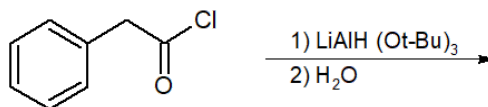


## 19.16: ADDITIONAL EXERCISES

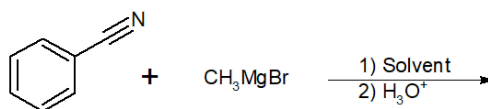
### General Review

**19-1** Give the product of the following reaction.

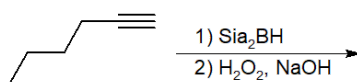


**19-2** For each of the following reactions, give the final product.

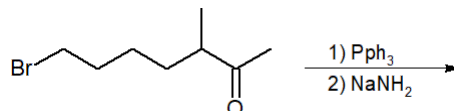
a)



b)

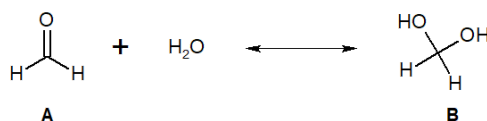


**19-3** For the following reaction, give the final product.

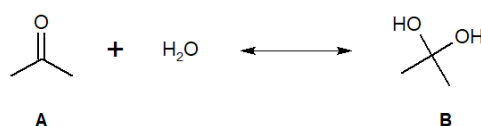


**19-4** For the following reactions, identify the side favored at equilibrium.

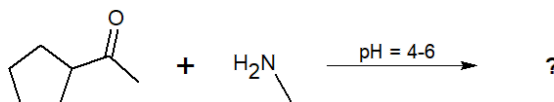
1)



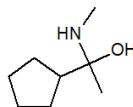
2)



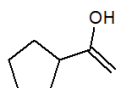
**19-5** Identify the correct product of the following reaction.



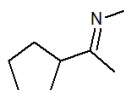
a)



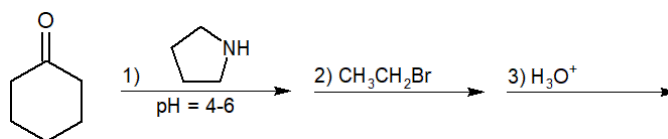
b)



c)

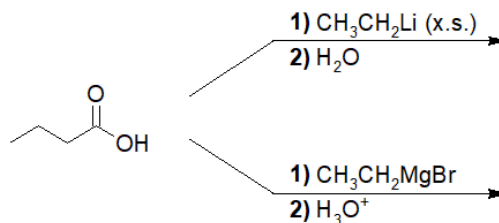


**19-6** Give the final product of the following chain of reactions.

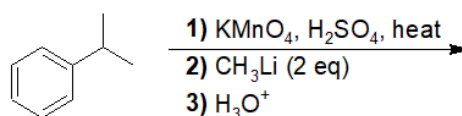


### Synthesis of Ketones from Carboxylic Acids

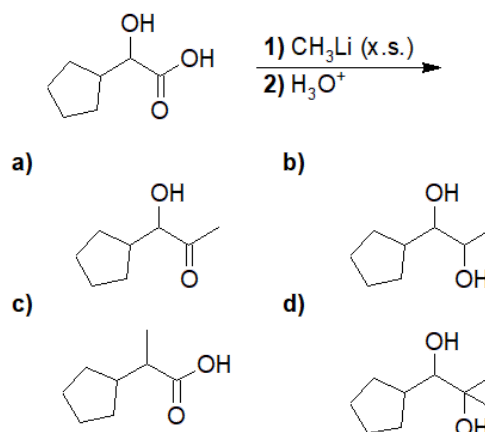
19-7 Provide the structures of the products of the following reactions.



19-8 Provide the structure and IUPAC nomenclature of the product of the following reaction.

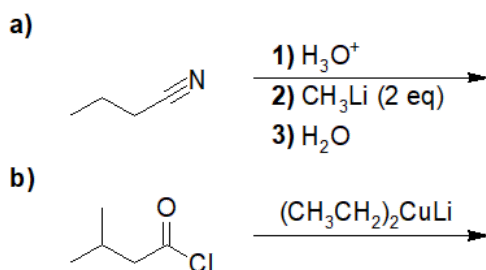


19-9 Choose the correct answer.

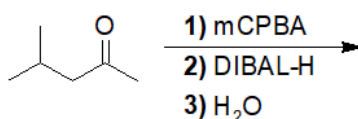


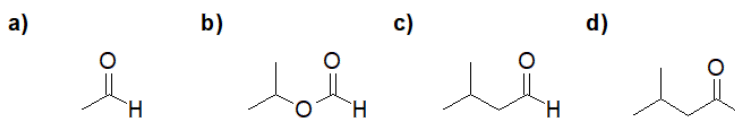
### Synthesis of Ketones and Aldehydes from Acid Chlorides, Esters, and Nitriles

19-10 Provide the structures of the products of the following reactions.

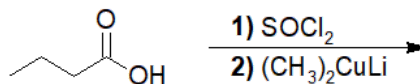


19-11 Choose the correct product of the following reaction.





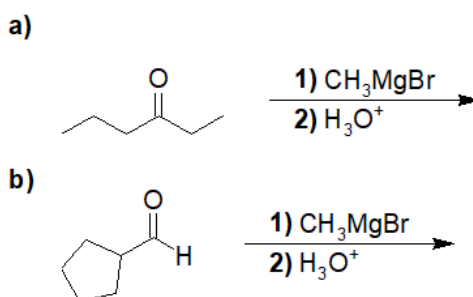
19-12 Choose the correct IUPAC nomenclature of the product of the following reaction.



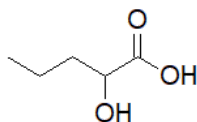
- a) butanal
- b) 2-methylhexan-3-one
- c) pentan-2-one
- d) 2-methylpentan-2-ol

### Reactions of Ketones and Aldehydes

19-13 Provide the products of the following reactions.

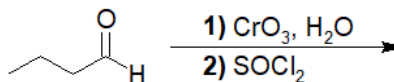


19-14 Suggest a way to make the following compound from butanol. Use any necessary reagents.



2-hydroxypentanoic acid

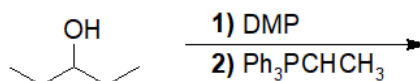
19-15 Choose the correct product of the following reaction.



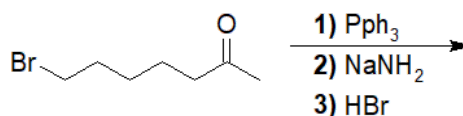
- a) 2-chloropentane
- b) 1-chlorobutan-1-ol
- c) 2-chlorobutanoic acid
- d) butanoyl chloride

### The Wittig Reaction

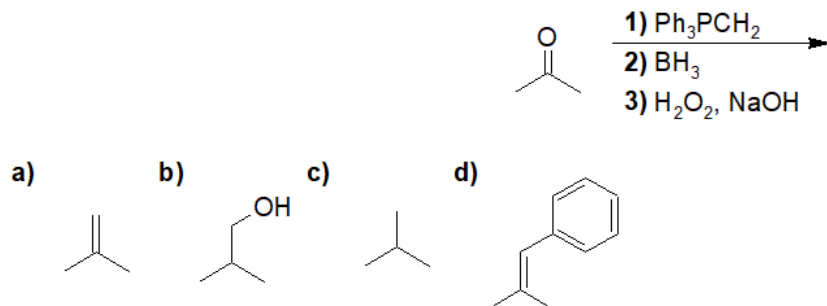
19-16 Predict the structure of the product of the following reaction.



19-17 Provide the product of the following reaction.

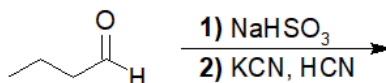


19-18 Choose the correct product of the following reaction.

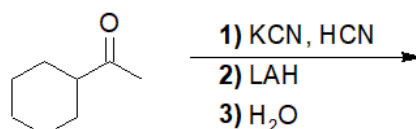


### Formation of Cyanohydrins

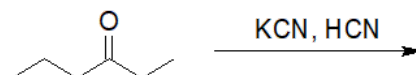
19-19 Predict the structure of the product of the following reaction.



19-20 Provide the structure of the product of the following reaction.



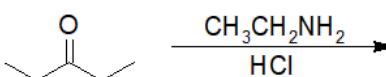
19-21 Choose the correct IUPAC nomenclature of the product of the following reaction.



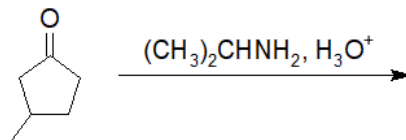
- a) 3-ethylhex-1-yn-3-ol
- b) 2-ethyl-2-hydroxypentanenitrile
- c) 3-(aminomethyl)hexan-3-ol
- d) butanoyl cyanide

### Formation of Imines

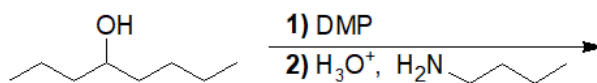
19-22 Predict the product of the following reaction.



19-23 Provide the structure of the product of the following reaction.



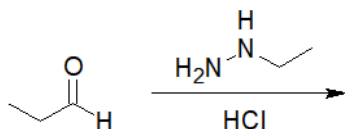
19-24 Choose the correct IUPAC nomenclature of the product of the following reaction.



- a) (4Z)-N-butyl-octan-4-imine
- b) (4Z)-N-propyl-octan-4-imine
- c) (4Z)-5-propyl-non-4-en-1-amine
- d) 4-(butylamino)octan-4-ol

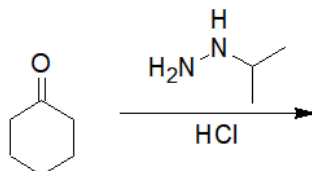
### Condensations with Hydroxylamine and Hydrazines

19-25 Choose the correct IUPAC nomenclature of the product of the following reaction.

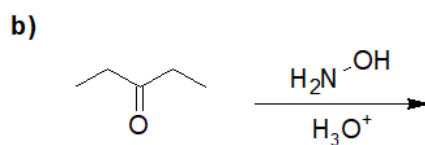
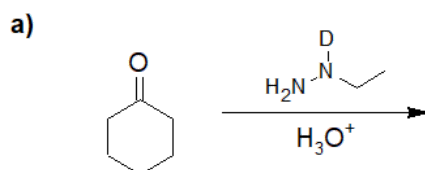


- a) 1-ethyl-2-propylhydrazine
- b) N-propoxyethanamine
- c) (1E)-N-ethylbut-1-en-1-amine
- d) (2E)-1-ethyl-2-propylidenehydrazine

19-26 Provide the structure of the product of the following reaction.

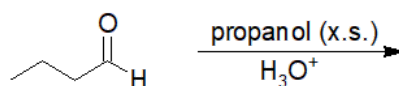


19-27 Provide the structure of the products of the following reactions.

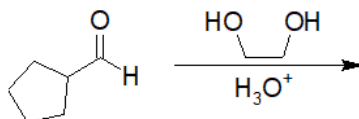


### Formation and Use of Acetals

19-28 Provide the structure of the resulting acetal.

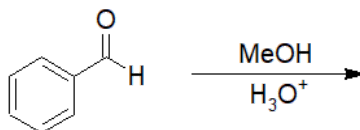


19-29 Choose the correct structure of the product of the following reaction.



- a)
- b)
- c)
- d)

19-30 Choose the correct IUPAC nomenclature of the product of the following reaction.

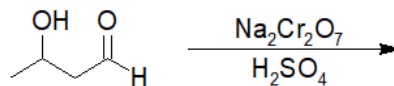


- a) (dimethoxymethyl)benzene
- b) benzoic acid

- c) phenylmethanediol
- d) (methoxymethyl)benzene

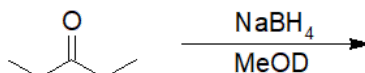
### Oxidation of Aldehydes and Reductions of Ketones and Aldehydes

19-31 Draw the structure of the product of the following oxidation reaction.

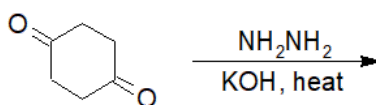


19-32 Draw the structures of the products of the following reduction reactions.

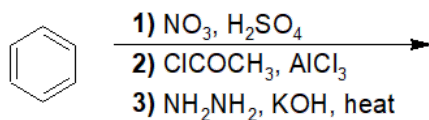
a)



b)



19-33 Predict the product of the following reaction and provide its IUPAC nomenclature.



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