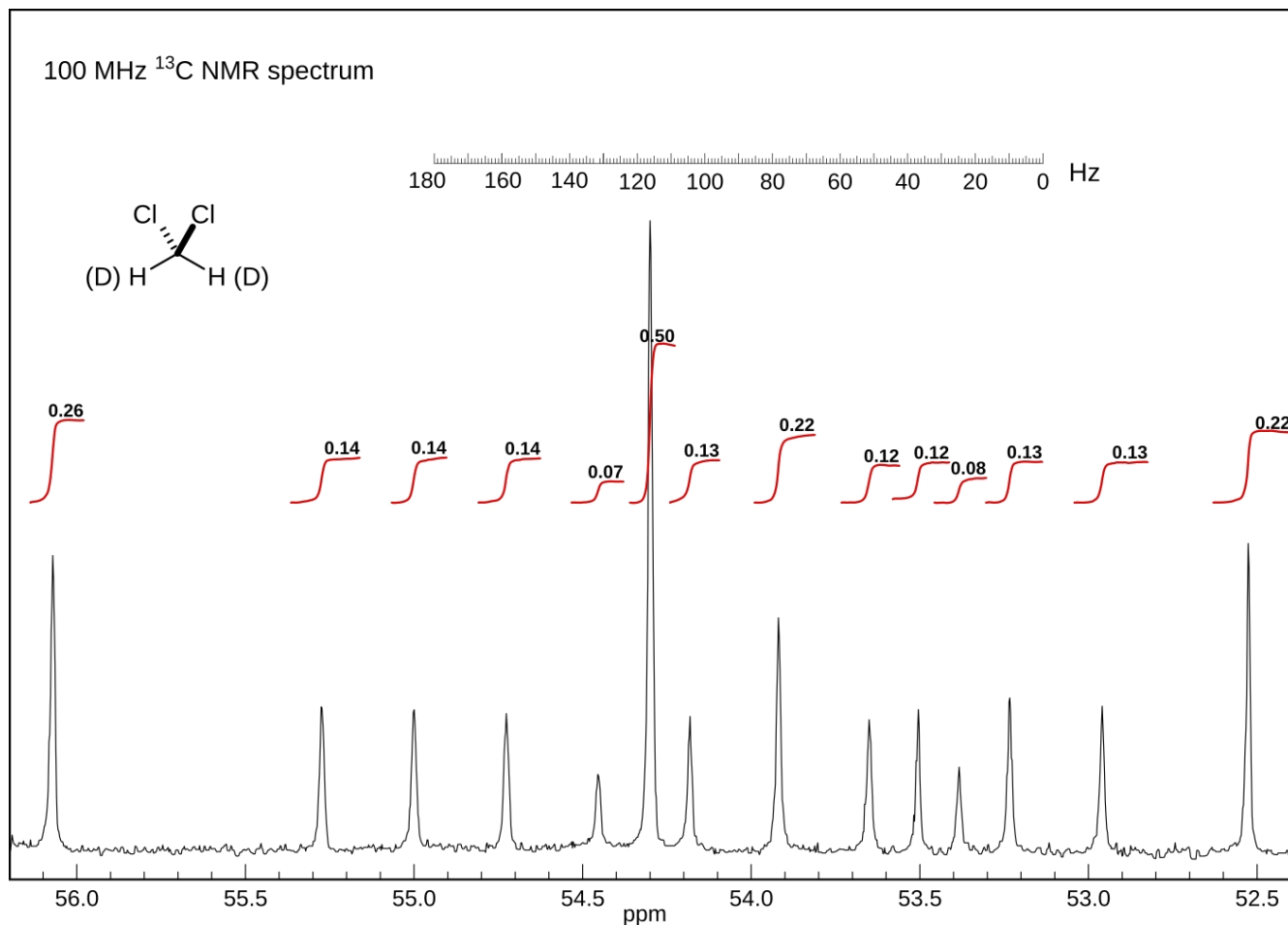


NMR - structural analysis: TEST 1

1. Figure below shows not-decoupled ^{13}C NMR spectrum of mixture of $\text{CCl}_2\text{H}_x\text{D}_{2-x}$.

- Assign the central position of individual multiplets to chemical shifts of various isotopomers.
- Provide estimate of $^1J_{\text{C-H/D}}$ coupling constants
- Explain the ratio of intensities within the multiplets.



2. ^1H spectrum of a heterocyclic compound (structure indicated in left-upper corner):

- Determine the working frequency of a NMR spectrometer used for recording this spectrum.
- Provide systematic name of analysed compound and probable type of solvent.
- Determine relative orientation of F atoms (cis or trans), explain.
- Assign the proton signals (keep in mind ^{19}F is $\frac{1}{2}$ NMR active nucleus exhibiting strong deshielding and large $^2J_{\text{HF}}$ coupling).
- Carefully interpret splitting of signals.

