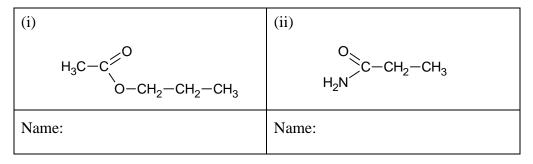
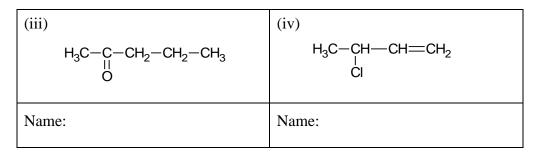


(i)	(ii)
Name: propylpentanoate	Name: 2-chlorohexanal

(iv)
Name: propanoylchloride

(b) Give the systematic IUPAC names for the following molecules.





(a)

QUESTION TWO:

Describe chemical tests that could be used to distinguish between the compounds in each of the pairs of substances below. For each test description:

- Include reagents used and observations
- Link the observed results to the reactions occurring at the functional groups present in the organic molecules
- (a) Chloroethane and ethanoyl chloride

(b) Butan-1-ol and butanal

Assessor's use only

QUESTION THREE:

(a) A piece of the structure of nylon 4,4 is shown below;

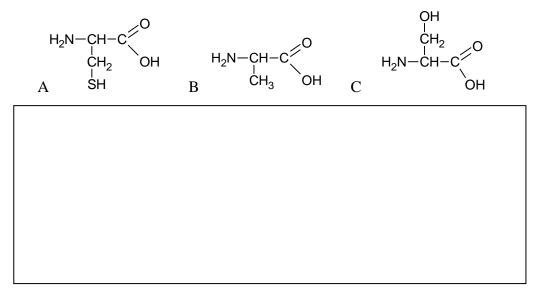
$$\begin{array}{c} -\mathsf{C}-\mathsf{N}-\mathsf{C}\mathsf{H}_2-\mathsf{C}\mathsf{H}_2-\mathsf{C}\mathsf{H}_2-\mathsf{C}\mathsf{H}_2-\mathsf{N}-\mathsf{C}-\mathsf{C}\mathsf{H}_2-\mathsf{C}\mathsf{H}_2-\mathsf{C}-\mathsf{N}-\mathsf{H}_2-\mathsf{H$$

(i) This polymer is made from a diamine and a diacid chloride. Draw the structure of the two monomers.

(ii) Explain why nylon 4,4 is a **condensation polymer.**

3

(b) Proteins are also condensation polymers formed by the joining of amino acids.
Draw the tripeptide formed when the following amino acids are joined in the order A-B-C.



(c) Amino acids can exist as enantiomers (optical isomers).Draw 3-dimensional structures of amino acid B in (b) that clearly shows the relationship between the two enantiomers.

(d) Describe similarities and differences in the chemical and physical properties of the enantiomers in part (c).

Assessor's

use only

(e) PVA is an **addition** polymer used in the adhesive industry as wood or paper glue.The monomer from which it is synthesised is

$$H_2C = C - O - C - H$$

 H

Draw a piece of the polymer showing two repeating units.

(f) Explain why the polymer in (e) is considered an **addition polymer**.

Assessor's use only

QUESTION FOUR:

(a) Use the following information to identify and write structural formulae for compounds A-F:

- Compound A is a colourless liquid with the molecular formula, C_3H_7Cl .
- A sample of A was refluxed with aqueous KOH and a compound B formed with the molecular formula C_3H_8O .
- A sample of B was heated with concentrated sulfuric acid and a compound C formed which rapidly decolourised bromine water.
- A sample of B was heated with acidified potassium dichromate and compound D formed and was isolated from the reaction mixture. D did not react with Tollens reagent but turned blue litmus red.
- Samples of compound B and D were refluxed together with a few drops of sulfuric acid and compound E formed.
- Compound E reacted with concentrated ammonia solution to form compound F, with molecular formula C_3H_7NO .

Compound A	Structural formula
A	
В	
С	
D	
E	
F	

- Compound G is a structural isomer of A with the same functional group. Compare (b) and contrast the reactions of G with the reagents in question (a) to that of compound A. Your answer should include:
 - The structure of any compounds formed in the reactions. •
 - A discussion of which reactions do or do not occur. •

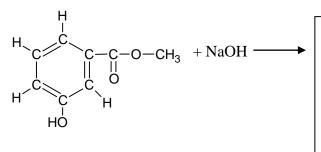
Assessor's

use only

QUESTION FIVE:

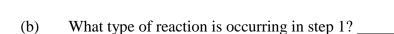
Methyl salicylate (oil of wintergreen) is an ester with a characteristic odour and a component of liniment. Salicylic acid (used to manufacture aspirin) can be prepared from methyl salicylate in the following way:

- 1. Methyl salicylate is **refluxed** with sodium hydroxide for 30 minutes during which two organic products form.
- 2. The mixture is **distilled** slowly and an alcohol is collected in the distillate.
- 3. Concentrated hydrochloric acid is added to the cooled residual solution and the salicylic acid crystals formed are washed and filtered off.
- (a) Complete the following equation for the reaction occurring in **step 1**.



methyl salicylate





(c) Write an equation for the reaction occurring in step 3.

