



CHEMISTRY ONLINE
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CHEMISTRY

INORGANIC CHEMISTRY II

Level & Board	AQA (A-LEVEL)
TOPIC:	POLYMERS
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	10
TOTAL MARKS	33

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Polymers - 2

1. Alkenes are the building blocks of synthetic addition polymers.

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

(a) Draw the repeating unit of the polymer. (1)

(b) Draw the structure of an isomer of X which shows E-Z isomerism. (1)

(c) Draw the structure of an isomer of X which does not react with bromine water. (1)

2. Draw the repeating unit of the polyester Terylene that is made from benzene-1,4-dicarboxylic acid and ethane-1,2-diol.

Although Terylene is biodegradable, it is preferable to recycle objects made from Terylene.

Give one advantage and one disadvantage of recycling objects made from Terylene.

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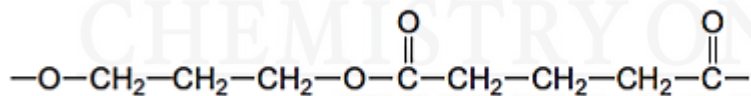
(4)

3. Which compound can form a polymer without needing another reagent?

- A. HOCH₂CH₂OH
- B. HOOCCH₂CH₂COOH
- C. HOCH₂CH₂COCl
- D. ClCH₂CH₂COOH

(1)

4. The repeating unit shown represents a polyester.



(a) Name this type of polymer.

(1)

(b) Give the IUPAC name for the alcohol used to prepare this polyester.

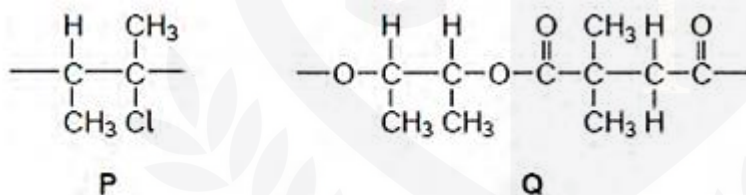
(1)

5. Which compound can polymerise by reaction with itself?

- A. $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
- B. $\text{CH}_3\text{CH}_2\text{CONH}_2$
- C. $\text{HOOCCH}_2\text{COOH}$
- D. $\text{NH}_2\text{CH}_2\text{COCl}$

(1)

6. Repeating units of two polymers, P and Q, are shown in the figure below.



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

(2)

(b) Draw the structures of two compounds that react together to form polymer Q.

(2)

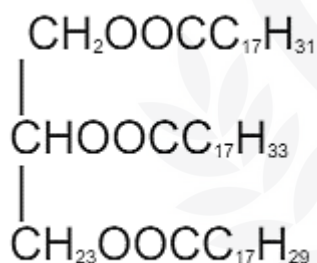
(c) Suggest an environmental advantage of polymer Q over polymer P.

Justify your answer.

(3)

7. The ester shown below occurs in vegetable oils.

Write an equation to show the formation of biodiesel from this ester.

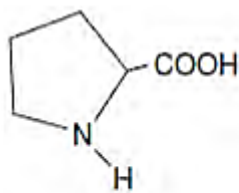


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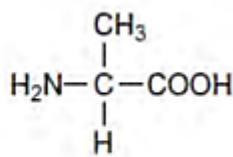
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(3)

8. The structures and common names of two amino acids are shown.



proline



alanine

(a) Draw the structure of the zwitterion of proline.

(1)

(b) Draw the structure of the tripeptide formed when a proline molecule bonds to two alanine molecules, one on each side.

(2)

9. Lactic acid, $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$, is formed in the human body during metabolism and exercise.

This acid is also formed by the fermentation of carbohydrates such as sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$.

A mixture of lactic acid and its salt sodium lactate is used as an acidity regulator in some foods.

An acidity regulator makes sure that there is little variation in the pH of food.

(a) Write an equation for the reaction of lactic acid with sodium hydroxide.

(1)

(b) The acid dissociation constant K_a for lactic acid has the value $1.38 \times 10^{-4} \text{ mol dm}^{-3}$ at 298 K.

Calculate the pH of an equimolar solution of lactic acid and sodium lactate.

(2)

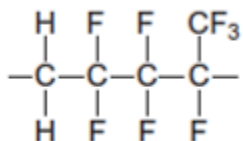
(c) Suggest an alternative name for the term acidity regulator.

Explain how a mixture of lactic acid and sodium lactate can act as a regulator when natural processes increase the acidity in some foods.

(3)

10. The repeating unit shown represents a polyalkene co-polymer.

This co-polymer is made from two different alkene monomers.



(a) Name the type of polymerisation occurring in the formation of this co-polymer.

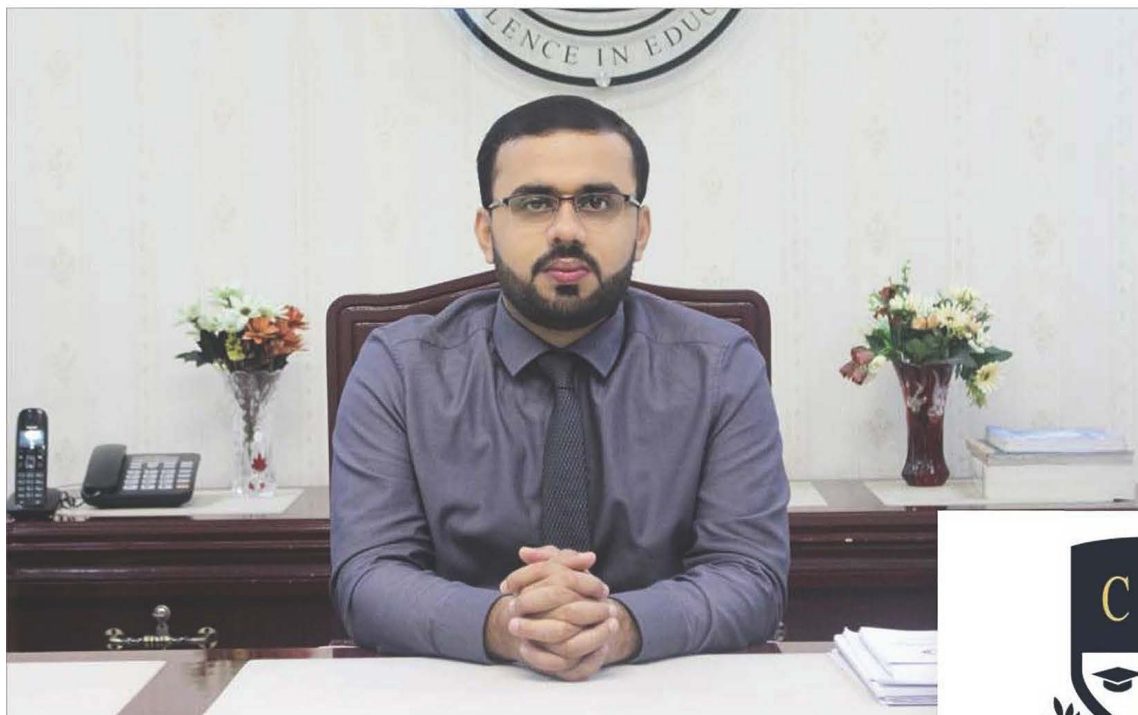
(1)

(b) Draw the structure of each alkene monomer.

(2)



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