EXPERIMENT MANUAL

SPARK
SCIENCE IN A FLASH

CRYSTAL GEODE

THAMES & KOSMOS

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

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 7 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 7 years of age.

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.

CAUTION!
For plaster (gypsum) and potassium aluminum sulfate (potassium alum):
May cause eye and skin irritation.
Avoid breathing dust. Do not get in eyes, on skin, or on clothing.
Wash hands thoroughly after handling.
Do not ingest. Use only as instructed.

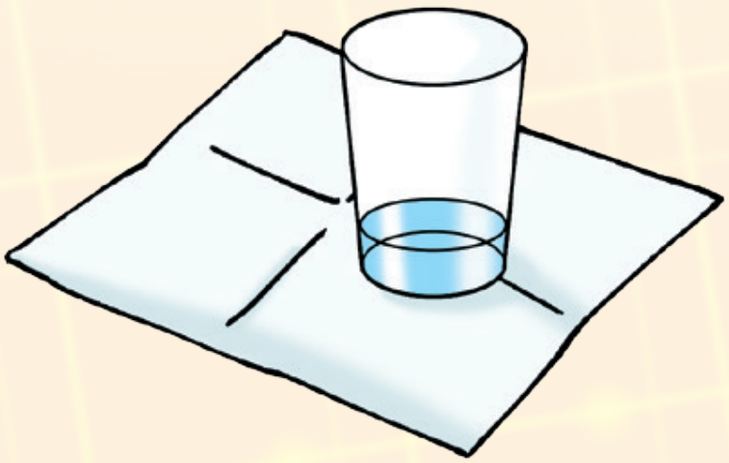
WARNING!
Not suitable for children under 3 years. There is a risk of choking due to small parts that can be swallowed or inhaled.
Keep the packaging and instructions, as they contain important information.

EXPERIMENT: MAKING A CRYSTAL GEODE

1. To start, you will need to make some seed crystals. Mix 20 grams of the potassium alum powder and 90 milliliters of water in a clean glass jar. Distilled water works best.

2. Place the jar in a metal cooking pot with an inch of water in it. Heat the pot on a stove set to a medium setting. Stir the alum mixture.

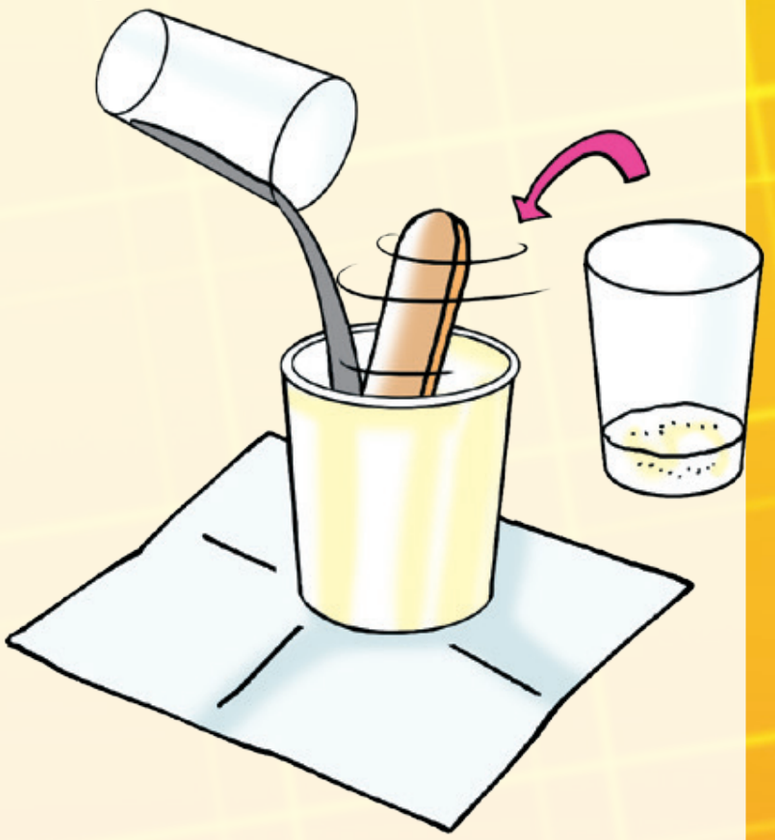
3. Once all the alum is dissolved, remove the jar from the heat. Leave it alone for a day or so. Seed crystals will have formed at the bottom of the jar. Remove them and save them.



4. Now you will make the plaster shell of the geode. Mix 100 grams of plaster and 60 milliliters of water. It should be a thick paste. Add more water or plaster to thin or thicken it as needed.

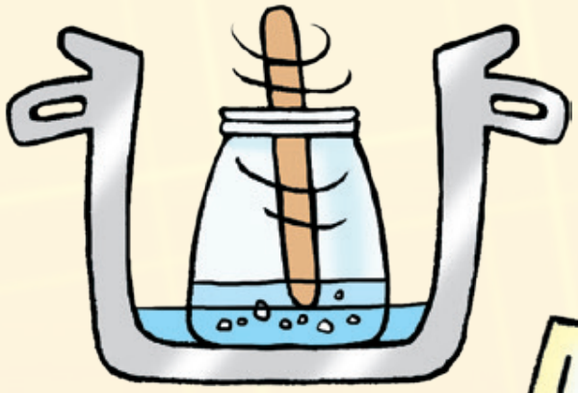
5. Use the spatula to spread about a quarter inch of plaster evenly on all sides and the bottom of the mold. You may have to wait a bit for the plaster to harden.

6. Sprinkle the seed crystals into the wet plaster, so they become embedded there. Let the shell harden for a day.

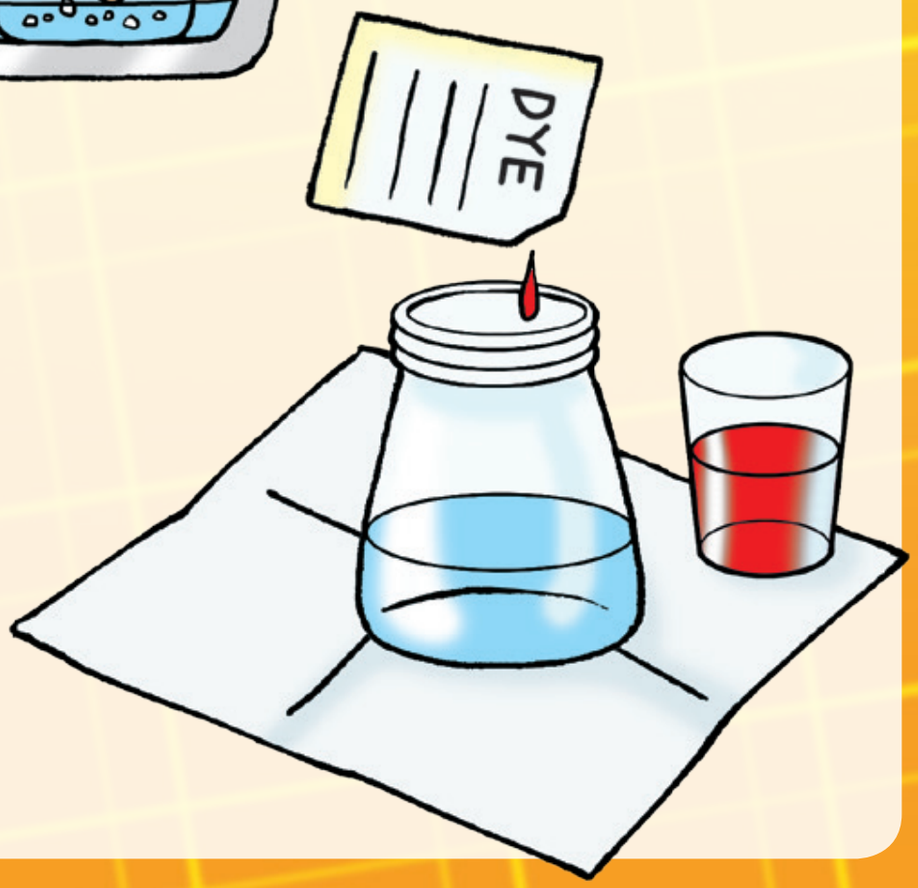


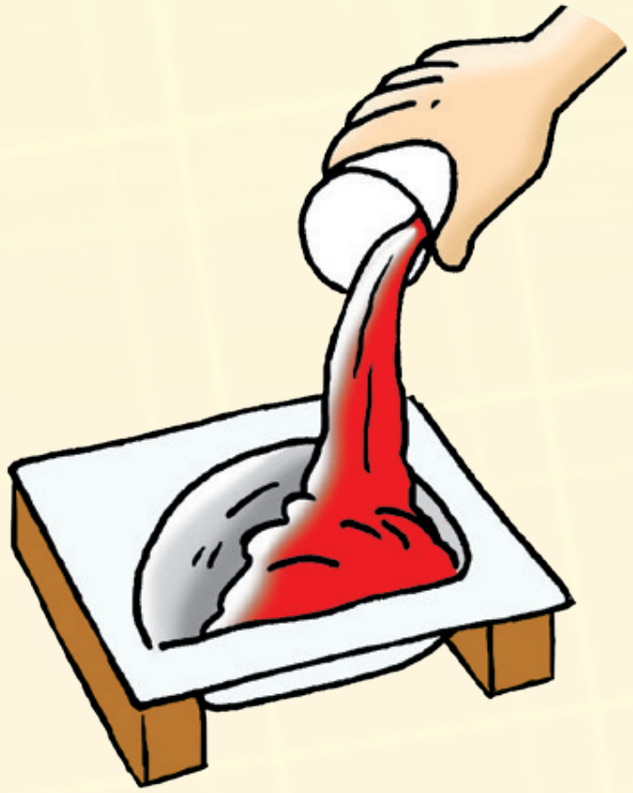
7. Now you will make the colored alum solution to finish your geode. Mix 20 grams of alum and 90 milliliters of water in a clean glass jar.

8. As before, heat the mixture in a pot with an inch of water in it until the alum is dissolved.



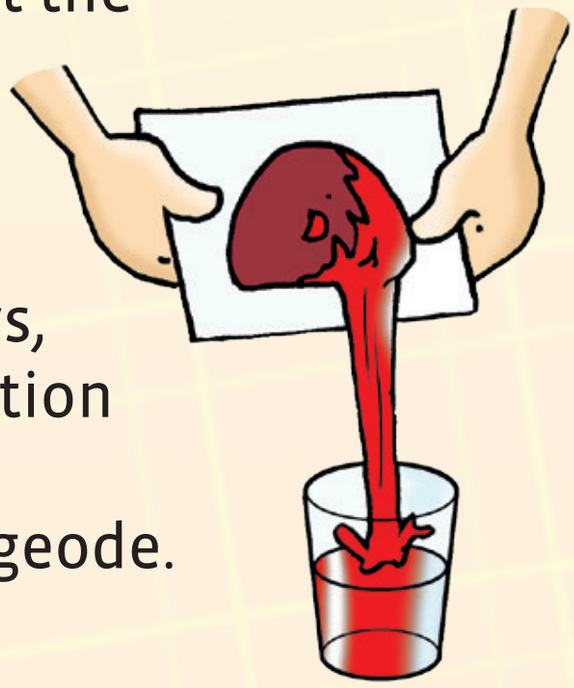
9. Remove the jar from the heat. Add the color dye and mix until dissolved.





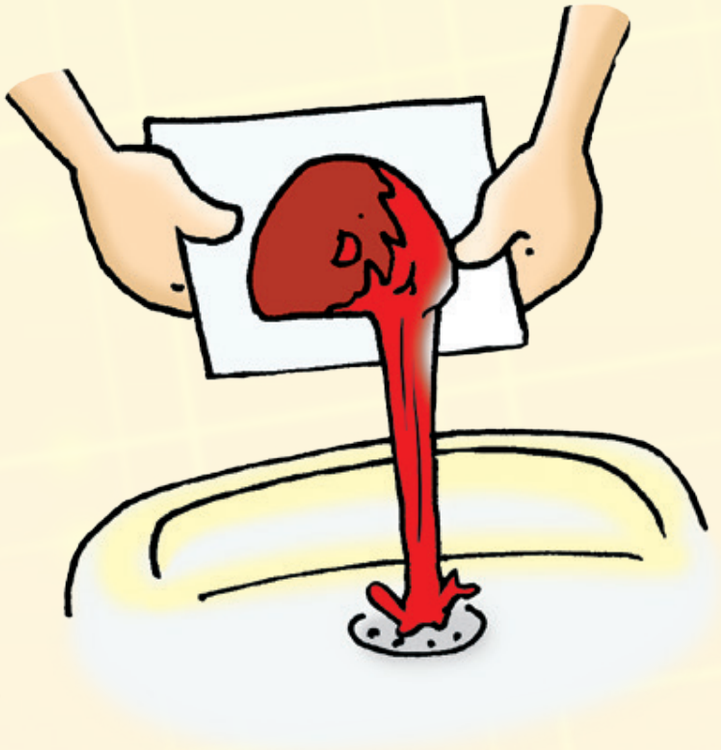
10. Let the alum solution cool for a few minutes. Pour the solution into the geode shell, up to the brim.

11. Let the geode sit undisturbed for two days to let the crystals grow.

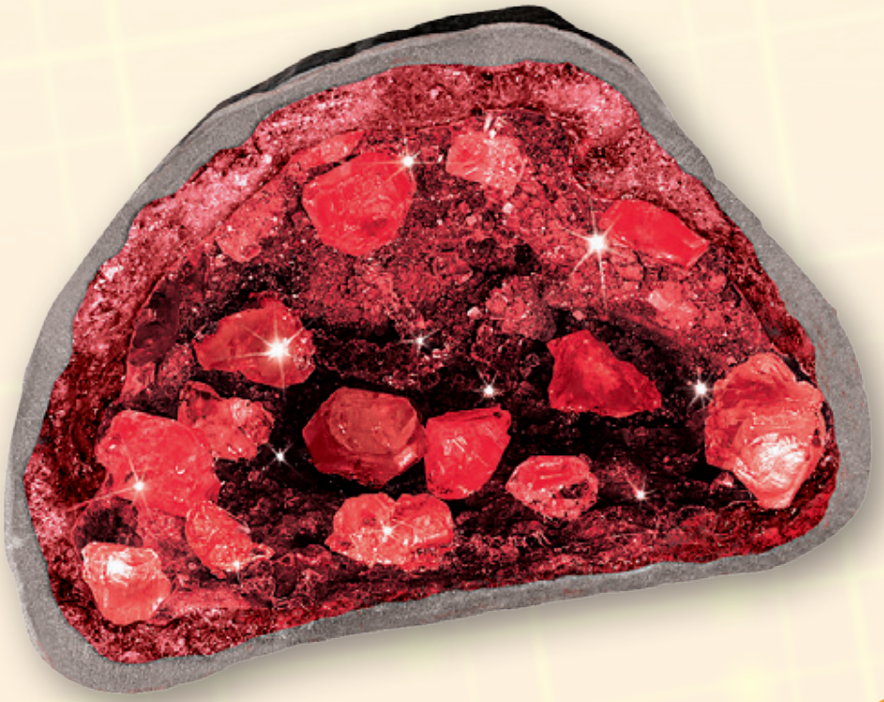


12. After two days, pour the solution into a jar and inspect your geode.

13. If you are happy with your geode, pour the leftover solution down the drain with a lot of water. If not, pour the solution back into the mold and let it crystallize for a few more days. You may want to reheat and redissolve loose crystals that may have formed.



14. Let the geode dry for another day. Then you can carefully press it out of the mold. Loose plaster or crystals pieces can be thrown away in the trash.



HOW DO GEODES FORM?

A rock **geode** forms when hollow spaces in volcanic rock become filled with hot water. Since this process takes place inside the Earth, **pressure** and **temperature** are often very high — ideal conditions for minerals to be dissolved in the water. If the mineral-containing water cools off in shallower layers of Earth, the minerals will crystallize out on the geode's walls — just as the alum in your experiments turned to crystals when the temperature in the jar dropped. The growth of crystals inside geodes can take years or decades. They look quite ordinary on the outside, but if you find a geode and break it open, you will discover the gorgeous crystals within.