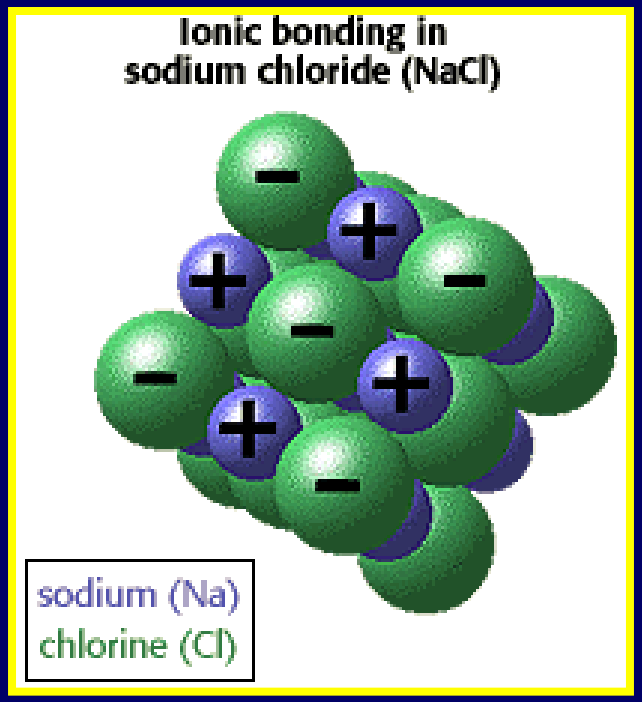
Naming and Writing Formulas for Ionic Compounds



I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can write chemical formulas and name ionic compounds, given a chemical formula

Ionic Compounds

Compounds formed by ionic bonds are called ionic compounds and have different properties than their individual atoms.

Explosive Metal

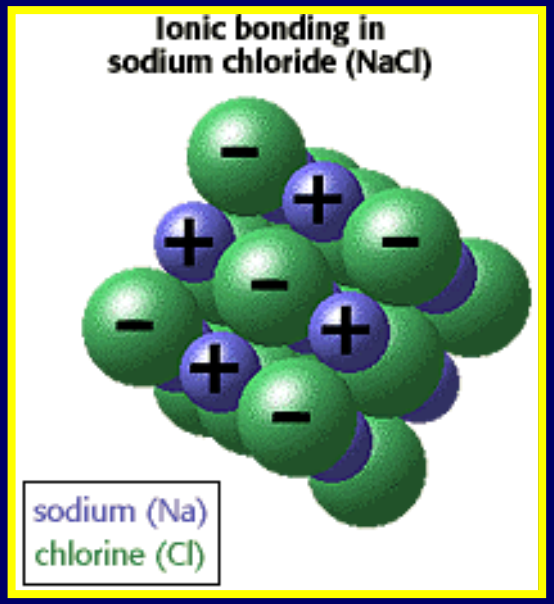
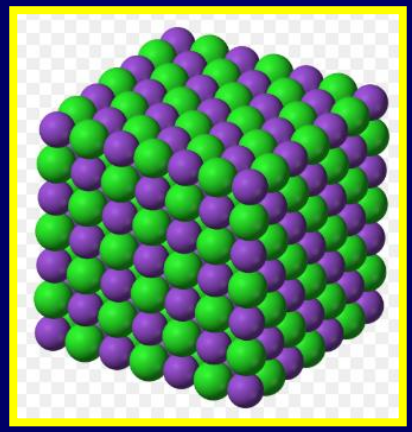


Table Salt

Poisonous Gas

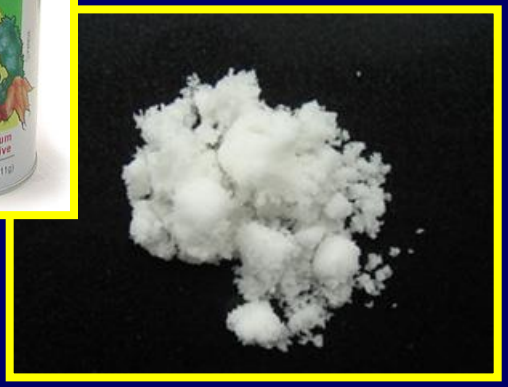
Properties of Ionic Compounds

Ionic compounds form crystals



NaCl

Sodium Chloride

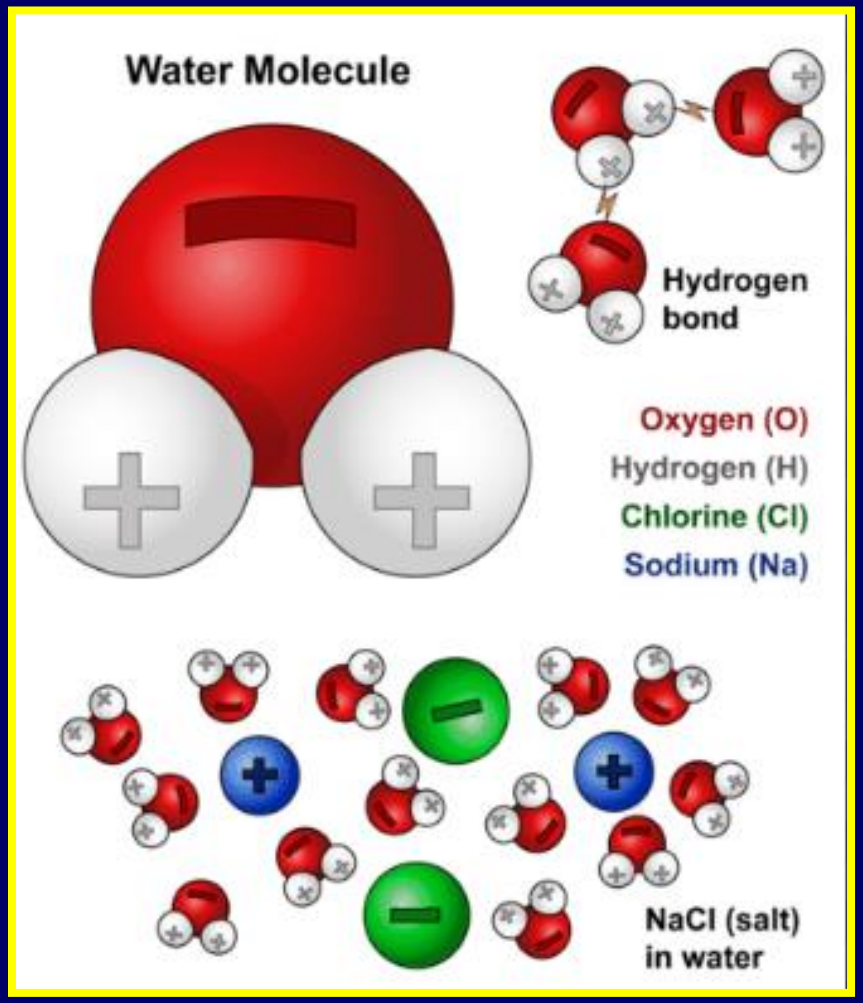


KCl

Potassium Chloride

Properties of Ionic Compounds

Ionic compounds dissolve easily in water.



Because the individual ions have a charge, they are attracted the charges in the water molecule and are easily separated or dissolved.

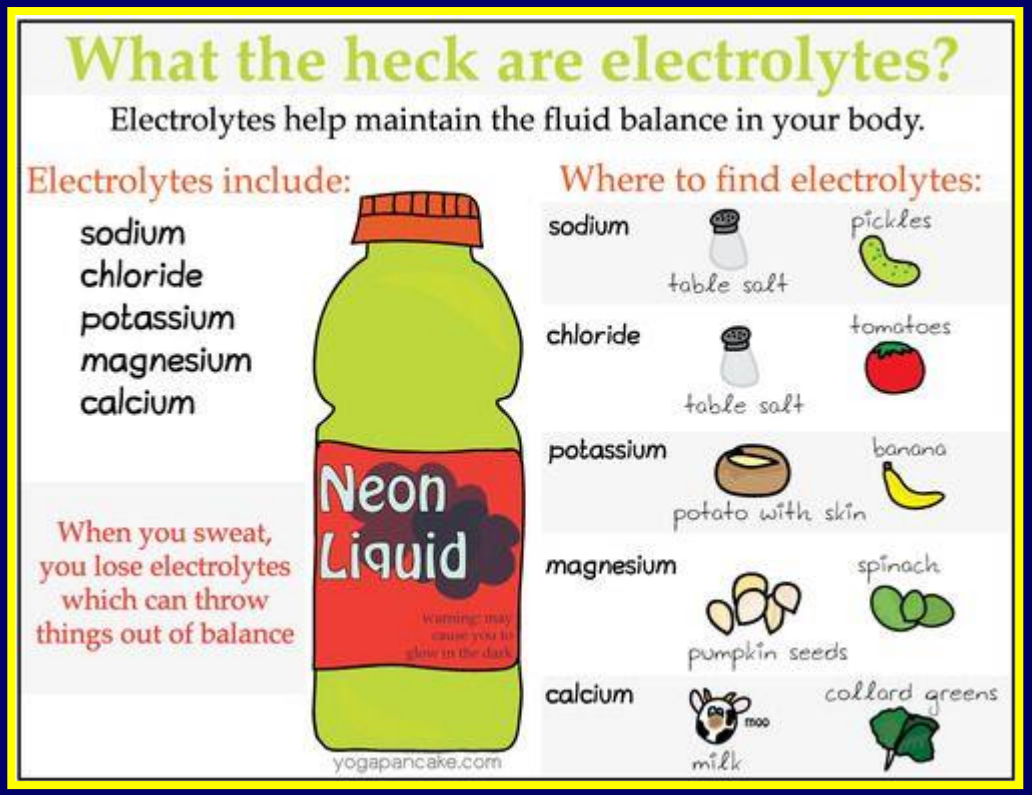
Ionic Compounds

When ionic compounds dissolve in water, the charged ions can conduct electricity and are called electrolytes.

Na+

Cl-

K+



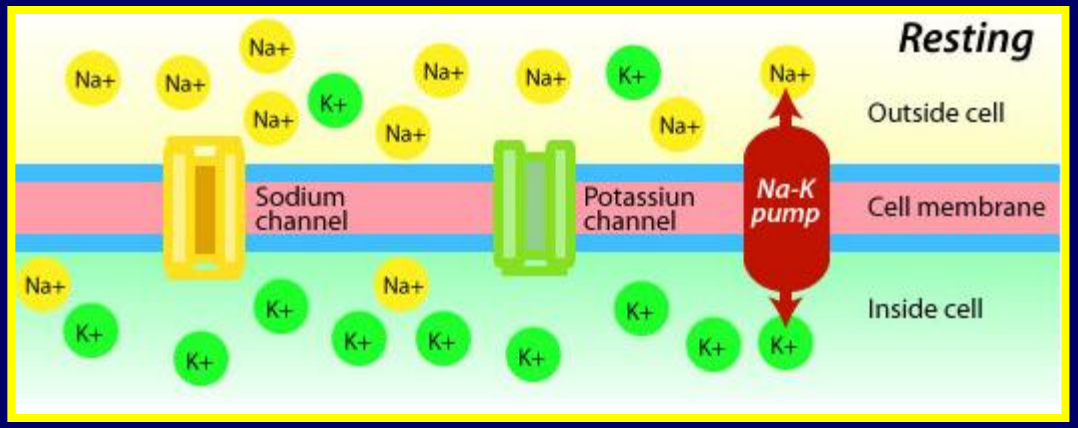
Mg+

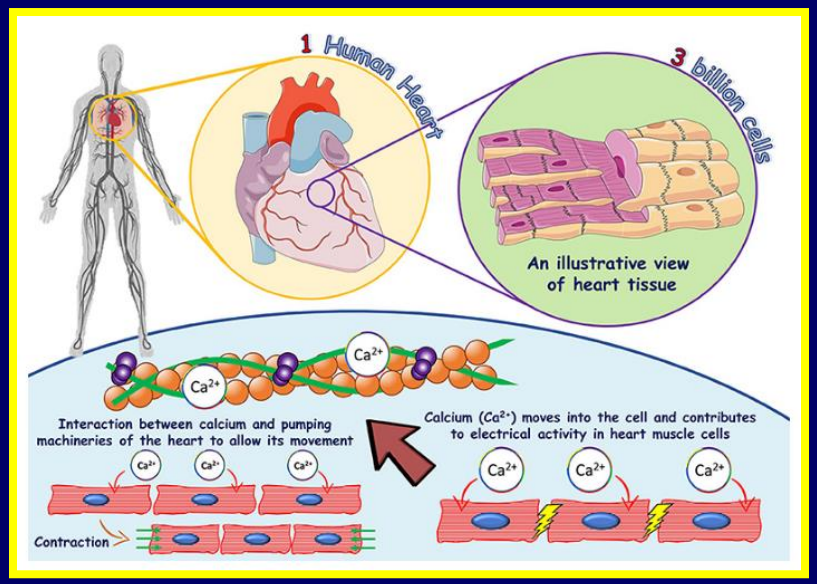
Ca+

Electrolytes

Electrolytes are vital to human health.

Na+ and K+ ions are involved in nerve signals.

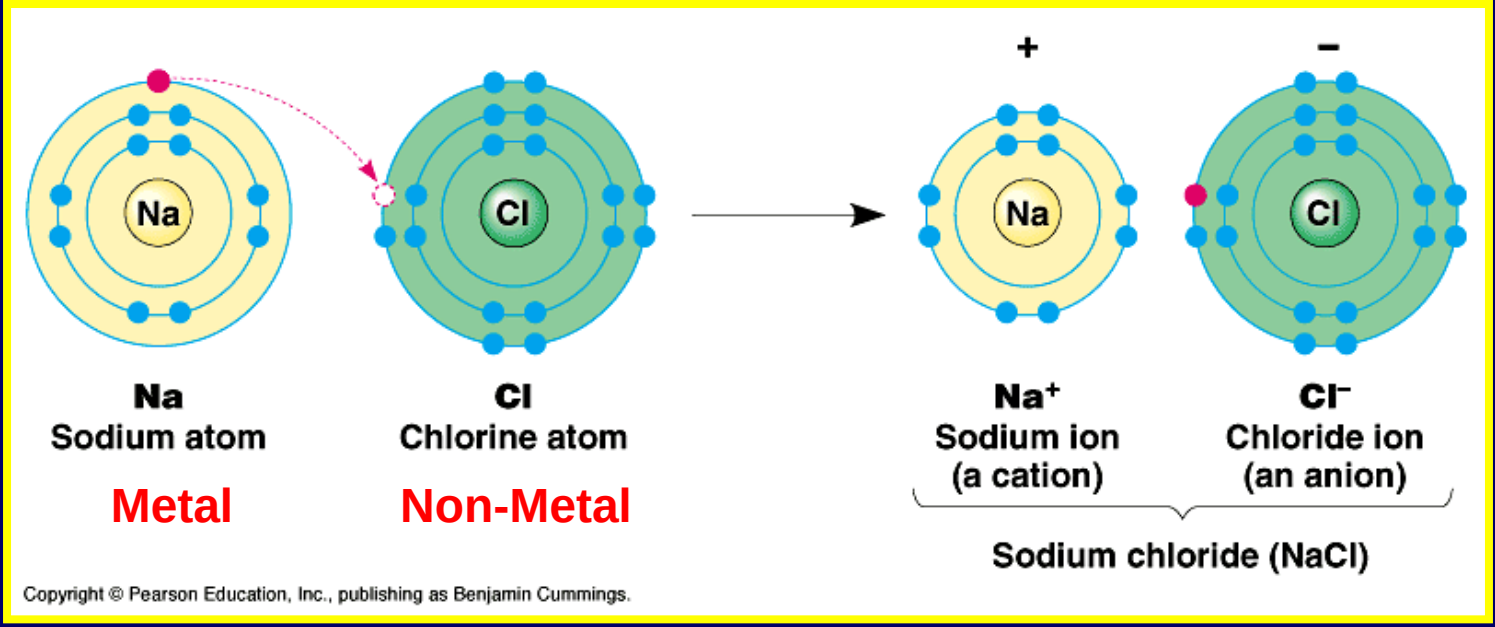




Ca+ ions cause your heart to pump blood and helps your heart maintain a rhythm.

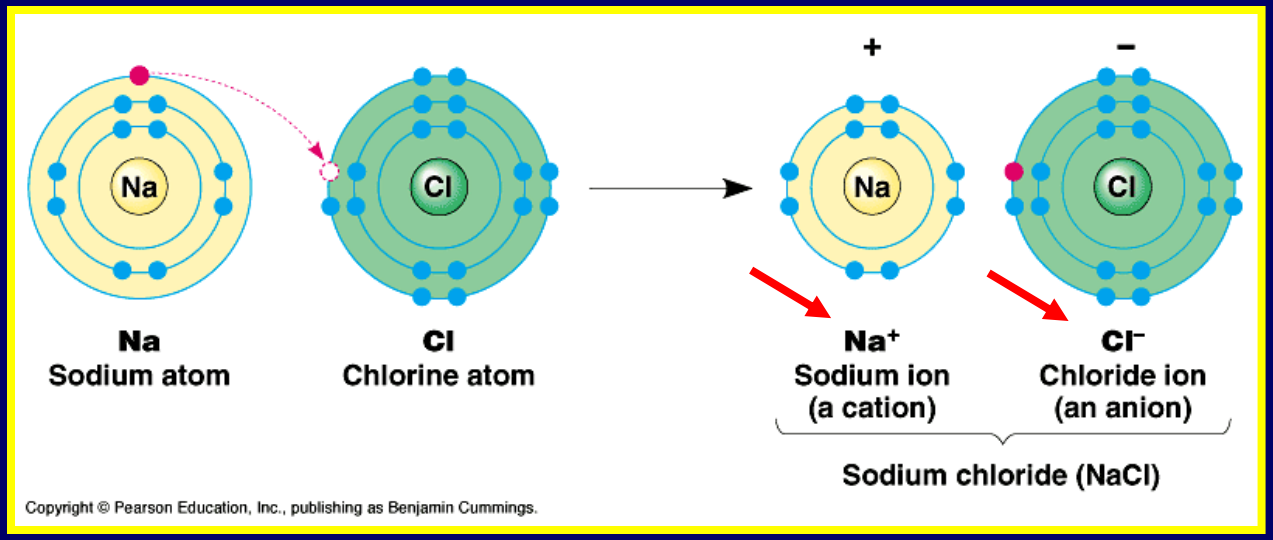
Ionic Bonds

Ionic compounds are formed when atoms exchange electrons, develop a charge, and oppositely charged ions form an ionic bond.



Atoms with a Charge

Atom develop a charge when they lose or gain electrons.



Charges can be either positive or negative.

Ions

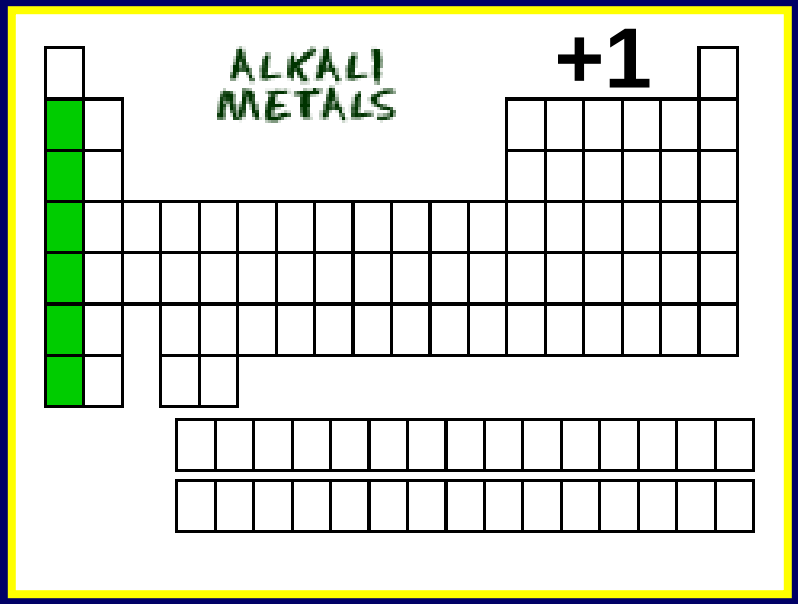
Atoms with a charge are called ions.

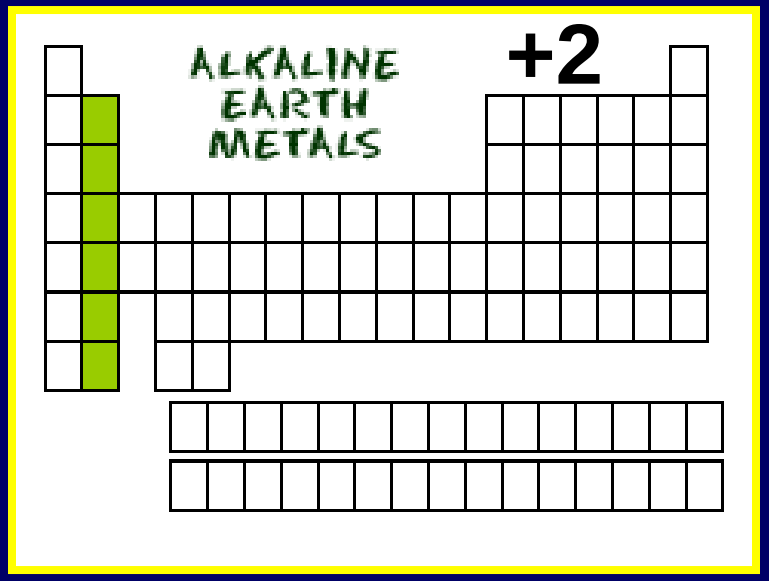
If an atom loses an electron, it will develop a positive charge.

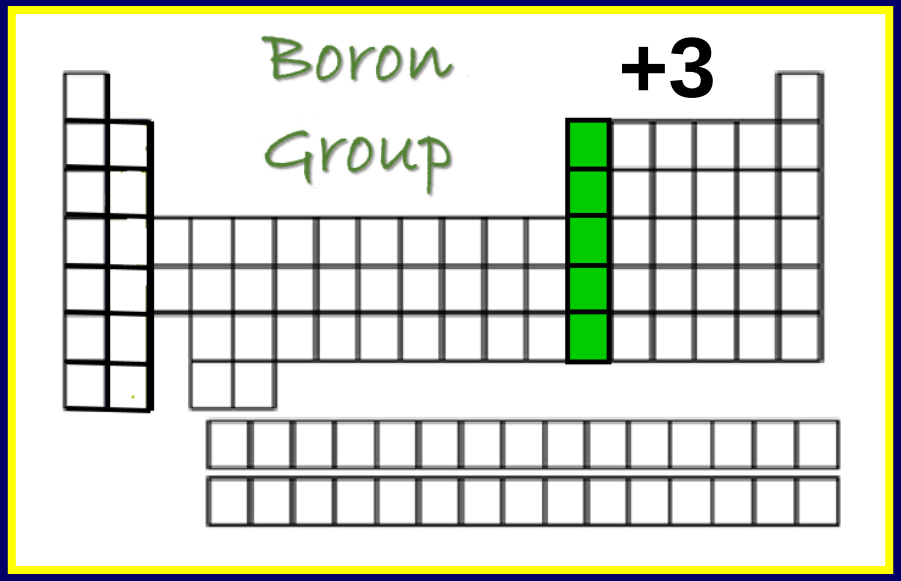
If an atom gains an electron, it will develop a negative charge.

Metals → Positive Ions

Metals lose electrons and develop a positive change, in the process.

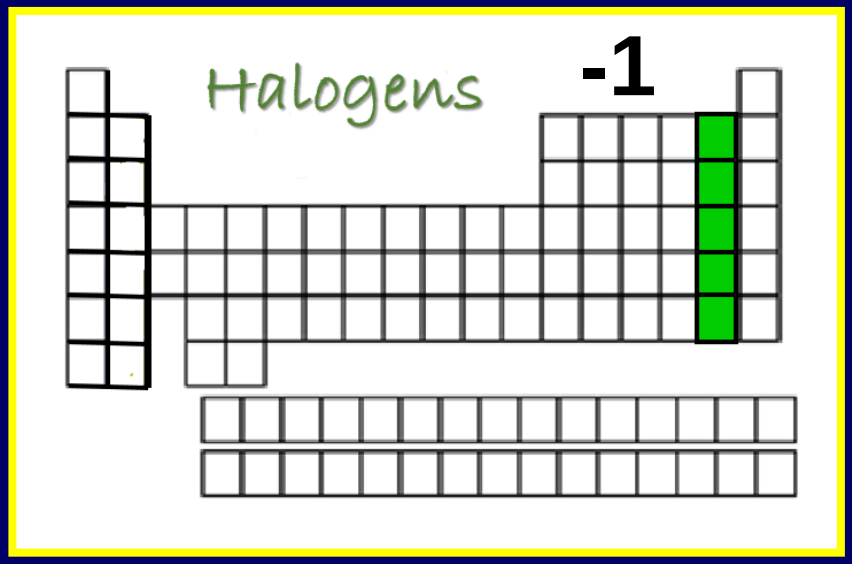


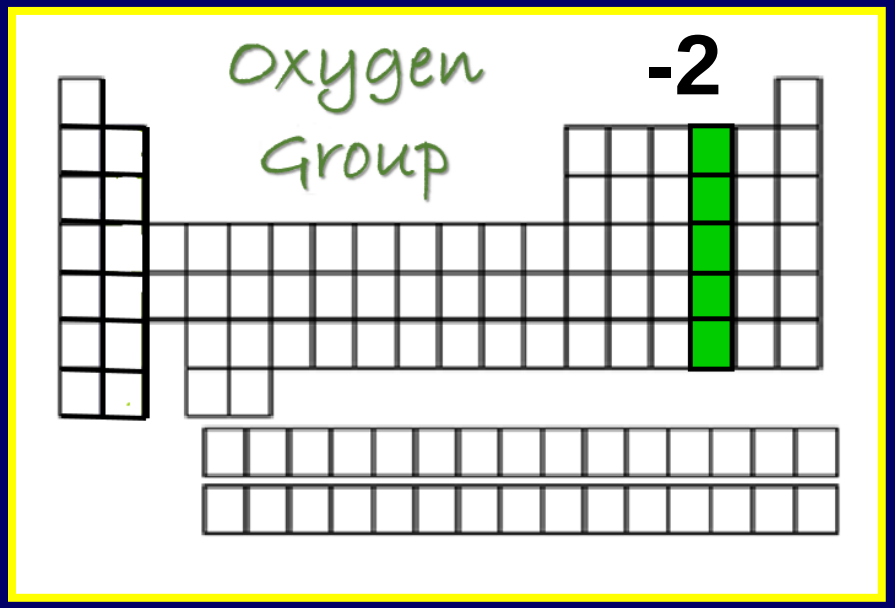


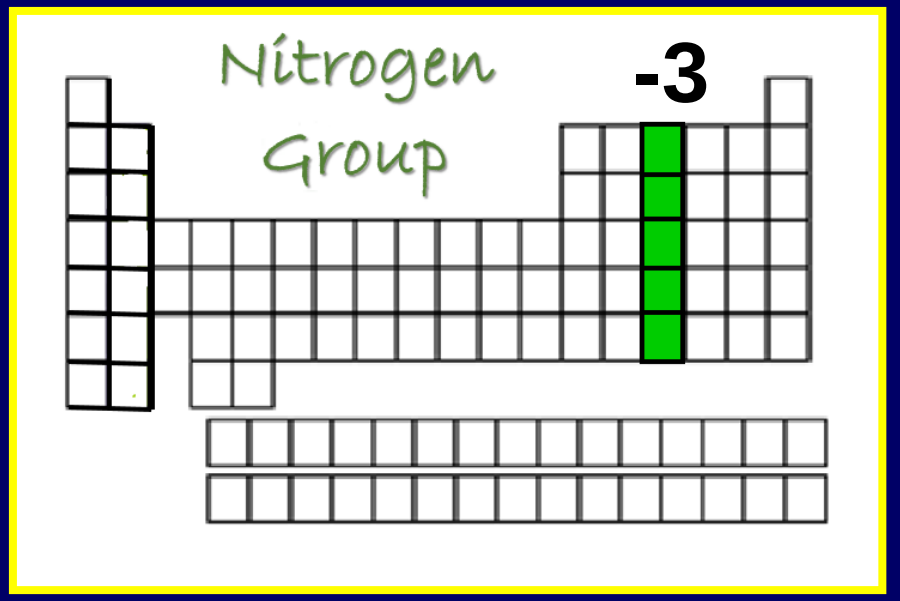


Nonmetals → Negative Ions

Nonmetals gain electrons and develop a negative charge, in the process.

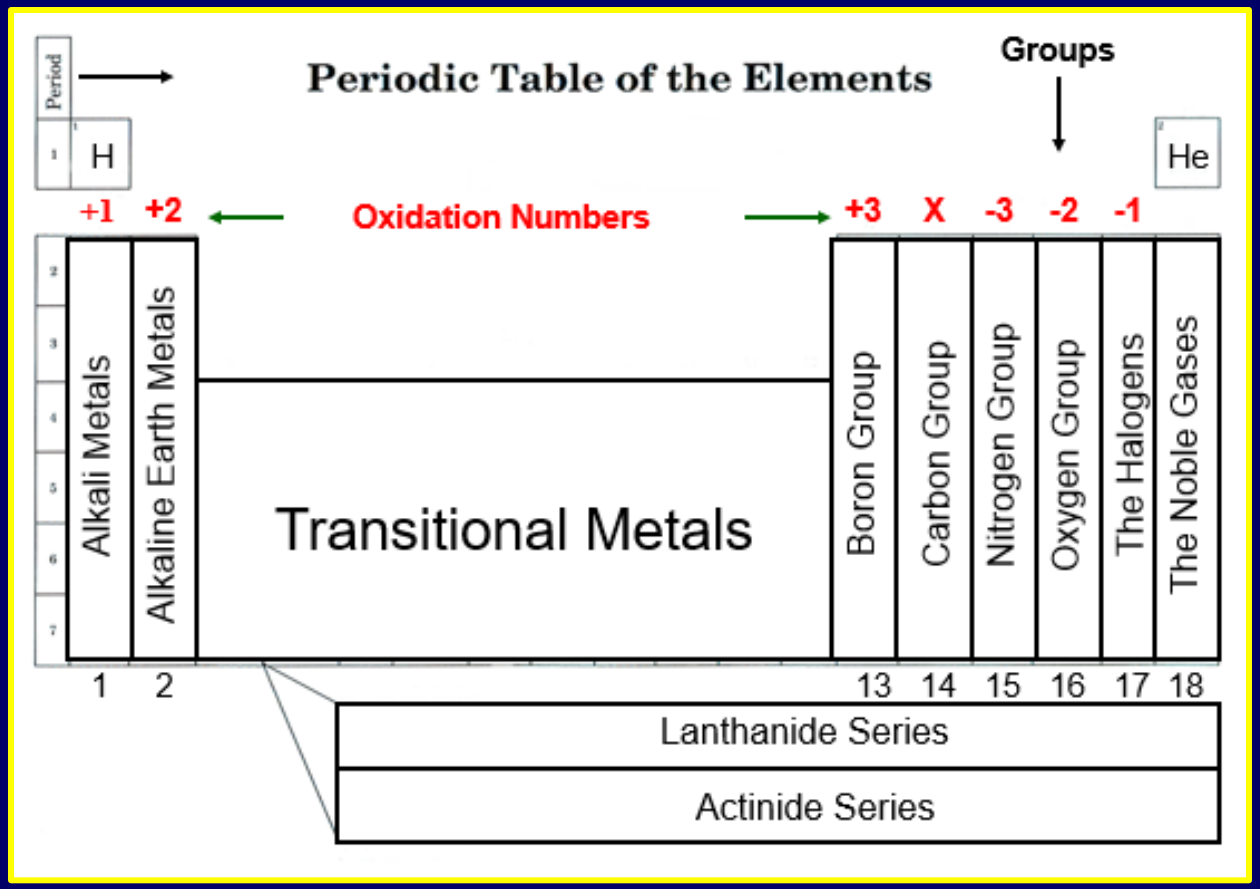






Oxidation Numbers

The specific charge an atom develops is called its oxidation number.



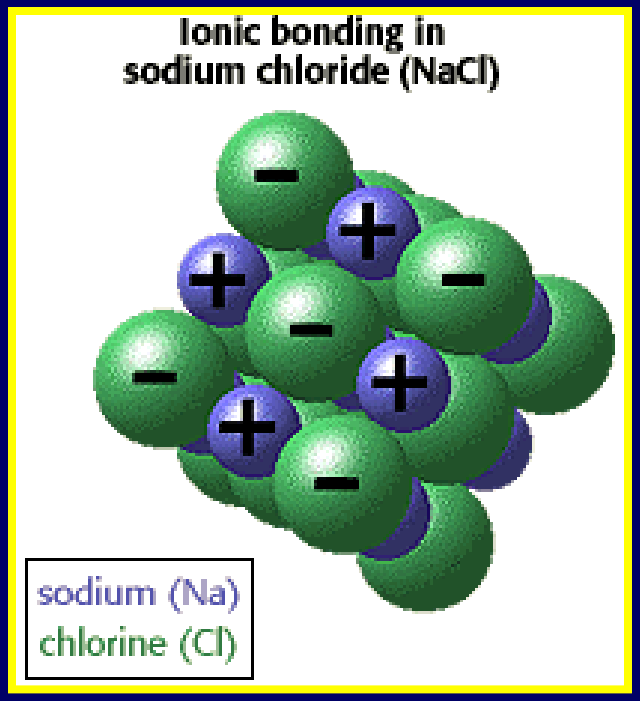
Oxidation Numbers

Oxidation numbers are always written as superscripts after the chemical symbol.

Na^{+1}	Ca^{+2}	B^{+3}
N^{-3}	O^{-2}	F^{-1}
K^{+1}	Mg^{+2}	Al^{+3}

Chemical Formulas

Chemical formulas are used to express they type of atoms and how many atoms are present in a compound.

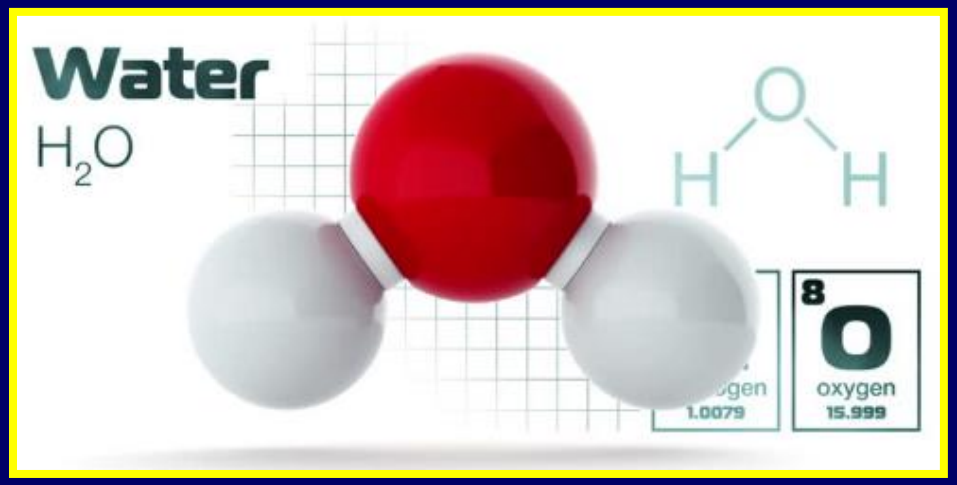


NaCl

1 Na atom

1 Cl atom

Subscripts



Subscripts, written after the element, identify the number of atoms there are of each element.

H_2O

2 Hydrogen atoms

1 Oxygen atom

The number 1 is not written in chemical formulas.

Writing Formulas

Binary ionic compounds have only two types of ions.

NaCl

Na^{+1} Cl^{-1}

Even though the ions carry a charge, the compounds themselves, are neutral.

Therefore, the number of negative ions must equal the number of positive ions.

$1(Na^{+1})$
$1(Cl^{-1})$

Formula Writing Rules

1. Write the symbol and positive oxidation numbered element first (this will always be a metal)

Magnesium Nitride

Mg^{+2}

Formula Writing Rules

2. Write the symbol of the element that has the negative oxidation number (this will always be a non-metal)

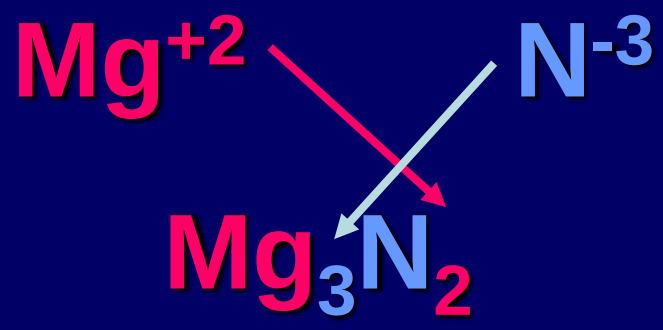
Magnesium Nitride

Mg^{+2} N^{-3}

Formula Writing Rules

3. Write oxidation numbers of each element, without the charge, as the subscript for the other element. (Criss Cross)

Magnesium Nitride



Formula Writing Rules

Once this is done, the compound will have the same amount of positive ions and negative ions.

Magnesium Nitride

Mg^{+2} N^{-3}

Mg_3N_2

3(+2) = + 6 2(-3) = - 6

Remember

There are NO CHARGES in the final formula

$NaCl$

Al_2O_3

Writing Names

1. Write the full name of the positive ion
(This will always be the metal)

NaCl

Sodium

2. Write the root name of the negative ion
(This will always be the non-metal)

NaCl

Sodium Chlor

Writing Names

3. Add the ending ide to the root of the second element

NaCl

Sodium Chloride

Endings for Non-Metals

15 VA	16 VIA	17 VIIA
7 **N** Nitrogen 14.01	8 **O** Oxygen 16.00	9 **F** Fluorine 19.00
15 **P** Phosphorus 30.97	16 **S** Sulfur 32.07	17 **Cl** Chlorine 35.45
		35 **Br** Bromine 79.90
		53 **I** Iodine 126.90

Nitride
Phosphide
Oxide
Sulfide
Fluoride
Chloride
Bromide
Iodide

The End