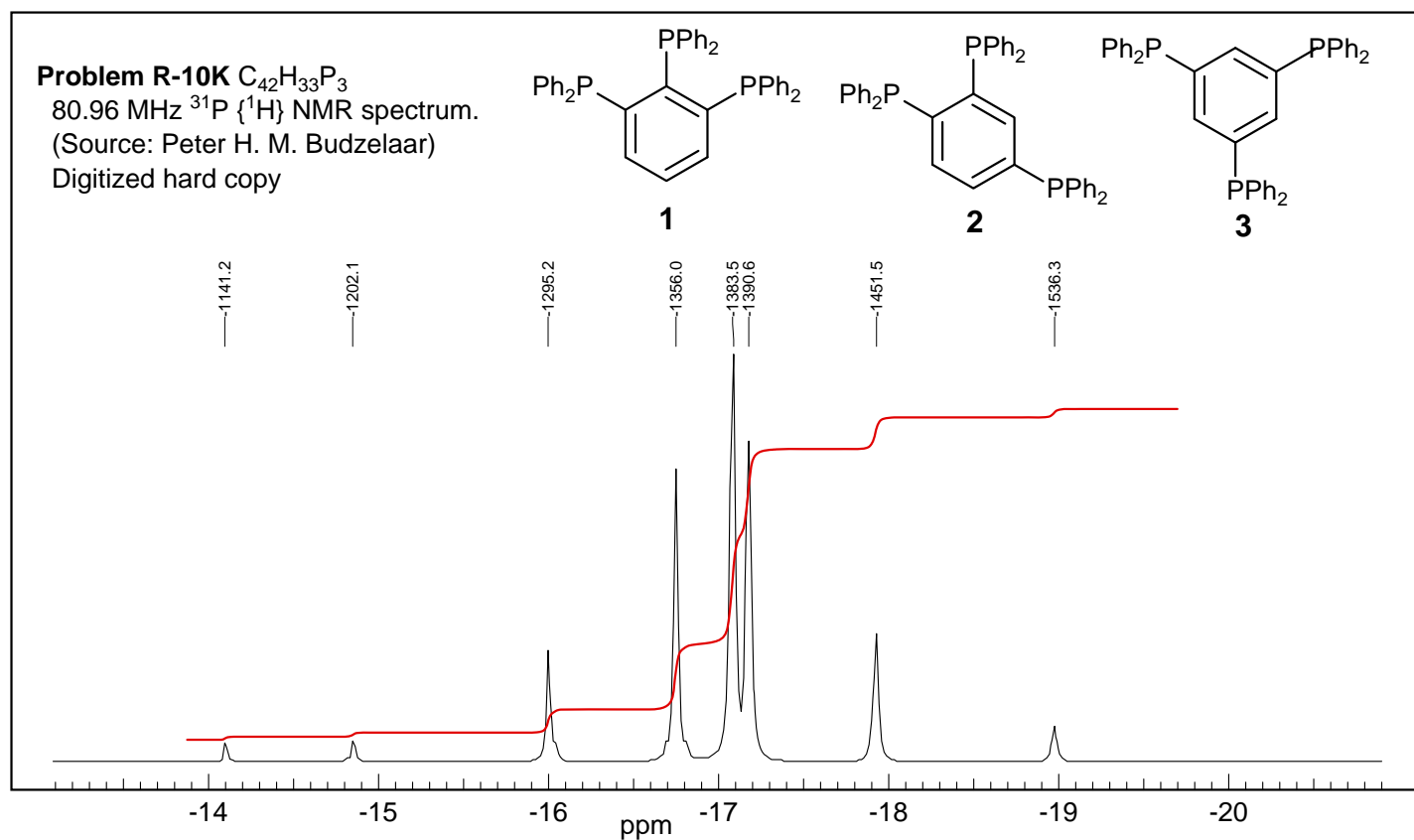


Problem R-10K ($C_{42}H_{33}P_3$). The proton decoupled ^{31}P NMR spectrum below is of one of the compounds **1**, **2** or **3**.

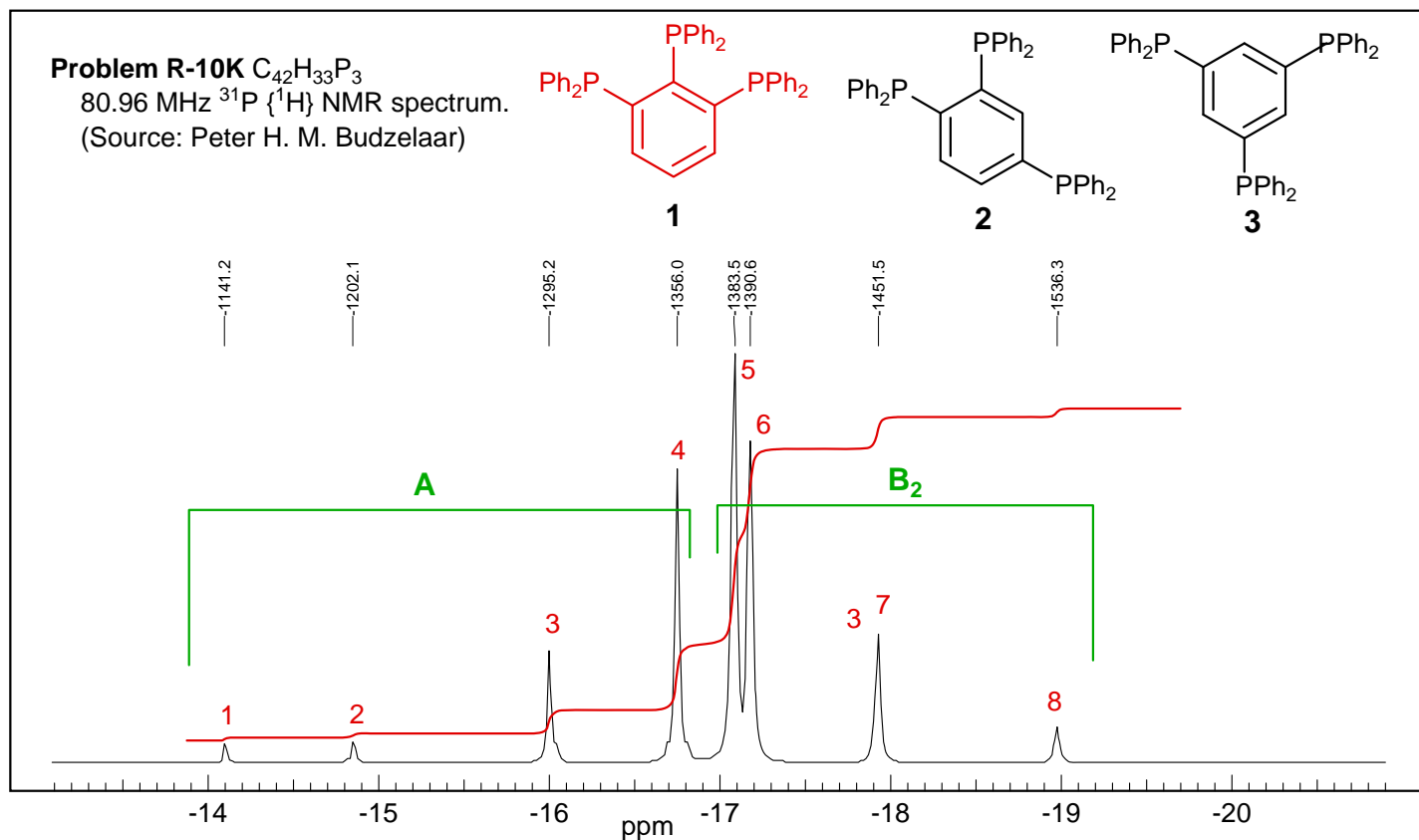


(a) Which of the structures is correct? _____. Explain briefly.

(b) What kind of pattern is this (e.g. AA'BB') _____. Analyze the spectrum to obtain all pertinent coupling constants and chemical shifts, and report them below.

(c) What is the proton NMR frequency on this spectrometer? _____

Problem R-10K ($C_{42}H_{33}P_3$). The proton decoupled ^{31}P NMR spectrum below is of one of the compounds **1**, **2** or **3**.



(a) Which of the structures is correct? 1. Explain briefly.

3 Should show just a singlet, **2** should show three shifts (AMX or ABX), each a dd. Neither one fits the spectrum
1 would show an AX_2 or AB_2 pattern, this clearly fits

(b) What kind of pattern is this (e.g. $AA'BB'$) AB_2 . Analyze the spectrum to obtain all pertinent coupling constants and chemical shifts, and report them below.

From the integration (as well as general appearance), the left 4 peaks are **A**, the right 4 peaks **B₂**

$$\nu_A = \nu_3 = -1295.2 \text{ Hz}, \delta_A = -16.0 \text{ ppm}$$

$$\nu_B = (\nu_5 + \nu_7) / 2 = -1417.6 \text{ Hz}, \delta_B = -17.51 \text{ ppm}$$

$$J_{AB} = (\nu_1 - \nu_4 + \nu_6 - \nu_8) / 3 = 120.2 \text{ Hz}$$

(c) What is the proton NMR frequency on this spectrometer? 200

$$\frac{\gamma_H}{\gamma_P} \times 80.96 = 199.95 \text{ MHz}$$