



# CRYSTAL GROWING

## — LEARNING GUIDE —



**⚠ WARNING:**

This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

**WARNING:** This set contains chemicals that may be harmful if misused. Read the information in the instruction manual. If splashed in the eyes, or on skin, flush thoroughly with water. Get medical attention immediately if splashed in eyes. Not to be used by children except under adult supervision, Not recommended for children under 12 years of age.

**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.

# CRYSTAL-GROWING INSTRUCTION MANUAL

## Safety Information:

	Chemical	Danger Symbol	H-and P-Statements	CAS No.
<b>Crystal Growing Powder</b>	Ammonium dihydrogenorthophosphate {Monoammonium Phosphate}	None	None	7722-76-1
<b>Crystal Seed Rock</b>	Ammonium dihydrogenorthophosphate {Monoammonium Phosphate}	None	None	7722-76-1
	Plaster of Paris	None	None	26499-65-0

## 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 only 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.
- 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.
- Do not allow chemicals or the crystal growing solution to touch any object besides the inside of your heat resistant crystal growing container. Chemicals and the solution may cause damage to clothes, objects, or surfaces.
- Substances in non-reclosable packaging should be used up {completely} during the course of one experiment, i. e. after opening the package.

## Safety Rules:

- 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 crystal {s} out of reach of children under 8 years of age.
- Clean all equipment after use.

- Ensure that all empty containers and/or non-reclosable packaging are disposed of properly.
- Wash hands after carrying out experiments.
- Do not eat or drink 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 with hot water and hot solutions.
- Ensure that during growing of the crystal the container with the liquid is out of reach of children under 8 years of age.
- Always wear eye protection.
- Dispose of contents and container in accordance with local regulations.

## First Aid:

- 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.

# CRYSTAL-GROWING INSTRUCTIONS

**WARNING:**Adult supervision required.

**Note:** Making your crystal solution is a time-sensitive experiment. To increase your chances of success, before you begin, gather and prep all of your ingredients, set up your workspace, and **thoroughly read all of the safety warnings, directions, and tips.**

## Contents List:

- Crystal Growing Powder-1.94 oz(55g) X3
- Seed Crystal Rock X3
- Magnifying Glass X1
- Wood Stir Stick X3
- Plastic Display Stand X3
- Instructions X1
- Beaker X3



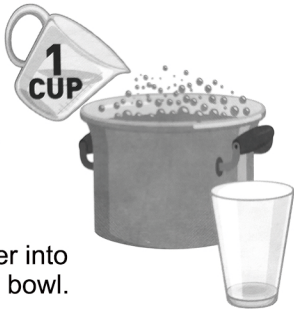
## What You' ll Need:

1. A stainless steel pot or an electric tea kettle to boil some water. {Filtered or distilled water is recommended.}  
**NOTE:** Do not use an aluminum pot.
2. A glass measuring cup.
3. A medium-sized mixing bowl {1 to 1.5 quarts}. **NOTE:** You can mix the Crystal-growing powder directly in the pot, just make sure after evaporation you are left with 1 cup of hot water.
4. A Crystal-growing chamber, such as a pint glass or a jar. It should be clear and heat proof.
5. Newspapers or cardboard to place below your experiment to help prevent the solution from spilling onto any surfaces.
6. A Crystal-growing area: Find a location where your experiment can remain undisturbed for 7-10 days. There are three things your area should have: stability, light, and warmth. Vibration will impede the Crystal growth, so place your Crystal-growing chamber in a spot where it won't be affected by surrounding movement. Light and warmth will make the water evaporate faster. We recommend 68°F {20°C}. {Your Crystal will still grow in a cooler, darker spot-just not as fast or as large.}

# Crystal-Growing Steps:

**1** Place the newspapers or cardboard in the spot where you will be mixing your Crystal-growing powder into the hot water. Thoroughly clean and dry the measuring cup, the mixing bowl, and your Crystal-growing chamber.

**2** Boil a little more than one cup of water {because some will evaporate}. While it's still very hot, pour **only 1 cup** into a glass measuring cup, and then pour the hot water into your mixing bowl.



**3** Without delay, pour some of the Crystal-growing power into the hot water and stir it with the stirring stick until it dissolves. Then pour in a little more powder, and keep stirring. Continue pouring and stirring until no more powder will dissolve in the solution. This process should take no more than five minutes.



**NOTE:** You may not need to add the entire bag of Crystal-growing power, but the more powder you can get to dissolve, the more Crystals will grow.

**4** Carefully pour the Crystal-growing solution into your Crystal-growing chamber, making sure to leave behind any undissolved crystal powder



**5** Place your experiment in your Crystal-growing area, and then let the solution cool for 15 minutes.

**6** Carefully drop the seed rock into your Crystal-growing chamber {flat side down}. If necessary, use the stirring stick to move the seed rock to the center of the chamber.



**7** Leave the experiment undisturbed for- 7-10 days. You should start to see crystal formation within a day, but the longer you let the experiment sit, the larger your Crystal will grow.

**8** To remove the remaining water-- careful, the Crystal will be delicate!-- gently tilt the growing chamber and pour the water out. You may need to hold the Crystal in place while pouring. If the Crystal is difficult to remove, have an adult use a butter knife or spoon to gently separate the seed rock from the base of the chamber. Then carefully remove your Crystal.

## Tips:

- Some people have reported that they can grow larger crystals if they cover the top of the crystal-growing chamber for the first 24 hours of the experiment. You can give this a try; it won't hurt the crystals, but make sure you remove the cover after 24 hours so the water will evaporate.
- Crystal-growing is a popular hobby, and the hobbyists who have the greatest success do so because they keep detailed notes. Mark down when you began the experiment, how much powder you used, how long you stirred it for, how long the water cooled for, etc. Then, when you're ready to try again, you can grow bigger and better crystals!
- This is a genuine experiment and, as such, there are many variables in play that can be difficult to control. These instructions should provide optimal results, but individual results will vary.

Always feel free to contact  
**support@g-p.hk**  
with any questions or concerns.

## What is a Crystal?

By definition, a crystal is a solid structure formed when atoms or molecules line up in a regular, three-dimensional pattern. The salt on your dinner table, the snow on the ground, and the diamond in a wedding ring are all crystals.

The actual word crystal comes from a Greek word krysos meaning "ice cold."



It was originally thought that crystals were a type of ice that was so cold it would never melt. A little over 200 years ago, scientists concluded that crystals "grew" by the addition of layers.

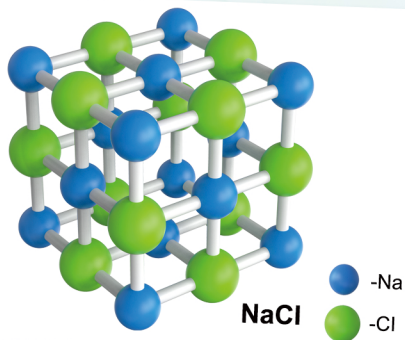
The smallest building block of a crystal is called a unit cell. The atoms in each unit cell are held together by electrical forces or bonds.



When a bunch of unit cells are near each other, the atoms arrange themselves into patterns. They tend to attract to one another in some directions more than in others. This pattern gives the crystals their characteristic shape with flat symmetrical



**Salt**



surfaces called facets. Some crystalline materials, such as gemstones, can be single crystals; others, such as metals, are made up of large numbers of small crystals that are joined together.

**Cool science  
Fact**

**A typical grain of salt has about 5700 unit cells, or 22800 atoms of sodium and the same number of atoms of chlorine.**



## How Do Crystals Form?

In nature, crystals form when liquid rock called magma slowly cools. Many valuable crystals such as diamonds, rubies, and emeralds form this way. Another way crystals form is when water evaporates from a mixture. Salt crystals typically form through this method.

Natural crystals only form when Earth's temperature and pressures are just right. But crystals can also be created in laboratories under controlled conditions. As you'll see with this science kit, they can even be created in your own kitchen!



## Here's How it Works

When certain types of liquid cool, the molecules inside the liquid begin to solidify. These crystal particles join together into unit cells. The first unit cells usually start by attaching to the surface of something solid {like the bottom of a cave}. The unit cells that form next will then attach themselves to the first crystals, forming a new layer. Given the right conditions, there really is no limit to the size to which a crystal can grow.

Graphite



The shape of crystal depends upon the substance it is made from. In perfect lab conditions, crystals can be grown to all have the same shape, but under different conditions of temperature and pressure, the same type of substance may crystallize in many different forms. For example, carbon has two distinct crystalline forms--diamonds and graphite.

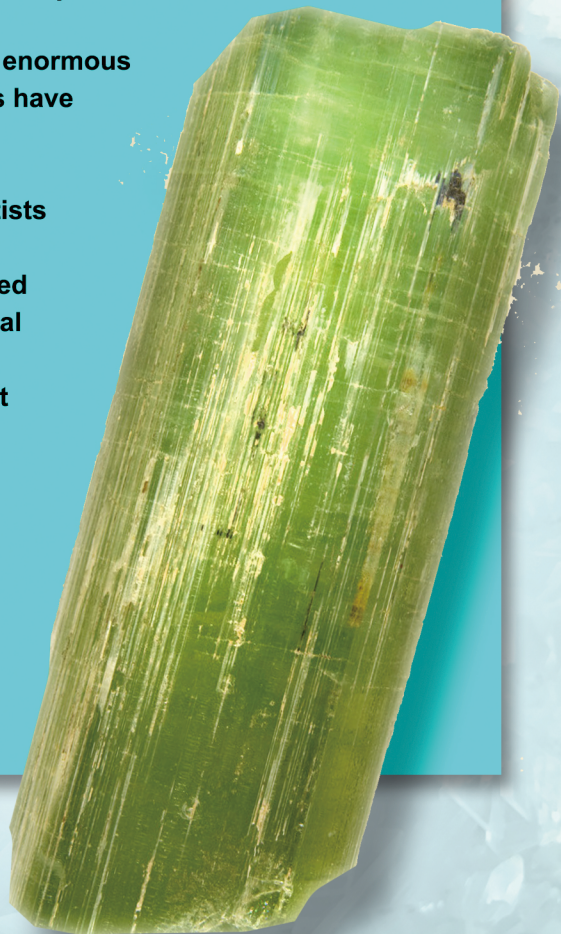


**Diamonds**

**Cool science  
Fact**

**Largest crystals ever found!**

Many enormous crystals have been found, but not all of them have been documented by scientists to confirm their size. The largest documented crystal is a beryl crystal found in Madagascar that measured 59 feet long and 11.5 feet in diameter. Based on its size and density, mineralogists estimated that it weighed 418 tons!



**Beryl**

## **Types of Crystals**

Crystals can form in a wide variety of shapes. Their range includes cubes, hexagons, double pyramids, tall spires, and more. Some crystals have just a few sides while others may have more than ten! Often crystals are symmetrical from one side to the other, but many types of crystals are not. The shape of the crystal structure is determined by the chemical components inside the crystal and the chemical bonds between the atoms and molecules.



Crystals also come in many colors, from clear diamonds, to red rubies, to blue sapphires, and more. They get their distinctive color from the materials that make up the crystals. The presence of iron in a quartz crystal, for example, will create purple amethyst. The crystal does not absorb. For instance, if a stone appears to be red, it



**Amethyst**

is because the green light is absorbed and the red light is reflected from the surface of the crystal. If a stone appears to be orange then the colors of blue and green are absorbed.



**Quartz**

**Quartz is the second most abundant mineral in the Earth's continental crust, and no matter how distorted a quartz crystal may be, the long prism faces always make a perfect 60 degree angle. Use the magnifying glass to inspect the real specimen in this kit and the crystal you grew. Do you notice any differences in the angle of the crystal faces?**

**Cool science  
Fact**

## Amethyst

This stone gets its name from the Greek word amethystos, which means “not drunken.” Many people believe that wearing amethysts offers protection from intoxication, and drinking vessels were often carved from amethyst. It is even thought to be helpful in overcoming addiction.

The ancient Egyptians saw amethyst as a stone of the intellect and wisdom. It has also been considered a calming influence, a good stone for clarity, and a protection from sorcerers and thieves.

Other uses for amethyst include remedies for hearing problems, insomnia, headaches, and other pain. Some sources suggest it can be used to stabilize mental disorders.



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