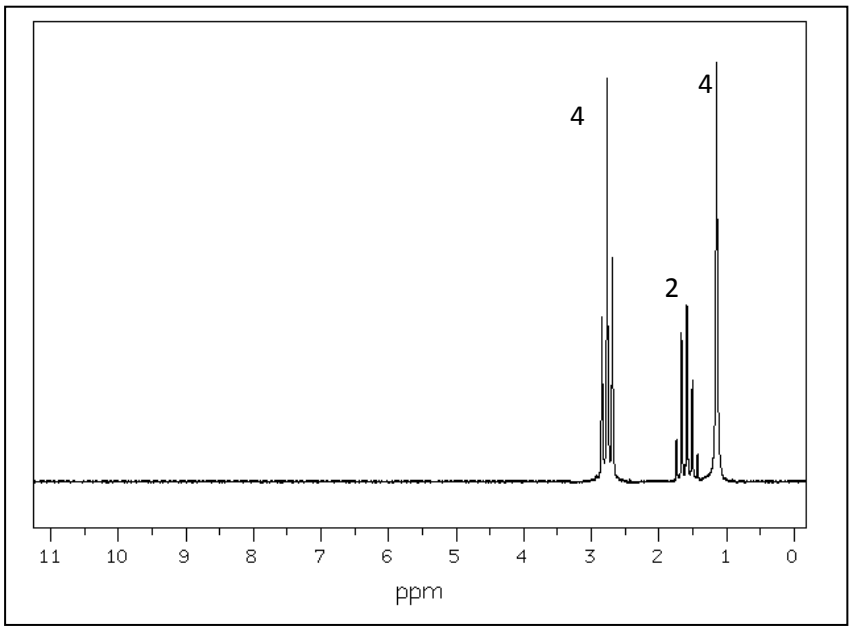
Revision for Organic Chemistry **Name: ……**

1) The following two reactions are part of an organic pathway .

1) Prop-1,2-diene $\xrightarrow{HCl}$ B

2) B $\xrightarrow{2NH_3}$ C + 2HCl

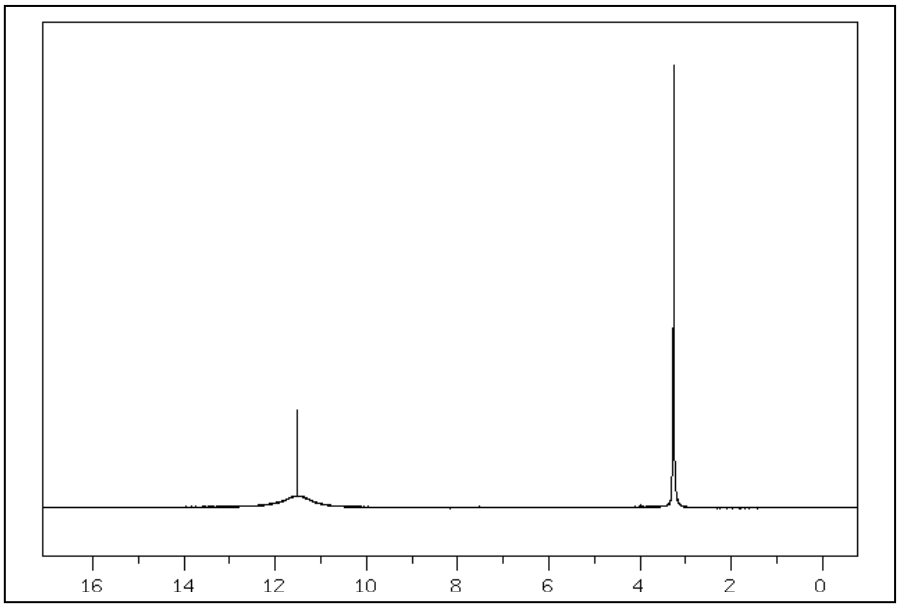
Below is the HNMR spectrum of compound C which has the molecular formula $C_3H_{10}N_2$

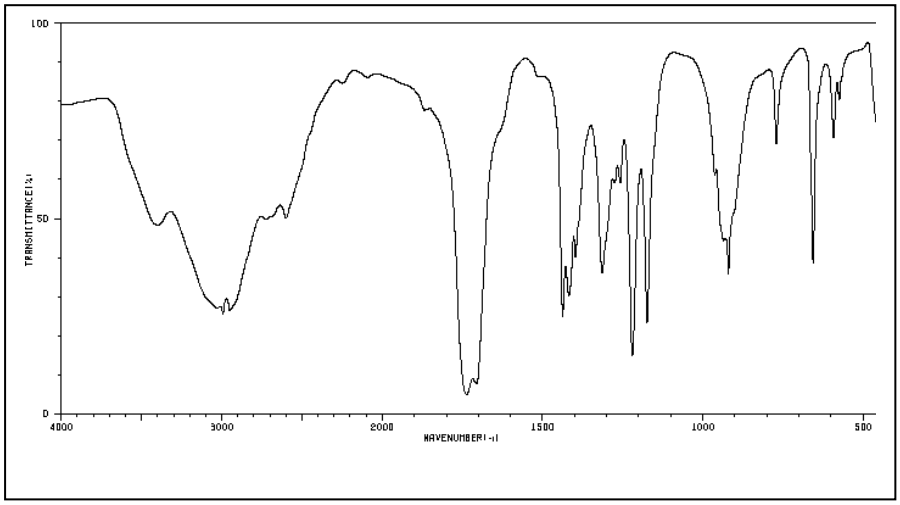


a) Identify compound C. Name and draw its structure.
b) Name two other possible products of reaction 1 above

c) What type of reaction is reaction:
1
2

d) Compound E has the molecular formula $C_3H_4O_4$ its HNMR and IR spectra are shown below.



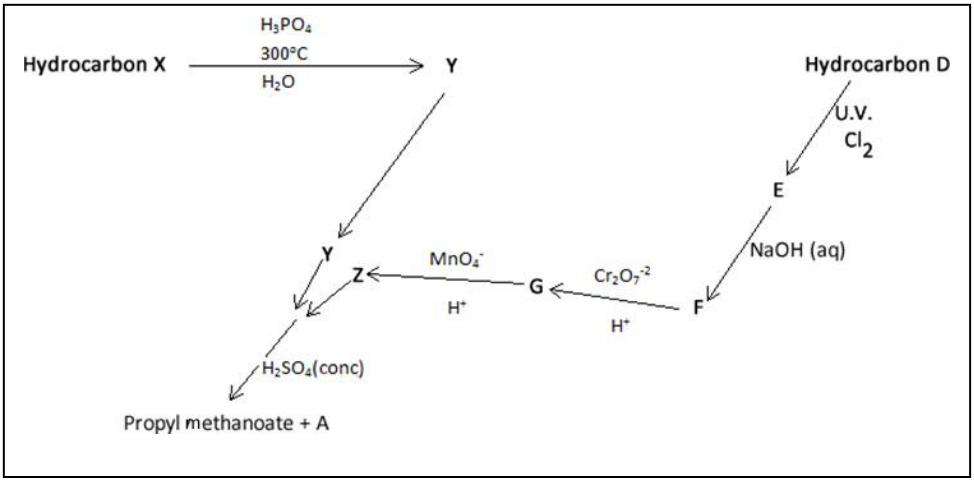


i. If 20.00 mL of a 1.00 M solution of compound E reacts with exactly 40.00 mL of a 1.00 M NaOH draw the structural formula and name compound E.

ii. Compound E and compound C react according to the equation below.
$C + E \rightarrow H_2O + F$
Draw the structural formula of compound F

iii. When more than one molecule of C and E react a long polymer is produced. Draw the structural formula of the polymer when two molecules of each compound react together.

2) Below is the reaction pathway to synthesising propyl methanoate.



a) Draw the structural formulae of each of the substances below.
   X
   Y
   E
   F
   Z

b) What type of reaction forms each of the compounds listed below?
   Y
   E
   F
   Z
   Propyl methanoate

c) The reaction that forms G is a redox reaction where $Cr_2O_7^{-2}$ is converted to Cr^{3+}. This reaction is used in an experimental fuel cell.
   i. Write the balanced equation for the half reaction that occurs at the:
   State not required.
   Anode
   Catode

d) Identify substance A.

e) Consider the reaction that forms substance Y.
   i. If 4.200 grams of substance X reacts completely to form 2.9 grams of substance Y calculate the percentage yield to the right number of significant figures.
   ii. What is the percentage atom economy for the reaction?

f) Consider substance Y
   i. How many isomers exist for substance Y?
   ii. How many of these isomers, if any, are optically active?