ORGANIC EXAM #1  SPRING 2010 (CH 14-15)

1. Give the IUPAC name for each of the following. (9 pts)

   \[
   \begin{align*}
   &\text{1-tert-butoxy-2-methylpropane} \\
   \text{2-tert-butoxy-2-methylpropane} \\
   &\text{(2R)-3-ethoxy-4-methylhex-4-en-2-ol} \\
   &\text{2,3-epoxy-3-phenylpentane} \\
   &\text{2-ethyl-2-methyl-3-phenylisoxazole}
   \end{align*}
   \]

2. When 2-methyl-1,3-butadiene is reacted with HBr at 0°C a major product is formed that is different from the major product formed when the reaction is run at 50°C. Show a step-by-step mechanism for the formation of both products and explain why different products are formed at different temperatures. (13 pts)

   \[
   \begin{align*}
   \text{2-methyl-1,3-butadiene} & \xrightarrow{H^+} \text{1,3-butadienyl cation} \\
   & \xrightarrow{\text{low temps}} \text{1,2-product} \\
   & \xrightarrow{\text{heated-removal}} \text{less stable cation} \\
   & \xrightarrow{\text{heat yields}} \text{more stable product}
   \end{align*}
   \]
3. When 1,2-epoxy-1-methylcyclohexane undergoes reaction with methanol in acid a product is formed that gives a positive test with Jones reagent. However when reacted with sodium methoxide (NaOCH₃) followed by acid the product gives a negative test with Jones reagent. Write the reaction equation showing the starting compound, reagents and products and explain why they are different. (13 pts)

\[
\begin{align*}
\text{CH}_3\text{OH} + \text{H}^+ &\rightarrow \text{epoxide is protonated making a good L.G. - the weak Nu moves comes in to the most stable C (most stable @) opp. the L.G.} \\
\text{NaOCH}_3 &\rightarrow \text{CH}_3\text{OCH}_3 \\
\text{H}^+ &\rightarrow \text{the strong Nu has to force ring open & so very Sw2 like as it comes in to least hindered C - opp. the L.G.}
\end{align*}
\]
4. Give the Diels-Alder products for each of the following. Be sure to show correct stereochemistry. (15 pts)

a) \[
\begin{align*}
\text{C} & \quad \text{H} \\
& \quad \text{D}
\end{align*}
\]

b) \[
\begin{align*}
\text{C} & \quad \text{H} \\
& \quad \text{D}
\end{align*}
\]

c) \[
\begin{align*}
\text{C} & \quad \text{H} \\
& \quad \text{D}
\end{align*}
\]

d) \[
\begin{align*}
\text{C} & \quad \text{H} \\
& \quad \text{D}
\end{align*}
\]

5. Give the diene and dienophile used to form each of the following Diels-Alder products. (10 pts)

a) \[
\begin{align*}
\text{C} & \quad \text{H} \\
& \quad \text{D}
\end{align*}
\]

b) \[
\begin{align*}
\text{C} & \quad \text{H} \\
& \quad \text{D}
\end{align*}
\]
6. Complete the following reactions by providing either the products or the necessary reagents. Show stereochemistry where appropriate. (40 pts)