

- **Key Question: What is the difference between a mechanical mixture and a solution?**

## COMPARING MIXTURES

You know that making food involves many mixtures. Look at Figure 1. An omelette could be a mixture of eggs, vegetables, and cheese.

Now look at Figure 2. Grape juice is also a mixture.



**Figure 1** This omelette is a mixture of eggs, vegetables, and cheese. You can see the different parts of this mixture.



**Figure 2** Grape juice is a mixture of water, sugar, and flavour particles. This mixture looks like just one kind of matter.

Ask yourself these questions:

- How are omelettes and grape juice the same?
- How are omelettes and grape juice different?

Mixtures are made of two or more different kinds of particles. Scientists put mixtures into two groups:

1. mechanical mixtures
2. solutions

**mechanical mixture** or **heterogeneous mixture**  
a mixture with different parts that you can see

## 1. Mechanical Mixtures

It is not always easy to tell if something is a mixture. You might not always be able to see the different parts. A **mechanical mixture** is one where you can see the different parts of the mixture. Mechanical mixtures are also called **heterogeneous mixtures**.

You see and use mechanical mixtures every day. You can find a mechanical mixture

- inside your closet
- inside your pencil case
- on your dinner plate
- on the playground

Mechanical mixtures can exist anywhere. You know soil is a mechanical mixture because you can see the different parts (Figure 3). Soil might have

- sand
- gravel
- twigs
- leaves



**Figure 3** You can see sand, little stones, twigs, and bits of leaves mixed together in this mechanical mixture.

Other mechanical mixtures are not as easy to see. Imagine you have a mixture of sugar and salt. Since sugar and salt look alike, it may look like one substance. If you look closely, you can see the different crystals.

## 2. Solutions

Some mixtures look like pure substances. Grape juice looks like one substance. So does shampoo. However, they are both mixtures.

### **solution or homogeneous mixture**

a mixture that looks like a single pure substance; a uniform mixture of two or more pure substances

Mixtures that look like pure substances are called solutions. **Solutions** have more than one kind of particle, but they look like pure substances. Solutions can also be called **homogeneous mixtures**.

Some solutions you know are

- steel
- seawater
- milk
- air

Figure 4 shows some other common solutions.



**Figure 4** Stainless steel is made of iron, chromium, and nickel particles. Tea is made of water, caffeine, and flavour particles.

Solutions can be in any of the three states: solid, liquid, or gas (Table 1).

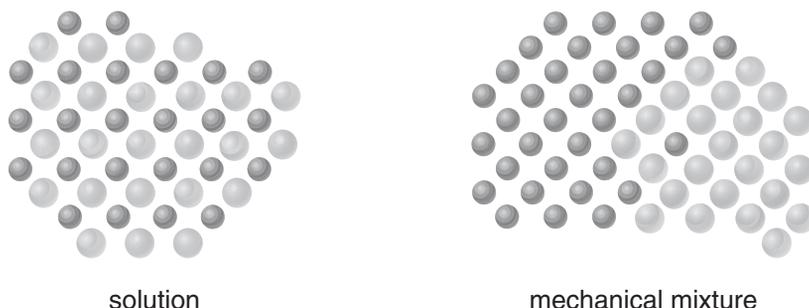
**Table 1** States of Common Solutions

<b>Solution</b>	<b>State</b>	<b>Parts</b>
candle wax	solid	wax (paraffin or beeswax), scent oils
air	gas	nitrogen, oxygen, argon, other gases
blood	liquid	platelets, red blood cells, white blood cells, water

Do you know why you cannot see the different parts of a solution? Look at Figure 5.

Particles in a solution are mixed together evenly. You cannot see the individual particles. This makes the solution look like one substance.

Particles in a mechanical mixture are not mixed evenly. The particles stay together in groups. You can see these groups as different kinds of matter.



**Figure 5** The different particles of a solution are evenly mixed. The different particles of a mechanical mixture are unevenly mixed.

## CLASSIFYING MATTER

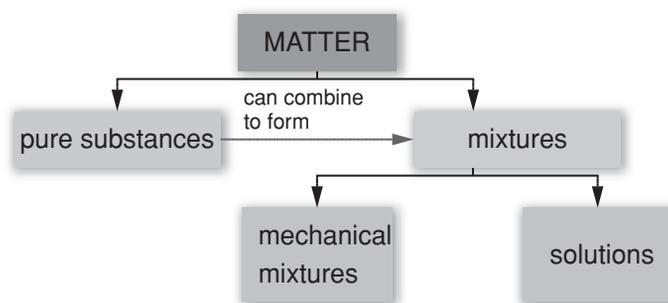
You know that matter can be grouped as

- a pure substance
- a mixture

Mixtures can be grouped as

- mechanical mixtures
- solutions

Figure 6 summarizes what you already know:



**Figure 6** Classification of matter

Name: \_\_\_\_\_ Date: \_\_\_\_\_



## CHECK YOUR UNDERSTANDING

1. Use your own words to describe a mechanical mixture.

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2. Use your own words to describe a solution.

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3. Name one mechanical mixture and one solution.

(a) mechanical mixture: \_\_\_\_\_

(b) solution: \_\_\_\_\_

4. Think back to the Key Question. How is the arrangement of particles in a solution different from the arrangement of particles in a mixture?

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