

Problem 17.9

Show the products obtained from addition of methylmagnesium bromide to the following compounds:

- (a) Cyclopentanone (b) Benzophenone (diphenyl ketone) (c) 3-Hexanone

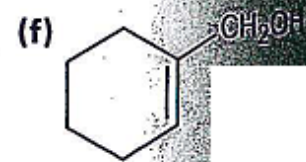
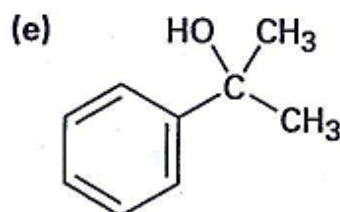
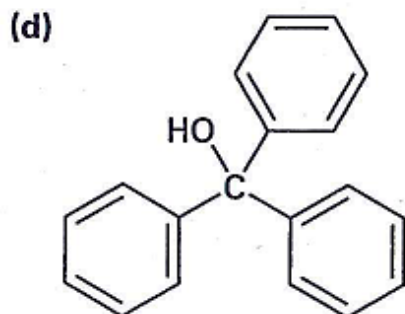
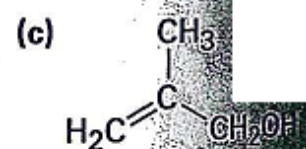
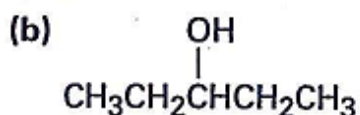
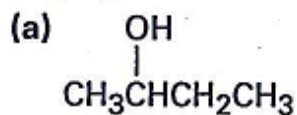
Problem 17.10

Use a Grignard reaction to prepare the following alcohols:

- (a) 2-Methyl-2-propanol (b) 1-Methylcyclohexanol (c) 3-Methyl-3-pentanol
(d) 2-Phenyl-2-butanol (e) Benzyl alcohol (f) 4-Methyl-1-pentanol

Problem 17.30

What Grignard reagent and what carbonyl compound might you start with to prepare the following alcohols?

**Problem 17.32**

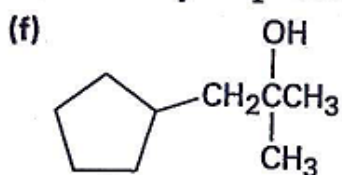
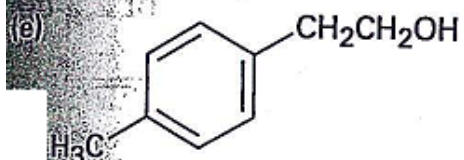
What carbonyl compounds might you start with to prepare the following compounds by Grignard reaction? List all possibilities.

(a) 2-Methyl-2-propanol

(b) 1-Ethylcyclohexanol

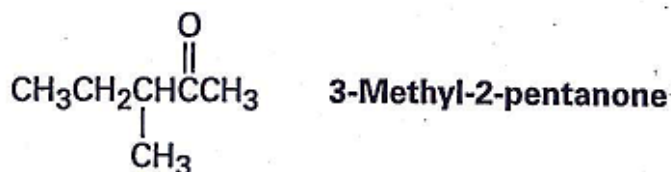
(c) 3-Phenyl-3-pentanol

(d) 2-Phenyl-2-pentanol



Problem 17.54

Reaction of (*S*)-3-methyl-2-pentanone with methylmagnesium bromide followed by acidification yields 2,3-dimethyl-2-pentanol. What is the stereochemistry of the product? Is the product optically active?

**Problem 19.34d**

Predict the products of the reaction of (1) phenylacetaldehyde and benzophenone with the following reagents:

- | | |
|--|--|
| (a) NaBH_4 , then H_3O^+ | (b) Dess–Martin reagent |
| (c) NH_2OH , HCl catalyst | (d) CH_3MgBr , then H_3O^+ |
| (e) 2 CH_3OH , HCl catalyst | (f) H_2NNH_2 , KOH |
| (g) $(\text{C}_6\text{H}_5)_3\text{P}=\text{CH}_2$ | (h) HCN, KCN |

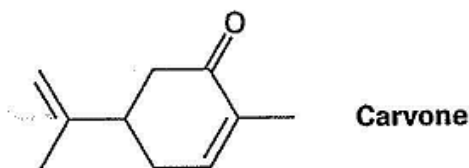
Problem 19.36

How would you use a Grignard reaction on an aldehyde or ketone to synthesize the following compounds?

- | | |
|--------------------------|----------------------|
| (a) 2-Pentanol | (b) 1-Butanol |
| (c) 1-Phenylcyclohexanol | (d) Diphenylmethanol |

Problem 19.40d

Carvone is the major constituent of spearmint oil. What products would you expect from reaction of carvone with the following reagents?



- | | |
|--|---|
| (a) $(\text{CH}_3)_2\text{Cu}^- \text{Li}^+$, then H_3O^+ | (b) LiAlH_4 , then H_3O^+ |
| (c) CH_3NH_2 | (d) $\text{C}_6\text{H}_5\text{MgBr}$, then H_3O^+ |
| (e) H_2/Pd | (f) CrO_3 , H_3O^+ |
| (g) $(\text{C}_6\text{H}_5)_3\text{P}^+\text{CH}_2\text{CH}_3$ | (h) $\text{HOCH}_2\text{CH}_2\text{OH}$, HCl |

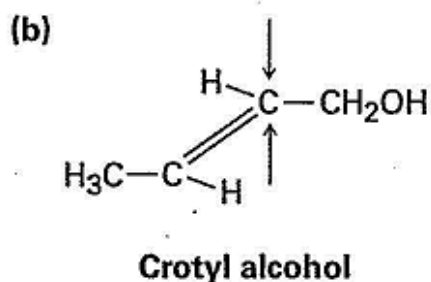
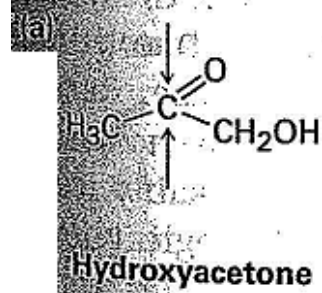
Problem 19.41

How would you synthesize the following compounds from cyclohexanone?

- (a) 1-Methylcyclohexene (b) 2-Phenylcyclohexanone
 (c) *cis*-1,2-Cyclohexanediol (d) 1-Cyclohexylcyclohexanol

Problem 5.23a

Identify the indicated faces of carbon atoms in the following molecules as *Re* or *Si*:



Problem 5.24

The lactic acid that builds up in tired muscles is formed from pyruvate. If the reaction occurs with addition of hydrogen to the *Re* face of pyruvate, what is the stereochemistry of the product?

Problem 5.59

The dehydration of citrate to yield *cis*-aconitate, a step in the citric acid cycle involves the *pro-R* "arm" of citrate rather than the *pro-S* arm. Which of the following two products is formed?

