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Introduction to Balancing Equations

<u>The Law of Conservations of Mass</u> tells us that the total amount of matter is neither created nor destroyed during any physical or chemical change. Therefore, the mass stays the same before and after a chemical reaction.

Chemical equations demonstrate this principle because they are always balanced. The total mass of the reactants must equal the total mass of the products. You can check to see if an equation is balanced by counting up the number of atoms- it has to be the same on each side of the equation.

To balance an equation, you can adjust the coefficients until there are the same number of each type of atom on both sides. You are never allowed to change the smaller numbers that make up the chemical formulas.
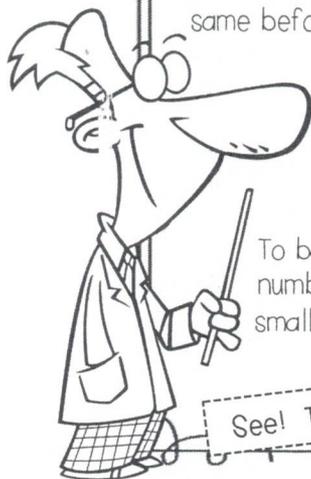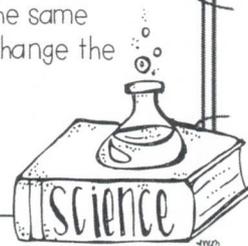
See! This is balanced!

$$N_2 \ + \ 3\,F_2 \ \rightarrow \ 2\,NF_3$$

2 nitrogens and 6 fluorines on this side...

and 2 nitrogens and 6 fluorines on this side!

Practice

Balance each equation using the law of conservation of mass. There is a chart above each problem to help you. Use the chart to make sure that you have the same number of atoms on each side.

First- Count up the number of atoms you currently have. Write that number in the chart for both sides of the equation.

Second- If the numbers don't match, try adjusting the coefficients one at at time. Make sure to change the number in the chart.

Remember- you can't change the formulas!

You should do this in pencil!

1.

Reactants			Products		
H	2	4	H	~~2~~	4
O	2	2	O		2

$$\underline{\quad}\ H_2 \ + \ \underline{\quad}\ O_2 \ \rightarrow \ \underline{\quad}\ H_2O$$

2.

Reactants			Products		
P		4	P	~~2~~	4
O	~~2~~	6	O	3	6

$$\underline{\quad}\ P_4 \ + \ \underline{\quad}\ O_2 \ \rightarrow \ \underline{2}\ P_2O_3$$

3.

Reactants	
N	×2 2
H	×6 6

Products	
N	×2
H	3 6

___ N₂ + __3__ H₂ → __2__ NH₃

4.

Reactants	
K	×2
Cl	2

Products	
K	×2
Cl	×2

__2__ K + ___ Cl₂ → __2__ KCl

5.

Reactants	
C	1
F	4 ×4
Br	2 ×4

Products	
C	1
F	×2 4
Br	4 ×4

___ CF₄ + __2__ Br₂ → __2__ CBr₄ + __2__ F₂

6.

Reactants	
Ga	1
F	×3 3
Cs	×3 3

Products	
Ga	1
F	×3 3
Cs	×3 3

___ GaF₃ + __3__ Cs → __3__ CsF + ___ Ga

7.

Reactants	
Ag	×
N	×2
O	3 ×6
Cu	1

Products	
Ag	×2
N	2
O	3
Cu	1

__2__ AgNO₃ + ___ Cu → ___ Cu(NO₃)₂ + ___ Ag

8.

Reactants	
Ba	1
S	1
Pt	1
F	2

Products	
Ba	1
S	1
Pt	1
F	2

___ BaS + ___ PtF₂ → ___ BaF₂ + ___ PtS

9.

Reactants	
Na	3
P	1
O	5
K	1
H	1

Products	
Na	×3
P	1
O	5
K	3
H	1

___ Na₃PO₄ + ___ KOH → __3__ NaOH + ___ K₃PO₄

10.

Reactants	
Mg	
F	
Li	
C	
O	

Products	
Mg	
F	
Li	
C	
O	

___ MgF₂ + ___ Li₂CO₃ → ___ MgCO₃ + ___ LiF

Balancing Equations: Counting Atoms
Guided Practice

The Law of Conservation of Mass states that matter cannot be created nor destroyed, only rearranged. This means that all chemical equations must be balanced. To begin solving the equations on page , start first by counting the atoms on each side of the chemical equation. Then make the necessary changes to balance the equation.
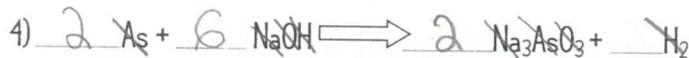
1) ____ CH_4 + _2_ O_2 $\Longrightarrow$ ____ CO_2 + _2_ H_2O

ELEMENT	# REACTANTS	# PRODUCTS
CARBON	1	1
HYDROGEN	4	4
OXYGEN	4	4

2) ____ N_2 + _3_ H_2 $\Longrightarrow$ _2_ NH_3

ELEMENT	# REACTANTS	# PRODUCTS
NITROGEN	2	2
HYDROGEN	6	6

3) _4_ Al + _3_ O_2 $\Longrightarrow$ _2_ Al_2O_3

ELEMENT	# REACTANTS	# PRODUCTS
ALUMINUM	4	4
OXYGEN	6	6

4) _2_ As + _6_ $NaOH$ $\Longrightarrow$ _2_ Na_3AsO_3 + ____ H_2

(IDK)

ELEMENT	# REACTANTS	# PRODUCTS
ARSENIC	2	2
SODIUM	6	6
OXYGEN	6	6
HYDROGEN	6	4