

5th Grade - Lesson 4.1

Conservation of Mass

Student Reading

Substances change in different ways. Sometimes a substance changes state like when liquid water becomes solid ice or when ice melts to become liquid water. Or a substance might break apart and dissolve in a liquid like when salt or sugar dissolves in water. Or two substances might interact in a chemical reaction and change to form a new substance, like when vinegar reacts with baking soda to form carbon dioxide gas.

Mass Stays the Same

Changes happen all the time, but one thing doesn't change: the total number and type of atoms stays the same during all these different kinds of changes. And if the total number and type of atoms stays the same, the mass stays the same.

Changes of State

If you weigh a container with water and ice, the mass should stay the same even as the ice melts. This is because the ice contains a certain number of water molecules and that number stays the same as the ice changes to liquid water. No water molecules disappear and no new ones arrive. Also, the water molecules themselves don't change as the ice melts. So just because the molecules were in the form of a solid and then changed to a liquid, they have the same number of molecules and will weigh the same.



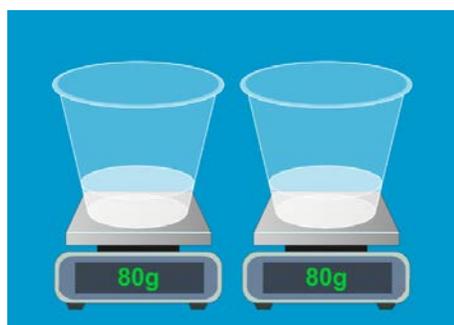
Dissolving

The same is true in the process of dissolving. If you weigh a container of water and sugar and then dissolve the sugar in the water, the mass stays the same. Dissolving the sugar spreads the sugar molecules out from one another but each sugar molecule still has all the atoms it had before it was dissolved. No atoms disappeared and no new atoms were created. So the mass of the water and sugar before dissolving is the same as the mass after dissolving.



Chemical Reactions

This is also true with chemical reactions. If you weigh two solutions and let them react, the products of the reaction should weigh the same as the sum of the solutions before the reaction. This is true because the solutions were made up of molecules with a certain type and number of atoms. When the substances



reacted, the atoms rearranged to form the products but the atoms themselves did not change. No new atoms appeared and no atoms disappeared. This means that the mass of the substances before the reaction is equal to the mass after the reaction.