Name: _____

Period: _____

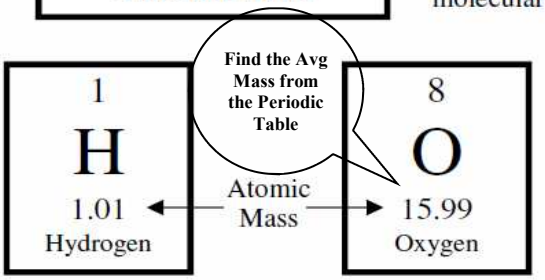
The Law of Conservation of Mass

In any closed reaction mass is never created or destroyed only transformed.

MASS MUST BE CONSERVED!

Molecular Mass

The molecular mass tells you how heavy a molecule is. To find the molecular mass add up the atomic masses of the individual atoms.



Example: Find the molecular mass of water.

H_2O = 2 H + 1 O
= (2 x 1.01) + (1 x 15.99)
= 2.02 + 15.99
= **18.01**

2nd method:
1.01
+ 1.01
+ 15.99
18.01

Open vs. Closed Reactions

Only a closed reaction can prove the Law of Conservation of Mass, since you can still measure the mass.

Closed System

Before: *54 grams*

Products are trapped.

Mass is not lost.

After: *54 grams*

Open System

Before: *54 grams*

Products can escape.

Mass *seems* to be lost.

After: *51 grams*

Actually, it just escaped!

Mass Must Be Conserved

The mass of the reactants must equal the mass of the products.
SO, the number of reacting atoms must equal the number of product atoms.

This is the Law of Conservation of Matter!

NOT BALANCED

$H_2 + O_2 \rightarrow H_2O$

(2 x 1.01) + (2 x 15.99)
2.02 + 31.98
34 before

(2 x 1.01) + (1 x 15.99)
2.02 + 15.99
18.01 after

The 2 sides have to have the same Molecular Mass

UNEQUAL MASS, SO NOT BALANCED

When both side are equal, the formula is balanced

BALANCED

$2H_2 + O_2 \rightarrow 2H_2O$

(4 x 1.01) + (2 x 15.99)
4.04 + 31.98
36.02 before

(4 x 1.01) + (2 x 15.99)
4.04 + 31.98
36.02 after

EQUAL MASS, SO BALANCED

Example 1:

$6Na + N_2 \rightarrow 2Na_3N$

g g ? g

How much Sodium Nitride was created?
Mass must be conserved so the reactants must equal the products, so:

g + g = ?g
g = ?g

Check with Mr. Neddo to see if you are correct

Example 2:

$MgCl_2 + Li_2O \rightarrow MgO + 2LiCl$

g g g ? g

How much Lithium Chloride was created?
Since mass must be conserved, the reactants must equal the products. So:

g + g = g + ?g
g = g + ?g
g - g = ?g
g = g of LiCl

So, 20 g of LiCl was created in the reaction!

Check with Mr. Neddo to see if you are correct

1. Closed System	A. In a closed reaction mass cannot be lost.
2. The Law of Conservation of Mass	B. When the reactants equal the products.
3. Open System	C. When the reaction is closed and gases can't escape.
4. Atomic Mass	D. How heavy a compound or molecule is.
5. Molecular Mass	E. When gases aren't caught by the experimental setup.
6. Balanced Reaction	F. The decimal numbers on the periodic table.

Find the atomic masses for the following elements

A. Sodium = _____ E. Gold = _____

B. Chlorine = _____ F. Hydrogen = _____

C. Iron = _____ G. Neon = _____

D. Mercury = _____ H. Lead = _____

Find the molecular mass of the following compounds.

N_2

CaF_2

CO_2

Na_2SO_3

Open or closed reaction?

Will you be able to prove the Law of Conservation of Mass with this setup? Why or why not?

Will the mass of his products be greater than, less than, or equal to his reactants?

Why?

$4K + O_2 \rightarrow 2K_2O$
25g + 5 g ? g

If 25 g of Potassium is reacted with 5 g of Oxygen, how much Potassium Oxide is produced?

$2Mg + O_2 \rightarrow 2MgO$
23g + ? g 38 g

If 23 g of Magnesium is reacted with Oxygen to produce 38 g of Magnesium Oxide, how much Oxygen was used in the reaction?

$2KCl + Li_2O \rightarrow K_2O + 2LiCl$
21g + 4 g ? g 12 g

Using the numbers given, find how much K_2O is produced in the reaction.

How many total molecules are there?

____ $2H_2O$ ____ $5Be_2Br$ ____ $8CO_2$

____ 3NaCl ____ O_2 ____ MgS

$Li_2O + MgCl_2 \rightarrow 2LiCl + MgO$

Name the first reactant: _____

Name the second product: _____

How many Magnesiums on the product side? _____

How many total atoms are there?

____ $2H_2O$ ____ $2Be_2Br$ ____ $7CO_2$

____ 6NaCl ____ $4O_2$ ____ 2MgS

$2K_3N + 3CaCrO_4 \rightarrow Ca_3N_2 + 3K_2CrO_4$

Circle the second reactant. *Underline* the first product.

How many Nitrogen atoms on the reactant side: _____

How many Calcium atoms on the product side? _____

$2AlCl_3 + 3Na_2CO_3 \rightarrow Al_2(CO_3)_3 + 6NaCl$

Circle the first product. *Underline* the first reactant.

How many Sodium atoms on the product side?_____

How many $AlCl_3$ molecules on the reactant side? _____

$Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

Circle and *Name* the first reactant: _____

How many total atoms on the product side:_____

How many total molecules on the reactant side: _____