1. Draw structures as indicated.

(a) Lewis structure of

(b) an isomer of

(c) condensed formula for

(d) a bond-line formula for

CH₃(CH₂)₃CH(OH)CH=CH(CH₃)₂

2. Consider the molecule below. Give:

(a) the hybridization of C₂ \( \text{sp} \)

HC≡C—CH₂—C—CH₃

(b) the hybridization of C₄ \( \text{sp}² \)

1 2 3 4 5

(c) the O-C₄-C₅ bond angle \( 120° \)

3. Draw the structure of an example (do not use R) of each of the following classes of compounds.

(a) 1° amine

(b) acyl chloride

(c) ether

(d) 2° alkyl bromide

4. Name the functional group or groups present in each of the following molecules. Indicate 1°, 2°, or 3° when appropriate.

(a) Amide

(b) CH₃—CH₂—CH₂—C≡N

(c) CH₃—C—CH₂CH₃

(d) nitrite

(e) thiol \( (2°) \)

(f) Ketone
5. **Multiple Choice**

(1) An oxygen-containing compound which shows no IR absorption at 1630-1780 cm\(^{-1}\) or 3200-3500 cm\(^{-1}\) is likely to be what type of compound?

(A) an amide  (B) an alcohol  (C) a ketone  (D) an ether

(2) Which of these compounds has a peak in its IR spectrum at 1630-1780 cm\(^{-1}\)?

(A) \[
\begin{array}{c}
\text{CH} \\
\text{H}
\end{array}
\]

(B) \[
\begin{array}{c}
\text{O} \\
\text{H}
\end{array}
\]

(C) \[
\begin{array}{c}
\text{O} \\
\text{H}
\end{array}
\]

(D) \[
\begin{array}{c}
\text{O} \\
\text{H}
\end{array}
\]

(3) Which of the following compounds has the highest boiling point?

(A) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3
\]

(B) \[
\text{CH}_3\text{C}-\text{CH}_3
\]

(C) \[
\text{CH}_3\text{OCH}_2\text{CH}_3
\]

(D) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}
\]

(4) Which of the following compounds is least soluble in water?

(A) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}
\]

(B) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}
\]

(C) \[
\text{(CH}_3)_2\text{CHCH}_2\text{CH}_2\text{OH}
\]

(D) \[
\text{(CH}_3)_2\text{CHCH}_2\text{CH}_2\text{Br}
\]

6. Indicate which of the four compounds below is responsible for the IR spectrum shown below. **Explain your answer.**

(A) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{C} \equiv \text{CCH}_3
\]

(B) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}
\]

(C) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{C} \equiv \text{CH}
\]

(D) \[
\text{CH}_3\text{CH}_2\text{CH}_2\text{COH}
\]