2 1. How many different $^1$H resonances (multiplets) will the following compounds have?

![Chemical structures](image)

2 2. Draw the structure of a compound whose $^1$H NMR spectrum consists of two singlets and three $^{13}$C resonances.

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3. (a) For the four isomers of C$_3$H$_6$Cl$_2$, assign the correct structure to each.

(b) In spectrum 2, assign the proton at $\delta$4.15.

(c) In spectrum 3, what is the multiplicity of the resonance at $\delta$2.22?
3. Below are the proton NMR spectra of the four isomers of dichloropropane. Draw these isomers, and put the correct structure in the boxes on each spectrum.

**Problem R-22F (C₃H₆Cl₂)**

300 MHz ¹H NMR spectrum in CDCl₃

Source: Aldrich Spectra Viewer/Reich