

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Mark Schemes

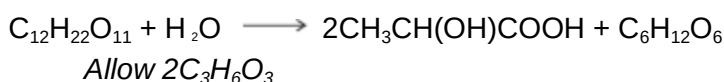
Q1.

- (a) (i) 2-hydroxypropanoic acid
OR
2-hydroxypropan(-1-)oic acid

*Do not penalise different or missing punctuation or extra spaces.**Spelling must be exact and order of letters and numbers as here.**Can ignore -1- before -oic, but penalise any other numbers here.*

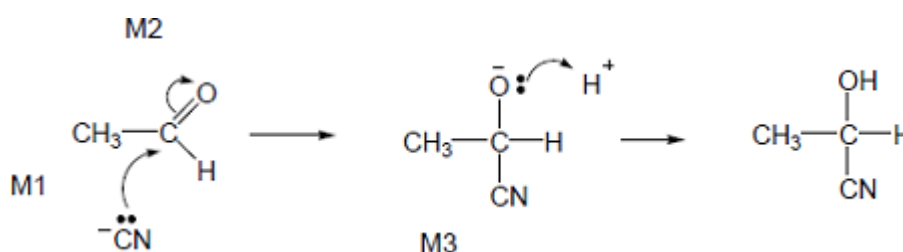
1

- (ii) $C_{12}H_{22}O_{11} + H_2O \longrightarrow 4CH_3CH(OH)COOH$
 Allow $4C_3H_6O_3$

OR

1

- (b) (i) Nucleophilic addition

M4 for lp, arrow and H⁺

- M1 lp and minus must be on C
- M1 and M4 include lone pair and curly arrow.
- M2 not allowed independent of M1, but allow following some attempt at attack on carbonyl C
- allow M1 for correct attack on C⁺
- + rather than δ⁺ on C=O loses M2
- M3 is for correct structure including minus sign but lone pair is part of M4
- Allow arrow in M4 to H of H-CN with arrow forming cyanide ion.

5

- (ii) Equal mixture of enantiomers / (optical) isomers

1

- (iii) (Plane) polarized light
If missing no further mark.

1

(Polarised light) rotated by single enantiomer but unaffected by racemate
Both needed; not allow bend, twist etc.

1

- (c) (i) $\text{CH}_3\text{CH}(\text{OH})\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{CH}(\text{OH})\text{COONa} + \text{H}_2\text{O}$
OR $\text{CH}_3\text{CH}(\text{OH})\text{COOH} + \text{OH}^- \rightarrow \text{CH}_3\text{CH}(\text{OH})\text{COO}^- + \text{H}_2\text{O}$
Not ambiguous mol formulae for product - must show COONa or CO_2Na or COO^- or CO_2^-

1

- (ii) $[\text{H}^+] = K_a$ **OR** $\text{pH} = \text{p}K_a$

1

$\text{pH} = 3.86$

Allow more than 2 decimal places but not fewer.

1

- (iii) M1 buffer
Ignore acidic but penalise alkaline or basic.

1

Any two out of the three marks M2 , M3 & M4

M2 Large lactate concentration in buffer
OR sodium lactate completely ionised

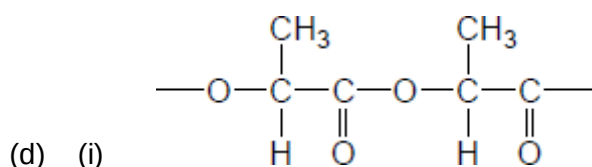
M3 added acid reacts with / is removed by lactate ion or A^- or sodium lactate or salt
OR equation $\text{H}^+ + \text{A}^- \rightarrow \text{HA}$

Ignore reaction of H^+ with OH^-

Ignore reference to equilibrium unless it is shown.

M4 ratio $[\text{HA}] / [\text{A}^-]$ stays almost constant
Ignore H^+ or pH remains constant.

Max 2



No marks if ester link missing

Correct ester link
allow $-\text{COO}-$

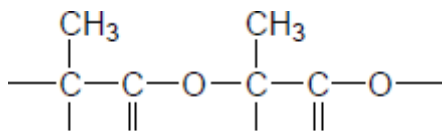
NB Correct answer scores 2

Ignore n here (compare with (d)(iv)).

Ignore brackets

1

OR



All rest correct with trailing bonds

If OH or COOH on either or both ends, lose one, ie dimer scores 1

If more than two repeating units, lose 1

1

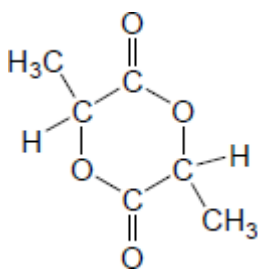
- (ii) (Poly)ester ie allow ester

Not terylene.

Ignore spaces and brackets in answer.

1

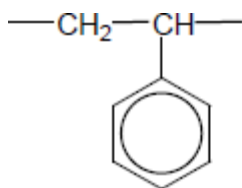
- (iii)



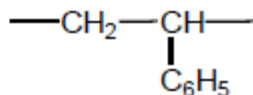
Allow any cyclic $C_6H_8O_4$

1

- (iv)



OR



Penalise n here (compare with (d)(i))

Ignore brackets.

Not allow Ph for phenyl.

1

- (v) In landfill, no air or UV, to assist decay

OR not enough water or moisture (to hydrolyse polyester)

Allow landfill has / contains:

no or few bacteria / micro-organisms / enzymes compared with compost heap

OR less oxygen

OR lower temperature.

1

[22]