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 : 27 Marks **Time : 27 Minutes**

Mark Schemes

Q1.

(a) **If 2 stage test for one compound, award no marks for that compound, eg no mark for ROH or RX to alkene then Br_2 test. If reagent is wrong or missing, no mark for that test; if wrong but close/incomplete, lose reagent mark but can award for correct observation. In each test, penalise each example of wrong chemistry, eg $AgClr_2$**

propan-1-ol

acidified
potassium
dichromate

sodium

Named acid + conc H_2SO_4

named acyl chloride

PCl_5

M1
1

(orange) turns green

effervescence

Sweet smell

Sweet smell /misty fumes

Misty fumes

M2
1

propanal

add Tollens or Fehlings / Benedicts

acidified
potassium
dichromate

Bradys or 2,4-dnph

if dichromate used for alcohol cannot be used for aldehyde

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M3

1

Tollens: silver mirror or Fehlings/ Benedicts: red ppt

(orange) turns green

Yellow or orange ppt

M4

1

propanoic acid

Named carbonate/ hydrogencarbonate

water and UI (paper)

Named alcohol + conc H_2SO_4

sodium or magnesium

PCl_5

if sodium used for alcohol cannot be used for acid

M5

1

effervescence

orange/red

Sweet smell

effervescence

Misty fumes

if PCl_5 used for alcohol cannot be used for acid

M6

1

1-chloro propane

NaOH then acidified $AgNO_3$

$AgNO_3$

If acidification missed after NaOH,
no mark here but allow mark for observation

M7

1

white ppt

white ppt

M8

1

(b) oxidation (of alcohol by oxygen in air)

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M1

1

absorption at <u>1680 -1750</u> (due to C=O)

Must refer to the spectrum

M2

1

comparison of polarity of molecules or correct imf statement:
propanone is less polar OR propan-2-ol is more polar
OR propanone has dipole-dipole forces
OR propan-2-ol has hydrogen bonding

M3

1

about attraction to stationary phase or solubility in moving phase
Propan-2-ol has greater affinity for stationary phase or vice versa
OR propanone is more soluble in solvent/moving phase or vice versa

M4

1

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Q2.

(a) (i) C

1

(ii) A

1

(iii) D

1

(iv) B

1

(b) **M1** Br_2 ***OR*** bromine (water) ***OR*** bromine (in CCl_4 / organic solvent)

If M1, has no reagent or an incorrect reagent, CE=0

Ignore "acidified"

For M1 penalise Br (or incorrect formula of other correct reagent), but mark on

For M1, it must be a whole reagent and/or correct formulae

Either order

If oxidation state given in name, it must be correct.

M2 cyclohexane ***OR* A** or the alkane: remains orange / red / yellow / brown / the same ***OR*** no reaction ***OR*** reference to colour going to cyclohexane layer

For M2 credit "no change"

Ignore "nothing"

Ignore "nothing happens"

Ignore "no observation"

M3 cyclohexene ***OR* D** or the alkene: decolourised / goes colourless / loses its colour

For M3, ignore "goes clear"

Alternatives : potassium manganate(VII)

M1 $KMnO_4$ in acid **M2** purple **M3** colourless

M1 $KMnO_4$ in alkali / neutral **M2** purple **M3** brown solid

Give appropriate credit for the use of iodine and observations

No credit for combustion observations

3

(c) **M1** acidified potassium or sodium dichromate

For M1, it must be a whole reagent and/or correct formulae

OR eg H_2SO_4 / $K_2Cr_2O_7$ ***OR*** H^+/ $K_2Cr_2O_7$

OR correct combination of formula and name

If oxidation state given in name, it must be correct.

M2 oxidation ***OR*** oxidised ***OR*** redox

Do not penalise incorrect attempt at formula if name is correct or vice versa

M3 secondary / 2^o (alcohol)

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Credit acidified potassium chromate(VI) / $\underline{H_2SO_4 + K_2CrO_4}$

3

(d) **M1** (free-) radical substitution (mechanism)

M1 both words required

M2 $Br_2 \longrightarrow 2Br\bullet$

Penalise absence of dot once only.

M3 $Br\bullet + CH_4 \longrightarrow \bullet CH_3 + HBr$

Penalise + or – charges every time

M4 $Br_2 + \bullet CH_3 \longrightarrow CH_3Br + Br\bullet$

Accept dot anywhere on methyl radical

Accept a correct termination step for 1 mark if neither M3 nor M4 are scored; otherwise ignore termination steps

Mark independently

NB If Cl_2 is used, penalise every time (this may be for M2, M3 and M4)

If cyclohexane is used, penalise every time (this may be for M3 and M4)

M5 Condition

ultra-violet / uv / sun light

OR high temperature

OR 125 °C ≤ T ≤ 600 °C

OR 400 K ≤ T ≤ 870 K

For M5 ignore "heat"

5

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