Advanced NMR concepts problem set

1. Explain why the use of a high-field NMR tends to give more first-order spectra.

2. What is meant by “deceptively simple spectra”? Give an example of when a non-first order spectrum can be interpreted according to first order rules.

3. What problems might be encountered if a non-first order spectrum is interpreted as a first order spectrum. How can these problems be overcome?

4. What information can be obtained specifically from a DEPT experiment?

5. What information can be obtained specifically from a COSY experiment?

6. What information can be obtained specifically from a HETCOR experiment?
Using the following spectra, determine the structure of this compound with formula $\text{C}_4\text{H}_8\text{Cl}$. Assign all the carbon and hydrogen atoms in this molecule to the appropriate NMR signals.

DEPT(135)
HETCOR
Using the following spectra, determine the structure of this compound with formula C₉H₁₀O. Assign all the carbon and hydrogen atoms in this molecule to the appropriate NMR signals.
Assign the labeled hydrogen and carbon atoms to the appropriate signals in the HETCOR spectrum. A blow-up of the aromatic region of the $^1$H NMR will help you. (Hints: Ignore the smaller splitting observed in the $^1$H NMR. Use the resonance structures below to help in proton assignments.)
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