1. The electron impact mass spectra of the isomeric 3-pentanone and 3-methyl-2-butane are shown below. Which spectrum belongs to which isomer? Explain.

2. The mass spectrum of bromomethane exhibits signals of almost equal intensity at m/e 94 and 96. However, the calculated molecular weight of bromomethane is 95. How do you explain this apparent discrepancy?

3. Infrared spectra A, B, C and D (see later pages) correspond to the four compounds listed below. Match each spectrum with the correct structure and briefly justify your reasoning.

4. Each IR spectrum, E through I (see later pages), represents one of the following: a ketone, an aliphatic alcohol, a carboxylic acid, an aromatic alcohol, or a terminal alkyne. Identify the most characteristic signals in the spectra and use this information to match each spectrum with the correct class of compounds.
Compound X has the following IR and Mass Spectrum. It reacts with magnesium metal and when added to acetone produces an alcohol. C/H analysis shows it to be 15.40%C and 3.23%H. What is compound X.
Compound X has the following IR and Mass Spectra. Its elemental composition is C 71.4%, H 9.5%, O 19.0%. What is the compound?

\[ \text{C}_5\text{H}_8\text{O} \]

\[ \text{MW} = 84 \text{g/mol} \]
7. Compound X has the following IR and Mass Spectra. Its elemental composition is C 62.1%, H 10.3%, O 27.6%. What is the compound? \[ \text{C}_2\text{H}_5\text{O} \rightarrow 58.0\% \text{mol} \rightarrow \text{unsat} \text{H} \]

\[
\begin{align*}
\text{Relative Intensity} \\
\text{m/z}
\end{align*}
\]

\[
\begin{align*}
\text{IR} \\
\text{Active} \\
\text{Frequency}
\end{align*}
\]