

# Exploring Chemical Reactions and the Law of Conservation of Mass (PhET: Reactants, Products, and Leftovers)

[https://phet.colorado.edu/sims/html/reactants-products-and-leftovers/latest/reactants-products-and-leftovers\\_en.html](https://phet.colorado.edu/sims/html/reactants-products-and-leftovers/latest/reactants-products-and-leftovers_en.html)



## STEP 1- Enter the Sandwiches Site:

1. **Examine the Sandwich formula** given at the top, **what and how much** of those ingredients are needed to make a sandwich?
2. **Answer before doing.** In a bit you are going to add four pieces of bread and two cheese, **how** many sandwiches will you make?
3. In this simulation **what do you think** the bread and cheese separately represent, the atom or the molecule? **Justify your answer.**
4. In this simulation **what do you think** the sandwich represents, the atom or the molecule? **Justify your answer.**
5. **Explore by conducting several trials** of this simulation. **Choose** your own number of bread and cheese before the reaction and document what is your product and the leftovers.

Trial Number	# of Bread Before Reaction	# of Cheese Before Reaction	# of Sandwiches After Reaction	Describe # of Leftovers After Reaction
1				
2				
3				
4				

6. **Did you** ever see a piece of bread or cheese go missing?

7. If a piece of bread or cheese was not used in a Sandwich, **what happened to it?**

8. **Conduct the SAME trials** as you did above, but this time **count the number** of ingredients you started with and that you ended up with. **You are NOT counting sandwiches**, but all the individual ingredients.

Trial Number	# of Bread Before Reaction	# of Cheese Before Reaction	# of Bread After Reaction	# of Cheese After Reaction
1				
2				
3				
4				

9. **What is** the major trend in your data for #8? (pay attention to the number of pieces you started with to the number of pieces you ended with)

## STEP 2- Enter the Molecules Site:

10. **What do** each individual ball or particle represent, an atom or molecule? **Explain.**

11. When two of those balls or particles are stuck (bonded) to each other, **what do** they represent, an atom or a molecule? **Explain.**

12. **Conduct the SAME trials** as you did above, but this time count the number of atoms you started with and that you ended up with. You are NOT counting molecules, but all the individual atoms.

Trial Number	# of Hydrogen Atoms Before Reaction	# of Oxygen Atoms Before Reaction	# of Hydrogen Atoms After Reaction	# of Oxygen Atoms After Reaction
1				
2				
3				
4				

13. **Examine** the new matter “Product” created in this reaction. **What** makes this new matter unique? **How** is new matter ‘created’?

14. **What is** the major trend in your data for #19? (pay attention to the number of particles you started with to the number of particles you ended with)

**Reflect:**

15. What conclusion can you come to about the number of atoms before and after the reaction?

16. What information do you still need to understand better about mass/amount of matter before and after a reaction?

**When you are finished with your responses, save your file (or take a photo) and submit to this assignment.**