

AQA – Atomic structure – AS Chemistry P11. **No.3**

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This question is about structure and bonding.

0	3	.	1
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Define electronegativity.

[1 mark]

0	3	.	2
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Explain why the C–Cl bond is polar.

[2 marks]

0	3	.	3
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Although the C–Cl bond is polar, CCl₄ is a non-polar molecule.

Explain why.

[2 marks]

0 3 . 4 There are van der Waals forces between non-polar molecules.

Explain what causes these forces.

[3 marks]

Barium reacts with oxygen to form barium oxide.

Barium oxide has a high melting point and an ionic lattice structure similar to that of sodium chloride.

0 3 . 5 Draw a 3D diagram to show how the particles are arranged in a barium oxide lattice. You should draw eight particles.

[2 marks]

2. No.6

0 6

This question is about atomic structure and mass spectrometry.

0 6 . 1

Give the **full** electron configuration for Br

[1 mark]

A sample of bromine (Br_2) is analysed in a mass spectrometer.

The sample is ionised using electron impact ionisation.

0 6 . 2

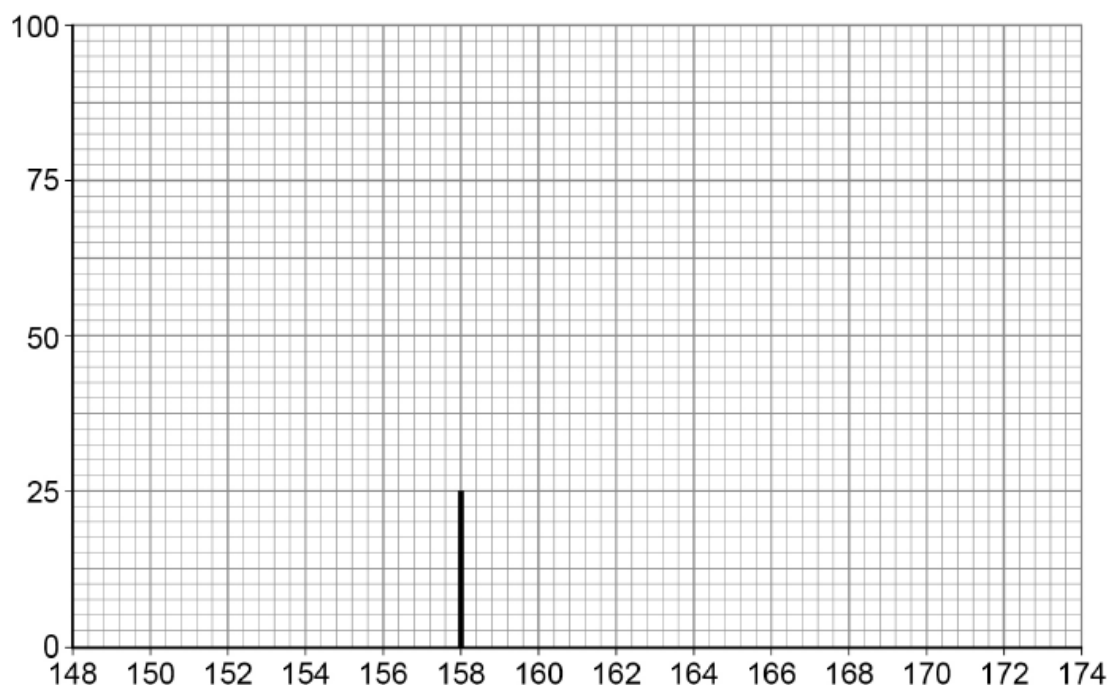
Give an equation, including state symbols, for the process that occurs during the ionisation of bromine.

[1 mark]

0 6 . 3 Bromine exists as two isotopes, ^{79}Br and ^{81}Br , which exist in equal abundance.

Figure 1 shows an incomplete mass spectrum for this sample of bromine.

Figure 1



Complete the spectrum by adding a label to each axis, and adding any further peaks you would expect to see.

[3 marks]

0 6 . 4 State how the detector enables the relative abundance of each ion to be determined.

[1 mark]

3. No.20

Samples of four different substances are analysed using time of flight mass spectrometry.

In each case, the samples are ionised to form ions with a single positive charge. The ions are accelerated to the same kinetic energy.

Which sample gives ions with the shortest time of flight?

[1 mark]

A A sample of ^{45}Sc that is ionised using electron impact ionisation.

☐

B A sample of C_3H_8 that is ionised using electrospray ionisation.

☐

C A sample of $\text{CH}_3\text{CH}_2\text{OH}$ that is ionised using electrospray ionisation.

☐

D A sample of CO_2 that is ionised using electron impact ionisation.

☐

4. No.21

Which isotope has 2 more protons and 3 more neutrons than an atom of ^{112}Cd ?

[1 mark]

A $^{115}_{48}\text{Cd}$

☐

B $^{115}_{50}\text{Sn}$

☐

C $^{117}_{50}\text{Sn}$

☐

D $^{117}_{51}\text{Sb}$

☐

5. No.24

Which atom has the greatest number of unpaired electrons?

[1 mark]

A P

☐

B V

☐

C Fe

☐

D Cu

☐