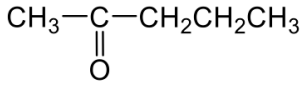
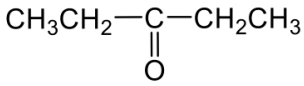
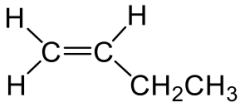
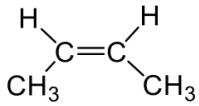
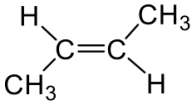
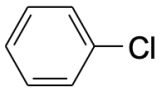
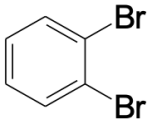
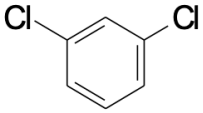
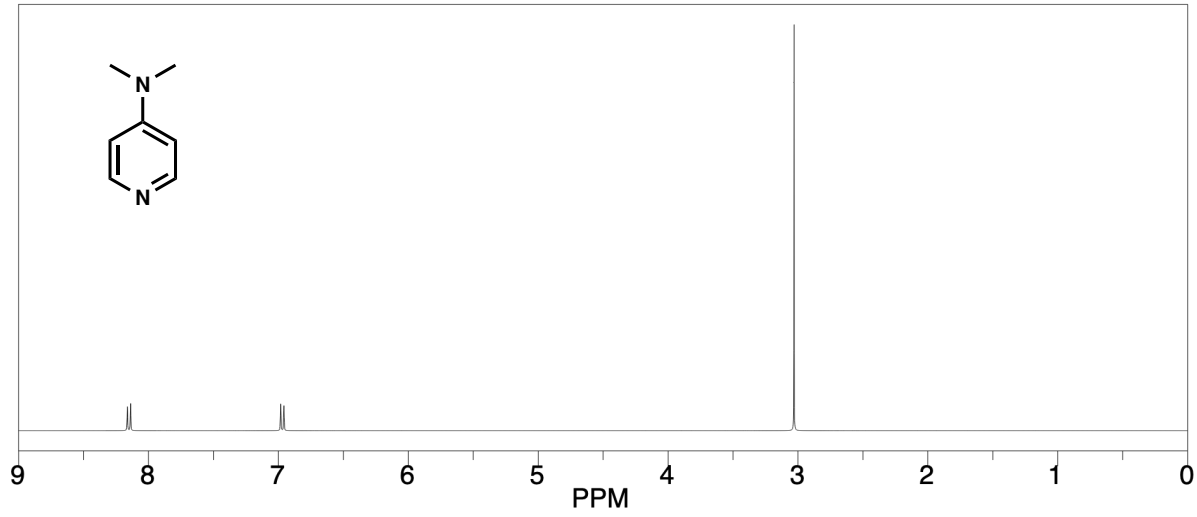
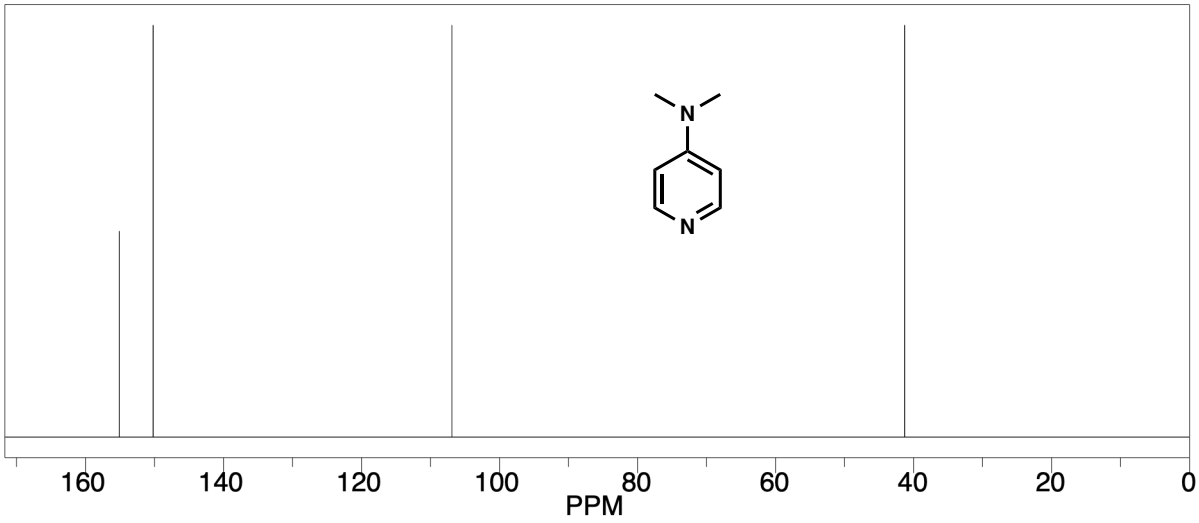
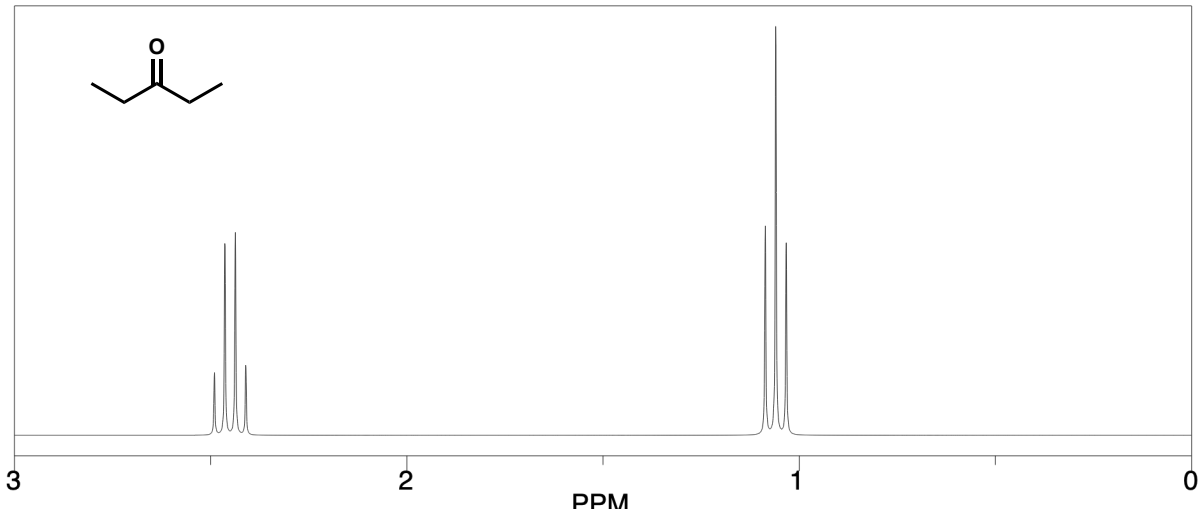
Esercizio 1
Scrivi il numero dei diversi ambienti chimici per i composti riportati in tabella.

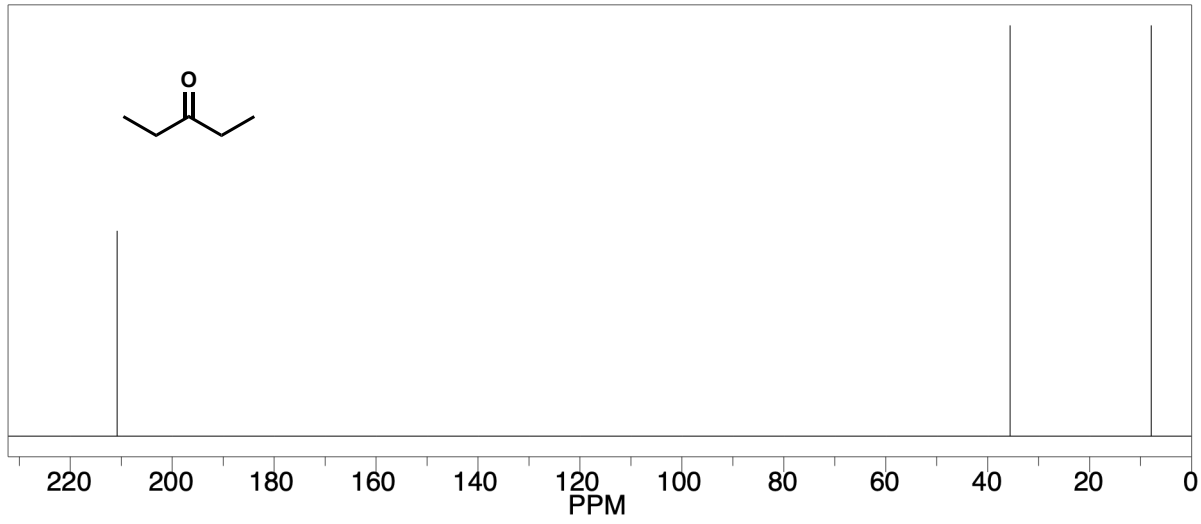
Struttura	Numero di ambienti dei protoni	Numero di ambienti dei carboni
		
		
		
		
		
		
		
		
		

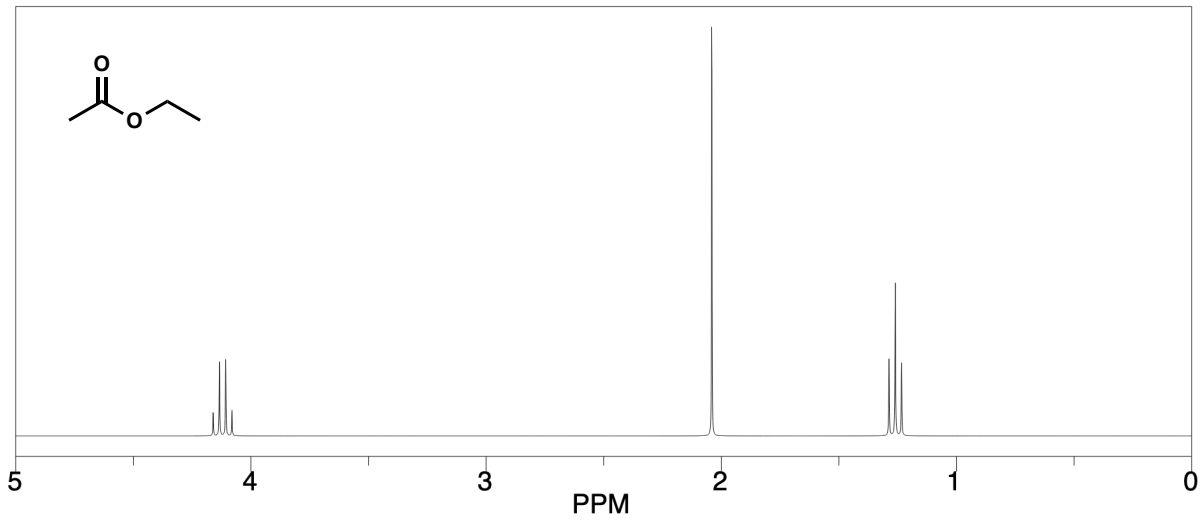
Esercizio 2
Di seguito sono riportati degli spettri NMR protonici e del ^{13}C con la relativa struttura della molecola. Attribuisci i picchi ai corrispondenti protoni e carboni e spiega il tuo ragionamento. Utilizza le lettere per indicare i protoni e i numeri per indicare i carboni.

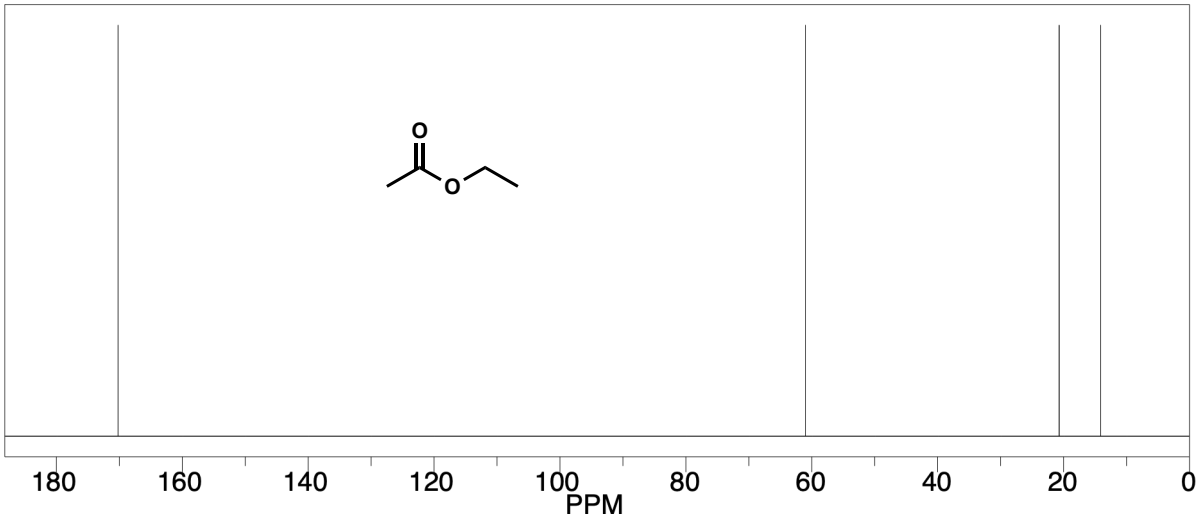


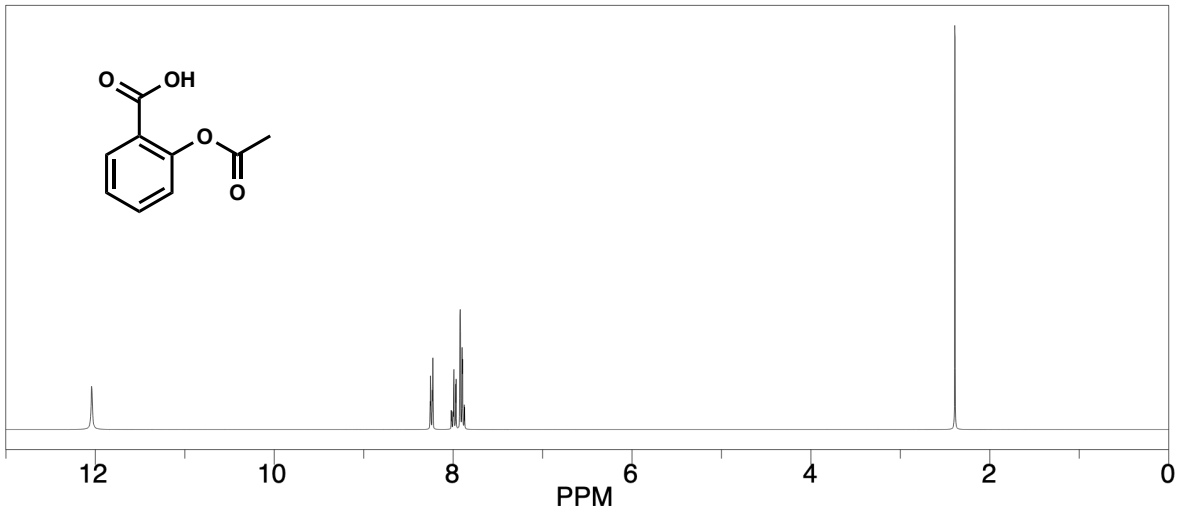


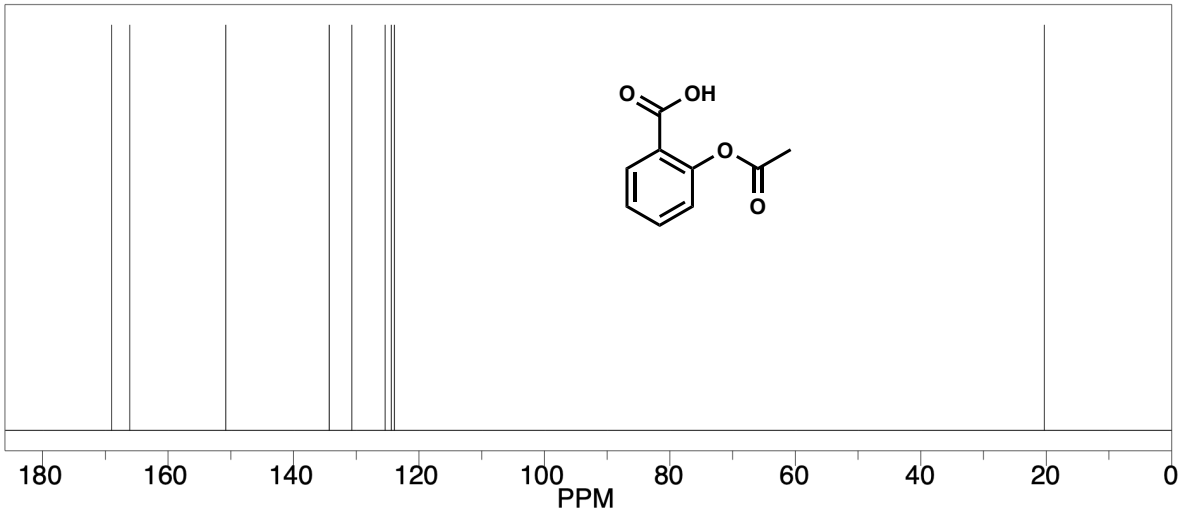

O
3
2
1
0
PPM

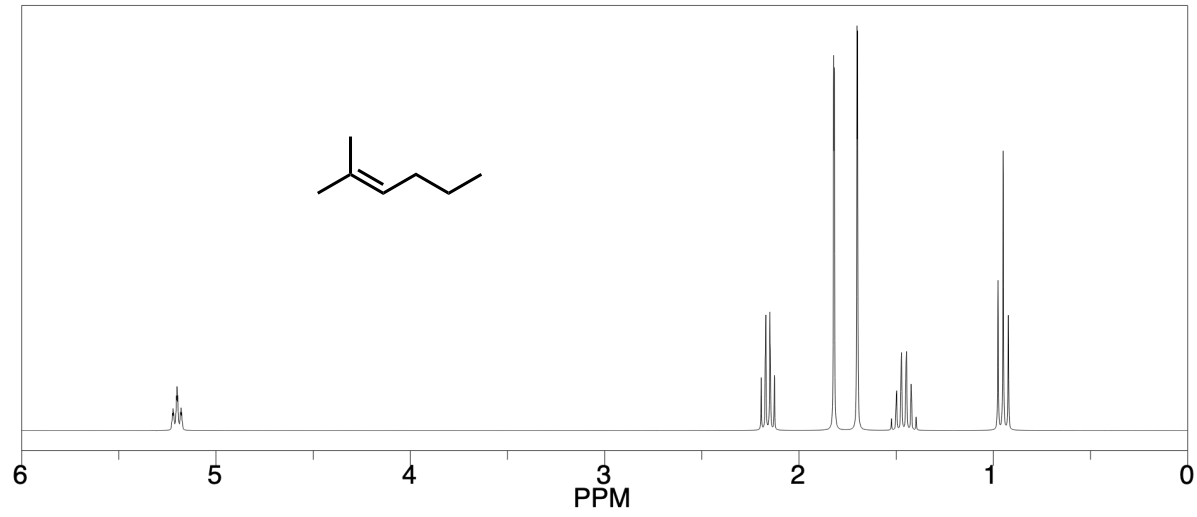

O
220
200
180
160
140
120
100
80
60
40
20
0
PPM

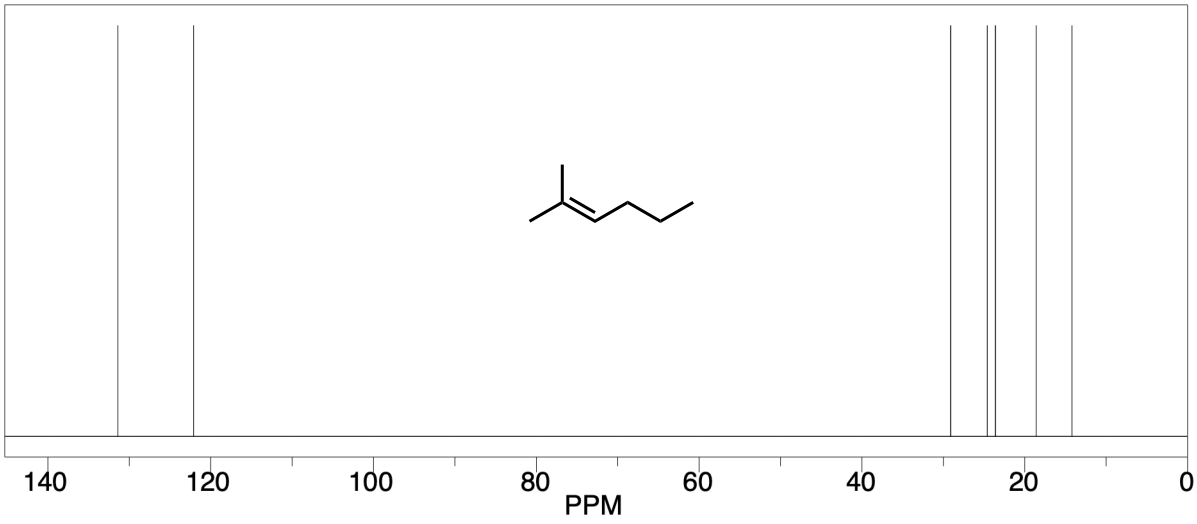

O
O
5
4
3
2
1
0
PPM


O
O
180
160
140
120
100
80
60
40
20
0
PPM


O
OH
O
O
12
10
8
6
4
2
0
PPM


O
OH
O
O
180
160
140
120
100
80
60
40
20
0
PPM

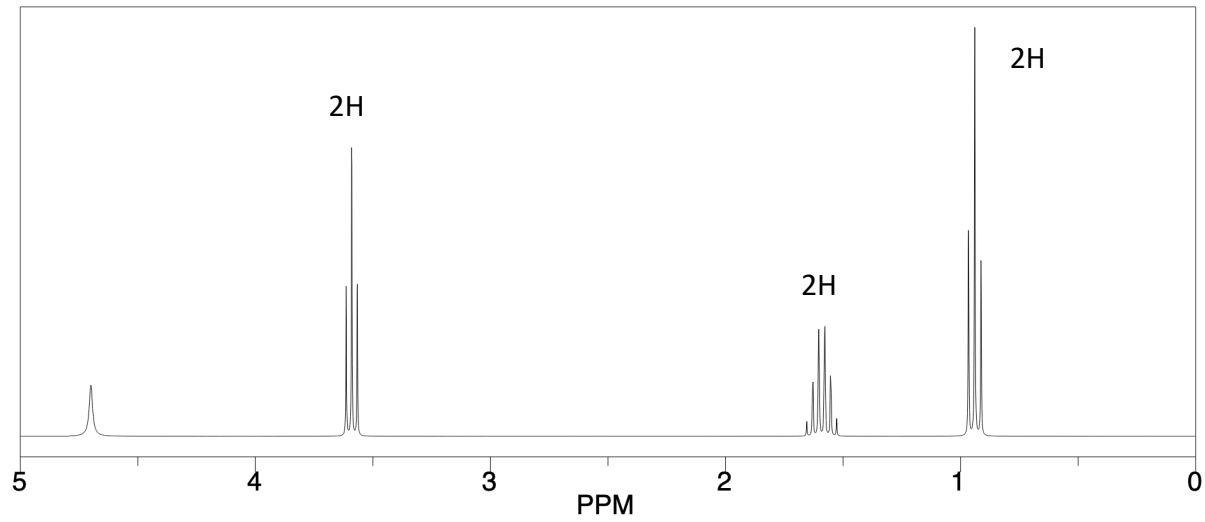

6
5
4
3
2
1
0
PPM

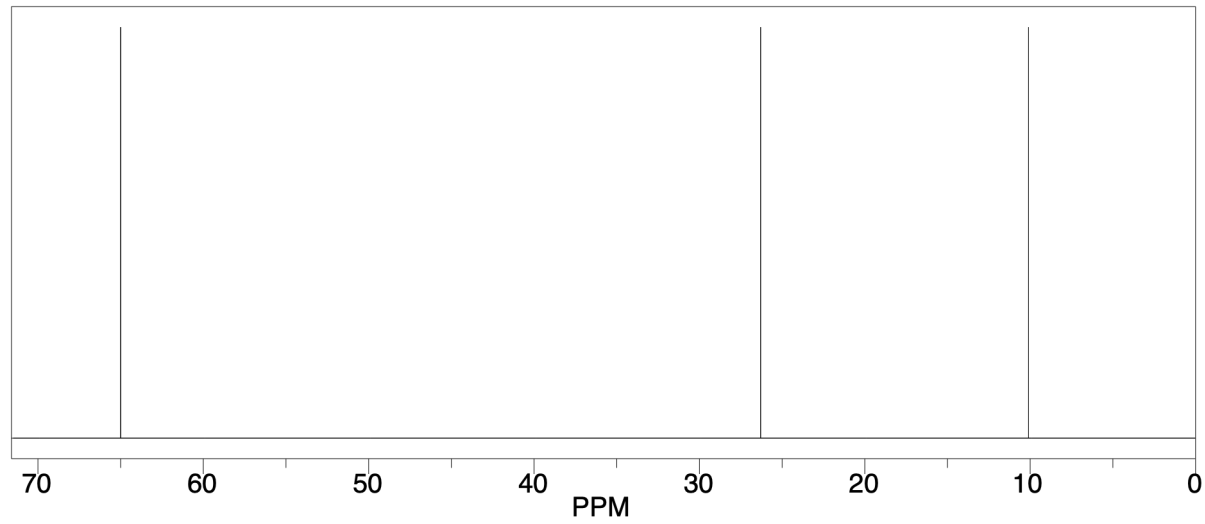

140
120
100
80
60
40
20
0
PPM

Esercizio 3
Di seguito sono riportati degli spettri NMR protonici e del ^{13}C con la relativa formula molecolare. Identifica la struttura della molecola. Utilizza le lettere per indicare i protoni e i numeri per indicare i carboni.

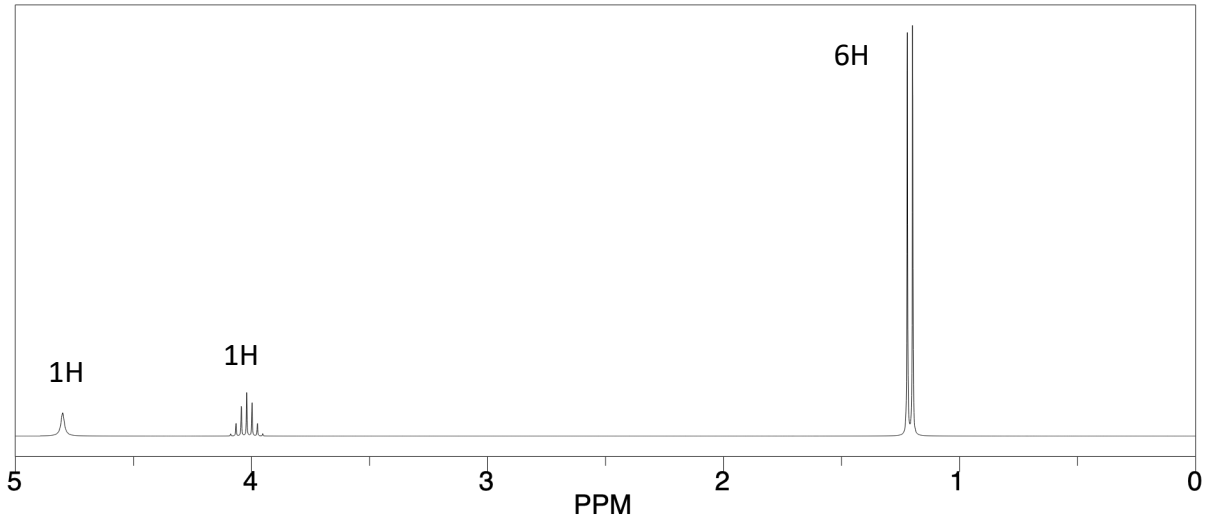
Consiglio: inizia determinando il grado di insaturazione: $\#Carboni - \frac{\#Idrogeni}{2} - \frac{\#Alogeni}{2} + \frac{\#Azoti}{2} + 1$

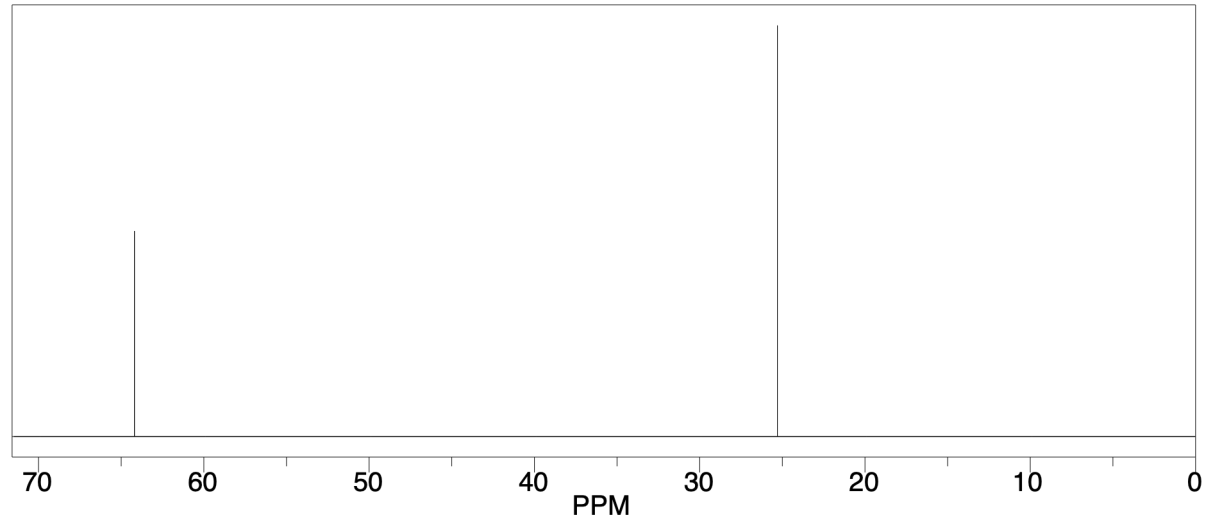
C_3H_8O



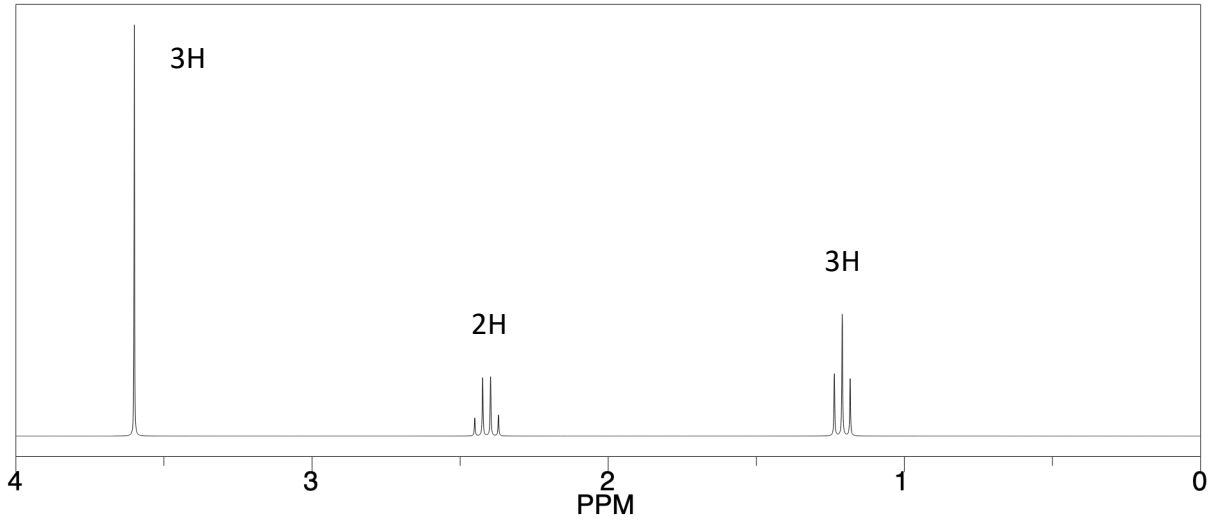


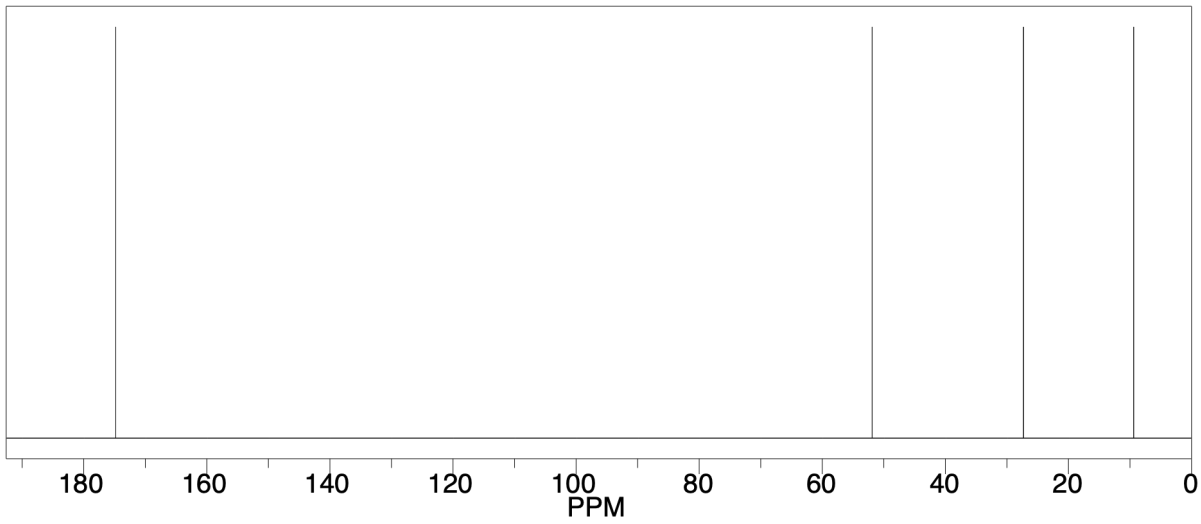
C_3H_8O



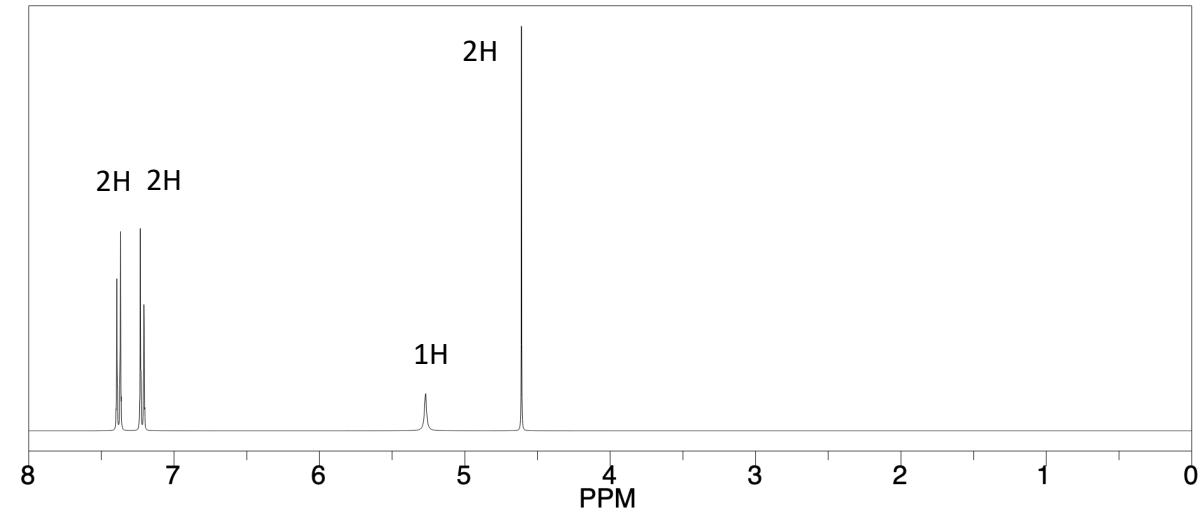


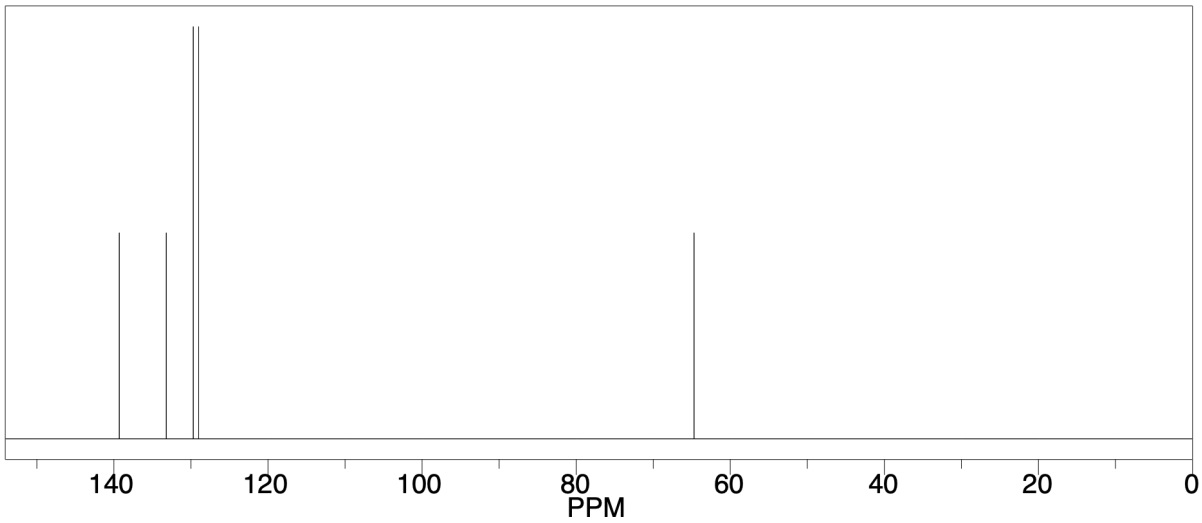
$C_4H_8O_2$



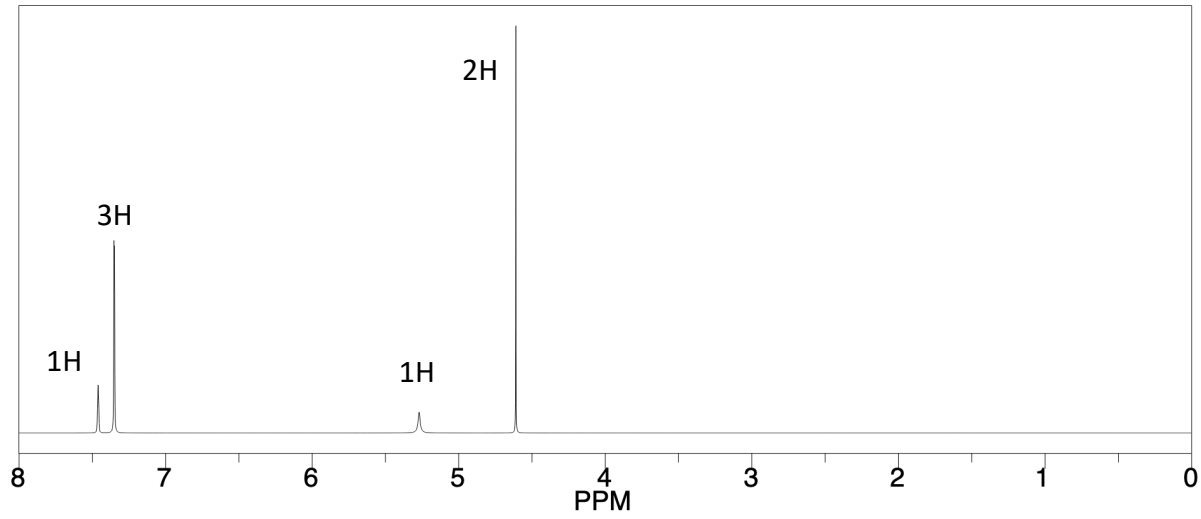


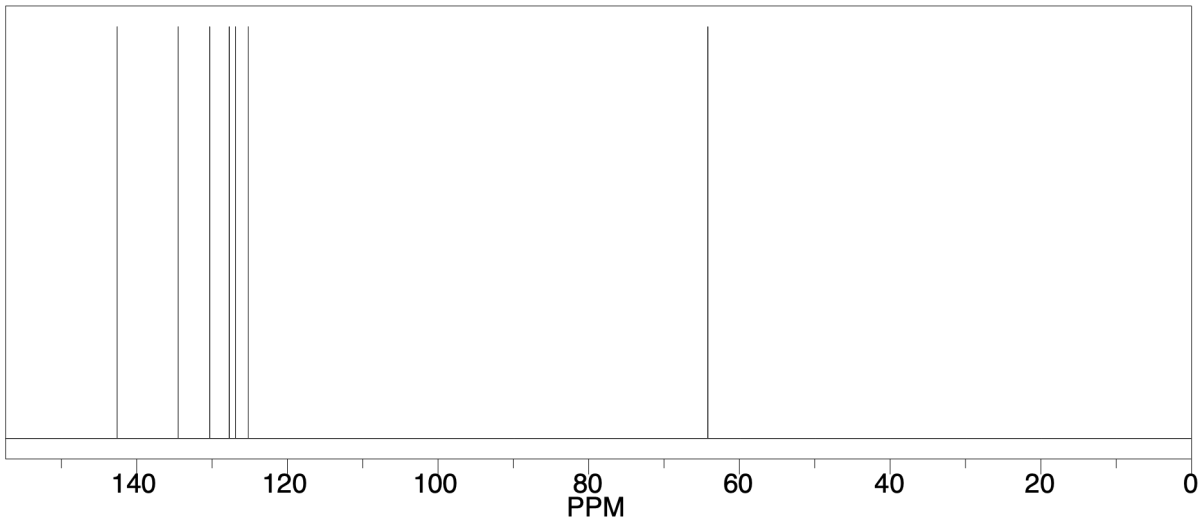
C_7H_7ClO





C_7H_7ClO





C_7H_7ClO