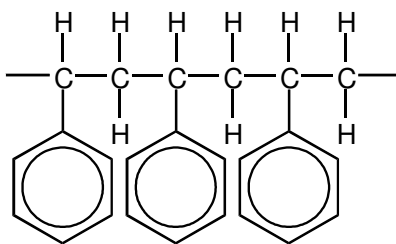
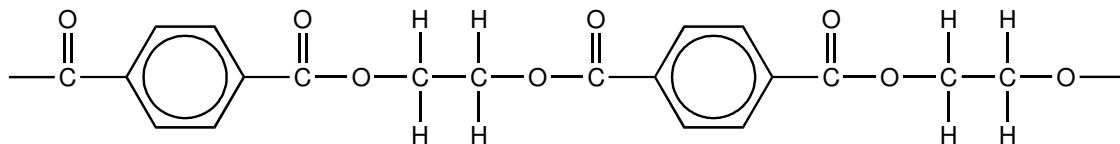


**F324 Module 2: HW6**

1. Short sections of the molecular structures of two polymers are shown below.



**polymer C**



**polymer D**

(a) (i) Circle, on the diagrams above, the simplest repeat unit in each polymer.

[2]

(ii) In the boxes below, draw the displayed formulae of the two monomers that could be used to prepare polymer **D**.

--	--

[2]

**F324 Module 2: HW6**

- (b) Chemists have developed degradable polymers to reduce the quantity of plastic waste being disposed of in landfill sites. Polymer **D** is more likely to be a 'degradable polymer' than polymer **C**.

Suggest **two** reasons why.

.....

.....

.....

.....

[2]

[Total 6 marks]

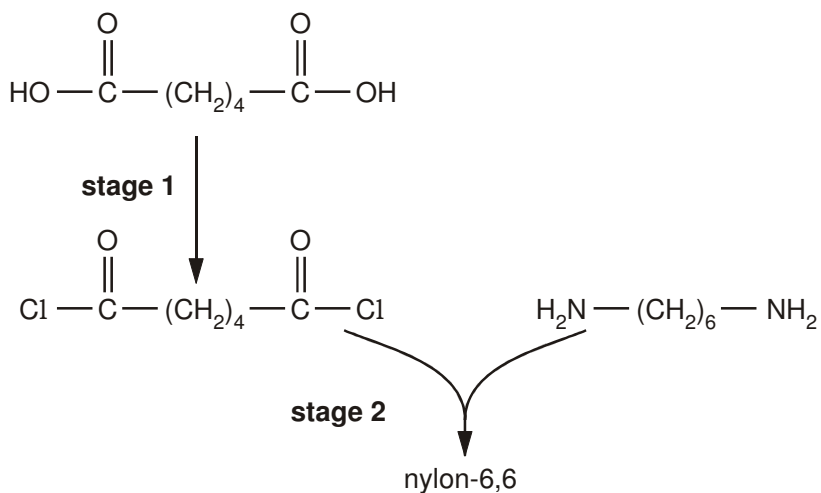
2. The fibres used in carpets are made from synthetic or natural polymers such as nylon-6,6, *Orlon*<sup>TM</sup> and wool.

- (a) Complete the table below.

	<b>nylo-6,6</b>	<b>Orlon<sup>TM</sup></b>
monomer(s)	$\text{HO}-\overset{\text{O}}{\parallel}{\text{C}}-(\text{CH}_2)_4-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$ $\text{H}_2\text{N}-(\text{CH}_2)_6-\text{NH}_2$	
repeat unit of the polymer		$\left[ \begin{array}{cc} \text{H} & \text{CN} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{H} & \text{H} \end{array} \right]$
type of polymerisation		

[4]

- (b) Nylon-6,6 can be made from its monomers in the laboratory in two stages as shown below.



- (i) State a suitable reagent to carry out **stage 1**.

.....

[1]

- (ii) Deduce the inorganic product that is also formed in **stage 2**.

.....

[1]

- (c) Industrially, nylon-6,6 is **not** manufactured by the method in (b). Instead, the two monomers are mixed directly at room temperature to give a salt. This salt is then heated to convert it to nylon-6,6.

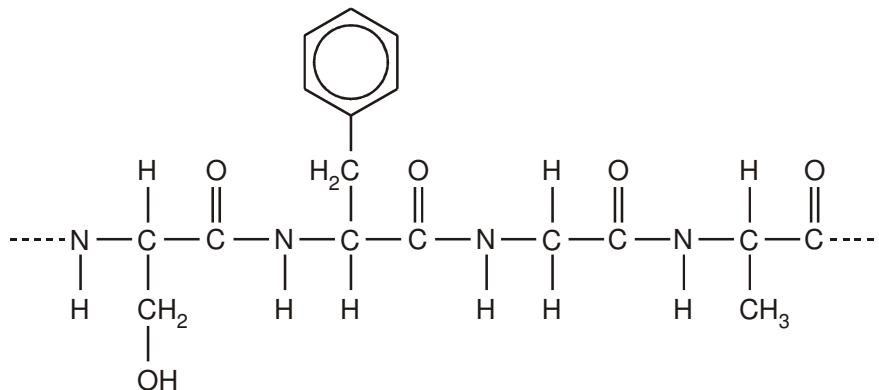
Suggest the structures of the two ions present in this salt.

[2]

**F324 Module 2: HW6**

- (d) Wool is a protein. It is a natural polymer made by the same type of polymerisation as nylon-6,6.

A section of the polymer chain in a protein is shown below.



- (i) How many monomer units does this section contain?

.....

[1]

- (ii) Draw the structure of **one** of the monomer molecules that was used to form this section.

[1]

- (iii) State **three** ways in which the monomer units of a protein differ from those of nylon-6,6.

.....

.....

.....

.....

.....

[3]

[Total 13 marks]