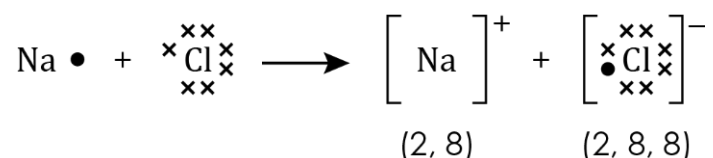


Ionic structure and bonding

- 1 The diagram represents the formation of a sodium ion and a chloride ion.



- (a) Which statement about a sodium ion is true?
Circle the correct answer.

(1 mark)

- A** A sodium ion has equal numbers of electrons and protons.
- B** A sodium ion has more electrons than protons.
- C** A sodium ion has fewer electrons than protons.
- D** A sodium ion has more electrons than a chlorine atom.
- (b) The atomic number of chlorine is 17. Which row in the table shows the correct number of sub-atomic particles for a chloride **ion** with a mass number of 35?
Circle the correct answer.

Row	Number of protons	Number of neutrons	Number of electrons
A	17	17	17
B	18	16	18
C	16	17	18
D	17	18	18

(1 mark)

2 The formula of magnesium oxide is MgO .

- (a) Draw a diagram to show how a magnesium atom (2, 8, 2) and an oxygen atom (2, 6) form a magnesium ion and an oxide ion. Your diagram should look like that in **question 1**.

(3 marks)

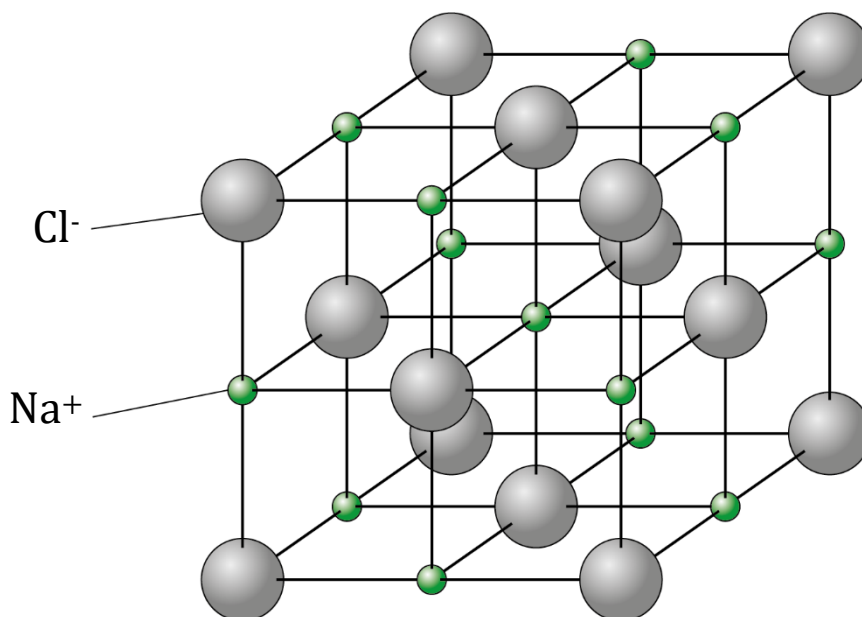
- (b) The formula of magnesium chloride is MgCl_2 . Describe what happens to magnesium atoms and chlorine atoms when the ionic compound magnesium chloride is formed.

(4 marks)

- (c) The symbol for an aluminium ion is Al^{3+} . The symbol for an oxide ion is O^{2-} . Write the formula for aluminium oxide?

(1 mark)

- 3 This diagram represents the giant ionic structure of sodium chloride.



- (a) What forces hold the giant structure together?

(1 mark)

- (b) Give one limitation of this diagram.

(1 mark)

- (c) Explain why sodium chloride has a high melting point.

(4 marks)

(d) The table shows the melting points of sodium chloride and magnesium oxide.

Ionic compound	Which ions are present? [give the formula]	Melting point/°C
sodium chloride		801
magnesium oxide		2852

i. Complete the table to show the ions present. (2 marks)

ii. What type of bond is broken when sodium chloride melts?

(1 mark)

iii. Explain why the melting point of magnesium oxide is higher than the melting point of sodium chloride.

[2 marks]

4 Some students investigated the electrical conductivity of solid zinc chloride, zinc chloride solution and molten zinc chloride. The table describes their observations.

Substance	Did it conduct electricity?
solid zinc chloride	no
zinc chloride solution	yes
molten zinc chloride	yes

(a) Explain the students' results.

(3 marks)

- (b) The melting point of zinc chloride is 290°C . Draw a diagram of the apparatus you could use to show that molten zinc chloride conducts electricity.

(3 marks)

[Total: 27 marks]



Which question(s) did you get wrong? Why?

What will you do next time you're asked a similar question?