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

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Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Mark Schemes

Q1.

(a) Pentan-2-one

ONLY but ignore absence of hyphens

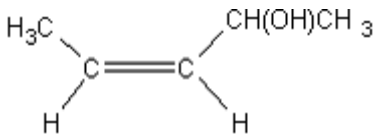
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(b) Functional group (isomerism)

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

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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

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/ **<u>alkene</u>** / **<u>carbon-carbon double bond</u>**

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

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Q2.

(a) (i) **M1** (yellow precipitate is) silver iodide OR AgI (which may be awarded from the equation)

M2 $Ag^+ + I^- \longrightarrow AgI$ (Also scores M1 unless contradicted)

M3 sodium chloride OR NaCl

For M2

Accept multiples

Ignore state symbols

Allow crossed out nitrate ions, but penalise if not crossed out

3

(ii) The silver nitrate is acidified to

- react with / remove <u>ions that would interfere</u> with the test
- prevent the formation of other <u>silver precipitates / insoluble</u> <u>silver</u> <u>compounds</u> that would interfere with the test
- remove (other) <u>ions that react</u> with the silver nitrate
- react with / remove carbonate / hydroxide / sulfite (ions)

Ignore reference to ''false positive''

1

(iii) **M1 and M2 in either order**

M1 <u>Fluoride</u> (ion) OR <u>F^-</u>

M2 • <u>Silver fluoride / AgF</u> is soluble / dissolves (in water)

• <u>no precipitate</u> would form / <u>no visible /observable</u> change

Do not penalise the spelling ''fluoride'',

Penalise "fluride" once only

Mark M1 and M2 independently

2

(b) **M1** $Ba^{2+} + SO_4^{2-} \longrightarrow BaSO_4$

(or the ions together)

M2 <u>white precipitate / white solid / white suspension</u>

M3 Barium meal or (internal) X-ray or to block X-rays

M4 <u>$BaSO_4$ / barium sulfate is insoluble</u> (and therefore not toxic)

For M1, ignore state symbols

Allow crossed out sodium ions, but penalise if not crossed out

For M2, ignore ''milky''

If $BaSO_3$ OR BaS used in M1 <u>and</u> M4, penalise once only

For M3 Ignore radio-tracing

For M4 NOT barium ions

NOT barium

NOT barium meal

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NOT "It" unless clearly $BaSO_4$

4

(c) **M1** **2**(12.00000) + **4**(1.00794) = 28.03176

M2 Ethene and CO or "they" have an imprecise $\mathbf{M_r}$ of 28.0 / 28

OR

Ethene and CO or "they" have the same M_r to one d.p.

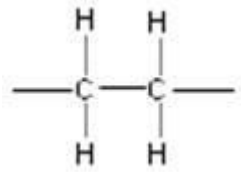
OR

These may be shown by two clear, simple sums identifying both compounds

M3 $C_2H_4 + \mathbf{2}O_2 \longrightarrow \mathbf{2}CO + \mathbf{2}H_2O$

($H_2C=CH_2$)

M4 Displayed formula



M5 Type of polymer = Addition (polymer)

M1 must show working using 5 d.p.for hydrogen

Penalise "similar" or "close to", if this refers to the imprecise value in M2, since this does not mean "the same"

For M3, accept $CH_2=CH_2$ OR CH_2CH_2

For M4, all bonds must be drawn out including those on either side of the unit.

Penalise "sticks"

*Ignore brackets around **correct** repeating unit but penalise "n"*

Penalise "additional"

5

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