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| **Activity title** |
| **Make crystals** |
| **Stay safe** |
| Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:    • ensuring that any equipment used for this activity is in good working condition  • behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others    Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol:⚠ |
| **Time required** |
| 20 minutes to prepare plus a few days for the crystals to develop |
| **Activity summary** |
| It’s hard to imagine a wintery snow scene without icicles! Drips of icy water freeze into long frozen structures which hang from our roofs, windows and from the branches of trees.  In this easy experiment we are going to create crystals at home – and you don’t need to keep them in the fridge! |
| **What equipment will you need?** |
| * A full tub of bicarbonate of soda (baking soda) - you might need it all to make a saturated solution * A piece of wool * Two paper clips * Two glass jars * A saucer * Water * And have an adult to help |
| **How to do it** |
| Watch the video here: ADD LINK TO VIDEO  **Step 1**  First, make a **saturated** **solution** of bicarbonate of soda and fill both jars with it. A **saturated** **solution** is one where you keep adding bicarbonate of soda to the water until it stops dissolving. It can be helpful to gently heat the solution to encourage the bicarbonate of soda to **dissolve**.  **Step 2**  Get a piece of wool and tie paper clips to either end.  **Step 3**  Soak the wool in the bicarbonate **solution**.  **Step 4**  Suspend each end of the wool in both jars, with a saucer under the thread and leave to rest. Make sure the middle of the wool is lower than the level of the bicarbonate solution in the jars.  The diagram below illustrates what you have to build:  **Step 5**  As the solution is soaked up and travels along the wool, it will drip down onto the saucer. After a few days you will see **crystals** beginning to form along the wool. **Crystals** are solid structures in a geometric shape.  **Step 6**  After a few more days, if you are lucky, you will see an icicle beginning to grow towards the saucer. The longer you leave it the bigger your icicle!  **Well done – you’ve cracked the Christmas challenge!** |
| **Now try this** |
| If you like being an icicle investigator you can try the experiment with other solutions such as sugar or salt and water. Maybe use some food colouring too!  So how DOES the watery solution turn into crystals? |
| **Here’s the science** |
| When bicarbonate of soda is **dissolved** in the water it makes a **solution**. When the water moves, the bicarbonate will move with it. We soaked the wool to make it easy for the solution to travel to the lowest point, where it would drip onto the saucer.  Over time, the water in the solution in the drips dried out – or **evaporated** – leaving little bits of the bicarbonate of soda behind which clumped together into a **crystal** and our “icicle”. |
| **Did you know?** |
| This is how stalactites and stalagmites form. Material inside rocks called “calcium carbonate” dissolves into water and then drips out of the ceiling of caves. The stalactites form from the ceiling and stalagmites from on the ground as the material solidifies. |
| **Mixtures and solutions** |
| **You might think they’re the same thing but in chemistry terms they’re VERY different!** |
| A **mixture** is two or more substances that are combined but each of them keeps to their original form. Imagine sand in a bucket of water – the sand will sink to the bottom and it can easily be removed with a sieve. |
| A **solution** is two or more substances that are combined in a way that can’t be separated without a chemical process taking place – for example by heating up or drying out (like our bicarbonate of soda and water solution – the water dried out – or in a process **called evaporation** leaving the solid bicarbonate behind.) Another difference is that the substances in a solution are equally spread together – unlike the sand in the bucket which just sinks to the bottom. |