

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

1. Go to the website above. Click on “sandwiches” . “Cheese” should be selected.
2. **Examine the** Sandwich formula given at the top, **what and how much** of those ingredients are needed to make a sandwich?
3. **Answer before doing.** In a bit you are going to add four pieces of bread and two cheese, **how** many sandwiches will you make?
4. In this simulation **what do you think** the bread and cheese separately represent, the atom or the molecule? **Justify your answer.**
5. In this simulation **what do you think** the sandwich represents, the atom or the molecule? **Justify your answer.**
6. **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				
5				

7. **Did you** ever see a piece of bread or cheese go missing?
8. If a piece of bread or cheese was not used in a Sandwich, **what happened to it?**
9. **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				
5				

10. **What is** the major trend in your data for #9? (pay attention to the number of pieces you started with to the number of pieces you ended with)
11. **How does** this data represent the “Law of Conservation of Mass”?
12. Now, go ahead and **explore this simulation further** by clicking on “Meat and Cheese” and “Custom.” After exploring, **how is your** experience similar to what we just did for “Cheese.”

13. Click on **Molecules at the bottom**.

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

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

16. **Explore by conducting** several trials of this simulation. **Choose** your own number of Hydrogen and Oxygen molecules and document your products and leftovers.

Trial Number	# of Hydrogen Molecules Reactants: Before the Reaction	# of Oxygen Molecules Reactants: Before the Reaction	# of Water Molecules Products: After the Reaction	Describe # of Leftovers After the Reaction
1				
2				
3				
4				
5				

17. **Did you** see a particle go missing?

18. If a particle was not utilized, **what happened** to it?

19. **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				
5				

20. **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)

21. **How does** this data represent the "Law of Conservation of Mass"?

22. **Examine** the new matter "Product" created in this reaction. **What** makes this new matter unique? **How** is new matter created?

23. **Explain** the similarities between the "Sandwich" site and the "Molecule" site? **What** did you learn?

24. Click "**Game**" at the bottom.

25. **Start with** level 1 and see if you can match the correct number of reactants to products. **Play** as long as assigned and see how far you can get. **You can advance** to level 2 and 3 if you have mastered the others.