Question 1
What is the IUPAC name of the following compound?

\[ \text{a. (S)-3,4,4-trimethylpentanal} \]
\[ \text{b. (R)-3,4,4-trimethylpentanal} \]
\[ \text{c. (R)-3-tert-butyl-3-methylpropanal} \]
\[ \text{d. (R)-3-tert-butylbutanal} \]

Question 2
What is the major organic product obtained from the following reaction?

\[ \text{1. } \text{NaBH}_4 \]
\[ \text{2. } \text{H}_2\text{O} \]

a. 2-pentanol
b. pentane
c. 1-pentene
d. (E) 2-pentene

Question 3
What is the major organic product obtained from the following reaction?

\[ \text{1. } \text{NaBH}_4 \]
\[ \text{2. } \text{H}_2\text{O} \]

a. 2-pentanone
b. 4-penten-2-ol
c. 2-pentanol
d. butane
16.4 Synthesis of Aldehydes
16.5 Synthesis of Ketones
16.11 Oxidation of Aldehydes
16.12 Chemical Analyses for Aldehydes and Ketones
12.3 Alcohols by Reduction of Carbonyl Compounds
16.6 Nucleophilic Addition to the Carbon – Oxygen Double Bond

**Question 1**
What is the best choice of reagent to perform the following transformation?

![Chemical structure](image)

a. HCl  

b. NaOH  

c. HIO₄  

d. PCC

**Question 2**
What is the major organic product obtained from the following reaction?

![Chemical structure](image)

a. 1  

b. 2  

c. 3  

d. 4

**Question 3**
What is the major organic product obtained from the following reaction?

![Chemical structure](image)

a. 1-butene, CH₃CH₂CH=CH₂  

b. butanal, CH₃CH₂CH₂CHO  

c. butanone, CH₃CH₂COCH₃  

d. butanoic acid, CH₃CH₂CH₂COOH
Question 1
What is the major organic product obtained from the following reaction?

\[ \text{CH}_3\text{OH} \xrightarrow{\text{H}_2\text{SO}_4} \text{H}_2\text{CO} \xrightarrow{\text{OCH}_3} \text{OCH}_3 \xrightarrow{\text{OCH}_3} \text{OCH}_3 \xrightarrow{\text{OCH}_3} \text{OCH}_3 \]

a. 1
b. 2
c. 3
d. 4

Question 2
What is the correct assignment of the names of the following functional groups?

\[ \text{N-NH}_2 \quad \text{NH}_2 \quad \text{NCH}_3 \quad \text{NOH} \]

a. 1 = imine; 2 = amine; 3 = hydrazone; 4 = oxime
b. 1 = hydrazone; 2 = amine; 3 = imine; 4 = oxime
c. 1 = oxime; 2 = imine; 3 = amine; 4 = hydrazone
d. 1 = imine; 2 = hydrazone; 3 = oxime; 4 = amine

Question 3
What is the major organic product obtained from the following reaction?

\[ \text{O} \xrightarrow{\text{H}_2\text{NOH}} \text{NH} \xrightarrow{\text{ONH}_2} \text{NH} \xrightarrow{\text{ONH}_2} \text{NOH} \xrightarrow{\text{O}} \text{ONH}_2 \]

a. 1
b. 2
c. 3
d. 4
Question 1
What is the major organic product obtained from the following sequence of reactions?

\[
\begin{array}{c}
\text{O} \quad \text{H} \\
\text{H} \\
\text{O} \\
\text{CN} \\
\end{array} \xrightarrow{\text{HCN}} \\
\begin{array}{c}
\text{O} \\
\text{H} \\
\text{O} \\
\text{CN} \\
\text{CN} \\
\text{CN} \\
\end{array}
\]

a. 1  
b. 2  
c. 3  
d. 4

Question 2
What is the major organic product obtained from the following reaction?

\[
\begin{array}{c}
\text{O} \\
\end{array} \xrightarrow{1. (\text{CH}_3)_2\text{CHCH}_2\text{MgBr}} \xrightarrow{2. \text{H}_3\text{O}^+} \\
\begin{array}{c}
\text{O} \\
\end{array}
\]

a. 2,3-dimethyl-3-heptanol  
b. 2,4-dimethyl-4-heptanol  
c. 3,5-dimethyl-4-heptanol  
d. 3,5-dimethyl-3-heptanol

Question 3
Which combination(s) of alkyl bromide and carbonyl compound can be used to prepare the following product by addition of the Grignard reagent derived from the alkyl bromide to the carbonyl compound?

\[
\begin{array}{c}
\text{OH} \\
\end{array} \xrightarrow{\text{MgBr}} \\
\begin{array}{c}
\text{Br} \\
\text{Br} \\
\text{CH}_3\text{Br} \\
\text{CH}_3\text{CH}_2\text{Br} \\
\end{array}
\]

a. only 1  
b. only 3  
c. only 1 and 4  
d. only 2 and 3
Lecture 19
HWeb16
16.10 The Addition of Ylides: The Wittig Reaction

**Question 1**
What is the major organic product obtained from the following reaction?

\[
\begin{align*}
1. & \quad \text{Ph}_3\text{P-CH}_2 \\
2. & \quad \text{H}_3\text{O}^+
\end{align*}
\]

a. 1-butene  

b. 2-butene  

c. 2-methylpropene  

d. 2-methyl-1-propanol

**Question 2**
Which combination(s) of alkyl bromide and carbonyl compound can be used to prepare the following product by reaction of the Wittig reagent derived from the alkyl bromide with the carbonyl compound?

![Reaction Diagram]

- a. only 1 and 2  
- b. only 2 and 4  
- c. only 2 and 3  
- d. only 1, 2 and 3

**Question 3**
Which of the following is **not** true about the Wittig reaction?

a. triphenylphosphine reacts with 2° alkyl bromides by an \( S_n2 \) reaction to give an alkyltriphenylphosphonium bromide  

b. alkyltriphenylphosphonium bromides are deprotonated by strong bases to give a phosphonium ylid  

c. phosphonium ylids are nucleophilic  

d. the product of the Wittig reaction is an alkyne
Question 1
What is the major organic product obtained from the following sequence of reactions?

```
1. CH₃MgBr
2. H₂O'
```

![Diagram](image)

1. O-NH₂
2. NH-OH
3. NOH
4. NH

a. 1
b. 2
c. 3
d. 4

Question 2
What is the major organic product obtained from the following sequence of reactions?

```
1. Mg, Et₂O
2. PhCH₂CHO
```

![Diagram](image)

1. CH
2. O
3. OH
4. Br

a. 1
b. 2
c. 3
d. 4

Question 3
What is the major organic product obtained from the following reaction?

```
1. PPh₃
2. BuLi
3. CH₃COCH₃
4. H₂O
```

![Diagram](image)

a. (E)-3-methyl-2-pentene
b. (Z)-3-methyl-2-pentene
c. 2-methyl-2-pentene
d. 4-methyl-1-pentene
Question 1
What type of reaction takes place upon treatment of a ketone with HCN to form a cyanohydrin?

a. nucleophilic addition  
b. electrophilic addition  
c. nucleophilic substitution  
d. electrophilic substitution

ANS: a

Question 2
Which of the following is the best description of the mechanism of the reaction between a ketone and an amine to form an imine?

a. concerted bimolecular substitution  
b. nucleophilic addition followed by elimination  
c. elimination followed by nucleophilic addition  
d. electrophilic addition followed by rearrangement

Question 3
Which of the following statements is not true?

a. Reaction of benzophenone with methanol in the presence of acid gives a acetal  
b. Reaction of butanal with ethanol in the presence of base gives an acetal  
c. Reaction of benzaldehyde with ethanol in the presence of acid gives an acetal  
d. Reaction of acetone with methanol in the presence of base gives a hemiacetal