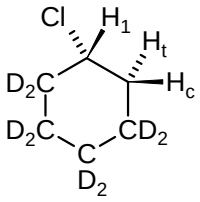
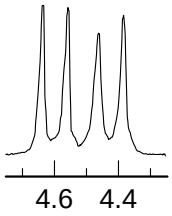
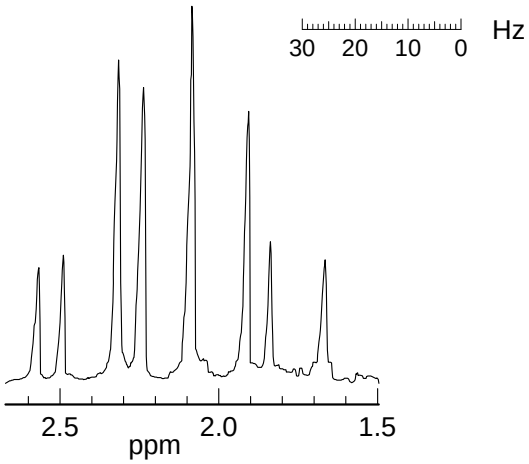
Problem N-373 ($C_6H_{11}Cl$). The deuterium-decoupled 60 MHz ^1H NMR spectrum of **A** at -12.6 °C is shown below. Clearly assign peaks to H_1, H_c and H_t, and mark the distances corresponding to J values assuming an AMX analysis of the spectrum. Briefly tell how you made the assignments (digitized hard copy spectra from Hoefner, Lesko, Binsch *Org. Magn. Reson.* **1978**, *11*, 179).



A

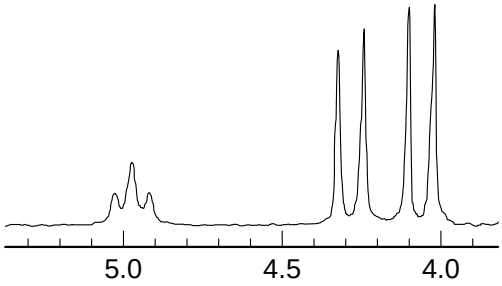
T = -12.5 °C

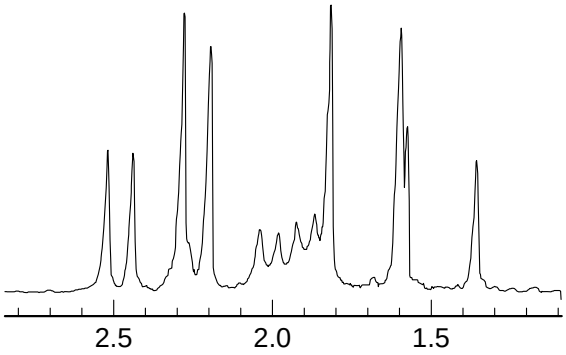




The low-temperature NMR spectrum of **A** is shown below. Clearly indicate assignments and explain the multiplicities observed.

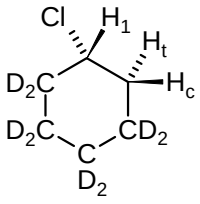
T = -76.2 °C



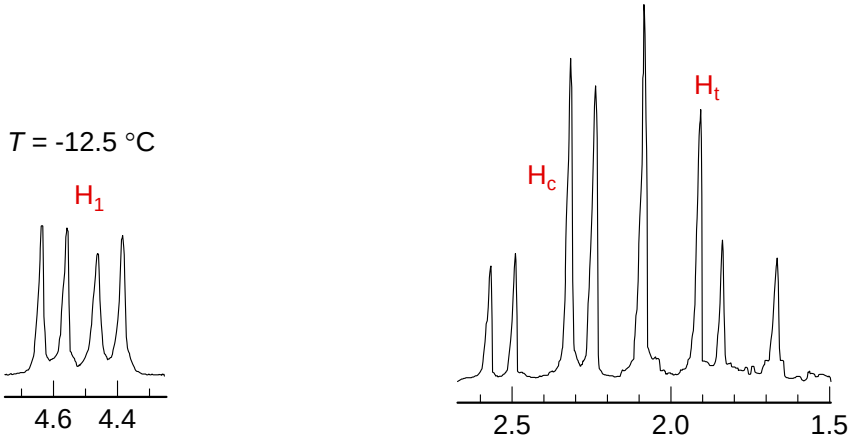


NOTE: Chemical shift scale may not be exact.

Problem N-373 ($C_6H_{11}Cl$). The deuterium-decoupled 60 MHz ^1H NMR spectrum of **A** at -12.6 °C is shown below. Clearly assign peaks to H_1, H_c and H_t, and mark the distances corresponding to J values assuming an AMX analysis of the spectrum. Briefly tell how you made the assignments (digitized hard copy spectra from Hoefner, Lesko, Binsch *Org. Magn. Reson.* **1978**, *11*, 179).



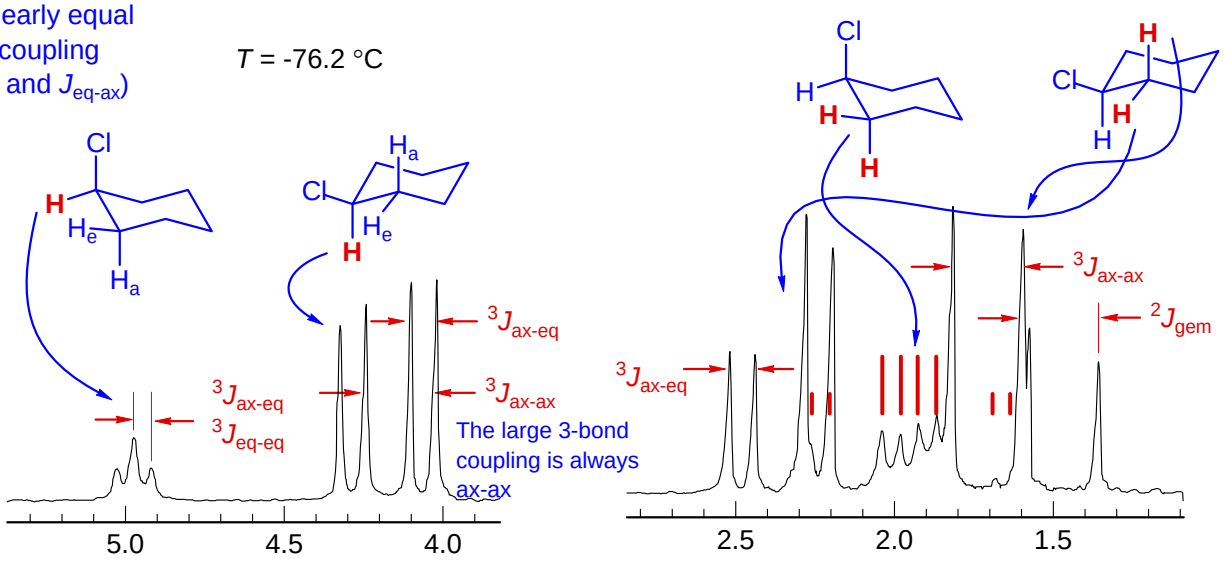
A



At -12.6 °C ring inversion of chlorocyclohexane is fast on the NMR time scale, so one set of averaged signals is seen.

The low-temperature NMR spectrum of **A** is shown below. Clearly indicate assignments and explain the multiplicities observed.

Two nearly equal small coupling ($J_{eq\text{-}eq}$ and $J_{eq\text{-}ax}$)



At -76 °C the ring inversion of chlorocyclohexane has become slow on the NMR time scale, so distinct signals are seen for the axial and equatorial conformations, with the characteristic small $^3J_{eq\text{-}eq}$ and $^3J_{ax\text{-}eq}$, and the large $^3J_{ax\text{-}ax}$.