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 : 21 Marks **Time : 21 Minutes**

Mark Schemes

Q1.

(a) **M1** Named carbonate / hydrogencarbonate / bicarbonate (or Mg / Na)

Allow any correct chemical test.

*Allow name or formula of suitable reagent in **M1***

1

M2 No (visible/observed) reaction/change/effect

1

M3 effervescence / bubbles (of gas) / fizzing

*If no reagent or incorrect reagent in **M1**, CE = 0 and no marks for **M2** or **M3***

*In **M3** ignore reference to name/formula of correct gas, but penalise reference to name/formula of incorrect gas*

*In **M3** allow reference to limewater going cloudy as an alternative*

*Penalise incorrect formula of correct reagent (or incomplete reagent) in **M1**, but mark on for **M2** and **M3***

Where there is no reaction, ignore "nothing (happens)" or "no observation"

1

OR

M1 universal indicator

M2 neutral / no change / pH7

M3 orange / red / pH < 7 / acidic

*If use of named alcohol in **M1**, allow no reaction for **M2** and sweet smell for **M3***

Allow use of other suitable indicators (e.g. litmus)

(b) **M1** Tollens' (reagent) OR ammoniacal silver nitrate OR a description of making Tollens'

1

M2 No (visible/observed) reaction/change or stays colourless

1

M3 silver mirror or black solid / precipitate

1

OR

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M1 Fehling's (solution) or Benedict's solution

M2 no (visible/observed) reaction/change or stays blue

M3 red solid / precipitate (credit orange or brown)

OR

M1 acidified potassium dichromate or $K_2Cr_2O_7/H_2SO_4$ ***or*** $K_2Cr_2O_7/H^+$ ***or*** acidified $K_2Cr_2O_7$

M2 no (visible/observed) reaction/change or stays orange

M3 (orange to) green solution ***or*** goes green

OR

M1 acidified potassium manganate(VII) or $KMnO_4/H_2SO_4$ ***OR*** $KMnO_4/H^+$ ***OR*** acidified $KMnO_4$

M2 no (visible/observed) reaction/change or stays purple

M3 (purple to) colourless solution **OR** goes colourless

Allow any correct chemical test.

*If no reagent or incorrect reagent in **M1**, **CE = 0** and no marks for **M2** or **M3***

*Allow name or formula of suitable reagent in **M1***

*Penalise incorrect formula of correct reagent in **M1**, but mark on for **M2** and **M3***

*For Tollens' reagent: for **M1** ignore either $AgNO_3$ or $[Ag(NH_3)_2^+]$ or "the silver mirror test" on their own, or "Tolling's reagent", but mark **M2** and **M3**; for **M3** allow silver precipitate/deposit*

*For Fehling's/Benedict's solution: for **M1** Ignore $Cu^{2+}(aq)$ or $CuSO_4$ or "Fellings" on their own, but mark **M2** and **M3***

*For acidified potassium dichromate(VI): if "dichromate" or "(potassium) dichromate(IV)" or incorrect formula or no acid, penalise **M1** but mark **M2** and **M3**; for **M3** ignore dichromate described as "yellow" or "red".*

*For acidified potassium manganate(VII): If "manganate" or "(potassium manganate(IV)" or incorrect formula or no acid, penalise **M1** but mark **M2** and **M3**.*

*Credit alkaline / neutral $KMnO_4$ for possible full marks but **M3** gives brown precipitate or solution goes green*

Where there is no reaction, ignore "nothing (happens)" or "no observation"

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Q2.

(a) **Must be a single test-tube reaction**

If incorrect reagent then no marks

M1 Reagent: acidified potassium dichromate ***OR*** **$K_2Cr_2O_7/H_2SO_4$** ***OR*** **$K_2Cr_2O_7/H^+$** ***OR*** **acidified $K_2Cr_2O_7$**

*For acidified potassium dichromate: if "dichromate" or "(potassium) dichromate(IV)" or incorrect formula or no acid, penalise **M1** but mark on - ignore dichromate described as "yellow" or "red".*

1

M2 ….-1-ol (orange to) <u>green</u> solution ***OR*** **goes <u>green</u>**

1

M3 ….-2-ol no (visible/observed) reaction/change or NVR or stays orange

1

OR

M1 Reagent: acidified potassium manganate(VII) or $KMnO_4/H_2SO_4$ ***OR*** **$KMnO_4/H^+$** ***OR*** **acidified $KMnO_4$**

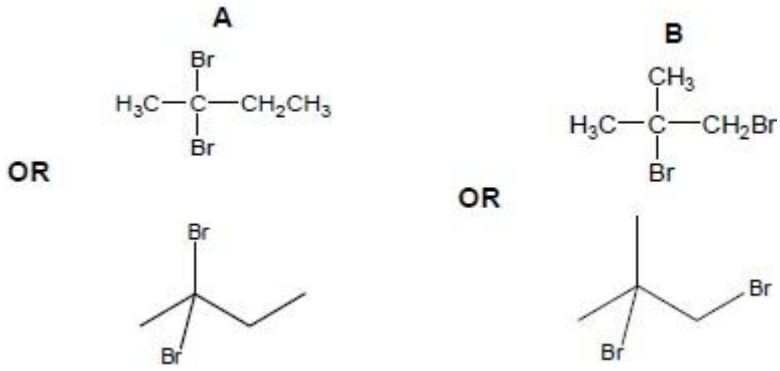
M2….-1-ol (purple to) <u>colourless</u> solution ***OR*** **goes <u>colourless</u>**

M3….-2-ol no (visible/observed) reaction/change or stays purple

*For acidified potassium manganate(VII): If "manganate" or "(potassium manganate(IV)" or incorrect formula or no acid, penalise **M1** but mark on*

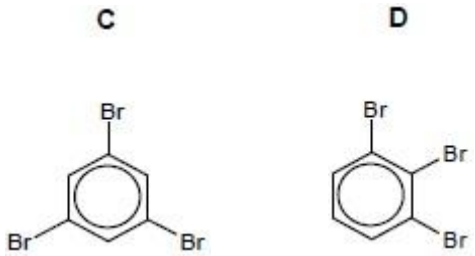
*Credit alkaline / neutral KMnO4 for possible full marks but **M2** gives <u>brown precipitate</u> or solution goes <u>green</u>*

(b)



2

(c)



Allow Kekulé structures

Penalise missing aromatic ring each time

2

(d) **F**

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G

E

1

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Q3.

(a) Cyclopentanone

Allow cyclopentan -1-one but no other numbers

Ignore spaces, commas and hyphens

1

(b)

This question is marked using Levels of Response. Refer to the Mark Scheme Instructions for Examiners for guidance.	
Level 3 **5-6 marks**	**All stages are covered and each stage is generally correct and virtually complete.** Answer is well structured with no repetition or irrelevant points. Accurate and clear expression of ideas with no errors in use of technical terms.
Level 2 **3-4 marks**	**All stages are covered but stage(s) may be incomplete or may contain inaccuracies OR two stages are covered and are generally correct and virtually complete.** Answer shows some attempt at structure Ideas are expressed with reasonable clarity with, perhaps, some repetition or some irrelevant points. Some minor errors in use of technical terms
Level 1 **1-2 marks**	**Two stages are covered but stage(s) may be incomplete or may contain inaccuracies OR only one stage is covered but is generally correct and virtually complete.** Answer includes isolated statements and these are presented in a logical order. Answer may contain valid points which are not clearly linked. Errors in the use of technical terms.
0 marks	Insufficient correct chemistry to gain a mark.

Indicative Chemistry content

Stage 1: boiling points

1a) **Y** has a higher bp

1b) **Y** has H-bonds between molecules and **X** has dip-dip imf

1c) More energy required to overcome H-bonds

Mention of covalent bond breaking loses 1c

Stage 2: ^{13}C NMR

2a) Both have 3 peaks/absorptions in their ^{13}C NMR

2b) **X** has peaks at 20-50 **OR** 190-220ppm

2c) **Y** has peaks at 50-90 **OR** 90-150ppm

(Ignore peaks at 5-40ppm - present in both)

Stage 3: ir

3a) **X** has a peak (for C=O) at 1680-1750 cm^{-1}

3b) **Y** has peak (for O−H) at 3230-3550 cm^{-1}

OR peak (for C=C) at 1620-1680 cm^{-1}

3c) They would have different fingerprint regions (below 1500 cm^{-1})

6

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