

## Properties of Matter

### Learning Goals for Students and Teachers

<p><b>Overview:</b> In this unit on matter, students learn to differentiate physical and chemical changes in matter. They also learn that matter is made up of small particles called <i>atoms</i> and <i>molecules</i>. When melting and freezing occur, the motion (speed) and arrangement of molecules change. When chemical changes occur, the atoms in molecules rearrange to form new substances with different properties.</p>	
Student and Teacher Learning Goals	Additional Teacher Learning Goals
<p>1. Matter can undergo observable changes that can be described and categorized.</p>	<p>1Ta. All matter is made up of atoms that combine in a variety of ways to form molecules.</p> <p>1Tb. Molecules are composed of atoms held together by chemical bonds.</p>
<p>2. Solids can become liquids when heat is added. Liquids can become solids when heat is removed (when the matter cools).</p>	<p>2T. Each pure substance has characteristic physical and chemical properties that can be used to identify it. These properties are related to the size and arrangement of the atoms that make up the material.</p>
<p>3a. The atoms or molecules that make up a particular kind of matter, such as water, are the same whether the matter is a solid (ice) or a liquid (water).</p> <p>3b. The atoms or molecules that make up a particular kind of matter, such as water, are the same whether the substance is a solid (ice) or a liquid (water), but their arrangement and motion change as heat is added or taken away.</p>	<p>3Ta. <i>Temperature</i> is a measure of the average movement or speed of particles (molecules) in a substance.</p> <p>3Tb. When physical changes occur, both matter and energy are conserved.</p>
<p>4. The arrangement and motion of atoms or molecules that make up a particular kind of matter change as heat is added or taken away. Solids can become liquids when heat is added and molecules move faster, break away from their rigid structure, and move around more freely. Liquids can become solids when heat is removed (the matter cools), and the molecules slow down, form a rigid structure, and vibrate in place.</p>	<p>4T. When two or more substances combine, the atoms in molecules separate and rearrange to form a completely new substance with different properties.</p>
<p>5. <b>Synthesis of earlier lessons:</b> All matter is made up of very small pieces or particles called <i>atoms</i> and <i>molecules</i>. Matter can change from a solid to a liquid when heat is added. This causes the molecules to speed up, break away from their rigid structure, and move around more freely. Matter can change from a liquid to a solid when heat is removed (when the matter cools). This causes the molecules to slow down, form a rigid structure, and vibrate in place.</p>	<p>5T. The amount (weight) of matter is conserved when it changes form, even in transitions when it seems to vanish.</p>