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

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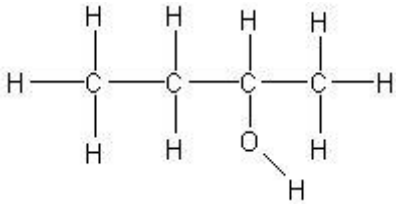
Name of the Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

Mark Schemes

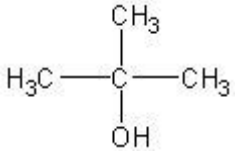
Q1.

(a) **M1**
Displayed formula for butan-2-ol



M1 displayed formula must have all bonds drawn out, including the O—H but ignore angles
Penalise "sticks"

M2 Alcohol **X** is



M2 structure must be clearly identifiable as 2-methylpropan-2-ol and may be drawn in a variety of ways.

M3 Alcohol **Y** is named (2)-methylpropan-1-ol ONLY
M3 must be correct name, but ignore structures

3

(b) **M1** The infrared spectrum shows an absorption/peak in the range 3230 to 3550 (cm^{-1})(which supports the idea that an alcohol is present)
In M1, allow the words "dip", "spike", "low transmittance" and "trough" as alternatives for absorption.

M2 Reference to the 'fingerprint region' or below 1500 (cm^{-1})

M3 Match with or same as known sample/database spectra
Check the spectrum to see if alcohol OH is labelled and credit.

OR

M2 Run infrared spectra (of the alcohols)

M3 Find which one matches or is the same as this spectrum.

3

(c) **M1** balanced equation

$C_6H_{12}O_6 \rightarrow CH_3CH_2CH_2CH_2OH + \mathbf{2}CO_2 + H_2O$

or C_4H_9OH

Or multiples for M1 and M3

In M1 and M3 penalise use of $C_4H_{10}O$ or butan-2-ol once only

M2 Any one from

- excess/adequate/sufficient/correct amount of/enough/plenty/ a good supply of oxygen or air
- good mixing of the fuel and air/oxygen

For M2, do not accept simply "oxygen" or "air" alone

Ignore reference to "temperature"

M3 $CH_3CH_2CH_2CH_2OH + \mathbf{6}O_2 \rightarrow \mathbf{4}CO_2 + \mathbf{5}H_2O$

or C_4H_9OH

M4 A biofuel is a fuel produced from (renewable) biological (re)source(s)

OR

(renewable) (re)source(s) from (a specified) plant(s)/fruit(s)/tree(s)

In M4

Ignore references to "carbon neutral"

Ignore "sugar" and "glucose"

4

(d) **M1** butan-1-ol is a primary or 1° (alcohol)

M2 Displayed formula (ONLY) for butanal $CH_3CH_2CH_2CHO$

M3 Displayed formula (ONLY) for butanoic acid $CH_3CH_2CH_2COOH$

M2 and M3 displayed formula must have all bonds drawn out including the O—H but ignore angles.

If butanal and butanoic acid formulae are both correctly given but not displayed, credit one mark out of two.

M4 Oxidation (oxidised) OR Redox

M5 orange to green

Both colours required for M5

Ignore states

5

[15]

Q2.

(a) Allow 1 mark each for any correctly drawn primary, secondary and tertiary alcohol of molecular formula C_4H_8O

3

Tertiary alcohol cannot be oxidised

1

(b) Region 1500–400 cm^{-1}

1

exact match to spectrum of known compound

1

(c) **A**

$CH_3CH_2CH_2OH$ or $CH_3CH(OH)CH_3$ **(1)**

B

$CH_3CH_2–O–CH_3$ **(1)**

C

one alkene e.g.

$CH_2=CHCH_2CH_2CH_3$

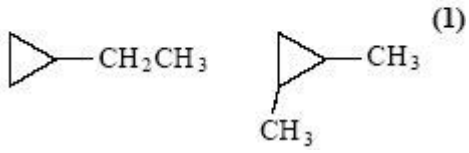
$CH_3–CH=CH–CH_2CH_3$

$(CH_3)_2C=CHCH_3$

$H_2C=C(CH_3)CH_2CH_3$

D

one cycloalkane e.g.



(1)

(1)

etc

E

CH_3CH_2CHO **(1)**

F

CH_3COCH_3 **(1)**

6

[12]