A3 · Ionic bonds · Worked examples and practice

Name: _____ Date: _____

Worked examples

Read these first. There is one for each kind of question in this lesson.

Example 1 · Show an ionic bond forming

Show the ionic bond forming between sodium (group 1) and fluorine (group 17) with electron dot diagrams. Give the formula.

1. Draw each atom's electron dot diagram: sodium has 1 dot and fluorine has 7.
2. Move electrons from the metal to the non-metal: the 1 electron moves to fluorine.
3. Add atoms until every atom is full: both are full, so no more atoms are needed.
4. Draw the ions in brackets, with charges: Na^+ has no dots, and F^- has 8 dots.
5. Check: 1 electron lost equals 1 electron gained.

Answer: The formula is NaF.

Example 2 · Show an ionic bond when the numbers do not match

Show the ionic bond forming between magnesium (group 2) and chlorine (group 17) with electron dot diagrams. Give the formula.

1. Draw each atom's electron dot diagram: magnesium has 2 dots and chlorine has 7.
2. Move electrons from the metal to the non-metal: one chlorine atom takes only 1.
3. Add atoms until every atom is full: 2 chlorine atoms are needed.
4. Draw the ions in brackets, with charges: one Mg^{2+} and two Cl^-.
5. Check: 2 electrons lost equal 2 electrons gained.

Answer: The formula is $MgCl_2$.

Practice

Questions 1 to 4 are easy. Questions 5 to 8 are medium. Questions 9 and 10 are harder.

EASY

1. A lithium atom has 1 valence electron. A chlorine atom has 7. Which atom loses an electron, and which atom gains it?

EASY

2. Draw the electron dot diagram of a sodium ion.

EASY

3. Draw the electron dot diagram of a chloride ion.

EASY

4. What is an ionic bond?

MEDIUM

5. Show the ionic bond forming between calcium (group 2) and sulfur (group 16) with electron dot diagrams. Give the formula.

MEDIUM

6. Show the ionic bond forming between sodium (group 1) and oxygen (group 16) with electron dot diagrams. Give the formula.

MEDIUM

7. Write the balanced equation, with state symbols, for solid magnesium reacting with chlorine gas to make solid magnesium chloride.

MEDIUM

8. A magnesium atom has 2 valence electrons to lose. A bromine atom needs 1. How many bromine atoms does one magnesium atom need? Give the formula.

HARDER

9. Calcium (group 2) and phosphorus (group 15) form an ionic compound. Explain how many atoms of each are needed. Give the charge of each ion and the formula.

HARDER

10. A student draws a calcium ion as Ca with 2 dots and the charge 2+. Say what is wrong. Then describe the correct diagram.