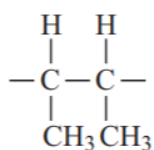


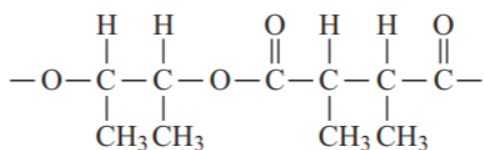
## CHAPTER 29 POLYMERISATION

1

The repeating units of two polymers, **P** and **Q**, are shown below.



**P**



**Q**

- (i) Draw the structure of the monomer used to form polymer **P**. Name the type of polymerisation involved.

*Structure of monomer*

*Type of polymerisation* .....

- (ii) Draw the structures of **two** compounds which react together to form polymer **Q**. Name these **two** compounds and name the type of polymerisation involved.

*Structure of compound 1*

*Name of compound 1* .....

*Structure of compound 2*

*Name of compound 2* .....

*Type of polymerisation* .....

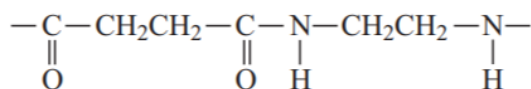
- (iii) Identify a compound which, in aqueous solution, will break down polymer **Q** but not polymer **P**.

.....

*(8 marks)*

**2**

The structure below shows the repeating unit of a polymer.



By considering the functional group formed during polymerisation, name this type of polymer and the type of polymerisation involved in its formation.

Type of polymer .....

Type of polymerisation .....

(2 marks)

**3**

(a) The compound  $\text{H}_2\text{C}=\text{CHCN}$  is used in the formation of acrylic polymers.

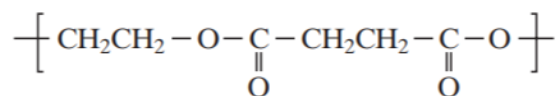
(i) Draw the repeating unit of the polymer formed from this compound.

(ii) Name the type of polymerisation involved in the formation of this polymer.

.....

(2 marks)

(b) The repeating unit of a polyester is shown below.



(i) Deduce the empirical formula of the repeating unit of this polyester.

.....

(ii) Draw the structure of the acid which could be used in the preparation of this polyester and give the name of this acid.

Structure .....

Name .....

(iii) Give **one** reason why the polyester is biodegradable.

.....  
.....

(4 marks)

4

Consider the hydrocarbon **G**,  $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$ , which can be polymerised.

(i) Name the type of polymerisation involved and draw the repeating unit of the polymer.

Type of polymerisation .....

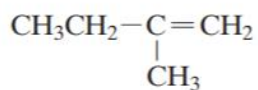
Repeating unit

(ii) Draw the structure of an isomer of **G** which shows geometrical isomerism.

(iii) Draw the structure of an isomer of **G** which does not react with bromine water.

(4 marks)

- 5** (a) The hydrocarbon **M** has the structure shown below.



- (i) Name hydrocarbon **M**.

.....

- (ii) Draw the repeating unit of the polymer which can be formed from **M**. State the type of polymerisation occurring in this reaction.

*Repeating unit*

*Type of polymerisation* .....

(3 marks)

- (b) Draw the repeating unit of the polymer formed by the reaction between butanedioic acid and hexane-1,6-diamine. State the type of polymerisation occurring in this reaction and give a name for the linkage between the monomer units in this polymer.

*Repeating unit*

*Type of polymerisation* .....

*Name of linkage* .....

(4 marks)

6

(a) Synthetic polyamides are produced by the reaction of dicarboxylic acids with compounds such as  $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$

(i) Name the compound  $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$

.....

(ii) Give the repeating unit in the polyamide nylon 6,6.

.....

*(2 marks)*

(b) Synthetic polyamides have structures similar to those found in proteins.

(i) Draw the structure of 2-aminopropanoic acid.

(ii) Draw the organic product formed by the condensation of two molecules of 2-aminopropanoic acid.

*(2 marks)*

**7**

**(a)** Explain why polyalkenes are chemically inert.

.....

.....

.....

.....

.....

*(2 marks)*

**(b)** Explain why polyesters and polyamides are biodegradable.

.....

.....

.....

.....

.....

*(2 marks)*

**(c)** Discuss the advantages of recycling polymers.

.....

.....

.....

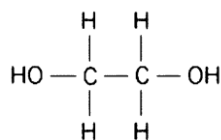
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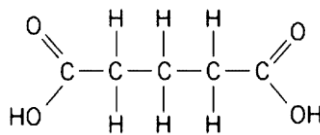
*(2 marks)*

8

The displayed formula of two organic compounds are shown below.



Monomer A



Monomer B

(a) (i) Monomer A is diol. Name compound A.

.....  
(1 mark)

(ii) What type of compound is monomer B?

.....  
(1 mark)

(b) Monomer A and monomer B can react together to form a useful new substance named compound C.

(i) Draw a repeat unit of the new substance compound C.

(1 mark)

(ii) Circle the ester linkage in compound C.

(1 mark)

(iii) Name the non-organic product of this reaction.

.....  
(1 mark)

(iv) State the type of reaction that has taken place.

.....  
(1 mark)

(v) Suggest why a lab coat made from compound C may be damaged if concentrated sodium hydroxide was accidentally spilt on it.

.....  
.....  
(1 mark)