

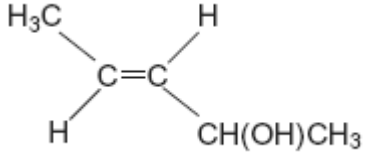
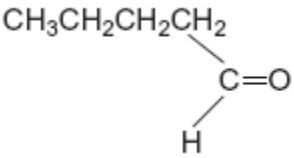
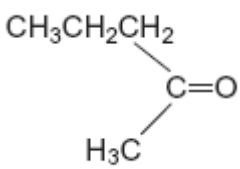
Name of the Student: _____

Max. Marks : 25 Marks

Time : 25 Minutes

Q1.

The table below shows the structures of three isomers with the molecular formula $C_5H_{10}O$

Isomer 1 	(E)-pent-3-en-2-ol
Isomer 2 	pentanal
Isomer 3 	

(a) Complete the table by naming Isomer 3.

(1)

(b) State the type of structural isomerism shown by these three isomers.

(1)

(c) The compound (Z)-pent-3-en-2-ol is a stereoisomer of (E)-pent-3-en-2-ol.

(i) Draw the structure of (Z)-pent-3-en-2-ol.

(1)

- (ii) Identify the feature of the double bond in (*E*)-pent-3-en-2-ol and that in (*Z*)-pent-3-en-2-ol that causes these two compounds to be stereoisomers.

(1)

- (d) A chemical test can be used to distinguish between separate samples of Isomer **2** and Isomer **3**.

Identify a suitable reagent for the test.

State what you would observe with Isomer **2** and with Isomer **3**.

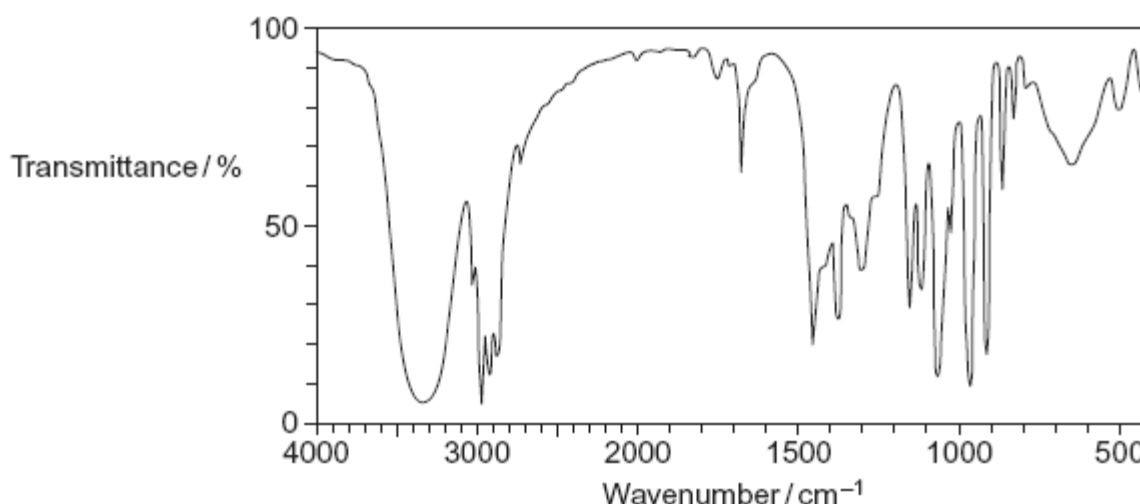
Test reagent _____

Observation with Isomer **2** _____

Observation with Isomer **3** _____

(3)

- (e) The following is the infrared spectrum of one of the isomers **1**, **2** or **3**.



- (i) Deduce which of the isomers (**1**, **2** or **3**) would give this infrared spectrum. You may find it helpful to refer to **Table 1** on the Data Sheet.

(1)

- (ii) Identify two features of the infrared spectrum that support your deduction. In each case, identify the functional group responsible.

Feature 1 and functional group _____

Feature 2 and functional group _____

(2)

(Total 10 marks)

Q2.

- (a) Some scientists thought that the waste water from a waste disposal factory contained **two** sodium halides.

They tested a sample of the waste water.

They added three reagents, one after the other, to the same test tube containing the waste water.

The table below shows their results.

Reagent added	Observations
1. Silver nitrate solution (acidified with dilute nitric acid)	A cream precipitate formed
2. Dilute ammonia solution	A yellow precipitate remained
3. Concentrated ammonia solution	The yellow precipitate did not dissolve

- (i) Identify the yellow precipitate that did **not** dissolve in concentrated ammonia solution. Write the **simplest** ionic equation for the formation of this precipitate from silver ions and the correct halide ion. Identify the other sodium halide that must be present in this mixture of two sodium halides.

(3)

- (ii) Give **one** reason why the silver nitrate solution was acidified before it was used in this test.

(1)

- (iii) The method that the scientists used could **not** detect one type of halide ion. Identify this halide ion. Give **one** reason for your answer.

(2)

- (b) The scientists thought that the waste water also contained dissolved barium ions. An aqueous solution of sodium sulfate can be used to test for the presence of dissolved barium ions.

Write the **simplest** ionic equation for the reaction between barium ions and sulfate ions to form barium sulfate.

State what is observed in this reaction.

Give a use for barium sulfate in medicine and explain why this use is possible, given that solutions containing barium ions are poisonous.

(4)

- (c) The scientists also analysed the exhaust gases from an incinerator used to destroy waste poly(ethene).

Mass spectrometry showed that there was a trace gas with a precise $M_r = 28.03176$ in the exhaust gases from the incinerator.

The table below contains some precise relative atomic mass data.

Atom	Precise relative atomic mass
^{12}C	12.00000
^1H	1.00794
^{16}O	15.99491

Use the data to show that the trace gas is ethene. Show your working.

Suggest why both ethene and carbon monoxide might have been identified as the trace gas if the scientists had used relative atomic masses to a precision of only one decimal place.

Write an equation for the incomplete combustion of ethene to form carbon monoxide and water only.

Ethene is used to make poly(ethene).

Draw the displayed formula for the repeating unit of poly(ethene).

Name this type of polymer.

(5)
(Total 15 marks)