

4. What do the properties of propene and poly(propene) have in common?

- 1 Chemical properties
- 2 Empirical formula
- 3 Percentage composition
- 4 Relative molecular mass

A 1 and 2

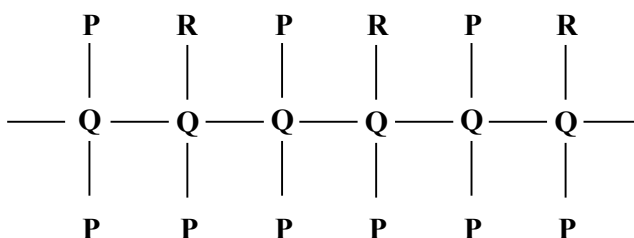
B 2 and 3

C 3 and 4

D 2, 3 and 4

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5. A section of the structure of poly(chloroethene) is shown below. The letters **P**, **Q** and **R** represent the atoms of the different elements.

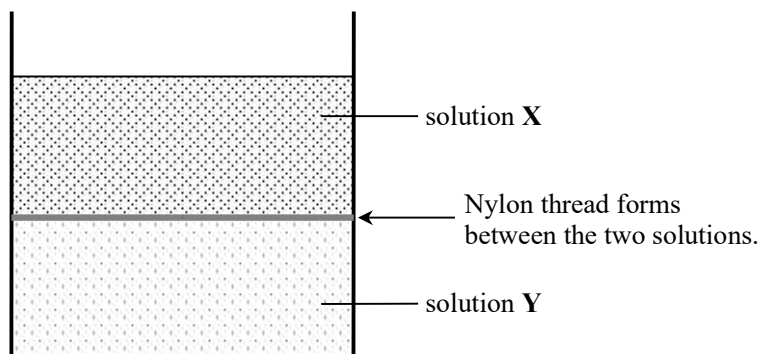


Which of the following correctly identifies all three elements?

	Element P	Element Q	Element R
A	Carbon	Hydrogen	Chlorine
B	Hydrogen	Carbon	Chlorine
C	Chlorine	Carbon	Hydrogen
D	Chlorine	Hydrogen	Carbon

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6. The diagram shows how a nylon thread can be made by simply reacting two immiscible solutions.

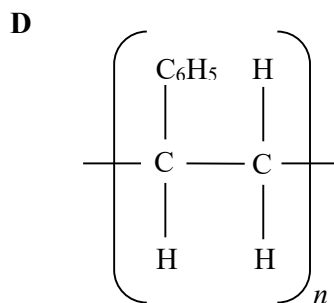
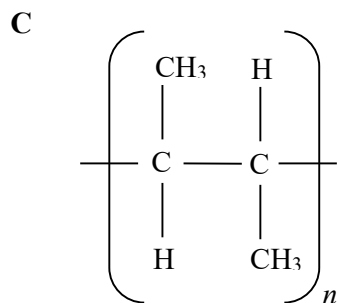
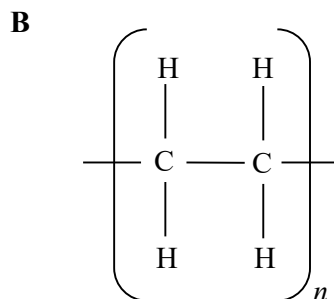
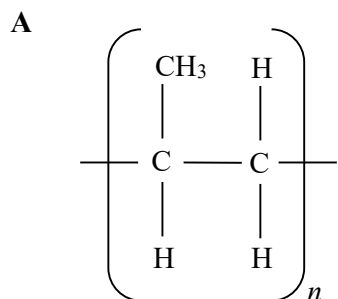


What can the two solutions **X** and **Y** be?

	Solution X	Solution Y
A	Diamine	Dicarboxylic acid
B	Diol	Diamine
C	Dicarboxylic acid	Diol
D	Ester	Amide

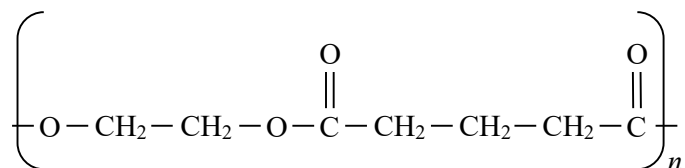
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7. Which of these polymers has an empirical formula of CH?



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8. The structure of a polymer is represented as shown below.



Which two monomer units could be used to produce this polymer?

	Monomer 1	Monomer 2
A	HO-CH ₂ -CH ₂ -OH	HOOC-CH ₂ -CH ₂ -CH ₂ -COOH
B	HO-CH ₂ -CH ₂ -CH ₂ -OH	HO-C-CH ₂ -CH ₂ -COOH
C	HO-CH ₂ -CH ₂ -COOH	HO-CH ₂ -CH ₂ -CH ₂ -OH
D	H-CH ₂ -CH ₂ -COOH	H-CH ₂ -CH ₂ -CH ₂ -OH

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- (a) Which of these are addition polymers and which are condensation polymers? [2]

- (b) Draw the structure(s) of the monomer(s) needed to form each of these four polymers. [4]

P	Q
R	S

13. PVC (polyvinyl chloride) is an important artificial plastic. Vinyl chloride is also called chloroethene and can be manufactured by the addition reaction between 1 mol of ethyne (C_2H_2) and 1 mol of hydrogen chloride gas (HCl).

- (a) 'Chloroethene is the monomer of this plastic.' What does this statement mean? [1]

- (b) Write the chemical equation for the formation of chloroethene. [1]

- (c) What is the mass of chloroethene that would be produced from 4 dm³ of ethyne gas and excess hydrogen chloride? Assume that the volumes are measured at room temperature and pressure. [Molar gas volume = 24 dm³. A_r : C = 12; H = 1; Cl = 35.5] [2]

- (d) Give one use of PVC and explain the properties of PVC that make it suitable for that particular use. [1]

- (e) When PVC is burnt, a thick black smoke and a strong acidic gas are produced. Suggest the identity of the

(i) black smoke; _____ [1]

(ii) acidic gas. _____ [1]