Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Mark Schemes

Q1.

(a) Pentan-2-one

ONLY but ignore absence of hyphens

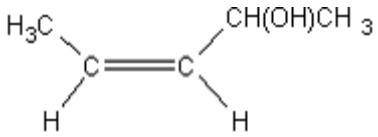
1

(b) Functional group (isomerism)

Both words needed

1

(c) (i)



Award credit provided it is obvious that the candidate is drawing the Z / cis isomer

The group needs to be $CHOHCH_3$ but do not penalise poor C–C bonds or absence of brackets around OH

Trigonal planar structure not essential

1

(ii) Restricted rotation (about the C=C)

OR

No (free) rotation (about the C=C)

1

(d)

M1 Tollens' (reagent) *(Credit ammoniacal silver nitrate OR a description of making Tollens')* *(Do not credit Ag^+, $AgNO_3$ or $[Ag(NH_3)_2^+]$ or "the silver mirror test" on their own, but mark M2 and M3)*	**M1** Fehling's (solution) / Benedict's *(Penalise $Cu^{2+}(aq)$ or $CuSO_4$ but mark M2 and M3)*
M2 silver mirror OR black solid or black precipitate	**M2** Red solid/precipitate *(Credit orange or brown solid)*
M3 (stays) colourless	**M3** (stays) blue

OR no (observed) change / no reaction	OR no (observed) change / no reaction

*If **M1** is blank CE = 0, for the clip*

Check the partial reagents listed and if M1 has a totally incorrect reagent, CE = 0 for the clip

Allow the following alternatives

***M1** (acidified) potassium dichromate(VI) (solution); mark on from incomplete formulae or incorrect oxidation state*

***M2** (turns) green*

M3 (stays) orange / no (observed) change / no reaction

OR

***M1** (acidified) potassium manganate(VII) (solution);*

mark on from incomplete formulae or incorrect oxidation state

***M2** (turns) colourless*

***M3** (stays) purple / no (observed) change / no reaction*

*In all cases for **M3***

Ignore "nothing (happens)"

Ignore "no observation"

3

(e) (i) **Spectrum is for Isomer 1**

or named or correctly identified

The explanation marks in (e)(ii) depend on correctly identifying Isomer 1.

The identification should be unambiguous but candidates should not be penalised for an imperfect or incomplete name. They may say "the alcohol" or the "alkene" or the "E isomer"

1

(ii) **If Isomer 1 is correctly identified, award any two from**

- (Strong / broad) absorption / peak in the range **3230 to 3550** cm^{-1} or specified value in this range or **marked correctly** on spectrum
  and
  (characteristic absorption / peak for) OH group /**alcohol** group

- No absorption / peak in range **1680 to 1750** cm^{-1} or absence marked correctly on spectrum
  and
  (No absorption / peak for a) **C=O** group / **carbonyl** group / **carbon-oxygen double bond**

- Absorption / peak in the range **1620 to 1680** cm^{-1} or specified value in this range or marked correctly on spectrum
  and

  (characteristic absorption / peak for) **C=C** group / **alkene** / **carbon-carbon double bond**

If 6(e)(i) is incorrect or blank, CE=0

Allow the words "dip" OR "spike" OR "trough" OR "low transmittance" as alternatives for absorption.

Ignore reference to other absorptions e.g. C-H, C-O

2

[10]

Q2.

(a) (i) single (C-C) bonds <u>only</u>/no double (C=C) bonds

1

Allow all carbon atoms bonded to four other atoms
Single C-H bonds only = 0
C=H CE

C and H (atoms) only/purely/solely/entirely

Not consists or comprises
Not completely filled with hydrogen
CH molecules = CE
Element containing C and H = CE

1

(ii) C_nH_{2n+2}

Formula only
C_xH_{2x+2}

1

(b) (i) $C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$

Accept multiples
Ignore state symbols

1

(ii) gases produced are greenhouse gases/contribute to Global warming/effect of global warming/climate change

Allow CO_2 or water is greenhouse gas/causes global warming
Acid rain/ozone CE = 0

1

(c) carbon

Allow C
Allow soot

1

(d) (i) $C_9H_{20} \rightarrow C_5H_{12} + C_4H_8$

OR

$C_9H_{20} \rightarrow C_5H_{12} + 2C_2H_4$

Accept multiples

1

(ii) Plastics, polymers

Accept any polyalkene/haloalkanes/alcohols

1

(iii) so the <u>bonds</u> break ***OR*** because the <u>bonds</u> are strong

IMF mentioned = 0

1

(e) (i) 1,4-dibromo-1-chloropentane/1-chloro-1,4-dibromopentane

Ignore punctuation

1

(ii) Chain/position/positional

Not structural or branched alone

1

[11]