Problem R-10J \((\text{C}_{24}\text{H}_{28}\text{O}_9)\)

300 MHz \(^{13}\text{C}\) NMR spectrum in CDCl\(_3\)

Source: Geoffrey Sametz/Burke
75 MHz $^{13}$C NMR spectrum in CDCl$_3$
Problem R10J \((C_{24}H_{28}O_9)\). This problem requires you to analyze part of the \(^1H\) NMR spectrum of a tetrahydropyran, and determine the stereochemistry at three centers. A planar projection and conformational drawing is shown below.

(a) Determine the stereochemistry at C-6. Explain what signal(s) you used, give their shift and multiplicity (e.g. \(\delta 0.00, \text{tq}, J = 0, 0\)) and briefly describe how you made the stereochemical assignment using the data:

\[ A = \text{______}, \quad B = \text{______} \text{ (H or CO}_2\text{Me)}. \]

(b) Determine the stereochemistry at C-4. Explain what signal(s) you used, give their shift and multiplicity and briefly describe how you made the stereochemical assignment using the data:

\[ C = \text{______}, \quad D = \text{______} \text{ (H or OBz)}. \]

(c) Determine the stereochemistry at C-3. Explain what signal(s) you used, give their shift and multiplicity and briefly describe how you made the stereochemical assignment using the data:

\[ E = \text{______}, \quad F = \text{______} \text{ (H or OBz)}. \]
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(a) Determine the stereochemistry at C-6. Explain what signal(s) you used, give their shift and multiplicity (e.g. \(\delta 0.00, \text{tq}, J = 0, 0\)) and briefly describe how you made the stereochemical assignment using the data:

\[
\begin{align*}
A &= \\ \delta 4.31 \ (H^5) \\
0.00, \text{tq, } J = 0, 0
\end{align*}
\]

\[
\begin{align*}
B &= \text{CO}_2\text{Me} \\
&= \text{H or CO}_2\text{Me}
\end{align*}
\]

(b) Determine the stereochemistry at C-4. Explain what signal(s) you used, give their shift and multiplicity and briefly describe how you made the stereochemical assignment using the data:

\[
\begin{align*}
C &= \\ \delta 5.40 \ (H^4) \\
&= \text{H or OBz}
\end{align*}
\]

(c) Determine the stereochemistry at C-3. Explain what signal(s) you used, give their shift and multiplicity and briefly describe how you made the stereochemical assignment using the data:

\[
\begin{align*}
E &= \\ \delta 5.86 \ (H^3) \\
&= \text{H or OBz}
\end{align*}
\]

3 pts for correct answer
3 or 4 for reasoning
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