4. (8 points) In the Williamson ether synthesis, here are two reaction sequences to make 1-isobutoxy-1-methylcyclohexane. Fill in the blanks with structures.

Path A: isobutyl alcohol + Na → \[
\begin{array}{c}
\text{CH}_3 \\
\text{CH}_3
\end{array}
\] + 1-bromo-methylcyclohexane → ether

Path B: \[
\begin{array}{c}
\text{CH}_3 \\
\text{CH}_3
\end{array}
\] + Na → 1-methylcyclohexanoxide + 1-bromo-2-methylpropane → ether

a. Which reaction sequence is the best? Explain.

b. What would be the main organic product of the wrong reaction sequence?

c. Draw the ether product:

\[
\begin{array}{c}
\text{CH}_3 \\
\text{CH}_3
\end{array}
\]

5. (9 pts) Which ketone or aldehyde would fit with the following reagents and products?

\[
\begin{array}{c}
\text{C}_5 \text{H}_{10} \text{O} \\
\text{LiCuEt}_2 \quad \text{1. acid workup}
\end{array}
\]

\[
\begin{array}{c}
\text{CH}_3 \text{CH}_2 \text{CH}_2 \text{CH}_3 \text{Br} \\
\text{1. Ph}_3 \text{P} \quad \text{2. BuLi} \quad \text{3. acid workup}
\end{array}
\]

\[
\begin{array}{c}
\text{H}_3 \text{C} \quad \text{CH}_3
\end{array}
\]