AQA Chemistry A-level

Topic 3.12 - Polymers

Flashcards

What is condensation?

What is condensation?

Small molecule eliminated (usually H_2O) to form a larger molecule

How many monomers are condensation polymers usually formed from?

How many monomers are condensation polymers usually formed from?

two

What properties do these monomers forming condensation polymers have?

What properties do these monomers forming condensation polymers have?

Each has two functional groups

Examples of condensation polymers?

Examples of condensation polymers?

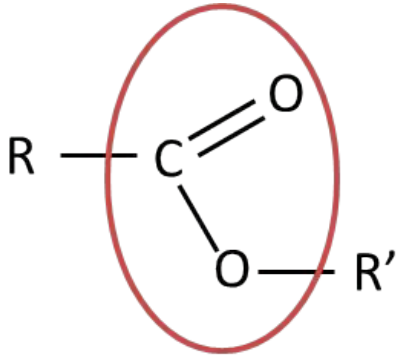
Polyesters

Polyamides

Polypeptides

What is the linkage in a polyester?

What is the linkage in a polyester?



What molecule is eliminated in formation of a polyester?

What molecule is eliminated in formation of a polyester?

H_2O

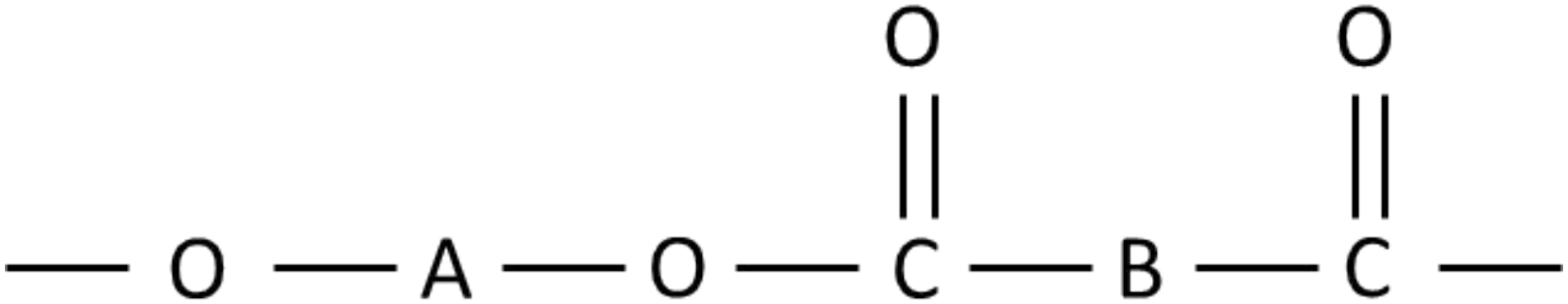
What are the two monomers which form a polyester (generic names and structures)?

What are the two monomers which form a polyester (generic names and structures)?

Diol and dicarboxylic acid or a molecule with both alcohol and a carboxylic acid functional groups

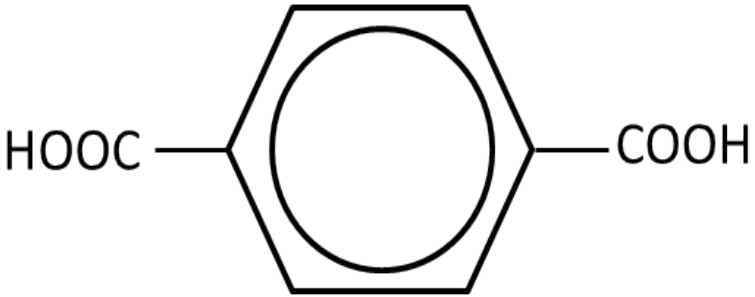
Draw a generic repeating unit for a polyester

Draw a generic repeating unit for a polyester

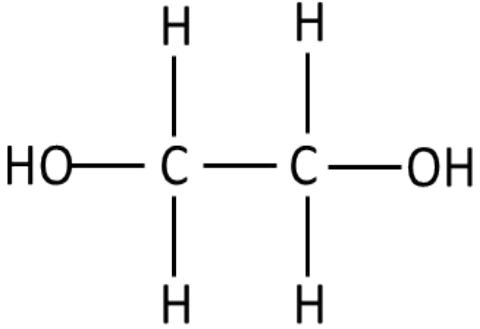


Which monomers is Terylene made from?

Which monomers is Terylene made from?



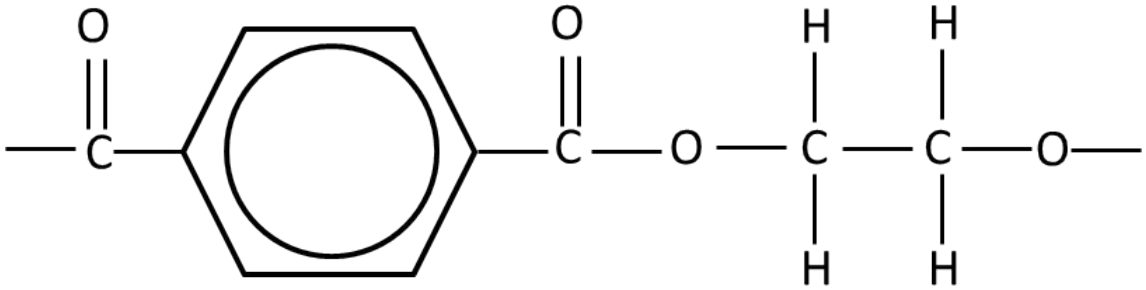
Benzene-1,4-dicarboxylic acid



Ethane-1,2-diol

Draw the repeating unit of Terylene

Draw the repeating unit of Terylene



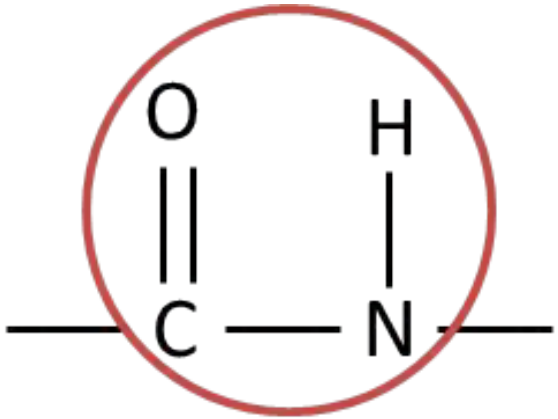
What is Terylene used for?

What is Terylene used for?

As a fibre for making clothes

What is the linkage in a polyamide?

What is the linkage in a polyamide?



The peptide linkage

Which molecule is eliminated when a polyamide is formed?

Which molecule is eliminated when a polyamide is formed?

H_2O

What are the two monomers used to form a polyamide (generic names and structures)?

What are the two monomers used to form a polyamide (generic names and structures)?

Diamine and dicarboxylic acid

Examples of polyamides?

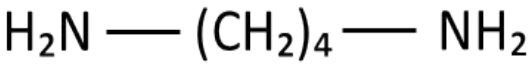
Examples of polyamides?

Nylon, Kevlar

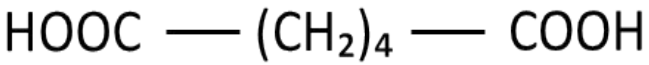
Which monomers is Nylon-6,6 made from?

Which monomers is Nylon-6,6 made from?

1,6-diaminohexane

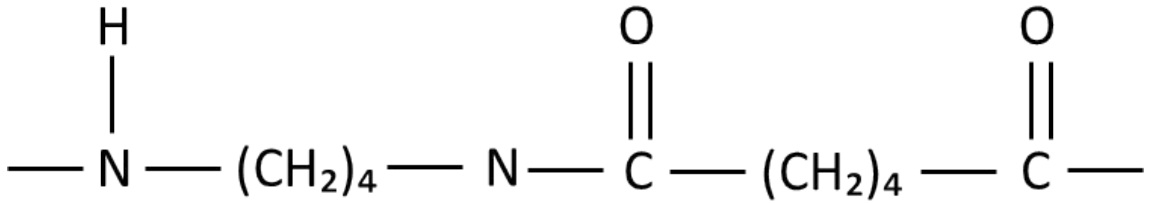


Hexanedioic acid



Draw the repeating unit of Nylon-6,6.

Draw the repeating unit of Nylon-6,6.



If you are making Nylon in the lab, what monomers would you use and why? What molecule is eliminated?

If you are making Nylon in the lab, what monomers would you use and why? What molecule is eliminated?

Use hexane-1,6-diacyl chloride as the rate of reaction is much faster. HCl is eliminated

What is Kevlar used for?

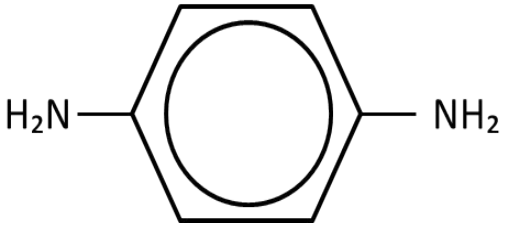
What is Kevlar used for?

In body armour (bullet proof vests, stab vests), helmets (e.g. F1 drivers'), oven gloves

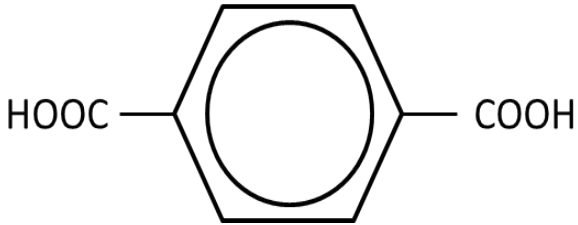
Which monomers is Kevlar made from?

Which monomers is Kevlar made from?

1,4-diaminobenzene

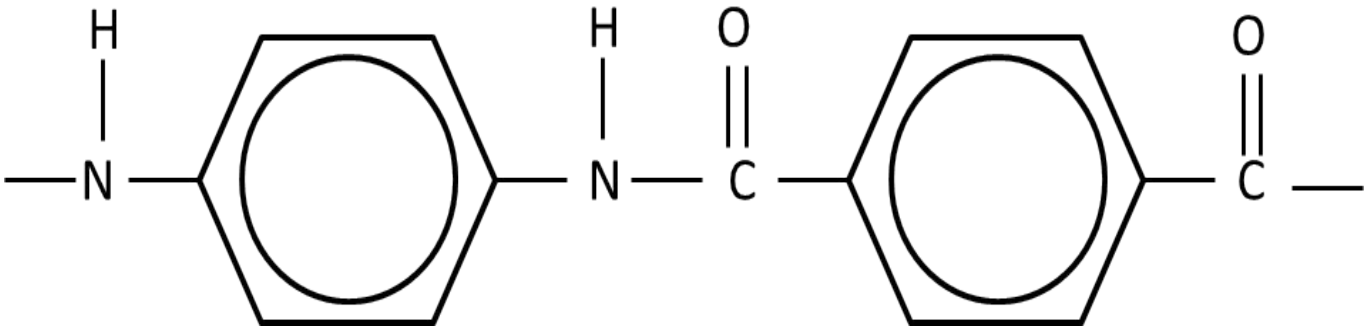


Benzene-1,4-dicarboxylic acid



What is the repeating unit of Kevlar?

What is the repeating unit of Kevlar?



Why is Kevlar so strong?

Why is Kevlar so strong?

Rigid chains and close packing of flat aromatic rings

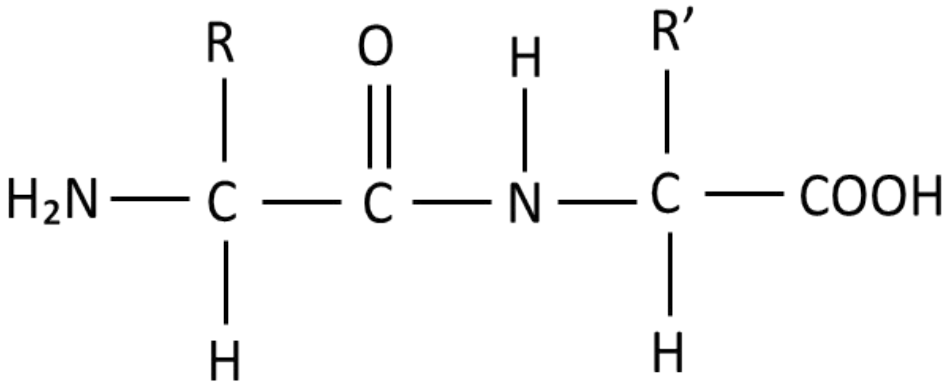
What are polypeptides? What is the linkage?

What are polypeptides? What is the linkage?

Same linkage as polyamides. But made from just one amino acid monomer

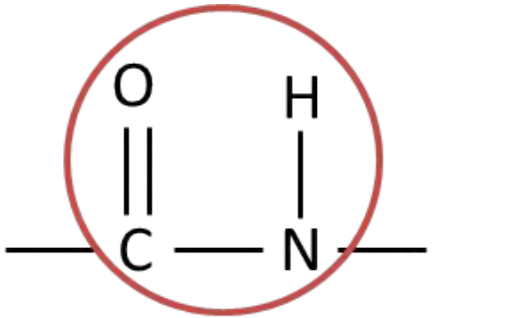
Draw a dipeptide.

Draw a dipeptide.



Draw the repeating unit of a polypeptide.

Draw the repeating unit of a polypeptide.



The peptide linkage

Why are poly(alkenes) not biodegradable?

Why are poly(alkenes) not biodegradable?

Non-polar C-H and C-C bonds

Why is it bad to burn poly(alkenes)?

Why is it bad to burn poly(alkenes)?

Releases CO_2, CO, C (soot) and other toxic chemicals from monomers

Where do most poly(alkenes) end up?

Where do most poly(alkenes) end up?

Landfill sites

Why can condensation polymers be broken down?

Why can condensation polymers be broken down?

They have polar bonds

How are condensation polymers broken down?

How are condensation polymers broken down?

Hydrolysis (opposite of condensation)

Why does hydrolysis not happen in normal conditions?

Why does hydrolysis not happen in normal conditions?

Very slow rate in standard conditions

What are the four stages needed when recycling polymers?

What are the four stages needed when recycling polymers?

Collected → sorted → melted → reformed

Advantages of recycling polymers?

Advantages of recycling polymers?

Saves expense of crude oil and preserves a non-renewable resource

Reduces landfill

Disadvantages of recycling polymers?

Disadvantages of recycling polymers?

Energy and manpower is needed for collecting, sorting and melting the polymers, making it expensive.

Can only be done a limited number of times

What does “draw the polymer” mean?

What does “draw the polymer” mean?

Draw with square brackets, n, and trailing bonds

What does “draw the repeating unit” mean?

What does “draw the repeating unit” mean?

Just draw the molecule, with trailing bonds - no brackets or n

What is the difference between addition and condensation polymerisation?

What is the difference between addition and condensation polymerisation?

Condensation makes the polymer and eliminates a small molecule; addition polymerisation breaks C=C to form only one product (just the polymer).

Explain hydrogen bonding between polyamides.

Explain hydrogen bonding between polyamides.

Both C=O and N-H are polar bonds, as N's electronegativity > H's and O's electronegativity > C's.

Hydrogen bonding between H δ+ and O δ- in different molecules

Uses the lone pair of electrons on the O atom.

Why do polyesters not show hydrogen bonding?

Why do polyesters not show hydrogen bonding?

All O-H bonds are removed during polymerisation