Problem R-83E \((C_{3}H_{9}O_{3}P)\)

300 MHz \(^1\)H NMR spectrum in CDCl\(_3\)
Source: Aldrich Spectral Collection/Reich g

\[
\begin{align*}
\text{Me} & \quad \text{P} \\
\text{OMe} & \quad \text{OMe}
\end{align*}
\]

75 MHz \(^{13}\)C NMR spectrum in CDCl\(_3\)
Source: Aldrich Spectral Collection/Reich g

40.5 MHz \(^{31}\)P NMR spectrum
Problem R-83E \((C_3H_9O_3P)\). The \(^{31}\text{P}\) NMR spectrum of \(\text{CH}_3\text{P(O)(OCH}_3\text{)}_2\) is shown below. The theoretical number of lines is: ________

Is \(J(\text{PCH}_3)\) or \(J(\text{POCH}_3)\) larger?

Mark distances on the spectrum corresponding to these quantities, and show the origin of the lines in a coupling "tree".
Problem R-83E (C_4H_9O_3P). The $^{31}$P NMR spectrum of CH$_3$P(O)(OCH$_3$)$_2$ is shown below. The theoretical number of lines is: \[ q \text{ sept} = 4 \times 7 = 28 \text{ lines} \]

Is $J(PCH_3)$ or $J(POCH_3)$ larger? \[ 2J(PCH_3) \]

Mark distances on the spectrum corresponding to these quantities, and show the origin of the lines in a coupling "tree".

One expects a quartet of septets for the $^{31}$P NMR spectrum:

- Quartets: 1 : 3 : 3 : 1
  - \[ 2J(PCH_3) \]
  - \[ 3J(POCH_3) \]

Color-coded septets

The outer lines are buried in the noise

Simulation

PLT pr-080-to-86.plt