



**EXAM PAPERS PRACTICE**

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Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

2002

**XVIII**

1583

Time allowed  
**34 Minutes**

Score

**/28**

Percentage

**%**

**CHEMISTRY**

**OCR  
AS & A LEVEL**

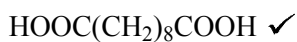
**Mark Scheme**

**Module 6: Organic chemistry  
and analysis**

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*ALLOW*  $\text{H}_2\text{NCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$



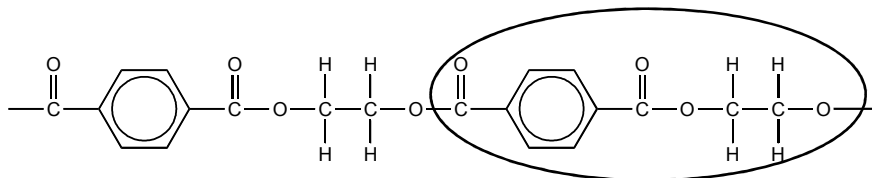
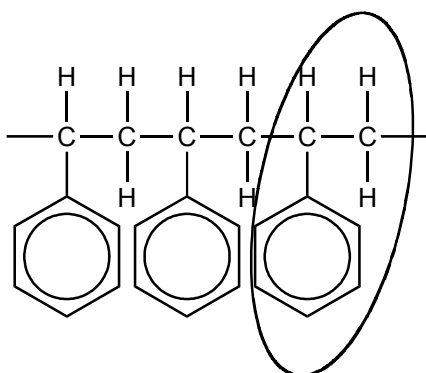
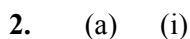
*ALLOW*  $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$

*ALLOW*  $\text{CO}_2\text{H}$  for  $\text{COOH}$

*ALLOW* acid chloride,  $\text{ClOC}(\text{CH}_2)_8\text{COCl}$

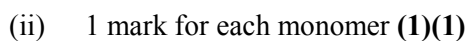
*ALLOW* displayed formulae or skeletal formulae

[2]

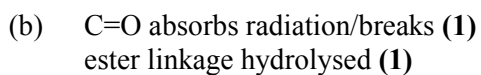


1 mark for each repeat unit (1)(1)

2

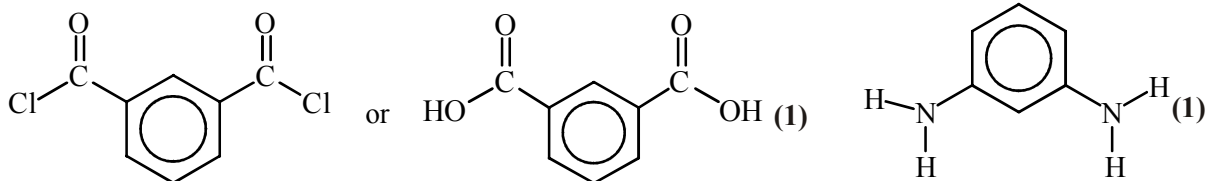


2



2

[6]



2



- (ii) any valid suggestion to explain or describe stronger intermolecular forces – e.g. Nomex is planar so packs together more easily / greater H-bonding / Van der Waals' / forces between molecules **(1)** AW (ignore arguments based on *M<sub>r</sub>*)

1

[3]

4. (a)

$\begin{array}{c} \text{HO}-\overset{\text{O}}{\parallel}{\text{C}}-(\text{CH}_2)_4-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH} \\ \text{H}_2\text{N}-(\text{CH}_2)_6-\text{NH}_2 \end{array}$	$\begin{array}{c} \text{H} \quad \text{CN} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{H} \end{array} \quad \text{(1)}$
$\left[ \begin{array}{c} \text{O} \quad \quad \text{O} \\ \parallel \quad \quad \parallel \\ -\text{C}-\text{(CH}_2)_4-\text{C}-\text{N}-\text{(CH}_2)_6-\text{N}- \\   \quad \quad   \\ \text{H} \quad \quad \text{H} \end{array} \right]$ <p>monomers connected by NHCO <b>(1)</b> correct repeat shown <b>(1)</b></p>	$\left[ \begin{array}{c} \text{H} \quad \text{CN} \\   \quad   \\ -\text{C}-\text{C}- \\   \quad   \\ \text{H} \quad \text{H} \end{array} \right]$
condensation	addition

**(1)** for both

4

- (b) (i)  $\text{PCl}_5 / \text{SOCl}_2$   
(ii)  $\text{HCl}$

1

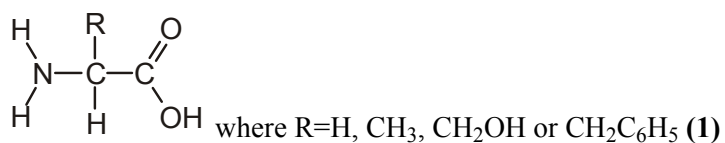
1

- (c)  $\text{H}_3\text{N}^+-(\text{CH}_2)_6-\text{NH}_3^+ \quad \text{(1)} \quad \text{}^{-}\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-(\text{CH}_2)_4-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^{-}$   
allow 1 mark for: both  $\text{H}_3\text{N}^+-(\text{CH}_2)_6-\text{NH}_3^+$  and  
 $\text{HO}-\overset{\text{O}}{\parallel}{\text{C}}-(\text{CH}_2)_4-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^{-}$

2

- (d) (i) 4  
(ii)

1



1

(iii) any three different chemically or biologically correct differences between amino acids and the nylon monomers **(1)(1)(1)** - eg

- protein monomers are amino acids / nylon monomers are a (di)amine/base and a (di)acid
- protein monomers have different types/R groups / nylon monomers are two types/no variation
- protein monomers have stereo/optical isomers/are chiral
- protein monomers have higher melting points/ form zwitterions

other possible answers include:

- nylon monomers have longer chain length/no other functional groups / no aromatic content / are symmetrical etc  
*don't allow comparisons solubility or  $M_r$*

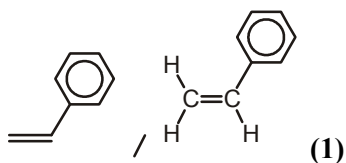
3

[13]

5. (i) addition (polymerisation) **(1)**  
*NOT additional*

1

(ii)



1

(iii)  $\pi$ -bond breaks **(1)**

**many** molecules join / a **long** chain forms /  
equation to show this using 'n' **(1)**

2

[4]