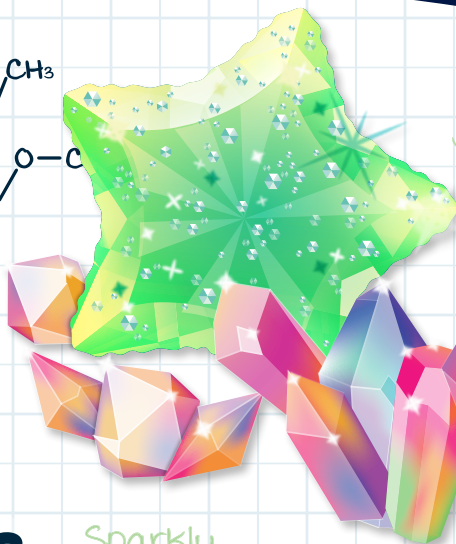
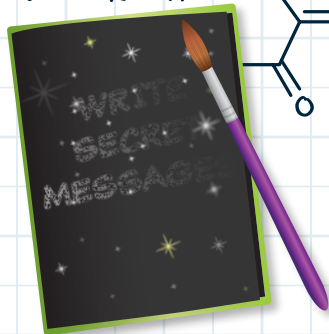
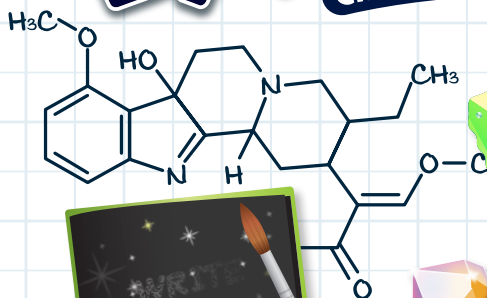


SCIENTISTS = FUN!
KIDS



EXPERImake

CREATED BY SCIENTISTS. FUN FOR KIDS!



glistening



WARNING

Sparkly

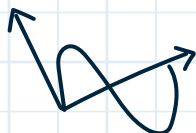
Not suitable for children under 8 years. For use under adult supervision. Contains some chemicals which present a hazard to health. Read the instructions before use, follow them and keep them for reference. Do not allow chemicals to come into contact with any part of the body, particularly the mouth and eyes. Keep small children and animals away from experiments. Keep the experimental set out of reach of children under 8 years. **Warning.** Gloves are made of natural rubber latex. Warning! This product contains gypsum powder. Do not place the material in the mouth. Do not inhale dust or powder. Do not apply to the body.

COLOURFUL
CRYSTAL CREATIONS

FUN
FACTS
INSIDE

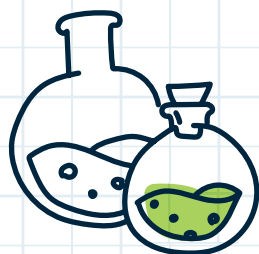
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Advice for Supervising Adults

- Read and follow these instructions, the safety rules and the first aid information, and keep them for reference.
- The incorrect use of chemicals can cause injury and damage to health. Only carry out those experiments which are listed in the instructions.
- This experimental set is for use by children over 8 years.
- Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which experiments are suitable and safe for them. The instructions should enable supervisors to assess any experiment to establish its suitability for a particular child.
- The supervising adult should discuss the warnings and safety information with the child or children before commencing the experiments. Particular attention should be paid to the safe handling of acids, alkalis and flammable liquids.
- The area surrounding the experiment should be kept clear of any obstructions and away from the storage of food. It should be well lit and ventilated and close to a water supply. A solid table with a heat resistant top should be provided.
- Substances in non-reclosable packaging should be used up (completely) during the course of one experiment i.e. after opening the package.
- This set contains colourings which can stain. Keep away from objects and delicate fabrics.
- For use under adult supervision. Keep this chemical toy set out of reach of children under 8 years old. The working area should be cleaned immediately after carrying out this activity.



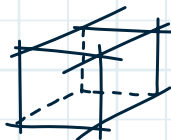
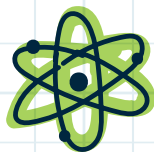
Safety Rules

Warning! This product contains gypsum powder.

Do not place the material in the mouth.

Do not inhale dust or powder. Do not apply to the body.

- Read these instructions before use, follow them and keep them for reference.
- Keep young children and animals away from the experimental area.
- Store this experimental set and the final crystals out of reach of children under 8 years.
- Clean all equipment and surfaces before and after use.
- Ensure that all empty containers and/or non-reclosable packaging are disposed of properly.
- Wash hands before and after carrying out experiments.
- Do not eat, drink or smoke in the experimental area.
- Do not allow chemicals to come into contact with the eyes or mouth.
- Do not apply any substances or solutions to the body.
- Do not grow crystals where food or drink is handled or in bedrooms.
- Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.
- Take care while handling hot water and hot solutions.
- Ensure that during the growing of crystals the container with the liquid is out of reach of children under 8 years of age.
- Make sure that all containers are fully closed and properly stored after use.



Contents

Protective gloves

Potassium alum (50g)

Gypsum (50g)

Sea salt (50g)

Yellow food colouring (10 ml)

Blue food colouring (10 ml)

Fish mould

Star mould

Large measuring cup

2 small measuring cups

Petri dish with lid

Dish

Pipette

2 wooden spatulas

3 round filter papers

Paintbrush

Black card



Chemicals Supplied and Warnings

Keep all containers tightly closed. Store in a cool, dry place.

Substance/ID	Hazard and Precautionary Statements
Yellow food colouring (E102) CAS # 1934-21-0	Do not ingest. Avoid contact with eyes. Use only according to directions.
Blue food colouring (E133) CAS # 3844-45-9	Do not ingest. Avoid contact with eyes. Use only according to directions.
Potassium Alum ($\text{AlK}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$) CAS # 7784-24-9	Do not ingest. Avoid contact with eyes and mouth. Use only according to directions.
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) CAS # 7778-18-9	Do not place the material in the mouth. Do not inhale dust or powder. Do not apply to the body. Do not ingest. Avoid contact with eyes. Use only in accordance with instructions.
Sea Salt (Sodium Chloride - NaCl) CAS # 7647-14-5	Do not ingest. Avoid contact with eyes and mouth. Use only according to directions.

Disposal of Used Chemicals and Packaging

When you need to dispose of chemical substances, it is necessary to refer to the national and/or local regulations. Never throw chemicals into sewers and garbage. For more details please refer to a competent authority. For disposal of packaging make use of the specific collection points.

Please recycle all packaging where possible.



General First Aid Information

- **In case of eye contact:** Wash out eye with plenty of water, holding eye open if necessary. Seek immediate medical advice.
- **If swallowed:** Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.
- **In case of inhalation:** Remove person to fresh air.
- **In case of skin contact and burns:** Wash affected area with plenty of water for at least 10 minutes.
- In case of doubt, seek medical advice without delay. Take the chemical and its container with you.
- In case of injury always seek medical advice.

In case of emergency dial:

UK 999 • Europe 112

USA 911 • Australia 000



Write the telephone number of the national poison information centre or local hospital below.

They may provide you with information about measures to take in case of intoxication.

Welcome to the Wonderful World of Science!

EXPERIMAKE science sets have been designed by scientists to encourage **learning** through **play**.

Science, Technology, Engineering & Maths (STEM) education is important and each set will enable the development of at least two of these skills.

The **skills** and **knowledge** gained are essential for children's learning.

EXPERIMAKE sets not only support education but are fun and enjoyable for parents too.

When having fun, or making discoveries, a neurotransmitter called **dopamine** is released. Dopamine helps control the brain's **reward centre**.

When we have a positive experience and dopamine is released, we are more likely to remember it.

So, if learning is a positive experience it will stimulate the brain to help develop various skills.

EXPERIMAKE sets are **educational toys** that combine **science** and **creativity** by fostering curiosity and experimentation.

We hope you enjoy exploring the wonderful world of science through our **EXPERIMAKE** range.

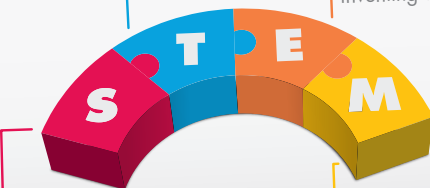
Inventive, creative and imaginative, STEM toys are educational, teaching new skills and knowledge and are (most importantly) lots of fun!

Technology

Encouraging problem solving and methodology skills.

Engineering

Encouraging design, building, and inventing skills.



Science

Encouraging a curiosity for the world around us.

Maths

Exploring different ways of getting children to think about numbers.

Why not share your results with us?

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 hello@addoplay.com

Before You Start...

Crystals are a special kind of solid material where the molecules fit together in a repeating pattern. This pattern causes the material to form all sorts of unique shapes. The process of crystal forming is called **crystallisation**. Crystals often form in nature when liquids cool and start to harden. Certain molecules in the liquid gather together as they attempt to become stable. They do this in a uniform and repeating pattern that forms the crystalline structure.

To create crystals successfully, it is important to make saturated and supersaturated solutions as there is a much higher probability of two solute molecules finding each other.

A **solution** is a mixture where one of the substances dissolves in the other. The substance that dissolves is called the **solute**.

The substance that does not dissolve is called the **solvent**.

A substance that dissolves is described as soluble whereas a substance that will not dissolve is insoluble.

A **saturated** solution is a solution that contains the maximum quantity of a solute at room temperature.

A **supersaturated** solution is a solution that contains more solute than can be dissolved in a solvent at room temperature.

This is achieved by heating the solution.

Crystals can have very flat surfaces called **facets**. They can form geometric shapes such as triangles, rectangles, and squares.

The shapes are a direct result of the type of molecules and atoms that make up the crystal. Crystals of different sizes formed of the same molecules and in the same method should have similar shapes.

In nature, crystals can form when liquid rock, called magma, cools. If it cools slowly, then crystals may form. Many valuable crystals such as diamonds, rubies, and emeralds form this way. Crystals also form when water evaporates from a solution.

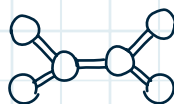
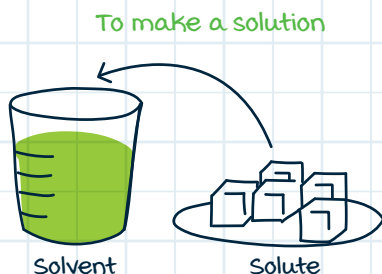
Scientific Terminology

Matter is the stuff that makes up everything in the universe.

Matter usually exists in one of three states: solid, liquid, or gas.

atoms – The atom is the basic building block for all matter in the universe. Atoms are extremely small and are made up of a few even smaller particles. The basic particles that make up an atom are electrons, protons, and neutrons. Atoms fit together with other atoms to make up matter. There are different kinds of atoms based on the number of electrons, protons, and neutrons each atom contains.

Each different kind of atom makes up an element.

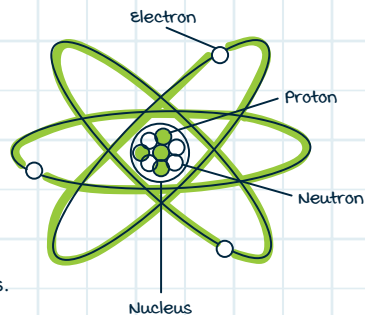


element - An element is a pure substance that is made from a single type of atom. Elements are the building blocks for all the rest of the matter in the world. There are 92 natural elements and up to 118 when you count in man-made elements.

molecules - When two atoms join, they make a molecule. Everything is made up of molecules.

mixture - A mixture is made when two or more substances are combined, but they are not combined chemically.

compound - A chemically combined mixture of two or more substances.

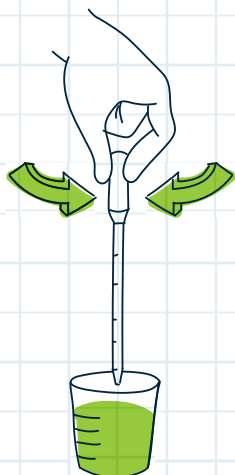


How to Use Your Pipette

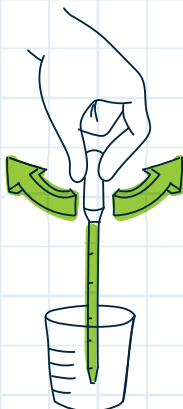
A pipette is used to collect liquid in small amounts and move from one container into another. It lets you control the amount of liquid you are adding by releasing a drop at a time. Before you begin with the experiments, you should practice using a pipette. The soft and squidgy end is called the **bulb** and the other end is called the **tip**.

1. Fill a small container with water, squeeze the bulb and place the tip into the water.
2. Slowly release the bulb until you see water filling up the tube.
3. Now that you have collected the liquid you can release it again in small drops. To do this, remove the pipette tip from the liquid and press the bulb lightly. You will see the drops come out one by one.

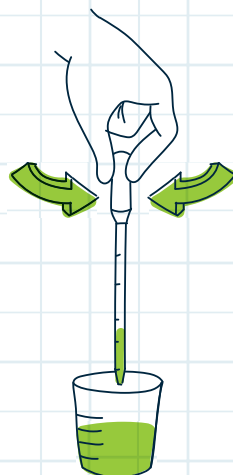
1.



2.



3.



Tip: To avoid contamination, always use the same pipette for the same solution.

EXPERIMENTS

1. Grow Your Own Crystals

You will need

Protective gloves, potassium alum, food colouring, large measuring cup, small measuring cups, petri dish, pipette, wooden spatula, water (not included).

Steps

1. Ask an adult to heat some water. Measure 50ml of hot water into the large measuring cup.
2. Put on your protective gloves.
3. Add 20ml of potassium alum and stir well with the wooden spatula until dissolved. If required, ask an adult to heat it up to make sure it is all dissolved.
4. Using the pipette, add 4 drops of food colouring and stir the solution.
5. Pour the solution into the petri dish and leave uncovered, near a window, in a quiet place, away from young children and animals. Be patient whilst your beautiful shiny crystals are formed. This could take up to 24 hours.

Explanation

The crystal continues to grow until it reaches equilibrium. In this experiment equilibrium occurs when the number of potassium alum molecules in the crystal equals the number of potassium alum molecules still dissolved in the solvent.

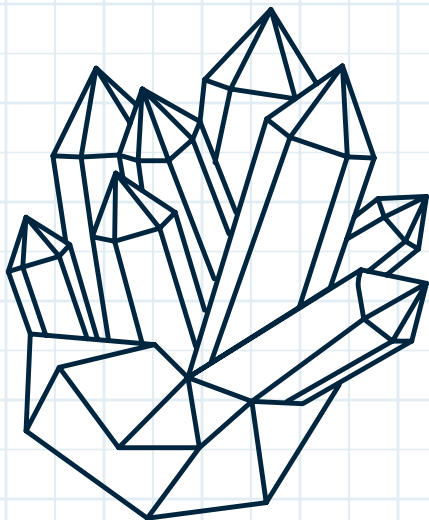
This equilibrium is reached faster when the solvent evaporates.

Explanation

Crystals start to form through a process called **nucleation**. This is caused by the molecules present in the potassium alum solution that you prepared.

The potassium alum molecules are dissolved in water. As molecules are free to move when in a liquid state, the potassium alum molecules meet and eventually bind together forming a nucleation spot.

This process happens one by one and form what scientist call a **molecular aggregate**.



2. A Crystallised Star

You will need

Protective gloves, star mould, potassium alum, food colouring, gypsum, large measuring cup, small measuring cups, dish, pipette, wooden spatula, plate (not included), absorbent paper (not included), water (not included), microwavable mug (not included), cling film (not included).

Steps

1. Put on your protective gloves.
2. Measure 9ml of potassium alum in a small measuring cup.
3. In another small measuring cup, measure 25ml of gypsum, taking care not to inhale the dust or powder.
4. Pour both contents into the large measuring cup and mix well with the wooden spatula.
5. Measure 12ml of water. Using the pipette, add 4 drops of food colouring to the water.
- ⚠ **Attention!** The next steps must be carried out quickly, otherwise the gypsum can solidify.
- Make sure you have the star mould near you.
6. Pour the water into the large measuring cup and stir until thoroughly mixed, making sure that there is no powder left on the edge of the cup.
7. Transfer the contents into the star mould.
8. Be patient whilst your star dries for 1 hour.
9. Ask an adult to put 150ml of very hot water into a mug.
10. Carefully add 25ml of potassium alum into the mug and stir well with the wooden spatula until it is completely dissolved.
11. Using the pipette, add 4 drops of colouring and mix well.
12. Leave it to cool for 15 minutes.
13. Carefully remove your star from the mould and put it in the dish as shown below (small, smooth surface face down).
14. Pour your solution into the dish so that it covers your star. If it floats, don't worry, that's normal!
15. Cover the dish with cling film and leave it for 24 hours.
16. Remove the cover and leave it for another 72 hours.
17. Remove the star from the dish, put it on a plate with absorbent kitchen towel and wait 1 week until the water is completely evaporated.

You can pour the remaining solution into a sealable container and label it to use again. Make sure you keep this out of reach of children and animals.

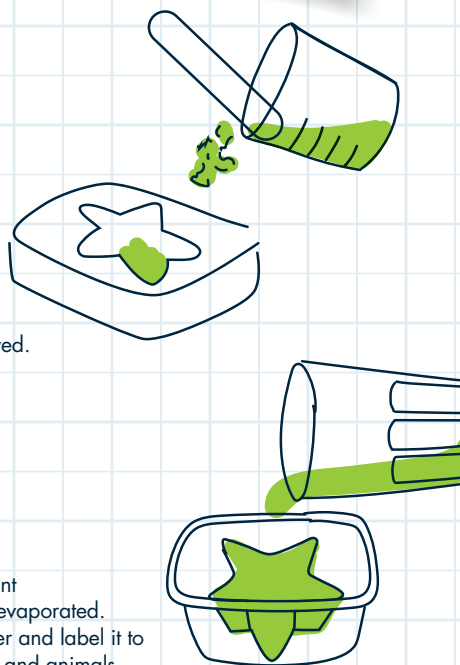
18. When your star is completely dry it is okay to touch so that you can admire your crystallised star.

Explanation

When you dissolve the potassium alum in hot water, you are creating a supersaturated solution. The solubility of alum decreases quickly with the reduction in temperature, which causes the alum to crystallise.

In this experiment, the star provides a surface for the potassium alum crystals, which allows the nucleation process to initiate.

The solute molecules gather in molecular bonding over the gypsum surface, creating a beautiful crystal star.



3. Fish in a Dish

You will need

Protective gloves, sea salt, food colouring, gypsum, fish mould, large measuring cup, small measuring cup, pipette, wooden spatula, dish, absorbent paper (not included), water (not included), microwavable mug (not included), cling film (not included).

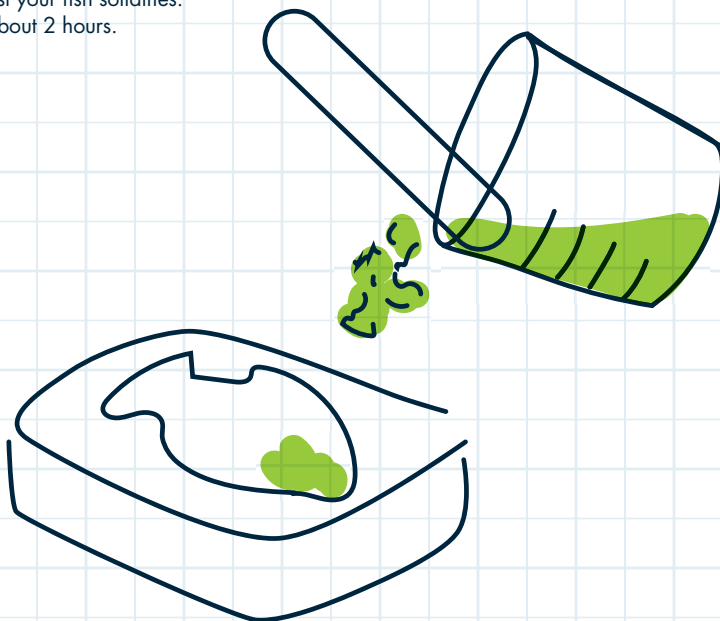
Steps

1. Measure 5ml of sea salt into the large measuring cup.
2. Measure 20ml of gypsum into the large measuring cup.
3. Measure 10ml of water into the small measuring cup.
4. Using the pipette, add 2 drops of colouring to the water and mix.

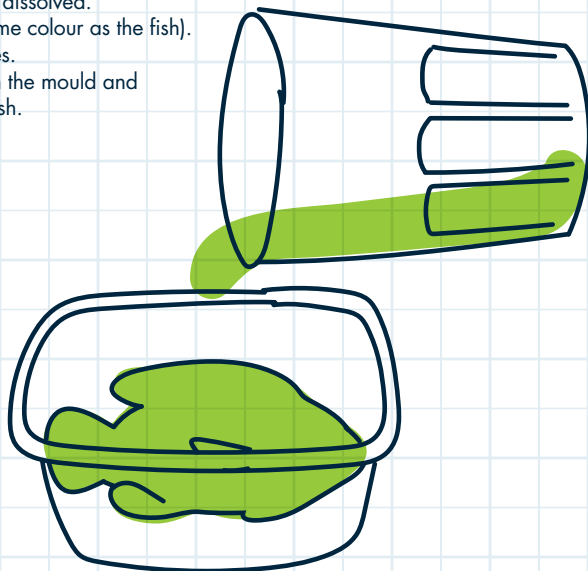
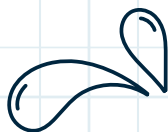
⚠ Attention! The next steps must be carried out quickly, otherwise the gypsum can solidify.

Make sure you have the fish mould near you.

5. Pour the water into the large measuring cup and stir until thoroughly mixed, making sure that there is no powder left on the edge of the cup.
6. Transfer the contents into the fish mould.
7. Be patient whilst your fish solidifies.
This will take about 2 hours.



8. Ask an adult to heat 60ml of water.
9. Carefully add 30ml of sea salt and stir well with the wooden spatula until dissolved.
10. Add 2 drops of colouring (same colour as the fish).
11. Let it cool down for 10 minutes.
12. Carefully remove the fish from the mould and place it facing down in the dish.



13. Pour the solution into the dish, covering the fish.
14. Cover the dish with cling film and leave it to rest for 24 hours.
15. After 24 hours, remove the cover and let it rest for another 24 hours.
16. Remove the fish from the solution to check if it is shiny! If it is, place the fish on a plate with absorbent paper to absorb the excess water. If not, place the fish back in the solution and cover. Leave for another 24 hours.
17. When your fish is dry, you can handle it carefully to observe your sparkling crystals.

You can pour the solution into a sealable container and label it to use again. Make sure you keep this out of reach of children and animals.

Explanation

Similarly, to the crystalised star, when you heat the water, and dissolve the sea salt, you are creating a supersaturated solution. The solubility of salt decreases quickly with the reduction in temperature, which causes the salt to crystallise.

In this experiment, the nucleation happens around the gypsum fish.

The solute molecules gather in molecular bonding over the gypsum surface, creating your fish in a dish!

4. Secret Crystal Messages

You will need

Protective gloves, sea salt, food colouring, small measuring cup, large measuring cup, pipette, wooden spatula, paint brush, black card, hot tap water (not included), cup (not included).

Steps

1. Put on your protective gloves.
2. Measure 25ml of sea salt into the large measuring cup.
3. Add 50ml of hot tap water to the large measuring cup and stir using the wooden spatula until the salt dissolves. You could also add a few drops of food colouring.

Note: You might need to re-heat the solution to help it dissolve. Take care with hot water.

4. Dip the paintbrush in the solution and write or draw something on the black card.

Note: It is important to keep mixing the solution and to wet the paintbrush for each stroke.

5. For best results, repeat over your original design.
6. When you have finished, ask an adult to put the black card somewhere warm and quiet. Let the card rest until the water evaporates completely.
7. Observe the results.



Explanation

Salt dissolves in water. When the water evaporates only the salt molecules remain in the card, leaving behind your crystal design.

Salt is a solute which dissolves in the water, which is a solvent, creating a solution.

A solvent is a substance capable of dissolving another. Whereas a solute is a substance which dissolves in another.

5. Crystal Flowers

You will need

Protective gloves, sea salt, small measuring cup, large measuring cup, filter paper, petri dish, wooden spatula, coloured felt tip pens (not included), water (not included).

Steps

1. Put on your protective gloves.
2. Make sure your surfaces are protected.
3. Draw multi coloured dots all over the filter paper. Make sure you use non-primary colours
i.e. not yellow, red or blue.
4. Transform your filter paper into a flower as shown below. When it is ready, staple the bottom of the flower.
5. Ask an adult to heat 40ml of water and pour into the large measuring cup.
6. Add 20ml of sea salt into the large measuring cup.
7. Stir well with the wooden spatula until the salt is dissolved as much as possible.
8. Carefully pour the solution into the petri dish making sure that any undissolved salt stays in the measuring cup.
9. Place the flower on the petri dish in a quiet place such as a window sill.
10. Be patient whilst the water evaporates.
11. Observe the results.



Explanation

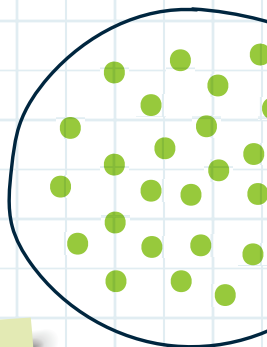
This process is called chromatography. Chromatography is a physical-chemical method used to separate homogeneous mixtures. This separation is possible because the components have a different weight, mass and density.

Complex colours (secondary) are broken down into primary colours. This happens because the primary colours have different weights and therefore remain in different positions on the paper. The water can move the lightest colours the furthest distance.

Explanation

In this experiment, the salt solution has created beautiful crystals along the filter paper.

Because the paper is porous, the solution is absorbed by the filter paper through capillary action. When the water evaporates, the salt crystals form, creating your beautiful crystal flower.



6. Giant Crystals

You will need

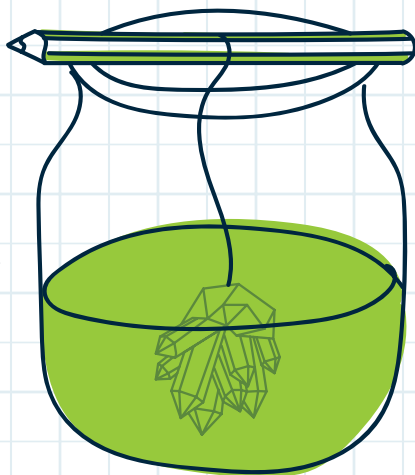
Protective gloves, solution and crystals from experiment 1, food colouring, water (not included), thin thread (such as cotton - not included), pencil (not included), microwavable mug (not included).

Steps

1. Put on your protective gloves.
2. From your crystal growing **experiment 1**, choose the best crystal and carefully tie it to the pencil with some thin thread.
3. Ask an adult to heat the remaining solution and crystals in a microwavable mug. This is likely to take about 1 minute.
4. Allow this solution to cool for 15 minutes.
5. Hang the crystal in the mug so that it's inside the solution without touching the sides or the bottom of the mug.
6. Place it away from children and animals on a window sill in a quiet place.
7. Be patient whilst your crystals start to form.

Wait 24 hours, remove the suspended crystal to see the results. If you want an even bigger crystal, follow steps 8 and 9.

8. Put the crystal to one side whilst you re-heat the solution in the mug, until all the crystals that have formed have melted.
9. Let the solution cool and re-suspend the crystal ensuring that it's inside the solution without touching the sides or the bottom of the mug.
10. Repeat **steps 8 and 9** until you are happy with the size of your crystal or until you see that it has stopped growing.



Explanation

In this experiment your giant crystals are formed through evaporation. The process takes a long time as you have to repeat the experiment many times, however the results are worth the wait!

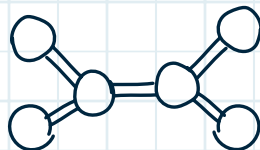


Congratulations! You are on your way to achieving your **experimake certificate**.

To claim your certificate collect **3** of these tokens and send them to us.



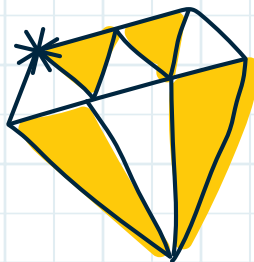
You eat crystals every day! Table salt (sodium chloride) and sugar (sucrose) are examples of crystals which are part of our daily lives.



Snowflakes consist of frozen water in a crystal form.

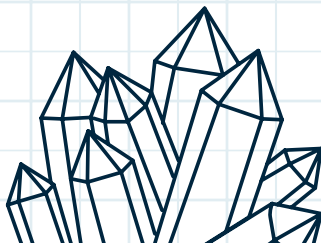
These crystals may have 6 to 12 sides. No two snowflakes are the same!

Crystals like to be in a quiet place. Disturbances or vibrations will result in smaller crystals being formed.



There are also liquid crystals. These are a specific state of matter in between solid and liquid.

There are crystals that can be dangerous to our health. The amazing colours of crystals are due to the presence of chemicals. These may be lethal to our health, such as uranium or mercury.



Please ask your parent or guardian to complete:

Name _____

Age _____

EXPERImake

Home Address _____

Email Address _____

Please send **3** tokens to Addo to receive your **experimake** certificate

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