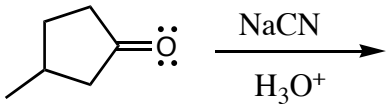
b) 

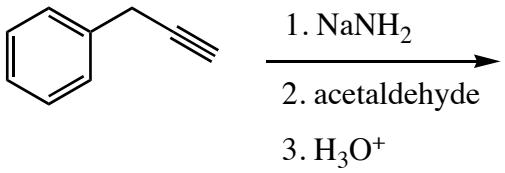
c) 

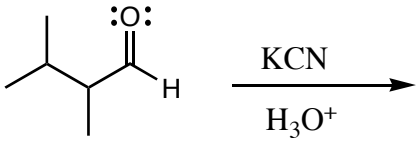
d) 

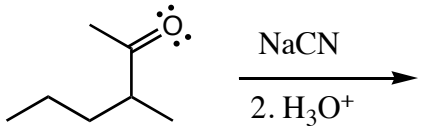
6. Predict the products of the following reactions.

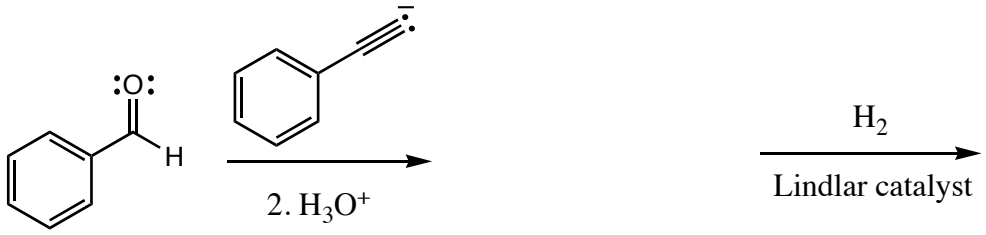
a) 

b) 

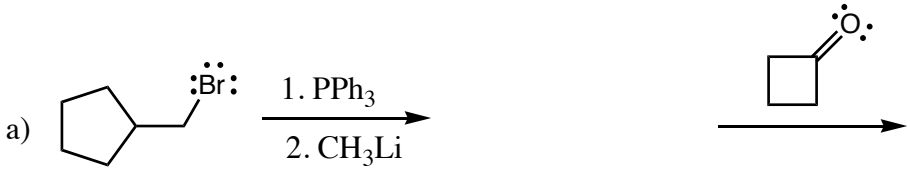
c) 

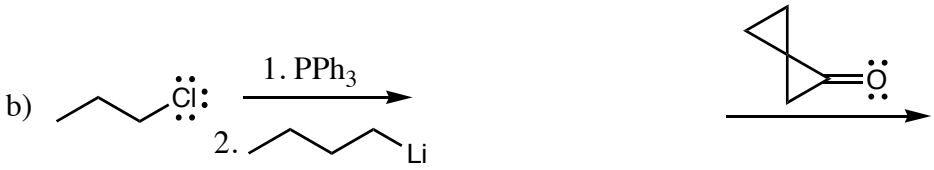
d) 

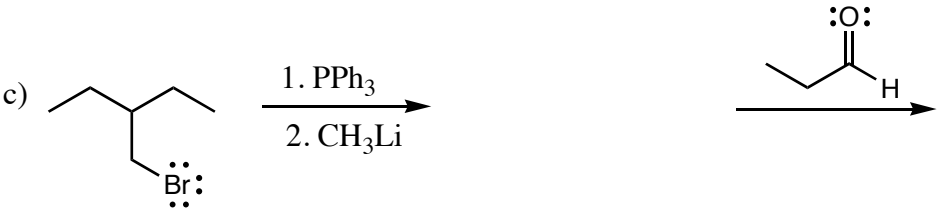
e) 

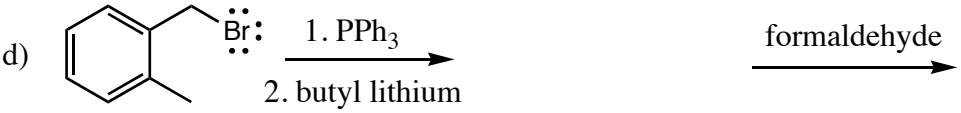
f) 

8. Give the product of each of the following.

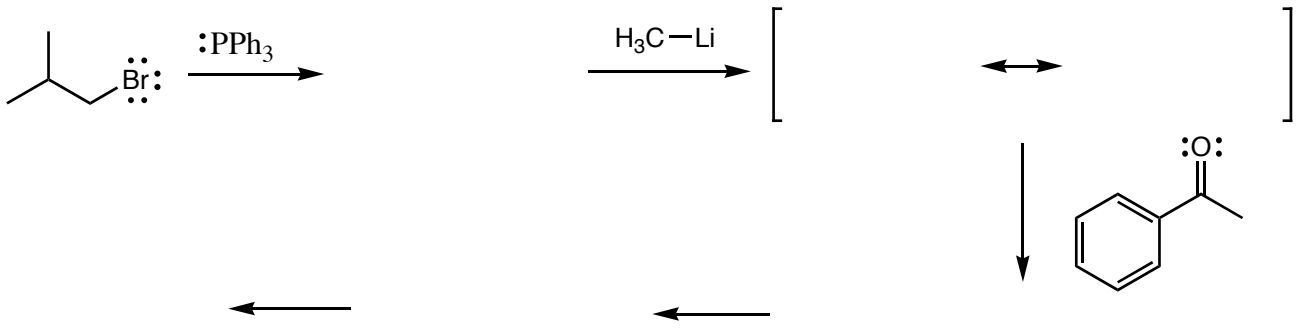
a) 

b) 

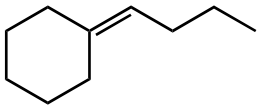
c) 

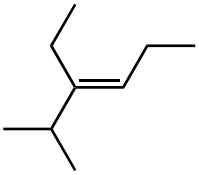
d) 

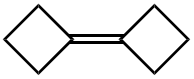
9. Give the arrows and intermediates in each step of the following Wittig reaction.

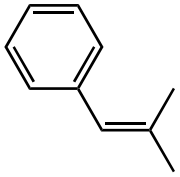


10. Synthesize each of the following alkenes using a Wittig reaction. Avoid the formation of side products where possible; if there is no way to do it without forming side products, write them in.

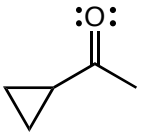
a) 

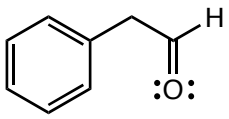
b) 

c) 

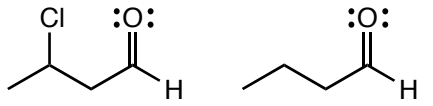
d) 

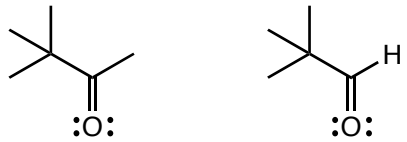
11. Draw the mechanism by which the compound in a) could be converted to its hydrate by H_3O^+ and H_2O and the compound in b) could be converted to its hydrate by OH^- and H_2O. Use the mechanism to explain why are the H_3O^+ and OH^- catalytic.

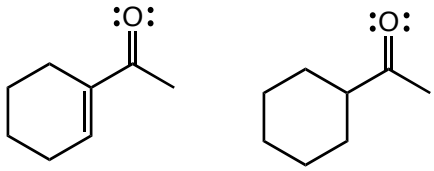
a) 

b) 

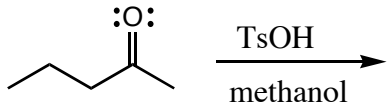
12. Circle the member of each pair that will have the most hydrate at equilibrium. Give a short explanation for your choice.

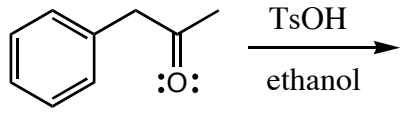
a) 

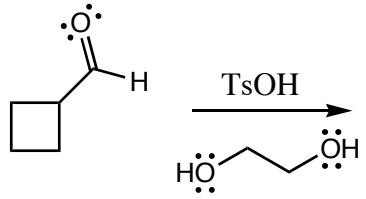
b) 

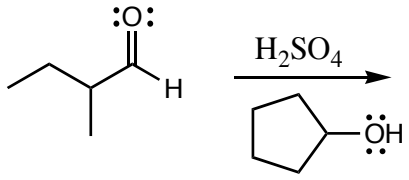
c) 

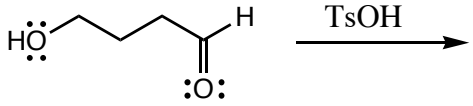
13. What products would be formed from the following reactions?

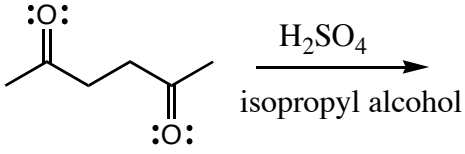
a) 

b) 

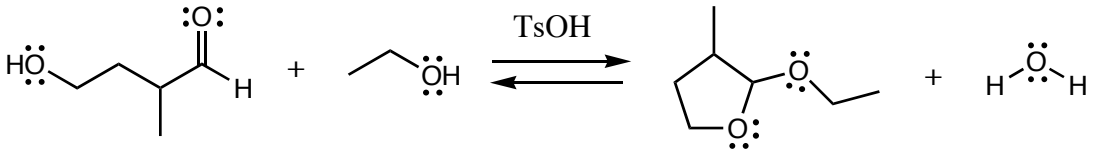
c) 

d) 

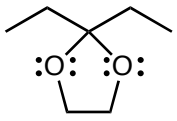
e) 

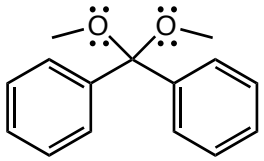
f) 

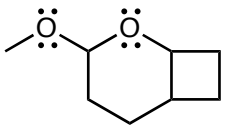
14. Show the mechanism of the following reaction. Write in every step, every arrow, electron pair, and charge. Hint: the OH that is already attached will attack first.

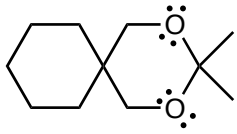


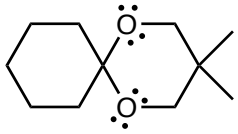
15. What products will be formed when the following acetals are treated with acid and water?

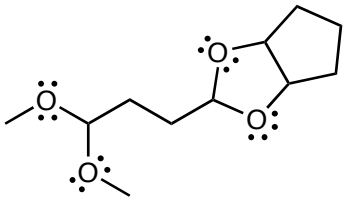
a) 

b) 

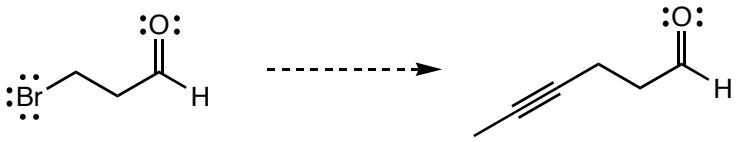
c) 

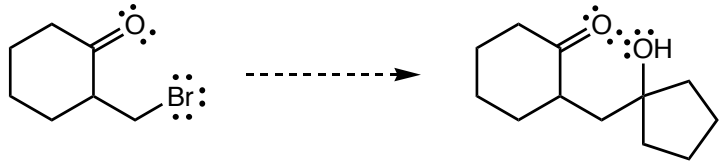
d) 

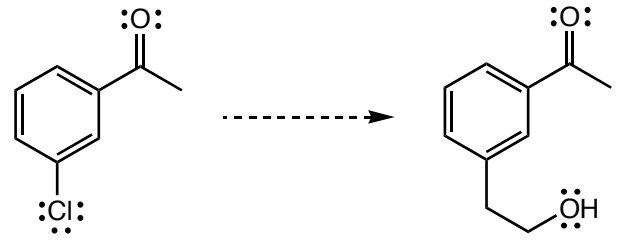
e) 

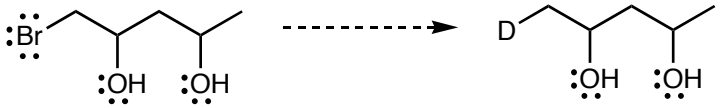
f) 

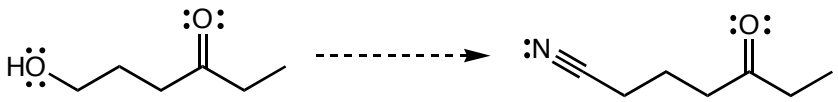
16. Give a reaction sequence (reagents and intermediate products) by which the following transformations could be completed. Each will make use of an acetal protecting group and a reaction from last semester.

a) 

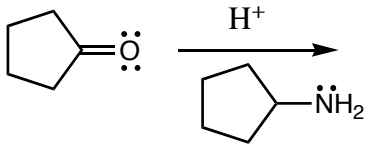
b) 

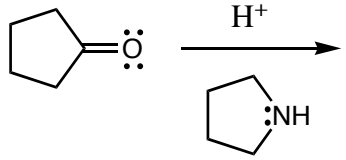
c) 

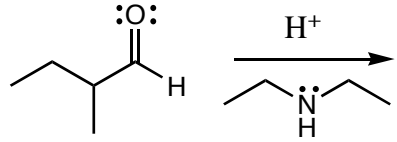
d) 

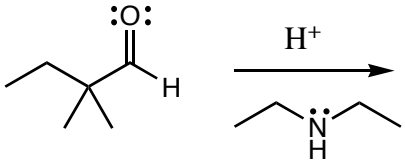
e) 

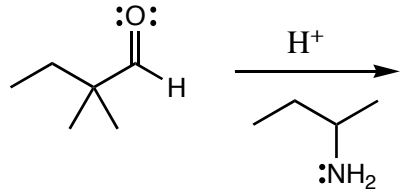
17. Give the products of the following reactions. Be sure to write out any stereoisomers or constitutional isomers which would be formed.

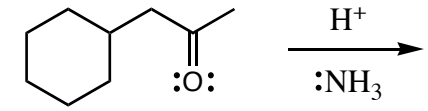
a) 

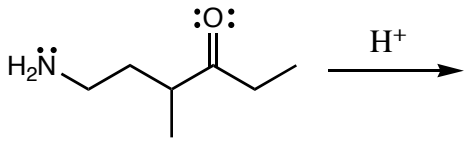
b) 

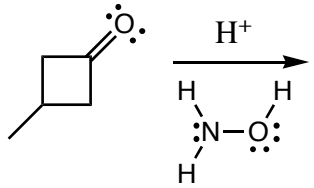
c) 

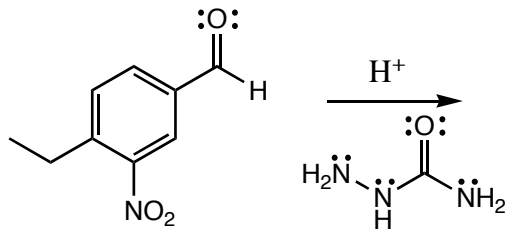
d) 

e) 

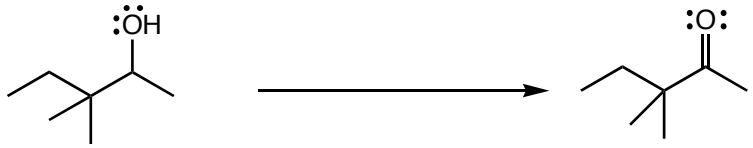
f) 

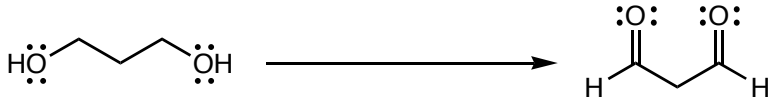
g) 

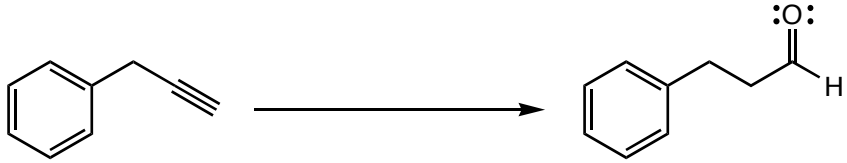
h) 

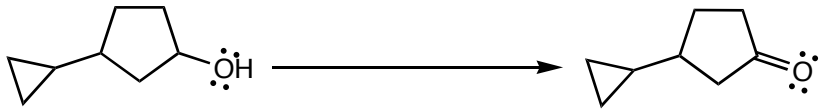
i) 

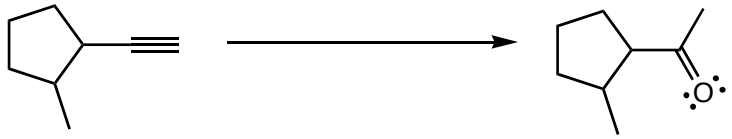
18. What reagents would be needed to convert the following starting materials into the aldehydes or ketones shown? Give the <u>name</u> of each product.

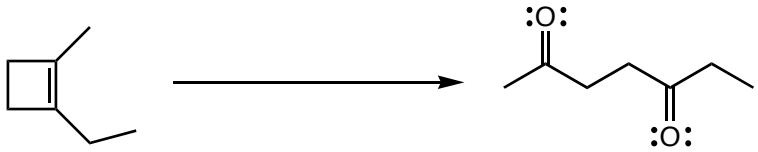
a) 

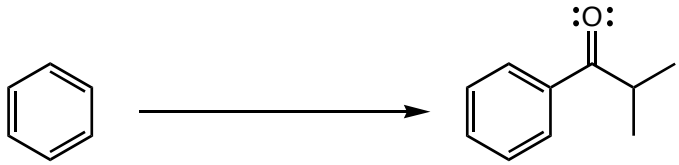
b) 

c) 

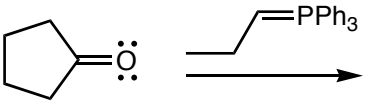
d) 

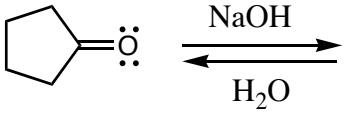
e) 

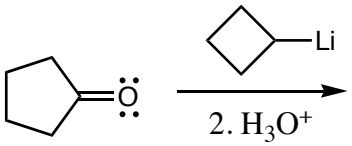
f) 

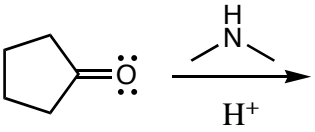
g) 

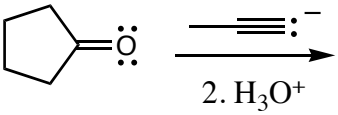
19. What products will result from the following reactions?

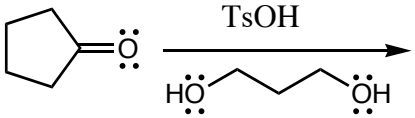
a) 

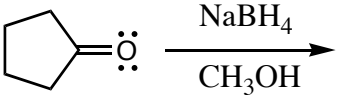
b) 

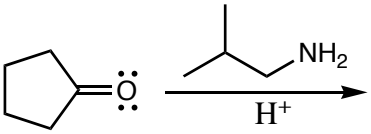
c) 

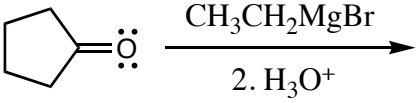
d) 

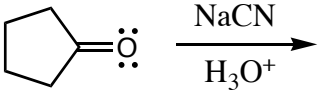
e) 

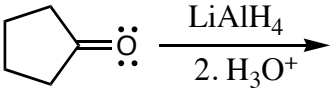
f) 

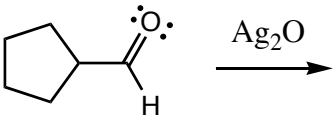
g) 

h) 

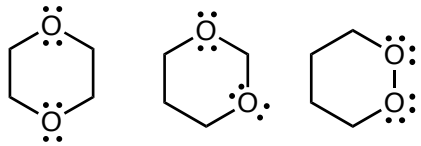
i) 

j) 

k) 

l) 

20. Match the three isomers of dioxane with their descriptions.



a) unstable - explosive
b) stable in base, reacts with mild aqueous acid
c) reacts only with strong acid (HBr or HI)

____ ____ ____

21. What would be the product of 2-butanone when treated with the following?

a) $NaBH_4$ in CH_3OH

b) $NaBH_4$ in CH_3OD

c) $NaBD_4$ in CH_3OH

d) $NaBD_4$ in CH_3OD