

**WHAT
HAPPENS TO
MATTER WHEN
A CHANGE
OCCURS?**

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WHAT IS A CHANGE OF MATTER?

A change of matter means that the substance either changes forms or becomes something totally different.

Changes can be classified as either a physical change or a chemical change.

Chemists study the changes that matter undergoes to learn a lot about nature!

There are many kinds of changes that can take place. These can include:

Mixing



Heating



Cooling



Did you know...

- No matter what change happens to matter, the total weight of the matter will always be conserved!
This means that the total weight of matter will always stay the same.

In all of the examples below, a change is taking place, but the weight of the matter is not changing!



MAKING COOKIE DOUGH

What happens to matter when we make cookie dough?

Well, let's see.

If you add the weights of the cookie dough recipe all together, the total weight of a batch of cookie dough is 760 grams!

When you combine, or mix, these ingredients, they become one item: cookie dough! All of the weight from each of the ingredients is used to find the total weight of the cookie dough. As you can see, no matter was gained or lost!

Cookie Dough Recipe:

- 2 ¼ cups of flour (270 grams)
- 1 tsp baking soda (4 grams)
- 1 tsp salt (6 grams)
- 1 cup of butter (113 grams)
- ¾ cup of sugar (150 grams)
- ¾ cup brown sugar (150 grams)
- 1 tsp vanilla extract (4 grams)
- 2 large eggs (63 grams)



FREEZING WATER

What happens to matter when we freeze water?

Let's see!

If you take 30 grams of water and put it in your freezer to cool, the water will freeze. When this happens, ice forms. This ice will still weigh 30 grams!

Even though the water has changed from liquid to solid ice, the weight of the matter did not change.



MELTING BUTTER

What happens to matter when we melt butter?

When you heat a stick of butter on a stove top, the butter change from a solid to a liquid.

However, the weight of the butter will stay the same!



ROASTING MARSHMALLOWS

What happens to matter when we roast marshmallows?

When you heat marshmallows over a flame, the marshmallow melts and puffs up. This is the result of a physical change.

Although the marshmallow changed state, and got bigger, the amount of matter still stayed the same for the marshmallow.



MIXING SUGAR AND WATER

What happens to matter when we mix sugar and water?

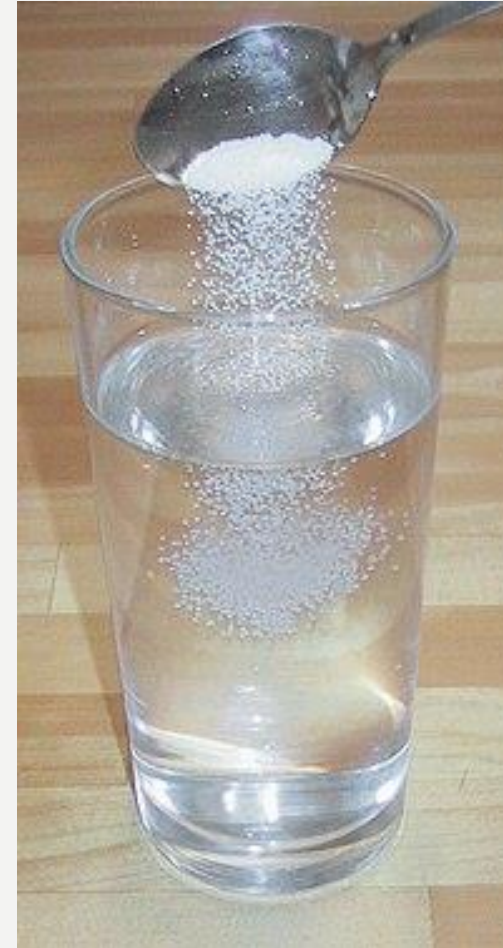
When you mix sugar and water, the sugar dissolves.

Even though the sugar looks like it is gone, you can still taste it. This is because the sugar is still there!

When you combined the sugar and water, the weight of the sugar mixed with the weight of the water.

This physical change created a new product.

No matter was lost or destroyed, only added together.



MIXING BAKING SODA AND VINEGAR

What happens to matter when we mix baking soda and vinegar?

When you mix baking soda and vinegar, a new product is formed! This is because of a chemical reaction.

The weight of the vinegar combined with the weight of the baking soda is the same before and after the change. The total weight of the new product (the bubbles and gas) is the same as the original combined weight.



WHY DOES THE WEIGHT OF MATTER NEVER CHANGE?



This is because of the **Law of Conservation of Mass!**

The Law of Conservation of Mass states that mass is never created or destroyed. This means that mass can never disappear and can never be made! It is just changed.

Many of the examples in this book showed this. For example, with the cookie dough, each of the ingredients combined to make a new product, and the masses of each ingredient did not change, they were just added to each other to make the total weight!