

EXPERIMENT MANUAL

Grow a **CRYSTAL**



WARNING — THIS SET CONTAINS CHEMICALS THAT MAY BE HARMFUL IF MISUSED. READ CAUTIONS ON INDIVIDUAL CONTAINERS AND IN MANUAL CAREFULLY. NOT TO BE USED BY CHILDREN EXCEPT UNDER ADULT SUPERVISION.

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SAFETY INFORMATION

Notes on Safety

WARNING. 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 old.

Keep the packaging and instructions, as they contain important information.

Contents: 1 packet of potassium aluminium sulfate (alum, EC no. 233-141-3) 20g (0.71 oz., Part No. 772060), 1 packet of dye, measuring cup, stirring stick, crystal storage box

Please start by reading and checking the label to be sure you have the correct chemical (potassium aluminium sulfate/alum).

Advice for Supervising Adults

Dear Parents,

The experimental equipment in this kit meets U.S. and European safety standards, which specify the safety requirements for crystal growing sets. These standards impose obligations on the manufacturer, such as forbidding the use of any particularly dangerous substances. The standards also stipulate that adults should assist their children with advice and assistance in their new hobby.

- A. Read and follow these instructions, the safety rules and the first aid information, and keep them for reference. Please observe the notes on handling the crystal salt (potassium alum) and its environmentally sound disposal.
- B. The incorrect use of chemicals can cause injury and damage to health. Only carry out those experiments which are listed in the instructions.
- C. This experimental set is for use only by children over 8 years.
- D. 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.

- E. The supervising adult should discuss the warnings, safety information, and the possible hazards with the child or children before commencing the experiments. Particular attention should be paid to the safe handling of hot water, alum, and the alum solutions.
- 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 and ventilated and close to a water supply. A solid table with a heat resistant top should be provided.
- G. Substances in non-reclosable packaging (potassium alum packet) should be used up (completely) during the course of one experiment, i.e. after opening the package.

Hot water is used in the production of crystal salt solution. You should devote special care to handling it safely and assist your child when help is needed. Make sure there is no fire risk


when heating water on the kitchen stove!

While experimenting, please be careful not to let the crystal salt come into contact with the skin, eyes, or mouth. It is also important not to let the crystal salt, its solution, or especially the finished crystals get into the hands of young children. They could mistake them for candies and put them into their mouths.

The powdered dye may leave behind stains, so your child should wear old clothes when performing the experiments. Keep all tablecloths, curtains, and carpets away from the experiment area.

The work area should not be in the kitchen, as chemicals should be kept strictly separate from foods and kitchen equipment. Do not use any containers or tools in the kitchen after you have used them for growing crystals.

Always get any required equipment and chemicals ready before starting an experiment.



Poison Control Centers (United States)

In case of emergency, your nearest poison control center can be reached everywhere in the United States by dialing the number:

1-800-222-1222

Local Hospital or Poison Centre (Europe)

Record the telephone number of your local hospital or poison centre here:

Write the number down now so you do not have to search for it in an emergency.

Basic Rules for Safe Experimentation (Safety Rules)

»» 1. Read these instructions before use, follow them and keep them for reference. Pay special attention to the specified quantities and the sequence of individual steps. Only perform the experiments described or suggested in this manual.

»» 2. Keep young children and animals away from the experimental area.

»» 3. Store this experimental set and the final crystal(s) out of reach of children under 8 years of age.

»» 4. Clean all equipment after use.

»» 5. Ensure that all non-reclosable packaging (crystal salt packet and dye packet) is disposed of properly.

»» 6. Wash hands after carrying out experiments and clean your workplace.

»» 7. Do not eat or drink in the experimental area.

»» 8. Do not allow chemicals to come into contact with the eyes or mouth.

»» 9. Do not apply any substances or solutions to the body.

»» 10. Do not grow crystals where food and drink is handled or in bedrooms.

»» 11. Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.

»» 12. Take care while handling with hot water and hot solutions. Be particularly careful with hot burners, and don't forget to turn them off after use! Do not inhale hot vapors!

»» 13. Ensure that during growing of the crystal the container with the liquid is out of reach of children under 8 years of age. All filled containers should have a label indicating what they contain.

Note the information on the crystal salt packet and the notes on handling the crystal salt.

ADVICE ...

... in case something should go wrong.

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. For example, move person into another room with open windows or outside.
- »» **In case of skin contact and burns:** Wash affected area with plenty of water for at least 10 minutes. Cover burns with a bandage. Never apply oil, powder, or flour to the wound. Do not lance blisters. For larger burns, seek immediate medical help.
- »» **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.**

Notes on handling the crystal salt (alum)

Please pay attention to the following hazard and precautionary statements about the potassium aluminium sulfate (alum) crystal salt contained in this kit.

Potassium aluminium sulfate (alum):

Avoid breathing dust. Do not get in eyes or on skin.

WARNING! The following applies to the alum:
Store locked up. Keep out of reach of children.

This primarily applies to young children, but also to older children who — unlike the

experimenter — have not been appropriately instructed by adults.

The following precautionary statement applies as well: **IF SWALLOWED: Get immediate medical advice/attention and have product container or label (of chemical substance) at hand.**

If any chemicals inadvertently get onto the skin, rinse off immediately under running water. Always be careful not to inhale chemical dust or powder when experimenting.

Making Colorful Crystals

EXPERIMENT 1

YOU WILL ALSO NEED:

- › Scissors, tap water or distilled water (from a supermarket or drug store), old pot, trivet, oven mitts, clean empty mason jar (heat-resistant canning jar), paper towels, old spoon

Before starting, get a trivet ready at your work station.

1. Open the crystal salt packet

Cut off one corner of the potassium aluminium sulfate packet with a pair of scissors. Never use your teeth! Make sure the printed information remains intact and legible. Pour the contents into a clean mason jar. Use the measuring cup to measure about 90 mL of water (3 cups of water using the measuring cup provided) and add it to the jar with the alum powder.

If the crystal salt has formed



clumps, this does not indicate a quality problem. It just means that some moisture (possibly from the air) has gotten into the packet. This won't affect the behavior of the salt. The salt's age also makes no difference.

2. Dissolve the crystal salt

Ask a grownup to help you with the following steps. Fill the pot with water to a height of about 3-4 cm. The water level should be below the level of the water in the mason jar. Place the mason jar with the alum powder and water in the middle of the pot. Bring the water in the pot to a boil. Switch off the stove and using the oven mitts carefully set the pot on the trivet. Stir the solution with the plastic

rod to help dissolve the crystals. The hot water will warm the mixture and dissolve the alum salt. If you still see a few individual crystals after repeated stirring, take out the jar and reheat the water in the pot.

3. Add the dye

When all the alum salt is dissolved add the packet of dye powder.

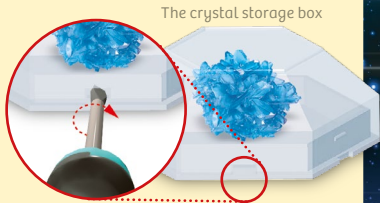
CAUTION: The dye can stain clothing and table surfaces!

4. Crystallization

Place the jar in a quiet, out-of-the-way location and wait. After just a few hours, you will start seeing transparent, angular shapes forming on the bottom of the jar, which will grow bigger and bigger within a day or two. Use an old spoon to fish out the crystals that you like best and place them on a paper towel to dry. Then put them in the transparent crystal box and close the box. Screw

Tip! If you don't get a large enough crystal to tie on a thread, you can repeat Experiment 1 multiple times. You can also save one of the small crystals and once the solution has cooled, place it in the solution. It will act as a seed crystal. Then wait a day or two. A hand towel can also be wrapped around the jar as it cools to slow the cooling process and allow the crystals to grow larger.

the lid onto the jar containing the remaining solution and label the jar. That way, you can continue to perform experiments with it later on.



Close the box tightly by pressing the lid and bottom together. Make sure the lid is positioned correctly. To open the box, insert a small screwdriver into the slot on the side and twist it carefully.

Making a Large Individual Crystal

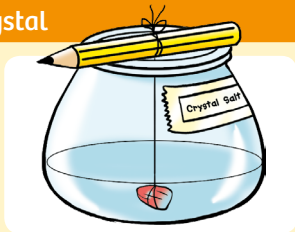
EXPERIMENT 2

YOU WILL NEED:

› The remaining crystal solution, a crystal from Experiment 1, old pot, trivet, oven mitts, thread

1. Heat the solution in the jar as in Experiment 1. Stir until all the crystals have re-dissolved. It will take a little longer this time because the crystals are larger. Let the solution cool for 20 minutes.

Tip! This is how to label the mason jars: Write "crystal salt solution" with a pencil or ballpoint pen on a narrow strip of paper, and tape the paper to the jar. If you use self-adhesive labels, you should still cover the label with a strip of tape.



2. After the solution has cooled, take a crystal from your box and tie a thread around it. Then tie the other end of the thread to a wooden skewer or long pencil, and lay the skewer or pencil across the top of the jar. The thread should be long enough to allow the crystal to be submerged in the solution without touching the bottom of the jar.
3. Return the jar to its out-of-the-way spot and wait. The crystal will continue to grow larger over the next few days. If a lot of little

crystals form on the bottom of the jar, you can simply reheat the solution to dissolve them — first removing the large crystal, of course, and then suspending it in the solution again after the liquid has cooled. It may take a few days, but with enough patience you will end up with a beautiful individual crystal that is about one inch in diameter.

Saving your crystals:
Always save your finished, dry crystals in the locked crystal storage box!



Cleaning and Disposal of Waste

Cleanliness is particularly important in chemistry. Always clean your containers and work area immediately after completing your experiments. Afterwards, rinse the containers well with clean water, dry them with paper towels, and then throw the paper towels in the trash. Because this experiment kit only includes small quantities of a harmless chemical, you can just rinse liquid waste down the drain with plenty of water. Dispose of solid waste in the household garbage.