

Question 1

Explain how magnesium reacts with oxygen to make magnesium oxide.

Magnesium has two electrons in its outside shell as it is in group 2.

Oxygen has 6 electrons in its outside shell as it is in group 6.

Magnesium will give two electrons to oxygen so it can have a full outer shell.

Oxygen will gain two electrons from magnesium so it has a full outer shell of 8 electrons.

Magnesium will now have 12 protons (+), but only 10 electrons (-) so the ion will have a 2+ charge.

Oxygen will now have 8 protons (+), but 10 electrons (-) so the ion will have a 2- charge.

The 2+ magnesium ion and the 2- oxide ion will now attract each other as they are opposite charges.

This electrostatic attraction is an ionic bond.

Challenge question

What do you notice about the names of the ions made in this question?

Question 2

Explain why sodium chloride has a high melting point and will not conduct electricity.

Sodium chloride is an ionic substance as it contains a metal and a non-metal element.

Ionic substances are made of charged particles (+ and -).

Ions attract each other as they are opposite charges. They attract each other in a regular 3D structure called a lattice.

Electrostatic attraction in a lattice is strong as it acts in all directions.

This means it takes a lot of energy to break a lattice apart.

So sodium chloride has a high melting point.

In the lattice, the ions cannot move and carry the charge.

So solid sodium chloride will not conduct electricity.

Challenge question

What can we do to get sodium chloride to conduct electricity?

Question 3

What is the structure and bonding like in fluorine gas (F₂)?

Fluorine is in group 7, it is a non-metal and so will bond covalently.

Fluorine has 7 electrons in its outside shell as it is in group 7.

When one fluorine atom reacts with another fluorine atom they will share one electron each to get a full outer shell of 8 electrons.

A covalent bond is a shared pair of electrons, so fluorine will have a single covalent bond as it shares one pair of electrons.

The fluorine makes a diatomic gas as two atoms join together in F₂.

The structure is called a molecule (it is a simple molecular covalent substance).

Challenge question

What element in the periodic table will make a diatomic gas with a double covalent bond?

Teaching notes

These cards should be shuffled and given to the students in a random order. The students will then need to find the question and sort the cards into a sensible order to make an explanation that answers the question.

You can then ask students to

- write the answer in full sentences (they do not all make sense without connectives etc)
- highlight the most important key idea that explains the answer
- add a diagram to illustrate what is happening in the answer.

Challenge question answers

1. Oxide ion rather than oxygen ion is made.
2. Melt it or dissolve in water to allow the ions to move.
3. Oxygen, as it is group 6, needs 2 electrons to make a full outside shell