Problem R-10E \( ((C_8H_{16}O_3) \). 
300 MHz \(^1\)H NMR Spectrum in CDCl\(_3\). 
Source: Joe Langenhan/Gellman 10/31 g
Problem R-10E (C₈H₁₆O₃).
75.4 MHz ¹³C NMR Spectrum in CDCl₃.
Source: Kevin Jantzi/Reich 10/31

Problem R-10E (C₈H₁₆O₃).
IR Spectrum Neat
Source: Nicolet FT-IR
Problem R-10E (C₈H₁₆O₃). Determine the structure of R-10E from the ¹H NMR, ¹³C NMR and IR spectra provided.

(a) DBE____  (b) What information can you obtain from the IR spectrum (give frequency and peak assignment).

(c) Interpret the ¹³C NMR spectrum, showing any part structures that can be identified, and the corresponding δ values.

<table>
<thead>
<tr>
<th>δ</th>
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<tbody>
<tr>
<td>14.13</td>
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<tr>
<td>17.68</td>
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<tr>
<td>19.76</td>
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<tr>
<td>22.40</td>
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<td>46.98</td>
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</tr>
<tr>
<td>72.47</td>
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<tr>
<td>177.80</td>
</tr>
</tbody>
</table>

(d) The signal at δ 2.7 in the ¹H NMR spectrum disappears when the sample is shaken with D₂O, and the signal δ 3.9 becomes a 1:3:3:1 quartet. What does this tell you about the structure?

(e) Analyze the ¹H NMR spectrum. For each of the groups of signals marked on the spectrum, report the multiplet structure in the standard format (e.g., 0.0 δ, dtd, J = 0.0, 0.0, 0.0 Hz, 2H) and any part structure you could obtain from the signal(s).

A   

B   

C   

D   

E   

(f) Give your answer below. If more than one structure fits the data, draw them, but indicate your best choice by circling the structure.
Problem R-10E \((C_8H_{16}O_3)\).
300 MHz \(^1\)H NMR Spectrum in CDCl\(_3\).
Source: Joe Langenhan/Gellman 10/31 g
**Problem R-10E** \((C_8H_{16}O_3)\). Determine the structure of **R-10E** from the \(^1\)H NMR, \(^{13}\)C NMR and IR spectra provided.

(a) DBE \(1\)

(b) What information can you obtain from the IR spectrum (give frequency and peak assignment).

3500-3600 cm\(^{-1}\) OH stretch  
1730 cm\(^{-1}\) Carbonyl stretch - probably an ester

(c) Interpret the \(^{13}\)C NMR spectrum, showing any part structures that can be identified, and the corresponding \(\delta\) values.

\[
\begin{align*}
\delta & \\
14.13 & \text{Very likely 4 CH}_3 \\
17.68 & \\
19.76 & \\
22.40 & 4^* \text{carbon (not bearing an O) disappears in DEPT} \\
46.98 & \text{must be -CH}_2\text{-OR} \\
60.65 & \text{Must be a} \\
72.47 & \text{OH} \\
177.80 &
\end{align*}
\]

(d) The signal at \(\delta\) 2.7 in the \(^1\)H NMR spectrum disappears when the sample is shaken with \(D_2O\), and the signal \(\delta\) 3.9 becomes a 1:3:3:1 quartet. What does this tell you about the structure?

(e) Analyze the \(^1\)H NMR spectrum. For each of the groups of signals marked on the spectrum, report the multiplet structure in the standard format (e.g., 0.0 \(\delta\), dtd, \(J = 0.0, 0.0, 0.0, 0.0 \) Hz, \(2H\)) and any part structure you could obtain from the signal(s).

\[
\begin{align*}
\delta & \text{ 1.15, 1H, d, } J = 7\text{Hz} & \text{CH}_3\text{-C} \\
\delta & \text{ 1.17, 1.18 - possible two methyl singlets, or isopropyl (} J = 5 \text{ Hz - a little small)} \\
\delta & \text{ 1.27, 3H, t, } J = 7\text{Hz} & \text{CH}_3\text{-CH}_2^{-} \\
\delta & \text{ 2.70, 1H, t, } J = 7\text{ Hz} & \text{-O-H} \\
\delta & \text{ 3.86, 1H, pentet, } J = 7\text{Hz} & \text{CH}_3\text{-C-OH} \\
\delta & \text{ 4.17, 2H, q, } J = 7\text{ Hz} & \text{-O-CH}_2\text{-CH}_3
\end{align*}
\]

(f) Give your answer below. If more than one structure fits the data, draw them, but indicate your best choice by circling the structure
Problem R-10E (C₇H₁₄O₃).

$^{13}$C NMR Spectrum in CDCl₃.

Source: Kevin Jantzi/Reich 10/31

Problem R-10E (C₇H₁₄O₃).

IR Spectrum Neat

Source: Nicolet FT-IR