

Separating Mechanical Mixtures

► Key Question: How can you separate mechanical mixtures?

Remember from Chapter 1 that a mechanical mixture is a mixture with different parts that you can see.

People work with mixtures every day:

- After you boil pasta, you pour the pasta and water through a colander. The water goes through the colander, and the pasta remains.
- You pick the tomatoes out of a salad made of lettuce, onions, peppers, and tomatoes.
- You sort clothes before washing them. You put the dark colours in one pile and the light colours in another pile.

These are all examples of separating mixtures. When was the last time you separated a mechanical mixture?

SEPARATING MECHANICAL MIXTURES

Some mechanical mixtures can be separated by hand. Others are made of parts too small to separate by hand. There are different ways that you can separate mechanical mixtures:

- sorting
- floating
- settling
- using a magnet
- using sieves and filters
- dissolving

1. Sorting

The simplest way to separate mechanical mixtures is by **sorting**. Sorting is when you put one or more of the pieces of a mixture in its own place. When you sort clothes, you put the light and dark pieces in their own place.

sorting

physically separating large pieces of a mechanical mixture so that similar pieces are together

2. Floating

Sometimes, parts of a mechanical mixture will float on the surface. When this happens, you can skim that part off and away.

floating

a separation technique in which a “lighter” component rises to the top of a liquid where it can be skimmed or poured off

This method of sorting is called **floating**. If you have seen someone make gravy, the fat floats to the top. If you want to sort the fat from the gravy, you can skim the fat off the top.

3. Settling

Sand and cocoa powder both settle in water. That is, they sink. To separate these materials from water, you can use **settling**. You can pour the water away and scoop out the material at the bottom. Look at Figure 1 to see how settling works.

settling

a separation technique in which a “heavier” component sinks to the bottom of a liquid, and the liquid can be poured off

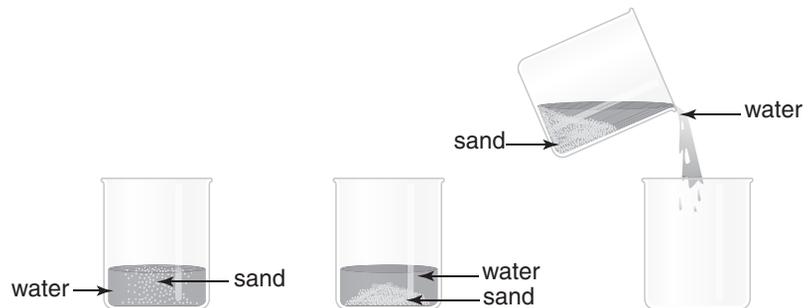


Figure 1 You can use the settling method to separate a mixture of sand and water.

Complex Mixtures

Some mechanical mixtures include solutions. These mixtures are called complex mixtures. Blood is one example of a complex mixture.

Blood is a solution of water with dissolved nutrients (plasma) and red blood cells. You can see the red blood cells as a group because of blood’s red colour. You cannot see each blood cell because they are too small.

Medical laboratories often separate the parts of blood. Blood taken from a patient will separate into its parts after a few hours. To speed this process, laboratory workers use a centrifuge.

The centrifuge spins the test tubes. Spinning causes the heavier red blood cells to fall to the bottom of the test tube. The clear, yellowish plasma floats to the top of the test tube.

4. Using a Magnet

Some metals such as iron and steel are attracted to magnets. Other metals such as silver and aluminum are not attracted to magnets. Non-metals such as plastic and glass are not attracted to magnets either.

You can use a magnet to separate a mixture that has one part that is attracted to the magnet. Look at Figure 2. The magnet pulls out the one part. The parts that are not attracted to the magnet stay behind.



Figure 2 People can use a magnet to separate mixtures of scrap materials. People can recycle and reuse the materials that the magnet pulls out.

5. Using Sieves and Filters

Many mechanical mixtures have parts of different sizes. For example, a pot of pasta contains large pasta parts and very small water particles.

You use a kitchen colander to separate pasta from the water it was cooked in. A colander is a kind of sieve.

sieve

a device used to separate the components of a mixture, with many visible holes that allow smaller solid pieces and liquids to pass through while blocking the larger solid pieces

sieving

the process of passing a mechanical mixture through a sieve to separate out the larger pieces of matter

A **sieve** is a tool that contains many visible holes. When a mixture is poured in, the small parts fall through the holes, while the large ones stay in the sieve.

The process of using a sieve is called **sieving** (Figure 3).



Figure 3 A colander separates a mechanical mixture of solid pasta and liquid water.

filter

a device with many small holes that trap solid pieces of a mixture but allow liquids and gases to pass through

You can also use a **filter** to separate the parts of a mixture. Like a sieve, a filter has small holes. But a filter does not separate tiny pieces of solids from larger pieces. A filter separates solid pieces from a liquid or gas. A coffee filter (Figure 4) is an example of a filter.

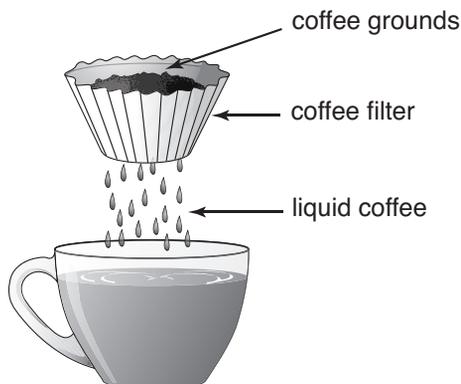


Figure 4 A coffee filter separates liquid coffee from solid coffee grounds.

filtration

the process of passing a mechanical mixture through a filter to separate out solid pieces from a liquid or gas

Unlike a sieve, a filter has holes that are too tiny to see. The process of using a filter is called **filtration**.

6. Dissolving

If one part of a mixture dissolves easily in a solvent, you can separate this part from the rest of the mixture. This method is called dissolving.

For example, suppose you had a mixture of salt and sand. You can add water to the mixture. The water dissolves the salt. The sand does not dissolve. It settles to the bottom. You can pour off the water with the salt.

Figure 5 shows another way to separate the sand and salt mixture. You can pour it through a filter. The filter traps the sand. The water and dissolved salt pass through the filter.

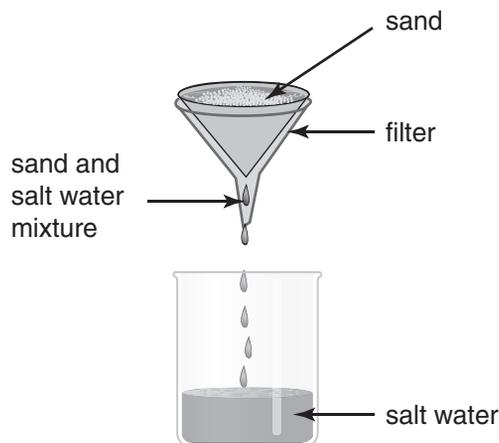


Figure 5 A filter can separate sand from salt water.

Name: _____ Date: _____



CHECK YOUR UNDERSTANDING

1. What are four methods of separating the parts of a mechanical mixture?

2. Describe a way to separate the parts of each of the following mechanical mixtures:

(a) metals in a scrap yard _____

(b) paper clips and sand _____

(c) water and gravel _____

3. Complete the table below. Identify an example of a mixture that you can separate using each method. Choose examples that the text does not use. The first one has been done for you.

Method	Example of mixture
sorting	a collection of forks, knives, and spoons
floating or settling	
using a magnet	
sieving or filtration	
dissolving	

4. Think back to the Key Question. Name two mechanical mixtures you separated this week. Describe how you separated them.
