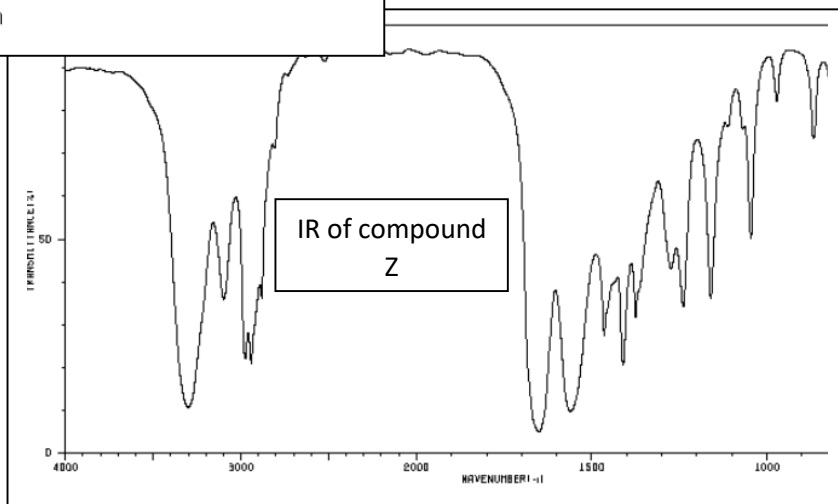
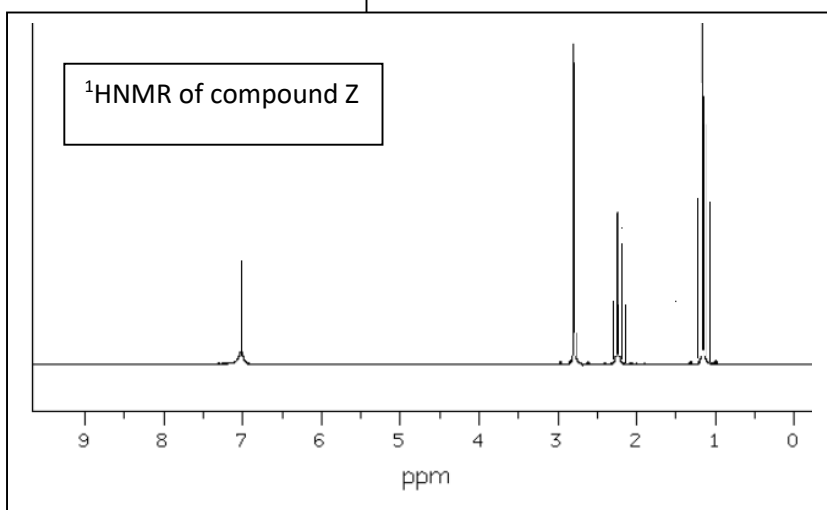
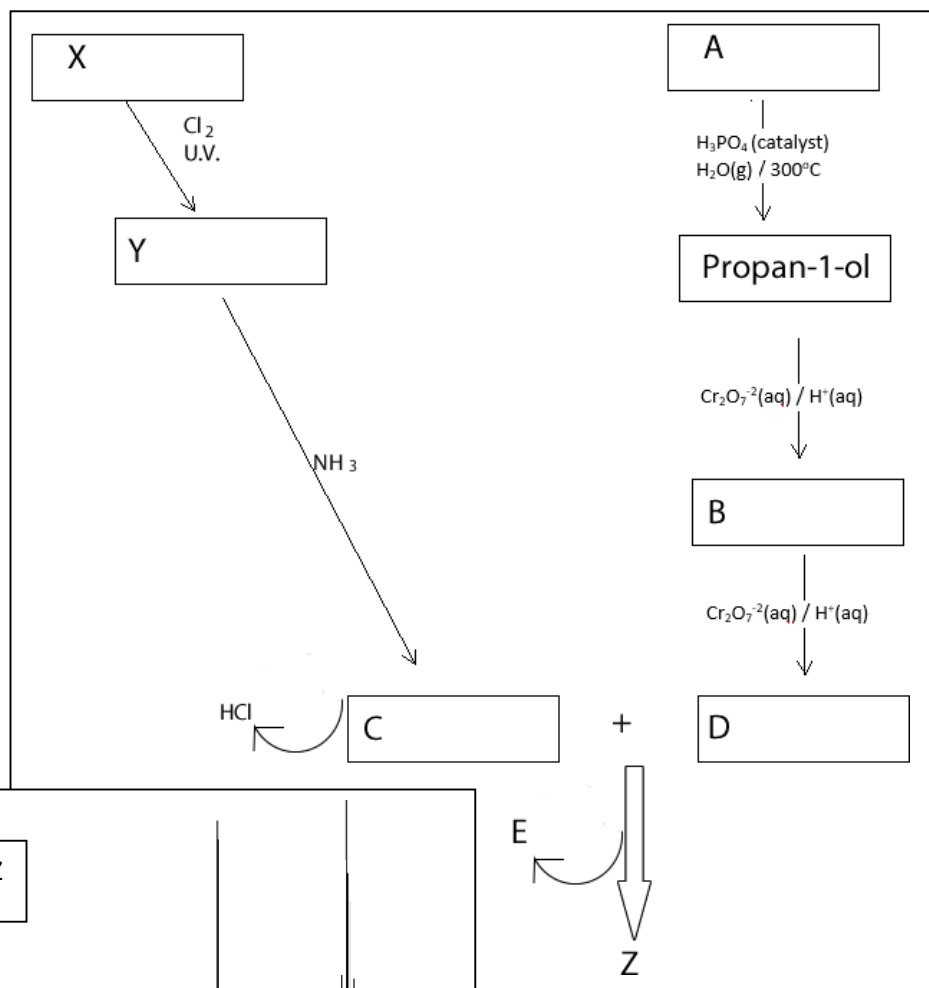


Friday worksheet 6 – <sup>1</sup>HNMR + IR + organic pathways.



1) The reaction pathway for the formation of compound Z is shown on the previous page as well as the  $^1\text{H}$ NMR and IR spectra of compound Z. The molecular formula of compound Z is  $\text{C}_4\text{H}_9\text{NO}$ .

i. What relevant information can be obtained from the IR spectrum around the wavelength:  
-  $3300\text{ cm}^{-1}$

*presence of an N-H bond*

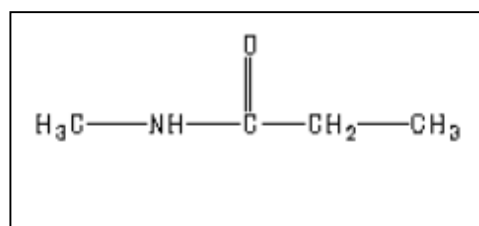
-  $1630\text{ cm}^{-1}$

*an amide C=O*

You may need to consult the data sheet.

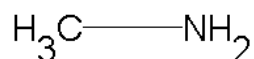
ii. Using the  $^1\text{H}$ NMR spectrum identify the number of hydrogen environments present in the molecule of compound Z and draw a structure of compound Z in the space provided on the right.

*4 hydrogen environments*



2) Give the name and the structure of each compound in the spaces on the right.

C - *Methanamine*



3) Identify what type of reaction takes place between compounds C and D and name molecule E.

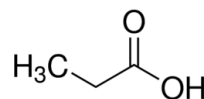
*Condensation reaction.*

*H<sub>2</sub>O*

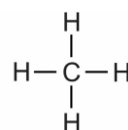
4) What type of reaction takes place to form propan-1-ol from compound A?

*Addition reaction.*

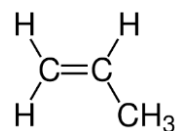
D - *Propanoic acid*



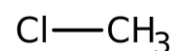
X - *Methane*



A - *Propene*



Y - *chloromethane*



5) Consider the compound shown on the right.

i. How many signals will be present in the  $^1\text{H}$ NMR spectrum of this molecule?

*3 signals as there are only 3 hydrogen environments. Note this is symmetrical molecule.*

ii. How many signals will be present in the  $^{13}\text{C}$ NMR spectrum of this molecule?

*2 signals*

iii. Describe the splitting patterns that are observed in the  $^1\text{H}$ NMR spectrum and give the simplest ratio of the area under each signal.

*A triplet, a singlet and a pentet.  
In the ratio  
triplet 2: singlet 2: pentet 1.*

iv. Name the molecule shown.

*propan-1,3-diamine*

