A1 · Recall: ions, and names and formulas · Practice key

This is the worked key. Every practice question is worked step by step.

Worked examples

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

Example 1 · Write an ionic formula

Write the formula of lithium oxide.

1. Find each ion's charge: Li^{+} and O^{2-}.
2. Balance the charges to zero: two 1+ ions cancel one 2− ion.
3. Write the positive ion first, with subscripts: Li_2O.
4. Reduce to the simplest ratio: 2 to 1 is already the simplest.
5. Check: the positive total, 2+, and the negative total, 2−, add to zero.

Answer: The formula is Li_2O.

Example 2 · Name an ionic compound whose metal has two charges

Name $CuCl_2$. Copper's ion charges in the Data Booklet are 2+ and 1+.

1. Sort the compound: copper is a metal, so it is ionic.
2. Use ion names: copper and chloride.
3. Add a Roman numeral: 2 chloride ions make 2−, so the copper ion is 2+.
4. It is not molecular, so no prefixes are used.

Answer: The name is copper(II) chloride.

Example 3 · Name a molecular compound

Name PCl_5.

1. Sort the compound: phosphorus and chlorine are two non-metals, so it is molecular.
2. Name the first element. There is one atom, so it has no prefix: phosphorus.
3. Name the second element with a prefix and the ending -ide: 5 atoms is "penta", so pentachloride.

Answer: The name is phosphorus pentachloride.

Practice

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

EASY

1. Sodium is a metal. Its box in the Data Booklet shows 1+. Write the symbol of a sodium ion. Say whether the atom lost or gained an electron.

1. A sodium ion is Na^{+}.
2. A metal atom loses electrons, so the sodium atom lost 1 electron.

EASY

2. Oxygen is in group 16. Use the group number to find the charge of an oxide ion.

1. 16 − 18 = −2.
2. So an oxide ion is O^{2-}.

EASY

3. Write the formula of sodium chloride.

1. The ions are Na^+ and Cl^-.
2. One plus and one minus add to zero.
3. The formula is NaCl.

EASY

4. Name $MgCl_2$.

1. Magnesium is a metal, so the compound is ionic. Use ion names.
2. Mg^{2+} is magnesium. Cl^- is chloride.
3. The name is magnesium chloride.

MEDIUM

5. Write the formula of aluminium chloride.

1. The ions are Al^{3+} and Cl^-.
2. Three chloride ions cancel one aluminium ion.
3. The formula is $AlCl_3$.

MEDIUM

6. Write the formula of sodium sulfate. Sulfate is SO_4^{2-}.

1. The ions are Na^+ and SO_4^{2-}.
2. Two sodium ions cancel one sulfate ion.
3. The formula is Na_2SO_4. One sulfate ion needs no brackets.

MEDIUM

7. Name CuBr. Copper's ion charges in the Data Booklet are 2+ and 1+.

1. Copper is a metal, so the compound is ionic.
2. Bromide is 1−. One bromide ion makes 1−, so the copper ion is 1+.
3. The name is copper(I) bromide.

MEDIUM

8. Name $SiBr_4$. Then write the formula of dinitrogen trioxide.

1. $SiBr_4$ has two non-metals, so it is molecular. Use prefixes.
2. $SiBr_4$ is silicon tetrabromide: one silicon atom and four bromine atoms.
3. "Di" is 2 and "tri" is 3, so dinitrogen trioxide is N_2O_3.

HARDER

9. Write the formula of magnesium phosphate. Phosphate is PO_4^{3-}.

1. The ions are Mg^{2+} and PO_4^{3-}.
2. Two and three do not match. The smallest total both can reach is six.
3. 3 magnesium ions give 6+. 2 phosphate ions give 6−.
4. The formula is $Mg_3(PO_4)_2$. Phosphate needs brackets because there is more than one.

HARDER

10. Sort each compound as ionic or molecular, then name it: $CaBr_2$, SCl_2 and FeO. Iron's ion charges in the Data Booklet are 3+ and 2+.

1. $CaBr_2$ has a metal, so it is ionic: calcium bromide.
2. SCl_2 has two non-metals, so it is molecular: sulfur dichloride.
3. FeO has a metal, so it is ionic. Oxide is 2−, so the iron ion is 2+: iron(II) oxide.