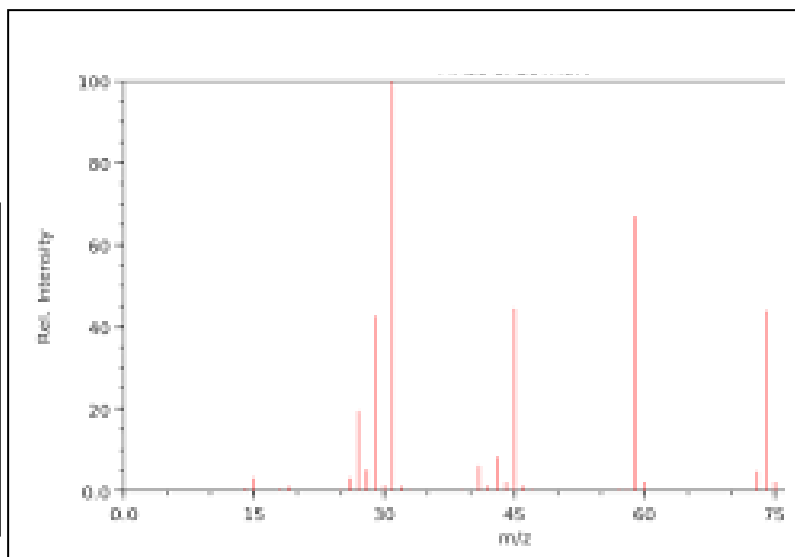


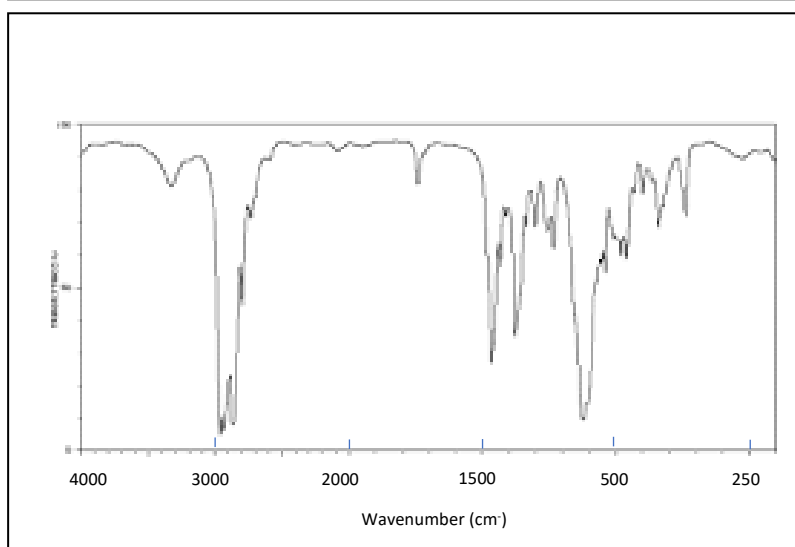
1. An organic compound was analysed and its empirical formula determined to be $C_4H_{10}O$. The mass spectrum, 1H -NMR and IR spectra are given below.

a. Using the information provided:

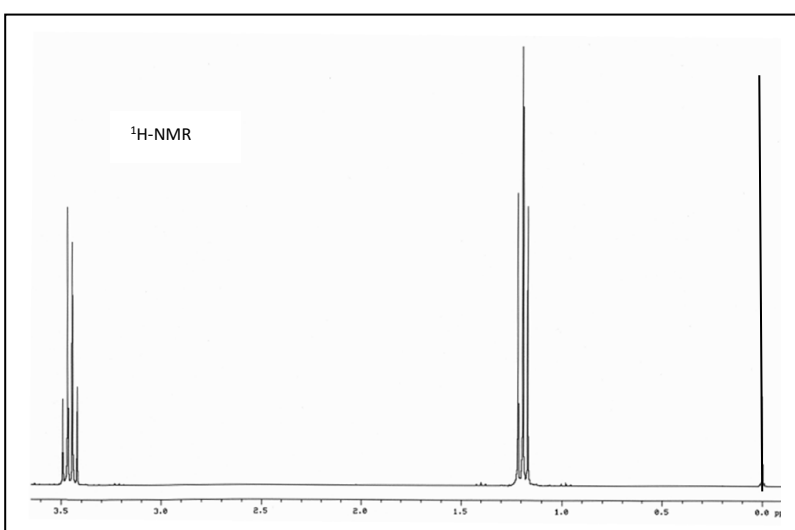
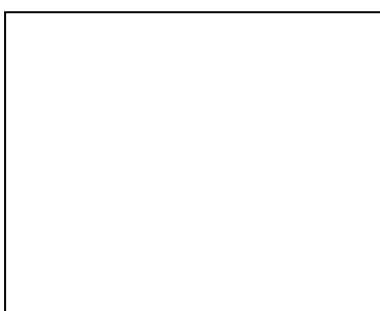
- i. draw the structural formula of the compound in the space below.



- ii. account for the peak at m/z value 75 on the mass spectrum.

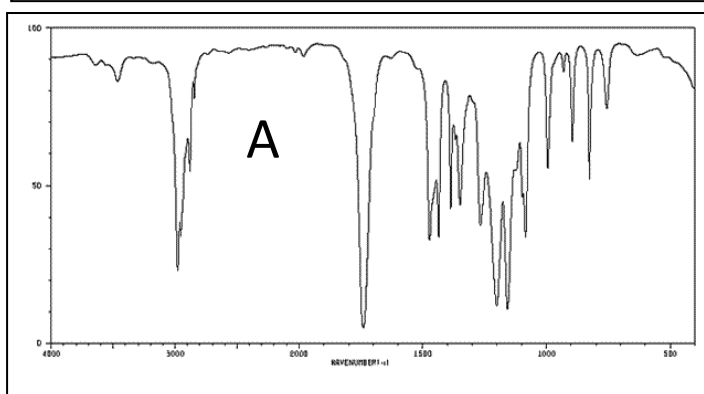
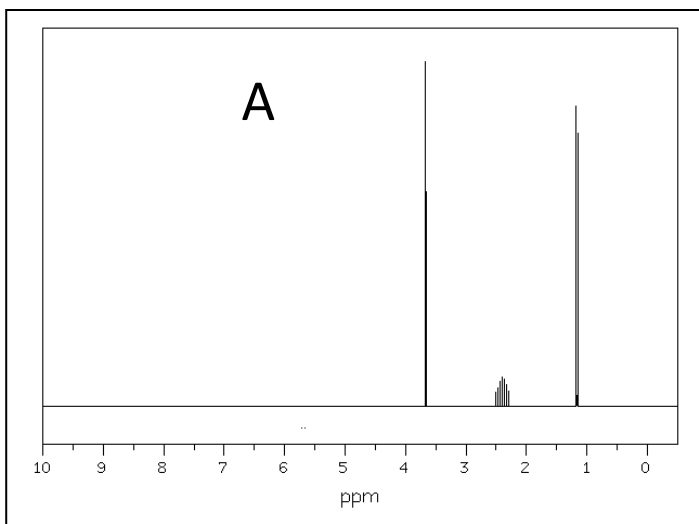
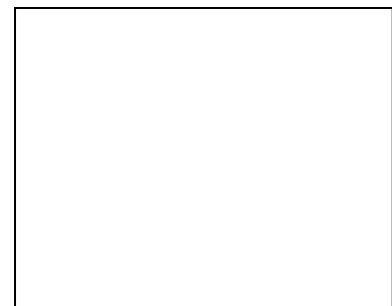


- iii. give a possible fragment to account for the peak at m/z 45 in the space below`

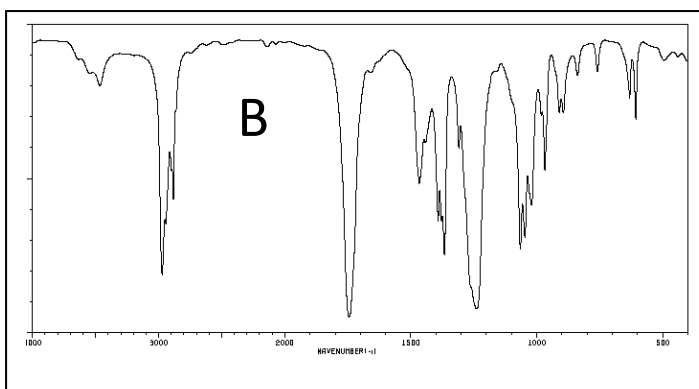
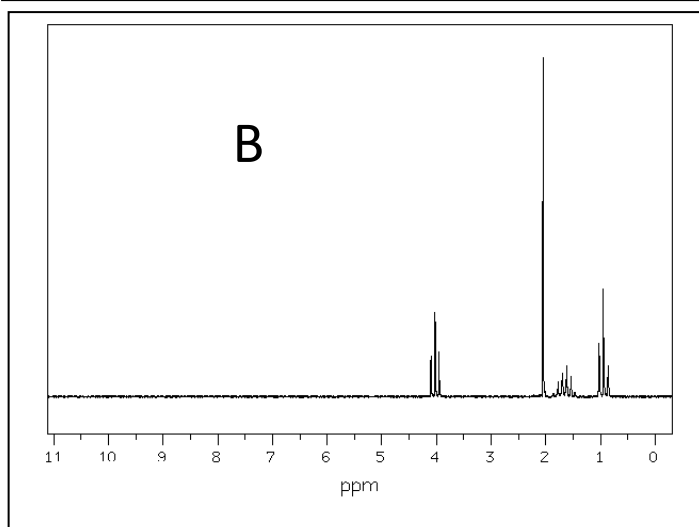


- b. What information can be derived from the mass spectrum that will enable the determination of the molecular formula?

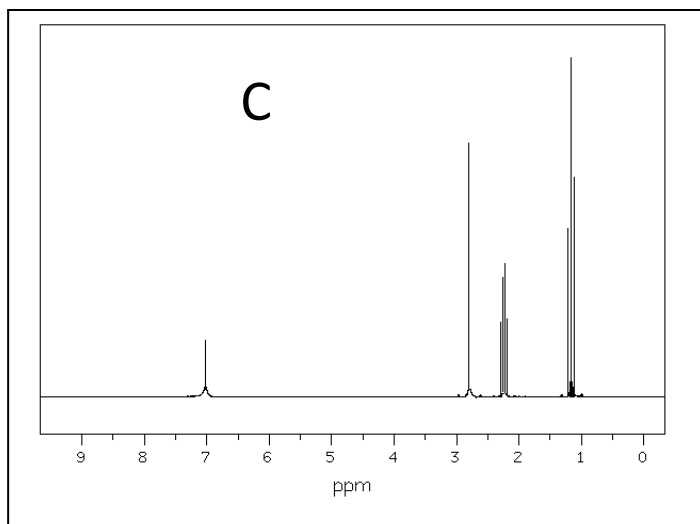
2. The following compounds A and B, shown on the right, have a molecular formula of $C_5H_{10}O_2$. Their 1H -NMR and IR spectra are shown below.



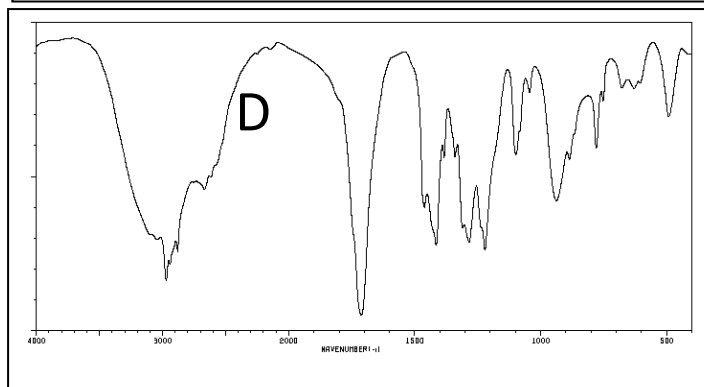
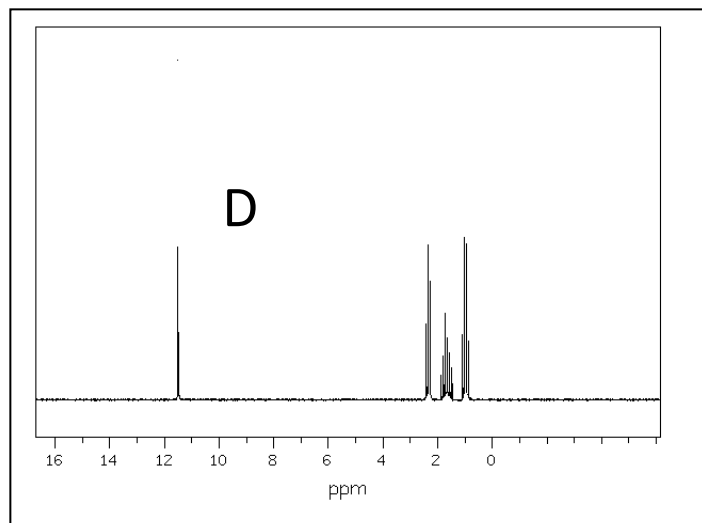
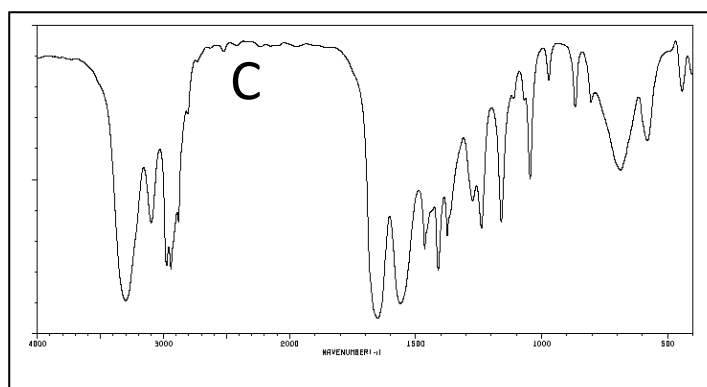
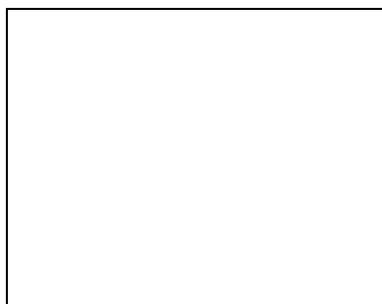
- b. Determine the structural formula of compound B.



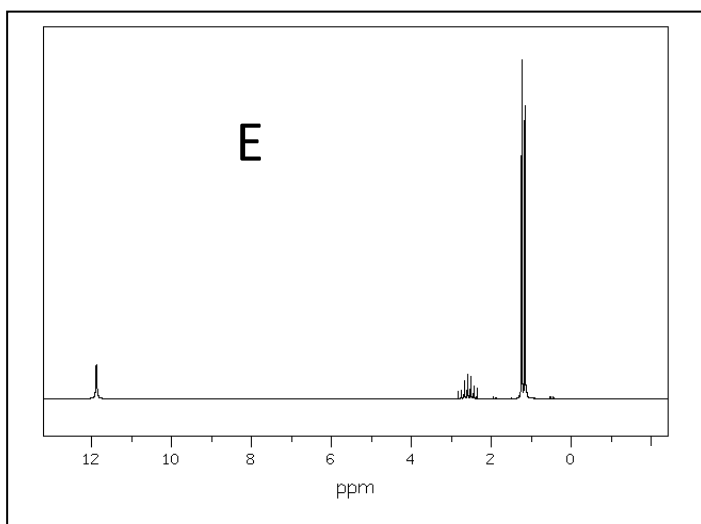
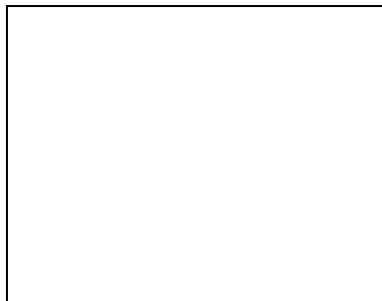
- c. Determine the structural formula of compound C given its molecular formula is C_4H_9NO .



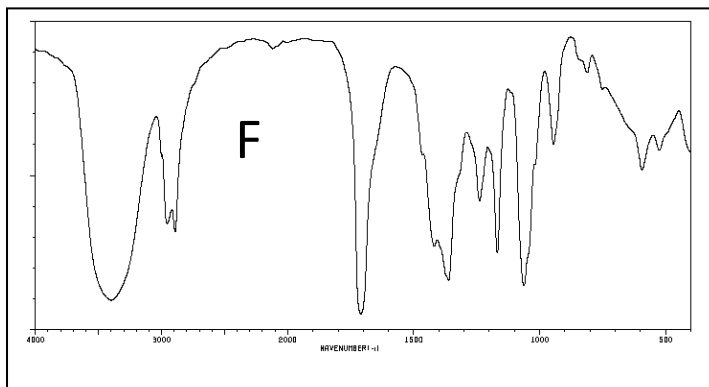
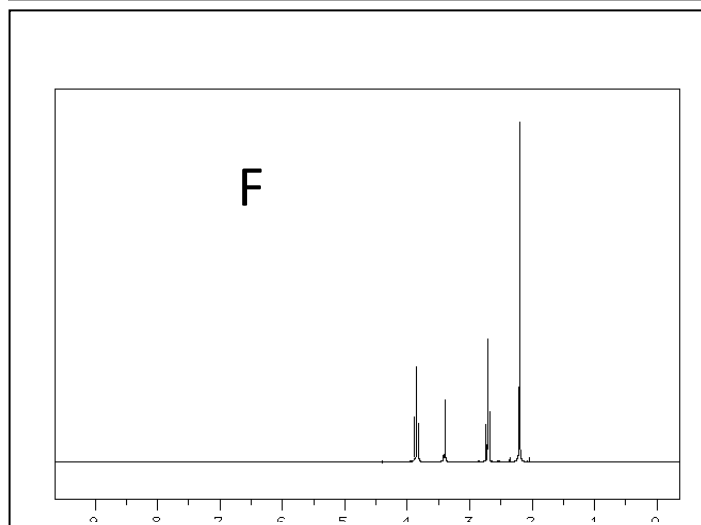
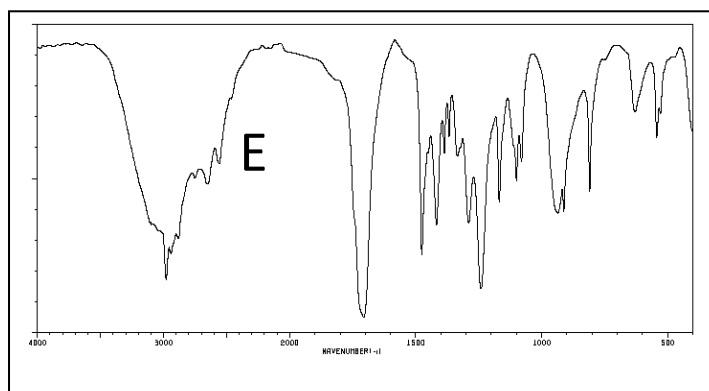
- d. Determine the structural formula of compound D given its molecular formula is $C_4H_8O_2$.



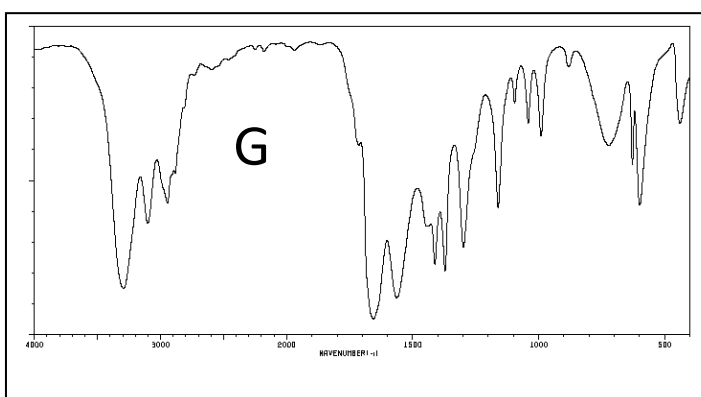
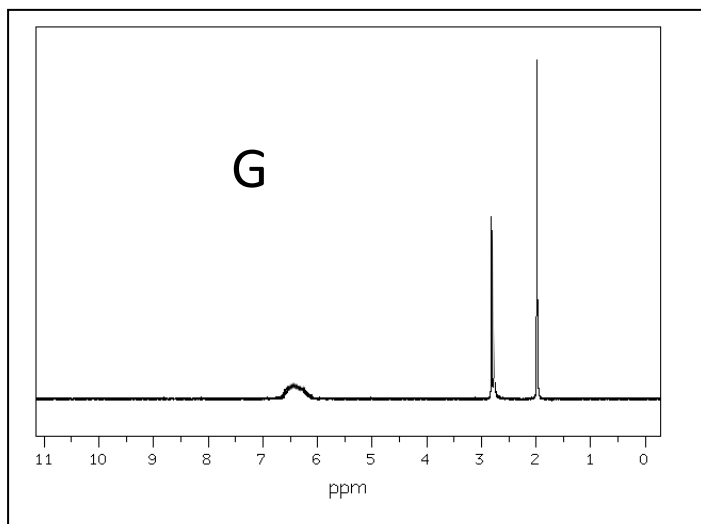
- e. Determine the structural formula of compound E with molecular formula $C_4H_8O_2$.



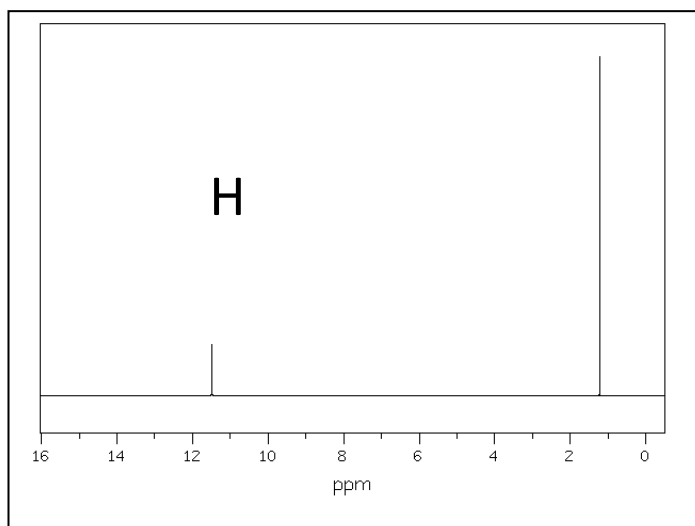
- f. Determine the structural formula of compound F, also with molecular formula $C_4H_8O_2$.



- g. Determine the structural formula of compound G with molecular formula C_3H_7NO . The 1H -NMR is modified.



- h. Determine the structural formula of an acidic compound H, with molecular formula $C_5H_{10}O_2$.



[Solutions](#)