Name: _____

Period: _____

Balancing Chemical Reactions

We balance chemical reactions for mass must be conserved.

A balanced chemical reaction fulfills the Law of Conservation of Mass because it shows that the mass before equals the mass afterwards.

Don't Change Subscripts!

H_2O and H_3O are NOT the same!

H_2O - water (you can drink it).

H_3O - hydronium (don't drink it).

Hydronium is a strong acid!

A compound exists in only one way. Changing the subscript changes the compound. If you need more atoms, you must add molecules by changing the coefficient.

Coefficients Multiply!

The coefficient tells the number of molecules.

Coefficient → $2Al_2O_3 = Al_2O_3 + Al_2O_3$ *Expanded*

So, $2Al_2O_3 = Al_4O_6$ ← *Reaction Notation*

Knowing how to write "Reaction Notation" will make balancing chemical reactions easier.

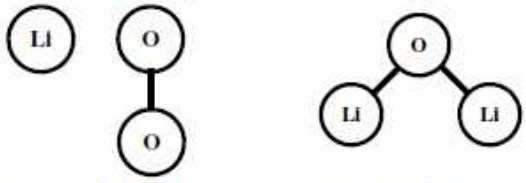
Number of Atoms Must be Equal on Both Sides

The number of atoms of each element must be the same on both sides.

Unbalanced Reaction

REACTANTS **PRODUCTS**

$Li + O_2 \longrightarrow Li_2O$

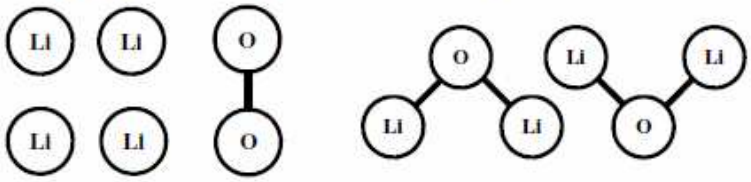


Not enough Lithiums *Not enough Oxygens*

Balanced Reaction

REACTANTS **PRODUCTS**

$4Li + O_2 \longrightarrow 2Li_2O$



$Li_2 + O_2$ Li_2O_2

Be Patient

When balancing some chemical equations you may have to change the coefficients several times. When one element becomes balanced, another may become unbalanced. Be patient and eventually you will succeed.

NOT BALANCED
Oxygens are not balanced. Add another water molecule.

$H_2 + O_2 \rightarrow H_2O$

STILL NOT BALANCED
Hydrogens are not balanced. Add another Hydrogen molecule.

$H_2 + O_2 \rightarrow 2H_2O$

H_4O_2 ←

Write the Reaction Notation underneath each molecule as you change coefficients. With this notation it is easy to see if the equation is balanced.

BALANCED
Equal number of Hydrogens and Oxygens on both sides.

$2H_2 + O_2 \rightarrow 2H_2O$

H_4 H_4O_2

balanced *balanced*

Expand out these compounds.

$3MgCl_2$ = _____

$4H_2$ = _____

$2Al_2O_3$ = _____

BeO = _____

$5Li_2O$ = _____

Write the following in reaction notation.

$3MgCl_2$ = _____ $2K_3N$ = _____

$4H_2$ = _____ $6Ca$ = _____

$2Al_2O_3$ = _____ $8NaCl$ = _____

BeO = _____ $7Fe_2O_3$ = _____

$5Li_2O$ = _____ $2Ca(SO_4)$ = _____

Why do we balance chemical reactions?

$Be + O_2 \rightarrow BeO$

O

Is this reaction balanced correctly? Why or why not?

Write the coefficient to equal the correct number of atoms.

____ $Be_2Br = Be_6Br_3$

____ $O_2 = O_4$

____ $Li_3N = Li_{12}N_4$

____ $CO_2 = C_3O_6$

____ $NaCl = Na_5Cl_5$

____ $Al_2O_3 = Al_{12}O_{18}$

____ $BeI_2 = BeI_2$

____ $H_2O = H_{16}O_8$

____ $CO = C_4O_4$

____ $Mg_3N_2 = Mg_6N_4$

____ $Ca(CO_3) = Ca_3C_3O_9$

____ $Be(NO_3)_2 = Be_4N_8O_{24}$

Find the molecular masses of the following:

Al_2 =

Li_3N =

Mg_3N_2 =

If 11 grams of Sodium Sulfate reacts with 17 grams of Barium Chloride and produces 19 grams of table salt.

how much $Ba(SO_4)$ is produced?

$Na_2(SO_4) + BaCl_2 \rightarrow Ba(SO_4) + 2NaCl$

(11g) (17g) (?g) (19g)

Balance the following chemical reactions.
(Write reaction notation beneath the reactions to help yourself.)

____ZnS + ____$O_2 \rightarrow$ ____ZnO + ____SO_2

____Be + ____$O_2 \rightarrow$ ____BeO

____Fe_2O_3 + ____$C \rightarrow$ ____Fe + ____CO

____Li_2O + ____$MgCl_2 \rightarrow$ ____$LiCl$ + ____MgO

____$Na_2(SO_4)$ + ____$BaCl_2 \rightarrow$ ____$Ba(SO_4)$ + ____$NaCl$