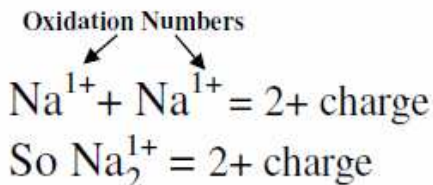


Ionic Compounds

Ion Charges Add

An ion is an atom with a positive or negative charge because it has gained or lost electrons. With multiple ions, their charges add together.

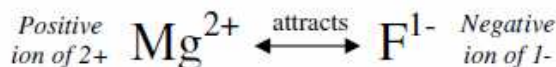


Each Sodium atom gives up 1 electron, so 2 Sodium atoms (Na_2) will give up 2 electrons and have a charge of 2+.

Opposite Ions Attract

Just as with protons and electrons: oppositely charged atoms attract. Positive ions (metals) attract negative ions (nonmetals), forming ionic compounds.

Positive ions attract Negative ions



Ions make *ionic* compounds. \longrightarrow MgF_2 Magnesium Fluoride
 Two F^{1-} for every Mg^{2+}

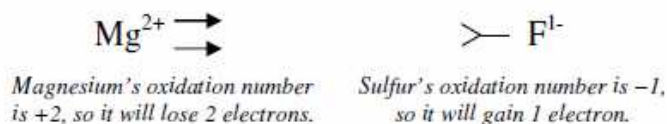
Electron Arrows

Electron arrows are an easy way to visualize electrons being given or accepted by atoms.

The Symbols

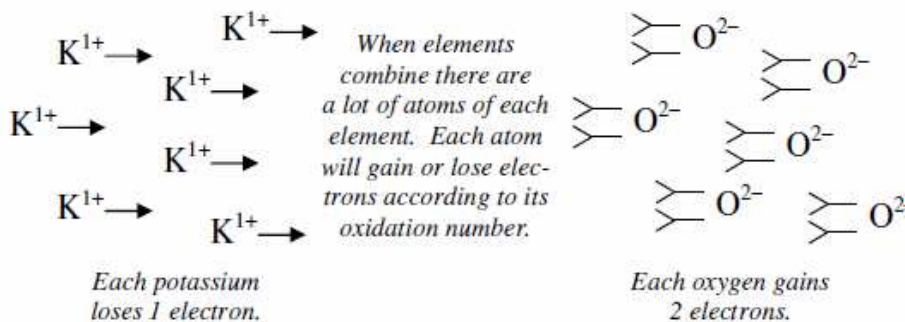
- \longrightarrow Losing 1 electron
- > Gaining 1 electron
- \longleftrightarrow An ionic bond

The number of electron arrows comes from the oxidation numbers. Positives give electrons; negatives receive.

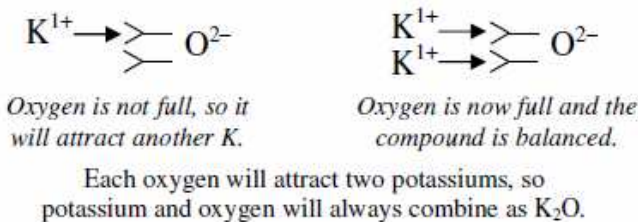


Ionic Compounds

How do elements combine to form compounds? Elements rarely occur naturally as individual atoms. Instead, each sample of an element contains a huge number of atoms! When placed together most elements will begin to lose electrons (becoming a positive ion) or gain electrons (becoming a negative ion). The positive ions are attracted to negative ions and combine into ionic compounds.

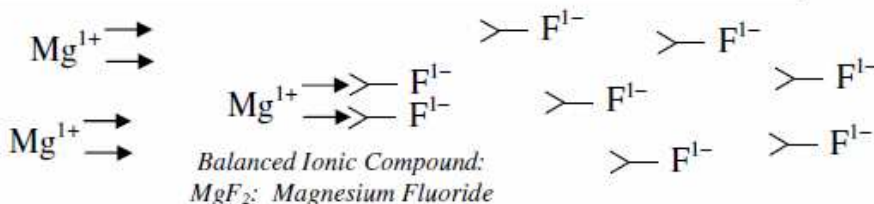


Ionic compounds always combine in a particular ratio (same number of each atom) so that they are *balanced*. The net charge must equal zero!



Limiting Reactant


As atoms combine into compounds, eventually one element will run out first. This is the limiting reactant, the reactant that is limited in amount. When one element is gone, the reaction will stop.



Magnesium and fluorine combine in a 1 to 2 ratio: MgF_2 . In this simplified example, the 8 fluorine atoms could combine with 4 magnesium atoms. Since there are only 3 magnesium atoms, the magnesium will run out first, making magnesium the limiting reactant. In the real world there are billions of atoms when they form compounds. Chemists are able to know how many atoms there are by the weight of the samples.



When the wood is all burned, the fire will stop. Wood is the limiting reactant because there is still oxygen.

1. Oxidation #s	A. Attracted by a positive ion.	6. Use the following symbols to answer the following. 
2. Zero	B. Tells you how many electrons will be gained or lost by an element.	
3. Negative ion	C. Net charge of a balanced ionic compound.	
4. Positive ion	D. When the number of electrons given equals the number taken.	
5. Balanced	E. Attracted by a negative ion.	
7. Give abbreviations with oxidation numbers and arrows		8. Give number of electrons gained or lost
Calcium	$\text{Ca}^{2+} \rightarrow \rightarrow$	Nitrogen
Oxygen		Fluorine
Sodium		Aluminum
		Ca^{2+} <u>2 lost</u> Ca_3^{2+} <u>6 lost</u> F^{1-} _____ F_3^{1-} _____ Al^{3+} _____ Al_2^{3+} _____ O^{2-} _____ O_3^{2-} _____ Na^{1+} _____ Na_3^{1+} _____ N^{3-} _____ N_2^{3-} _____

For the following six examples, combine the two given atoms using electron arrows, then give the balanced ionic compound formula.

Combine Sodium and Oxygen	Give the balanced ionic formula for <i>Sodium Oxide</i> .	Combine Beryllium and Fluorine	Give the balanced ionic formula for <i>Beryllium Fluoride</i> .
Combine Magnesium and Sulfur	Give the balanced ionic formula for <i>Magnesium Sulfide</i>	Combine Lithium and Phosphorus	Give the balanced ionic formula: <i>Compound name:</i>
Combine Calcium and Nitrogen	Give the balanced ionic formula: <i>Compound name:</i>	Combine Aluminum and Oxygen	Give the balanced ionic formula for <i>Beryllium Fluoride</i> . <i>Compound name:</i>
<i>Write the balanced ionic compounds for the following:</i> Be^{2+} and O^{2-} : _____ Na^{1+} and S^{2-} : _____ Li^{1+} and N^{3-} : _____ Ca^{2+} and N^{3-} : _____ Al^{3+} and Cl^{1-} : _____ K^{1+} and $(\text{SO}_4)^{2-}$: _____		<i>Write the balanced ionic formulas for the following:</i> Lithium and Oxygen: _____ Magnesium and Iodine: _____ Calcium and Sulfur: _____ Aluminum and Oxygen: _____	