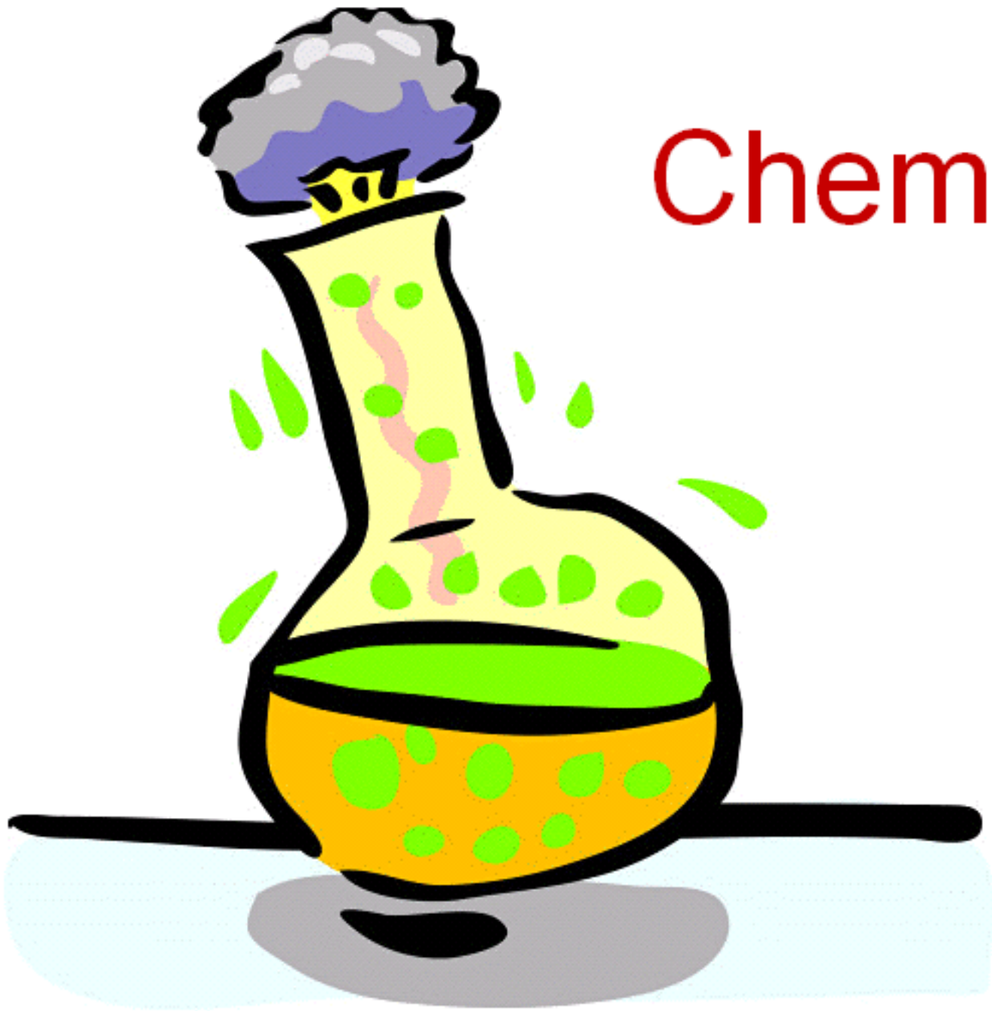

Chemical Equations

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This flipchart follows the Glencoe Science textbook Tennessee Science Grade 8 and supports the following State of Tennessee standards:

SPI 0807.9.8 Interpret the results of an investigation to determine whether a physical or chemical change has occurred.

SPI 0807.9.10 Identify the reactants and products of a chemical reaction.

SPI 0807.9.11 Recognize that in a chemical reaction, the mass of the reactants is equal to the mass of the products (Law of Conservation of Mass).

Let'sreview physical and chemical changes

physical change

dissolving sugar in water

crushing a can

cutting bread

melting

freezing

chemical change

baking bread

nail rusting

leaves changing color

scrambling eggs

burning

A chemical equation shows us the chemical reaction that has occurred.

- A chemical equation consists of reactants and products and tells us how much of each substance has been used.
- We can use everday words, chemical names, or molecular formulas to make a chemical equation.

ChemicalEquations

1. Everyday Words:

   baking soda + vinegar ⟶ liquid + gas + solid

2. ChemicalNames:

   sodiumbicarbonate + acetic acid ⟶ water +

   carbon dioxide + sodiumacetate

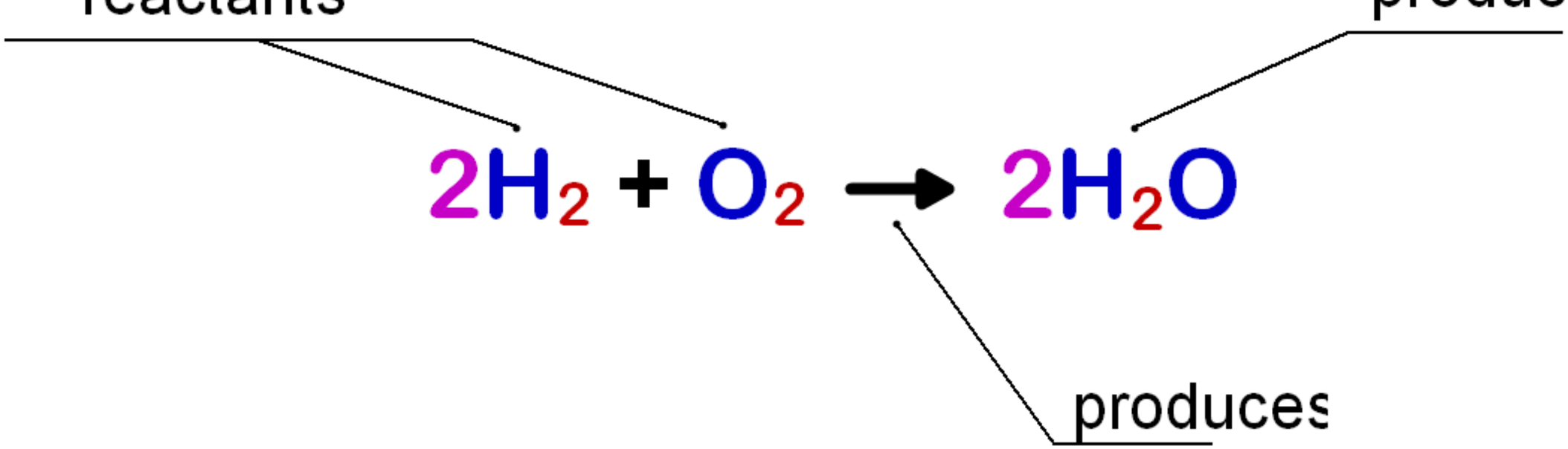
3. Molecular Formulas:

   $NaHCO_3 + C_2H_4O_2 \longrightarrow H_2O + CO_2 +$

$NaC_2H_3O_2$

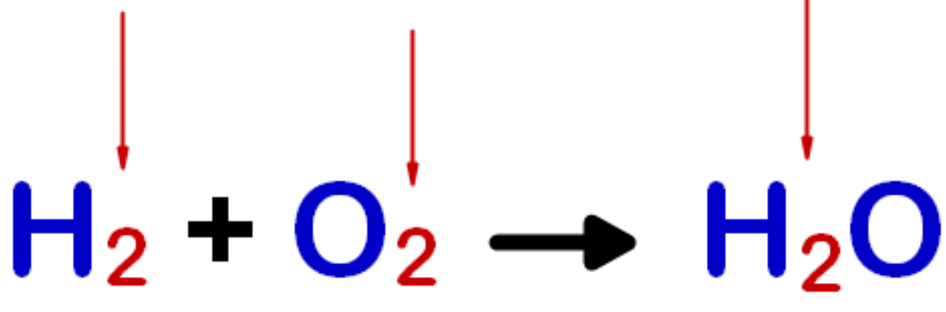
Molecularformulas consistof chemicalsymbolsand subscripts

- When we put theseall togetherto make a chemical equation,we must alsobalanceit by adding coefficients.



Q. What does the subscript tell us?

A. The number of atoms of that element that are in the molecule.



How many hydrogen atoms are in the molecule H_2?
2

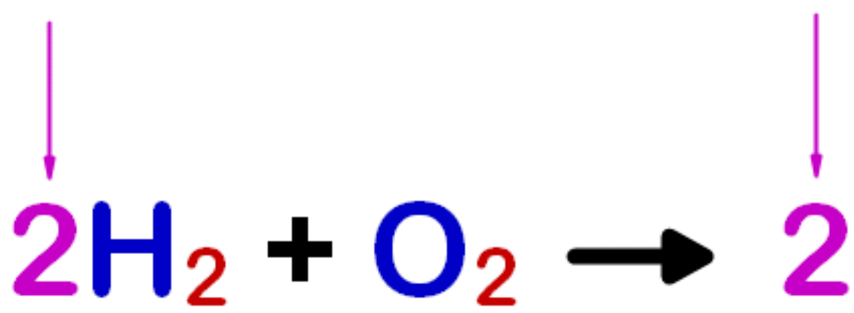
How many oxygen atoms are in the molecule O_2? 2

How many hydrogen atoms are in the molecule H_2O? 2

How many oxygen atoms are in the molecule H_2O? 1

Q. What doesthe coefficient tell us?

A. The number of  of the substance reacting or being produced.



How many molecules of H_2 are there? 2

How many molecules of O_2 are there? 1

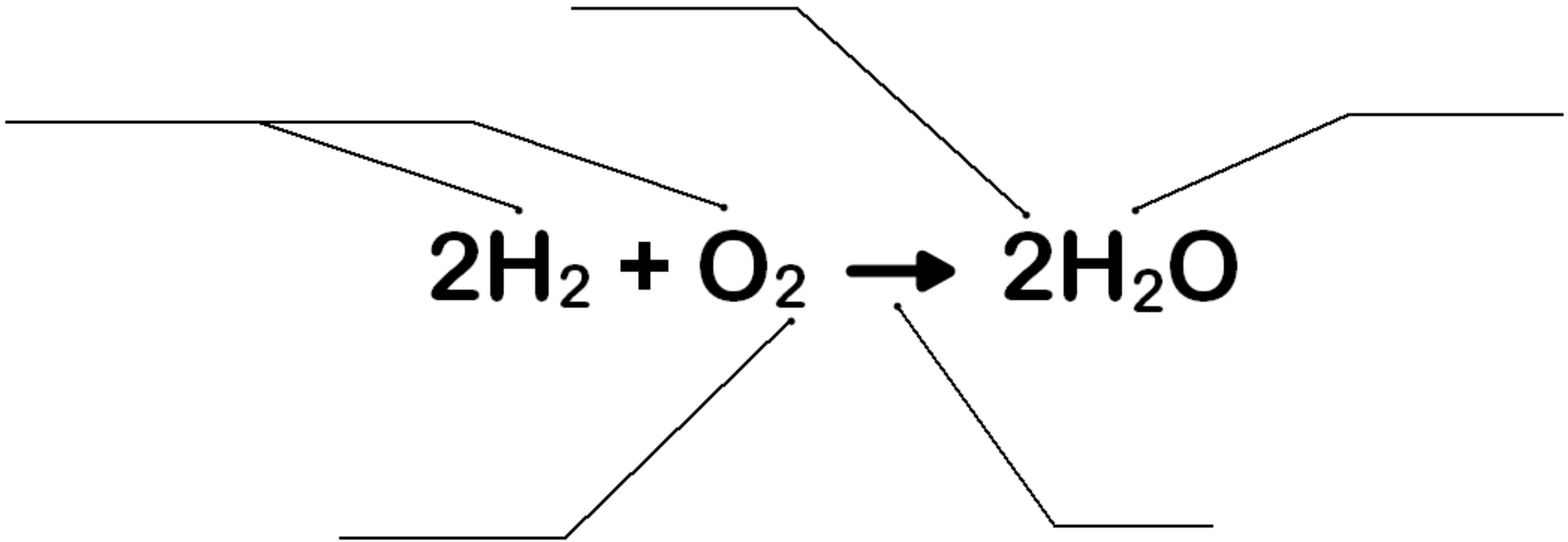
How many molecules of H_2O are there? 2

So. . .

to find the total number of atomsof each element

multiply the coefficient by the subscript.

$2H_2 + O_2 \rightarrow 2H_2O$



reactants

products

produces

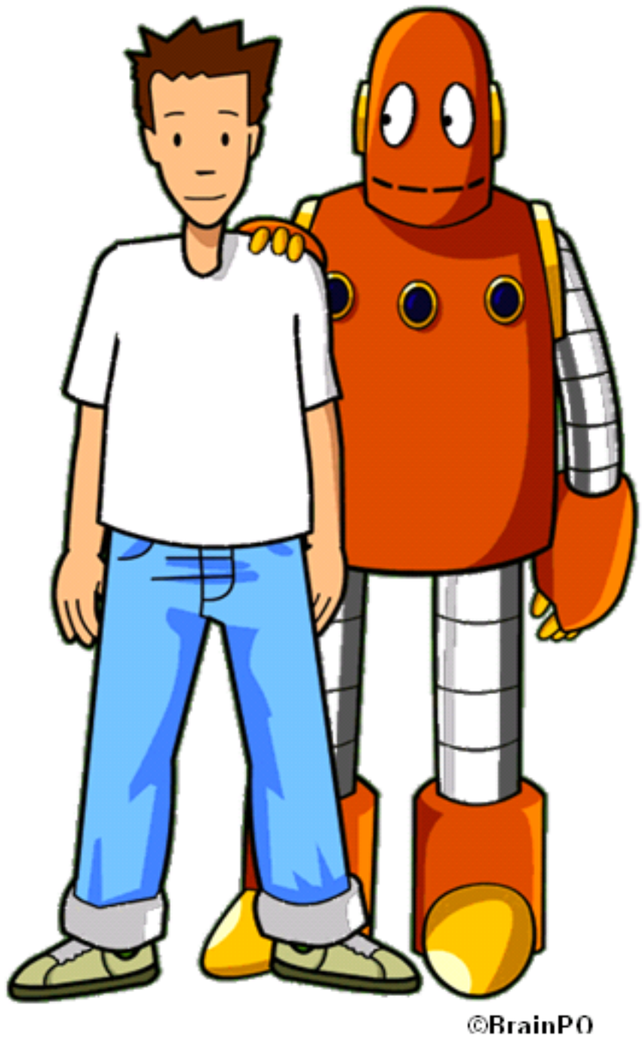
coefficient

subscript

In the 1700s, French chemist Antoine Lavoisier proposed the Law of Conservation of Mass, which states that in a chemical reaction, the mass of the products is equal to the mass of the reactants.

What does this mean?

Let's see what Tim & Moby have to say about the Law of Conservation of Mass!



Now let's start balancing equations

Step 1 List each element that's on each side of the equation. (Remember to list the reactants and products separately.)

$$H_2 + O_2 \rightarrow H_2O$$

H
O

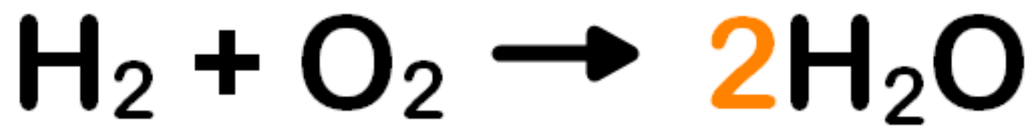
H
O

Step 2: Count the number of atoms of each element on each side of the equation.

$$H_2 + O_2 \rightarrow H_2O$$

H	2	H	2
O	2	O	1

Step3: Pick one elementthat is not balancedand add a coefficient to makeboth sideshave the same numberof atoms. Now multiply that coefficient throughout the moleculeand adjust your totals.



H	2	H	~~2~~ 4
O	2	O	~~1~~ 2

Step 4: If not balanced yet, continue adding coefficients to get the same number of atoms of each element on each side.

$$2H_2 + O_2 \rightarrow 2H_2O$$

H	~~2~~ 4	
O	2	

H	4
O	2

Is it balanced? YES!

There are 4 hydrogen atoms and 2 oxygen atoms on each side. We did not create or destroy matter! Yeah!

Now let's practice balancing some equations!

1. $Mg + O_2 \rightarrow MgO$

More practice!

2. $N_2 + H_2 \rightarrow NH_3$

Let's do it again!

3. $Na + AlCl_3 \rightarrow NaCl + Al$

One more time!

4. $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$