Vacation or Conservation (Of Mass): Crash Course Kids #23.1

Physical Science
https://youtube.com/watch?v=3lHHOiTdmK4
https://nerdfighteria.info/v/3lHHOiTdmK4

Sabrina: Even the most dedicated scientist needs a break right, and in my world break time means settling down with a nice cool drink.

(CrashCourse Kids intro plays)

Woah! I left the glass full of water here a while ago and look at it now, it's only half-full. Half-FULL: I'm an optimist, but what happened to the rest of the matter, the water that is, that was in this glass? IT looks like it went away, but can that happen? Does matter ever just go away?

(text: Big Question)

You already know a lot about matter, like how it can change between different states like solids, liquids, and gasses. You also know that matter can be part of mixtures called solutions and in solutions, the particles that make up matter become equally distributed in a container, like the sugar and water molecules in our picnic's sweet tea. And even though we didn't know it then, that sugar went through what's called a physical change.

A physical change is a change in the shape or form of matter. Physical changes do not form a new substance and they can usually be undone. Like how we were able to separate the sugar from the tea when we heated the tea so that the water evaporated.

You also know that matter can go through chemical changes, changes that occur when the particles that make up two or more substances are rearranged to form a new substance. Like, oh say pancakes, or shortcakes, or cupcakes, I like cake is what I'm saying here. The matter in wet cake batter turns into a new substance: fluffy, yummy cake. There are clues that a chemical change is occurring, like the production of gas bubbles and that delicious smell. And like all chemical changes, we can't undo that change.

The process by which chemical change occurs is called a chemical reaction. Scientists, being organized types, give special names to the substances involved in a chemical reactions. The reactants are things that react. They're what get changed during the chemical reaction, and the new substance that's made? That's the product. In our chemical change, the ingredients of the cake contain the reactants, and the cake was one of the products.

So, matter can change, but what matter can't do is just appear or vanish, and since all matter has mass, this means that mass can't appear or vanish either. Scientists have been experimenting with this idea for hundreds of years. Lots of experiments have provided evidence of what we call the conservation of mass. The conservation of mass is the scientific rule that says that mass, or the amount of matter in an object, is never made and never lost.

So what about the water from my glass? Well, it didn't just disappear. As the water evaporated, its molecules became mixed in with the air molecules, so it went through a physical change. It's still there, but we can't see it anymore.

(Text: Investigation)

Let's try making a solution like we did on our picnic. So you mix 5 grams of sugar into 10 grams of water. Remember that grams are the unit of mass. Then you stir your mixture until the sugar looks like it disappears. We started with 15 grams of material, so 5 grams of sugar and the 10 grams of water, and when you weigh the new solution, sure enough you'll get 15 grams.

There was no change in the amount of mass that you have even though we don't see the sugar anymore. The sugar didn't vanish, it just went through a physical change: it dissolved. But if you could gather up all the dissolved parts of sugar and weigh them together, they'd still equal the 5 grams you put in. And we'd find the same thing if we measured the mass of the water in my glass.

If we measure the mass of the water that's left in my half-full glass, and we were also able to catch all of the water molecules that escaped into the air and weighed them, together they would weigh the same as the water in my glass when it was full. Conservation of mass!

(Text: Conclusion)

So, the scientific rule called the conservation of mass tells us that matter is never made or lost, it just changes. We showed this by creating physical changes, in which matter just changes its form: in this case whole sugar into dissolved sugar. The conservation of mass also applies in chemical changes too, in which a new substance is made. But that's a topic for another day. See you next time!

(endscreen)