**6.3 Chemical Formulas**

Almost every compound in which a metal is combined with a non-metal displays ionic bonding.

The formulas of simple ionic compounds can predicted from the electronic configurations or from their location on the periodic table.

Elements in group 1 of the periodic table all have an outer-shell electronic configuration of s1 and so all form ions of charge +1.

Other cases are more complex so chemists find it useful to learn the charges on a number of common ions. Appendix 6 lists some common cations and anions.

**Writing Formulas: Rules**

**Simple Ions**

* The positive ion is placed first in the formula, the negative second.
* Positive and negative ions are combined so that the total number of positive charges is balanced by the total number of negative charges.
* When there are two or more of a particular ion in a compound, then in the chemical formula the number is written as a subscript after the chemical symbol. (Al2O3).

**Polyatomic Ions**

Some ions contain more than one atom and are called polyatomic ions.

They include nitrate (NO3-), carbonate (CO32-), hydroxide (OH-) and ammonia (NH4+).

If more than one of these ions is required to balance the charge, then it is placed in brackets and the required number written as a subscript after the brackets.

Examples include: magnesium nitrate Mg(NO3)2, aluminium hydroxide Al(OH)3, ammonium sulfate (NH4)2SO4.

Note brackets are not required when there is only one polyatomic ion present such as sodium nitrate, NaNO3.

**Ions of elements with different electrovalencies.**

Some elements form ions with different charges. In compounds of iron, some iron ions have a charge of +2, but in other compounds a Fe3+ ion is present.

In this situation, you need to specify the electrovalency when naming the compound. This is done by placing a Roman numeral representing the electrovalency of the ion immediately after the metal in the name of the compound, such as:

* Iron(II) chloride – Fe2+ and so the formula is
* Iron(III) chloride – Fe3+ and so the formula is
* Copper(I) sulphide – Cu+ and so the formula is

**Text Questions: 9 – 13**

**Chapter Review: 17 - 28**