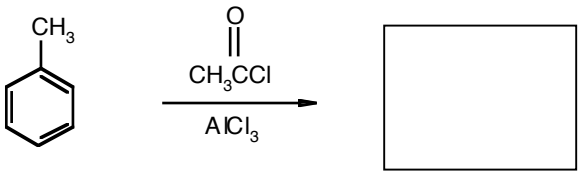
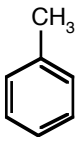
Names:_____ Sec. _____

Chem 227 / Dr. Rusay / Electrophilic Aromatic Substitution Reactions



Clearly indicate the chemically equivalent carbon atoms and the chemically equivalent hydrogen atoms for the starting compound including multiplicity of nmr signals and approximate chemical shifts.

Carbon:



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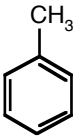
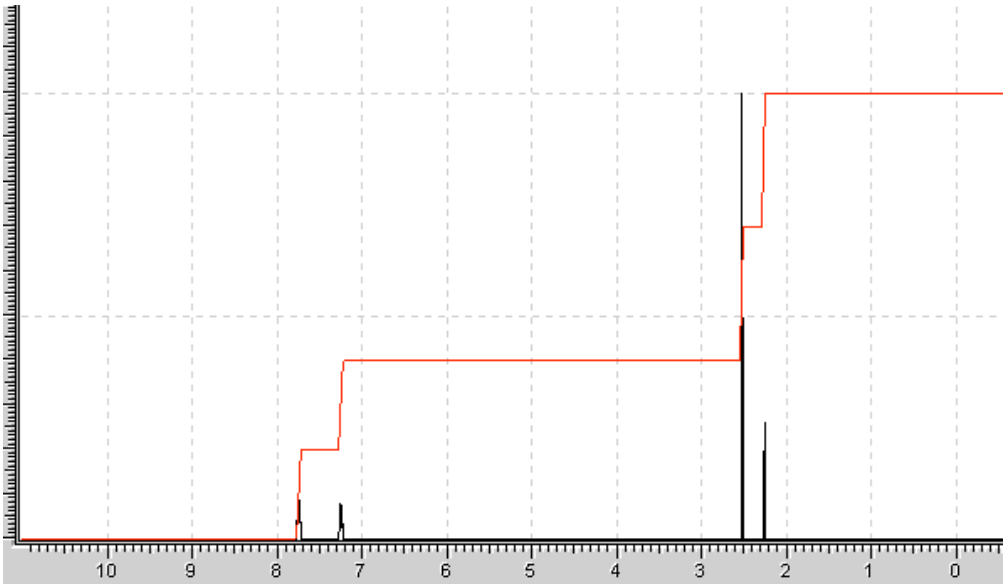
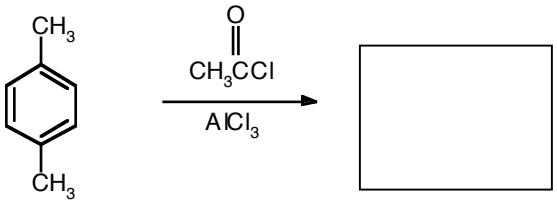


The ^{1}H nmr spectra is of one of the two possible products formed in the reaction. The ^{13}C nmr spectra is for the other. Draw the respective structures and assign the peaks to the structures. Identify which one is the sole product in the reaction.



13 C ppm 20.9 (q) 25.6 (q) 128.7 (d) 129.1 (d) 135.4 (s) 143.3 (s) 195.7 (s)	Explain how IR could be used to distinguish between the starting material and products.



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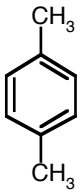
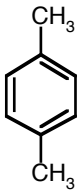
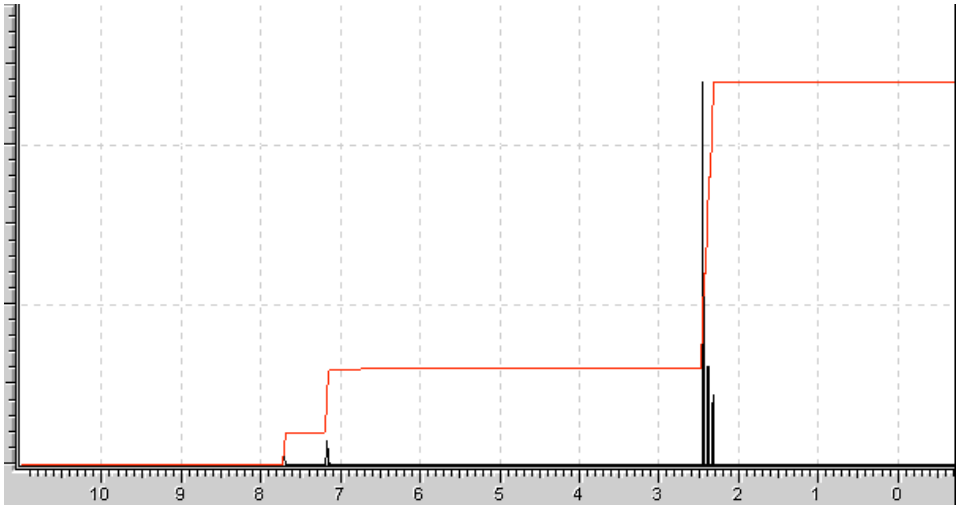
Carbon:



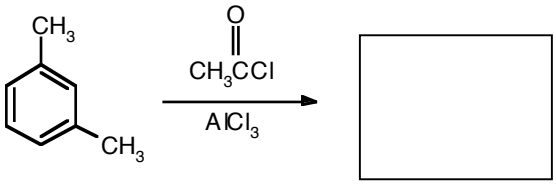
Hydrogen:



The ^{1}H nmr spectra and the ^{13}C nmr spectra are provided for the product. Draw the structure of the product and assign the peaks to the structure.

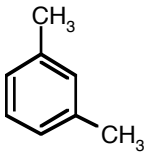


Carbon 13	Explain how IR could be used to distinguish between the starting material and products.
18.2 q 20.9 q 27.0 q 129.0 d 129.2 d 133.5 d 134.6 s 134.8 s 138.0 s 196.5 s	

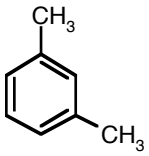


Clearly indicate the chemically equivalent carbon atoms and the chemically equivalent hydrogen atoms for the starting compound including multiplicity of nmr signals and approximate chemical shifts.

Carbon:



Hydrogen:



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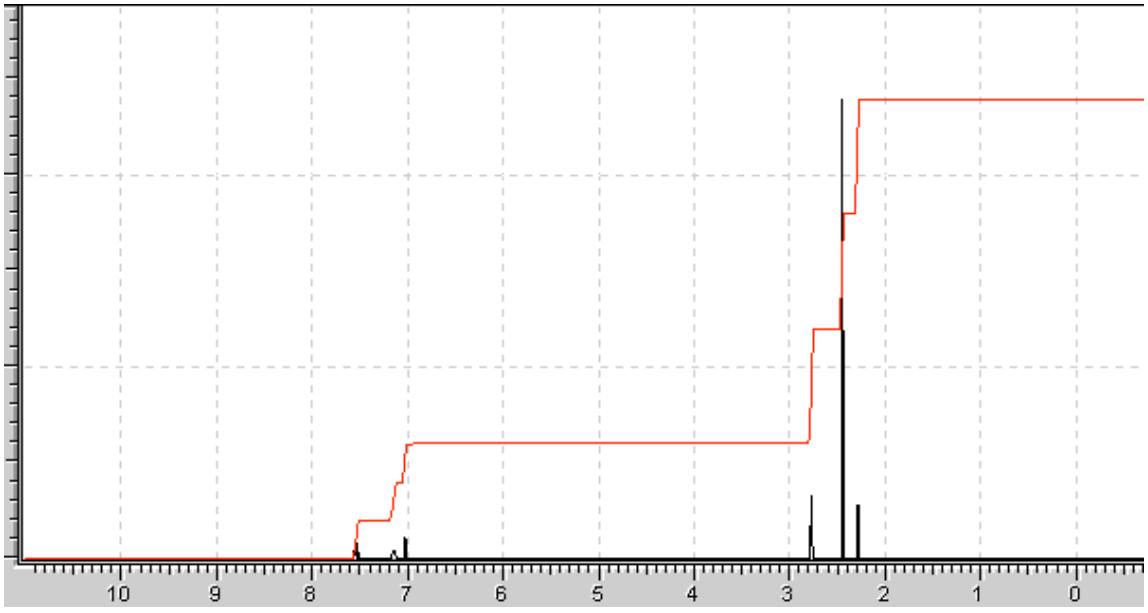
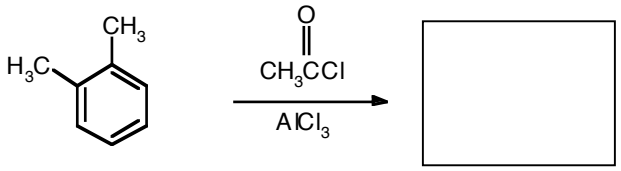
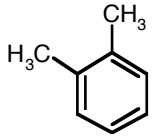


Carbon $_{13}$	Explain how IR could be used to distinguish between the starting material and products.
18.5 q 27.0 q 126.1 d 132.7 d 137.7 s 138.8 s 196.5 s	

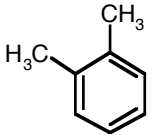


Clearly indicate the chemically equivalent carbon atoms and the chemically equivalent hydrogen atoms for the starting compound including multiplicity of nmr signals and approximate chemical shifts.

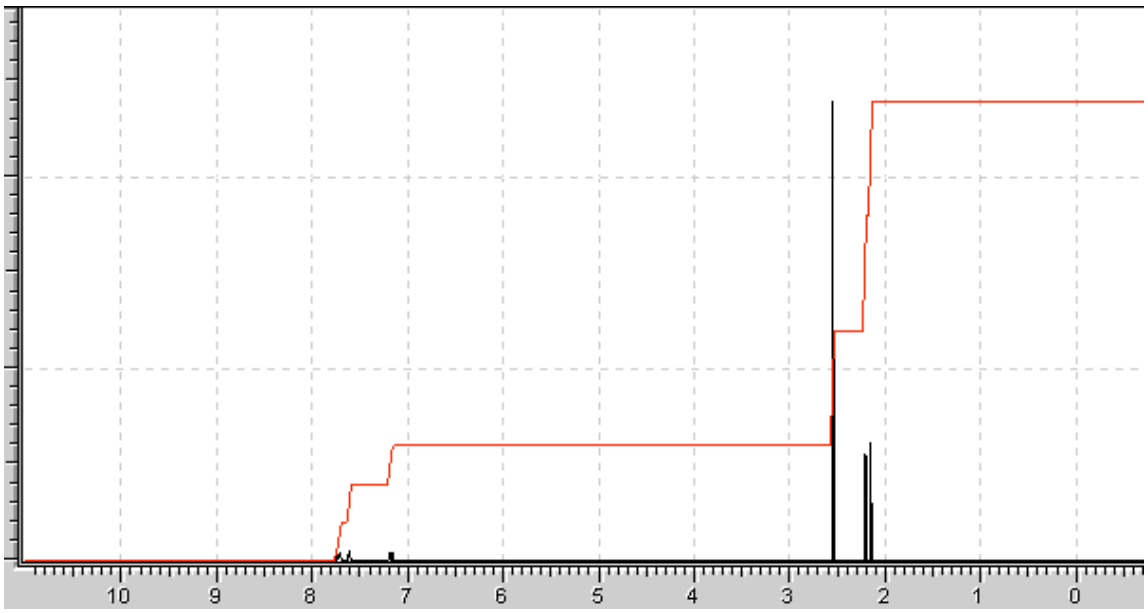
Carbon:



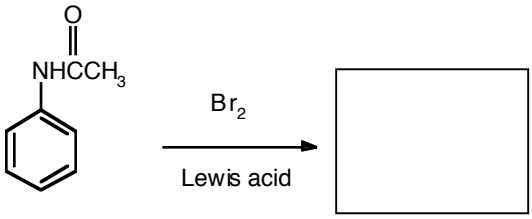
Hydrogen:



The ^{1}H nmr spectra is of one of the two products formed in the reaction. The ^{13}C nmr spectra is for the other. Draw the respective structures and assign the peaks to the structures.

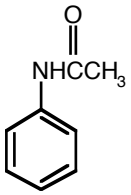


Carbon $_{13}$	Explain how IR could be used to distinguish between the starting material and products.
15.7 q 18.4 q 27.0 q 125.5 d 125.3 d 133.5 d 138.0 s 138.3 s 138.5 s 196.5 s	

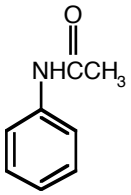


Clearly indicate the chemically equivalent carbon atoms and the chemically equivalent hydrogen atoms for the starting compound including multiplicity of nmr signals and approximate chemical shifts.

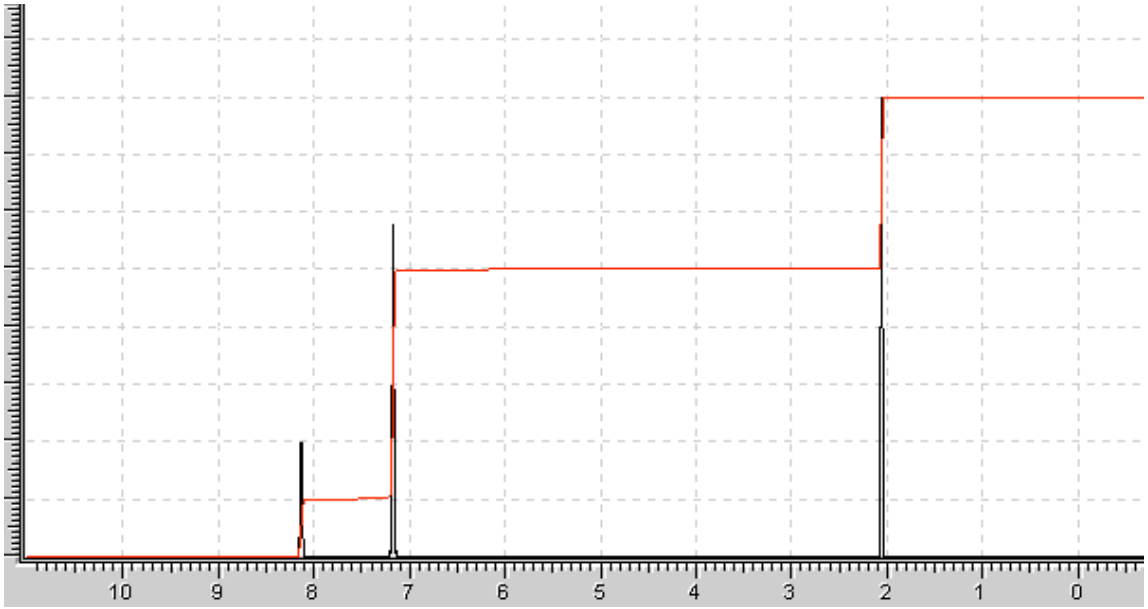
Carbon:



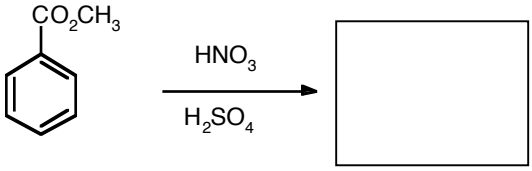
Hydrogen:



The ^{1}H nmr spectra and the ^{13}C nmr spectra are provided for the product. Draw the structure of the product and assign the peaks to the structure.

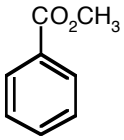


Carbon $_{13}$	Explain how IR could be used to distinguish between the starting material and products.
17.6 q 118.7 s 122.6 d 132.0 d 139.8 s 168.2 s	

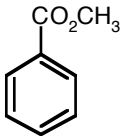


Clearly indicate the chemically equivalent carbon atoms and the chemically equivalent hydrogen atoms for the starting compound including multiplicity of nmr signals and approximate chemical shifts.

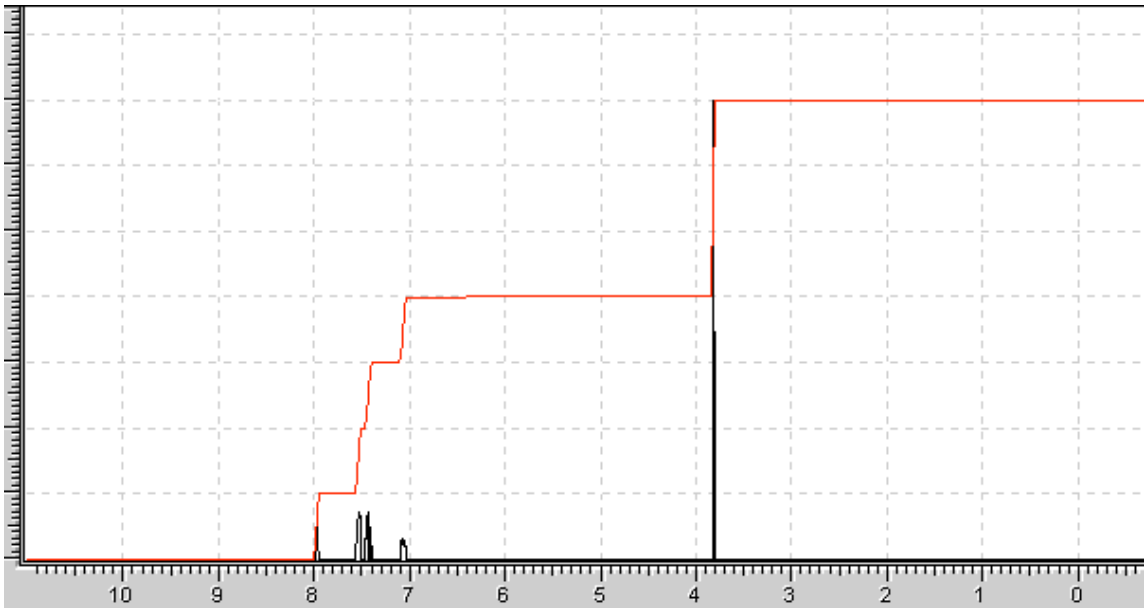
Carbon:



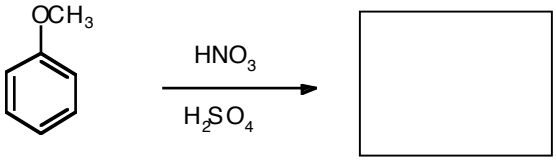
Hydrogen:



The ^{1}H nmr spectra and the ^{13}C nmr spectra are provided for the product. Draw the structure of the product and assign the peaks to the structure.

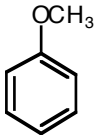


Carbon $_{13}$ 50.0 q 124.8 d 127.9 d 129.3 d 167.0 s 131.4 s 135.8 d 148.3 s	Explain how IR could be used to distinguish between the starting material and products.

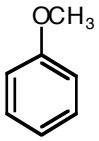


Clearly indicate the chemically equivalent carbon atoms and the chemically equivalent hydrogen atoms for the starting compound including multiplicity of nmr signals and approximate chemical shifts.

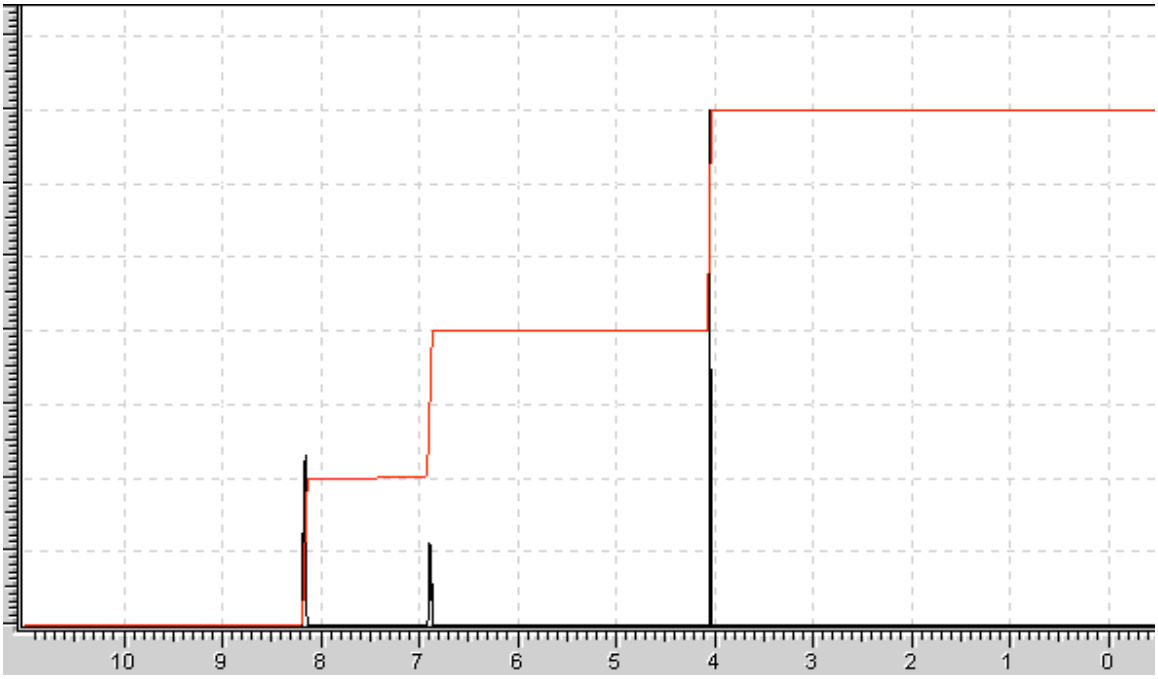
Carbon:



Hydrogen:



The ^{1}H nmr spectra and the ^{13}C nmr spectra are provided for the product. Draw the structure of the product and assign the peaks to the structure.



^{13}C ppm 55.9 (q) 113.6 (d) 125.1 (d) 141.0 (s) 163.8 (s)	Explain how IR could be used to distinguish between the starting material and products.