**Balancing Chemical Equations PhET Lab (TABLET COMPATIBLE)**

**Introduction:**

What goes in comes out; right? Antoine Lavoisier is credited with first stating this simple concept as a natural law: the *Law of the Conservation of Mass*. In a chemical reaction, we expect to be given the same mass of products as we started with mass of reactants. (It would be very disappointing to put 2 kilograms of cookie dough into the oven and only get 1 kilogram of cookies.)

When we balance chemical reactions, we prove the law of the conservation of mass: the same number and type of atoms as reactants produce the same number and type of atoms as products, just rearranged into different compounds (or broken down into their elements).

**Vocabulary:** Before you begin, please define the following in your own words: (use your text or the internet)

Reactant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Product \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Synthesis Reaction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Decomposition Reaction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Combustion Reaction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Reaction Coefficient \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Procedure:** *PhET Simulations 🡪 Play with the Sims 🡪 Chemistry 🡪 Balancing Chemical Equations*

**If a yellow bar drops down or pops up in your browser, click on it and select "Allow Blocked Content"**

 This is a very important process in agriculture. Want to know more? Search, “Haber Process”

Fill in the following reactions a balanced ***mole ratio***.



 When high voltage is run through water, it can actually separate the oxygen and hydrogen. Ask your instructor to do this for you. Again, determine the balanced ***mole ratio***.



 Methane is a simple hydrocarbon used in natural gas. It’s colorless, odorless, and lighter than air. When given the chance, methane will react with oxygen to produce heat, water, and carbon dioxide. Your instructor should definitely have this one planned for your lectures on reactions. If not, ask/beg to see this.



How does the number of methane molecules (CH4) compare to the number of carbon dioxide molecules (CO2)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Challenge your classmates to a rousing game ***BALANCING***!

My Best Scores: Level 1: \_\_\_\_\_\_ Level 2: \_\_\_\_\_\_ Level 3: \_\_\_\_\_\_

(\_\_\_\_\_\_\_\_\_\_\_who? ) Best scores: Level 1: \_\_\_\_\_\_ Level 2: \_\_\_\_\_\_ Level 3: \_\_\_\_\_\_

(\_\_\_\_\_\_\_\_\_\_\_who? ) Best scores: Level 1: \_\_\_\_\_\_ Level 2: \_\_\_\_\_\_ Level 3: \_\_\_\_\_\_

The best balancer in my lab group was : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Discussion Questions**

1. When a reaction is balanced, there are the same number and type of ***atoms / molecules / coefficients***. (circle)
2. The law of conservation of mass tells us that mass is neither \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but must be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a chemical reaction.
3. When balancing a chemical reaction we ***can / cannot*** change the chemical formulas in the reaction.
4. If 12 molecules of methane, CH4 reacted with plenty of oxygen, we should expect to produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules of carbon dioxide, CO2 and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules of water, H2O.
5. To produce 8 molecules of ammonia, NH3, we would need \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules of hydrogen, H2 and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules of nitrogen, N2.

**Balancing Practice** (*some* of these may be in the simulation) *BE SURE TO REDUCE TO LOWEST COEFFS*

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