Quiz #3

1) Rank the highlighted bonds in terms of increasing wavenumber in IR (2 points):

2) For each pair of compounds, determine which C=C bond will produce a stronger signal in IR (2 points).

3) Match each compound with the appropriate IR spectrum (3 points).
4) Describe how IR spectroscopy might be used to monitor the progress of each of the following reactions (2 points each):

\[
\text{CH}_3\text{CH}_2\text{OH} + \text{Na}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{CO}_2\text{H}
\]

5) Match each compound with the appropriate spectrum (3 points):

\[
\begin{align*}
\text{Cl} & & \text{NH}_2 & & \text{OH} & & \text{Br} \\
\begin{array}{c}
\text{a} \\
\text{b}
\end{array} & & & & & & \\
\begin{array}{c}
\text{c} \\
\text{d}
\end{array}
\]

6) For each of the following compounds, determine whether the two protons shown in red are homotopic, heterotopic, enantiotopic, diastereotopic (2 points):

(a) \[\text{OMe}\]
(b) \[\text{Cl}\]
(c) \[\text{OH}\]
(d) \[\text{C}=\text{O}\]

7) Identify the number of signals expected in the \(^1\text{H NMR}\) spectrum of each of the following compounds (2 points):

(a) \[\text{OMe}\]
(b) \[\text{Br}\]

8) Predict the chemical shifts for the signals in the \(^1\text{H NMR}\) spectrum of the following compound (2 points):

\[\text{O}=\text{O}\]

9) How would you use \(^1\text{H NMR}\) spectrum to distinguish between the following compounds (2 points):

(a) \[\text{HO}-\text{Cl}\]
(b) \[\text{HO}-\text{Cl}\]