1. Draw resonance structures for the following molecules
   a. \( \text{H}_2\text{N} \cdots \text{C} = \text{O} \)
   b. \( \text{C}_2\text{H}_5\text{O}^- \)
   c. \( \text{C}_2\text{H}_5^+ \)
   d. \( \text{C}_2\text{H}_5^+ \)
   e. \( \text{C}_6\text{H}_4\text{O}^- \)

2. Identify the more/most stable resonance form(s) for the following molecules.
   a. \( \text{C}_2\text{H}_5^+ \)
   b. \( \text{C}_2\text{H}_5^+ \)
   c. \( \text{C}_2\text{H}_5^- \)

3. Using resonance structures, explain why aniline is less basic than cyclohexylamine.
   \( \text{C}_6\text{H}_4\text{NH}_2 \)
   \( \text{C}_6\text{H}_{11}\text{NH}_2 \)

Don’t forget, resonance can alter reactivity too.
4. Provide names for the following compounds
a. 
\[
\begin{array}{c}
\text{CH}_2=\text{CH}-\text{CH}=\text{CH}-\text{CH}_3
\end{array}
\]

b. 
\[
\begin{array}{c}
\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2
\end{array}
\]

c. 
\[
\begin{array}{c}
\text{CH}_2=\text{CH}-\text{CH}_2=\text{CH}_2
\end{array}
\]

5. Determine the products of the following reactions. List only the products that are present in a reasonably large concentration and indicate which product is the major product.

a. 
\[
\begin{array}{c}
\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_3 + \text{HBr}
\end{array}
\]

b. 
\[
\begin{array}{c}
\text{C}_6\text{H}_5=\text{CH} + \text{Cl}_2
\end{array}
\]

6. For the reaction in 5b, what product might you find present in low concentration?

7. Determine the products in the following reactions, and identify the kinetic and thermodynamic products.

a. 
\[
\begin{array}{c}
\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_3 + \text{H}_2\text{SO}_4
\end{array}
\]

b. 
\[
\begin{array}{c}
\text{C}_6\text{H}_5=\text{CH} + \text{HCl}
\end{array}
\]

Mechanism of conjugated additions?
8. Determine the product of the following reaction. Pay careful attention to the stereochemistry of the product.

\[ \text{\includegraphics[width=0.5\textwidth]{reaction_diagram.png}} \]

9. Determine the products of the following reactions. Do not include products that account for less that 1% of the material produced. (Important ratios 1600:82:1 and 5:3.8:1)

a.

\[ \text{\includegraphics[width=0.3\textwidth]{reaction_diagram_a.png}} \]

b.

\[ \text{\includegraphics[width=0.3\textwidth]{reaction_diagram_b.png}} \]

c.

\[ \text{\includegraphics[width=0.5\textwidth]{reaction_diagram_c.png}} \]

10. Determine the product of the following reaction.

\[ \text{\includegraphics[width=0.4\textwidth]{reaction_diagram_10.png}} \]

\[ D = ^2H \]