

Core Concepts: Alkenes are unsaturated hydrocarbons containing at least one carbon-carbon double bond (C=C). They are more reactive than alkanes and undergo addition reactions. Addition polymerisation is the process where many small alkene molecules (monomers) join together to form a very large molecule (polymer) without the loss of any atoms.

Section A: Key Terms & Concepts

1. Alkenes are a homologous series of hydrocarbons. Complete the sentences below.

- (a) Alkenes are _____ hydrocarbons because they contain at least one carbon-carbon _____.
- (b) The general formula for alkenes with one double bond is _____.
- (c) The simplest alkene is _____, which has the formula _____.

2. Consider the diagram of ethene below.

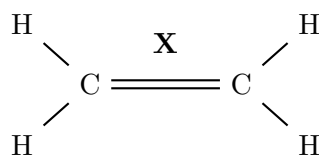


Figure 1: Ethene molecule

- (a) What type of bond is labelled **X**?

- (b) What term describes molecules like ethene that contain this type of bond?

3. Match the following terms to their definitions:

- **Monomer**
- **Polymer**
- **Addition Polymerisation**

- (i) A large molecule formed from many repeating smaller units.

- (ii) A small molecule that can be joined together to form a long chain.

- (iii) The process where unsaturated monomers join together to form a polymer without losing any atoms.

Section B: Core Concepts & Explanations

1. Explain why alkenes are generally more reactive than alkanes.

2. Describe the general type of reaction that alkenes undergo and briefly explain what happens during this reaction.

3. Describe the chemical test for unsaturation using bromine water, including the expected observation.

4. Explain what is meant by addition polymerisation, referring to monomers and polymers.

Section C: Exam Application & Extended Writing

1. The diagram below shows the formation of poly(ethene) from ethene monomers.

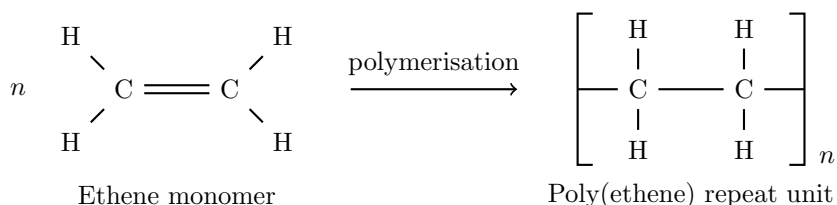


Figure 2: Formation of poly(ethene)

- (a) Identify the monomer and the polymer in Figure 2. Draw the repeat unit of the polymer.

- (b) Addition polymers like poly(ethene) are widely used but also pose significant environmental challenges. Discuss the advantages and disadvantages of using addition polymers, including their properties and environmental impact. (6 marks)
