2021 ASSESSMENT MATERIALS

GCSE
CHEMISTRY

Chemistry Test 4: Organic chemistry and Chemistry of the atmosphere (Higher)

Total number of marks: 38

0 3 This question is about hydrocarbons.

Hexane and hexene are hydrocarbons containing six carbon atoms in each molecule.

Hexane is an alkane and hexene is an alkene.

0 3 . 1 Draw **one** line from each hydrocarbon to the formula of that hydrocarbon.

[2 marks]

Hydrocarbon	**Formula**
	C_6H_8
Hexane	C_6H_{10}
	C_6H_{12}
Hexene	C_6H_{14}
	C_6H_{16}

0 3 . 2 Bromine water is added to hexane and to hexene.

What would be observed when bromine water is added to hexane and to hexene?

[2 marks]

Hexane _____

_____

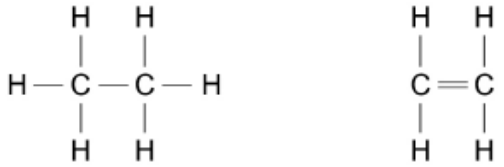
Hexene _____

_____

0 3 . 3 Ethane is an alkane and ethene is an alkene.

Figure 1 shows the displayed structural formulae of ethane and of ethene.

Figure 1



Ethane **Ethene**

Compare ethane with ethene.

You should refer to:

- their structure and bonding
- their reactions.

[6 marks]

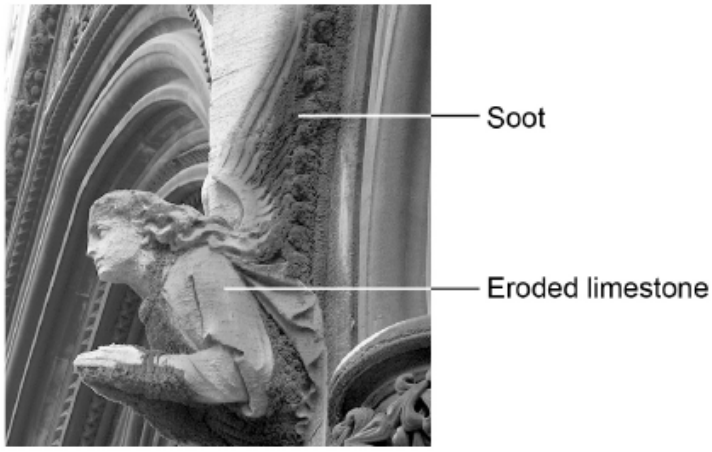
0 6 This question is about atmospheric pollution.

Figure 3 shows a limestone carving which has been damaged by atmospheric pollution.

The carving has been:

- blackened by soot
- eroded where the limestone has reacted with atmospheric pollutants.

Figure 3



0 6 . 1 Explain why soot is formed when some fossil fuels are burned.

[2 marks]

0 6 . 2 Fossil fuels are burned in car engines.

Explain how reducing the amount of sulfur in fossil fuels reduces the erosion of limestone.

[4 marks]

0 6 . 3 Oxides of nitrogen are atmospheric pollutants which are formed in car engines.

Explain why oxides of nitrogen are formed in car engines.

[2 marks]

0 6 This question is about polymers.

0 6 . 1 Name the monomer used to form poly(chloroethene).

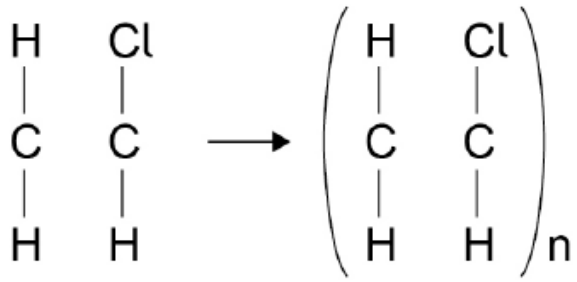
[1 mark]

0 6 . 2 **Figure 8** shows the equation for the formation of poly(chloroethene).

Complete **Figure 8**.

[3 marks]

Figure 8



0 6 . 3 Poly(chloroethene) is the only product.

What type of polymer is poly(chloroethene)?

[1 mark]

Ethanediol reacts with butanedioic acid to produce a polyester and a small molecule.

0 6 . 4 **Figure 9** shows the structural formula of ethanediol.

Figure 9

$HO–CH_2–CH_2–OH$

Name the functional group present in ethanediol.

[1 mark]

0 6 . 5 **Figure 10** shows the structural formula of butanedioic acid.

Figure 10

$HOOC–CH_2–CH_2–COOH$

Which formula represents the carboxylic acid functional group?

[1 mark]

Tick **one** box.

$–CH_2–$ ☐

$–CH_2–CH_2–$ ☐

$–CH_2–COOH$ ☐

$–COOH$ ☐

0 6 . 6 **Figure 11** shows part of the structure of the polyester.

Complete the box in **Figure 11**.

[2 marks]

Figure 11

0 6 . 7 Name the small molecule produced when ethanediol reacts with butanedioic acid.

[1 mark]

Starch, proteins and DNA are naturally occurring polymers.

0 6 . 8 Name the monomers from which starch and proteins are produced.

[2 marks]

Starch _____

Proteins _____

0 6 . 9 Describe the structure of DNA.

[2 marks]

0 8 Titan is a moon of the planet Saturn.

Table 3 shows the percentages of the gases in the atmosphere of Titan.

Table 3

Gas	Percentage of gas in atmosphere (%)
Nitrogen	98.4
Methane	1.4
Other gases	0.2

0 8 . 1 Some scientists think that living organisms could have evolved on Titan.

Explain why these organisms could **not** have evolved in the same way that life is thought to have evolved on Earth.

Use **Table 3**.

[3 marks]

0 8 . 2 Saturn has other moons.

The other moons of Saturn have no atmosphere.

Titan is warmer than the other moons of Saturn because its atmosphere contains the greenhouse gas methane.

Explain how this greenhouse gas keeps Titan warmer than the other moons of Saturn.

[3 marks]