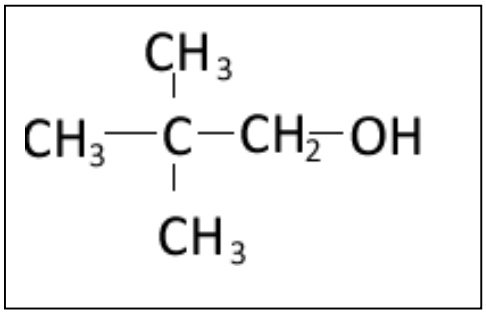
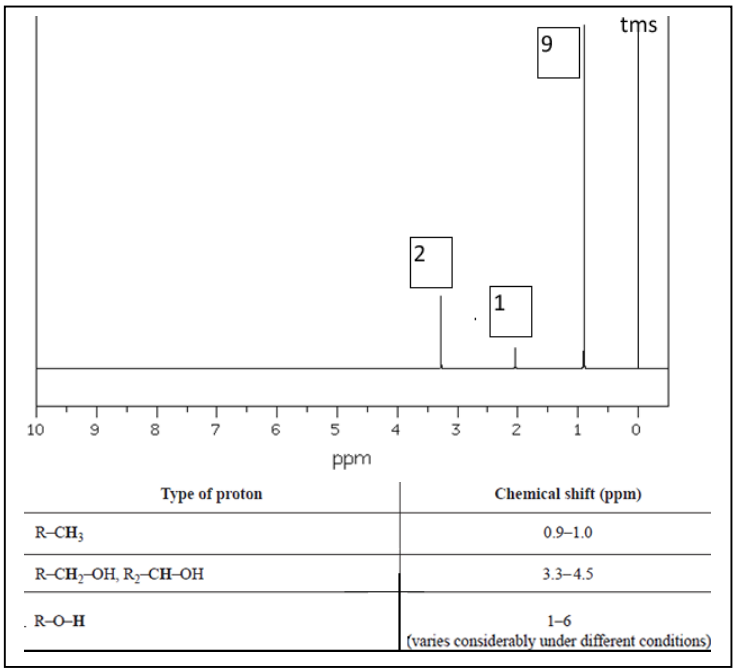
Friday Worksheet **Name: …….**

^{1}HNMR spectroscopy 3

1) Consider the molecule whose structural formula is shown below.





Type of proton	Chemical shift (ppm)
R–CH_3	0.9–1.0
R–CH_2–OH, R_2–CH–OH	3.3–4.5
R–O–H	1–6 (varies considerably under different conditions)

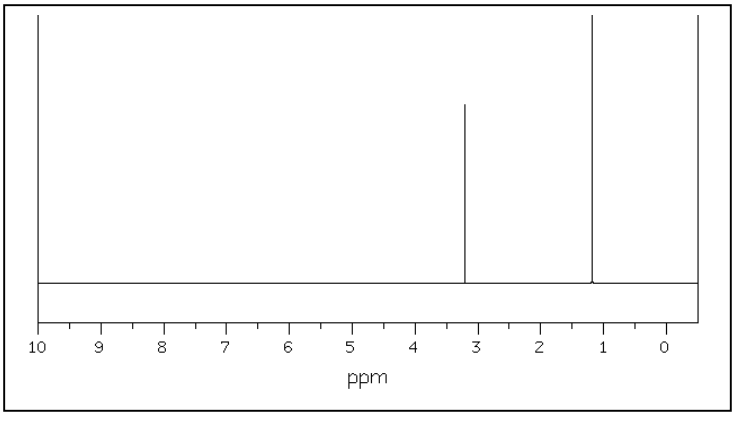
a) Write the IUPAC name for the molecule. *2,2-dimethylpropan-1-ol*

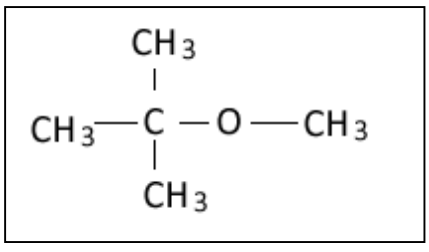
b) In the box, on the right, draw the ^{1}HNMR spectrum of this molecule. Note that the hydrogen on the OH group creates a signal at 2.0 ppm. *The data sheet should be used to determine the ppm of each non-equivalent group of hydrogens.*

c) Indicate on the spectrum the relative area of each signal.

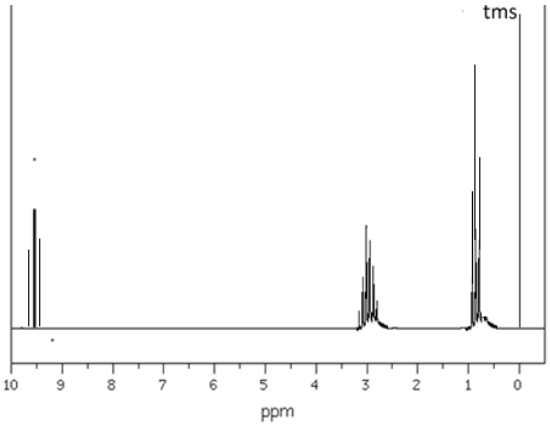
d) How many signals are expected on the ^{13}CNMR spectrum? *3*

2) A compound has the molecular formula $C_5H_{12}O$. Its ^{1}HNMR spectrum is shown below. If the ^{13}CNMR spectrum shows only three signals draw the structural formula of this compound in the box below.

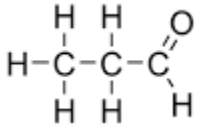




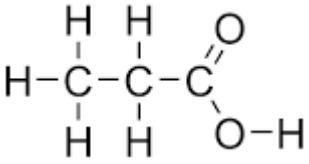
3) On the right is the ^{1}HNMR spectrum of an organic compound(X) with the molecular formula C_3H_6O. Three signals are visible, with two triplets at 9.5 and 0.8 ppm. A multiple peak signal at 3.0 ppm is also seen.



a) Draw the structural formula in the box below.

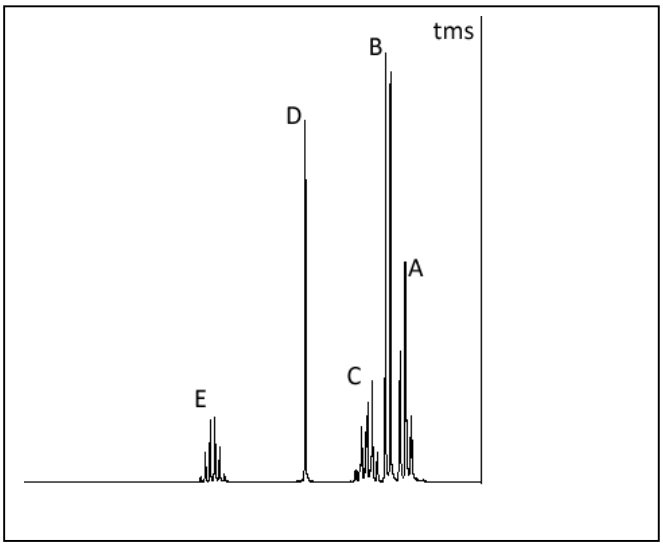


b) Name and draw the structural formula of the compound formed when compound "X" is oxidised in the presence of acidified $Cr_2O_7^{-2}$ solution.

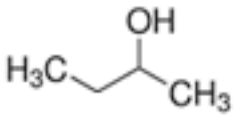


Propanoic acid

c) Another compound (Y) was analysed using ^{1}HNMR and its spectrum is shown below.
The spectrum shows 5 signals and are labelled.
Signal A is a triplet
Signal B is a doublet
Signal C is a pentet
Signal D is a singlet
Signal E is a sextet

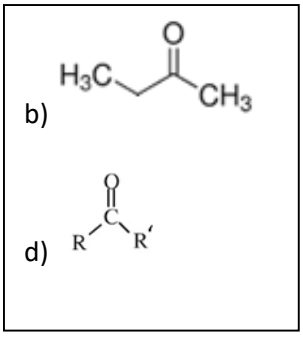


a) Name and draw the structural formula of compound Y if its molecular formula is $C_4H_{10}O$.



Butan-2-ol

b) Draw the structural formula of the compound formed when compound"Y" is oxidised in the presence of acidified $Cr_2O_7^{-2}$ solution.



b)

d)

c) To what group of compounds does this product belong? *Ketones.*

d) What is the functional group of this class of compounds?

e) To what group of compounds does "Y" belong?
secondary alcohol