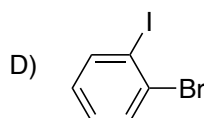
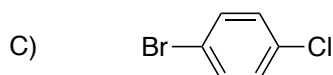
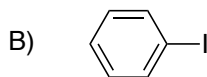
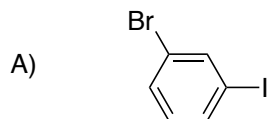
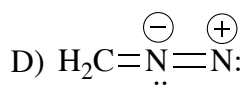
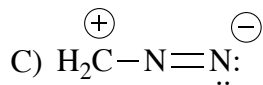
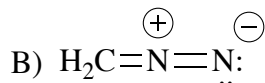
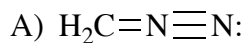
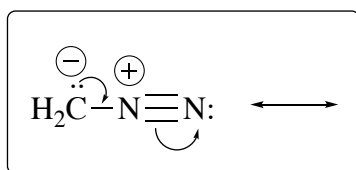


# You are not allowed to post this quiz on the internet!

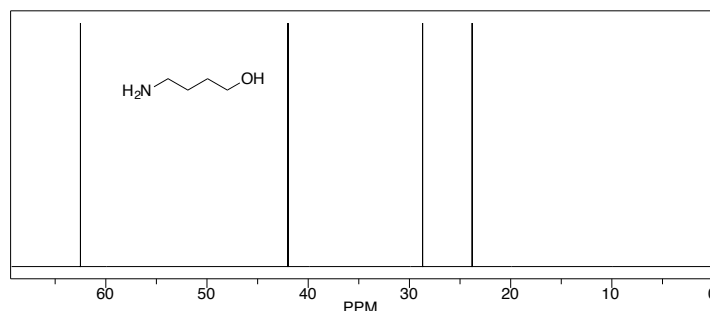
1. Which of the following compounds is expected to show four signals in the  $^1\text{H}$  NMR spectrum: one singlet, two doublets and one triplet.



2. Which one of the following structures represents resonance contributor of molecule in the box in agreement with the shown curved arrows?



3. The structure of 4-amino butanol is shown within its  $^{13}\text{C}$  NMR spectrum.



What is the chemical shift of the carbon atom directly bond to the hydroxyl group? – Remember the carbon atom that is bond to the element with highest electronegativity will have the highest chemical shift.

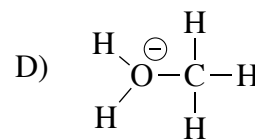
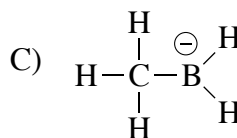
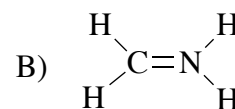
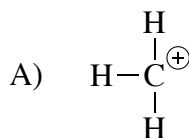
A) 62.5

B) 42.0

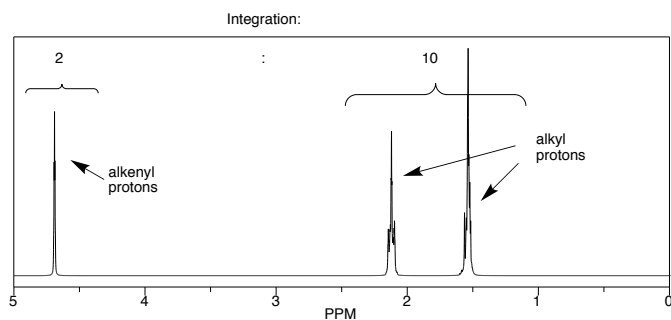
C) 23.8

D) 28.7

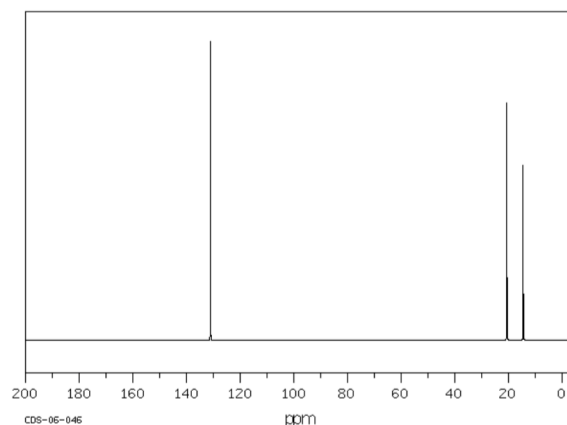
4. Which one of the following molecules or polyatomic ions is a correct Lewis structure with correct formal charge?



5. The chemical shifts in combination with the integration of the signals in  $^1\text{H}$  NMR spectrum shown below indicate that there are 2 alkenyl protons and 10 alkyl protons in this compound. Solely based on this information what is the structure of this compound?



7. Identify the compound whose  $^{13}\text{C}$  NMR spectrum shown below.

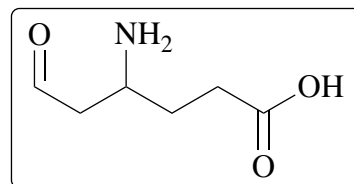


- A) C1=CCCCC1
- B) CC1=CCC(C)C1
- C) CCC=CC=C
- D) C12CCC(CC1)C2

6. Which of the following has a index of hydrogen deficiency (= also called degree of unsaturation) of 2?

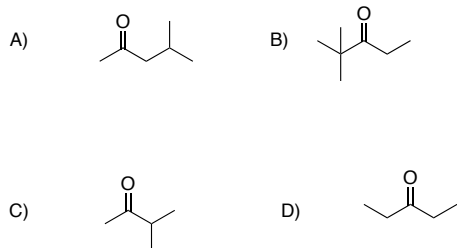
- A) C=CN1CCNCC1
- B) BrC1CCCC1
- C) CC(=O)c1ccccc1
- D) CC(=O)NCC(=O)NCC(=O)O

8. What are the names of functional groups in the following molecule?

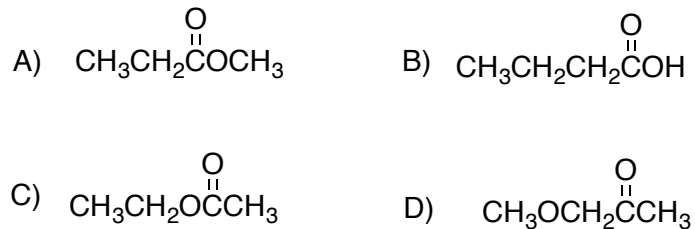


- A) ketone, amine, carboxyl
- B) aldehyde, amide, hydroxyl
- C) aldehyde, amine, carboxylic acid
- D) carbonyl, ammonium, carboxyl

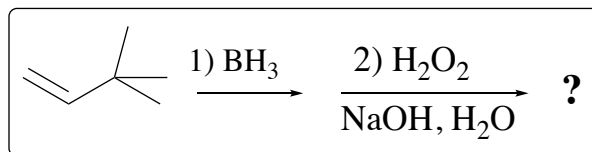
9. Which of the following compounds displays – besides other signals - a septet in the  $^1\text{H}$  NMR?



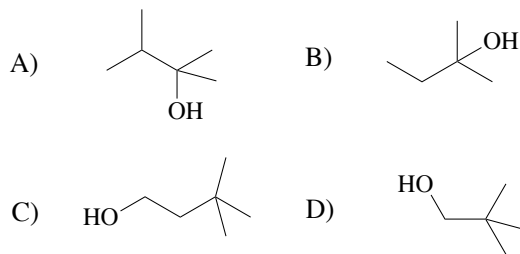
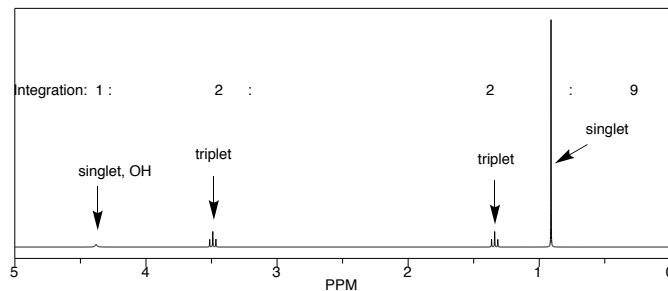
10. Which of the following compounds shows three singlets as only signals in the  $^1\text{H}$  NMR spectrum?



11. Which of the following is a major product of the reaction sequence shown in the box?

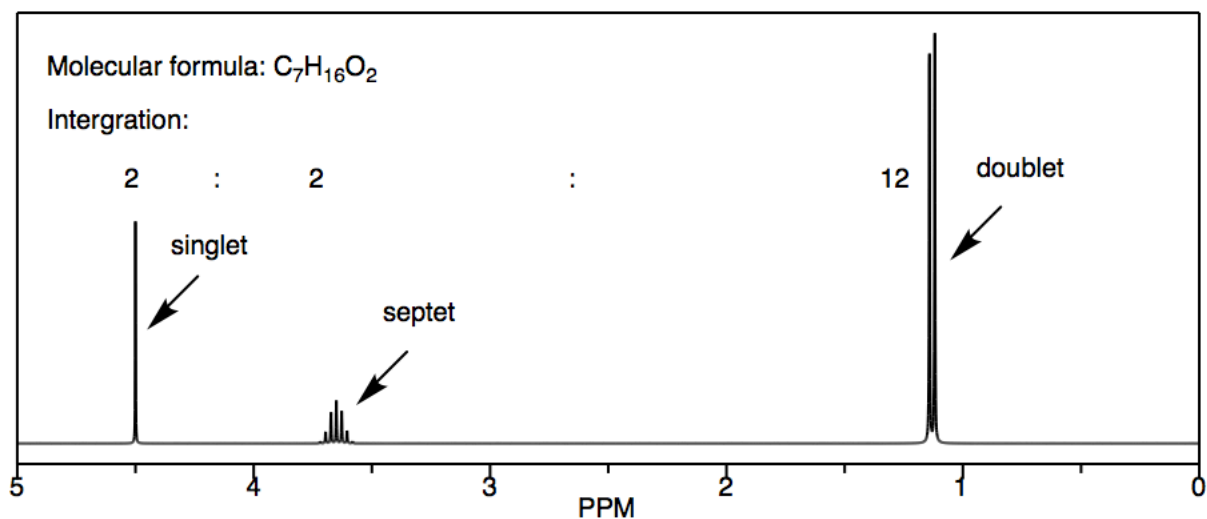


$^1\text{H}$  NMR of the major product – Please remember no coupling (=signal splitting) occurs between the OH-proton and protons of an adjacent alkyl group.



**END OF THE MULTIPLE CHOICE SECTION OF THIS QUIZ. PLEASE DRAW THE ANSWER TO QUESTION 12 ON THE BACK OF THE SCANTRON FORM**

Question 12: On the back on the Scantron form please draw the structure of the compound (Molecular formula  $C_7H_{16}O_2$ ) that shows following  $^1H$  NMR spectrum:



END OF QUIZ