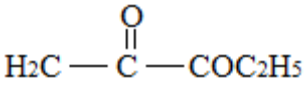
IB Exam Type Organic Questions

1. State the reagents and conditions required for the following reaction pathways:

a) $CH_2= CH_2$ ⟶ 

b) C_2H_5OH ----------> C_2H_5COOH

c) CH_3CHCH_2 ----------> CH_3COCH_3

d) CH_4 ----------> CH_3COOH

2. Rank the following compounds in order of:

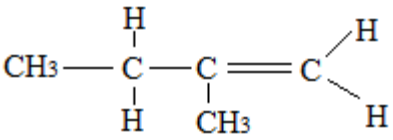
C_2H_5OH, CH_3CHO, C_3H_8

i) increasing boiling point

ii) solubility in a polar solvent

Justify your answer.

3. a compound **X** has the following structure:



a) Name **X**

b) Outline the equation for the reaction of **X** with:

(i) H^+/H_2O, (ii) H_2/Pt,

(iii) HCl,

(iv) High temperature/pressure, catalyst (show 3 segments of the polymers). Name the type of polymerisation that **X** has undergone.

c) Show the mechanism of the reaction, using curly arrows for reaction in 3(b) (iii) above.

4. Draw:

(i) the structure of the product that would be formed by the following reactions:

(ii) Name the product that would be formed by the following reactions

a) $HCOOH + C_2H_5OH$, (in the presence of conc. H_2SO_4)

b) $CH_3OH + C_3H_7COOH$ (in the presence of conc. H_2SO_4)

(iii) State and explain the role of conc. H_2SO_4 in both the above reactions

5. Compound **W** has the following molecular formula $C_4H_{10}O$

a) (i) Draw the possible structures for $C_4H_{10}O$ and name the isomers of **W**.

b) **W** reacts with $H^+/Cr_2O_7^{2-}$ to produce an organic acid. Give the 2 possible structural isomers of **W** that reacted with $H^+/Cr_2O_7^{2-}$.

c) When the product from (b) is dehydrated using conc. $H_3PO_{4(aq)}$, a compound **X** is formed.

(i) Give 2 possible structural isomers of **X**

(ii) Give the 4 possible structures of the compounds formed when **X** reacts with $HBr_{(g)}$

d) **X** actually forms **Y**, $CH_3C(Br)CH_3CH_3$, when it reacts with HBr, which structural formula of **X** produces **Y**.

e) **Y** is hydrolysed with OH^{-1} ions to produce **Z** by an S_N1 mechanism.

(i) What is meant by an S_N1 mechanism?

(ii) Why does an S_N1 mechanism occur rather than an S_N2 mechanism, explain.

(iii) Show the stepwise mechanism of the conversion of **Y** to **Z**.

(iv) State and explain if **Z** will react with $H^+/Cr_2O_7^{2-}$.