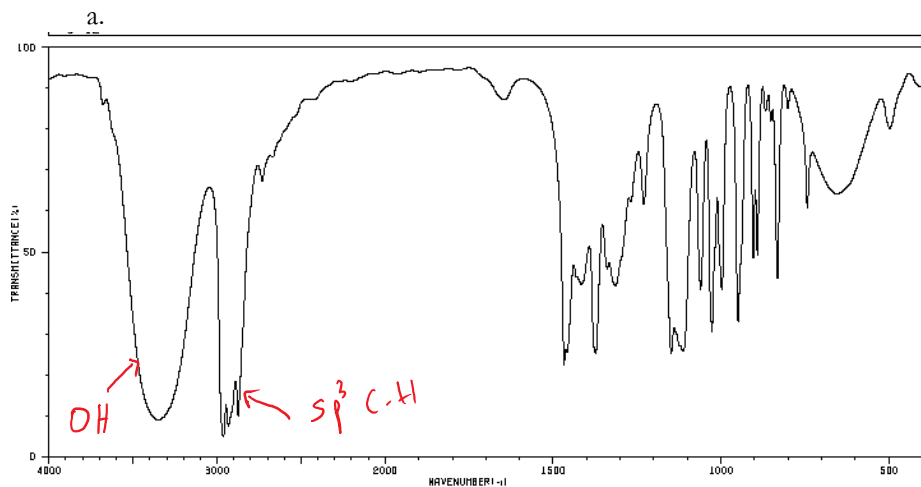


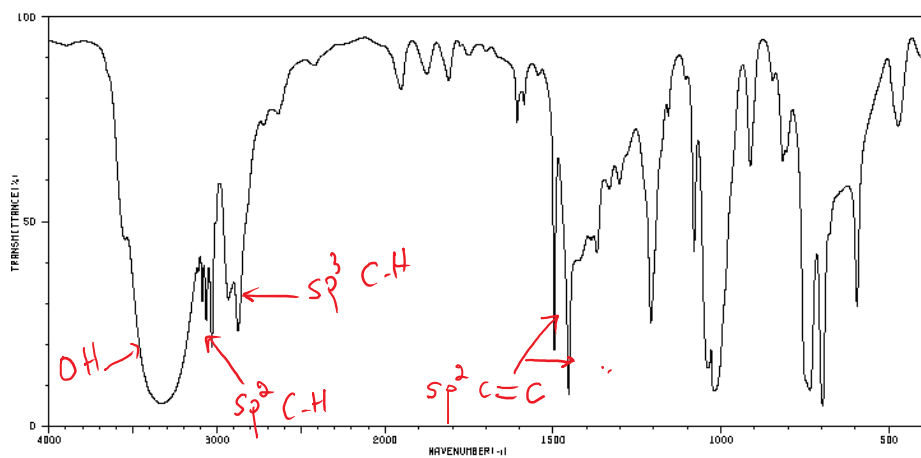
Practice Problem Set -5- KEY

1. Associate each of the following IR spectra with one of the following compounds and justify your answer.

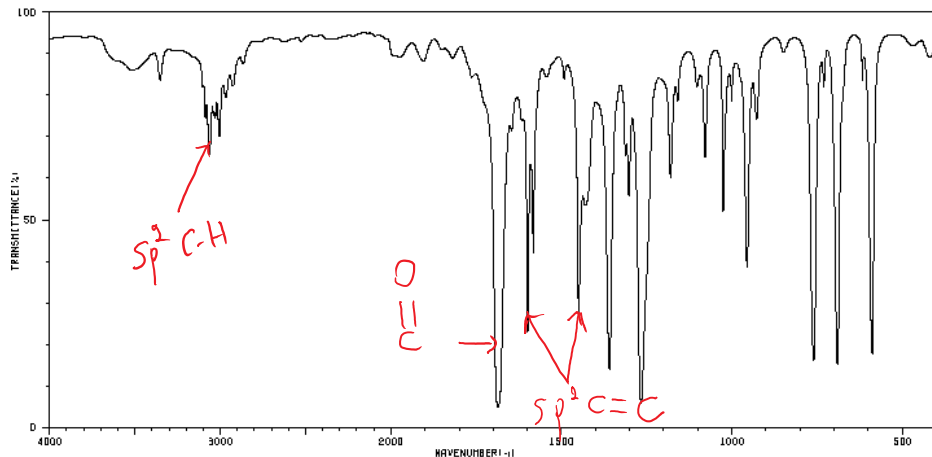
- a- Propanoic acid stretching bands: strong C=O, sp^3 C-H and broad band for OH
- b- 2-Pentanol stretching bands: sp^3 C-H and broad band for OH
- c- Benzyl alcohol stretching bands: sp^2 C-H broad band for OH and 2 bands for benzene C=C stretching.
- d- Acetophenone stretching bands: sp^2 C-H, 2 bands for benzene C=C stretching and strong C=O band.



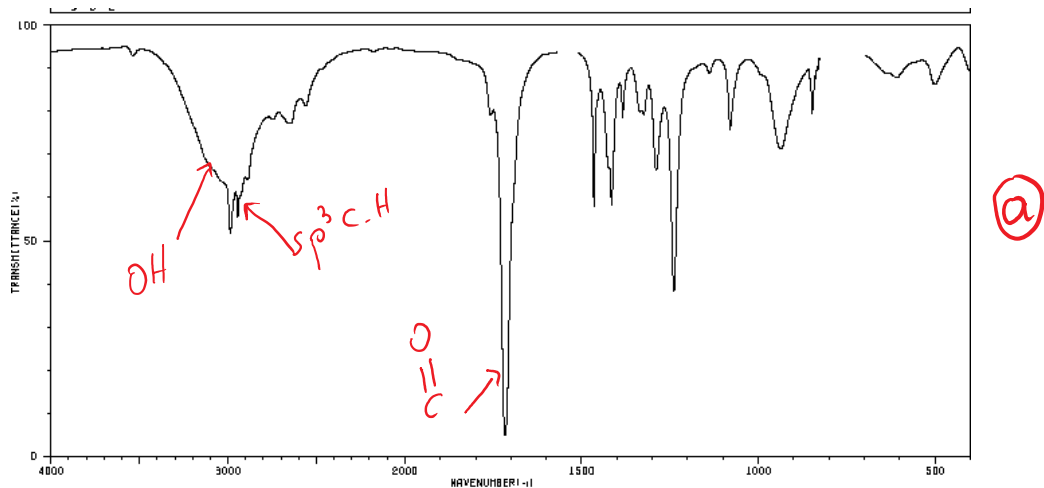
(b)



(c)

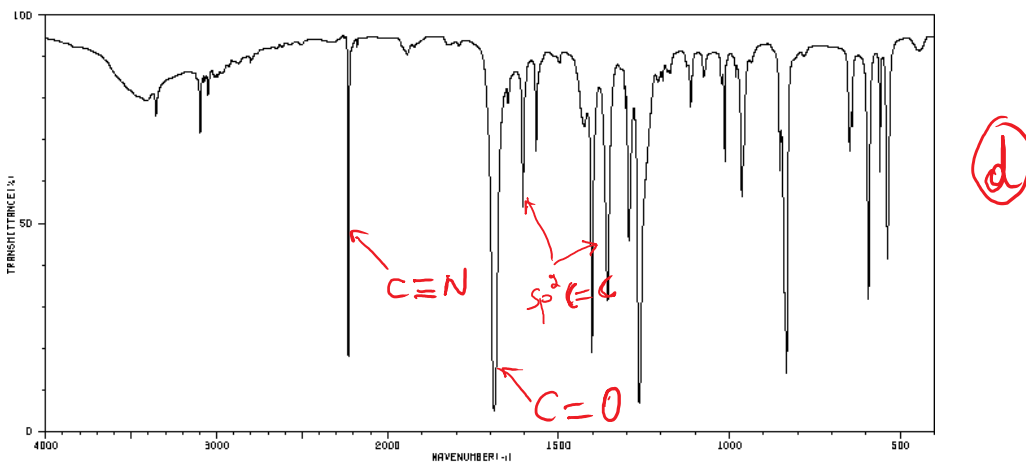
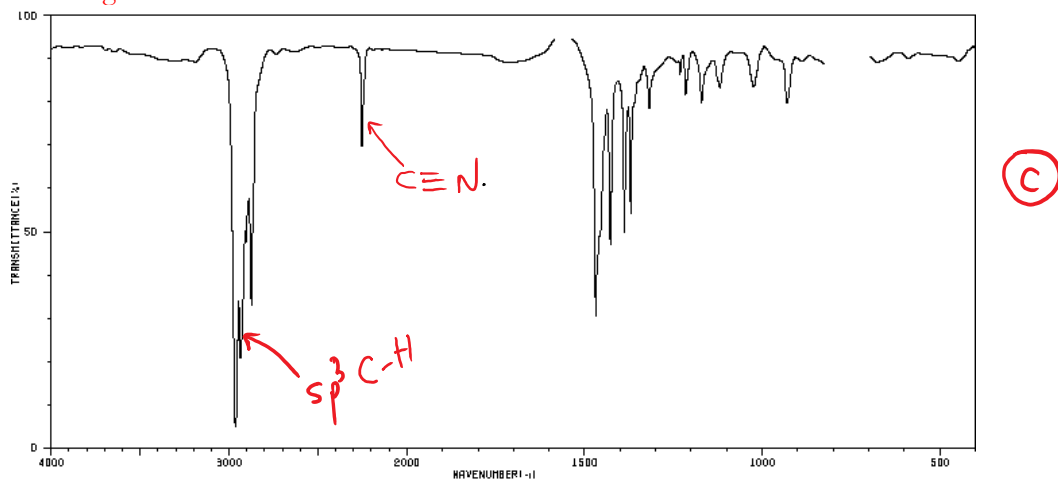


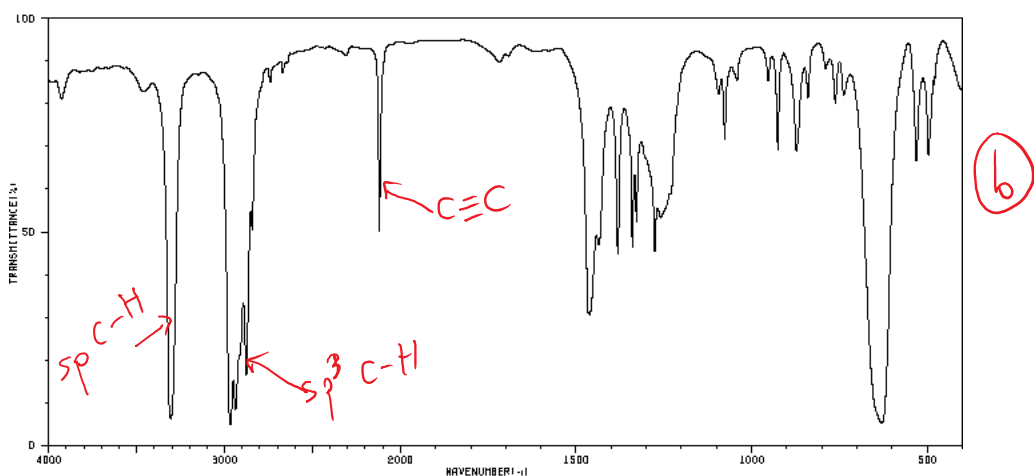
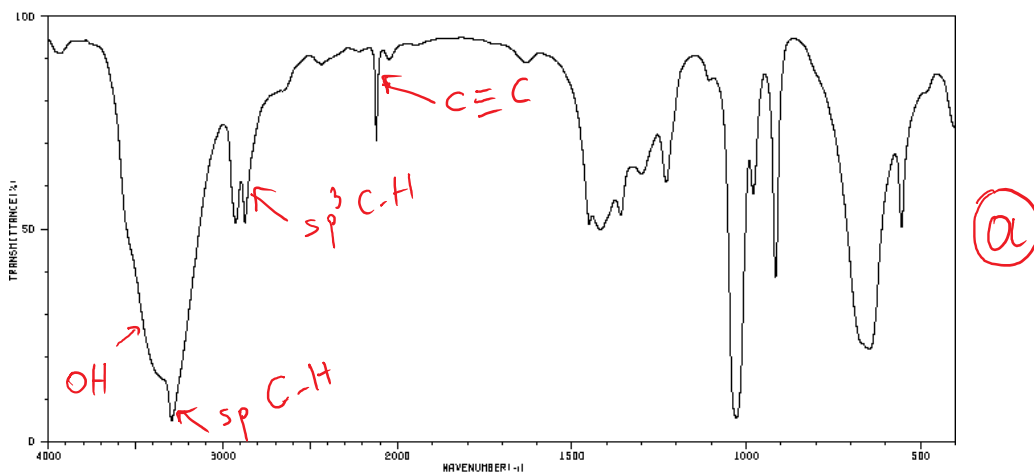
(d)



2. Associate each of the following IR spectra with one of the following compounds and justify your answer.

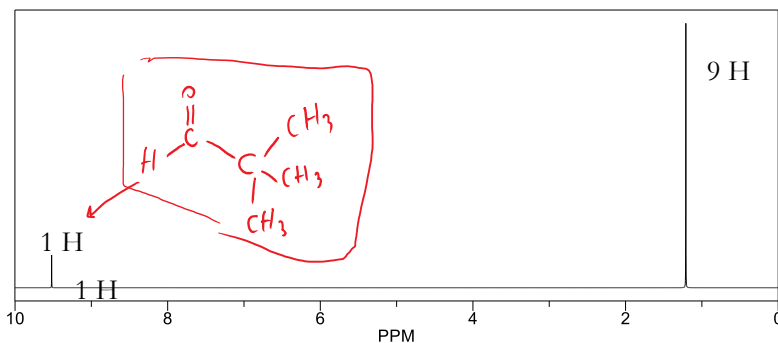
- a- 2-Propyn-1-ol **stretching bands:** broad band for OH, weak band for C≡C and sp C-H stretching band
- b- 1-Pentyne **stretching bands:** weak band for C≡C and sp C-H stretching band and sp³ C-H bands.
- c- 4-Methylpentanenitrile **stretching bands:** band for C≡N and sp³ C-H bands.
- d- *p*-Acetylbenzonitrile **stretching bands:** band for C≡N, strong C=O band and 2 bands for benzene C=C stretching



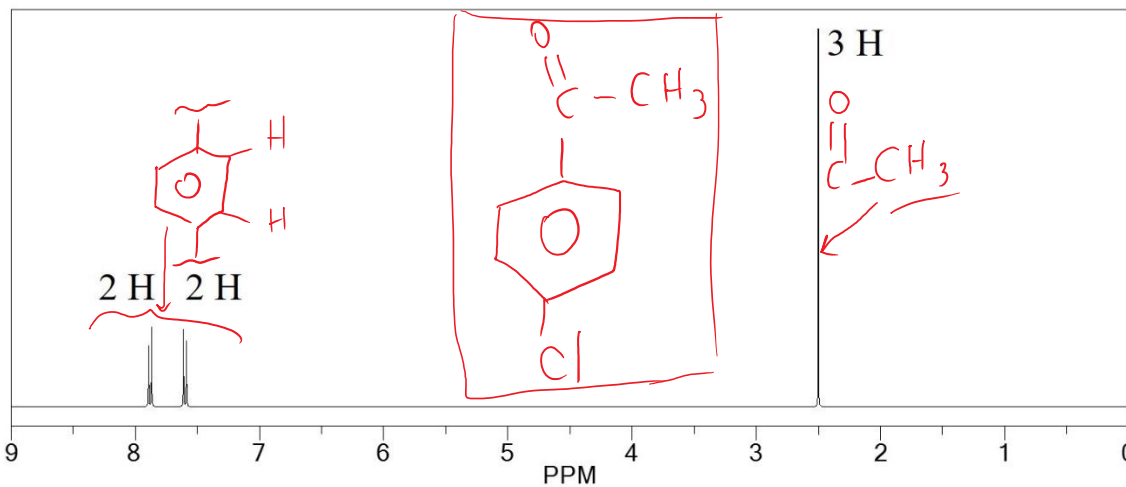
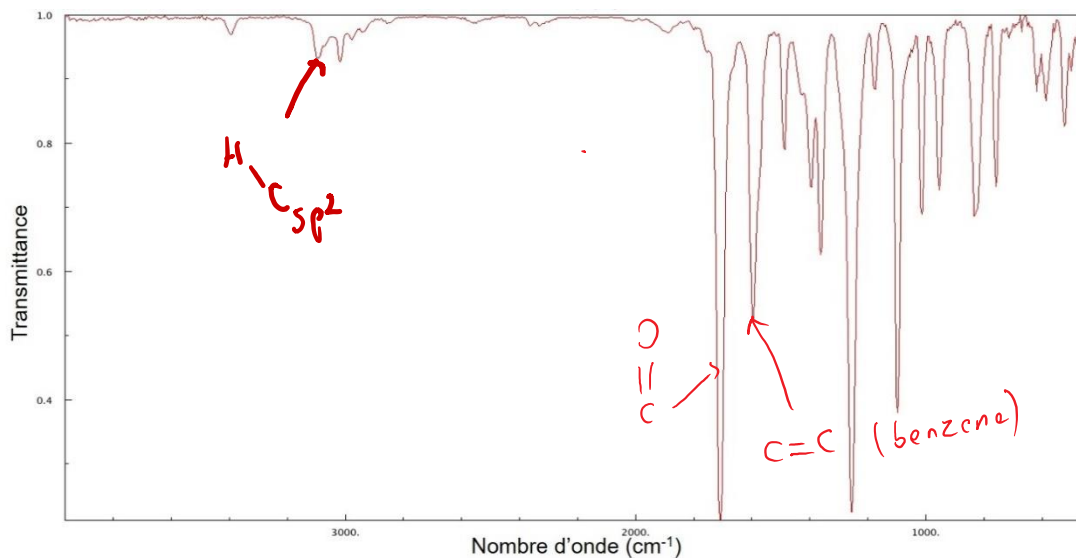


3. Analyze these spectra and determine the structure of each molecule:

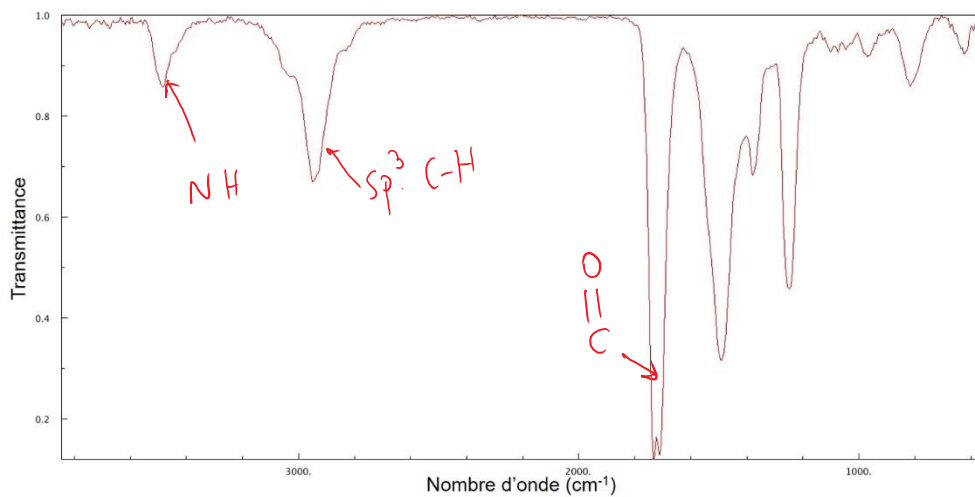
a- Molecule A: $C_5H_{10}O$ $DU = 1$
 IR : intense sharp band at $1700\text{ cm}^{-1} \Rightarrow C=O$

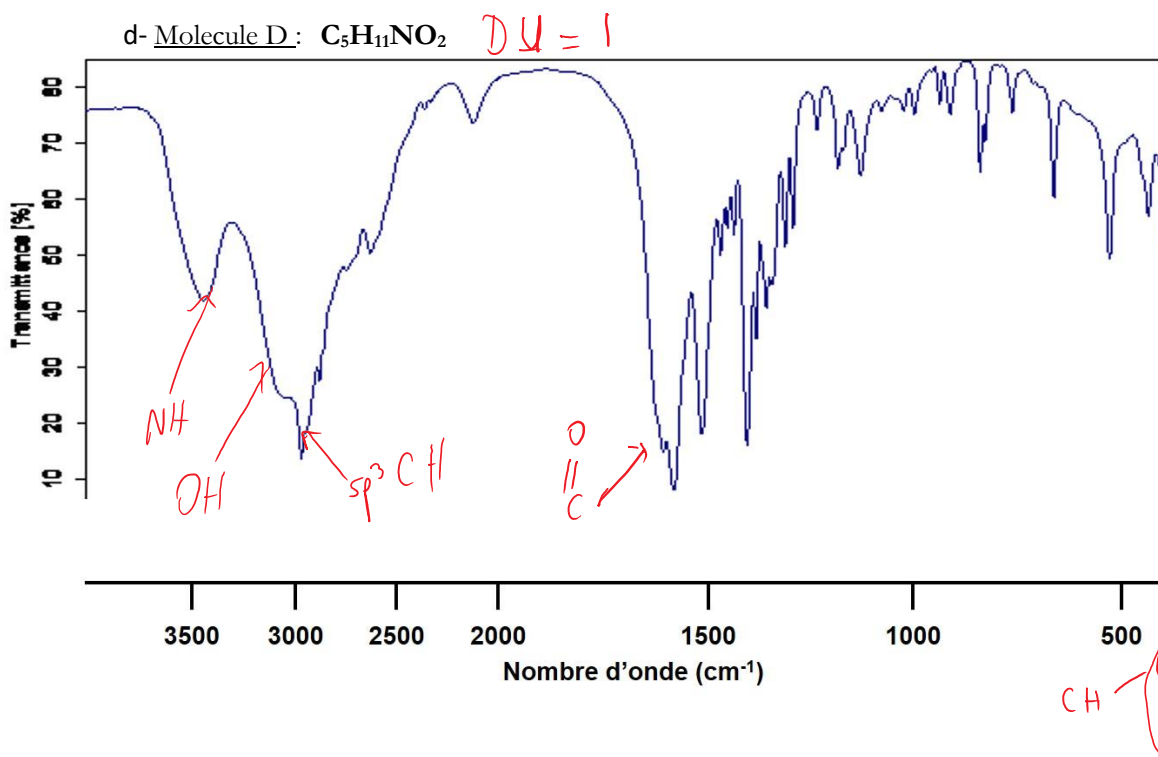
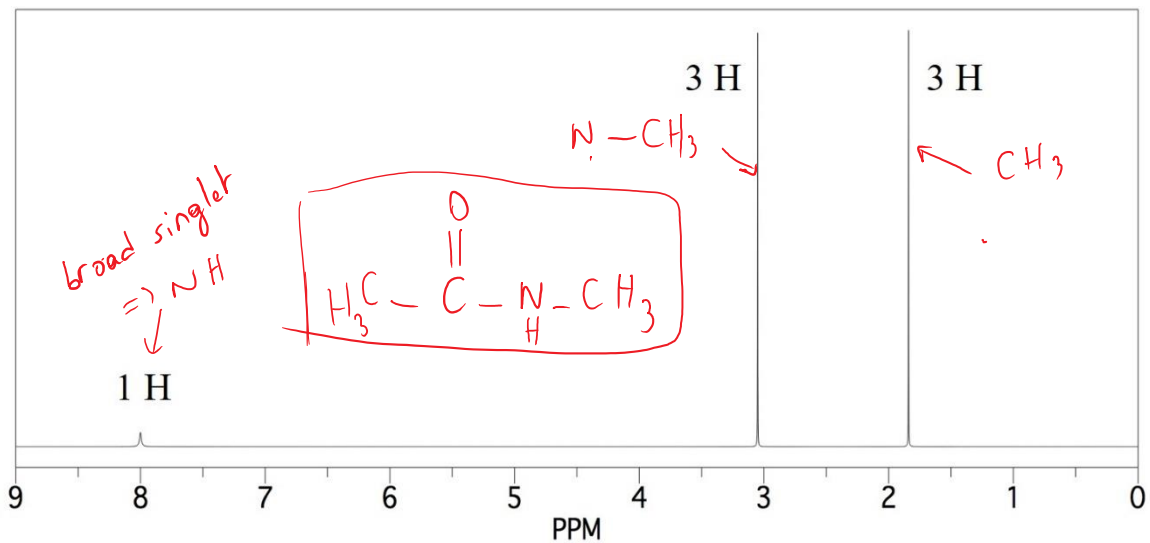


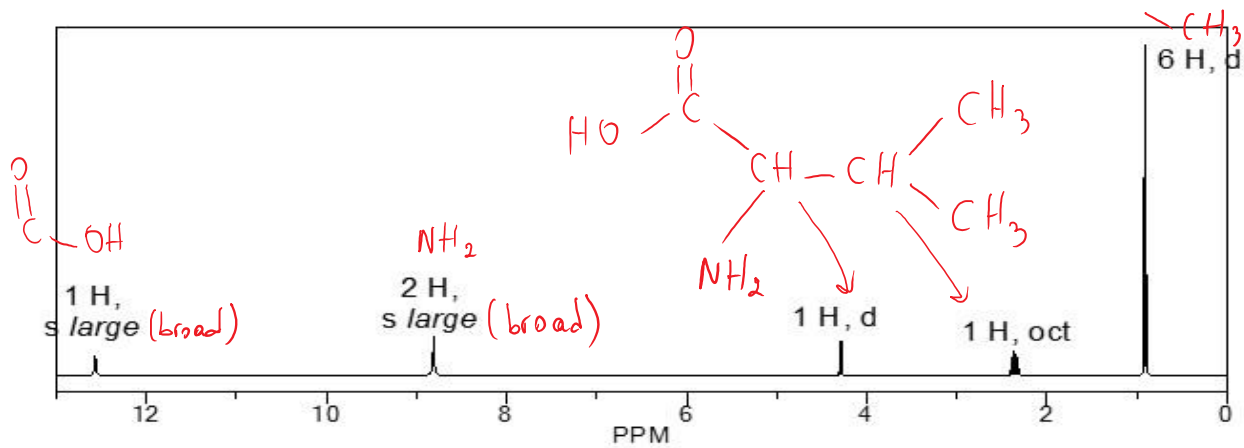
b- Molecule B: C_8H_7ClO $DU = 5$



c- Molecule C: C_3H_7NO $DU = 1$

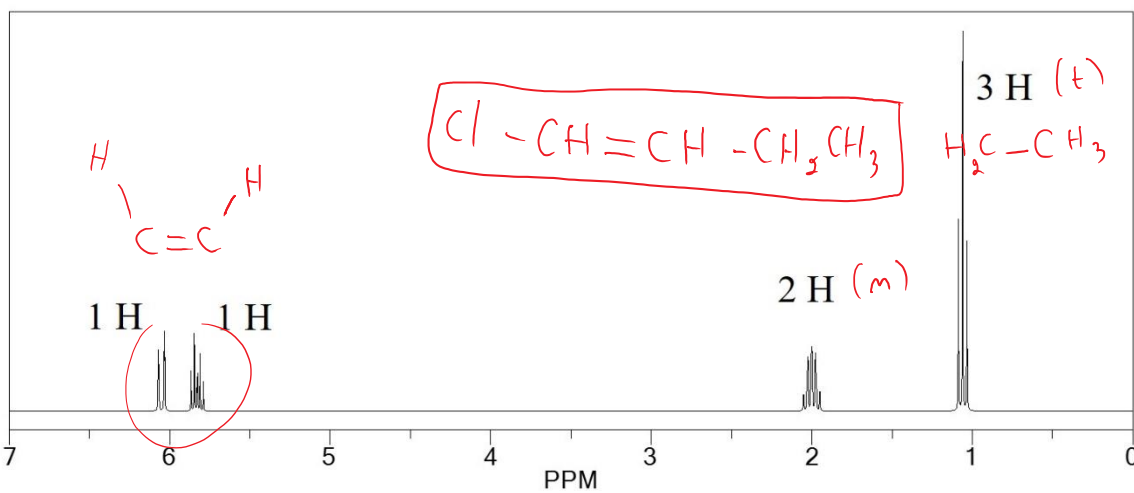
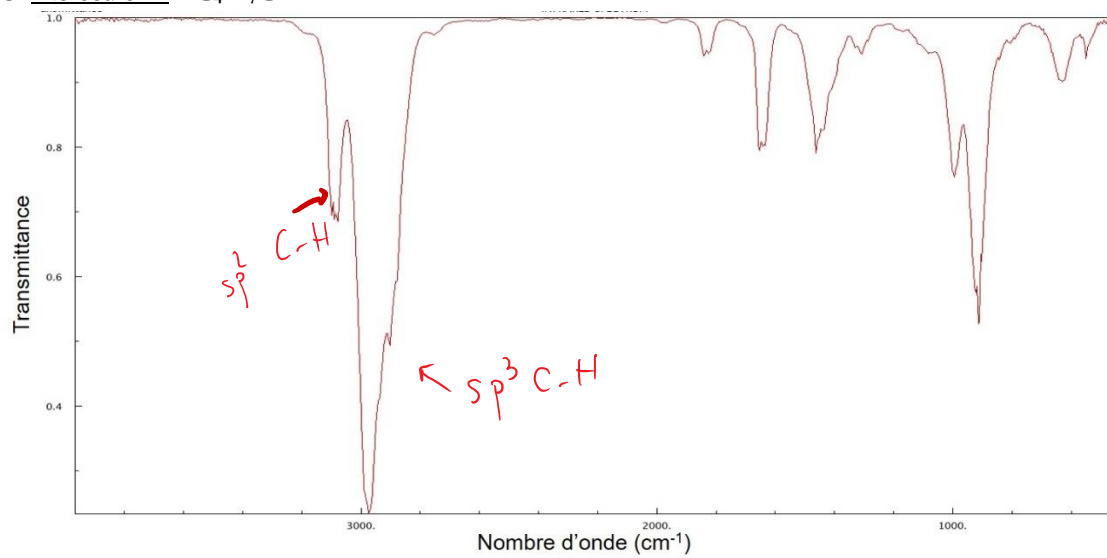






e- Molecule E: $\text{C}_4\text{H}_7\text{Cl}$

$\text{DU} = 1$



In-class ^1H NMR problem: $\text{C}_{10}\text{H}_{10}\text{O}_2$

^1H -NMR:

