AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.2.1.1

Chemical bonds

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2011–2022**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

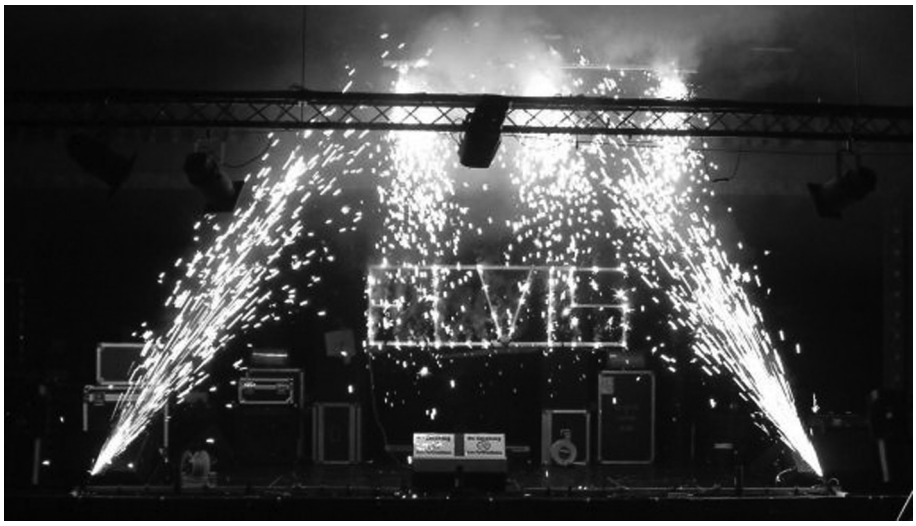
4.2.1.1 Chemical bonds

Question 01

June 2011 | CHY2H | Original Q4 | Legacy

4 Read the information in the box.

Flash powder is used to produce special effects at pop concerts.



Flash powder contains aluminium. The powder burns with a bright white flame and gives out lots of heat and light. It also produces white smoke.

The flash powder is placed on stage in a special container. At the bottom of the container there is a thin piece of wire. When the flash is needed, electricity is passed through the wire. The wire gets hot and starts the aluminium burning.

4 (a) When aluminium burns the reaction is *exothermic*.

What is the meaning of *exothermic?*

.....

.....

(1 mark)

4 (b) The hot wire provides energy to start the aluminium burning.

What is the name given to the heat energy needed to start a chemical reaction?

..... energy

(1 mark)

4.2.1.1 Chemical bonds

Question 01 · continued

4 (c) The white smoke produced is aluminium oxide.

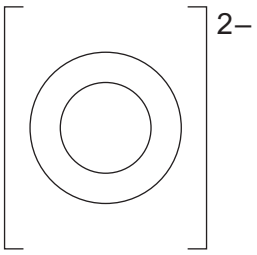
Aluminium oxide contains aluminium ions (Al^{3+}) and oxide ions (O^{2-}).

4 (c) (i) Complete the diagram to show the electronic structure of an oxide ion.

The atomic number of oxygen = 8

Use crosses (x) to represent the electrons.

oxide ion



(1 mark)

4 (c) (ii) The bonding in aluminium oxide is ionic.

What causes the aluminium ions and oxide ions to be held together strongly?

.....

.....

(1 mark)

4

4.2.1.1 Chemical bonds

Question 02

November 2020 | 8462/1H | Original Q1

0 1 This question is about structure and bonding.

0 1 . 1 Which **two** substances have intermolecular forces between particles?

[2 marks]

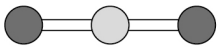
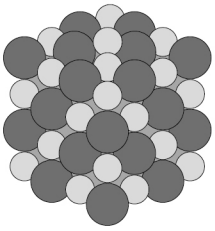
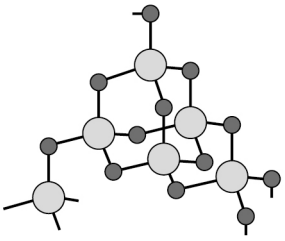
Tick (✓) **two** boxes.

- Diamond ☐
- Magnesium ☐
- Poly(ethene) ☐
- Sodium chloride ☐
- Water ☐

0 1 . 2 **Table 1** shows the structures of three compounds.

Table 1

Diagrams not to scale

Compound	Structure
Carbon dioxide	
Magnesium oxide	
Silicon dioxide	

4.2.1.1 Chemical bonds

Question 02 · continued

Compare the structure and bonding of the three compounds:

- carbon dioxide
- magnesium oxide
- silicon dioxide.

[6 marks]

8

4.2.1.1 Chemical bonds

Question 03

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 _____

_____

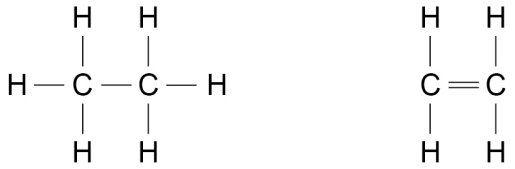
4.2.1.1 Chemical bonds

Question 03 · continued

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]

10

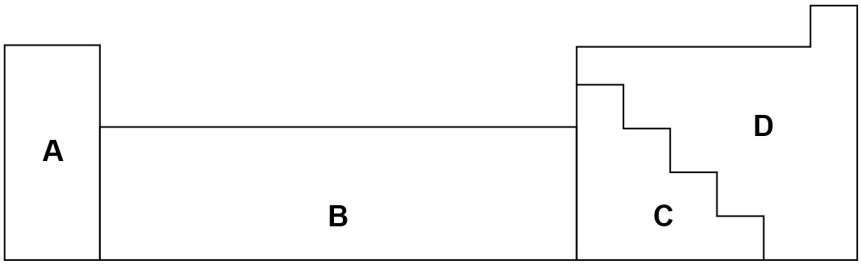
4.2.1.1 Chemical bonds

Question 04

0 1 This question is about metals and non-metals.

Figure 1 shows an outline of part of the periodic table.

Figure 1



0 1 . 1 Element **Q** is a dull solid with a melting point of 44 °C.

Element **Q** does not conduct electricity.

Which section of the periodic table in **Figure 1** is most likely to contain element **Q**?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 2 Element **R** forms ions of formula R^{2+} and R^{3+}

Which section of the periodic table in **Figure 1** is most likely to contain element **R**?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 3 Give **two** differences between the physical properties of the elements in Group 1 and those of the transition elements.

[2 marks]

1 _____

_____

2 _____

_____

4.2.1.1 Chemical bonds

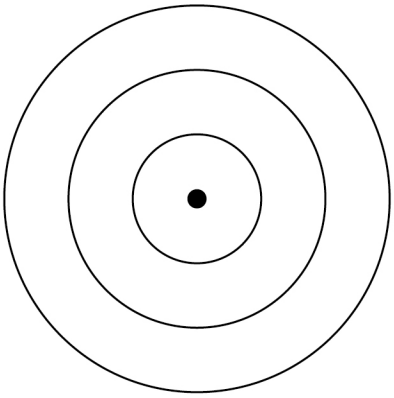
Question 04 · continued

0 1 . 4 Complete **Figure 2** to show the electronic structure of an aluminium atom.

Use the periodic table.

[1 mark]

Figure 2



0 1 . 5 Aluminium is a metal.

Describe how metals conduct electricity.

Answer in terms of electrons.

[3 marks]

0 1 . 6 Name the type of bonding in compounds formed between metals and non-metals.

[1 mark]

4.2.1.1 Chemical bonds

Question 04 · continued

0 1 . 7 Magnesium oxide is a compound formed from the metal magnesium and the non-metal oxygen.

Describe what happens when a magnesium atom reacts with an oxygen atom.

You should refer to electrons in your answer.

[4 marks]

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