

POLYMERS

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Lesson Description

In this lesson we:

- Identify and name polymers
- Write balanced chemical equations for polymerisation reactions



Summary

Terminology

Macromolecule

A molecule that consists of a large number of atoms

Polymer

A large molecule composed of smaller monomer units covalently bonded to each other in a repeating pattern

Monomer

Small organic molecules that can be covalently bonded to each other in a repeating pattern

Polymerisation

A chemical reaction in which monomer molecules join to form a polymer

Types of Polymerisation

Addition Polymerisation

A reaction in which small unsaturated molecules join to form very large molecules by an addition reaction in which the double bonds are broken

Addition polymer: A polymer formed when monomers containing a double or triple bond, combine through an addition reaction e.g. polyethene

Condensation Polymerisation

Molecules of two monomers with different functional groups undergo condensation reactions with the loss of small molecules, usually water

Condensation polymer: A polymer formed by two monomers with different functional groups that are linked together in a condensation reaction in which a small molecule, usually water, is lost e.g. Polylactic acid



Test Yourself

Select the most correct answer from the options given. Write down only the correct letter

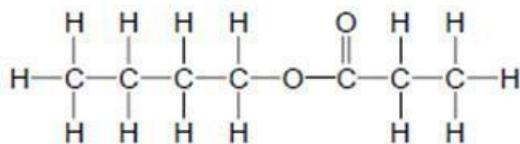
Question 1

Which of the following molecules are unsaturated hydrocarbons?

- ethane
- ethanol
- ethyl ethanoate
- ethene

Question 2

The structural formula of an ester is shown below



Which ONE of the following pairs of compounds can be used to prepare the above ester?

- A. Propanoic acid and butan-1-ol
- B. Propanoic acid and butan-2-ol
- C. Butanoic acid and propan-1-ol
- D. Butanoic acid and propan-2-ol

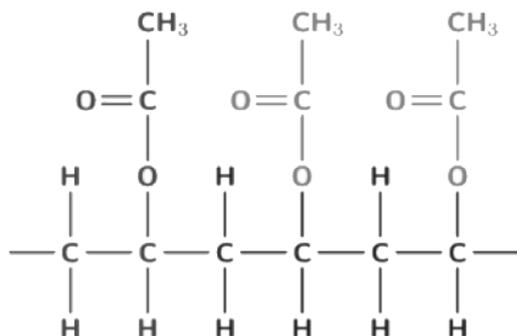
Question 3

Which ONE of the following polymers is prepared by condensation polymerisation?

- A. polyethylene
- B. polyethene
- C. polylactic acid
- D. polyvinyl chloride

Question 4

The small section of the structural formula of the polymer, polyvinyl acetate (PVC), is shown below

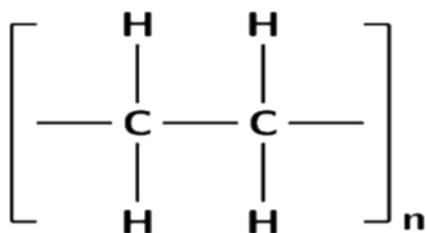


The molecular formula of the monomer used to produce this polymer is

- A. $\text{C}_4\text{H}_6\text{O}_2$
- B. $\text{C}_4\text{H}_8\text{O}_2$
- C. $\text{C}_5\text{H}_8\text{O}_2$
- D. $\text{CH}_3\text{CO}_2\text{CHCH}_2$

Question 5

The simplified structural formula of a polymer is shown below:



The name of this polymer and the monomer used to make the polymer are:

- A polyethene ethane
- B polyethane ethane
- C polyethene ethene
- D polyethane ethene



Improve your skills

Question 1

Polyethene is an addition polymer.

- a.) Identify the monomer used to form this polymer
- b.) Draw a structural formula of polyethene showing three repeating units
- c.) Illustrate the reaction to produce polyethene
- d.) Name three industrial uses of polyethene

Question 2

Polylactic acid (PLA) is an example of a polyester formed by condensation

- a.) Draw the structural formula of the monomer used to produce polylactic acid
- b.) Illustrate the reaction to produce polylactic acid by showing how two monomers combine

Question 3

Identify the monomers used to form the following polymers:

- a.) Polyvinyl chloride (PVC)
- b.) polystyrene
- c.) polythene
- d.) polyvinyl acetate (PVA)



Links

- Making silly putty

<http://www.waynesthisandthat.com/sillyputty.htm>