

Delve Into the Deep Fantastic Formations

The Marble Arch Caves are delighted to showcase three practical science experiments and demonstrations to help both teachers and students to get inspired about one of our favourite topics, caves. What better way to learn about caves than by getting hands-on with some short scientific investigations.

These activities form part of our teacher resource packs, available to download free of charge from our website at www.marblearchcaves.co.uk. Within these packs, you will find our practical experiment cards, lesson outcomes, instructions and methods, class questions, our lesson outline/plan and our plenary activity.

To help teachers and students with their experiments the Marble Arch Caves team have also created a series of three videos, to demonstrate the activities and aid student learning with some background information and ideas for extension activities. These can be accessed via Youtube at; ([Click Here](#)).

Experiment 1: Fantastic Formations - Grow your own stalactites



This activity is designed to help students gain a greater understanding of some of the wonderful formations that grow in caves. The fantastic formations which attract visitors from around the world can take thousands of years to grow, each developing their own unique shape and structure.

The processes which lead to the development of the more well-known formations such as stalactites, stalagmites and cave columns can be tricky to grasp, so our activity helps breakdown the key stages of how they grow, covering the key words students can learn and the basic science behind why they grow in cave chambers and passages.

Equipment & Materials

Here you find a list of items and materials students will need in order to begin growing their very own cave formations. We have also provided a list of key words which students can research before they begin their experiment. This may help them develop a basic understanding of the geology (the rocks and landscape) and the hydrology (the water) behind the formation of caves and cave features. These are also covered in our Youtube tutorials.

You will need

- Epsom salts (or similar)
- Warm water (with adult supervision)
- String
- Scissors
- Spoon
- Small dish, plate or jam pot lid
- 2X beakers/jars
- 2x small weight such as a paper clip or nail
- Food colouring (optional)

Key words

- Dissolve
- Saturated
- Evaporate
- Crystallize
- Solution
- Soluble

Student Learning Outcomes

I can:

1. Follow written instructions following a demonstration.
2. Describe what has happened using keywords.
3. Record my findings.
4. Suggest improvements for the experiment.

Tick (☑)

Method – this can be used in conjunction with our online tutorial

1. Mix the Epsom salts into warm water until it is saturated (this means when no more Epsom salts can dissolve into the water). The mixture should be clear but have a slightly thicker consistency.
2. Create a base for your experiment using an old tray or plate. Make sure there is room to space out your beakers/jars. Around 20-30cm apart is optimum, this gives space for the formation to form in between.
3. Pour the salt solution into two beakers/jars. Up until about $\frac{3}{4}$ of the depth of the jar is best, this gives room for adding more water or salt later, if necessary, and will avoid the excess salt crystallising at the surface of the beakers/jars.
4. Cut a piece of sting or wool (made of a natural fibre) about 30cm long. Tie a weight to each end of the strings such as large paper clips, nails, bolts or screws.
5. Place each end of the string in opposite jars. Make a 'M' shaped bridge between the jars, ensuring the string hangs down below the water level of the jars.
6. Put the jar lid or a small container below the 'M' of the string to catch the drips.
7. Keep the whole apparatus somewhere safe for three to five days.

Lesson outline

Preparation

1. Decide on group sizes and composition based on individual needs of the pupils.
2. Source Epsom salts (or equivalent), hot water, string, scissors, spoons, small dishes, beakers or jars for each group.
3. Print out or display the method sheet on page 2 for each group and the student note sheets as necessary.

Introduction

Solvents, solutes and solutions? <https://www.youtube.com/watch?v=fAjvEoNMpL8>

– introduction to some key terms (how and why things dissolve - solutions).

- Caves can form underground when water dissolves part of the limestone rock, but the dissolved calcium carbonate doesn't disappear, it is still in the water. The calcium carbonate can be left behind when the water drips from or onto a surface, this makes stalactites and stalagmites!

Demonstration

Certain materials can dissolve in water. When something dissolves it becomes part of the solution, but it is still there. There is a limit to the amount of material that can be dissolved. When no more can be dissolved, the solution is saturated. As the water evaporates, there is less water to keep the salt dissolved, and this will form salt crystals. This forms the basis for what happens both in our experiment and in caves.

Experiment - Top Tips

Make sure to stir the mixture carefully and add small amounts of Epsom salts at a time, when there is a small amount of salt in the bottom that won't dissolve, the solution is saturated. You may also notice a slight change in how the mixture feels when stirring, it becomes slightly viscous. Make sure that the string reaches the liquid in both containers, and ensure that it bends downwards in the middle so that the drips will come from one place. It is also useful to wet the string in the solution in the jars before extending the string between them.

Plenary & Extension Activities

Fill out the 'what do I think will happen?' and the 'why do I think this might happen?' sections of the experiment note sheet on page 4. You could also undertake some extension activities testing the following;

- What do you think is happening?
- Is there anything else that we could try?
- What about adding food colouring? Do you think food colouring is a solution?
- What about a different colour in each beaker?

Return to the experiment in 3-5 days to see how the stalactites have grown, and, if appropriate, return to the note cards so the class can evaluate their predictions.

Interesting questions

Do you think putting these stalactites in different places might affect how they grow?

How could we change the solution to change the colour or shape of these stalactites?

Student Experiment Worksheet - Notes

Name: _____

This is an area where you can make notes or observations on what is happening throughout your experiment 

Before Carrying Out the Experiment

What do I think will happen?	I think that.....
Why do I think this might happen?	This will happen because.....

After Carrying Out the Experiment

What happened?	I found that.....
Why do I think this happened?	This happened because.....