Science 10: Ionic Compounds

Compounds are formed when two or more elements combine. This can happen in two main ways.

1. **Ionic Compounds** are formed when a metal donates electrons to a non-metal. In the process the metal becomes a **cation** (+ charge) and the non-metal becomes an **anion** (- charge). The two (or more) ions then become stuck together (positives and negatives are attracted!) to form an ionic compound.

* Ionic bonds are always between a METAL and a NON-METAL

2. **Covalent Compounds** are formed when two (or more) non-metals share electrons. This type of bond is generally weaker than an ionic bond. The result is still that each atom ends up with full valence shell.

* Covalent bonds are always between NON-METALS

**Ionic Compounds:**

Example: Sodium + Chlorine

BOHR

Sodium Chlorine

LEWIS DOT

* Sodium has one extra electron, Chlorine has one too few; It’s a match made in heaven!
* So sodium can donate one electron to chlorine and both will end up with a full valence shell.
* To do this the atoms must move close together.
* When sodium gives up one electron it becomes an ion with a charge of 1+. When chlorine accepts an extra electron it becomes an ion with a charge of 1- (**A chloride ion**).
* These two ions then ‘stick’ with a force of *electrostatic attraction* together forming a NaCl molecule. The **net charge** of the molecule will be 0.

LEWIS DOT BOHR

Na Cl

The positive sodium ion and the negative

chloride ion are now electrically attracted.

Na+ Cl-

+ - The two become ‘stuck’ together with an *electrostatic force*. This is a new molecule!

NaCl

The last diagram(s) show a single molecule of NaCl, Sodium Chloride.

**Rule for Naming Ionic Compounds:**

Ex 2: Magnesium and Fluorine.

Florine Magnesium

* This is a little different. Magnesium has two extra electrons, fluorine only need one.
* In order for the compound to form **all atoms must end up with full valence shells**.
* This means we will need two fluorine atoms.
* Magnesium can donate both electrons, each fluorine can accept one.
* The atoms must move close together.
* Mg becomes Mg2+. Each F becomes F- (fluoride).
* The ions then ‘stick’ together with a force of *electrostatic attraction* forming a MgF2 molecule. The **net charge** of the molecule will be 0.

LEWIS BOHR

F Mg F

Notice that the atoms all *look* the same.

What makes them different?

F- Mg2+ F-

- 2+ -

MgF2

The last diagram shows a single molecule of Magnesium Fluoride.

**Your turn:**

1. Beryllium + oxygen. For this example draw all three steps showing, with arrows how the electrons move. At the last step name the compound.

2. Sodium + Oxygen. For this example draw all three steps showing, with arrows how the electrons move. At the last step name the compound.

3. Lithium + Nitrogen. For this example see if you can skip right to the final molecule. Name the compound.