

Past-paper walk-through

Polymers ■ 11.8

eXercise

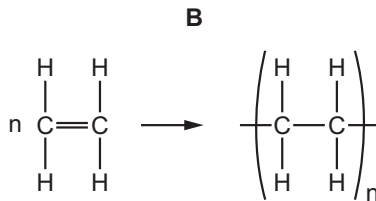
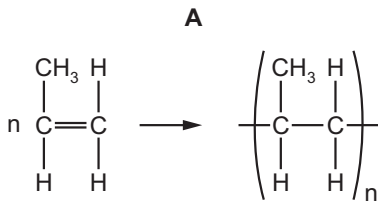
Questions in this set

- 0620/21 N25 Q35 ■ 1 mark
- 0620/21 N25 Q38 ■ 1 mark
- 0620/23 N25 Q35 ■ 1 mark
- 0620/21 J25 Q37 ■ 1 mark
- 0620/22 J25 Q37 ■ 1 mark
- 0620/23 J25 Q37 ■ 1 mark
- 0620/22 M25 Q38 ■ 1 mark

Question 35

0620/21 N25 ■ Q35 ■ 1 mark

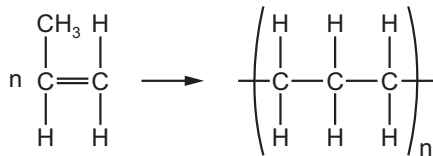
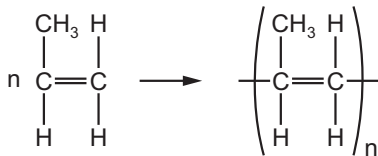
35 Which equation represents the formation of poly(propene) from propene?



C

D

Question 35



Solution 35

Answer: **A**

Why

- Addition polymerisation opens the $\text{C}=\text{C}$ of each monomer and joins the carbons into a chain.
- Propene is $\text{CH}_2=\text{CHCH}_3$, so the repeat unit is $-\text{CH}_2-\text{CH}(\text{CH}_3)-$.
- The n must appear on both sides, and no small molecule is lost.

Question 38

0620/21 N25 ■ Q38 ■ 1 mark

- 38** Which statement about addition polymers or condensation polymers is correct?
- A** Addition polymers only contain carbon and hydrogen atoms.
 - B** One of the monomers used to make a polyester is a diamine.
 - C** Addition polymers contain carbon–carbon double bonds in the main chain.
 - D** Water is an additional product in the formation of a protein from amino acids.

Solution 38

Answer: **D**

Why

- Addition polymers can contain other atoms too – PVC has chlorine in every repeat unit.
- A polyester is made from a diol and a dicarboxylic acid; it is a *polyamide* that needs a diamine.
- The real distinction is that condensation polymerisation always loses a small molecule and addition never does.

Question 35

0620/23 N25 ■ Q35 ■ 1 mark

35 The diagrams represent four monomers.



The monomers each react in a 1 : 1 ratio with the dicarboxylic acid shown.



How many of the four monomers shown can react with the dicarboxylic acid to form a polymer?

A 1

B 2

C 3

D 4

Solution 35

Answer: **C**

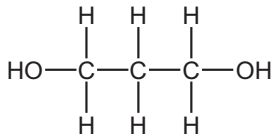
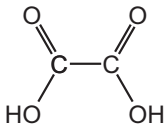
Why

- To build a polymer with a dicarboxylic acid in a 1 : 1 ratio, each monomer needs *two* groups that react with -COOH .
- Both -OH and -NH_2 react with -COOH , so a diamine, a diol and an amino-alcohol all work.
- The monomer that already carries a -COOH has only one usable group left, so it cannot – three of the four qualify.

Question 37

0620/21 J25 ■ Q37 ■ 1 mark

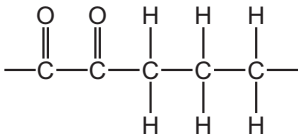
37 The structures of two monomers that are used to make a condensation polymer are shown.



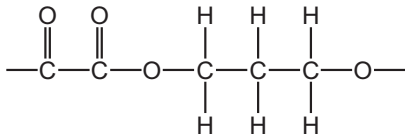
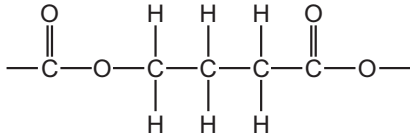
Which structure represents one repeat unit of the condensation polymer formed?

A**B**

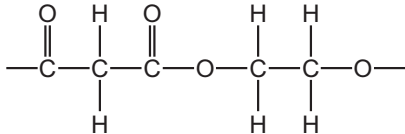
Question 37



C



D



Solution 37

Answer: **B**

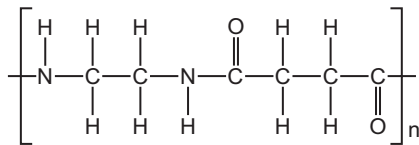
Why

- The two monomers are a diol and a dicarboxylic acid, so the polymer is a polyester.
- Each link forms by losing water between an -OH and a -COOH group.
- So the repeat unit shows the ester linkage -COO- joining the two monomer residues.

Question 37

0620/22 J25 ■ Q37 ■ 1 mark

37 The structure of a polymer repeat unit is shown.

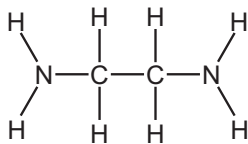
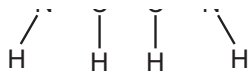


Which pair of monomers is used to make this polymer?

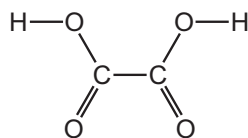
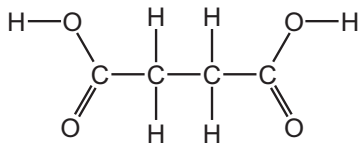
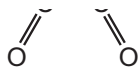
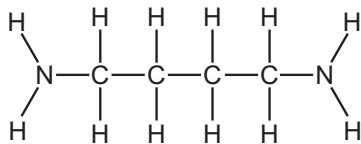
	monomer 1	monomer 2
A	$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & / \\ & \text{N}- & \text{C}- & \text{C}- & \text{N} \end{array}$	$\begin{array}{ccccc} \text{H}-\text{O} & & & \text{O}-\text{H} \\ & \diagdown & & / \\ & \text{C}- & \text{C} & \end{array}$

Question 37

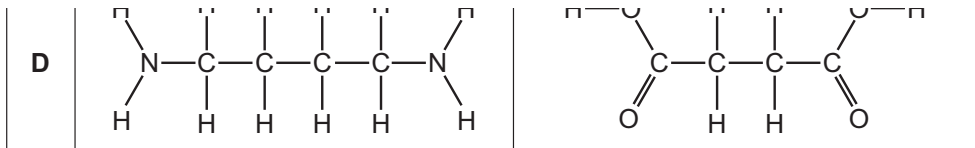
B



C



Question 37



Solution 37

Answer: **B**

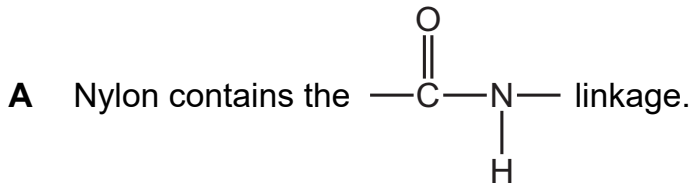
Why

- Look at the linkage in the repeat unit: --CO--NH-- is an amide, so this is a polyamide like nylon.
- A polyamide is made from a diamine and a dicarboxylic acid.
- So pick the monomer pair with an --NH_2 at both ends of one and a --COOH at both ends of the other.

Question 37

0620/23 J25 ■ Q37 ■ 1 mark

37 Which statement about polymers is correct?



B Nylon is a polyester.

C Propane can be polymerised by addition polymerisation.

- D** The linkage in PET contains a carbon–carbon double bond.

Solution 37

Answer: **A**

Why

- Nylon is a polyamide, so its linkage is the amide --CO--NH-- .
- A polyester is PET, whose linkage is --COO-- and contains no C=C .
- Propane has no double bond, so it cannot polymerise by addition – propene can.

Question 38

0620/22 M25 ■ Q38 ■ 1 mark

38 Nylon is made in a polymerisation reaction.

Which row describes the type of polymerisation and identifies the other product of the reaction?

	type of polymerisation	other product
A	addition	water
B	addition	none
C	condensation	water
D	condensation	none

Solution 38

Answer: **C**

Why

- Nylon is made from a diamine and a dicarboxylic acid, losing a small molecule at every link.
- That makes it condensation polymerisation, not addition.
- The small molecule lost is water.