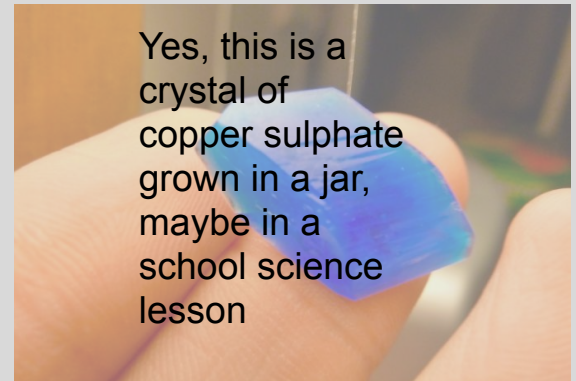
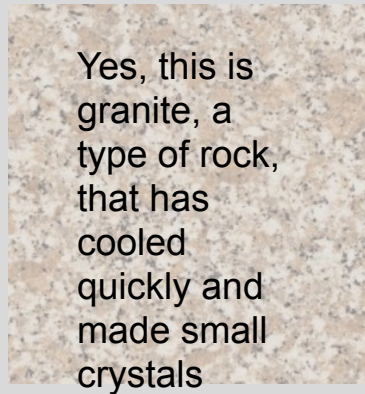
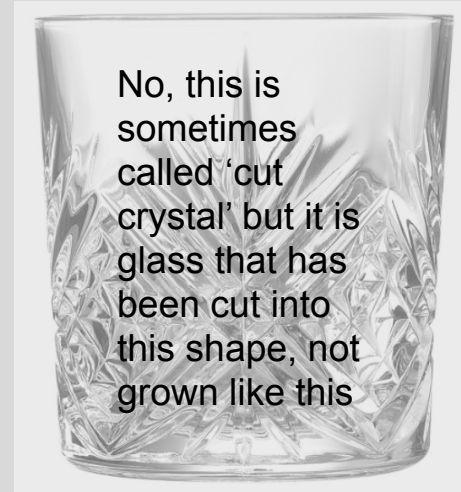
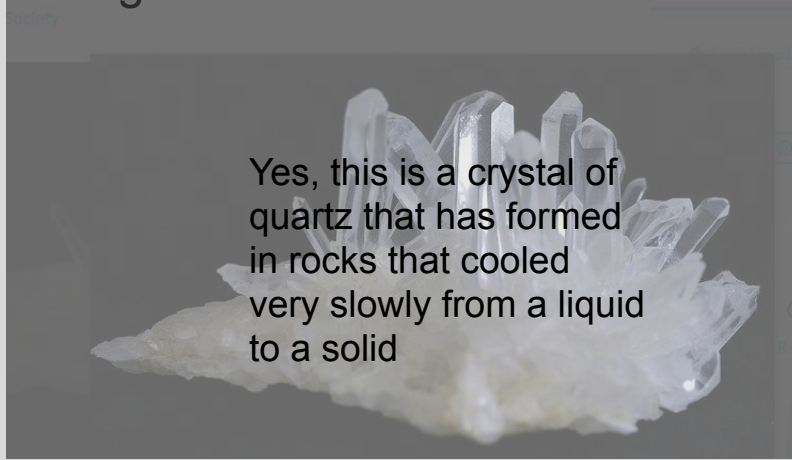


What are crystals?

Are these crystals - yes or no? Discuss your ideas about what a crystal is.

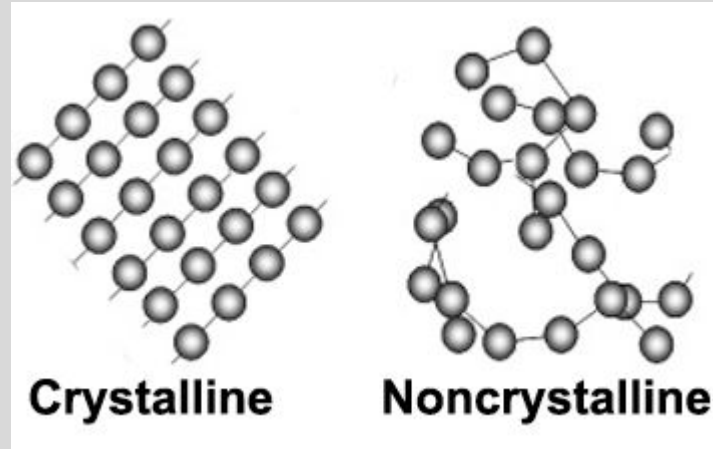
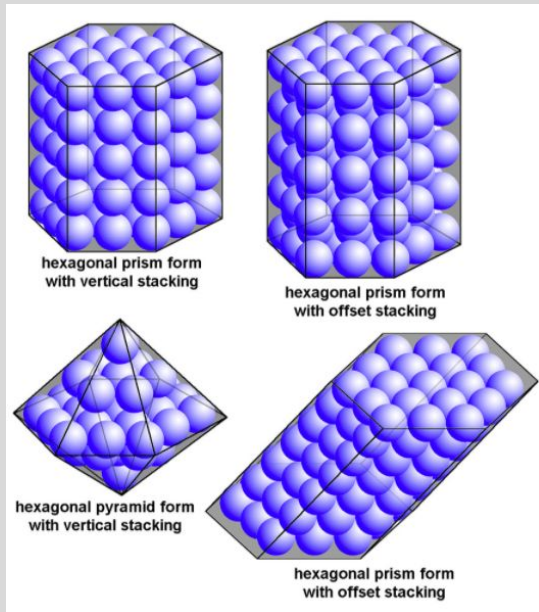


Here are the answers - A **crystal** is a solid whose particles are arranged in a repeating pattern over and over until it becomes big enough to see



Particles and crystals - a simple explanation

Here are some pictures to help explain what a crystal is - different types of crystals have long names, but this shows you how you can imagine the particles they are made from being stacked up in different ways to make different crystal shapes:



How can we make crystals?

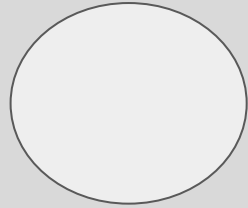
Do you know any ways to make crystals - discuss this first, then go on to the next slide (or go straight there if you don't know yet!)



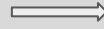
How to make crystals of salt. Step 1:

- Make sure an adult is helping you as they will need to use boiling water to make a saturated solution of salt - that means that no more salt will dissolve in it no matter how much you stir it
- When the saturated solution has cooled then you can pour some of it into a clean cup or container before you start planning how to grow your crystals
- You will need to filter the saturated solution to get rid of any grains of salt that haven't dissolved - if you have proper, science lab, filter paper and a funnel there are instructions on how to do it on the next slide
- If you don't have lab filter paper, you could use a coffee filter or something like a kitchen J-cloth instead - there is a photo of this on the next slide too

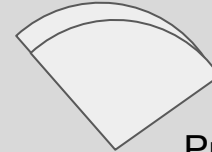
Filtering the saturated solution of salt:



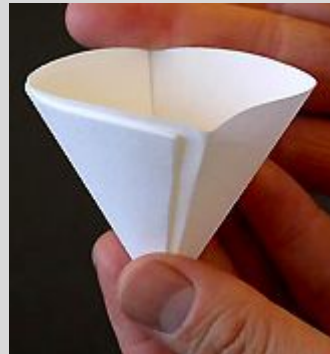
Fold in half



Fold in half
again



Pull out one
side and make
a cone shape



Put this inside
your funnel
and filter the
saturated
solution
through it into
a clean
container

If you haven't got filter paper, use some kitchen cloth, or a clean piece of thin material like a hankie. Make a dent in the middle and pour the solution through very slowly.



How to make crystals of salt. Step 2:

- To make crystals you need to let the water evaporate - this means that it turns to a gas called water vapour and mixes with the air in the room
- The water level in your container will slowly go down and salt crystals will start to grow
- You should plan the best way to help your crystals grow and write your ideas down in your plan:
 - What sort of container will you use and what shape will it be - tall and thin or flat and wide?
 - How much of the saturated solution will you put into the container? If you can, measure it and write it down
 - Where will you put the container? Somewhere warm or cold? Bright or dark? In a cupboard or in a big room?
- Other ways that might help are to hang a piece of thread into the solution from a pencil or stick across the container or soak a piece of card in the solution and put this somewhere to see if crystals grow on it

Let's talk about what happened:

- Did you make any crystals?
- How long did it take for them to start growing?
- What did they look like?
- What size were they?
- Were they all the same size and shape?
- What was the best container to grow crystals in?
- Where was the best place to put the container?
- What can you change if you decide to try making crystals again?
- Would this change make the crystals bigger or smaller?
- Can you think of other things you could try, like different substances or making coloured or interestingly shaped crystals?

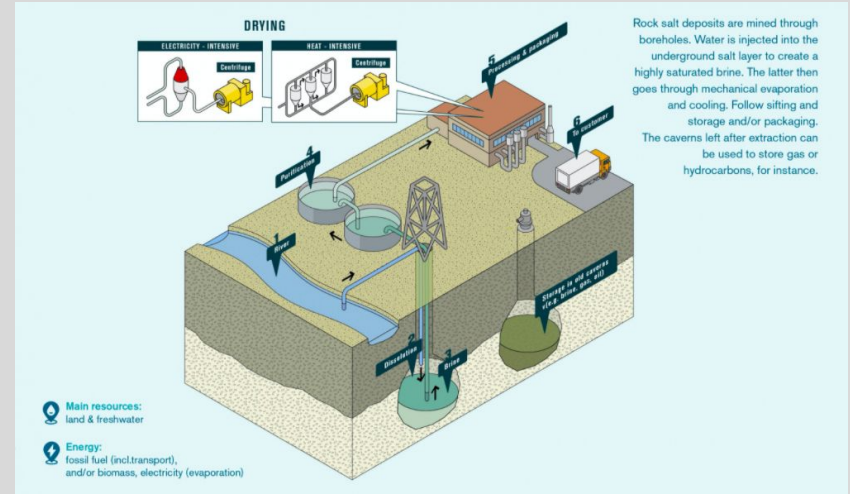
Why is dissolving useful?



Simple syrup is simply sugar dissolved into water. The syrup provides an easy way to add dissolved sugar to any recipe.

At room temperature (68 °F / 20 °F), you can dissolve about 67 g of sucrose into 33 g of water to make 100 g of simple syrup. Chefs and bartenders often refer to this as a two-to-one simple syrup. A less-concentrated simple syrup, using a one-to-one ratio, is also common.

In cooking we might need to dissolve the right amount of an ingredient to make the recipe taste good



In some places salt is found in rocks underground and we can dissolve it, pump it to the surface and make salt for cooking and other uses

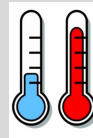
Why is evaporation useful?



People have used salt for thousands of years to preserve food. One way to make salt is to evaporate sea water in big ponds like in this picture.



Evaporation is used to dry washing. There are three ways to make it dry more quickly. What are they?



Why are crystals useful?



Crystals can tell us about different types of rocks, how they formed and what useful minerals and metals they might contain. These are giant crystals of selenite in Mexico



We have even worked out ways to make crystals grow in the shapes we want them to like this part for a jet engine (could you grow crystals in a mould to make different shapes?)

Ideas for more investigations and challenges:

- Write a report or design a wall poster to display your findings - what method worked well for making the best shaped or largest crystals?
- Change your method, research ways of growing crystals in different ways such as using small, seed crystals first to grow larger crystals from
- Plan and carry out an investigation to find out if different types of salt grow different sorts of crystals - design a fair test to make sure you are only changing the salt
- Carry out a project on crystals - find out where they are found in nature, what they tell us about rocks and minerals, how they are used in industries, for jewellery and other things