1. Draw a structure for 2-methoxy-2-butene

2. What is the IUPAC name for the following structure

\[
\begin{align*}
\text{CH}_3\text{CH}_2\text{OCHCH}_3 \\
\text{CH}_3\text{CCH}_2\text{CH}_3 \\
\end{align*}
\]

3. Draw a tautomer for the following structure. Use equilibrium sign to indicate the most stable tautomer.

4. What is the structure of compound R? Explain why the product given is the most stable.

\[
\text{R (C}_7\text{H}_{12}) \xrightarrow{\text{hydroboration, oxidation}} \text{CH}_2\text{CH}
\]

5. Starting with an alcohol, write chemical equations to outline the synthesis of t-butyl ethyl ether.

6. Which of the following are ethers? *Circle all that apply*

\[
\begin{align*}
\text{O} & \quad \text{O} & \quad \text{OCH}_3 & \quad \text{O} & \quad \text{O}
\end{align*}
\]
7. Complete the following reactions by giving the reagents, products, or conditions:

\[
\begin{align*}
&\text{C} \equiv \text{CH} & \text{excess HBr} \\
&\text{CH}_3 &\text{CH}_3 \\
&\text{CH}_3\text{CH}_2\text{CH} = \text{CCH}_3 + \text{CH}_3\text{CH}_2\text{OH} & \text{H}^+ \\
&2\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} & \text{H}_2\text{SO}_4 \\
& & 140 \degree \text{C}
\end{align*}
\]

8. The mass spectrum of a compound gives a molecular ion peak at m/z = 122. There is also a peak of nearly equal intensity at m/z = 124. Give the molecular formula of a compound that is consistent with this data.

9. What are two peaks (m/z values) that you would expect in the mass spectrum of methylcyclobutane? Explain.

10. Using chemical equations to show how cyclohexene can be converted to a structure having an epoxide ring and then to a glycol.