

كلية : التربية للعلوم الصرفة

القسم او الفرع : الكيمياء

المرحلة : الرابعة

أستاذ المادة : أ.م.د. نبيل ياسين جمعة الهيتي

اسم المادة باللغة العربية : التشخيص العضوي

اسم المادة باللغة الإنكليزية : Organic Identification

اسم المحاضرة التاسعة باللغة العربية : تطبيقات ($^1\text{H-NMR}$) في تشخيص المركبات العضوية

اسم المحاضرة التاسعة باللغة الإنكليزية : Application($^1\text{H-N.M.R}$) spectrum in identification

organic compounds

المحاضرة التاسعة

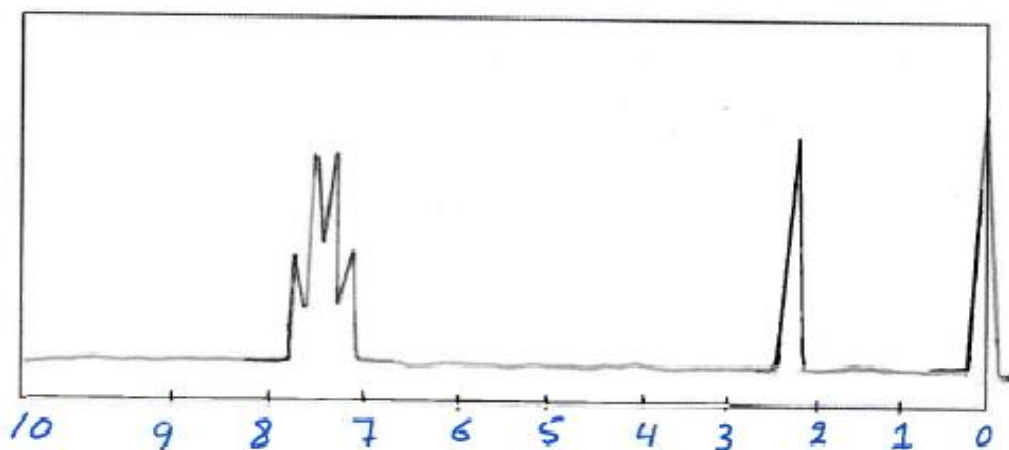
تطبيقات ($^1\text{H-NMR}$) في تشخيص المركبات العضوية :(Application($^1\text{H-N.M.R}$) spectrum in identification organic compounds)

Example (1) :

Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_8\text{H}_7\text{OCl}$) with explain relative signals .

مثال (1) :

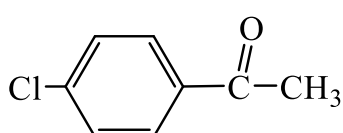
شخص المركب العضوي الذي اعطى طيف ($^1\text{H-NMR}$) له الشكل التالي وصيغته الجزيئية هي ($\text{C}_8\text{H}_7\text{OCl}$) مع توضيح عائدة الاشارات .



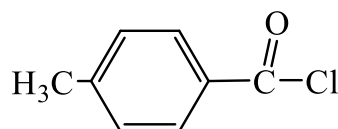
الحل :

من الطيف نستنتج الاتي :

- 1- الاشارة الاحادية عند (2.2 ppm) تعود الى البروتونات في المجموعة ($\text{C}-\text{CH}_3$) او $\text{Ph}-\text{CH}_3$
- 2- الاشارة الرباعية المنتاسقة عند (8-7 ppm) تعود الى بروتونات الحلقة الاروماتية ثنائية التعويض في موقع بارا ($p-$) بمجموعتين مختلفتين .
- 3- الصيغ التركيبية المتوقعة للمركب هي :



or



Example (2) :

Draw the ($^1\text{H-NMR}$) spectrum for the Organic Compound (2-butanone) with explain relative signals ?

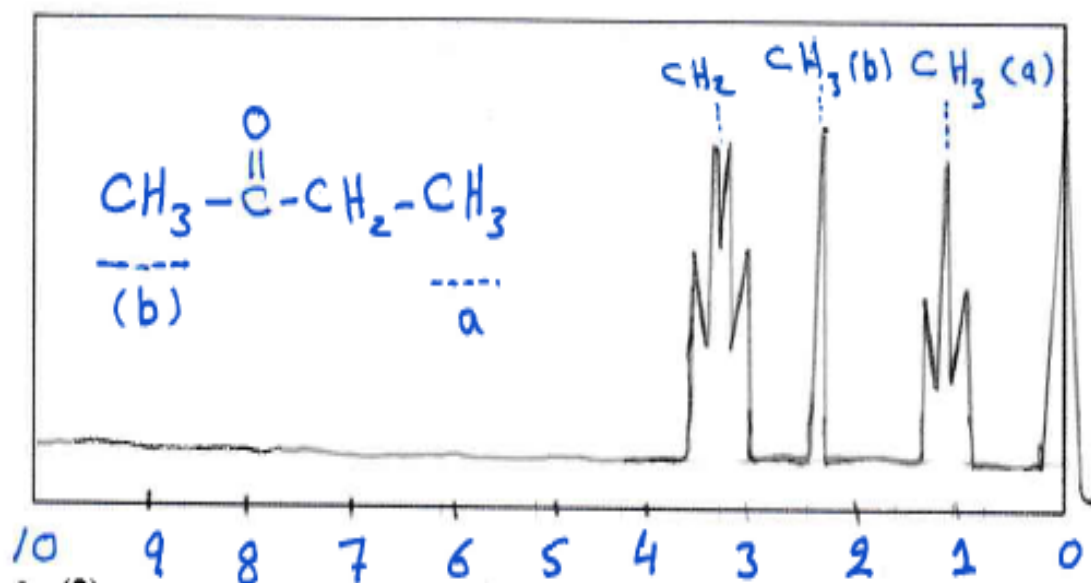
مثال (2) :

ارسم طيف ($^1\text{H-NMR}$) للمركب (2-butanone) مع توضيح عائديه الاشارات ؟

الحل :

في حل هذا السؤال نتبع الخطوات التالية :

- 1- نكتب الصيغة التركيبية للمركب ($\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{CH}_3$).
- 2- نحدد نوع البروتونات .
- 3- تسلسل الاشارات .
- 4- شكل الاشارة .
- 5- رسم الطيف .



Example (3) :

The Organic Compound unknown it has molecular formula ($C_6H_{10}O_2$) which gives these signals: singlet (2.2) and singlet (2.8) by measurement (δ). Identification these signals and gave the structure formula expected for this compound ?

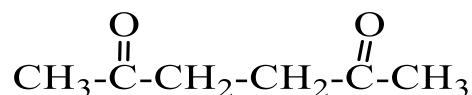
مثال (3) :

مركب عضوي مجهول صيغته الجزيئية ($C_6H_{10}O_2$) اعطى الاشارات التالية : احادية عند (2.2) و احادية عند (2.8) بمقياس (δ) . شخص الاشارات واعط الصيغة التركيبية المتوقعة لهذا المركب .

الحل :

نستنتج من الطيف الاتي :

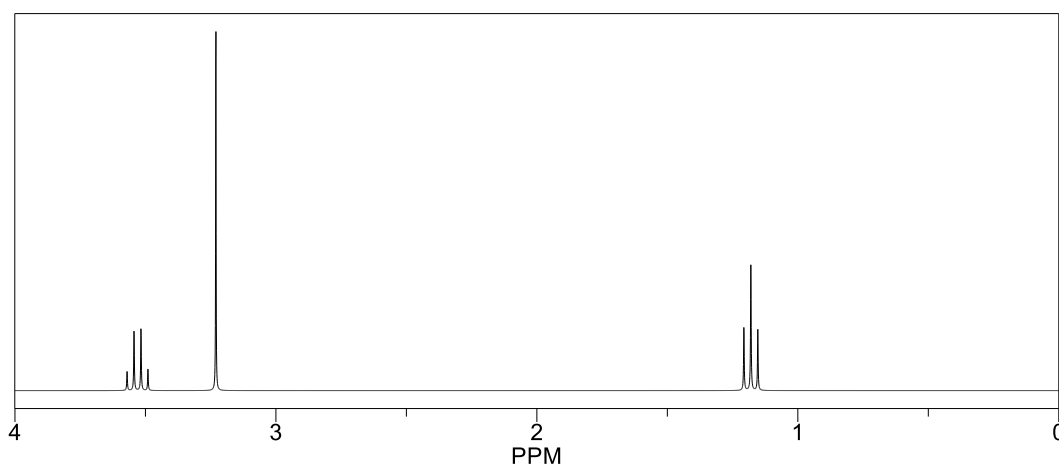
- 1- عدم وجود اشارة عند المدى (7 – 8) يدل على ان المركب اليقاتي .
- 2- الاشارة الاحادية عند (2.2) تعود لمجموعة المثيل كاربونيل ($CH_3-C=O$) .
- 3- الاشارة الاحادية عند (2.8) تعود لبروتونات ($CH_2-C=O$) .
- 4- بما انه لا توجد اشارت اخرى فهذا يدل على ان البروتونات المتبقية والتي عددها ضعف البروتونات المشخصة هي بروتونات لها نفس البيئة الالكترونية للبروتونات في النقطة (2 و 3) اي تظهر بنفس المكان وهي ($CH_3-C=O$ و $CH_2-C=O$) .
- 5- اي ان الصيغة التركيبية المتوقعة للمركب هي :

**Example (4) : (H.W)**

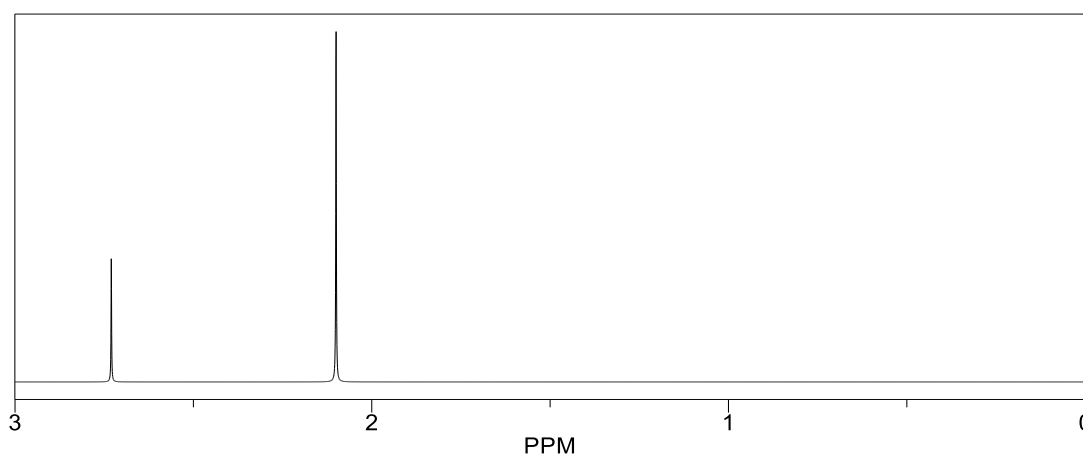
Draw the (1H -NMR) spectrum for the Organic Compound (ph-CO- CH_2CH_3) with explain relative signals ?

مسائل في طيف $^1\text{H-NMR}$:

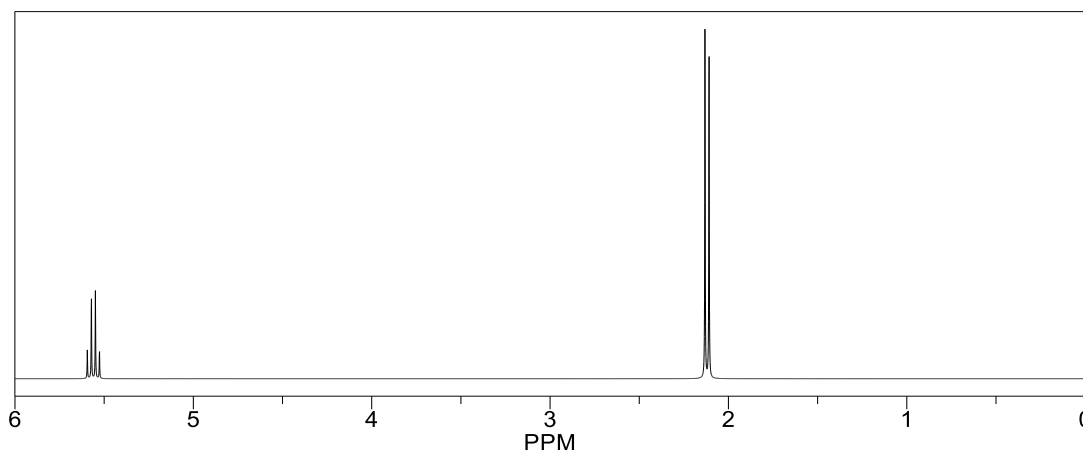
Q1 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_3\text{H}_8\text{O}$) with explain relative signals .



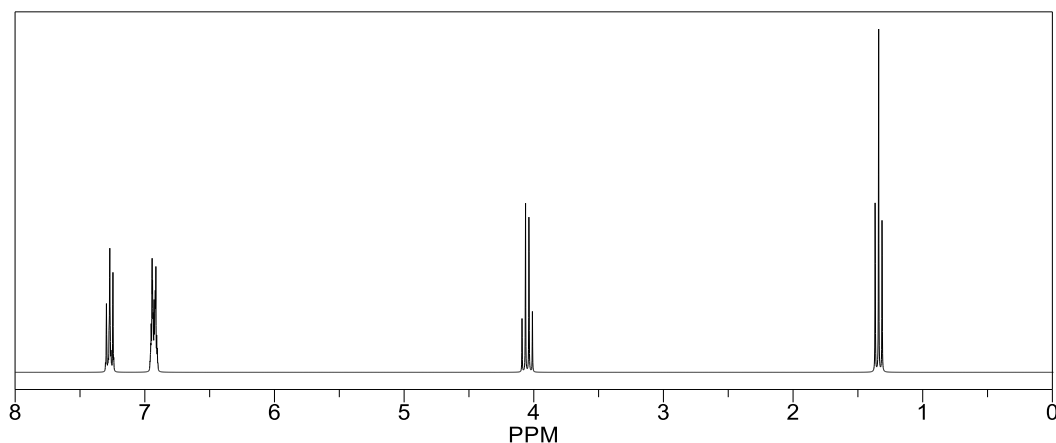
Q2 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_6\text{H}_{10}\text{O}_2$) with explain relative signals .



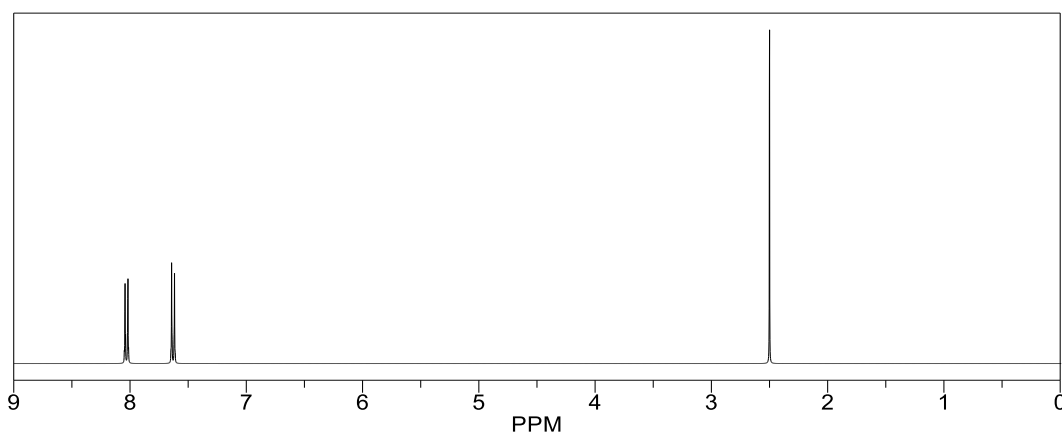
Q3 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_2\text{H}_4\text{Cl}_2$) with explain relative signals .



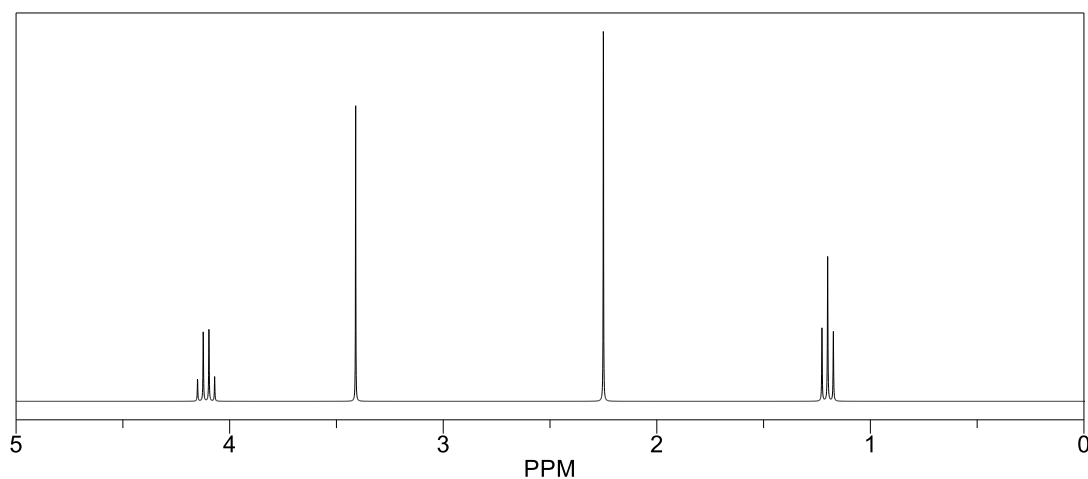
Q4 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_8\text{H}_{10}\text{O}$) with explain relative signals .



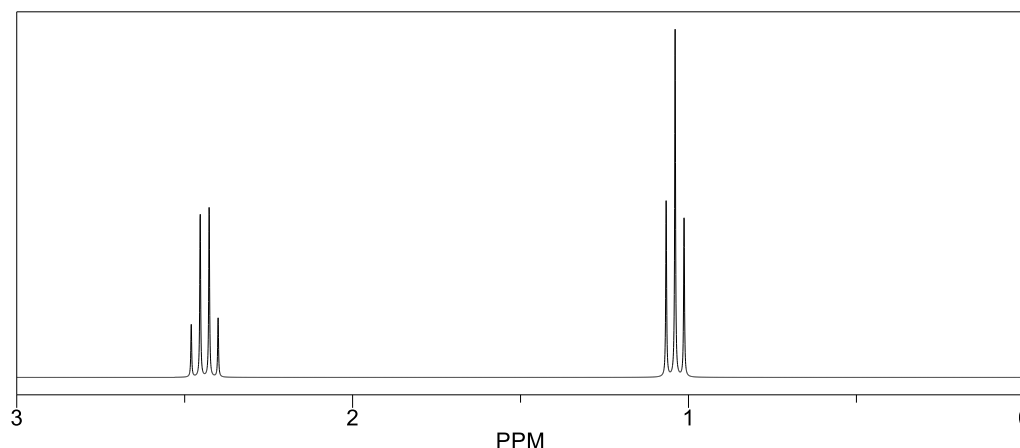
Q5 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_8\text{H}_7\text{OBr}$) with explain relative signals .



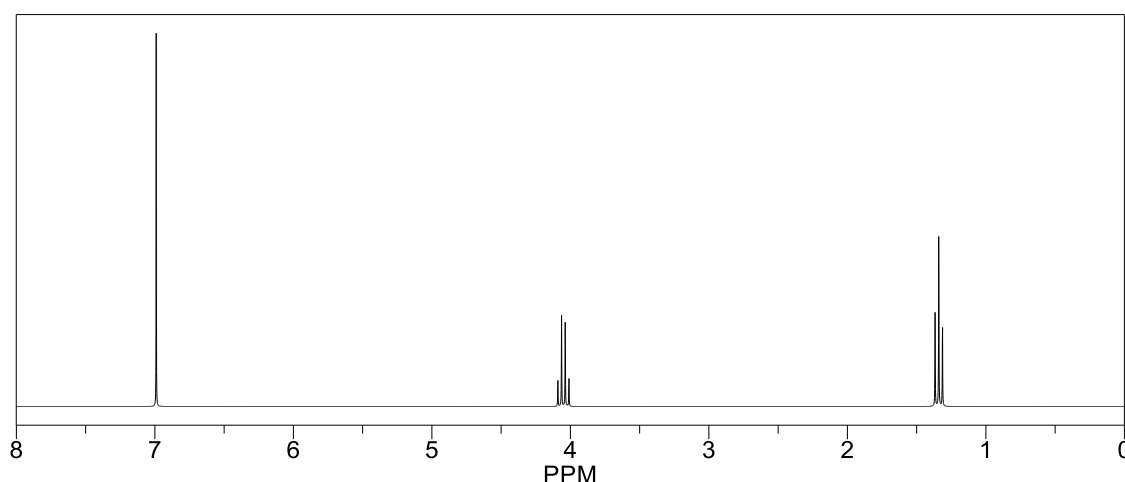
Q6 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_6\text{H}_{10}\text{O}_3$) with explain relative signals .



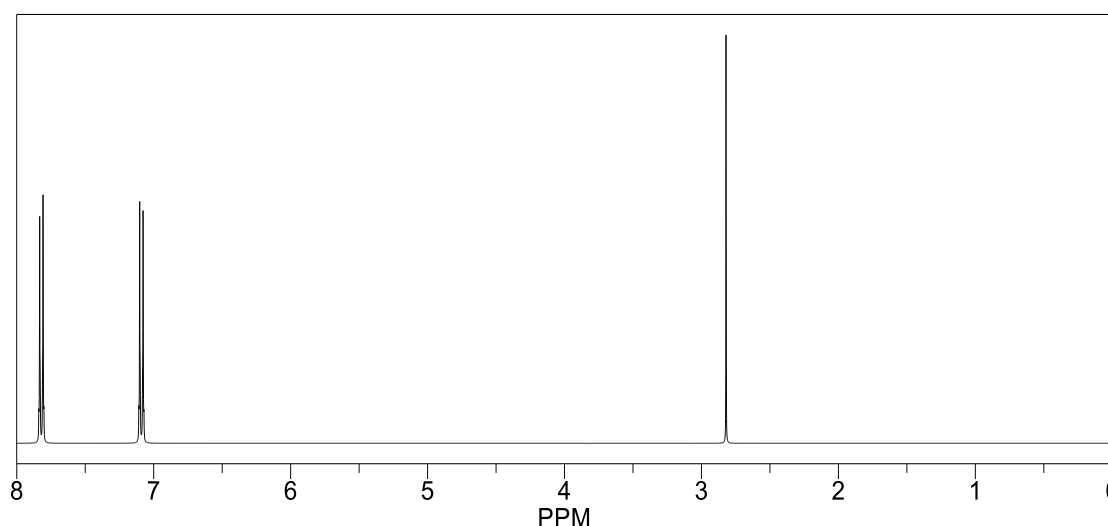
Q7 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_6\text{H}_{10}\text{O}_2$) with explain relative signals .



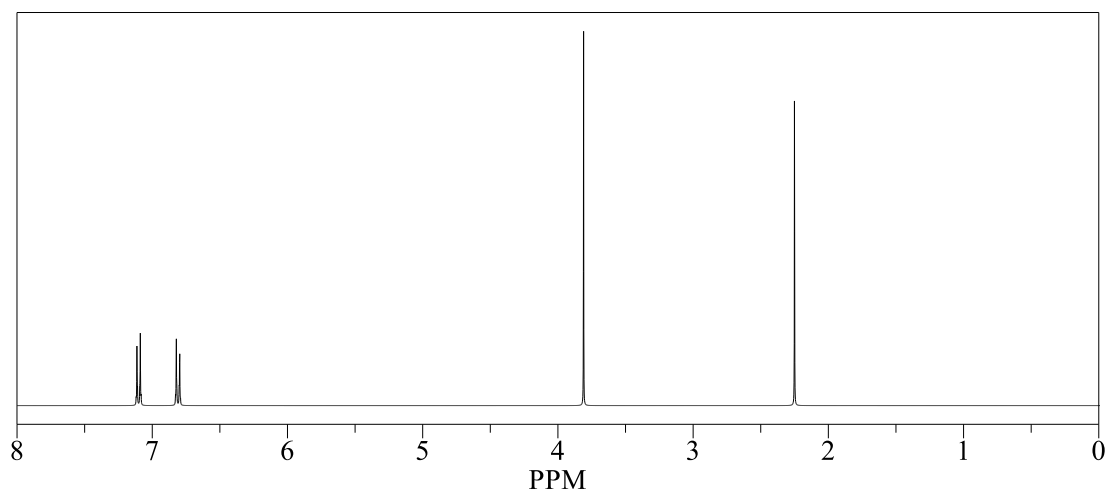
Q8 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_{10}\text{H}_{14}\text{O}_2$) with explain relative signals .



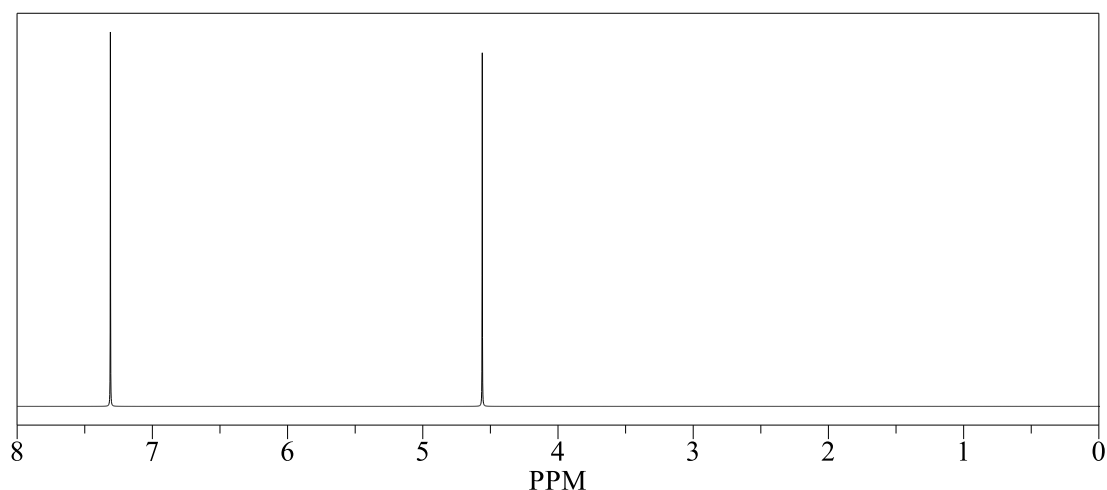
Q9 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_{14}\text{H}_{12}\text{Br}_2$) with explain relative signals .



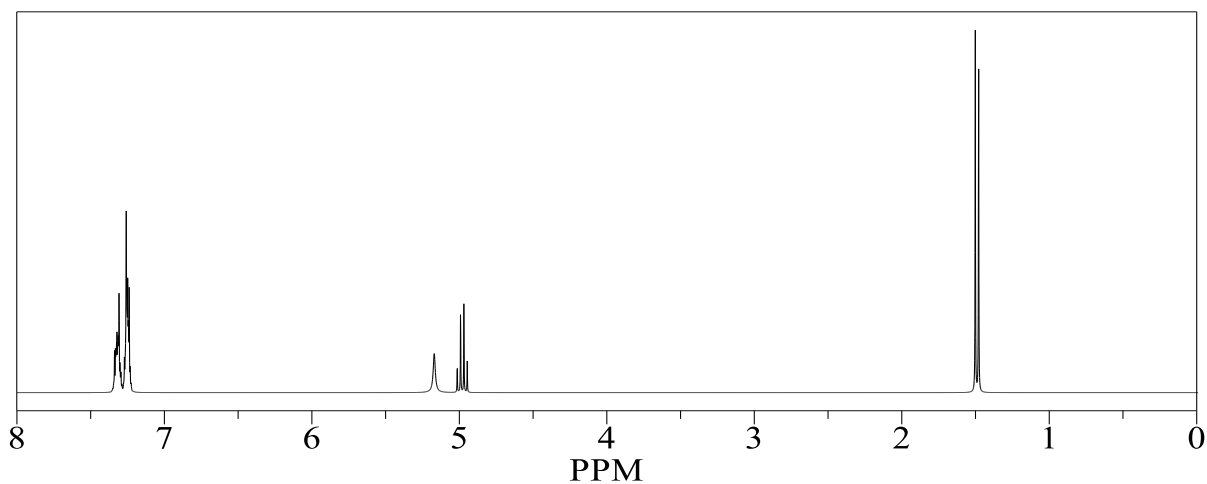
Q10 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_8\text{H}_{10}\text{O}$) with explain relative signals .



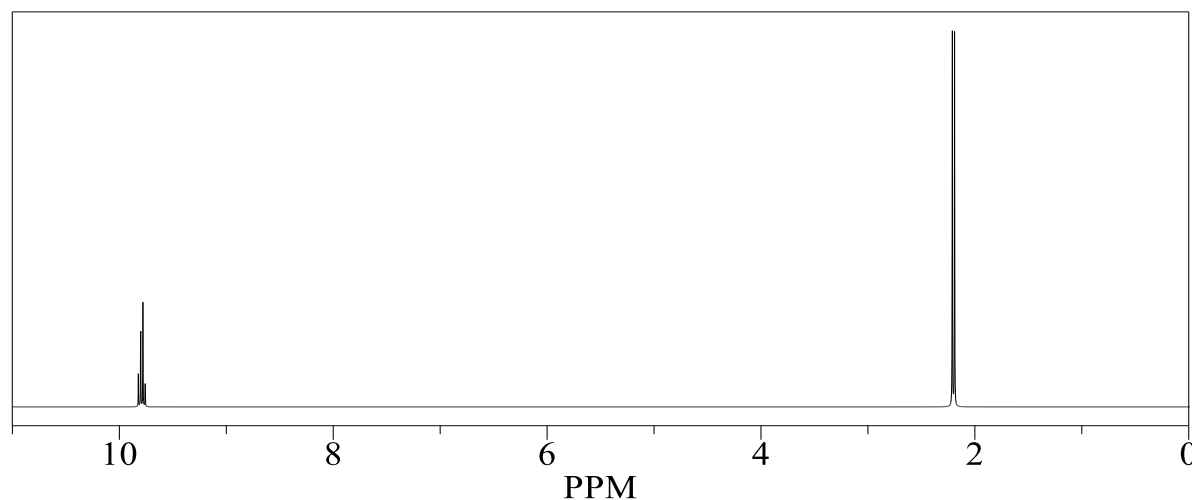
Q11 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_8\text{H}_8\text{Br}_2$) with explain relative signals .



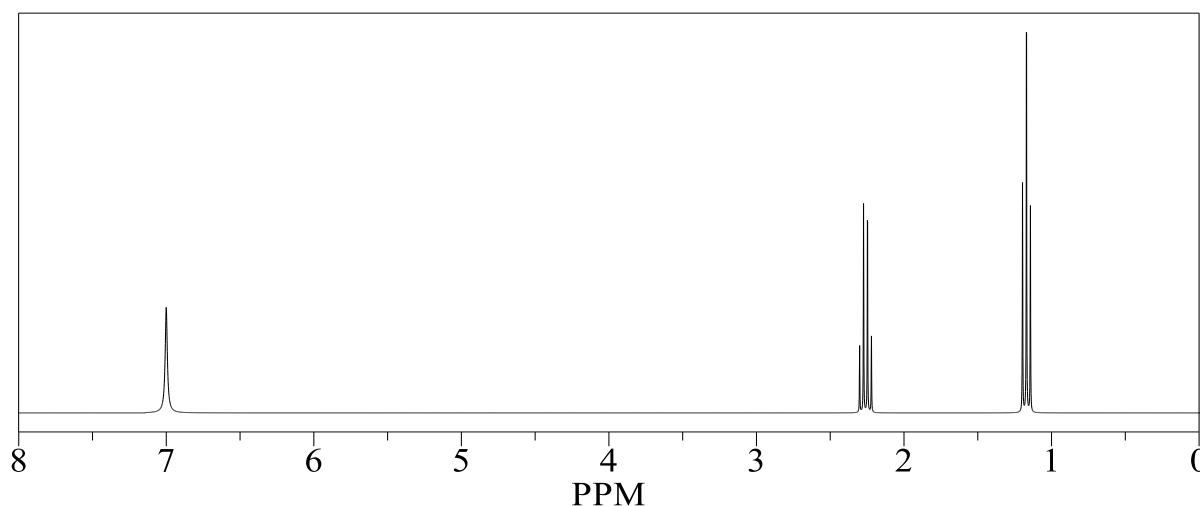
Q12 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_8\text{H}_{10}\text{O}$) with explain relative signals .



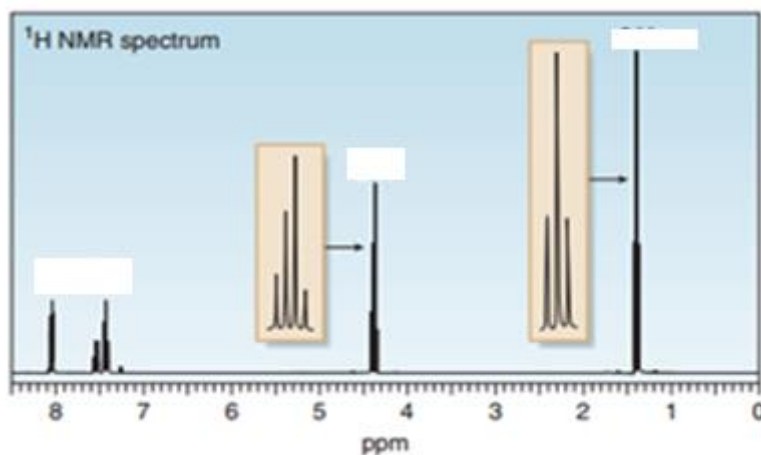
Q13 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_2\text{H}_4\text{O}$) with explain relative signals .



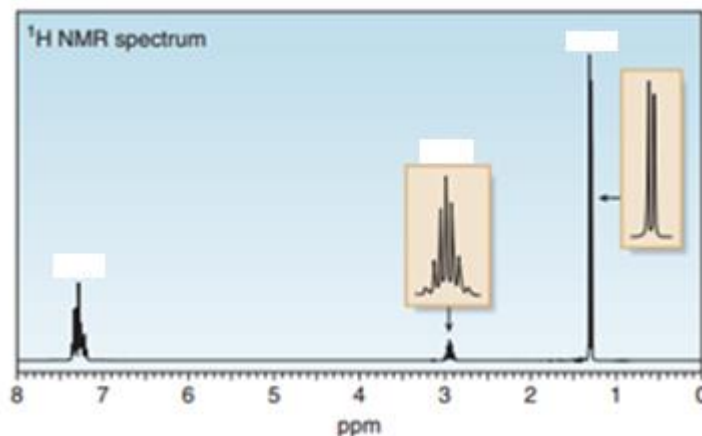
Q14 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_3\text{H}_7\text{ON}$) with explain relative signals .



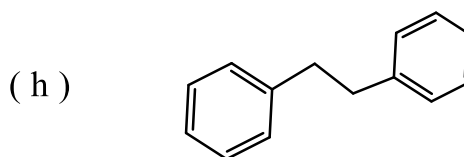
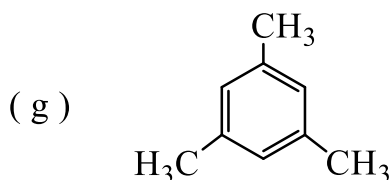
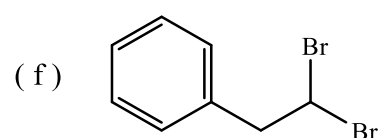
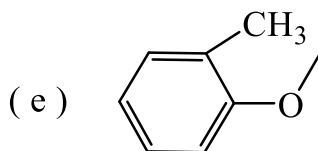
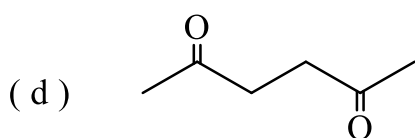
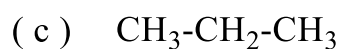
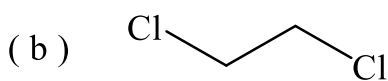
Q15 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula ($\text{C}_9\text{H}_{10}\text{O}_2$) with explain relative signals .

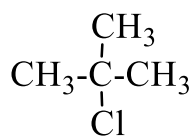


Q16 : Identification the Organic Compound unknown which gave him this ($^1\text{H-NMR}$) spectrum figure and the molecular formula (C_9H_{12}) with explain relative signals .



Q17 : Draw the ($^1\text{H-NMR}$) spectrum for these Organic Compounds with explain relative signals .

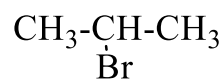


س18 : اعط فقط عدد الاشارات لطيف ($^1\text{H-NMR}$) للمركبات التالية :

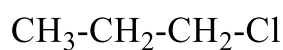
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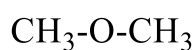
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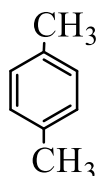
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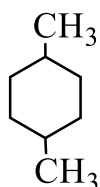
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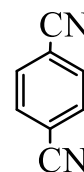
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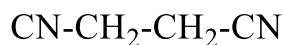
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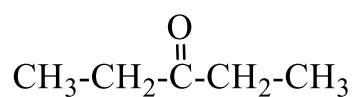
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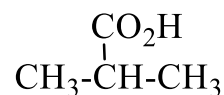
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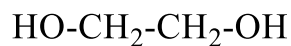
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