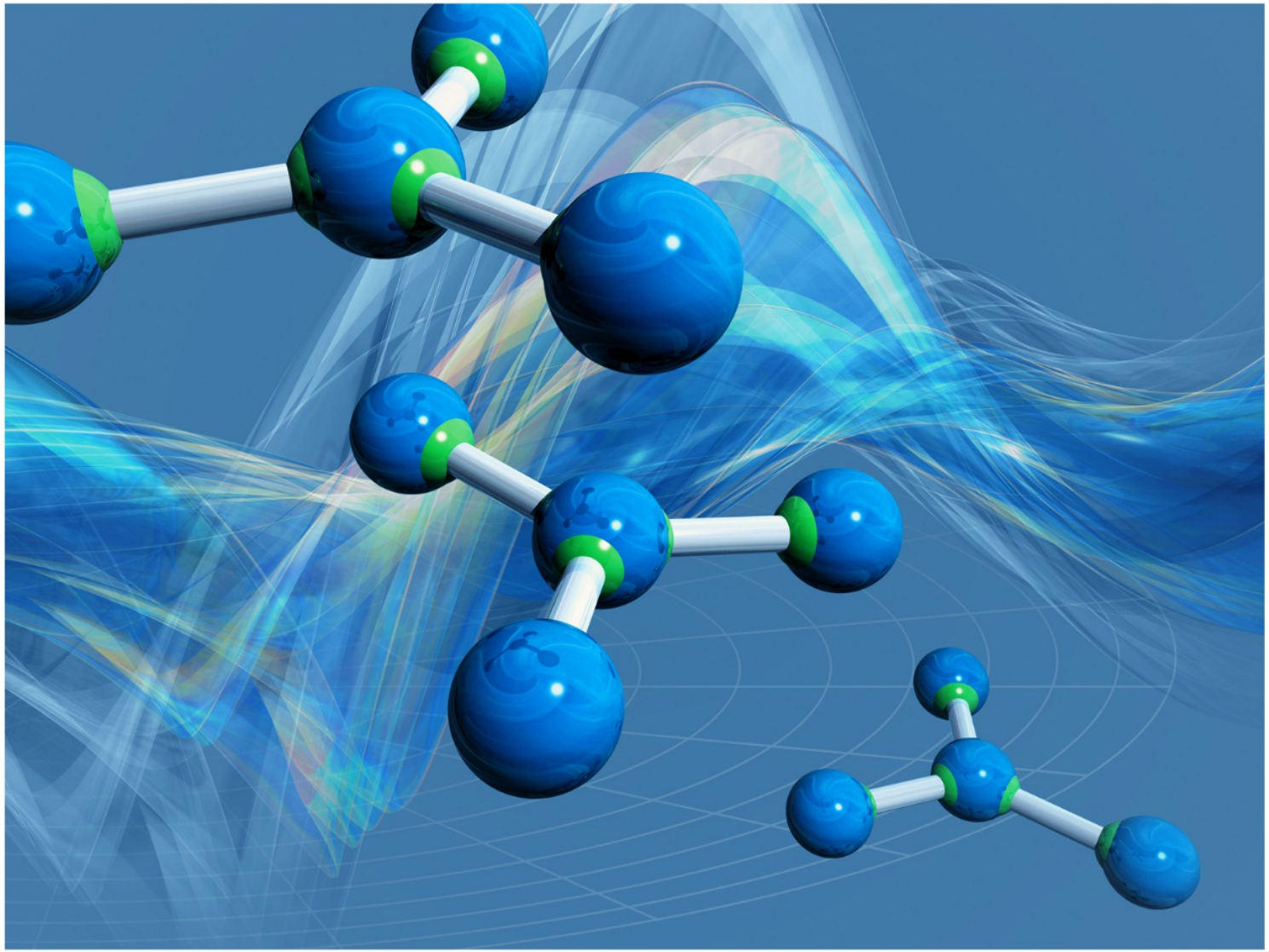
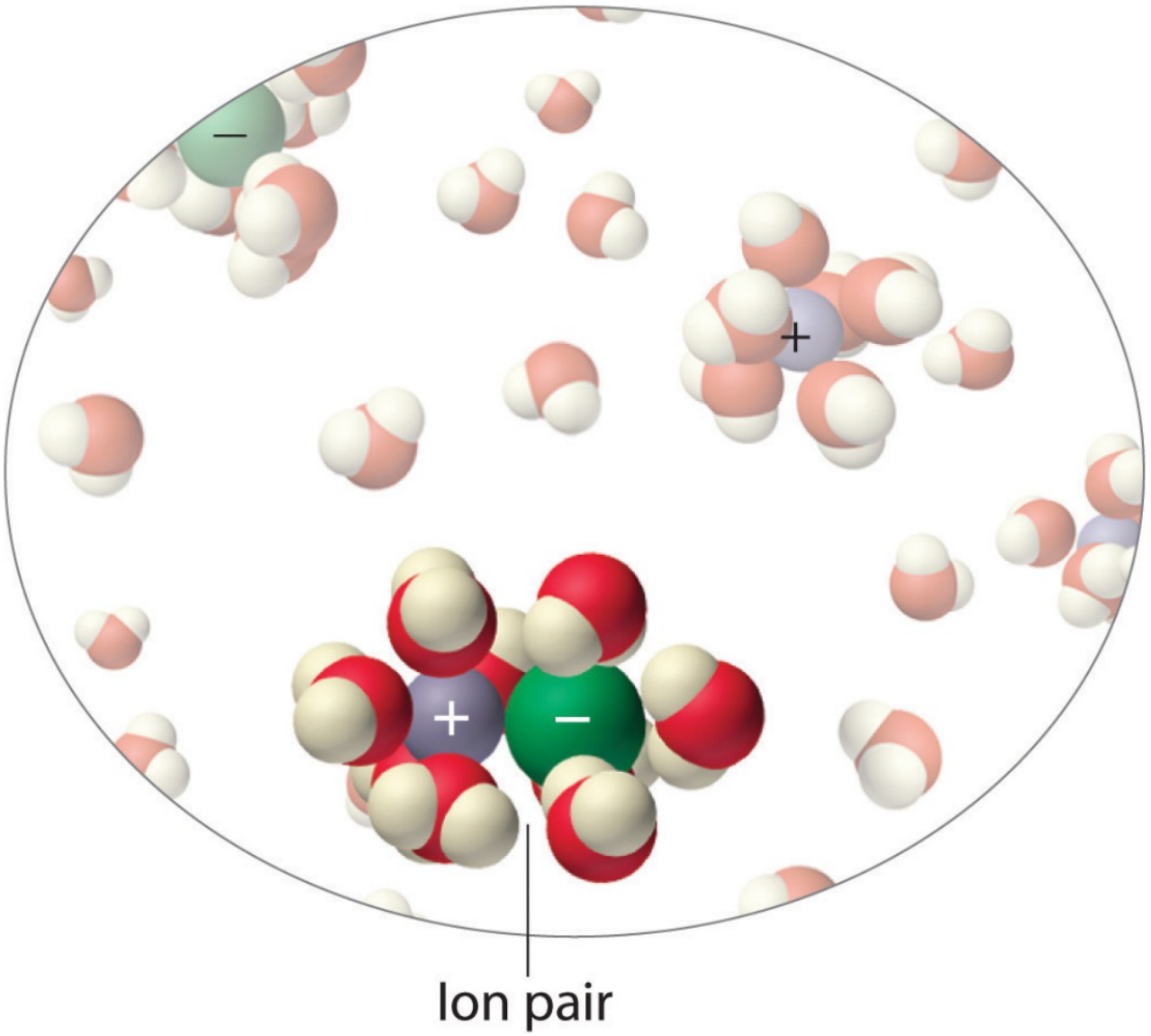
Chemical Bonding



Writing and Naming Chemical Compounds

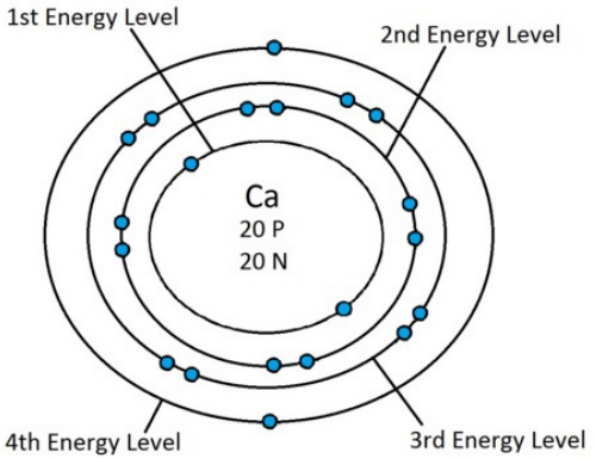
Day 1 Lecture



Writing & Naming Ionic Compounds

Review

- **Energy Levels**: locations of the electrons in the electron cloud
- **Valence Shell Electrons:** Outermost region of the electron cloud (the outer energy level)
  - **Octet Rule**: atoms share or transfer electrons to form bonds in order to have a full and stable outer shell
  - All atoms want 8 valence shell electrons (except the first row of the periodic table; they want 2)



Review (cont.)

- **Oxidation Number**: tells how many electrons will be gained, lost or shared in a bond
  - We show this by a positive (+) or negative (-) number
  - Nitrogen has an oxidation number of -3 because Nitrogen needs to *take* 3 more electrons to fill its valence shell

New Vocabulary

- **Chemical Bond**: force that holds together the atoms in a compound; made by gaining, losing or sharing electrons
  - Atoms do this to fill their valence shell and become stable

- **Ions**: atoms that have an unequal number of protons and electrons
  - Loosing electrons causes positive (+) numbers
  - Gaining electrons causes negative (-) numbers
  - This happens *after* atoms gain or lose electrons
  - Written with a superscript above the atomic symbol
    - Ex: Na^{+1}, Cl^{-1}, P^{-3}, Mg^{+2}

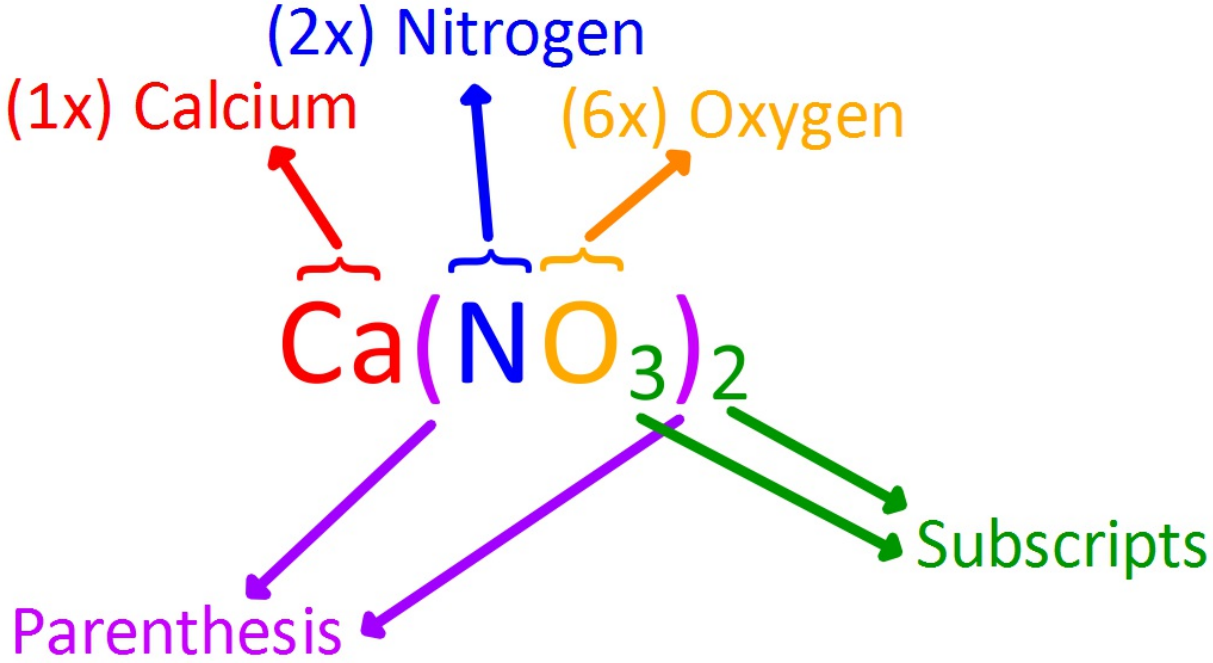
Chemical Formulas

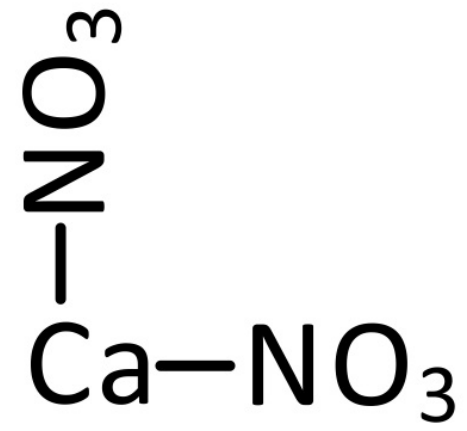
- **Chemical Formula**: tells what elements a compound contains and the ratio of differing elements; written as chemical shorthand (remember scientists are *lazy*)
  - **Subscript:** tells us how many atoms of that element are in the compound

Example:

$Ca(NO_3)_2$

No



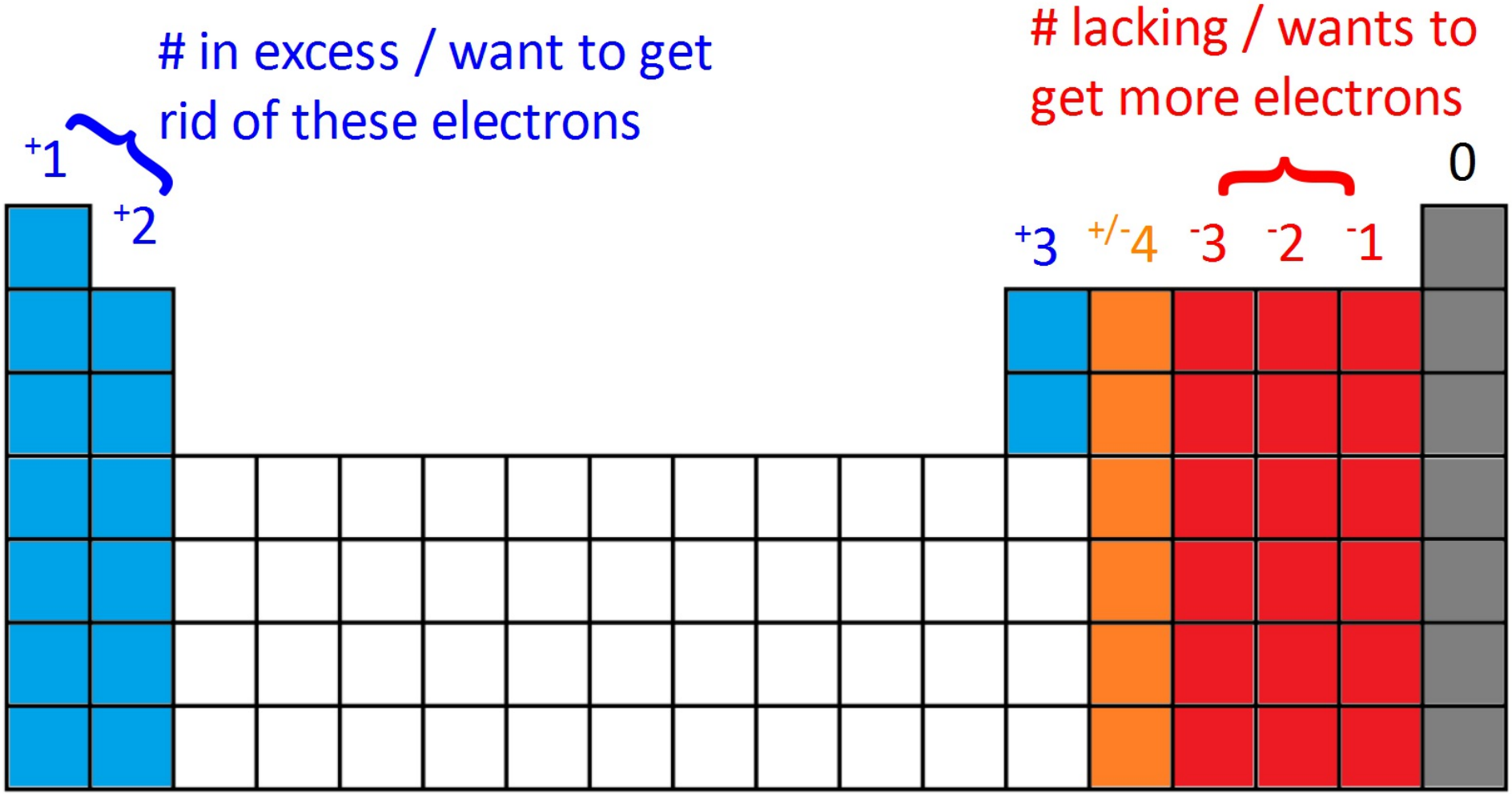


In the blank, write the number of atoms of each element.

Independent Problems

H_2SO_4	H: 2 S: 1 O: 4
$CaCO_3$	Ca: 1 C: 1 O: 3
KI	K: 1 I: 1
$Ca(OH)_2$	Ca: 1 O: 2 H: 2

Remember the Oxidation Numbers?

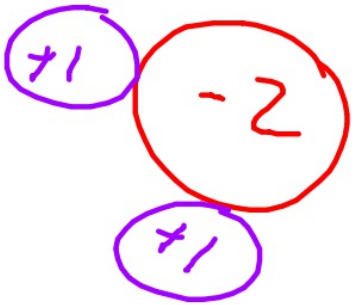


The Oxidation Numbers help you figure out the Ratio

Oxidation Numbers & Subscripts

- The subscripts are determined by the oxidation numbers

Li^{+1} S^{-2}



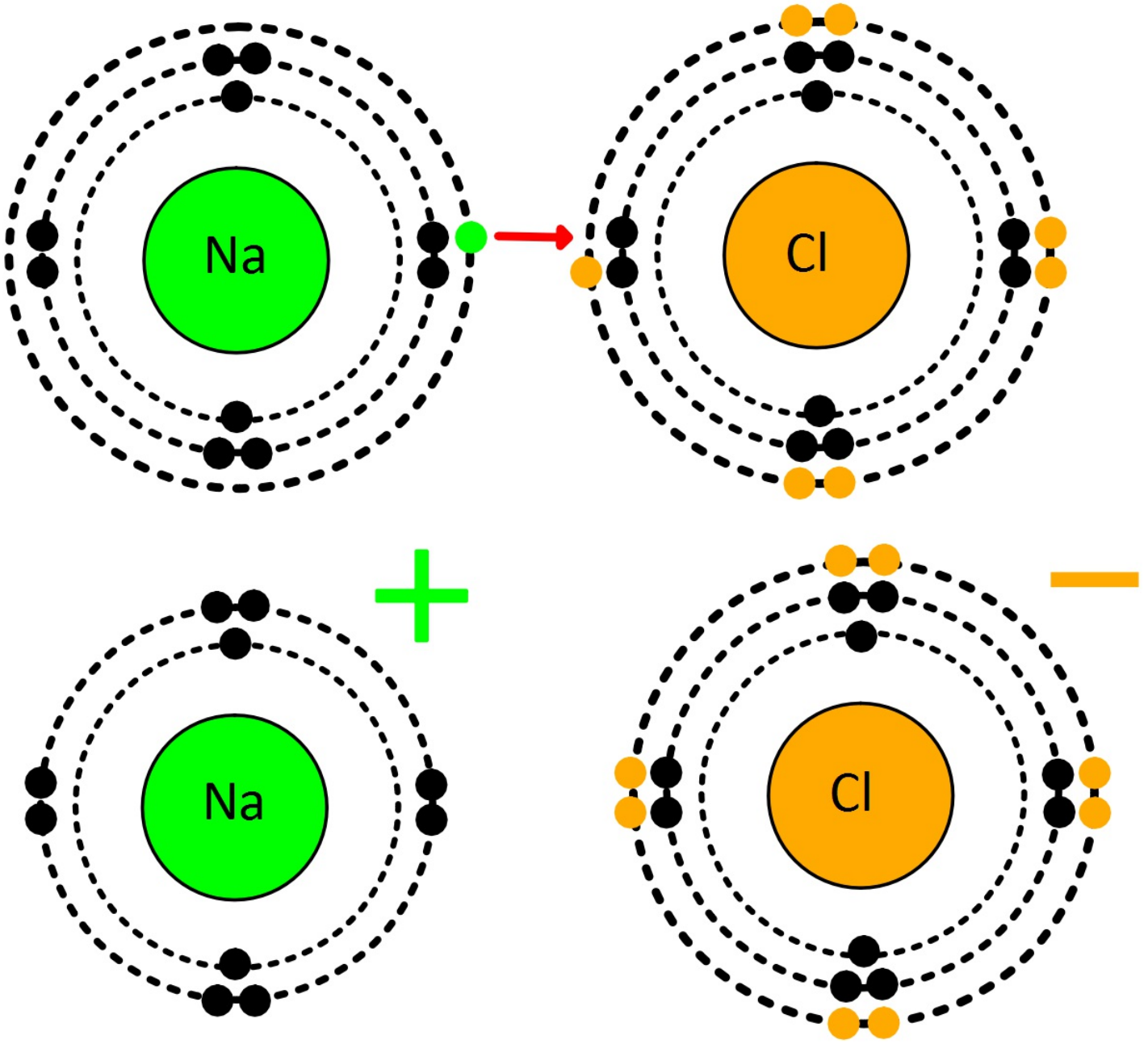
becomes...

Li_2S

Ionic Bonding

- The gaining or losing of electrons
- Usually formed by bonding between *METALS* and *NONMETALS*
- Force of attraction between the opposite charges of the ions

Let's draw bohr diagrams to model an ionic bond



Let's draw Lewis dot diagrams of the same bond

Solid form

Na-Cl

In water
(aqueous solution)

Na^+ 

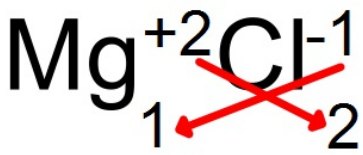
$Na^+ Cl^-$

Rules: WRITING Ionic Formulas

1. Write down the symbol and the oxidation # for each element; metal first, then nonmetal

$$Mg^{+2} \quad Cl^{-1}$$

2. Criss-cross the oxidation numbers to get the correct subscript
3. Leave off the signs (+ or -)



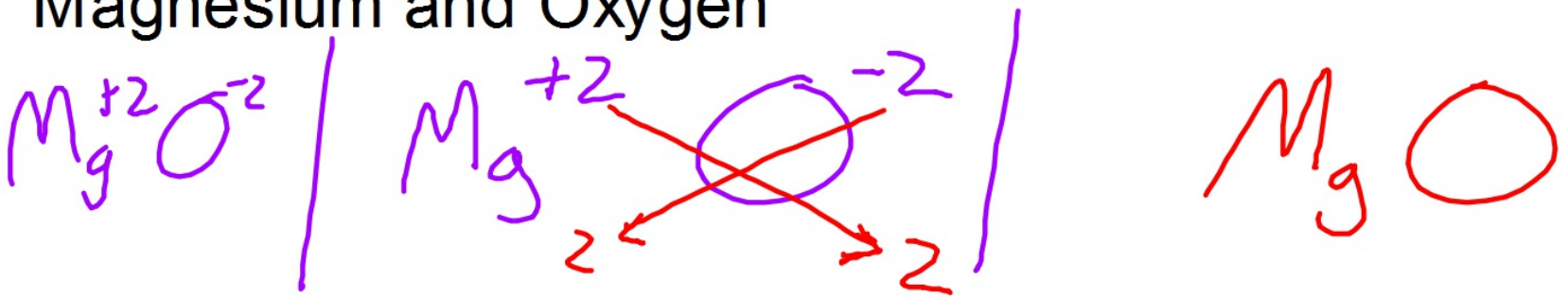
Rules: WRITING Ionic Formulas

4. Drop out the "1's"
5. Cancel out the numbers if they are the same
6. Simplify the numbers (ex: both divisible by 2)

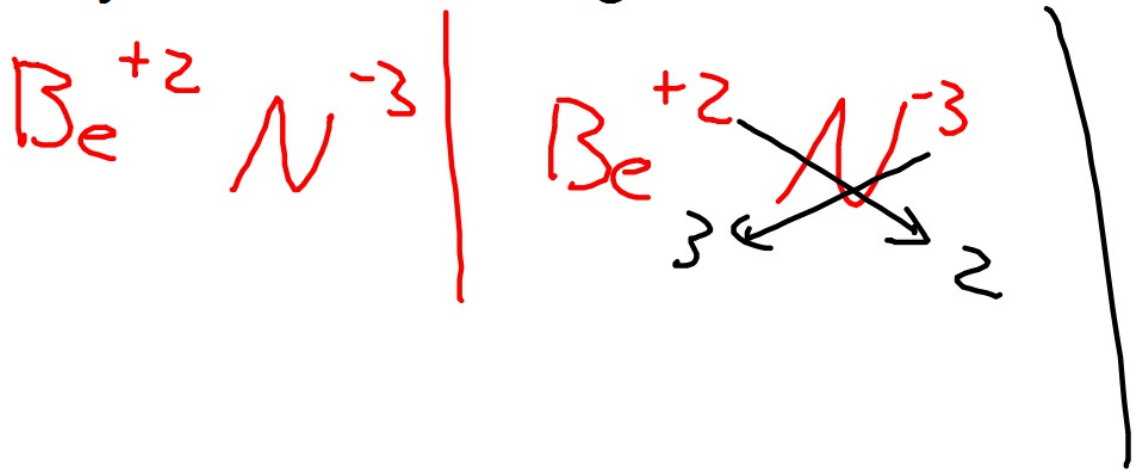
$MgCl_2$

Group Practice

Magnesium and Oxygen



Beryllium and Nitrogen



Independent Practice

Fill in the the chart on your paper.

Fill in the chart below to determine the formula for the compounds.

Element	Symbol & Oxidation #	Element	Symbol & Oxidation #	FORMULA
Aluminum		Chlorine		
Magnesium	$+2$	Bromine	-1	$MgBr_2$
Sodium		Oxygen		
Lithium	$+1$	Oxygen	-2	Li_2O
Calcium	$+2$	Phosphorus	-3	Ca_3P_2
Carbon		Chlorine		
Beryllium		Sulfur		
Sodium	Na^{+1}	Fluorine	F^{-1}	NaF
Aluminum		Oxygen		

Rules: NAMING Ionic Compounds

Metal & Non-metal

Example: KBr

1. Identify the metal & write the name of the metal first.
2. Identify the non-metal & the name of the non-metal changing the ending to "ide"

Potassium Brom~~ine~~

becomes...

Potassium Bromide

Independent Practice

Fill in the chart on you paper by naming the following Ionic Compounds.

a. $CaBr_2$ Calcium Bromide

b. NaF Sodium Flouride

c. $BaBr_2$ Barium Bromide

d. Li_3N Lithium Nitride