Writing formulas for ionic compounds

Learning objectives

1. Recall the names and formulas of common positive and negative ions.
2. Write formulas of ionic compounds.

Introduction

Writing and combining ionic formulas is a crucial skill in chemistry. In this task, you will first build your knowledge of the formulas of some common positive and negative ions. You will then combine these to create formulas of ionic compounds.

Activity 1: ion formulas

Work in groups to complete Activity 1 by writing the names of ions in the appropriate places. Remember:

* For any **transition metal** ions, you must use the roman numerals to indicate the charge of the ion *e.g. cobalt(II) ions are* $Co^{2+}$*.*
* Negative ions change the second part of their name to end in ‘-ide’ or ‘-ate’.

|  |  |
| --- | --- |
| **Formula** | **Name of ion** |
| $$Na^{+}$$ |  |
| $$K^{+}$$ |  |
| $$Ag^{+}$$ |  |
| $$NH\_{4}^{ +}$$ |  |
| $$Ca^{2+}$$ |  |
| $$Mg^{2+}$$ |  |
| $$Pb^{2+}$$ |  |
| $$Zn^{2+}$$ |  |
| $$Cu^{2+}$$ |  |
| $$Fe^{2+}$$ |  |
| $$Fe^{3+}$$ |  |
| $$Al^{3+}$$ |  |

|  |  |
| --- | --- |
| **Formula** | **Name of ion** |
| $$Cl^{-}$$ |  |
| $$Br^{-}$$ |  |
| $$I^{-}$$ |  |
| $$NO\_{3}^{ -}$$ |  |
| $$N^{3-}$$ |  |
| $$OH^{-}$$ |  |
| $$CO\_{3}^{ 2-}$$ |  |
| $$S^{2-}$$ |  |
| $$SO\_{4}^{ 2-}$$ |  |

Activity 2: formulas for ionic compounds

Use the ion formula cards to construct formulas for the following ionic compounds. Then write the formulas into the table.

Worked example

Constructing the formula of sodium carbonate to balance the charges:

$$CO\_{3}^{ 2-}$$

$$Na^{+}$$

Formula is $Na\_{2}CO\_{3}$

$$Na^{+}$$

|  |  |
| --- | --- |
| **Compound** | **Formula** |
| Magnesium carbonate |  |
| Silver(I) nitrate |  |
| Calcium bromide |  |
| Copper(II) hydroxide |  |
| Iron(II) nitrate |  |
| Iron(III) iodide |  |
| Lead sulfate |  |

|  |  |
| --- | --- |
| **Compound** | **Formula** |
| Zinc nitrate |  |
| Potassium sulfate |  |
| Magnesium sulfide |  |
| Aluminium hydroxide |  |
| Ammonium chloride |  |
| Sodium hydrogen carbonate |  |
| Iron(III) carbonate |  |

Review: magnesium nitride vs magnesium nitrate

What do we now know about the differences between magnesium nitride, $Mg\_{3}N\_{2}$and magnesium nitrate, $Mg(NO\_{3})\_{2}$?

* Write a short explanation of the different ions these compounds contain.
* You can use diagrams, similar to those you used in Activity 2.
* If you came up with other examples of ‘ides’ and ‘ates’, do the same for these compounds.