

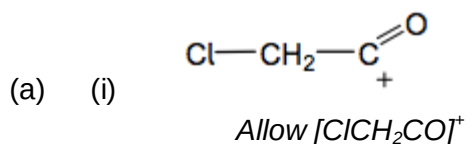
Name of the Student: \_\_\_\_\_

Max. Marks : 24 Marks

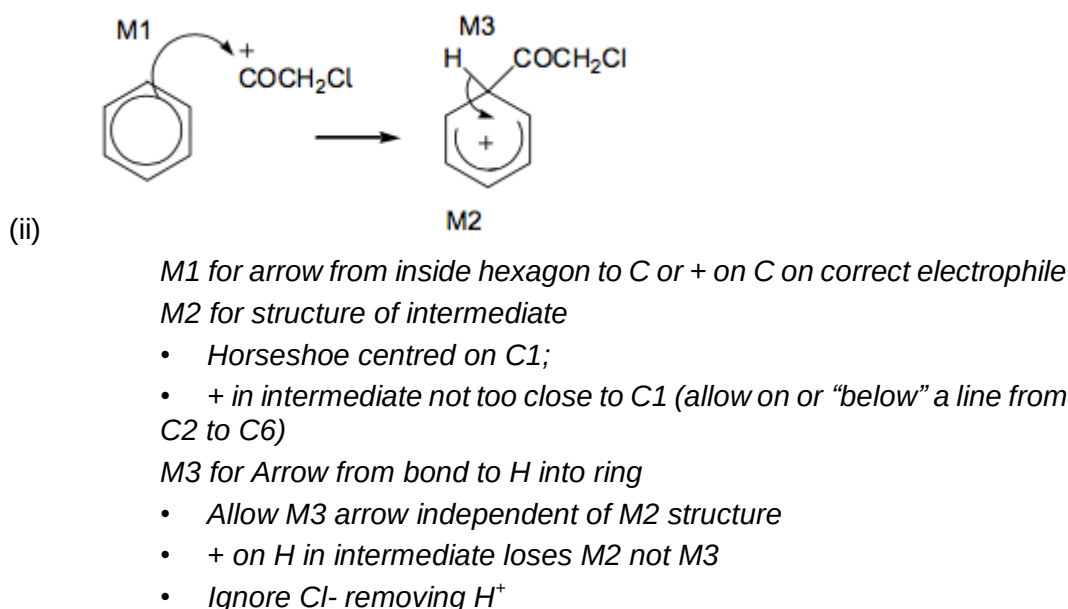
Time : 24 Minutes

Mark Schemes

Q1.



1



1

1

1

(b) Reagent

Water

(Aqueous) silver nitrate

NaOH followed by acidified silver nitrate

(Water +) named indicator

Named alcohol

Na<sub>2</sub>CO<sub>3</sub> or NaHCO<sub>3</sub>

Ammonia

1

P

No reaction

No reaction (or slow formation of ppt)

No reaction (or slow formation of ppt)

No colour change

*NVC*

*NVC*

*No reaction*

*Do NOT award*

*No observation*

1

**Q**

Steamy /misty/ white fumes

White precipitate (immediately formed)

White precipitate (immediately formed)

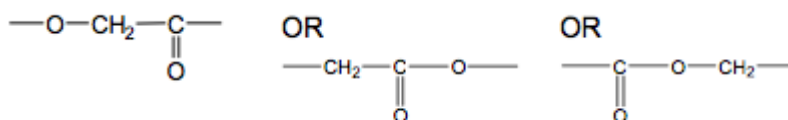
Indicator turns to correct acid colour

*Fruity or sweet smell or misty fumes*

*Fizzing or effervescence (not just gas produced)*

*White smoke*

1



(c) (i)

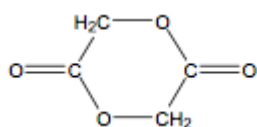
*One unit only*

*Must have trailing bonds*

*Ignore n and brackets*

*allow*  $\text{---O---CH}_2\text{---CO---}$

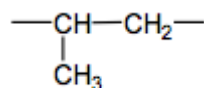
1



(i)

*Allow CO for C=O*

1



(d) (i)

*One unit only*

*Must have trailing bonds*

*Ignore n and brackets*

1

(ii) PGA sutures react/dissolve/break down/are biodegradable/ are hydrolysed / attacked by water or nucleophiles /no need to

remove

*OR Polypropene not biodegradeable/ not hydrolysed / not attacked by water/nucleophiles*

1

(Ester links have) polar bonds

*polypropene contains non-polar bonds*

*ignore intermolecular forces*

1

[12]

Q2.

(a) Method 1

$$M1 \text{ \%O} = 27.1$$

$$\begin{array}{ccc} \frac{61.0}{12.0} & \frac{11.9}{1.0} & \frac{27.1}{16.0} \\ = 5.08 & = 11.9 & = 1.69 \end{array}$$

$$M2 \quad 3 \quad 7 \quad 1$$

$$M3 \quad C_3H_7O = 59 \text{ which is half of } M_r \text{ so } MF = 2EF$$

**OR**

Method 2

$$M1 \quad 61\% \text{ of } 118 = 72.0 \text{ and } 11.9\% \text{ of } 118 = 14.0$$

$$M2 \quad 72 + 14 = 86 \text{ so oxygen} = 32 \text{ out of } 118$$

$$\text{OR } 27.1\% \text{ of } 118 = 32.0$$

$$\begin{array}{ccc} \frac{72.0}{12.0} & \frac{14.0}{1.0} & \frac{32.0}{16.0} \\ = 6 & = 14 & = 2 \end{array}$$

M3

*Method 3*

*Alternative using given molecular formula*

$$M1 \quad C = \frac{12 \times 6}{118} \times 100 = 61.0\%$$

$$M2 \quad H = \frac{14 \times 1}{118} \times 100 = 11.9\%$$

$$M3 \quad O = \frac{16 \times 2}{118} \times 100 = 27.1\%$$

3

- (b) For this question, marks can be awarded either for a description of how the structure is derived or from the given structure itself. The maximum mark to be awarded is nine from the ten marks listed.

Marks fall into three sections:

- Infrared evidence : two marks are available for use of the infrared evidence, (M1 and M10)
- Chemical evidence: one mark is available for use of the chemical evidence (M2)
- N.m.r. evidence: six marks are available for use of the n.m.r. evidence (M3 – M8 inclusive)

plus one mark (M9) for a completely correct structure.

**Suggested procedure for marking**

First look at the infrared spectrum: marks M1 and M10 may be scored there or in the written answer.

Then look for use of the acidified potassium dichromate(VI) evidence, (M2).

Then look at the final structure: this may lead to the award of marks M3 to M9 as shown on the structures below.

Beware contradictions, e.g. using the chemical evidence they may state that **R** is a primary or secondary alcohol but then draw a tertiary alcohol. This will lose M2 but may score M3.

The written 'evidence' frequently simply contains extracts from the Table **B** on the Data Sheet and, if only this is given, is unlikely to score many marks.

Described

*Or drawn*

M1 Infrared peak/absorbance at  $3400\text{ cm}^{-1}$  = O-H alcohol  
(reference to ir spectrum needed)

*Note: please check the spectrum*

*If peak at  $3000\text{ cm}^{-1}$  is identified as acid then cannot score M1  
(contradiction)*

M10 **Either** no peak between  $1680\text{--}1750\text{ cm}^{-1}$  so no C=O or not aldehyde/acid  
**OR** peak at  $1000\text{--}1300\text{ cm}^{-1}$  so C-O present

*Apply list principle to IR analysis for M10*

M2 (Acidified potassium dichromate(VI) turns green) so primary alcohol or secondary alcohol or not tertiary alcohol

*Ignore aldehyde here*

*Lose M2 if just tertiary alcohol in structure*

M3  $\delta = 3.1$  singlet or integration = 1 is O-H

*Award M3 if structure has 1 O-H group only (can be primary, secondary or tertiary)*

*Lose M3 if more than one OH group shown*

M4 two triplets at 1.4 & 3.8 =  $\text{--CH}_2\text{--CH}_2\text{--}$

*Allow  $\text{--CH}_2\text{--CH}_2\text{--CH}_2\text{--}$*

M5  $\delta = 3.8$  means  $\text{CH}_2$  attached to O (in ether NOT ester)

*Allow  $\text{O--CH}_2\text{--CH}_2\text{--CH}_2\text{--C}$*

$\delta = 1.4$  means  $\text{CH}_2$  attached to C (but not to C=O)

M6  $\delta = 1.1$  (singlet) integration 6 =  $2 \times$  equivalent  $\text{CH}_3$  on same C

*$\text{--C(CH}_3)_2\text{--}$*

M7  $\delta = 1.1$  singlet so no H attached to  $\text{--C(CH}_3)_2\text{--}$

*$\text{R--C(CH}_3)_2\text{--R}$*

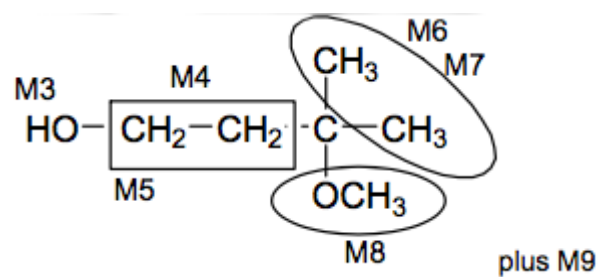
M8  $\delta = 3.2$  singlet integration 3 =  $\text{--OCH}_3$

*$\text{--OCH}_3$*

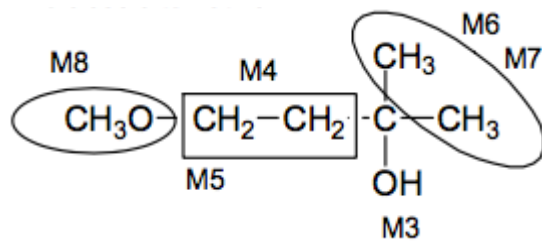
M9 For completely correct

*If no structure given then Max 8*

R is



This close alternative



would not score M9, but could score up to 8 marks

[12]