Name: KEY Date: _____ Period: _____

AcCounting for Atoms

Ah! Numbers! So many numbers! What does it all mean?

Just like in mathematics where there is an order of operations (BEDMAS), there is a method to correctly count the number of atoms in a chemical expression. Read on to see how this works!

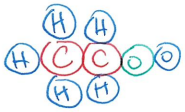
Chemical symbol	Meaning	Composition
H_2O	One molecule of water: 	Two H atoms and one O atom
$2H_2O$	Two molecules of water: 	Four H atoms and two O atoms
H_2O_2	One molecule of hydrogen peroxide: 	Two H atoms and two O atoms

Level 1: Elements and Subscripts

- Every element symbol has a capital letter. Many elements have one or more lowercase letters after the capital letter.
- A subscript on the right of an element indicates the number of atoms of that element. If there is no subscript, there is only one of that element.

For each of the following:

a) Colour each element a different colour
b) Draw the compound, showing the atoms
c) Write the total number of atoms of each element

O_2 O: 2 	$MgCl_2$ Mg: 1 Cl: 2 	$NaNO_3$ Na: 1 N: 1 O: 3 
Co_2S_3 Co: 2 S: 3 	PF_4 P: 1 F: 4 	CH_3CH_2OH C: 2 H: 6 O: 1 

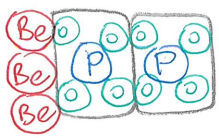
Write how many of each atom there is in each compound.

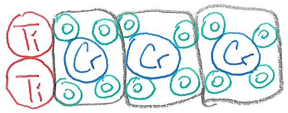
Compound	Counting	Compound	Counting	Compound	Counting
$CaCO_3$	Ca: 1 C: 1 O: 3	Be_3N_2	Be: 3 N: 2	CCl_4	C: 1 Cl: 4
H_2O	H: 2 O: 1	NaOH	Na: 1 O: 1 H: 1	$MgBr_2$	Mg: 1 Br: 2

Level 2: Polyatomic Ions, Brackets, and Subscripts

- For ionic compounds containing polyatomic ions, a subscript on the right of a bracket indicates how many of that polyatomic ion are in the compound.

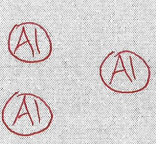
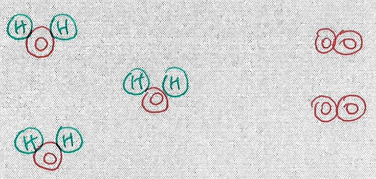
Draw the following ionic compounds and write how many of each atom is present.

$Be_3(PO_4)_2$ Be: 3 P: 2 O: 8 	$Mg(OH)_2$ Mg: 1 O: 2 H: 2 

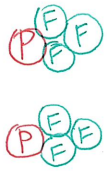
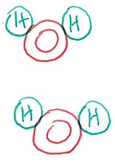
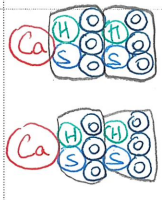
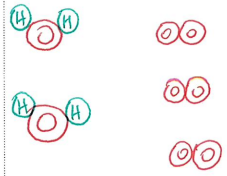
$Ti_2(CrO_4)_3$	$Ni(HS)_3$
 Ti:2 Cr:3 O:12	 Ni:1 H:3 S:3

Write how many of each atom there is in each compound.

Compound	Counting	Compound	Counting
$Cr(CN)_3$	Cr:1 N:3 C:3	$(NH_4)_3PO_4$	N:3 P:1 H:12 O:4
$Sc_2(Cr_2O_7)_3$	Sc:2 O:21 Cr:6	$Mg(CH_3COO)_2$	Mg:1 H:6 C:4 O:4

LEVEL 3: COEFFICIENTS AND ADDITION		
• A coefficient in front of a compound or element indicates how many of that compound or element.	3Al  Al:3	$2MgCl_2$  Mg:2 Cl:4
• A plus sign means you are adding those two elements/compounds things together. Count the atoms separately then add any identical elements together.	$3H_2O + 2O_2$  H:6 O:7	

For each of the following chemical expressions, write the total number of each atom that is present.

Chemical(s)	Counting	Chemical(s)	Counting
$2PF_3$	 P:2 F:6	$2H_2O$	 H:4 O:2
$2S_3$	 S:6	$2Ca(HSO_3)_2$	 Ca:2 H:4 S:4 O:12
$3Mg(OH)_2$	 Mg:3 O:6 H:6	$2H_2O + 3O_2$	 H:4 O:8