

# Mixtures, Solutions, and Compounds

By Sharon Fabian

<sup>1</sup> You have probably already heard of elements. Elements are the basic materials that everything on earth is made of, and there are just over one hundred of them. Some of our everyday things are elements. There are copper pennies, iron nails, and neon lights. But most of the things we see each day are not just one element; most of them are combinations. The three main kinds of combinations are mixtures, solutions, and compounds.



<sup>2</sup> Soil is a **mixture**. A shovelful of soil might contain some top soil, some clay, maybe a little sand, a few bugs, maybe some really tiny microorganisms, maybe a worm, maybe some rotting plant roots, and maybe some more things. Soil is a mixture. Each shovelful of soil is probably a little different from the next one. Maybe one has more sand, and the other has more clay. Maybe one shovelful has two worms! Soil can be separated into its different parts. You can take the worm and the bugs out. You can sift out the sand, or scoop out the clay. These are some characteristics of a mixture: a mixture is not the same from one sample to the next, and a mixture can be separated into its parts.

<sup>3</sup> Salt water is a **solution**. A glassful of salt water contains both salt and water. The salt is dissolved evenly throughout the water, so that one spoonful of the salt water would contain the same amounts of salt and water as another spoonful of the salt water. Salt water can be separated into its parts. You can let the water evaporate, and you will have just the salt left. Salt water is a solution because it has these two characteristics: it has the same concentration of each of its parts throughout the solution, and it can be separated by some physical process.

<sup>4</sup> Water is a **compound**. It is made of hydrogen and oxygen, as you can tell by its chemical formula -  $H_2O$ . The H stands for the element hydrogen, and the O stands for the element oxygen. So,  $H_2O$  means two atoms of hydrogen mixed with one atom of oxygen. All pure water is the same, two parts hydrogen to one part oxygen. Water is not much like either hydrogen or oxygen; it is a totally different material, created when hydrogen and oxygen combine chemically. Water cannot be separated by any physical means. It would take a chemical change to separate water back into its parts. These are characteristics of compounds: they are made of elements that are chemically combined, they have the same proportion of their elements throughout the material, they cannot be separated except by a chemical change, and they may not be at all like the elements that they were made from.

<sup>5</sup> Here are some more combinations. See if you can guess whether each one is a mixture, a solution, or a compound. Then read the next paragraph to see if you were right.

- a bowl of green jello
- the sugar you sprinkle on your cereal
- a healthy vegetable salad
- the salt on your french fries
- the silver filling the dentist puts in your tooth

<sup>6</sup> Most solutions are liquids, but not all of them. Jello is a solution; it's jello powder dissolved in water. The jello turns solid when it gets colder in the refrigerator. Sugar is a compound. It's a chemical combination of carbon, hydrogen, and oxygen. Yum! The vegetable salad is a mixture. The lettuce, tomatoes, cucumbers, and peppers can easily be separated from each other. Salt is another compound. Its chemical formula is  $NaCl$ , which stands for sodium chloride. Tooth fillings may look like pure silver, but they are actually a solution of mercury in silver.

<sup>7</sup> Now take a look around the room that you are in, and see if you can find some mixtures, solutions, and compounds.

## Mixtures, Solutions, and Compounds

<p>1. Jello is</p> <p><input type="radio"/> A A mixture</p> <p><input type="radio"/> B An element</p> <p><input type="radio"/> C A compound</p> <p><input type="radio"/> D A solution</p>	<p>2. Copper is</p> <p><input type="radio"/> A A mixture</p> <p><input type="radio"/> B A solution</p> <p><input type="radio"/> C An element</p> <p><input type="radio"/> D A compound</p>
<p>3. Trail mix would be</p> <p><input type="radio"/> A A compound</p> <p><input type="radio"/> B A solution</p> <p><input type="radio"/> C A mixture</p> <p><input type="radio"/> D An element</p>	<p>4. Poster paint would be</p> <p><input type="radio"/> A A compound</p> <p><input type="radio"/> B An element</p> <p><input type="radio"/> C A solution</p> <p><input type="radio"/> D A mixture</p>
<p>5. Mixtures, solutions, and compounds all contain</p> <p><input type="radio"/> A Two elements</p> <p><input type="radio"/> B One element</p> <p><input type="radio"/> C More than one element</p> <p><input type="radio"/> D At least ten elements</p>	<p>6. Which of the following can be separated by some physical process?</p> <p><input type="radio"/> A Mixture</p> <p><input type="radio"/> B Solution</p> <p><input type="radio"/> C Compound</p> <p><input type="radio"/> D Both a and b</p>
<p>7. Which of the following are the same throughout? One sample would be similar to another sample.</p> <p><input type="radio"/> A Elements</p> <p><input type="radio"/> B Solutions</p> <p><input type="radio"/> C Compounds</p> <p><input type="radio"/> D All of the above</p>	<p>8. Which of the following can be separated by a chemical change?</p> <p><input type="radio"/> A Solution</p> <p><input type="radio"/> B Compound</p> <p><input type="radio"/> C Element</p> <p><input type="radio"/> D Mixture</p>

