Activity Sheet - Disappearing rock

- **Curriculum Strands:** HE, SI, BK – Matter, Earth and Space
- **Stages:** 7–15

Limestone and dolomite rock dissolve in water to form a solution. But what happens when we dissolve a substance and just what is a solution?

Solubility and solutions

Have you ever stirred sugar into a cup of tea? It seems to disappear and we can't get it back again... or can we?

If a substance like sugar or salt is **soluble** in water, then when you add it to water it will apparently dissolve, or disappear. If it is not soluble (we call that **insoluble**), like a piece of iron or steel, then it will not change or be affected.

When you dissolve a soluble substance like limestone in water you are making a **solution**: the substance being dissolved is called the **solute** and the liquid that it dissolves in is the **solvent**.

Even though when a solute dissolves in a solvent it becomes invisible, **it is still there**. If you heated the liquid in a sweet cup of tea until it had all disappeared – **evaporated,** you would be left with your dry sugar again in the bottom of the cup. When it's possible to separate out the original parts of a solution, In chemistry this is known as a **mixture.**

Equipment

You will need:

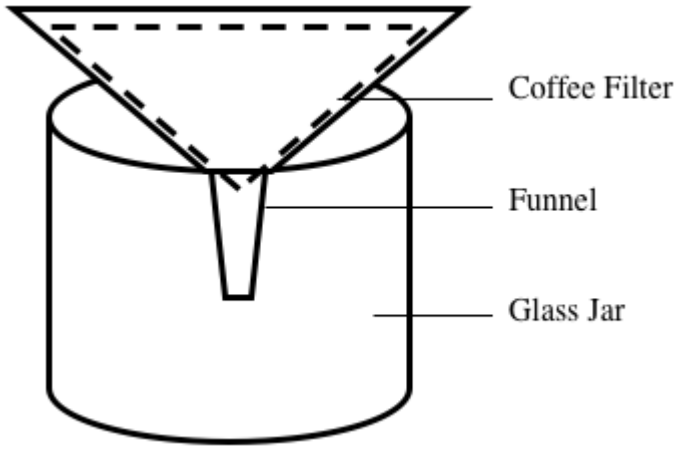
- 1 tablespoon of salt or sugar
- 1 tablespoon of iron filings or clean sand
- 2 small glass jars with lids
- 1 cup of water
- filter paper (laboratory or coffee filter) and filter funnel
- magnifying lens

	Sugar	Iron Filings
Observations before mixing		
Amount before mixing		
Observations of mixture		
Total amount of mixture		
Observations after adding water		
Observations after separation & drying		
Amount after separation & drying		

Method

1. Measure a tablespoonful of iron filings and a tablespoon-full of sugar and place them separately on a sheet of paper. Have a look at each under the magnifying glass. What do you notice? Record your observations in a data table like the one shown below.

2. Put the sugar and filings into one of your glass jars. Put the lid on and shake until they are completely mixed together.
3. Using your magnifying lens, look closely at the mixture. Can you still see the individual grains of sugar and iron filings? Record your observations.
4. Add about half a cup of hot water from the tap into the jar and stir with a spoon. Be careful, the glass will get very hot!
5. Using your magnifying lens, look closely at your solution. What do you notice? Can you still see the individual grains of sugar and iron? Record your observations in your data table.
6. Place the filter in the funnel and put the funnel in the top of your second glass jar to make your separation apparatus.



7. Slowly pour the solution onto the filter, being careful not to pour too much at once.
8. When all the liquid has passed through the filter have a look at the coffee filter and see what is left there.
9. Place both the glass jar of **solute** (the remaining liquid) and the filter paper somewhere warm (and safe) such as on a sunny windowsill, or in an oven if your teacher can do it for you. Leave to dry until all the water has evaporated. This may take a day or two.
10. If they have been in the oven, remove the jar and filter paper from the oven using oven gloves and allow the jar and filter to cool to room temperature before handling.
11. After they are cool, use your magnifying lens to make observations of them both. What do you notice? Can you still see the individual grains of sugar and iron? Are they mixed together or separated? Record your observations in your data table.
12. Now carefully use a tablespoon to measure the amount of sugar and iron filings you ended up with. Do these amounts match the amounts you started with? Why do you think this happened?

Questions

- Could you use the same technique to get dissolved calcium carbonate (limestone) from cave water?
- What happens to the drips when they land on the ground? What is left behind when the water evaporates?
- What might cause the colour in some formations?

Additional study

- Many different chemicals have different solubilities. By adding different amounts of salt, sugar or baking soda to water you can see how soluble each chemical is. Just add each chemical, one teaspoon at a time, to a glass of water until you notice that it no longer dissolves when you stir it around. Be sure to use a fresh glass of water for each experiment, and use the same amount of water each time! The chemical that dissolves the most into the same amount of water is the most soluble, and the chemical that dissolves the least is the least soluble. Try it!
- How might temperature affect the solubility of a chemical? Try dissolving the same amount of sugar in hot water, room-temperature water and ice-cold water. What happens? Can you think of other variables that might affect solubility?