Spectroscopy Problem Set

Please provide structures for the compounds represented by the following spectra.

A.

C₄H₆O

1. H₃C - O - CH₂

2. Hb more deshielded by resonance

3. 3H CH₃ signal split into doublet by Hb

H₃C - C = C - H

This structure does not work!
B. \( C_{10}H_{14}O \)

\[
\begin{align*}
\text{OH} & \quad \text{CH}_3 \\
\text{CH}_3 & \quad \text{CH} - \text{CH}_3
\end{align*}
\]

\( H_a \) \( H_b \) \( H_c \)

**O-H stretch**

**Integral values**

- 10.7
- 9.7
- 6.9
- 6.5
- 5.7
- 5.3
- 4.7
- 4.2
- 3.7
- 2.8
- 2.4
- 2.1
- 1.4
- 1.2

**Proton NMR**

\[
\text{ratio} = 1:1:1
\]

**Carbon-13 NMR**

**Ring carbons**

**Resonance donor by oxygen**

**Isolated isopropyl doublet + septet**

\[\text{H}^+ = \text{OH} \quad \text{CH}_3 \quad \text{CH} - \text{CH}_3\]

**NO H**

\[\text{H} \quad \text{CH} - \text{CH}_3\]

\[\text{C} \quad \text{NO}_2 \quad \text{CH}_3\]

\[\text{ resonance donation by oxygen increases shielding of } H_a \text{ or } H_b \]

\[\text{C-H add to } 6 \text{ H's} \quad \text{CH}_3 \text{ add, } \nu \text{ to } 0 \text{ H's} \quad 2 \text{ equiv.} \]

\[\text{CH}_2 \text{ add, } \nu \text{ to } 1 \text{ H} \]

\[\text{a carbon} \text{ is showing a current solvent effect on carbon}\]
C.
C_{11}H_{14}O_{2}

\[ \text{ratio} = \frac{2}{3} \]

Integral Values

Carbon 13 NMR

Proton NMR

\( \text{CH}_2 \) split by
\( \text{CH}_2 \) into triplet
for downfield
so adj. to oxygen
\( \text{CH}_2 \) split
by \( \text{CH}_2 \)
\( \text{CH}_2 \) split by
\( \text{CH}_2 \)
\( \text{CH}_2 \)

\( \text{O} \rightarrow \text{CH}_2 \text{CH}_2 \rightarrow \text{CH}_2 \text{CH}_3 \)

\( \text{don't work!} \)

\# C x 2 + 2 - \# H

\( \text{UN} = \frac{2}{2} \)