Balancing Equations PhET

The Law of Conservation of Mass states that matter cannot be created or destroyed. This idea became a scientific law because many careful experiments indicated that mass is the same before and after a chemical or physical change. Examine the chemical equation below:

N2 + H2 🡪 NH3

1. If you weighed the atoms that appear on the reactant side of the equation, would they have the same mass as the atoms that appear on the product side? Tell how you know.
2. How many atoms of nitrogen appear to be on the reactant side? The product side?
3. How many atoms of hydrogen appear to be on the reactant side? The product side?
4. Do you feel that this equation is currently following the law of conservation of mass?

If our written chemical equations do not follow the law of conservation of mass then we will not be able to make predictions about the impact of those reactions in real life. The simulation will help you get started learning how to balance chemical equations so that they follow the Law of Conservation of Mass.

1. Go to [www.phet.colorado.edu](http://www.phet.colorado.edu) and find the simulation called Balancing Chemical Equations and play with the simulation until you know what everything does.
2. Reset the simulation. Under tools, select either the balance or the bar graph (if you decide you don’t like one, switch to the other at any time). Add one of each substance to the equation.
3. Consider the nitrogen atoms.
	1. Which side of the reaction needs more nitrogen? (reactant side or product side)
	2. Without going back to zero, what can you change so that the number of nitrogen atoms on both sides of the equation is the same?
4. Consider the hydrogen atoms.
	1. Which side of the reaction needs more hydrogen? (reactant side or product side)
	2. Without going back to zero, what can you change so that the number of hydrogen atoms on both sides of the equation is the same?
5. When the equation is balanced, a smiley face appears. Does the equation now follow the law of conservation of mass? Tell how you know.
6. When we balance equations we place large numbers called **coefficients** in front of each formula.
	1. Did the simulation allow you to change the coefficients in order to balance the equation?
	2. Did the simulation allow you to change the subscripts in the formulas? Why or why not?
7. Practice balancing using the simulations titled “Separate Water” and “Combust Methane.”
8. When you are done, go to the game. Select a level and balance the equations. Record your balanced equations below.

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| Level 3 |  |
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Show your teacher your final score for the day before you log off of your computer.