









Unit 2

Polymers

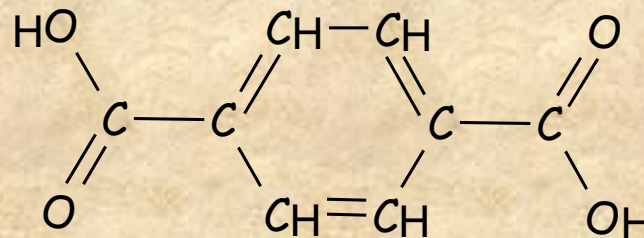
Go to question

- 1  A monomer used to make Kevlar is shown opposite. What is the percentage of carbon by mass, in this monomer?
- 2  The diagram shows part a polyester polymer. Name the two monomers used to make this polymer.
- 3  The diagram show 2 amino acids joined together. When this molecule is hydrolysed which bond breaks?
- 4  The monomer that gives rise to this polymer is?
- 5  Which polymer can dissolve in water?
- 6  The graph shows an enzymes activity with increasing temperature. Which statement best describes what is happening?
- 7  Bakelite is a thermosetting plastic. Its properties are due to?
- 8  Ethene is used as the building block of many polymers. What is the name given to the process by which ethene is made into polythene?



1

A monomer used to make Kevlar is shown opposite. What is the percentage of carbon by mass, in this monomer?



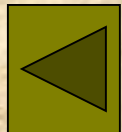
- a. 50.1 %
- b. 57.8%
- c. 44.4 %
- d. 80.0%



a hint!!!!

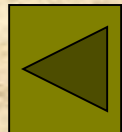
1st hint

What is the molecular formula?



2st hint

What is *GFM* of this compound?



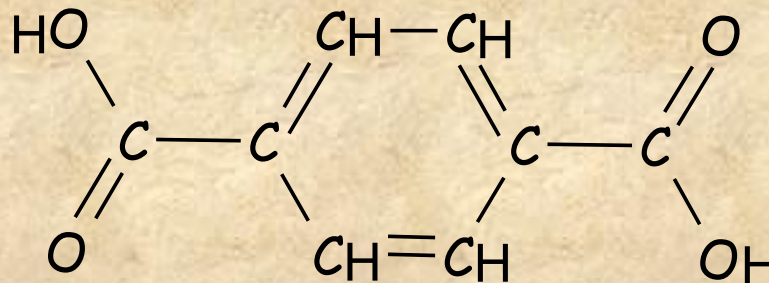
3rd hint

What is the mass of carbon?



A monomer used to make Kevlar is shown opposite.
What is the percentage of carbon by mass, in this monomer?

Correct because.....



It's molecular formula is $C_8H_6O_4$.

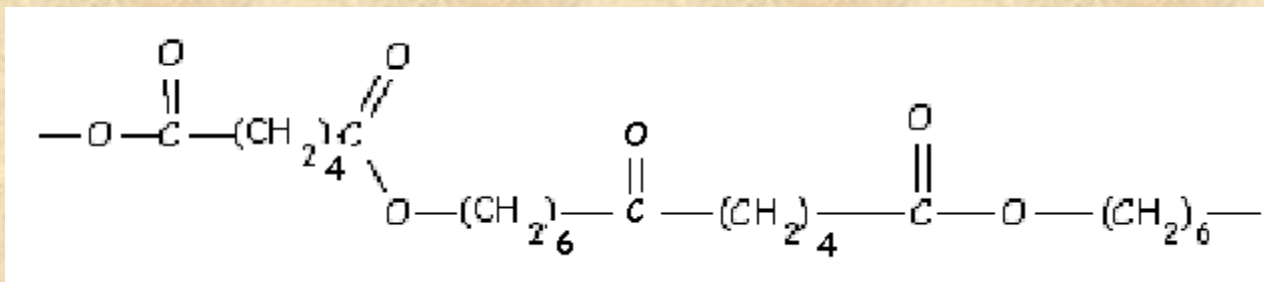
Therefore $(8 \times 12) + (6 \times 1) + (4 \times 16) =$ formula mass

$$\% \text{ mass of Carbon} = \frac{\text{mass of Carbon}}{\text{Formula mass}}$$

$$= (96/166) \times 100 = \mathbf{57.8\%}$$



2



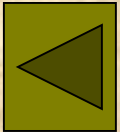
The diagram shows part a polyester polymer.
Name the two monomers used to make this polymer.

- 1,6-hexanediol and 1,6-hexanedioic acid
- 1,6-hexanediol and hexyl hexanoate
- 1,6-hexanedioic acid and hexyl hexanoate
- Hexanol and hexanoic acid

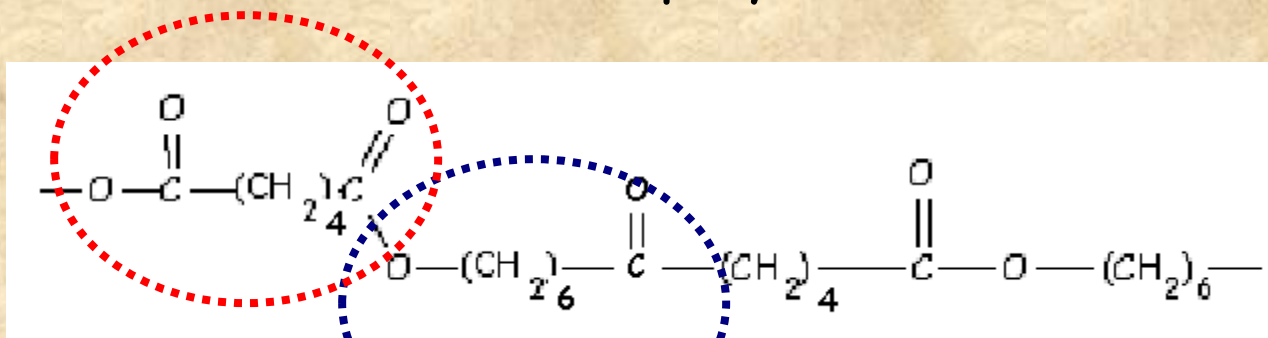


a hint!!!!

A polyester is made from 2 monomers, a diol and a diacid.



The diagram shows part of a polyester. Name the two monomers used to make this polymer.



1,6-hexanedioic acid

1,6-hexanediol

Correct because.....

A polyester is made from a diol and a diacid.

1,6-hexanediol and **1,6-hexanedioic acid**



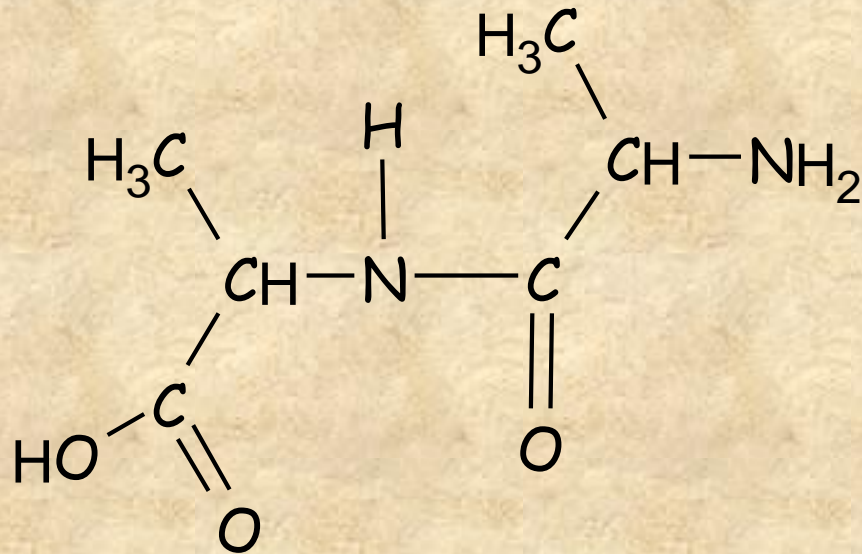
3 The diagram show 2 amino acids joined together.
When this molecule is hydrolysed which bond breaks?

a. C - C

b. C = C

c. C - N

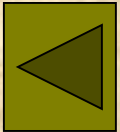
d. C - H



a hint!!!!

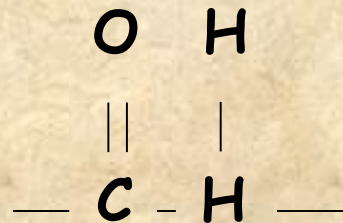
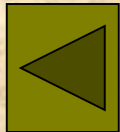
1st hint

Look at the peptide link



2nd hint

The peptide link looks like



Peptide link

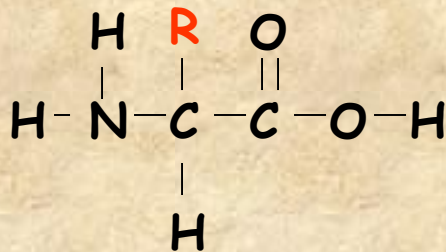


The diagram show 2 amino acids joined together.
When this molecule is hydrolysed which bond breaks?

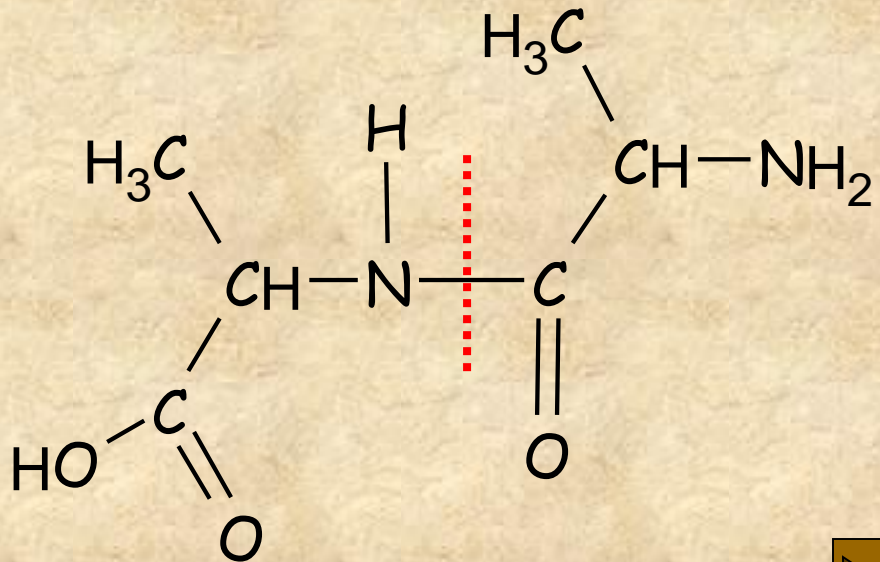
Correct because.....

The peptide (amide) bond breaks. This means that the C—N bond breaks during hydrolysis.

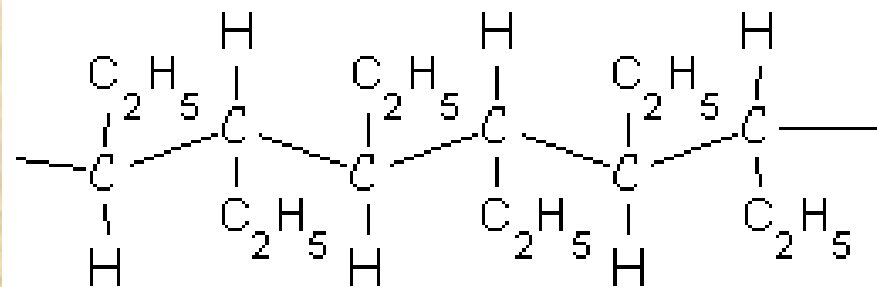
C - N



Amino acid



4 The monomer which is used to produce polymer is?

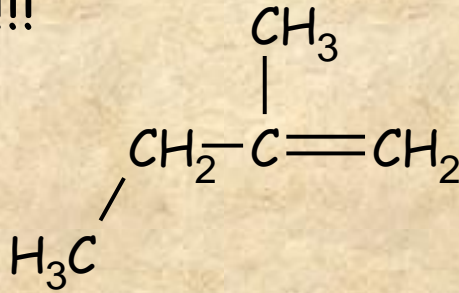
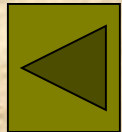


- a. 1,2 - dimethylbut-2-ene
- b. 3, - methylhepta-3,4-diene
- c. hex-3-ene
- d. 2,3-dimethylbut-2-ene



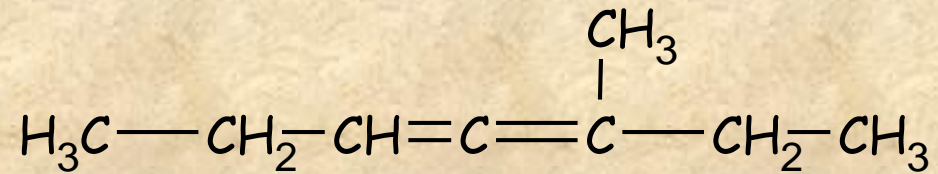
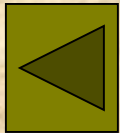
a hint!!!!

1,2, dimethylbut-1-ene!!!!



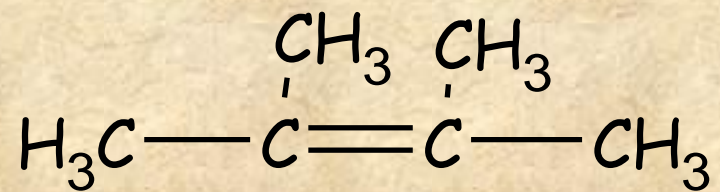
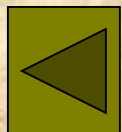
a hint!!!!

3 - methylhepta-3,4-diene



a hint!!!!

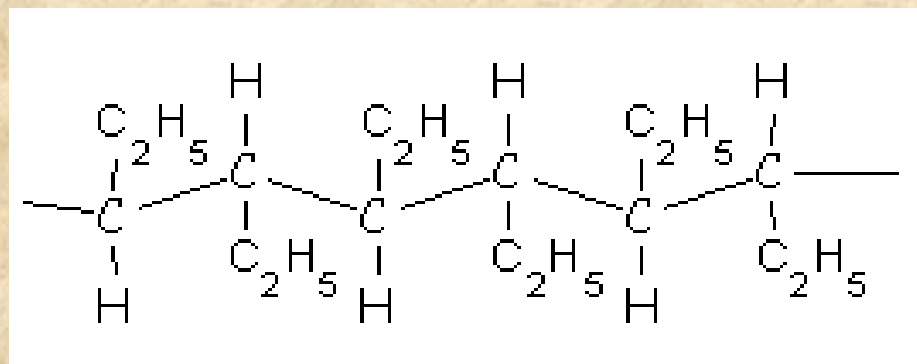
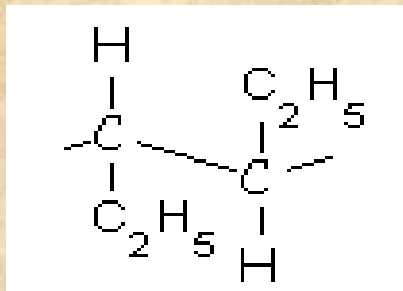
2,3-dimethylbut-2-ene



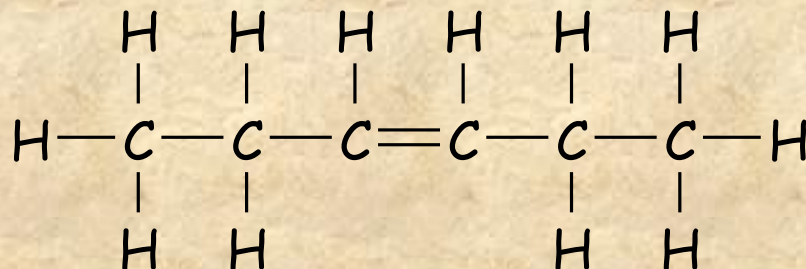
The monomer that gives rise to this polymer is?

Correct because.....

Hex-3-ene, the repeating unit in this polymer chain is



The longest chain of this monomer has 6 carbons.
It also requires a double bond.



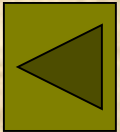
5 Which polymer can dissolve in water?

- a. polystyrene
- b. poly(ethenol)
- c. polyamide, nylon 6,6
- d. polytetrafluoroethene



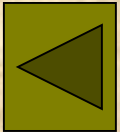
a hint!!!!

Polystyrene is an excellent insulator and can be used for drinking cups.



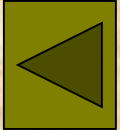
a hint!!!!

Nylon is an excellent fibre which is used for clothing



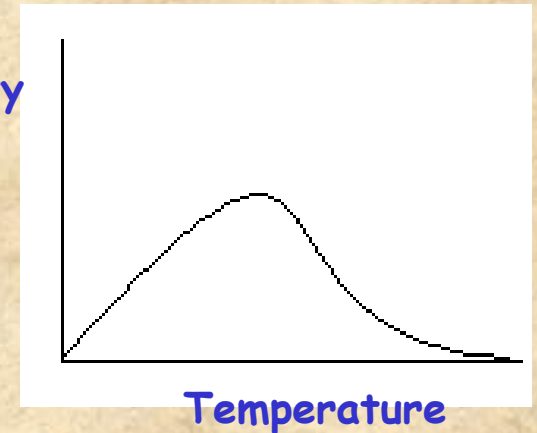
a hint!!!!

Another name for this polymer is teflon, used for non-stick frying pans!



6 The graph shows an enzyme's activity with increasing temperature. Which statement best describes what is happening?

Activity

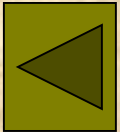


- a. The enzyme's activity increases with temperature
- b. The enzyme's activity slows down after a certain temperature. This effect is reversible.
- c. The enzyme's activity works best at an optimum temperature.
- d. The enzyme's activity is increased after a certain temperature. This effect is irreversible.



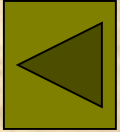
a hint!!!!

Does the graph show that this is always true?



a hint!!!!

After a certain temperature the enzyme shape changes permanently.

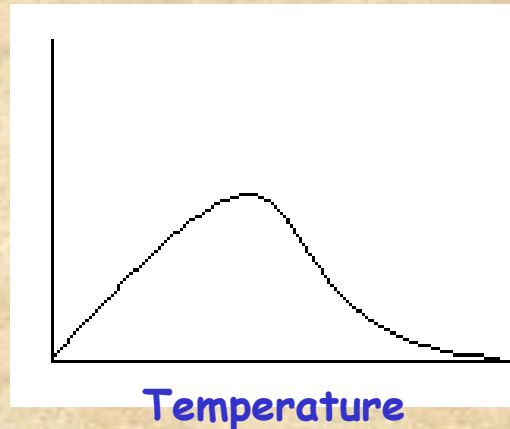


The graph shows an enzyme's activity with increasing temperature. Which statement best describes what is happening?

Correct because

The enzyme's activity works best at an optimum temperature. Enzymes are biological catalysts. Their activity increases with temperature until an optimum temperature is reached. If it gets too hot the enzyme denatures, its shape changes permanently.

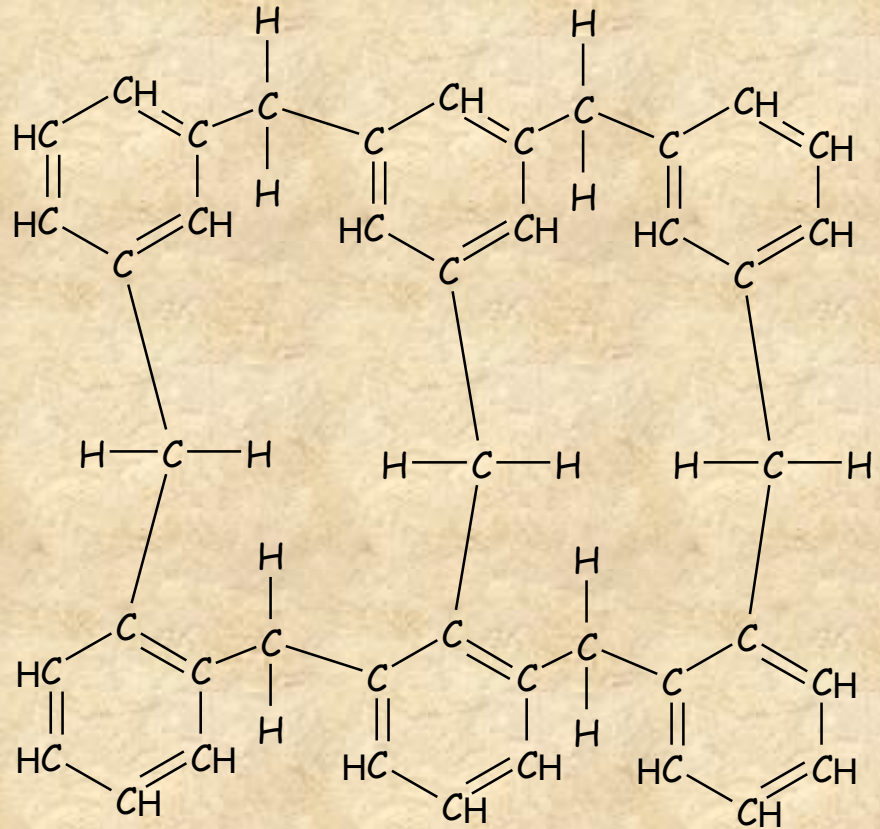
Activity



7

Bakelite is a thermosetting plastic. This property is due to?

- a. The aromatic nature of its structure.
- b. Cross-linking covalent bonding
- c. Hydrogen bonding between the polymer chains
- d. The number of carbon/carbon double bonds



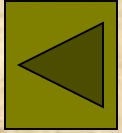
a hint!!!!

Bakelite is a rigid, hard and fairly brittle plastic. What must be true about the polymer chains?



a hint!!!!

Look at the cross-linking in the structure of bakelite!

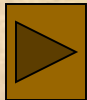
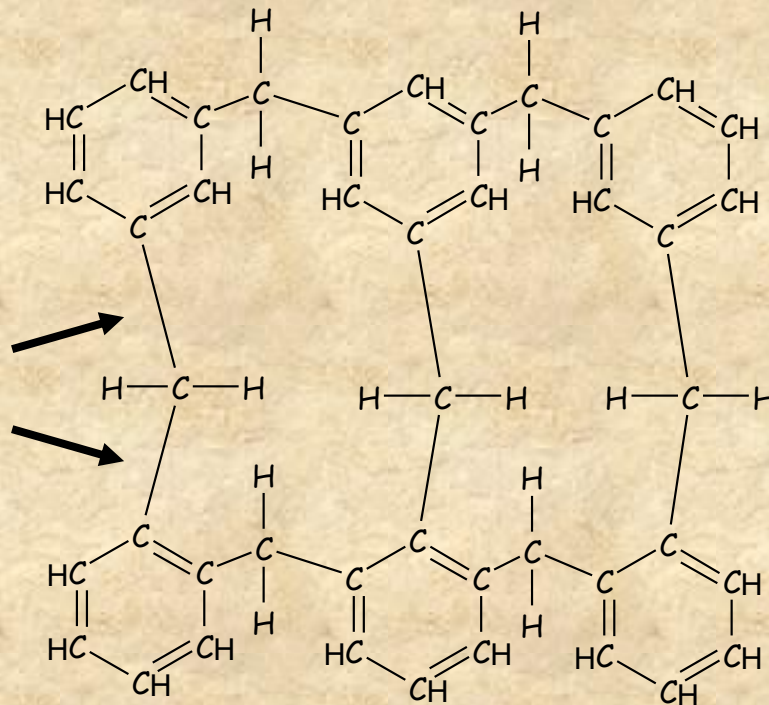


Bakelite is a thermosetting plastic. This property is due to?

Correct because

Bakelite is a thermosetting plastic. It is made by heating phenol and methanal, to form a network which is cross-linked by strong **covalent bonding**

Cross linking



8 Ethene is used as the building block of many polymers. What is the name given to the process by which ethene is made into polythene?

a. Condensation polymerisation

b. Hydrogenation

c. Oxidation

d. Addition polymerisation



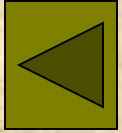
a hint!!!!

Making polythene only uses one monomer.



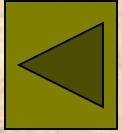
a hint!!!!

This process adds hydrogen across a $C=C$ bond.



a hint!!!!

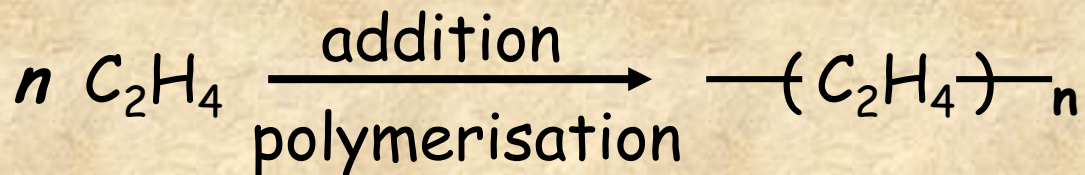
This involves the addition of oxygen.



Ethene is used as the building block of many polymers.
What is the name given to the process by which ethene is made into polythene?

Correct because....

Poly(ethene) is formed from ethene in an **addition polymerisation**.



n = a large number

