Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Organic analysis

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Name of the Student:_____
Max. Marks : 29 Marks **Time : 29 Minutes**

Q1.

The following pairs of compounds can be distinguished by simple test−tube reactions.

For each pair of compounds, give a reagent (or combination of reagents) that, when added separately to each compound, could be used to distinguish between them.
State what is observed in each case.

(a) Butan−2−ol and 2−methylpropan−2−ol

Reagent _____

Observation with butan−2−ol

_____

_____

Observation with 2−methylpropan−2−ol

_____

_____

(3)

(b) Propane and propene

Reagent _____

Observation with propane

_____

_____

Observation with propene

_____

_____

(3)

(c) Aqueous silver nitrate and aqueous sodium nitrate

Reagent _____

Observation with aqueous silver nitrate

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_____

_____

Observation with aqueous sodium nitrate

_____

_____

(3)

(d) Aqueous magnesium chloride and aqueous barium chloride

Reagent _____

Observation with aqueous magnesium chloride

_____

_____

Observation with aqueous barium chloride

_____

_____

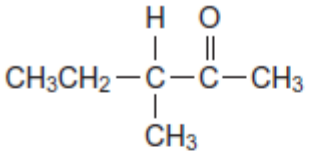
(3)

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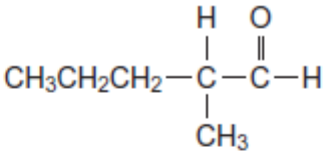
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Q2.

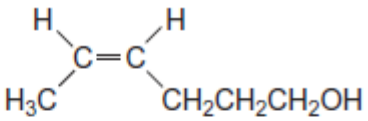
The following five isomers, **P**, **Q**, **R**, **S** and **T**, were investigated using test-tube reactions and also using n.m.r. spectroscopy.



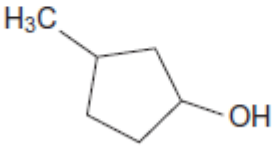
P



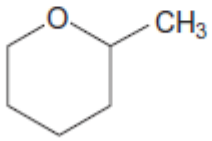
Q



R



S



T

(a) A simple test-tube reaction can be used to distinguish between isomers **P** and **S**.

Identify a reagent (or combination of reagents) you could use.
State what you would observe when both isomers are tested separately with this reagent or combination of reagents.

_____

_____

_____

_____

_____

(3)

(b) A simple test-tube reaction can be used to distinguish between isomer **Q** and all the other isomers.

Identify a reagent (or combination of reagents) you could use.
State what you would observe when **Q** is tested with this reagent or combination of reagents.

_____

_____

_____

_____

(2)

(c) State which **one** of the isomers, **P**, **Q**, **R**, **S** and **T**, has the least number of peaks in its ^{1}H n.m.r. spectrum.
Give the number of peaks for this isomer.

_____

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(2)

(d) Write the **molecular** formula of the standard used in ^{13}C n.m.r. spectroscopy.
Give **two** reasons why this compound is used.

(3)

(e) **Figure 1** and **Figure 2** show the ^{13}C n.m.r. spectra of two of the five isomers.

Figure 1

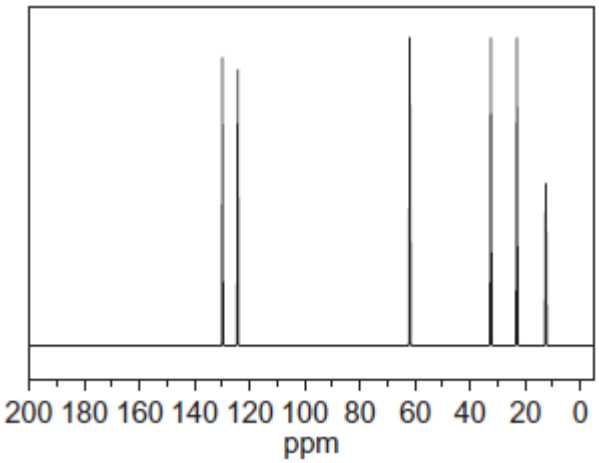
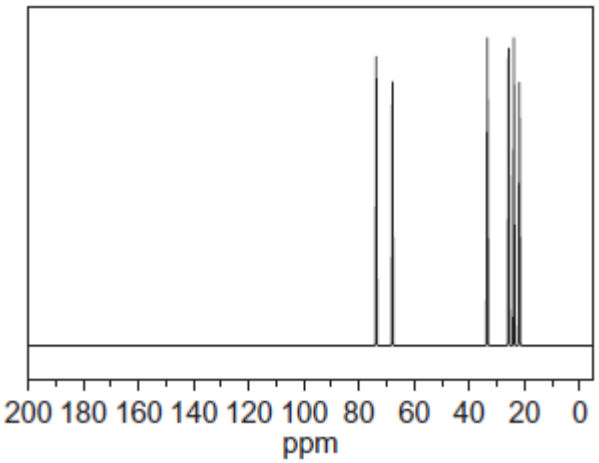
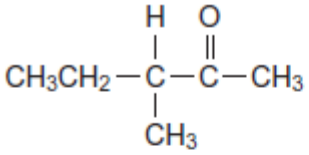


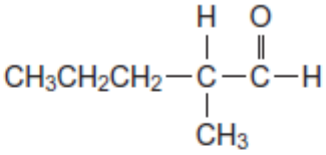
Figure 2



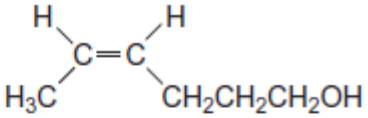
The structures of the five isomers are repeated to help you answer this question.



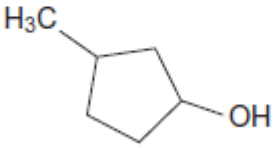
P



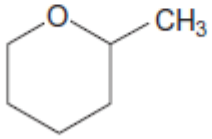
Q



R



S



T

State which isomer produces the spectrum in **Figure 1** and which isomer produces the

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spectrum in **Figure 2**.

Explain your answer.

You do not need to identify every peak in each spectrum.
Use **Table C** on the Data Sheet to answer the question.

(5)

(f) **U** and **V** are other isomers of **P**, **Q**, **R**, **S** and **T**.
The ^{1}H n.m.r. spectrum of **U** consists of two singlets.
V is a cyclic alcohol that exists as optical isomers.

Draw the structure of **U** and the structure of **V**.

U **V**

(2)
(Total 17 marks)

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