

# GCSE CHEMISTRY

Chemistry Test 1: Atomic structure and the periodic table and  
Bonding, structure and the properties of matter (Foundation)

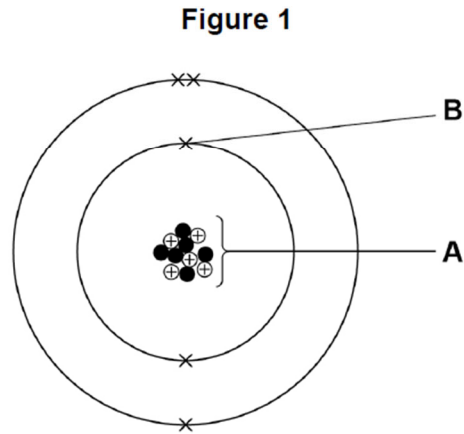
---

Total number of marks: 36

0 1

This question is about atomic structure.

**Figure 1** represents an atom of element **Z**.



0 1 . 1

Name the parts of the atom labelled **A** and **B**.

Choose answers from the box.

[2 marks]

electron	neutron	nucleus	proton
----------	---------	---------	--------

0 1 . 2

Which particle has the lowest mass?

Choose the answer from the box.

[1 mark]

electron	neutron	nucleus	proton
----------	---------	---------	--------

0 1

This question is about the elements in Group 7 of the periodic table.

**Table 1** shows the melting points and boiling points of some of the elements.

**Table 1**

Element	Melting point in °C	Boiling point in °C
Fluorine	-220	-188
Chlorine	-101	-35
Bromine	-7	59

0 1 . 1 What is the state of bromine at 100 °C?

Use **Table 1**.

[1 mark]

Tick (✓) **one** box.

Gas

Liquid

Solid

0 1 . 2 What temperature does chlorine gas condense at to form a liquid?

Use **Table 1**.

[1 mark]

Temperature = \_\_\_\_\_ °C

0 1 . 3 Complete the sentences.

[2 marks]

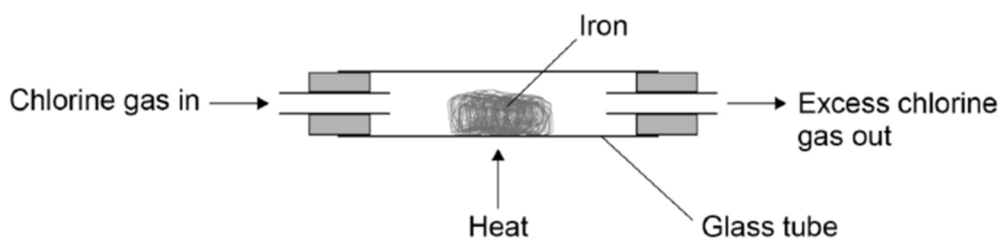
Going down Group 7 the melting points \_\_\_\_\_.

This is because the size of the molecules increases so the intermolecular forces \_\_\_\_\_.

A teacher investigated the reaction of iron with chlorine.

**Figure 1** shows the apparatus used.

**Figure 1**



0 1 . 4 Why did the teacher do the investigation in a fume cupboard?

[1 mark]

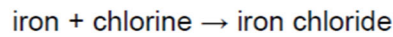
Tick (✓) **one** box.

Chlorine gas is coloured.

Chlorine gas is flammable.

Chlorine gas is toxic.

0 1 . 5 The word equation for the reaction is:



Iron chloride is a solid.

The teacher weighed the glass tube and contents:

- before the reaction
- after the reaction.

What happened to the mass of the glass tube and contents during the reaction?

Give **one** reason for your answer.

[2 marks]

The mass of the glass tube and contents \_\_\_\_\_.

Reason \_\_\_\_\_  
\_\_\_\_\_

The teacher repeated the investigation with bromine gas and with iodine gas.

**Table 2** shows the results.

**Table 2**

Element	Observation
Chlorine	Iron burns vigorously with an orange glow
Bromine	Iron burns with an orange glow
Iodine	Iron slowly turns darker

0 1 . 6 Fluorine is above chlorine in Group 7.

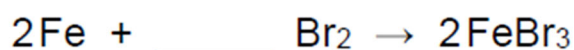
Predict what you would observe when fluorine gas reacts with iron.

Use **Table 2**.

[1 mark]

0 1 . 7 Balance the equation for the reaction between iron and bromine.

[1 mark]



0 1 This question is about mixtures.

0 1 . 1 Substances are separated from a mixture using different methods.

Draw **one** line from each substance and mixture to the best method of separation.

[3 marks]

**Substance and mixture**

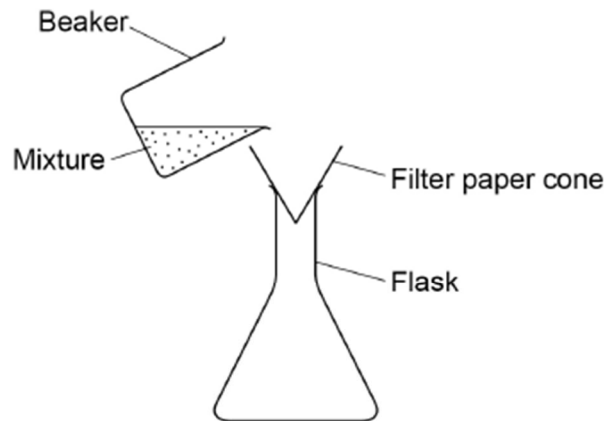
**Method of separation**

Ethanol from ethanol and water	Chromatography
Salt from sea water	Crystallisation
The different colours in black ink	Electrolysis
	Filtration
	Fractional distillation

0 1 . 2 A student filters a mixture.

Figure 1 shows the apparatus.

Figure 1



Suggest **one** improvement to the apparatus.

[1 mark]

0 1 . 3 Complete the sentences.

Choose answers from the box.

[2 marks]

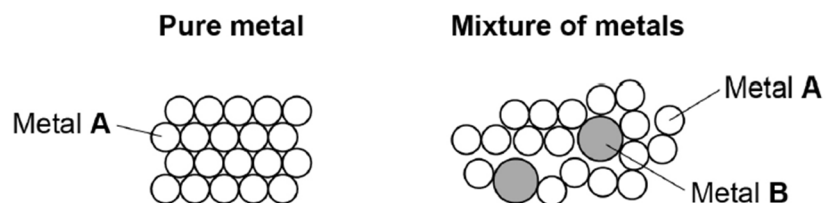
condense	evaporate	freeze	melt	solidify
----------	-----------	--------	------	----------

In simple distillation, the mixture is heated to make the liquid \_\_\_\_\_.

The vapour is then cooled to make it \_\_\_\_\_.

Figure 2 shows the arrangement of atoms in a pure metal and in a mixture of metals.

Figure 2



0 1 . 4

Calculate the percentage of metal **B** atoms in the mixture of metals shown in **Figure 2**.

**[2 marks]**

---

---

---

Percentage of metal **B** atoms = \_\_\_\_\_ %

0 1 . 5

What is a mixture of metals called?

**[1 mark]**Tick **one** box.

An alloy

A compound

A molecule

A polymer

0 1 . 6

Why is the mixture of metals in **Figure 2** harder than the pure metal?

**[1 mark]**Tick **one** box.

The atoms in the mixture are different shapes.

The layers in the mixture are distorted.

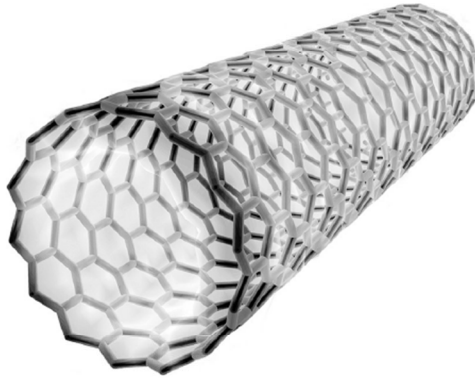
The layers in the mixture slide more easily.

The mixture has a giant structure.

1 0 This question is about materials and their properties.

1 0 . 1 **Figure 13** shows a carbon nanotube.

**Figure 13**



The structure and bonding in a carbon nanotube are similar to graphene.

Carbon nanotubes are used in electronics because they conduct electricity.

Explain why carbon nanotubes conduct electricity.

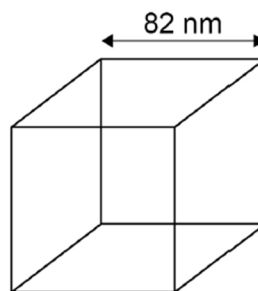
**[2 marks]**

Zinc oxide can be produced as nanoparticles and as fine particles.

1 0 . 3 A nanoparticle of zinc oxide is a cube of side 82 nm

**Figure 15** represents a nanoparticle of zinc oxide.

**Figure 15**





Calculate the surface area of a nanoparticle of zinc oxide.

Give your answer in standard form.

[3 marks]

---



---



---



---

Surface area = \_\_\_\_\_ nm<sup>2</sup>

1 0 . 4

Some suncreams contain zinc oxide as nanoparticles or as fine particles.

Suggest **one** reason why it costs less to use nanoparticles rather than fine particles in suncreams.

[1 mark]

0 8

This question is about structure and bonding.

0 8 . 1

Which **two** substances have intermolecular forces between particles?

[2 marks]

Tick (✓) **two** boxes.

Diamond

Magnesium

Poly(ethene)

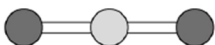
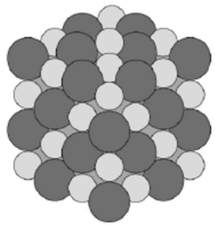
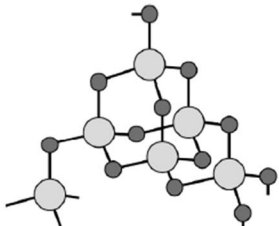
Sodium chloride

Water

0 8 . 2 Table 5 shows the structures of three compounds.

Table 5

Diagrams not to scale

Compound	Structure
Carbon dioxide	 <p><b>Key</b></p> <p>● O</p> <p>● C</p>
Magnesium oxide	 <p><b>Key</b></p> <p>● O<sup>2-</sup></p> <p>● Mg<sup>2+</sup></p>
Silicon dioxide	 <p><b>Key</b></p> <p>● O</p> <p>● Si</p>

Compare the structure and bonding of the three compounds:

- carbon dioxide
- magnesium oxide
- silicon dioxide.

[6 marks]