

1. Predict the products formed when cyclohexanone reacts with the following reagents.

- a) $\text{CH}_3\text{NH}_2, \text{H}^+$

- b) Excess $\text{CH}_3\text{OH}, \text{H}^+$

- c) Hydroxylamine (NH_2OH) and weak acid

- d) Ethylene glycol ($\text{CH}_2\text{OHCH}_2\text{OH}$) and weak acid

- e) Phenylhydrazine ($\text{PhNH}=\text{NH}_2$) and weak acid

- f) PhMgBr followed by H_3O^+

- g) Tollens reagent

- h) Sodium acetylide, then H_3O^+

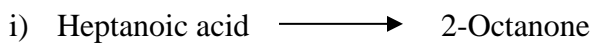
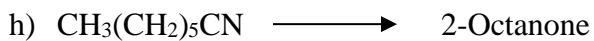
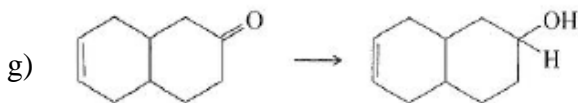
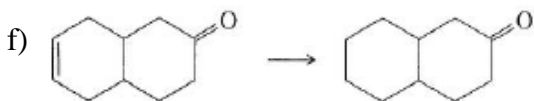
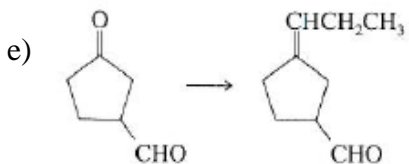
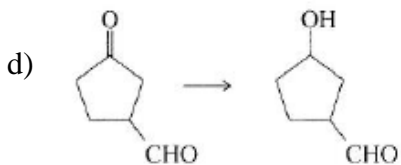
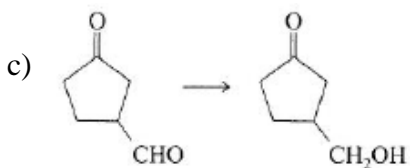
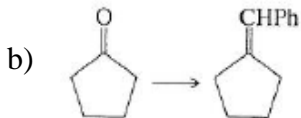
- i) Sodium cyanide

- j) Acidic hydrolysis of product from (i)

- k) Hydrazine, then hot fused KOH

- l) $\text{Ph}_3\text{P}=\text{CH}_2$

2. Show how you would accomplish the following synthesis efficiently and in good yield. You may use any necessary reagents.



3. Predict the products formed when cyclohexanecarbaldehyde reacts with the following reagents.

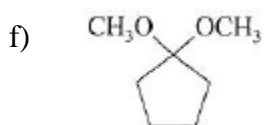
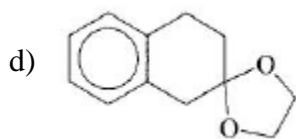
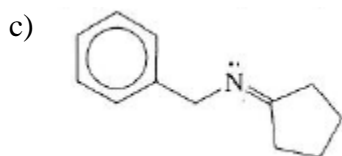
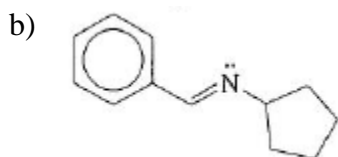
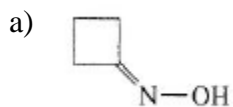
a) PhMgBr then H_3O^+

b) Tollens reagent

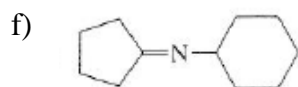
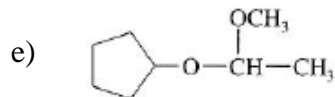
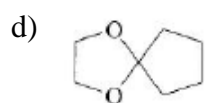
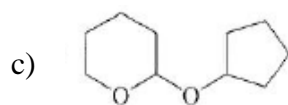
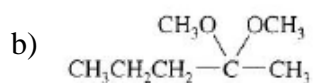
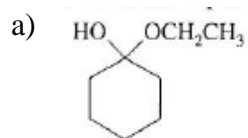
c) Excess ethanol and acid

d) Zn/Hg and HCl

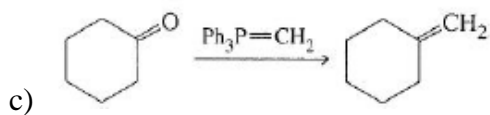
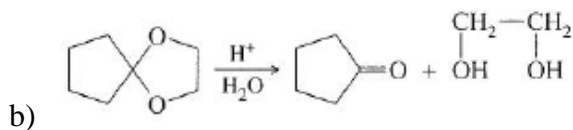
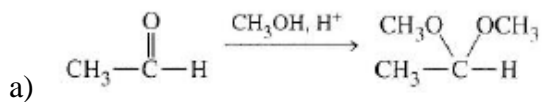
4. Show how you would synthesize the following derivatives from appropriate carbonyl compounds.



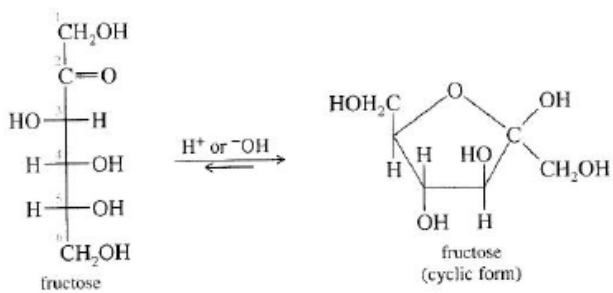
5. For each compound: name the functional group and show what compounds result from complete hydrolysis.



6. Propose a mechanism for the following reactions.



7. Two structures of fructose are shown below: the open chain and cyclized. Show the mechanism of the cyclization in presence of dilute acid. (Hint: number the carbons to help you with the mechanism)

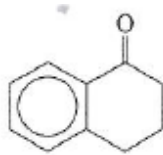


8. Show how you would accomplish the following synthesis

a) Benzene \longrightarrow n-butylbenzene

b) Benzene \longrightarrow p-methoxybenzaldehyde

c) $\text{Ph}(\text{CH}_2)_4\text{OH} \longrightarrow$



9. The following roadmap centers on the structure and properties of A; give all the other structures related to it.

