

NAME _____ DATE _____ PER _____

Chemical Reaction and Equations

Background:

Physical changes, like liquid water molecules breaking free from their intermolecular attraction and evaporating into invisible gaseous water molecules, do not involve any chemical reaction. Chemical reactions involve breaking the bonds of **REACTANT** compounds and the rearrangement of the atoms to form new **PRODUCT** compounds.

Pre Activity:

A simple cheese sandwich requires 2 slices of bread and 1 slice of cheese, as indicated by the “chemical” equation pictured to the right.



1. How many cheese sandwiches you could make if you had 6 slices of bread and 2 slices of cheese? _____ . Compare your answer with your shoulder partner.

Activity 1 - Reactants, Products, and Leftovers

- In a web browser open up the simulation at the following link: <https://goo.gl/M0S0jL>
 - Click on the giant “Sandwiches” square and use the sim to test your prediction from above by adding 6 slices of bread and 2 slices of cheese to the REACTANTS.
2. How many sandwiches were PRODUCED? _____ What was LEFTOVER? _____
 - Google the terms LIMITING REACTANT and EXCESS REACTANT
 3. **Identify** is the LIMITING and EXCESS REACTANTS for our current equation? **Justify** your response. _____

 4. What are the REACTANTS needed to make exactly 4 sandwiches (no LEFTOVERS)? _____

 5. What is the relationship or ratio between bread and cheese? If your ratio can be simplified then that's not the relationship. _____
 6. Where can you look to quickly find this ratio? Look around this paper and the sim.

 - Switch the sim over to “Meat and Cheese” sandwiches and max out all the REACTANTS.
 7. What is the LIMITING REACTANT and what did you have an EXCESS of?

 8. I love lettuce and tomato on my sandwiches. Why didn't any of the sandwiches PRODUCED end up with lettuce or tomato on them? _____

 9. Based on this experience, what conclusion or rule can we come to about REACTANTS and PRODUCTS? _____

Activity 2 - Balancing Chemical Equations

- In a web browser open up the simulation at the following link: <https://goo.gl/NHKpvK>
 - Click on the giant "Introduction" square and set it up to use the balance tool.
 - Nitrogen gas and Hydrogen gas can REACT to PRODUCE Ammonia (NH_3).
10. Will **one** Nitrogen molecule and **one** Hydrogen molecule be enough to create an Ammonia molecule? Why or Why not? Remember that Nitrogen and Hydrogen are *Diatomic elements*. _____

11. If you only have one of each molecule to start with what would be the LIMITING REACTANT?

12. **Illustrate** the REACTANTS and PRODUCTS and write a sentence to **describe** the BALANCED chemical equation for making Ammonia:
14. So what does it really mean when we say that equation is BALANCED?

- Click the circle to change the reaction to "Separate Water"
13. What is the BALANCED chemical equation for separating water? _____
14. Illustrate what it would look like if you only got to start with **one** (1) water molecule as your REACTANT. What would the PRODUCTS be? What is wrong with this scenario?
14. What would the BALANCED chemical equation for "making" water be? _____
- Click the circle to change the reaction to "Combust Methane"
15. What is the BALANCED chemical equation for the Combustion of Methane?

16. The number placed in front of a formula is called a COEFFICIENT. The small number within a chemical formula is called a SUBSCRIPT. Why do we adjust COEFFICIENTS when balancing chemical equations and NOT SUBSCRIPTS? Think about the making of water as an example to help you with this response. _____

17. If you think about what it really means to have a balanced equation and you have 4 grams of Hydrogen REACT with 64 grams of Oxygen, what would the MASS of of the water PRODUCED be? Explain your reason for giving this answer _____