

# Chemical Bonding

Metals react with nonmetals to produce salts, also known as *ionic compounds*. When naming these compounds, we do not change the name of the metal ion (an ion is a charged atom). But we do change the ending of the nonmetal ion to *ide*.

## Examples:

- When sodium reacts with chlorine, it becomes sodium chlor*ide*.
- When calcium reacts with fluorine, it becomes the salt calcium fluor*ide*.

To predict the formula of the resulting compound, consult the periodic table for the charge of the ion (alkali metals are +1, halogens, -1, etc) and use the appropriate number of each ion so that the total charge of the compound is 0.

## Examples:

- What is the formula for potassium oxide? We need two  $K^{+1}$  and A single  $O^{-2}$  to get a sum of 0 charge, so the correct formula is  $K_2O$ .
- What is the formula for magnesium phosphide? We need three  $Mg^{+2}$  and two  $P^{-3}$  to get a sum of 0 charge, so the correct formula is  $Mg_3P_2$ .

## Polyatomic Ions

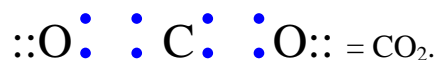
Some atoms combine to form groups with an extra number of electrons or with a deficit of electrons. Because these charged atoms contain more than one atom, they are called *polyatomic* ions or radicals. (*radicals* is not the best name because they can be confused with free radicals which do not have a charge) Here are some important polyatomics.

<i>POLYATOMIC</i>	<i>CHRISTIAN NAME</i>
$NO_3^{-1}$	<i>nitrate</i>
$PO_4^{-3}$	<i>phosphate</i>
$OH^{-1}$	<i>hydroxide</i>
$SO_4^{-2}$	<i>sulfate</i>
$CO_3^{-2}$	<i>carbonate</i>
$HCO_3^{-1}$	<i>hydrogen carbonate</i>
$NH_4^{+1}$	<i>ammonium</i>
$ClO_3^{-1}$	<i>chlorate</i>

## Covalent Compounds (436 only)

Non metals don't assume a charge when reacting with each other. Instead they share electrons in an attempt to fill their outermost shells. Lewis dot structures use a dot for each valence electron. For the simplest structures, we then try to arrange the dots (without creating any new ones) so that each atom is satisfied. Hydrogen only wants two electrons. Carbon, nitrogen, oxygen, and the halogens want eight electrons (this is known as the *octet rule*).

### *Examples:*



The shared electrons are what keep the atoms together within the diatomic or compound molecule. They are called **bonds**. When compounds react to form elements or other compounds, these bonds have to break.