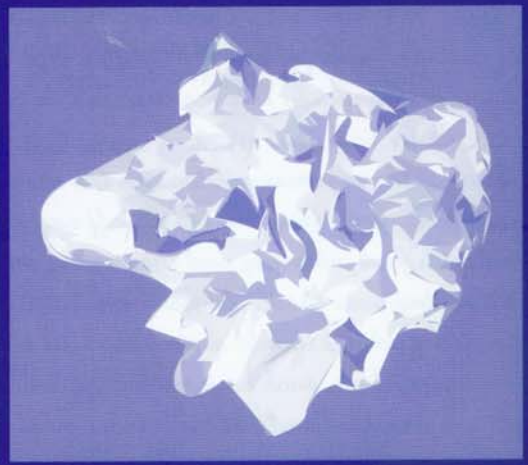
Crystal Wonder book

12+



WARNING! ONLY FOR USE BY CHILDREN OVER 12 YEARS OLD. THESE TOYS ARE NOT SAFETY PROTECTIVE DEVICES. TO BE USED SOLELY UNDER THE STRICT SUPERVISION OF ADULTS THAT HAVE STUDIED THE PRECAUTIONS GIVEN IN THE CRYSTAL GROWING SET.
TOY CONTAINS SMALL PARTS.
NOT FOR CHILDREN UNDER 3 YEARS.

CAUTION! CONTAINS SOME CHEMICALS WHICH ARE CLASSIFIED AS SAFETY HAZARD. 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. STORE THE CRYSTAL GROWING SET OUT OF REACH OF SMALL CHILDREN. EYE PROTECTION FOR SUPERVISING ADULTS NOT INCLUDED.

EDU-TOYS

USER INFORMATION:-

Safety Goggles

Instructions for Use, Storage & Maintenance:

Hold goggles with one hand, if possible without touching the lens.
Pull the elastic head band over the back of your head, just above the ears, so that the goggles sit on your forehead. Then pull goggles down over eyes carefully and adjust strap for a sung and comfortable fit.
Ensure goggles are kept clean and dry and cannot come into contact with loose chemicals or sharp objects.
Wash and allow to dry after use. Wash with warm soapy water and a soft cloth (not to be placed in dishwasher).

These Safety Goggles are only to be used with the contents and instructions supplied.

If goggles become damaged do not attempt to repair, please discard.

WARNING

Materials which may come into contact with the skin could cause allergic reactions to susceptible individucals. In the case of irritation discontinue use. If the lens becomes scratched or damaged the goggles should be replaced. Eye protectors/goggles worn over standard ophthalmic spectacles may transmit impacts, thus creating a hazard to the wearer.

NOTE: Eye protector/goggles only protect against high speed particles at room temperature.
EC Type Examination conducted by SGS United Kingdom Ltd, Unit 202B Worle Parkway, Weston Super Mare BS22 0WA Notified Body 0120

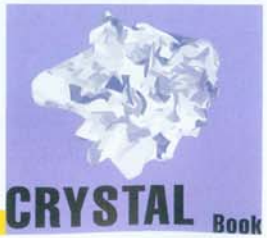
Letter to Adult

This kit has been designed to arouse children's interest in growing crystals, to stimulate their natural desire to question, experiment, and create. Crystal Growing is a hobby with clubs and competitions through out the world. Crystal Growing is also an industrial process. Growing crystals takes time and lots of patience. Therefore you should explain this at the beginning to avoid disappointment: the longer you wait the better results you get. The minimum time before you can see crystals is about 12 hrs but crystals keep growing for week. Working and experimenting have to be done under adult supervision. The salts may be harmful if not used properly: the salts provided, like table salt (NaCl) are classified as chemicals. Familiarize yourself and the child by reading all the warnings and cautions appearing in this manual and on the labels of the salts provided.

Some of the experiments require the use of warm water,therefore care should be taken. It is very important that a clean flat area is prepared, away from any foodstuff and kitchen utensils. It is advisable to cover the working area with paper as the salts are mixed with food colouring and they easily colour anything that comes in contact with them. The colour can be washed out with water. The working area should be well ventilated. Because children's abilities vary so much, even within the age groups, supervising adults should make sure that the instructions are understood by the child. This kit requires the use of extra containers for experimenting, such as jars, bottles, and small containers. These should be prepared before starting to work with the kit. Plain labels are provided and the containers must be marked with the contents: these should be kept well out of reach of small children.

The manual is written in 3 parts: the first part deals with warnings and a list of equipment provided and needed. The second part deals with the suggested experiments and activities and the third part deals with crystals in general. The first two parts must be read and understood, the third part is optional.

First edition 2003

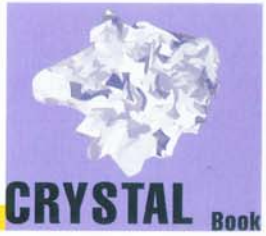


ADVICE FOR SUPERVISING ADULTS

a) Read and follow the instructions, the safety rules and the first aid information. Keep them for reference.
b) The incorrect use of chemicals can cause injury and damage to health. Only carry out those preparations which are listed in the instructions.
c) This Crystal Growing Set is for use only by children over 12 years old.
d) Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which preparations are suitable and safe for them. The instructions should enable supervisors to assess any preparation to establish its suitability for a particular child.
e) The supervising adult should discuss the warnings and safety information with the children before commencing the experimental preparations. Particular attention should be paid to the safe handling of the materials in the bottles. and all chemical preparations made in the activities.
f) The area surrounding the experiment should be kept clear of any obstructions and away from the storage of food. It should be well lit, ventilated and close to a water supply.
A solid table with a heat-resistant top should be provided.
g) A separate tin or bucket should be used for the disposal of solid waste materials.
Any wasted solution should be poured down a drain but never into a sink.
h) To be used solely under the strict supervision of adults that have studied the precautions given in the Crystal Growing set.

Part List

Monoammonium Phosphate
Aluminium Potassium Sulphate
Plaster of Paris
3 petri dishes
5 plastic containers with lids
2 Plastic Mold
1 large measuring cup with lid
1 small measuring cup with lid
2 measuring spoons
Tweezers
Plastic funnel
Eye dropper
Thread
15 granite base rocks
Magnifying glass
Display stand
Protective glasses
15 blank labels
Instruction book



EXPLANATION OF CHEMICALS

First Aid; in the event of accidents these appear on each container.
ALUMINIUM POTASSIUM SULPHATE AND FOOD DYE COLOUR.
$KAl(SO_4)_2 \bullet 12H_2O$ and a concentrated food dye powder.
* If chemical or solution contacts skin, immediately rinse with soap and water.
* If chemical or solution contacts the eyes or mouth immediately flush with large amounts of water for 15 minutes. If irritation occurs, get medical attention.
* If chemical is inhaled, seek fresh air, if any adverse symptoms occur get medical attention.
* If chemical, crystal or solution is swallowed, immediately rinse mouth, drink several glasses of milk or water. Do not induce vomiting.Get medical attention and call poison control center.

MONOAMMONIUM PHOSPHATE AND FOOD DYE COLOUR.
$NH_4\ H_2PO_4$ and concentrated food dye powder.
Treatment and warning as above.

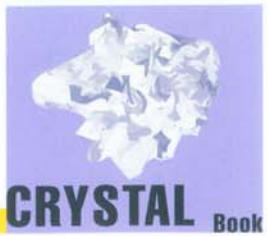
CALCIUM SULPHATE (PLASTER OF PARIS).
$CaSO_4$
Treatment and warning as above.

DO NOT place in mouth.
DO NOT inhale dust or powder.
DO NOT apply to the body.

IMPORTANT TELEPHONE NUMBERS

TO BE COMPLETED BY AN ADULT BEFORE USING THE KIT.

POISON CENTER:	
HOSPITAL:	
FIRE DEPARTMENT:	
DOCTOR:	



SAFETY INFORMATION

General first aid information

A) In case of eye contact : Wash the eye with plenty of water, holding the eye open if necessary. Seek immediate medical advice.

B) If swallowed : Wash the mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.

C) In case of inhalation - Move person to fresh air.

D) In case of skin contact and burns : Wash affected area with plenty of water for 5 minutes.

E) In case of a cut : Wash the cut with antiseptic solution (if not available, use clean water). Then put on a bandage. In case of any serious injury, you should get first aid treatment and Inform a doctor as soon as possible.

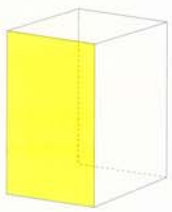
In case of doubt seek medical advice without delay. Take the material together With the container with you. In case of injury, always seek medical advice.

SAFETY RULES

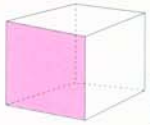
* MUST read the instructions before use, follow them and keep them for reference.
* MUST keep young children, animals, and those not wearing eye protection away from the experimental area.
* MUST always wear safety goggles.
* MUST store the kit out of reach of young children.
* MUST clean all equipment after use.
* MUST wash hands after experimenting.
* MUST dispose of any material, which has been mixed and is not for further use.
* MUST make sure that all containers are fully closed and properly stored after use.
* DO NOT eat, drink or smoke in the area where experiments are made.
* DO NOT allow salts or solutions to come in contact with eyes or mouth.
* DO NOT put foodstuffs in used container.
* DO NOT use any containers or equipment used in the kit for any other purpose.
* DO NOT dispose of any materials from this kit in the kitchen; all materials must be flushed down the toilet.
* DO NOT look directly at the sun through the lens of the magnifier.

INTRODUCTION TO CRYSTAL GROWING

In this kit, we show you how to make crystals of different shapes, sizes and colours.
By experimenting and developing the basic methods of crystal growing, you can create beautiful crystals, which can be the "seed": for growing larger crystals, or which can be preserved for display.
However, before we lead you into the world of crystal growing: WHAT IS A CRYSTAL?
Millions of years ago, the earth was not as we know it now, but a mass of constantly moving hot gases.
At some point in time the gases cooled and formed liquids, of which some cooled further to become rocks.
This rock formation, unless disturbed, produced crystals.
We are surrounded by crystals without knowing it: many of the stones under our feet are crystals, and in the kitchen we can all find salt and sugar: these are crystals too.
Crystals are geometric bodies with plane surfaces and straight edges that meet at point shaped corners.
A fundamental property of crystals is their symmetry, and crystals are classified according to their symmetrical shapes.

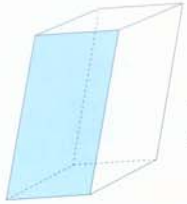


Tetragonal Family



Isometric Family

Monoclinic Family

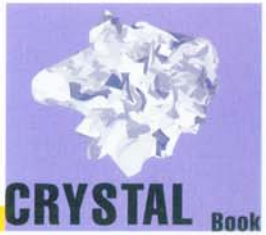


Triclinic Family

Hexagonal Family

Crystals have been the subject of great fascination since ancient times.
Their symmetrical shapes and beautiful colours led to the creation of legends, and even today, crystals are ascribed powers that grant their owner special abilities and a feeling of well being.

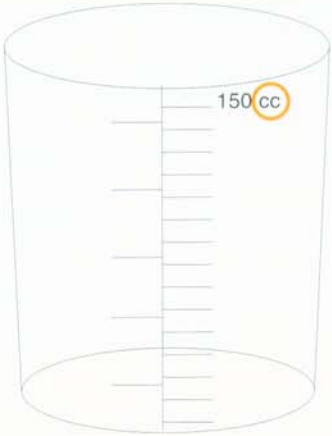
This exciting and absorbing science will give you hours of pleasure: although, you will need patience, as crystals take time to grow.
Follow our basic crystal growing instructions carefully, and your patience will be rewarded.
In this manual all of the coloured photos are crystals grown from salts supplied and it took an average of 12hrs to get the shown results.
By experimenting you will learn to adapt and improve your technique: the possibilities are fascinating and endless.



HOW TO USE YOUR TOOLS

MEASURING CUPS: you have 2 measuring cups in your kit: these cups are used for measuring the required amounts of water and salts.
1 small measuring cup to 25 mls
1 large measuring cup to 150 ccs
We will quote all liquid measurements in mls, (milliliters), so when using the large measuring cup,
1 cc is equal to 1 ml.

The salts are measured in gms (grams).
When using the cups
for measuring the weight of the salts,
refer to the following list:

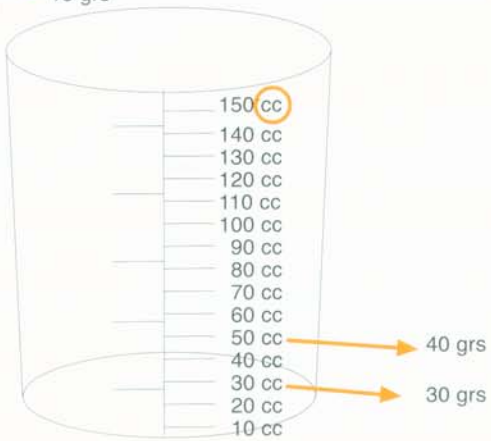


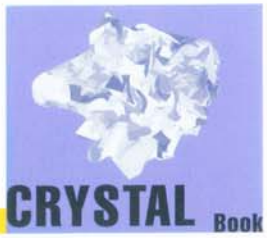
SMALL MEASURING CUP

The 10 ml line is equivalent to 10 grams
The 20 ml line is equivalent to 17 grams
The 25 ml line is equivalent to 20 grams

LARGE MEASURING CUP

The 30 ml line is equivalent to 30 grams
The 50 ml line is equivalent to 40 grams





TWEEZERS: use the tweezers for picking up your crystals.
Never pick them up in your fingers, as dirt or oil from your hands can damage the crystals.

EYE DROPPER: use the dropper for placing drops of the prepared solution onto the petri dish for cultivating small amounts of crystals.

FUNNEL: use the funnel for draining off any surplus liquids that can be used at a later stage.

PETRI DISHES: these are used for growing small amounts of crystals. Once crystals have formed, they can be removed with the tweezers and the petri dish can be washed and used again.

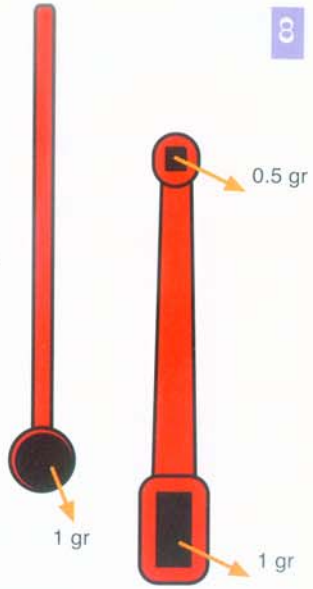
PLASTIC CONTAINERS: these are for growing larger amounts of crystals, or covering the crystals for display.

MEASURING SPOONS: these are used for measuring very small amounts and also for stirring; remember to wash after use.

PLASTIC MOLDS: these can be used either for plaster molding or for growing crystalline shapes.

PLASTER OF PARIS: we will show you later how to make bases and frames for crystals; use these to create jewelry and small ornaments; a lovely idea as a present!

SALTS: we supply you with 2 types of salt for growing crystals, both in a variety of colours. After taking the amount of salt required, always close the container immediately and make sure it is closed well, as the salt will start crystallizing if moisture enters the container. If you use your measuring spoon to take out the salt also make sure that it is clean and dry.



IMPORTANT: AFTER USING THE VARIOUS TOOLS IN YOUR KIT, ALWAYS WASH THOROUGHLY WITH CLEAN WATER SO AS NOT TO CONTAMINATE OTHER CRYSTAL SOLUTIONS.

HOW TO GROW YOUR CRYSTALS

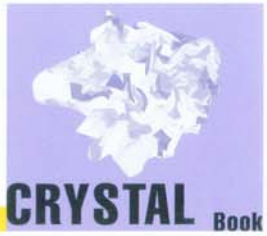
ADULT SUPERVISION

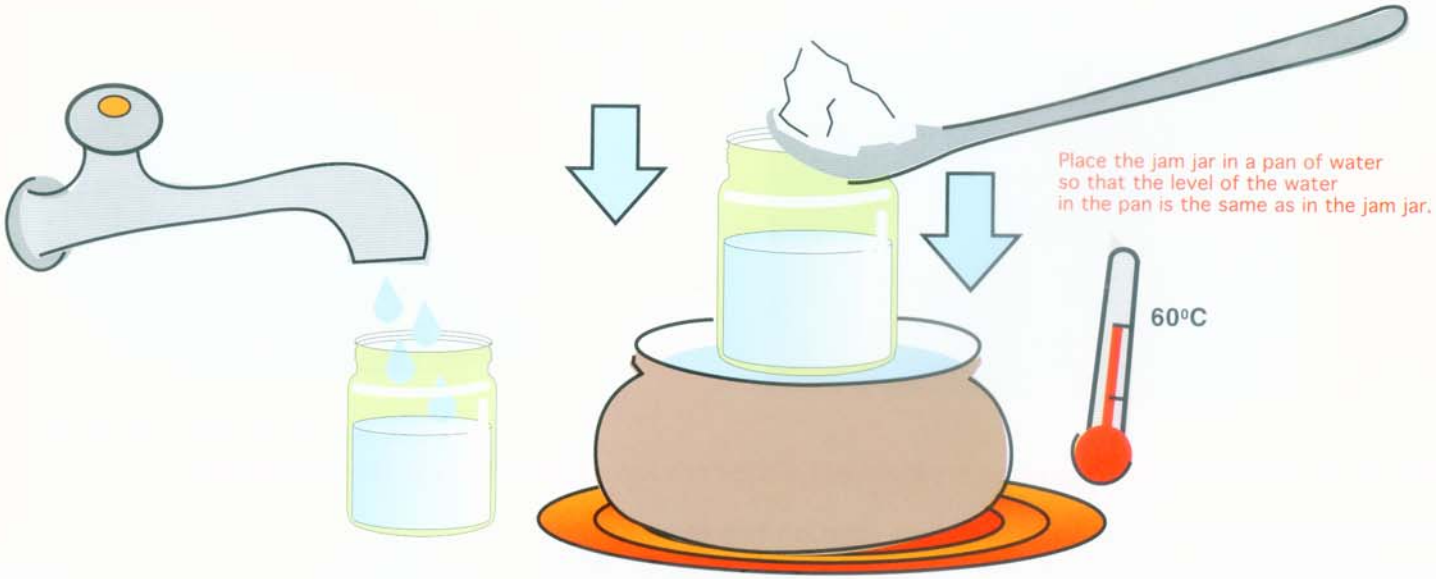
In this kit we supply two different salts in a variety of colours. Each salt produces different shaped crystals. The Aluminium Potassium Sulphate (alum) produces 8 sided crystals and the Monoammonium Phosphate produces needle shaped crystals. When preparing the solution of Aluminium Potassium Sulphate the proportions of salt to water are equal.

For example:
20 grams of salt to 20 mls of water.
35 grams of salt to 35 mls of water.

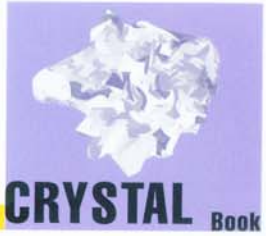
When preparing the solution of Monoammonium Phosphate
The proportions are 100 % to 80 %. (5 to 4)
For example: 20 grams of salt to 16 mls of water.
35 grams of salt to 28 mls of water.

Using warm tap water, measure the required amount of water you have decided to use and pour it into a clean jam jar.
Placé the jam jar in a pan of water so that the level of the water in the pan is the same as in the jam jar.
Place the pan on the burner at a low heat and add the measured amount of salt.

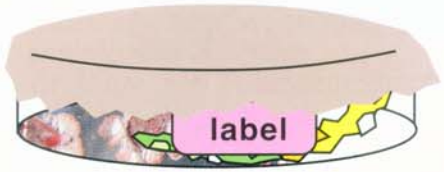




Stir in the salt until it dissolves; you will see that the salt dissolves more quickly as the water becomes hotter.
The solution should not be heated more than 60°C (you can just about put your finger in the water).
When all the salt has dissolved; take the pan off the heat with the help of the adult supervising you.
Turn off the burner and remove the jam jar. Be very careful, your working surface will be hot and also the jam jar.
There is always a possibility of the jam jar cracking when it is heated: check before you remove the jam jar from the pan. Use your dropper to place drops of the solution on a petri dish ,or pour the solution into any other container that you want to use for growing the crystals.
Put the container or petri dish in a warm place to help the evaporation. You should leave the solution in the jam jar on a high shelf in a well lit area.
The solution should be kept well out of the way of small children and should not be left in the kitchen. Cover the jar with a paper towel to prevent dust entering.You must cover all containers with crystal growing solutions in them.
Leave the solution for 6 to 12 hours and see what happens!

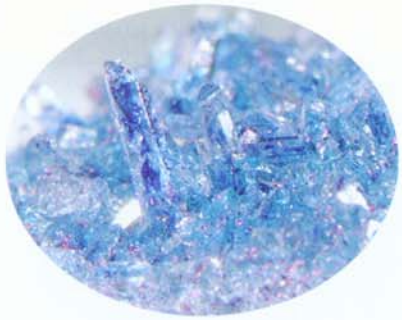


Observe the changes with your magnifying glass. You will see crystals forming on the bottom of the container. At this stage we suggest that you remove some of the surplus liquid, either with the dropper, or by gently pouring the liquid into another container: this can be used later for growing more crystals, after you have added more salts. Remember, you must label all containers, both for safety reasons and so as not to cause confusion.



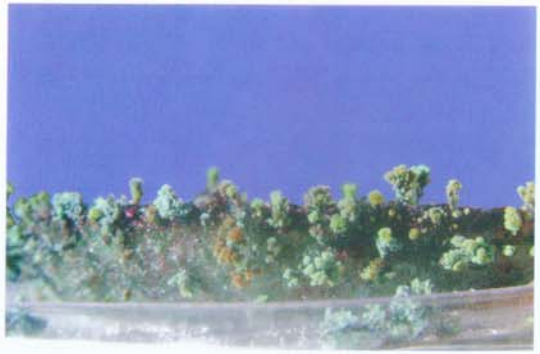
Be careful not to pour any liquid onto the crystals while they are forming as this will dissolve them.

Watch the crystals grow until all the remaining solution has evaporated; then wait a few more hours to see if the crystals have stopped growing; check the progress with your magnifying glass. At this stage the crystals are formed. If you are satisfied with the result, you can prepare them for display. We suggest that you spray them with lacquer to prevent loss of colour, which occurs through humidity.
You can use the crystal, or cluster of crystals,as a seed for growing bigger crystals; we will explain how in a later experiment.



Aluminium Potassium Sulphate

Monoammonium Phosphate



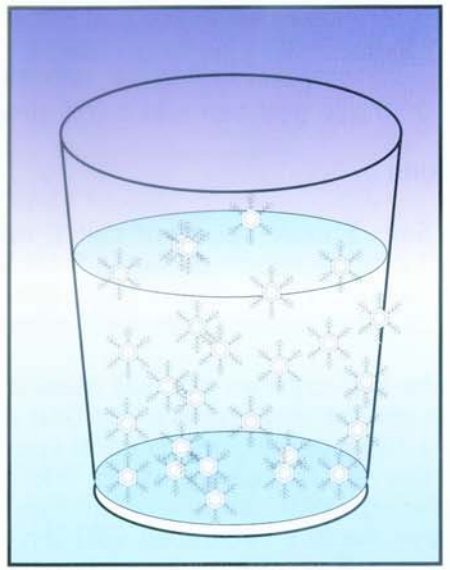
ACTIVITY 1

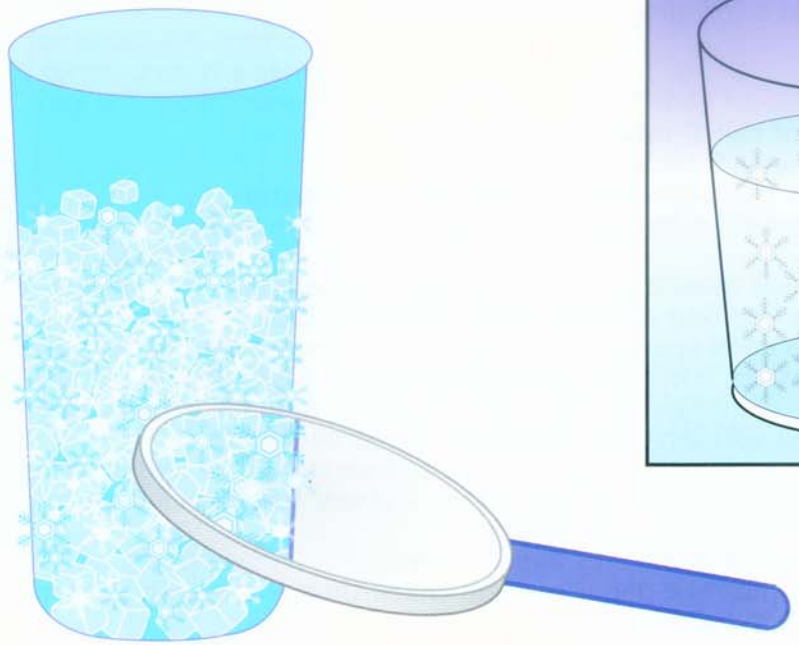
Prepare a solution as already explained and start growing your crystals.
Record the procedure on the record sheet supplied in the instruction book, you can find it on the next page.
You will need this information at a later stage for comparison purposes.
If you are in a hurry to see something happen, you can put one or
two drops of the solution onto a petri dish.
This will evaporate quickly and will give you snowflake
-like crystals in a very short time.

chemical	grams	ml	date	time	size	time	size	time	size
Alum	40 gr	40 ml	example	10 hours	8 -12 mm	12 hours	12 -14 mm		

ACTIVITY 2

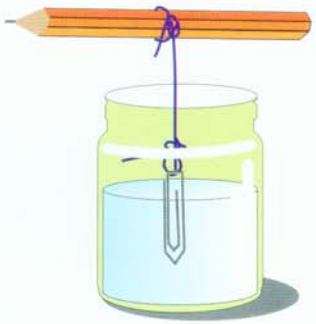
While waiting for these crystals to grow, you can produce ice crystals. If you have "ice snow" in your freezer; just scrape some of this off and examine with your magnifying glass. If not , put a small amount of water in a glass and place the glass in the freezer. In a very short time you will see ice crystals forming on the sides of the glass. Look closely with your magnifying glass; they look just like snow flakes!





ACTIVITY 3

In addition to the salts supplied you can use other salts and materials for growing crystals, some of these you may have at home others are available in grocery shops.
Table Salt
Sugar
Epsom Salts.
Borax
To all of these you can add a few drops of food colouring.



Solutions

Table Salt: 5 table spoon of salt 6 table spoon of water
Sugar:12 table spoon of sugar 5 table spoon of water
Epsom salts:5 table spoon of Epsom Salts 6 table spoon of water
Borax :5 table spoon of Borax 7 table spoon of water

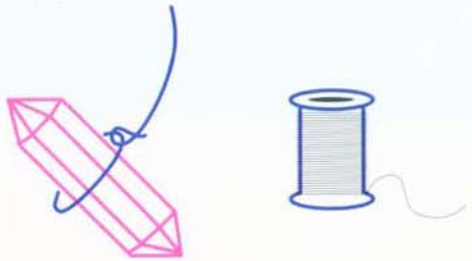
To make salt crystals you will need a clean jam jar and a paper clip.
Take a jam jar and prepare solution with hot water from the tap.
Using a table spoon, add several spoonfuls of table salt to the water and stir well.
When the salt has disappeared, add more salt and stir again. Keep adding salt, and stirring, until no more salt dissolves and there is a small amount of salt left undissolved.
You have made a saturated solution from which you can grow crystals.
Take a pencil and tie a piece of cotton round it: the cotton should be about half the length of the jam jar.
Attach the paper clip to the other end of the cotton and with the pencil balancing on the rim of the jam jar, the paper clip will be immersed in the salt solution.
Now leave the jam jar to cool and wait for a day or two.
Watch the salt crystals form on the paper clip and check their shape with your magnifying glass.
Remember to record your experiment.

ACTIVITY 4

Now you can make some candy; these are sugar crystals which are worth making as you can eat them.
We suggest that you keep this experiment well away from all other experiments,
so that you can be sure you are eating sugar crystals!
Fill a jam jar 3/4 full of hot tap water and make a saturated solution as you did in the last experiment,
only this time with sugar. Find a piece of string and tie one end round a pencil.
Drop the other end of the string into the sugar solution and balance the pencil on the rim of the jam jar,
as in previous activity.
Leave the jam jar to cool and wait for about 24 hours;
you will already have sugar crystals forming on the string.
However, if you leave them longer they will grow more and you will have more candy to eat!

ACTIVITY 5

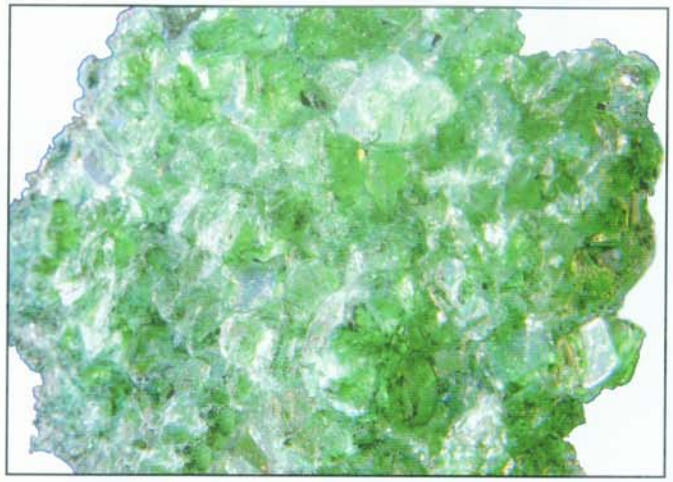
Now that you know how to prepare a solution, you can carry out more complicated experiments.
In this experiment you will use a seed crystal to make a much larger crystal.
Take one of the plastic containers supplied in the kit and pour in a prepared solution of
Monoammonium Phosphate, of a quantity suitable for the size of the container.
Cover the container and leave for at least 24 hours.
Using your tweezers, very carefully pick up one of the larger crystals and tie it to a thread.
You do this by making a loop at the end of a piece of cotton and gently catching the crystal in the loop.
Either use the thread we provide in the kit, or cotton from home: never use nylon thread.



Now take a jam jar and prepare another solution of the same salt but a different colour.
Attach the other end of the thread to a pencil and immerse your crystal in the solution with the pencil balanced on the rim of the jar. Adjust the length of the thread so that the crystal is under the solution but does not touch the walls of the jar.Leave the jar, covered,
for 12 to 24 hours and you will see that the crystal is growing.
You can leave it for longer to see how much it will grow.
The solution will give you crystals of a needle shaped crystals as we have already mentioned.

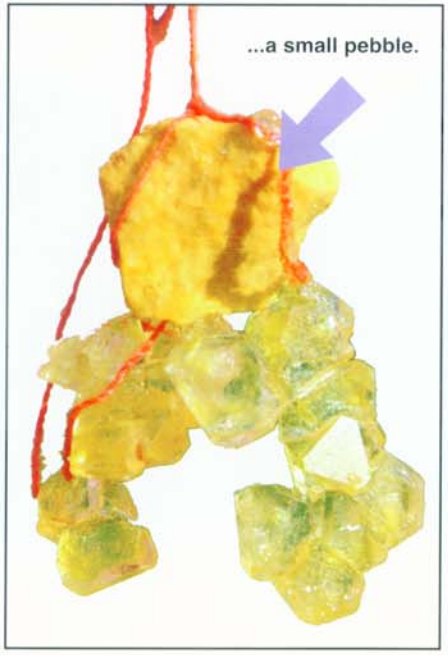
ACTIVITY 6

Now use the other salt in your kit: Aluminium Potassium Sulphate
to make a seed crystal.
Using the same procedure as in Activity 5, grow a seed crystal.
Make a second solution with the same salt but a different colour
and immerse your seed crystal in the solution as we explained before.
The solution will give you 8-sided crystals;
check this out with your magnifying glass.



ACTIVITY 7

The seed for growing a crystal does not have to be another crystal; you can use a glass bead or a small pebble. Prepare a solution in a jam jar and immerse the bead or pebble in the solution using the thread and a pencil as before.

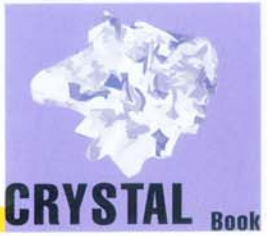


ACTIVITY 8

In your kit you will find 2 small plastic molds, each one a different shape.
Fill the shapes with your prepared solution and wait 24 to 36 hours.
The crystals will set in the shape of the mold.
When all the liquid has evaporated and the crystals are fully formed,
gently take the crystal out of the mold and place on your display stand.

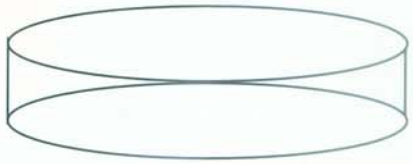
wait 24 to 36 hours...

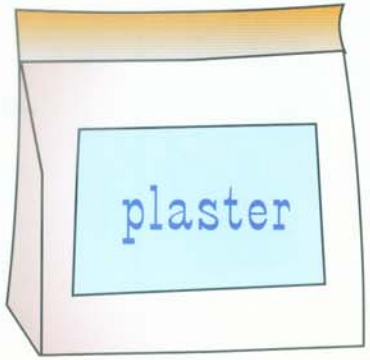
molds



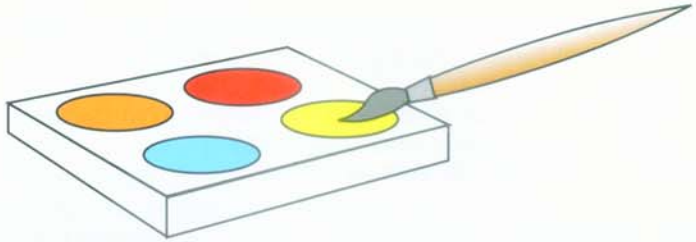
ACTIVITY 9

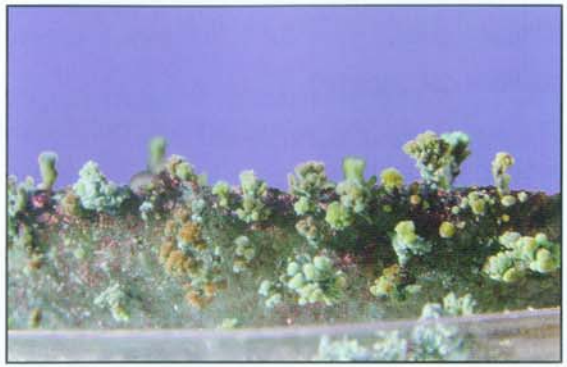
By now you will have a collection of many coloured crystals in a variety of shapes.
We will show you now how you can set the crystals in plaster casts
so as to make jewellery and small ornaments.
In your kit you will find lids for your two measuring cups.
Use these or any other plastic lids for making the plaster casts.
Have a crystal ready to imbed in the plaster.
Take a lid of your choice and coat the inside of the lid with a thin layer of cooking oil.
Now find an old tablespoon, take a tablespoon of the plaster of paris and with your eyedropper
add drops of water to the plaster mixing it together with a matchstick.
When you have the consistency of a thick pudding, pour the mixture into the lid with the matchstick
and spread the mixture evenly to make your plaster base.Using your tweezers,
place the crystal onto the plaster base. Make sure the plaster is not too wet as it will absorb
the colour of the crystal.
Leave for 2 to 3 hours till the plaster sets and then gently press on the bottom of the lid
to release the plaster cast.





If you want to use the cast as jewelry, remember to make a hole in the plaster while it is still wet.
If you want to paint the plaster, use water colours.



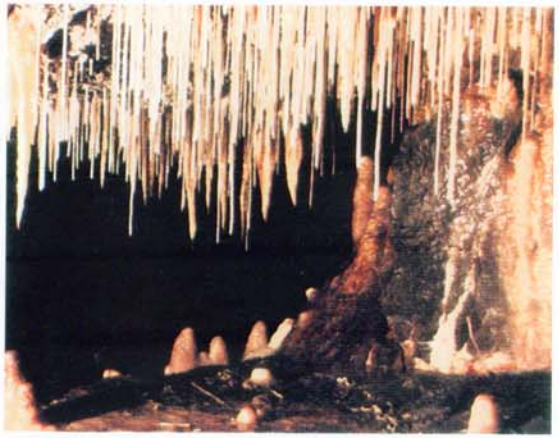


ACTIVITY 10

If you are feeling ambitious, you can prepare a plaster base with one of the lids from the plastic containers to create a crystal garden.
Using your collection of crystals;
imbed them into the still soft plaster and create a garden of your own design.
Use adhesive to attach crystals,
beads or pebbles to the imbedded crystals to add a further dimension to your garden.
You can also use a hardened plaster base or one of the plastic lids provided, and attach the crystals with double sided tape.
We leave this now to your imagination!

Activities that takes a long time

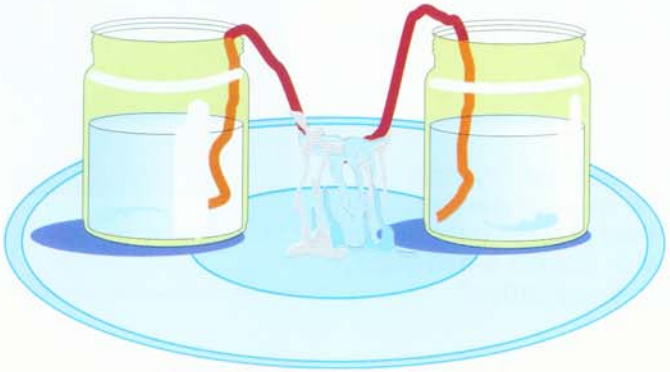
ACTIVITY 11



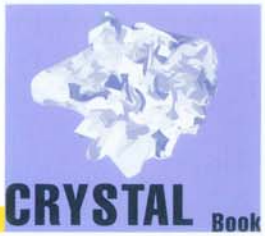
If you have visited caves where there are Stalactites and Stalagmites you will have noticed columns that have grown over hundreds of years from the ceiling and from the floor, at some stage they meet and form a column. This is caused by limewater dripping very slowly and crystallizing.
If you have patience, you can do this at home.

You will need the following:

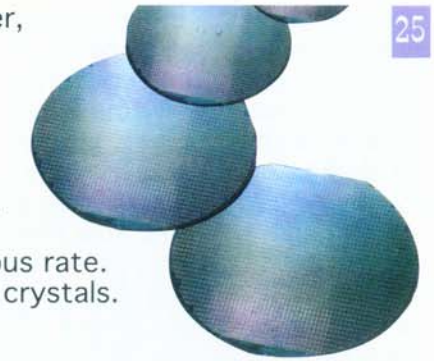
2 jars, old baking dish or aluminum take away dish, a strip of cotton cloth, preferably toweling 3 centimeters wide and 40 centimeters long.
12 tblsp of washing soda (sodium carbonate) this is to make the solution.
Pour one cup of hot water in each jar and put half of the soda in each jar. It is possible to try using the salts in your kit. Insert one end of the cloth in one jar and the other end in the other.
Make sure that in both jars the cloth reaches the bottom of the jar.
Place the jars in the dish as in diagram.
Place the dish in a warm place and well out of the reach of small children and than wait for several days, you will see that the solution starts to drip and starts making a column.



You are now proficient in the basics of crystal growing and we have given you various suggestions as to what you can do with the crystals.
It is now up to you to discover more about growing crystals.
Once you have really mastered the technique of crystal growing and if you have access to the internet; you will find clubs and competitions all over the world for dedicated crystal growers.
By now you will have a large selection of crystals on display;
but you do not know how they grow and how they achieve such amazing shapes.
We will now give you some insight into how they grow and how these fascinating symmetrical structures are formed.
Since ancient times people have been fascinated by crystals.
Because of their perfect symmetry and sparkling colours they were attributed with religious and supernatural powers, and this is still true today.
Many years ago "rock crystal' which looks like ice, was thought to be very hard frozen ice which was not able to thaw. As a result of this theory,
the rock crystal was given the name "crystal", from the Greek word "krystallos" meaning "ice".
Crystals are created from their solutions by either cooling or by evaporation.
Cooling is best explained by how rain is made. When moist, hot air rises to a high altitude and meets cold air,
the moisture in the air condenses and produces clouds containing water droplets.
These droplets are released as rain, snow, or hail depending on the temperature.

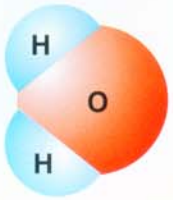


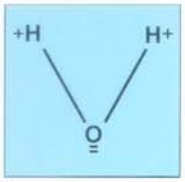
Evaporation is a much slower process; a good example is extracting salt from sea water,
a method still used today in some countries. Seawater is collected in large flat pools:
the water slowly evaporates through exposure to strong sunlight,
and gradually the salt crystals and other minerals are left behind.
Crystals are made synthetically for industrial purposes.
Synthetic crystals are used as semiconductors (for conducting electricity),
and as detectors, checking for harmful substances such as pesticides or leaking gases.
They are used in space research and also in the field of medicine.
Technology using synthetic crystals is very advanced and is developing at a tremendous rate.
Scientists are using the basic structure of a crystal to develop new types of synthetic crystals.
But what is the basic structure of a crystal?



A crystal consists of atoms connected in an organized and repetitive series.
The atoms group together to form molecules;
we can explain more easily by using water as an example.
A water molecule consists of 2 hydrogen atoms and 1 oxygen atom;
you probably know the chemical formula – H2O.
Atoms are either positively charged or negatively charged and they group together to form
molecules by applying the theory that "like charges repel and unlike charges attract"
You may know this from learning about magnets.
So a water molecule looks like this:

molecule of water

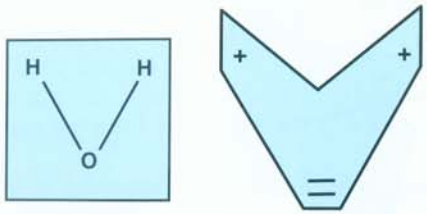




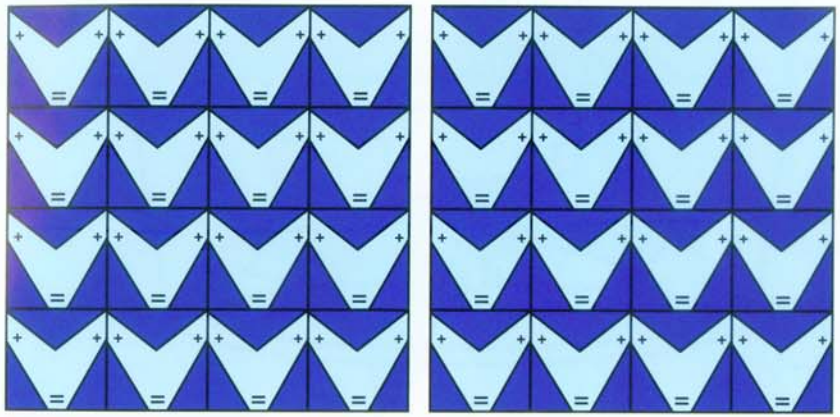
As you can see, the oxygen molecule has 2 negative charges and each
hydrogen molecule has a positive charge;
They join together to make a neutral molecule of water.
The following activity will show you how it works; it's not as easy as it looks!

ACTIVITY 12

Illustrated here are stylized models of water molecules.

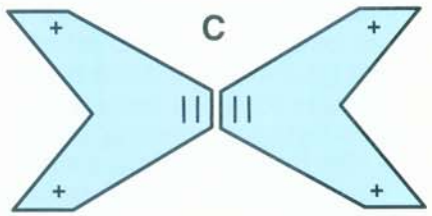


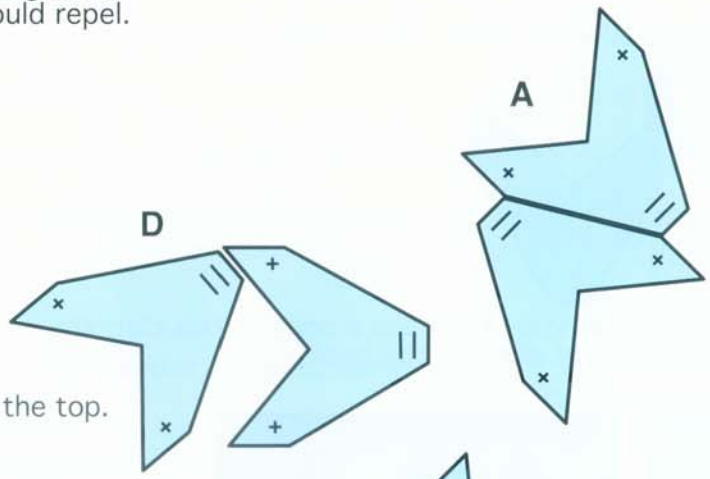
Cut them all out. We suggest that you first make a copy of this diagram, and then cut up the copy, so as not damage the book.



Cut one strip, fold it along the black lines. And then when you cut one molecule, you actually cut out four. Having cut out all the figures, which represent water molecules, "freeze" them. What you have to do in order to "freeze" them, is to place them on a table as close together as you can. Remember: like poles repel and unlike poles attract!

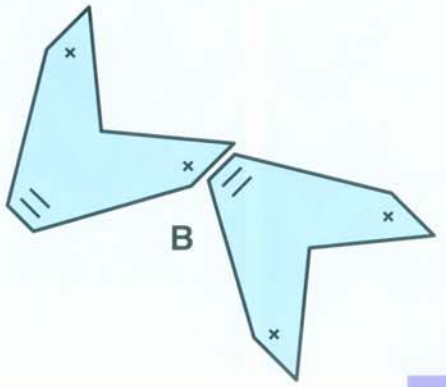
In the figure C, the two ends will not hold together, since both have the same charge. They would repel.





Notice that in figure D everything is O.K. at the top. At the bottom however, the two positive poles are too close to each other.

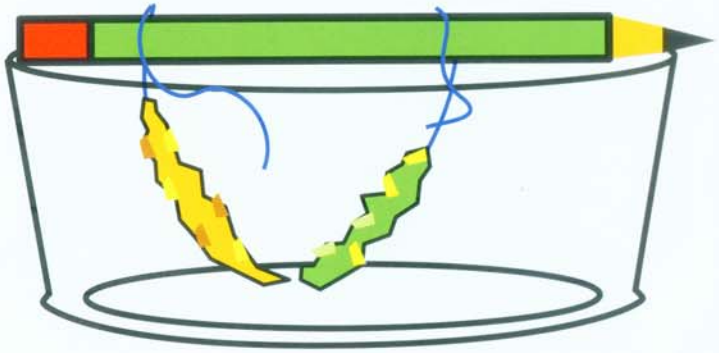
Assemble all the units and then check if everything is "legal". Notice that without even trying, you made some sort of pattern. Next ask a friend or relative to do what you have just done. This person will make a completely different pattern, but again without even trying his or her product will form a shape which resembles yours. Since both yours and his or her model must obey the same rules. This is what crystal formation is all about.



ACTIVITY 13

Make a sugar necklace. This takes a very long time.
Prepare a saturated sugar solution as you did in Activity 4 and put it in a baking dish.
It is a good idea to add a tea bag or food colouring to the solution.
Take a chopstick or a long pencil and tie a piece of string to each end leaving a suitable length for your necklace: (see the picture below).
Place the pencil on the edges of the baking dish so that the string is immersed in the solution.
Now you have to wait a few days for the crystals to grow on the string.

Once you have admired your necklace, **you should dispose of it down the toilet.**



ACTIVITY 14

Try growing the crystals in ice.
Place the container with your solution
in a bowl of ice cubes and see what happens.

ACTIVITY 15

Try putting the solution in a metal lid and placing
the lid on a warm radiator or warm pipe.
Make sure it is out of reach to smaller children.

ACTIVITY 16

See how big you can grow a crystal by repeatedly
immersing a seed crystal in a new saturated solution.

Troubleshooting

If your crystals are not growing check the following:

a) Your solution may not be saturated in which case
your "seed" is simply dissolving.
Start again with a saturated solution.

b) You may have left your solution in a place
with a varying temperature.
Always grow your crystals in a place
with a steady temperature.

c) You may have used a dirty container or left
your container uncovered.
It is very important to use clean equipment
and to prevent dust or dirt getting into the solution.