5 1. Give the product(s) of the following reactions.

(a) \[
\text{peroxides} \quad \xrightarrow{\text{HBr}} \quad \begin{array}{c}
\text{Br} \\
\text{Br}
\end{array}
\]

(b) \[
\text{1. Hg(OAc)}_2, \text{CH}_3\text{OH, THF} \\
\text{2. NaBH}_4, \text{NaOH} \\
\begin{array}{c}
\text{OCH}_3
\end{array}
\]

(c) \[
\xrightarrow{\text{HBr}} \\
\begin{array}{c}
\text{Br}
\end{array}
\]

(d) \[
\text{1. O}_3 \text{ excess, } -78^\circ \text{C, CH}_2\text{Cl}_2} \\
\text{2. S} \\
\begin{array}{c}
\text{H} \\
\text{H}
\end{array}
\]

(e) \[
\text{1. BH}_3, \text{THF} \\
\text{2. H}_2\text{O}_2, \text{NaOH} \\
\begin{array}{c}
\text{OH}
\end{array}
\]

2 2. Answer the following questions about the reaction in 1e.

a) Draw the transition state for Step 1.

\[\text{(H can be R)}\]

b) Draw an intermediate formed in Step 2 that has the carbon chain and boron in it.

1 3. Consider the following reaction. There are three intermediates in this reaction. Two of them are ozonides. Draw the two ozonides that are formed.

\[
\text{1. O}_3, -78^\circ \text{C, CH}_2\text{Cl}_2} \\
\text{2. S} \\
\begin{array}{c}
\text{O}
\end{array}
\]

2 4. Answer the following questions about the reaction shown.

\[
\text{1. Hg(OAc)}_2, \text{H}_2\text{O, THF} \\
\text{2. NaBH}_4, \text{NaOH} \\
\begin{array}{c}
\text{H}_3\text{OAc}
\end{array}
\]

a) Draw the product after Step 1.

b) Draw the intermediate formed in the rate-determining step of Step 1.