

Name of the Student: _____

Max. Marks : 28 Marks

Time : 28 Minutes

Q1.

- (a) (i) Give a suitable reagent and state the necessary conditions for the conversion of propan-2-ol into propanone. Name the type of reaction.

Reagent _____

Conditions _____

Type of reaction _____

- (ii) Propanone can be converted back into propan-2-ol. Give a suitable reagent and write an equation for this reaction.
(Use [H] to represent the reagent in your equation.)

Reagent _____

Equation

(5)

- (b) Propanal is an isomer of propanone.

- (i) Draw the structure of propanal.

- (ii) A chemical test can be used to distinguish between separate samples of propanone and propanal. Give a suitable reagent for the test and describe what you would observe with propanone and with propanal.

Test reagent _____

Observation with propanone _____

Observation with propanone _____

(4)

(Total 9 marks)

Q2.

This question concerns four isomers, **W**, **X**, **Y** and **Z**, with the molecular formula $C_5H_{10}O_2$

- (a) The proton n.m.r. spectrum of **W** shows 4 peaks.
The table below gives the chemical shifts, δ values, for each of these peaks, together with their splitting patterns and integration values.

δ/ppm	2.18	2.59	3.33	3.64
Splitting pattern	singlet	triplet	singlet	triplet
Integration value	3	2	3	2

State what can be deduced about the structure of **W** from the presence of the following in its n.m.r. spectrum.

- (i) The singlet peak at $\delta = 2.18$

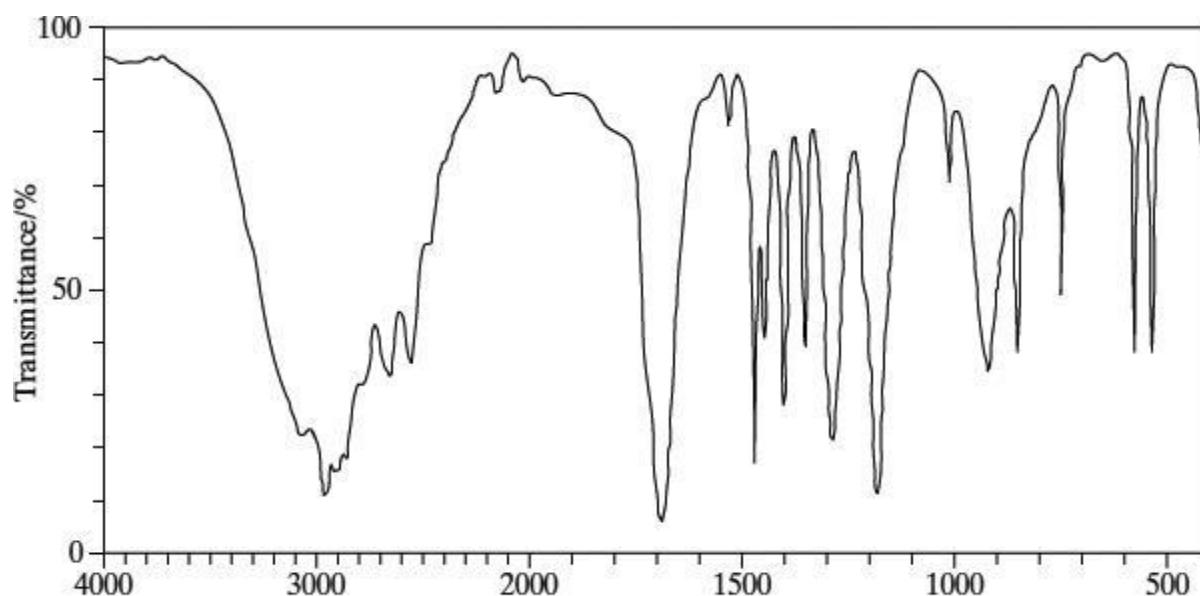
- (ii) The singlet peak at $\delta = 3.33$

- (iii) Two triplet peaks.

- (iv) Hence, deduce the structure of **W**.

(4)

- (b) The infra-red spectrum of **X** is shown below.

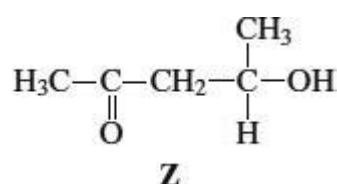
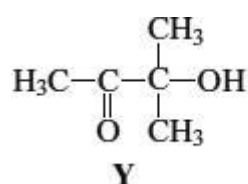


- (i) What can be deduced from the broad absorption centred on 3000 cm^{-1} in the infra-red spectrum of **X**?

- (ii) Given that the proton n.m.r. spectrum of **X** contains only two peaks with the integration ratio 9:1, deduce the structure of **X**.

(2)

- (c) Isomers **Y** and **Z** have the structures shown below.



Identify the two reagents you could use in a simple chemical test to distinguish between **Y** and **Z**. State what you would observe when each of **Y** and **Z** is tested with a mixture of these two reagents.

Reagents _____

Observation with **Y** _____

Observation with **Z** _____

(3)

(Total 9 marks)

Q3.

Some alcohols can be oxidised to form aldehydes, which can then be oxidised further to form carboxylic acids.

Some alcohols can be oxidised to form ketones, which resist further oxidation.

Other alcohols are resistant to oxidation.

- (a) Draw the structures of the **two** straight-chain isomeric alcohols with molecular formula, $C_4H_{10}O$

(2)

- (b) Draw the structures of the oxidation products obtained when the two alcohols from part (a) are oxidised separately by acidified potassium dichromate(VI). Write equations for any reactions which occur, using [O] to represent the oxidising agent.

(6)

- (c) Draw the structure and give the name of the alcohol with molecular formula $C_4H_{10}O$ which is resistant to oxidation by acidified potassium dichromate(VI).

(2)

(Total 10 marks)