

AQA A-Level Chemistry

Polymers

Questions only

All 12 polymers questions

Questions

12

Total marks

31

Time allowed

40 min

Name

Class or teacher

Date

Instructions

- Answer all questions in the spaces provided.
- Use black ink. Show your working for every calculation.
- You may use a scientific calculator and the AQA Data Sheet.
- Print the separate mark scheme when you are ready to mark your answers.

For marking

Q	Source	Marks	Score
1	2024 A-level P3 Q32	1	
2	2021 A-level P3 Q24	1	
3	2017 A-level P3 Q25	1	
4	2019 A-level P3 Q28	1	
5	2025 A-level P2 Q3	20	
6	2024 A-level P3 Q28	1	
7	2024 A-level P3 Q31	1	
8	2022 A-level P3 Q28	1	
9	2020 A-level P3 Q29	1	
10	2021 A-level P3 Q34	1	
11	2021 A-level P3 Q33	1	
12	2022 A-level P3 Q27	1	

Total _____ / 31 Percentage _____ %

Questions from AQA past papers, 2017–2025, reproduced for revision. Practise these topics online, with instant marking:

whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions?topics=polymers&len=0

Questions

Polymers · 12 questions · 31 marks · time allowed 40 min

Q1 · June 2024 · Paper 3 · Q32 · [1 mark]

In which polymer does hydrogen bonding occur between the polymer chains?

Tick (✓) one box.

- ☐ **A** A polyalkene
- ☐ **B** A polyamide
- ☐ **C** A polychloroalkene
- ☐ **D** A polyester
-

Q2 · November 2021 · Paper 3 · Q24 · [1 mark]

Which polymer has hydrogen bonding between the polymer chains?

Tick (✓) one box.

- ☐ **A** Kevlar
- ☐ **B** PVC
- ☐ **C** poly(phenylethene)
- ☐ **D** Terylene
-

Q3 · June 2017 · Paper 3 · Q25 · [1 mark]

Which compound can form a polymer without needing another reagent?

Tick (✓) one box.

- ☐ **A** $\text{HOCH}_2\text{CH}_2\text{OH}$
- ☐ **B** $\text{HOOCCH}_2\text{CH}_2\text{COOH}$
- ☐ **C** $\text{HOCH}_2\text{CH}_2\text{COCl}$
- ☐ **D** $\text{ClCH}_2\text{CH}_2\text{COOH}$
-

Q4 • June 2019 • Paper 3 • Q28 • [1 mark]

Which polymer has hydrogen bonding between its chains?

Tick (✓) one box.

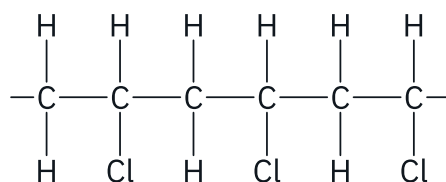
- ☐ **A** Kevlar
- ☐ **B** Polythene
- ☐ **C** PVC
- ☐ **D** Terylene

Q5 • June 2025 • Paper 2 • Q3 • [20 marks]

This question also needs Amines, Bonding and Carboxylic acids.

This question is about polymers.

03.1 A section of the polymer PVC is shown.



Name the monomer used to make PVC.

Draw the structure of the monomer used to make PVC.

[2 marks]

Monomer name

Structure

03.2 State why PVC is not biodegradable.

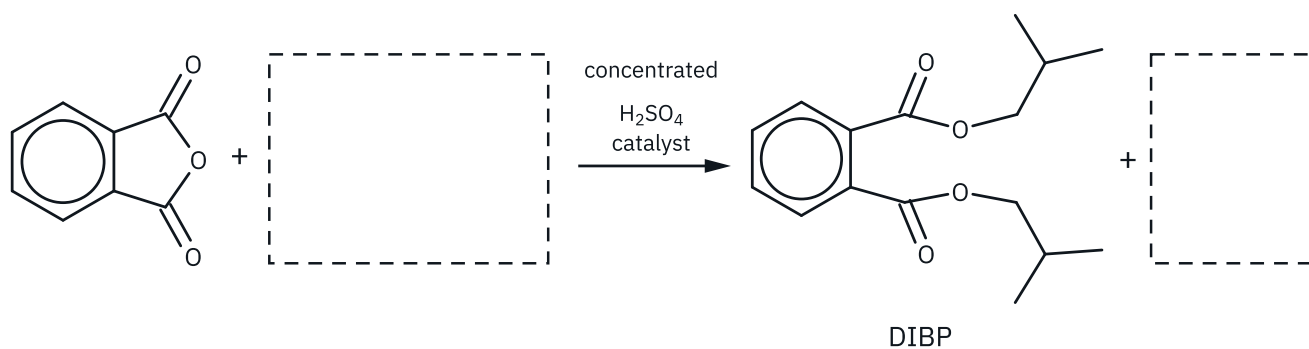
[1 mark]

03.3 Diisobutyl phthalate (DIBP) is a plasticiser added to PVC to modify its properties.

State how the properties of PVC are modified by the addition of DIBP.

[1 mark]

03.4 An incomplete equation for the reaction used to make DIBP is shown.



Complete the equation.

Give the name of the mechanism for this reaction.

Deduce the empirical formula of DIBP.

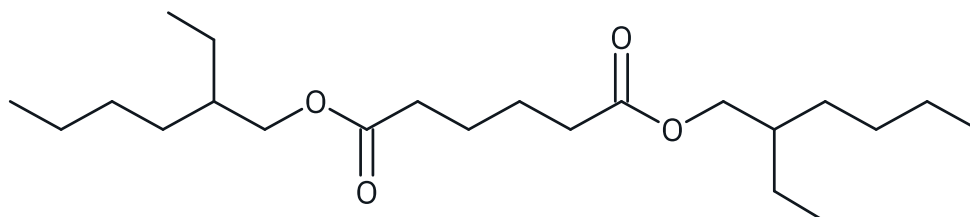
[4 marks]

Name of mechanism

Empirical formula of DIBP

03.5 A different plasticiser, DEHA, is added to PVC used for food packaging.

The structure of DEHA is



Identify the organic compound that would react with hexanedioic acid to form DEHA.

[1 mark]

03.6 DEHA can be absorbed into food from PVC packaging.

In an investigation, 1 kg samples of three different foods are stored in PVC packaging for 30 days.

Table 1 shows the water content, fat content and mass of DEHA in each type of food after 30 days.

Table 1

Food Water content (%) Fat content (%) Mass of DEHA in food after 30 days / mg

Milk	87	3	2.83
Cheese	45	26	10.88
Butter	16	80	24.56

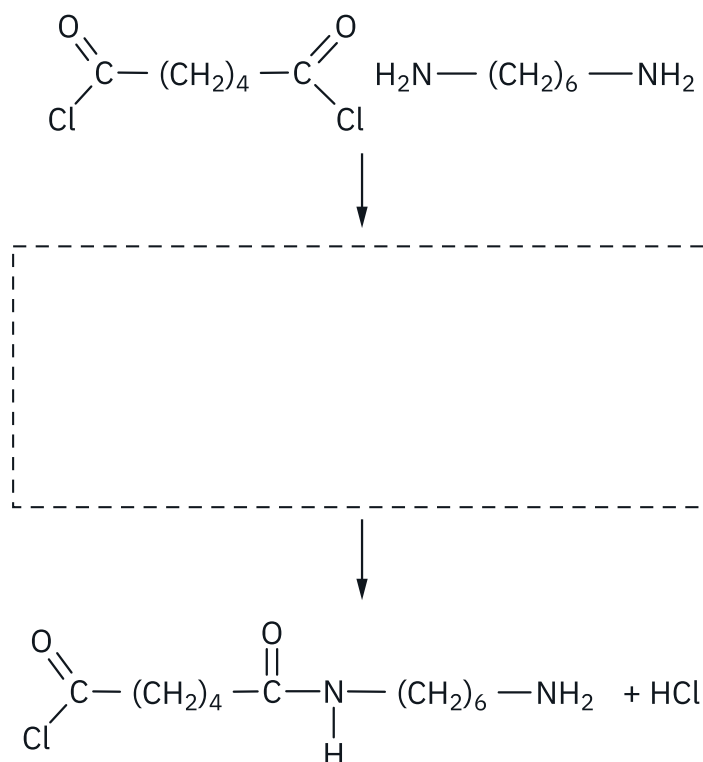
Use your knowledge of intermolecular forces to explain these results.

[3 marks]

03.7 The polymer nylon 6,6 can be made from hexanedioyl dichloride and hexane-1,6-diamine.

Figure 2 shows an incomplete mechanism for the first steps in this reaction.

Figure 2



Draw the missing intermediate in the box in Figure 2.

Complete Figure 2 by adding the curly arrows and any relevant lone pairs of electrons involved in these steps in the mechanism.

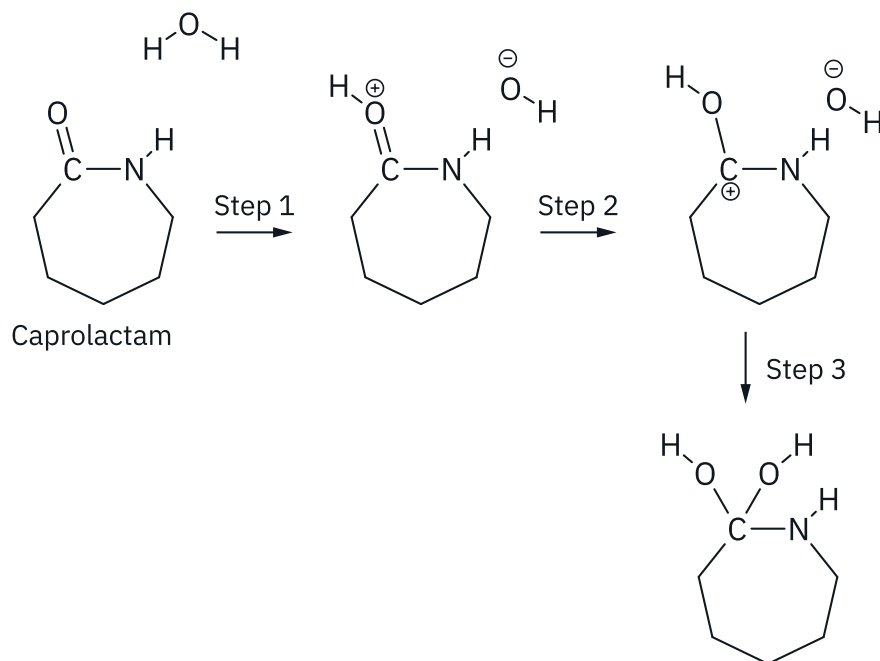
[4 marks]

Draw your answer on the figure above.

03.8 The polymer nylon 6 can be made by heating caprolactam with water.

Figure 3 shows the species involved in the first three steps of the mechanism for this reaction.

Figure 3



Complete Figure 3 by adding the curly arrows and any relevant lone pairs of electrons involved in these steps in the mechanism.

[4 marks]

Draw your answer on the figure above.

Q6 • June 2024 • Paper 3 • Q28 • [1 mark]

Which statement concerning nylon-6,6 is correct?

Tick (✓) one box.

- ☐ **A** Butanedioic acid is one of the reactants used to make nylon-6,6
- ☐ **B** Nylon-6,6 is an addition polymer.
- ☐ **C** Nylon-6,6 can be hydrolysed by aqueous sodium hydroxide.
- ☐ **D** All molecules of nylon-6,6 have the same relative molecular mass.

Q7 · June 2024 · Paper 3 · Q31 · [1 mark]

Which type of polymer is most difficult to hydrolyse?

Tick (✓) one box.

- ☐ **A** Polyalkene
- ☐ **B** Polyamide
- ☐ **C** Polyester
- ☐ **D** Protein
-

Q8 · June 2022 · Paper 3 · Q28 · [1 mark]

Which polymer is not hydrolysed when heated with aqueous alkali?

Tick (✓) one box.

- ☐ **A** Kevlar
- ☐ **B** Nylon 6,6
- ☐ **C** Poly(propene)
- ☐ **D** Terylene
-

Q9 · November 2020 · Paper 3 · Q29 · [1 mark]

Which forms a polymer with $\text{ClOC}(\text{CH}_2)_8\text{COCl}$?

Tick (✓) one box.

- ☐ **A** $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
- ☐ **B** $(\text{CH}_3\text{CO})_2\text{O}$
- ☐ **C** $\text{CH}_3\text{CH}_2\text{CONH}_2$
- ☐ **D** $\text{NH}_2\text{CH}_2\text{COOH}$

Q10 • November 2021 • Paper 3 • Q34 • [1 mark]

Which type of polymer is not hydrolysed by heating with concentrated aqueous sodium hydroxide?

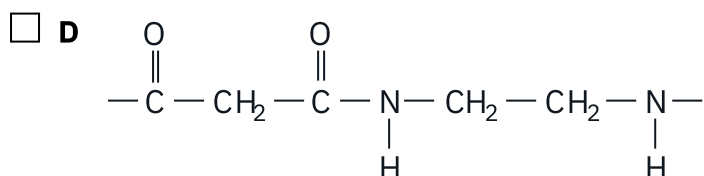
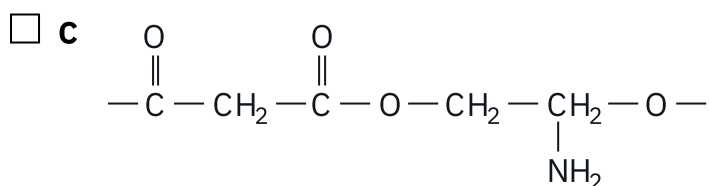
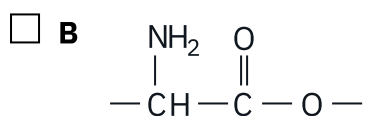
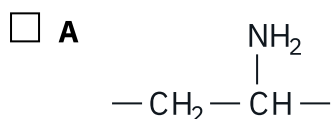
Tick (✓) one box.

- ☐ **A** poly(alkene)
- ☐ **B** poly(amide)
- ☐ **C** poly(ester)
- ☐ **D** protein

Q11 • November 2021 • Paper 3 • Q33 • [1 mark]

Which is the repeating unit of a polyamide?

Tick (✓) one box.



Q12 · June 2022 · Paper 3 · Q27 · [1 mark]

Suberoyl chloride, $\text{ClOC}(\text{CH}_2)_6\text{COCl}$, is commonly used in the manufacture of polymers. Which compound can form a polymer with suberoyl chloride?

Tick (✓) one box.

- ☐ **A** $\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$
- ☐ **B** $\text{ClOCCH}_2\text{COCl}$
- ☐ **C** $\text{CH}_3\text{CH}_2\text{CONH}_2$
- ☐ **D** $\text{HOOCCH}_2\text{COOH}$

Source: AQA A-Level Chemistry past papers. Reproduced for revision at whiteboardchemistry.com.

Mark scheme:

whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions/pdf/polymers-mark-scheme.pdf