4.36 Provide a systematic name for each of the following compounds:

(a)  

(e)  

(j)  

(k)  

4.40 Draw each of the following compounds:
(a) 2,2,4-Trimethylpentane
(b) 1,2,3,4-Tetramethylcycloheptane

4.53 Draw a Newman projection of the following compound as viewed from the angle indicated:
4.56 Rank the following conformations in order of increasing energy:

4.43 Draw the ring flip for each of the following compounds:

5.37 Identify the number of stereoisomers expected for each of the following:
5.45 For each of the following pairs of compounds, determine the relationship between the two compounds:

(a) \[ \text{Cl} \text{Cl} \]  (b) \[
\begin{align*}
\text{Cl} & \quad \text{Cl} \\
\text{Cl} & \quad \text{Cl}
\end{align*}
\]

(c) \[ \text{OH} \]  (d) \[
\begin{align*}
\text{Cl} & \quad \text{Cl} \\
\text{Cl} & \quad \text{Cl}
\end{align*}
\]

5.38 Draw the enantiomer for each of the following compounds:

(a) \[ \text{Cl} \text{OH} \]  (b) \[
\begin{align*}
\text{Cl} & \quad \text{Cl} \\
\text{Cl} & \quad \text{Cl}
\end{align*}
\]

(c) \[ \text{Cl} \text{F} \]
5.39 Identify the configuration of each chiral center in the following compounds:

(e)

(g)

5.55 Identify whether each of the following compounds is chiral or achiral:

(a)  
(b) Cl
(c)  
(e) OH
5.29 For each of the following alkenes, assign the configuration of the double bond as either E or Z:

Label each reaction diagram with product, reactant, transition state(s), and intermediate (if it exists). Show $\Delta G$ and $\Delta G^\ddagger$, then identify as exergonic/endergonic and spontaneous/non-spontaneous.
6.55 Which of the following can serve as a nucleophile?

(a) \( \text{H} - \text{C} - \text{H} \)  (b) \( \text{H} - \text{N}^+ - \text{H} \)  (c) \( \text{H} - \text{B} - \text{H} \)  (d) \( \text{H} - \text{O} - \text{H} \)

6.27 For each of the following reactions identify the arrow-pushing pattern that is being utilized:

(a)  \( \text{Cl} \)  \( \rightleftharpoons \)  \( \text{Cl}^- \)  +  \( \text{Cl}^+ \)

(b)  \( \text{phenyl} - \text{Cl}^+ \)  \( \rightarrow \)  \( \text{phenyl} \)  +  \( \text{Cl}^- \)

(c)  \( \text{cyclic ketone} \)  \( \rightleftharpoons \)  \( \text{trivial ketone} \)

(d)  \( \text{esters} \)  \( \rightarrow \)  \( \text{esters} \)  +  \( \text{OH}^- \)
6.37  Draw curved arrows for each step of the following mechanism:
6.41 Predict whether each of the following carbocations will rearrange. If so, draw the expected rearrangement using curved arrows.