

CRYSTAL GARDEN



Please note the safety advice, the safety rules, and the suggestions for supervising adults.

WARNING — Chemistry Set. This set contains chemicals and parts 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.

Contents

3rd Edition 2012
© 2008, 2010, 2012 Franckh-Kosmos Verlags-GmbH & Co. KG, Pfizerstrasse 5–7, 70184 Stuttgart, Germany

This work, including all its parts, is copyright protected. Any use outside the specific limits of the copyright law is prohibited and punishable by law without the consent of the publisher. This applies specifically to reproductions, translations, micro-filming, and storage and processing in electronic systems, networks, and media. We do not guarantee that all the information in this work is free from copyright or other protection.

Project management: Kristin Albert; Revision: Karin Bischoff; Copy editing: Christiane Theis; Technical product development: Dr. Petra Müller; Packaging design and layout: Peter Schmidt Group GmbH, Hamburg; Manual concept: Atelier Bea Klenk, Berlin; Manual typesetting and layout: Michael Schlegel, Komuniki, Würzburg; Manual illustrations: Frieder Werth, Horb; Andrea Mangold, München
Manual photos: istockphoto, p. 4, top right and bottom right; Grisca Georgiew, p. 4 middle right (©fotolia.com); da-ruk, p. 4 bottom left (©istockphoto.com); CC-BY-2.0, p. 7 middle; Ra'ike, p. 8 top right (©wikipedia.de, CC-BY-SA-3.0); Dr. Mark Bachofer, Stuttgart, p. 7 top center; Lindsey Nicholson (CC-BY-2.0), p. 8 bottom
Packaging photos: argus; ExcellEnt backgrounds HERE (both ©shutterstock.com); Michael Flaig, pro-studios, Stuttgart (overview of contents)

1st English Edition © 2013 Thames & Kosmos, LLC, Providence, RI, U.S.A.
© Thames & Kosmos is a registered trademark of Thames & Kosmos, LLC.
Editing: Ted McGuire; Additional Graphics and Layout: Dan Freitas

Distributed in North America by Thames & Kosmos, LLC, Providence, RI 02903
Phone: 800-587-2872; Email: support@thamesandkosmos.com

- ▶ 4 Flower cards
- ▶ 4 Packets of magic water (aqueous solution of monopotassium phosphate, item no. 706185)
- ▶ 4 Growing dishes
- ▶ 8 Filter paper tree pieces

Check that all of the materials are contained in the box.

You will also need: paper, colored pencils or paintbrush and paint, scissors, non-permanent felt-tip markers (optional), old spoon, water

SAFETY INFORMATION

Safety Notes

WARNING!

- »» Only for use by children over 10 years of age. Not suitable for children under 10.
- »» For use under adult supervision. To be used solely under the strict supervision of adults who have studied the precautions given in the experimental set.
- »» Contains some chemicals which present a 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.
- »» Keep the experimental set out of the reach of children under 10 years old.
- »» Eye protection for supervising adults is not included.

NOTE! Not suitable for children under 3 years of age. There is a risk of suffocation due to small parts that might be swallowed or inhaled. Save the packaging and instructions, which contain important information.

Note! Before you start experimenting, please read the following information carefully.

Safety Rules and First Aid Information

- »» 1. Read these instructions before use, follow them and keep them for reference.
 - »» 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 10 years of age.
 - »» 4. Clean all equipment after use. Dispose of liquid waste down the drain (rinse it down with water), and put solid waste in the household garbage.
 - »» 5. Ensure that all empty containers and non-reclosable packaging are disposed of properly.
 - »» 6. Wash hands after carrying out experiments.
 - »» 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. Do not let the magic water get onto your body. Do not bring it into contact with your eyes or mouth.
- 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 cold 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.
- »» 10. Do not grow crystals where food or 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.
 - »» 13. Ensure that during growing of the crystal the container with the liquid is out of reach of children under 10 years of age.

Poison Control Centers

The following resources are available day and night to provide information on measures that should be taken in all cases of poisoning:

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.

When in doubt, seek medical advice without delay. Bring the chemical and its container with you. In case of injury, always seek medical advice.

Suggestions for Supervising Adults

Dear Parents,

With this experiment kit, you and your child will be able to make glittering decorative crystal flowers together.

It is natural to have questions about the safety of a kit that contains chemicals. Improper use of chemicals can lead to injuries and other health risks. The experimental equipment in this kit meets U.S. safety standards as well as European Safety Standard EN 71-4, which specifies safety requirements for chemistry experiment kits. This standard imposes obligations on the manufacturer, such as forbidding the use of any particularly dangerous materials.

The aqueous solution of monopotassium phosphate contained in this kit is **non-toxic** and is used as a **food additive** (E340). Nevertheless, the safety standard specifies that parents should be ready to provide their children with help and advice in their new hobby.

Therefore, please read and follow these instructions, the safety rules and the first aid information, and keep them for reference.

Tell your child that it is important to pay attention to all this advice, and to perform only those experiments described in this manual, since the incorrect use of chemicals can lead to injuries or other health risks. Inform your child, but do not frighten him or her.

This experimental set is for use only by children over 10 years. The capabilities of children in any age group can vary quite a bit, so take a look through the experiments and carefully select those that seem safe and appropriate for your child.

Before starting the experiments, discuss all the safety information with your child!

Any well-lit, solid table with a surface that can handle a little abuse will serve as a work area. The surroundings should be free of any obstacles. However, the work place should not be in the kitchen — all chemicals must be kept strictly separate from foodstuffs and kitchen utensils!

It is best to have some paper towels on hand during the experiments, in case anything gets spilled. Any substances in non-reclosable packages (magic water pouches) should be completely used up during the experiment, i.e. after opening the package.

We wish you and your child a lot of fun with the fabulous crystal animals!



Where Do Your Flowers Grow?

EXPERIMENT 1

YOU WILL NEED:

▶ Paper, colored pencils or brush and paints, scissors (optional)

1. Think about which flower you would like to start with. Then create a drawing or painting as a place for your flower to grow.

Tip! Of course, you could also make several settings at once.

2. Think about a landscape or location that would be appropriate for your flower.

Does your flower grow in a warm greenhouse? Does it pop up deep inside a shady forest? Does it bloom by a calm moonlit pond? Or would you find it in a sunny garden near your home? Maybe the photos here will give you some inspiration for your scene.

3. You can also cut a shape out of the paper, such as a flower pot or a garden bed.



Making Magical Crystal Flowers

EXPERIMENT 2

YOU WILL NEED (FOR ONE FLOWER):

> 2 filter paper pieces (choose the color you want to use), flower card, green growing dish, bag of magic water, scissors, non-permanent felt-tip markers (optional)

1. Find a level work surface in a quiet place inaccessible to small children and animals. Your work surface should be able to get a little messy.

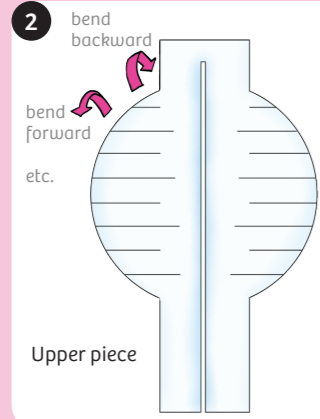
Tip! The crystals will grow especially well in a cool room.

2. Fan out the cut sections of the two paper pieces (upper piece and lower piece) by bending them slightly forward and backward in alternation.

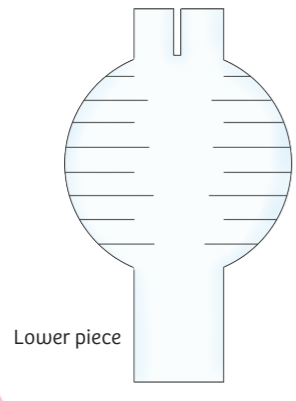
Tip! If you want different colors in the centers of your flowers, it's easy to change. Just color the white filter paper with a felt-tip marker in whatever color you like. As the liquid rises up the paper, it will take the color with it, and the crystal needles will become colored as well.

3. Then, push the lower piece into the cross-shaped mounting bracket in the green dish, hold it tight, and insert the upper piece onto it. Be careful not to bend the paper sections.

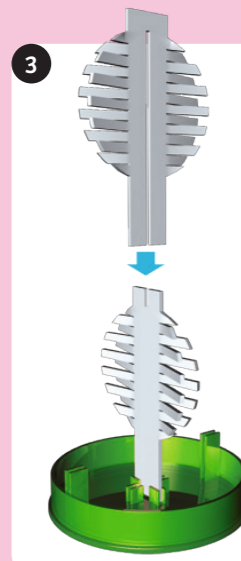
4. Set your selected flower card onto the paper structure and secure the flower's bottom petals in the holders on either side.



Upper piece



Lower piece



3



Making More Magic Water

EXPERIMENT 3

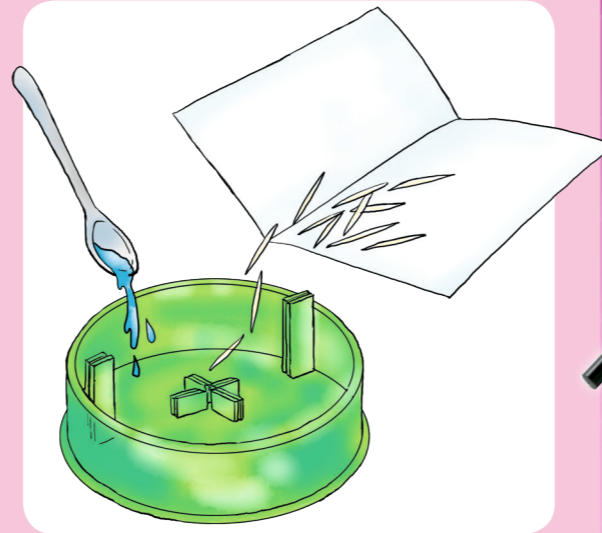
YOU WILL NEED:

> Crystal animal, miniature bowl, sheet of paper, old spoon, water

1. Use the spoon to scrape as many of the needles as possible off the flower and collect them on a piece of paper that you have creased down the center. Then pour the crystals into the dish, using the crease to help guide them.

2. Next, fill water into the dish with your old spoon, and stir carefully until the crystals have dissolved again.

3. Use this solution to make another crystal flower.



NOTE! Always use scissors to cut open the magic water packets at one corner. Never use your teeth. Make sure the printing on the packet remains readable.

5. Place the dish on the surface you drew or painted. Use a pair of scissors to cut open a magic water packet at the corner. Carefully fill the dish with the liquid.

Now leave your animal alone and watch how it changes.



WHAT'S HAPPENING? You won't need all that much patience, because you will start to see some changes pretty quickly. The liquid will first start to rise up the paper. You will see that the paper turns darker when it's wet. After a few hours, you will notice that all the liquid has disappeared from the dish. You will start to see a few fine needles at the edges of the paper tree, which will proceed to grow in size and number as time passes. Eventually, all the edges and some of the flat surfaces will be coated with a thick layer of white needles. Your flower has grown a pretty, glittering center.

Check It Out

WHAT DO SALT, SUGAR, AND SNOW HAVE IN COMMON?

You can find crystals all around you — salt and sugar both consist of crystals.

In winter, you can marvel over ice and snow crystals.

WHO DISCOVERED THE FIRST CRYSTALS?

Certain remarkable rocks had already been discovered in Stone Age times, over 10,000 years ago. These rocks glittered with unusual colors. People couldn't explain what created these extraordinary stones.

So crystals were regarded as something very special — as they still are to this day. People associate them with mysteries, and attribute healing powers to them. They are also thought to bring good luck.

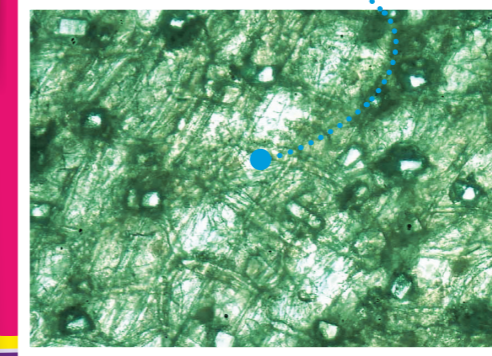


WHAT ARE CRYSTALS ANYWAY? Some minerals possess a very special quality: They form cubes, sharp needles, crooked squares, octagons, or other complicated shapes with smooth faces that sparkle in the light. Some glow with a blue, green, or red color. Others are as colorless as ice, and just as clear. These regular shapes are called crystals. The most beautiful crystals are very sought-after and valuable. They have names like diamond, sapphire, ruby, and amethyst. They filled the treasure chests of conquerors and decorated the crowns of emperors and kings.

DO CRYSTALS "GROW"?

Crystals don't grow in the same sense of the word as plants grow. It is perhaps more appropriate to say that crystals "form," because growing implies that they are alive. Crystals are inorganic, meaning that they are not living things.

Crystals actually form naturally inside the living tissue of many plants. These crystals are called druse, and form when minerals crystallize inside plant cells. Some people think they help the plant fend off hungry animals that might otherwise eat the plant.



WHAT ARE THE DIFFERENT CRYSTAL SHAPES THAT EXIST?

Crystals feature clear geometrical shapes that are otherwise unusual in nature. They form when dissolved substances gradually turn hard again. They can harden in the shape of needles like the ones that you made. But there are also small cubes, such as in salt, or so-called octahedrons. The shape is determined by the type of substance involved.



Crystal of potassium aluminum sulfate salt (alum)

HAVE YOU EVER SEEN ICE CRYSTALS ON PLANTS?

Frost crystals form on plants when the surface temperature of the plants drops below freezing. Water vapor freezes on the plants and forms tiny, fragile crystals that look like snowflakes. This is called hoar frost.

If you look closely at frost or snowflakes, you will see that it looks rather similar to the crystal structures you grew with this kit. However, the chemical composition is quite different.



WHAT ARE FROST FLOWERS?

In extremely cold parts of the ocean covered by smooth sheets of ice, you can sometimes find beautiful, delicate flowers made entirely of ice. This happens when the air is so cold, calm, and dry that it sucks water from the ice, and then deposits the water bit by bit in the form of fine ice crystals. Sometimes whole "meadows" of frost flowers cover large expanses of ice.

