RULES OF BALANCING EQUATIONS

In all games there are rules, and balancing equations is no exception!

**RULE #1.** You may only add **COEFFICIENTS** when balancing chemical equations! Remember, coefficients are the numbers that go in **FRONT** of a molecule.

\[ 2H_2O = 2 \text{ molecules of water} \ldots \text{There are 4 Hydrogen atoms and 2 Oxygen atoms} \]

\[ 2(H_2) = 4 \text{ Hydrogen atoms} \quad 2(O) = 2 \text{ Oxygen atoms} \]

**RULE #2.** Coefficients **DO NOT** go in the middle of a molecule! They always must go in front of the entire molecule.

\[ 4NaCl \quad \text{NOT} \quad Na_4Cl \]

**RULE #3.** You may **NEVER, EVER** add subscripts or parenthesis or anything other than a coefficient to a chemical equation to balance it!

If you want to say there are 2 water molecules you would write it like this... \[ 2H_2O \]. You would **NOT** write it \[ H_2O_2 \]. This is incorrect because \[ H_2O_2 \] is the chemical formula for hydrogen peroxide. So if you wrote this you would be saying there is one molecule of hydrogen peroxide instead of saying there are two molecules of water... **TOTALLY** different!

**RULE #4:** You may **NEVER** change numbers that are already part of a chemical formula.

So let’s balance this equation...

\[ H_2 + O_2 \longrightarrow H_2O \]

I would start by attempting to balance my Oxygen molecules. The only way I can do that is by putting a coefficient of 2 in front of the product, \[ H_2O \].

\[ H_2 + O_2 \longrightarrow 2H_2O \]

But now we have a problem because, our Hydrogen atoms are no longer balanced. The reactant side has two and the product side has 4. I cannot take away atoms, so the only way to even the Hydrogen atoms out is to put the coefficient 2 in front of \[ H_2 \]

\[ 2H_2 + O_2 \longrightarrow 2H_2O \]

Now everything is balanced... 4 Hydrogen atoms and two Oxygen atoms on each side.

What about this one?

\[ ____ \text{AgNO}_3 + ____ \text{Cu} \longrightarrow ____ \text{Cu(NO}_3)_2 + ____ \text{Ag} \]
\[2\text{AgNO}_3 + \text{Cu} \rightarrow \text{Cu(NO}_3\text{)}_2 + 2\text{Ag}\]