



TEACHER GUIDE

CONSERVATION OF MATTER GRADES 3-5

COMMON MISCONCEPTIONS

- **When a substance dissolves or evaporates, it disappears, so it is no longer there.**
All matter has to come from and go somewhere. When matter seems to appear or disappear, it is changing form (solid to liquid, liquid to gas, solid to gas, liquid to solid, etc.), not truly disappearing.
- **Dissolving vs melting (candy melts in our mouth).**
Melting is a physical change, while dissolving is a chemical change. Ice melts into liquid water when heated, but sugar dissolves into liquid water. Candy melts in our mouth due to heat.

STATES AND CONSERVATION OF MATTER

Matter can be defined as any substance that takes up space and has weight. Matter can take the form of solids, liquids, or gases. All matter can exist in different forms depending on the conditions (temperature and pressure). As matter changes forms, the amount of matter present remains the same. No matter is lost or gained even if it appears to be. This is called the Conservation of Matter.

In some cases, when matter seems to appear or disappear it is due to changes in phases—such as a liquid evaporating into an invisible gas or a liquid condensing seemingly out of nowhere (but actually from an invisible gas).

PHYSICAL AND CHEMICAL CHANGES

Another reason matter may seem to appear or disappear is due to physical or chemical changes that take place. These might result from changes that occur when mixing different types of matter. For example, Zoe's special paper seems to instantaneously disappear when burned, when in reality the matter (paper) was quickly converted to a gas due to combustion (a chemical change) when burned. Another example occurs when sugar is mixed into water. It seems to disappear but has become a solution with the water. This physical change is reversed when the water is heated and evaporates and the sugar reappears as a precipitate. When making lava lamps (DIY Activity), a chemical reaction occurs between the fizzy tablets—which are made from compressed baking soda and some other ingredients—and the water, which releases CO_2 gas.

CLOSED SYSTEMS

When working to understand Conservation of Matter, it is important to consider whether or not a system is open or closed. When Dr. Jeff and his helpers use balloons to seal the bottles where changes are occurring, it is to keep any gas produced from escaping. These are closed systems—all changes take place within the contained area and all matter is captured within, regardless of changes. In open systems, such as those demonstrated with the fire snake and baking cinnamon rolls, some gas may escape to the surrounding air because the system is open. This is why the weight is *about* the same, not exactly the same. This is important to keep in mind as students may develop misconceptions or even mistrust of conservation of matter (and science) if the weight does not appear to reflect the law.

