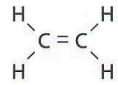
18 Polymers

For each question, choose the most suitable option and write the letter (**A**, **B**, **C** or **D**) in the brackets provided.

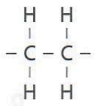
Level 1

1. Which of the following represents the structural formula of poly(ethene)?

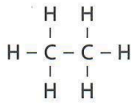
A



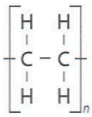
B



C



D



( )

2. Plastics are generally non-biodegradable.

Which of the following is **not** an environmental problem associated with the disposal of plastics?

A Burning plastics produces toxic gases.

B Disposing of plastics in landfills causes waste to be built up.

C Disposing of plastics in recycling bins prevents rubbish from piling up.

D Plastics disposed of into the sea cause harm to marine life. ( )

3. Which of the following statements about recycling poly(ethene) are **correct**?

1 A catalyst is usually used when poly(ethene) is chemically broken down.

2 Combustion is a chemical method used to recycle poly(ethene).

3 Cracking poly(ethene) produces smaller alkanes that can be used as fuels.

4 Recycling poly(ethene) has a low cost.

A 1 and 3 only

B 1 and 4 only

C 2 and 3 only

D 2 and 4 only ( )

4. Which of the following is **not** a step to convert plastic waste into pellets?

   A Cracking
   B Grinding
   C Melting
   D Washing ( )

Level 2

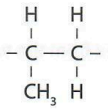
5. Which of the following statements about addition polymers is **not** correct?

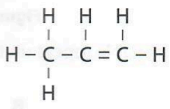
   A Addition polymerisation does not produce any by-products.
   B Addition polymers can be formed from monomers with a carbon–carbon triple bond.
   C Addition polymers have the same molecular mass as their monomers.
   D An addition polymer can only be formed from one alkene monomer. ( )

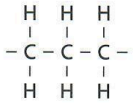
6. Polyvinyl chloride is a polymer that is used to make pipes and other lightweight objects.
   Which of the following is a likely monomer of polyvinyl chloride?

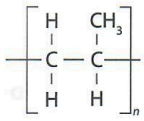
   A C_2H_3Cl
   B C_2H_3F
   C C_2H_5Cl
   D C_3H_7Cl ( )

7. Which of the following shows the structure of a repeat unit of the polymer formed from propene?

   A
   

   B
   

   C
   

   D
   

   ( )

8. Which of the following is **not** an issue related to recycling plastics?

   A Educational programmes on recycling plastics are introduced to the public.
   B Plastics must be disposed of in recycling bins which may not always be available.
   C Transporting, sorting and cleaning recyclable plastics require manpower.
   D Untreated wastewater produced from recycling plastics causes pollution when it is discharged into water bodies. ( )

Level 3

9. Substance **F** contains 2000 carbon atoms. When chlorine gas was passed through 1 g of the substance, the mass of the substance did not increase. Burning 1 g of the substance produced thick black smoke.

   Which of the following statements about substance **F** is **not** true?

   A Cracking can be used to recycle substance **F**.

   B It is expensive to recycle substance **F**.

   C Substance **F** reacts with chlorine in the presence of UV light.

   D Substance **F** reacts with hydrogen in the presence of a nickel catalyst. ( )

10. Which of the following is **not** an issue related to plastics?

   A An increased use of plastic bags leads to more carbon monoxide in the atmosphere.

   B Fuels produced from the cracking of plastic waste allows electricity to be generated.

   C Plastics need to go through several processes in order to be recycled.

   D The demand for recycled plastics in the market is low. ( )

11. During certain addition polymerisation reactions, it is possible for different monomers to combine to form polymers.

   Figure 18.1 shows the structures of two alkenes.

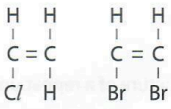
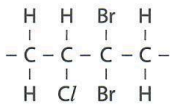


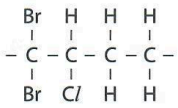
Figure 18.1

   Which of the following is a possible repeat unit of the addition polymer formed from the two alkenes?

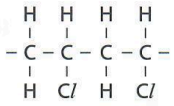
A



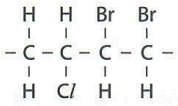
B



C



D



( )

12. A polymer was formed from two different monomers. A part of the structure of the polymer is shown in Figure 18.2.

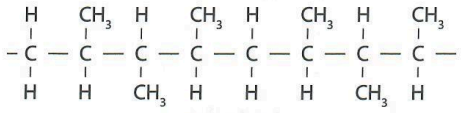
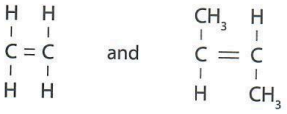


Figure 18.2

Which of the following are the monomers that combined to form the polymer?

A 

B 

C 

D 

( )

13. The cracking of polymer **Q** produces small alkanes and alkenes such as ethene, propene and propane.

Which of the following statements about polymer **Q** is/are **not** true?

1 Burning polymer **Q** produces less pollutants than burning propane.

2 Polymer **Q** is unsaturated.

3 The chemical formula of polymer **Q** is C_8H_{18}.

A 1 and 2 only

B 2 and 3 only

C 3 only

D All of the above

( )

14. The structure of compound **Z** is shown in Figure 18.3.

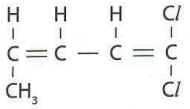
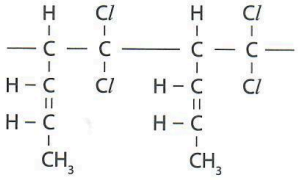


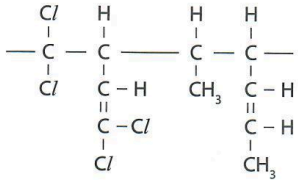
Figure 18.3

Which of the following show(s) part of the structure(s) formed when compound **Z** undergoes polymerisation?

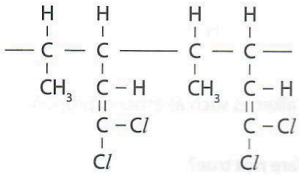
1



2



3



A 1 only

B 1 and 3 only

C 2 only

D 2 and 3 only ( )

15. Figure 18.4 shows part of the structure of a polymer.

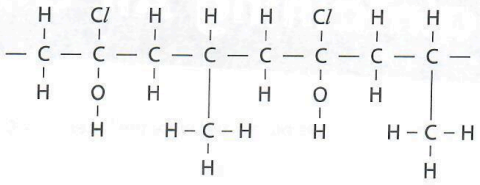


Figure 18.4

Which of the following statements **correctly** describe the polymer?

1 It is an unsaturated molecule.

2 It is likely to be formed from two different alkenes.

3 One of its monomers is ethene.

4 One of its monomers react with hydrogen to form propane.

A 1 and 2 only

B 2 and 3 only

C 2 and 4 only

D 3 and 4 only

( )