CHE 232 - Organic Chemistry
Exam 1, February 7, 2001

Name_________________________  Student ID No.___________________

Before you begin this exam: First: You are allowed to have a simple model set at your seat. Please put away all other materials. Second: Place your student identification on your desk. A proctor will come around to check everyone’s ID. Third: Read through the entire exam. Your goal, as always, is to score as many points as possible. Do not waste time on problems that you can’t do if there are others that look easy. Fourth: It is critically important that your answers be written in a clear, unambiguous manner. Answers in which your intentions are unclear will not receive credit. Fifth: READ THE INSTRUCTIONS FOR EACH PROBLEM.

You have until 6:50 to complete this exam. There will be no extensions, so budget your time carefully.

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<tr>
<th>Problem Number</th>
<th>Points possible</th>
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1. (8 points) Name the circled functional group in each of the following molecules.

![Molecules with circled functional groups]

2. (4 points) Circle the product(s) of the reaction below. Note: if more than one product is formed, circle all the products formed.

a) 

\[ \text{CH}_2=\text{CH}_2 + \text{Br}_2 \rightarrow \]

\[ \text{i)} \quad \text{Br} \quad \text{Br} \quad \text{Br} \quad \text{Br} \quad \text{Br} \]

\[ \text{ii)} \quad \text{Br} \quad \text{Br} \quad \text{Br} \quad \text{Br} \quad \text{Br} \]

\[ \text{iii)} \quad \text{Br} \quad \text{Br} \quad \text{Br} \quad \text{Br} \quad \text{Br} \]

3. (4 points) Which is the best method to accomplish the transformation shown? (Circle one)

\[ \text{Br} \quad \text{OH} \]

(a) (1) Mg, ether; (2) CH\sub{3}CH\sub{2}CHO; (3) H\sub{3}O\sub{+}; (4) NaBH\sub{4}
(b) (1) CH\sub{3}OH, H\sub{+}; (2) Mg, ether; (3) CH\sub{3}CH\sub{2}CHO; (4) H\sub{3}O\sub{+}; (5) NaBH\sub{4}
(c) (1) (CH\sub{3})\sub{2}CuLi; (2) Mg, ether; (3) CH\sub{3}CH\sub{2}CHO; (4) H\sub{3}O\sub{+}; (5) NaBH\sub{4}
(d) (1) LiAlH\sub{4}; (2) H\sub{3}O\sub{+}; (3) HOCH\sub{2}CH\sub{2}OH, H\sub{+}; (4) Mg, ether; (5) CH\sub{3}CH\sub{2}CHO
4. (25 points) Provide the product expected from the following reactions. Be sure to show any relevant stereochemistry.

a) 
\[
\text{O} \xrightarrow{1. \text{CH}_3\text{MgBr}} \text{O}_2 \xrightarrow{2. \text{H}_3\text{O}^+}
\]

b) 
\[
\begin{array}{c}
\text{CH}_3\text{O} \\
\text{NH}_2
\end{array} \xrightarrow{\text{O}} \begin{array}{c}
\text{O} \\
\text{O}
\end{array}
\]

c) 
\[
\text{1. BH}_3 \xrightarrow{2. \text{NaOH, H}_2\text{O}_2}
\]

d) 
\[
\text{CO}_2\text{Et} \xrightarrow{1. \text{LiAlH}_4} \text{O} \xrightarrow{2. \text{H}_2\text{O, HCl}}
\]

e) 
\[
\text{Cl} \xrightarrow{\text{HCl}}
\]
5. (8 points) Show how 2-methyl-1-7-octadiene can be made from 1-methylcyclohexene. More than one step may be required.

\[
\begin{align*}
\text{1-methylcyclohexene} & \quad \rightarrow \quad \text{2-methyl-1-7-octadiene}
\end{align*}
\]

6. (35 Points) Over each arrow, write in the reagent(s) needed to accomplish the transformations shown. Do not omit workup steps when needed.

a)
\[
\begin{align*}
\text{CO}_2\text{H} & \quad \rightarrow \quad \text{Cl}\text{O} & & \quad \rightarrow \quad \text{CH}_2\text{OCH}_2\text{CH(CH}_3)_2
\end{align*}
\]

b)
\[
\begin{align*}
\text{H} & \quad \rightarrow \quad \text{H} & & \quad \rightarrow \quad \text{OH}
\end{align*}
\]

c)
\[
\begin{align*}
\text{OH} & \quad \rightarrow \quad \text{H} & & \quad \rightarrow \quad \text{H}
\end{align*}
\]
7. (6 points) Draw a viable mechanism for the following reaction. Be sure your use of arrows conforms to the accepted conventions.
8. (10 points) Draw a viable mechanism for the following reaction. Be sure your use of arrows conforms to the accepted conventions.