1. (4 points) Write a balanced equation for the reaction of 4-methylcyclohexanol to afford 3-methylcyclohexene. What is the catalyst in this reaction?

2. (6 points) Explain what single feature of the IR spectrum would most readily allow you to distinguish between each pair of compounds listed below (i.e., assign absorption to a molecular feature and tell at approximately what frequency you would expect to observe it).

(a) \[
\begin{array}{c}
\text{C} \quad \text{C} \\
\text{H}_2 \quad \text{CH}_3 \\
\end{array}
\quad \text{vs} \quad
\begin{array}{c}
\text{C} \quad \text{C} \\
\text{H}_2 \quad \text{CH}_3 \\
\end{array}
\text{C} \\
\text{O} \\
\]

(b) \[
\begin{array}{c}
\text{H}_3\text{C} \quad \text{C} \equiv \text{C} \\
\text{CH}_3 \quad \text{C} \\
\end{array}
\quad \text{vs} \quad
\begin{array}{c}
\text{H} \quad \text{C} \equiv \text{C} \\
\text{H}_2 \quad \text{CH}_3 \\
\end{array}
\quad \text{C} \\
\text{H}_2 \\
\]
3. (5 points) Circle the structure which corresponds with the IR spectrum below. Assign (on the spectrum) as many diagnostic absorptions as possible.

![Chemical structures](image)

**threshold 2.00% band**

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</tbody>
</table>

21 peaks found
4b. (5 points) Circle the structure which corresponds with the IR spectrum below. Assign (on the spectrum) as many diagnostic absorptions as possible.