

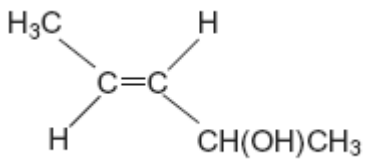
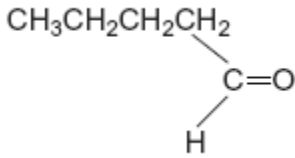
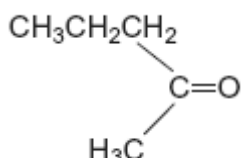
Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 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**.

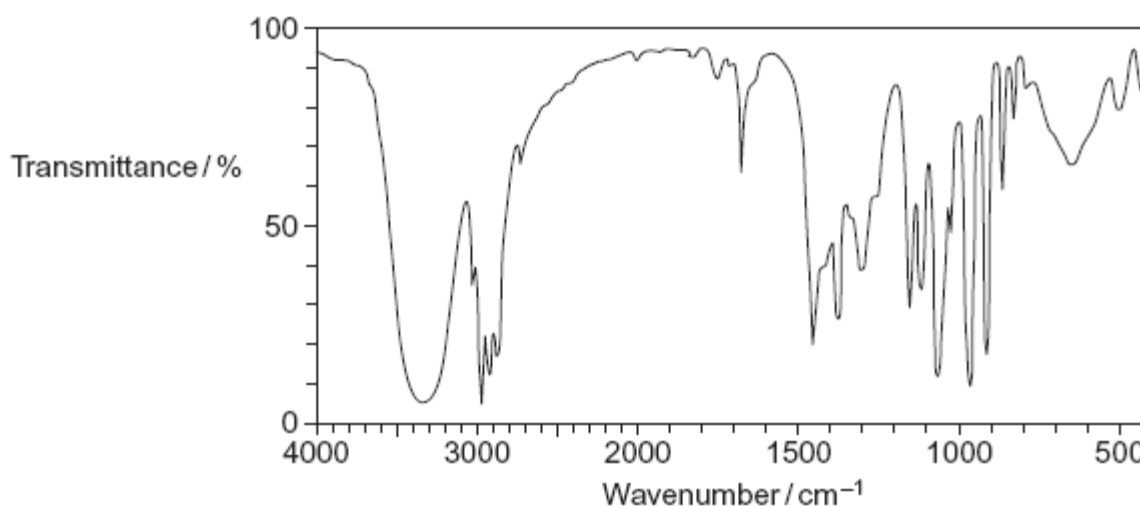
Test reagent _____

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.

Alkanes are saturated hydrocarbons which can be obtained from crude oil.
Pentane is an example of an alkane. A molecule of pentane contains five carbon atoms.

- (a) (i) State the meaning of the term *saturated* and of the term *hydrocarbon* as applied to alkanes.

Saturated _____

Hydrocarbon _____

(2)

- (ii) Give the general formula for the alkanes.

(1)

- (b) Pentane burns completely in oxygen.

- (i) Write an equation for this reaction.

(1)

- (ii) State how the products of this reaction may affect the environment.

(1)

- (c) Give the name of a solid pollutant which may form when pentane burns incompletely in air.

(1)

- (d) One molecule of C_9H_{20} can be cracked to form one molecule of pentane and one other product.

- (i) Write an equation for this cracking reaction.

(1)

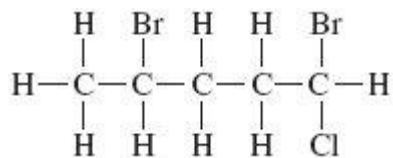
- (ii) Suggest a type of compound that can be manufactured from the other product of this cracking reaction.

(1)

- (iii) State why a high temperature is needed for cracking reactions to occur.

(1)

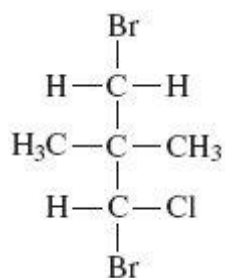
- (e) Pentane can react to form the following haloalkane **Q**.



- (i) Name **Q**.

(1)

- (ii) State the type of structural isomerism shown by **Q** and the haloalkane shown below.



(1)

(Total 11 marks)