Problem Set 4

1. Label the following transformations as either addition, elimination or substitution reactions.

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

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

\[ \text{H}_2\text{O} \quad \text{OH} \quad \text{H}_2\text{O} \]

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

2. Label the following functional groups/atoms as Nucleophiles or Electrophiles.

\[ \text{H}_2\text{O} \quad \text{H}_2\text{O} \]

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

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

\[ \text{NH}_3 \quad \text{NH}_3 \]

\[ \text{O} \quad \text{O} \]

\[ \text{C} \quad \text{C} \]

\[ \text{C} \quad \text{C} \]
3. Rank the following in order of stability (1 most stable, 4 least stable)

\[
\begin{align*}
\ce{CH3} & \quad \ce{CH3+} & \quad \ce{CH3+} \\
\ce{CH3} & \quad \ce{CH3-} & \quad \ce{CH3-} \\
\ce{H} & \quad \ce{H} & \quad \ce{H}
\end{align*}
\]

4. Label the two reaction diagrams as endothermic or exothermic. Also label the transitions states and intermediates.