Chemistry 2212  Organic Chemistry II  Spring 2003

Practice Midterm: covering material through the end of Chapter 13

1. Fill in the missing organic reagents for the following transformations:

(a)  
(b)  

2. Predict the major organic product for the following transformations:

(a)  
(b)  

3. Fill in the missing organic reagents for the following transformations:

(a) \[ \text{H} \quad \text{H} \quad \text{CH}_2\text{CH}_3 \quad \stackrel{\text{O}}{\longrightarrow} \quad \text{CH}_3\text{OCH}_2\text{CHCH}_2\text{CH}_3 \]

(b) \[ 2 \quad \text{Li} \quad \stackrel{\text{L}}{\longrightarrow} \quad \text{CuLi} \]

4. Using the given starting material, any necessary inorganic reagents, and any carbon-containing compounds with no more than two carbon atoms, indicate how the following synthesis could be carried out:

\[ \text{H}_2\text{C} \quad \text{C} \quad \text{OH} \quad \stackrel{\text{H}_2\text{C} \quad \text{C} \quad \text{OH}}{\longrightarrow} \quad \text{C} \quad \text{CH}_2 \quad \text{CH}_2 \quad \text{C} \quad \text{OH} \]
5. Methyl iodide is reacted with an unknown compound ("A") to give a new compound with molecular formula C₄H₁₁N. The ¹H NMR spectrum of the product “B” is given below.

(a) Give the structures of reactant “A” and product “B”.
(b) Assign the ¹H NMR resonances in the below spectrum to the hydrogens in compound “B”. The coupling information is:

1.1 ppm – t, 3H
2.2 ppm – s, 6H
2.4 ppm – q, 2H

![NMR Spectrum](image)
6. A biochemically important compound has the molecular formula C$_5$H$_6$O$_5$. Given the below spectra, determine the structure of the compound.

2.5 ppm: triplet, 2H
3.0 ppm: triplet, 2H
13.0 ppm: broad singlet, 2H
7. Compound A \((C_8H_{18}O)\) undergoes a reaction to produce compounds B and C in a 1 : 1 ratio:

\[
\begin{array}{c}
A \\
\longrightarrow \\
B \ + \ C
\end{array}
\]

\(C_8H_{18}O\)

Compound B has been analyzed by mass spectrometry, IR, \(^1\)H, and \(^{13}\)C NMR spectroscopy; the spectra appear below. Compound C has been analyzed by IR, \(^1\)H, and \(^{13}\)C NMR spectroscopy; the spectra appear below. Determine the structure of A, B, and C, as well as an appropriate reagent for the transformation.
7. continued

\[ \text{H NMR:} \]
0.92 ppm – d, 6H
1.75 ppm – m, 1H
2.07 ppm – s, 1H
3.39 ppm – d, 2H

\[ \text{C NMR:} \]
18.99 ppm
30.84 ppm
69.47 ppm
7. continued
7. continued

$^1$H NMR:
1.80 ppm – s

$^{13}$C NMR:
36.44 ppm
62.47 ppm