1. Describe the Diels-Alder using another well-accepted term that describes some aspect of the reaction (there are several possible correct answers). (2 pt)
   
   cycloaddition; pericyclic reaction; concerted reaction

2. Predict the product(s) of each of the following reactions. If there is more than one significant product, note which one is the major product. Show stereochemistry where appropriate.

   (2 pt)  
   \[
   \begin{array}{c}
   \text{CO}_2\text{Me} \\
   \text{CO}_2\text{Me} \\
   \end{array}
   \rightarrow \begin{array}{c}
   \text{CO}_2\text{Me} \\
   \text{CO}_2\text{Me} \\
   \end{array}
   \]

   (4 pt)  
   \[
   \begin{array}{c}
   \text{EtOAc} \\
   \text{hexanes} \\
   \end{array}
   \rightarrow \begin{array}{c}
   \text{endo (major)} \\
   \text{exo} \\
   \end{array}
   \]

   (4 pt)  
   \[
   \begin{array}{c}
   \text{Cl} \\
   \text{Cl} \\
   \end{array}
   \rightarrow \begin{array}{c}
   \text{Cl} \\
   \text{Cl} \\
   \end{array}
   \]

3. Why can't we buy a bottle of cyclopentadiene? Be specific. (2 pt)

   Because cyclopentadiene undergoes a spontaneous dimerization at room temperature by Diels-Alder reaction:

   \[
   \begin{array}{c}
   \text{2} \\
   \end{array}
   \rightarrow \begin{array}{c}
   \text{"dicyclopentadiene"} \\
   \end{array}
   \]

4. What is the common name of the following compound? What is it's utility. (2 pt)

   Aspirin - acetylsalicylic acid, a common analgesic (pain reliever)
5. Briefly, what does "chemiluminescence" mean? (3 pt)

Chemiluminescence is the process whereby light is produced via a chemical reaction with the evolution of little or no heat.

6. In our Fischer Esterification, we forced the reaction to completion using what technique. Name the technique; no description is necessary. (2 pt)

azeotropic distillation for removal of water

7. 9,10-Diphenylanthracene was used for what purpose in your Cyalume experiment? (3 pt)

9,10-Diphenylanthracene is the fluoroscope that actually emits the light. It is thought that it forms a charge-transfer complex with an unstable H₂O₂ oxidation product of Cyalume. Decomposition to CO₂ results in formation of the excited singlet state of 9,10-diphenylanthracene, which then fluoresces.

8. Write a detailed mechanism with "electron pushing". (Use the back of the previous page if you run out of room.) (6 pt)
1. Describe the Diels-Alder using another well-accepted term that describes some aspect of the reaction (there are several possible correct answers). (2 pt)

\[
\text{cycloaddition; pericyclic reaction; concerted reaction}
\]

2. Predict the product(s) of each of the following reactions. If there is more than one significant product, note which one is the major product. Show stereochemistry where appropriate.

\[
\begin{array}{c}
\text{Cyclopentadiene} + \text{Maleic anhydride} \xrightarrow{\text{EtOAc, hexanes}} \text{Product A} \\
\text{2,4-Dichlorophenol} + \text{Phenylacetic acid} \xrightarrow{x \text{Et}_3 \text{N}} \text{Product B} \\
\text{Butadiene} + \text{Acetate ester} \xrightarrow{\text{Toluene}} \text{Product C}
\end{array}
\]

3. Why can't we buy a bottle of cyclopentadiene? Be specific. (2 pt)

Because cyclopentadiene undergoes a spontaneous dimerization at room temperature by Diels-Alder reaction:

\[
\begin{array}{c}
2 \text{Cyclopentadiene} \rightarrow \text{Dicyclopentadiene}
\end{array}
\]

4. What is the common name of the following compound? What is it's utility. (2 pt)

Aspirin - acetylsalicylic acid, a common analgesic (pain reliever)
5. Briefly, what does "chemiluminescence" mean? (3 pt)

Chemiluminescence is the process whereby light is produced via a chemical reaction with the evolution of little or no heat.

6. In our Fischer Esterification, we forced the reaction to completion using what technique. Name the technique; no description is necessary. (2 pt)

   azeotropic distillation for removal of water

7. 9,10-Diphenylanthracene was used for what purpose in your Cyalume experiment? (3 pt)

9,10-Diphenylanthracene is the fluorescer that actually emits the light. It is thought that it forms a charge-transfer complex with an unstable \( \text{H}_2\text{O}_2 \) oxidation product of Cyalume. Decomposition to \( \text{CO}_2 \) results in formation of the excited singlet state of 9,10-diphenylanthracene, which then fluoresces.

8. Write a detailed mechanism with "electron pushing". (Use the back of the previous page if you run out of room.) (6 pt)