

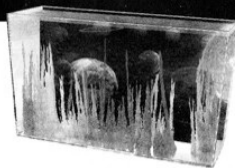
Smithsonian[®] MAGIC ROCKS[®]

INSTRUCTIONS

Magic Rocks—Your Crystal Garden

Your Magic Rocks kit is an example of what can happen when soluble (that is, able to dissolve in liquid) metal salt crystals are placed in a solution of sodium silicate dissolved in water. Interestingly, even after more than a century of studying this experiment, scientists still do not completely understand all of the details of how the crystal gardens grow. What they do know, however, is that when the dissolved metal salts react with the sodium silicate solution, a hydrous metal silicate gel forms around the metal salt crystal, and acts as a permeable membrane. That means that water molecules can still travel from one side of the membrane to the other. Because there are more metal salts, and less water, inside the membrane, water is pulled into the membrane in a process called osmosis, and the membrane begins to stretch, like an expanding balloon. It can only stretch so far, though, and sooner or later, it breaks open, and a jet of the metal-rich fluid shoots out into the surrounding sodium silicate solution.

In your kit, because the metal-rich fluid from inside the membrane is less dense than the surrounding sodium silicate solution, it rises upward. Around the edges of this rising fluid plume, where the metal-rich solution meets the sodium silicate solution, metal silicate is precipitated, forming a solid cylindrical wall around the rising plume, and a stalagmite-like column is formed. With other sorts of mineral salts, or in space, where there is no gravity, the crystal formations might be downward, sideways, or in blobs.



#52381

ages
10+

TOTAL NET WT. OF METALLIC SALTS: 0.44 oz (12.4 g)
TOTAL NET WT. OF SODIUM SILICATE: 9 fl oz (266 ml)

WARNING: Adult supervision required.

WARNING: SKIN AND EYE IRRITANT.
HARMFUL IF SWALLOWED.

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! SKIN AND EYE IRRITANT.
HARMFUL IF SWALLOWED.

Contains sodium silicate. Avoid contact with skin, eyes and mucous membranes. In case of contact, flush well with water. For skin, wash area with soap and water. For eyes, get immediate medical attention. If swallowed, give large quantities of water or milk. Call physician immediately. Parents, please read all cautionary statements on enclosed instructions. CONFORMS TO ASTM D-4236.

For additional health information call a physician or contact your Poison Control Center: 1-800-222-1222. FOR AGES 10 AND UP WITH ADULT SUPERVISION.

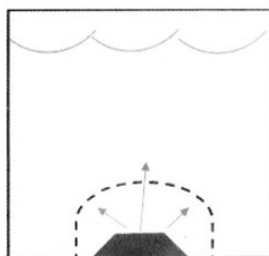
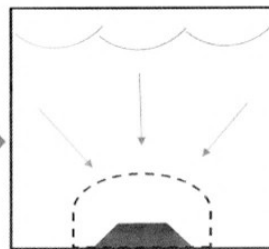
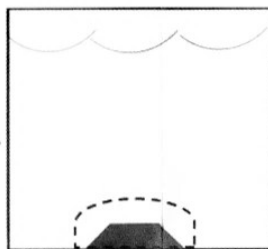
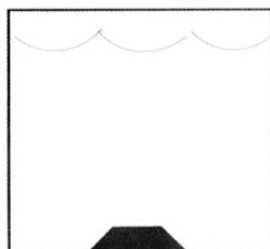
CAUTION: CLEAN SPILLS IMMEDIATELY!

THE LIQUID CHEMICAL (SODIUM SILICATE), BEFORE IT IS DILUTED WITH WATER, CAN BE HARMFUL. ONCE IT IS MIXED WITH WARM WATER, IT WILL STAIN CLOTHES, FURNITURE OR ANYTHING IT COMES IN CONTACT WITH. WATER AND MILD SOAP IS THE ONLY NEUTRALIZER YOU CAN USE. IT TAKES ONLY TEN (10) SECONDS TO RUIN A VARNISHED, WOOD STAINED, OR ANY OTHER TYPE OF FURNITURE SURFACE.

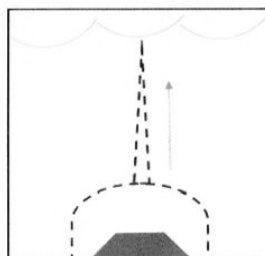
Metal salt crystal in sodium silicate solution—the two chemicals coming into contact create a reaction.

A gel of hydrous metal silicate forms around the metal salt crystal, and the gel acts as a semipermeable membrane.

Because there is more metal salt and less water inside the membrane, water from the silicate solution is pulled into the membrane by osmosis.



The added water causes the membrane to swell, and eventually it ruptures, shooting out a jet of metal-rich fluid into the surrounding solution.



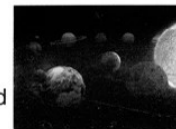
Because the fluid inside the membrane is less dense than the sodium silicate solution, it rises upward. Around the edges of this rising fluid plume, where the metal-rich solution meets the sodium silicate solution, solid metal silicate is precipitated, forming a stalagmite-like column.

INCLUDES

0.44 oz (12.4 g)
Metallic Salts



Magic Solution
2 x 4.5 fl oz (133 ml)
Sodium Silicate

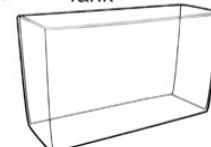


Background
Picture

Sticker
Sheet



Tank

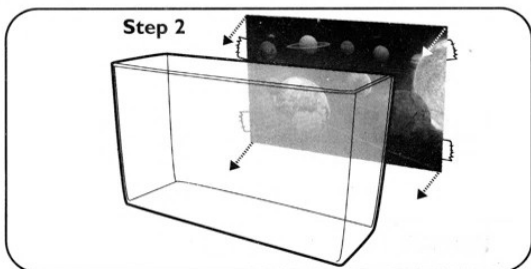


Before you start, please read these instructions from beginning to end.

- 1** Cover your work surface with wax paper, plastic wrap, or aluminum foil. DO NOT USE NEWSPAPERS! Work on a non-wood surface, and take all precautionary measures to avoid any spills. Have soap, water and paper towels handy just in case.

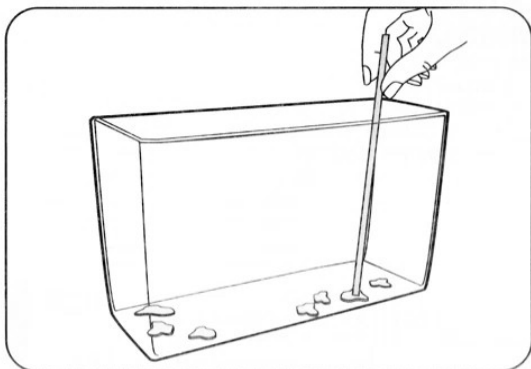
OVER

- 2** Tape the background picture to the OUTSIDE of the back of the tank with household cellophane tape.



- 3** Break or cut large rocks into approximately 1/4 inch (6.35 mm) to 1/2 inch (12.7 mm) pieces. Divide the rocks into (2) equal multicolored groups. Drop one rock group into tank. Use the end of a paintbrush or similar item to move rocks so that they are not touching each other or the sides of the tank.

NOTE: Excessive sediment will form on bottom if too many rocks are planted at one time. Grow rocks in a well ventilated room.



- 4** With scissors, snip off a corner from each of the 2 Magic Solution packages and carefully pour the contents into a glass mixing jar (not included). Add 32 fl oz (946 ml) of warm (70°F/21 °C) water and stir thoroughly with the end of a paint brush or similar item.

NOTE: The first group of rocks may not fully grow. They are necessary for the second group of rocks to be successful! Water which is too hot will accelerate growth. Cold or cool water will stunt the growth of your rocks. It is important to thoroughly stir the Magic Solution (sodium silicate) and water. Sodium silicate is heavier than water, and if not mixed thoroughly with the water, it may have a tendency to go to the bottom of the container.

- 5** Carefully pour the mixture into the tank. Mixture should be approximately 1/4 inch (6.35mm) from top of the tank. Use your paintbrush end to separate or reposition any rocks that may have moved. **DO NOT STICK YOUR FINGERS INTO THE SOLUTION!** Discoloration of the liquid mixture is caused by the color of the rocks and is normal. Keep the growing tank on a level surface. Do not move or mix liquid while your Metallic Salts are growing. Let this rock group grow for at least six hours.

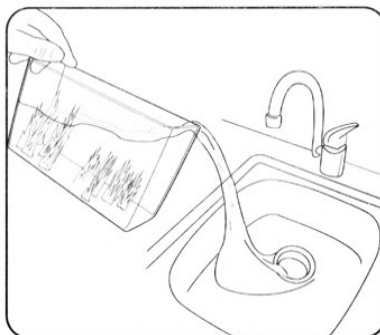
NOTE: The first group of rocks may not fully grow. They are necessary for the second group of rocks to be successful!



- 6** Plant your second rock group. These new rocks may touch rocks already grown but should not touch the tank sides.

After about another six hours, when your rocks are fully grown, pour the liquid solution used for growing Metallic Salts down the sink drain. Rinse the sink with hot water.

Carefully fill the tank with fresh tap water. Two or more fillings of fresh tap water may be necessary to properly cleanse your tank. Be careful as your rock garden is brittle. Keep your growing tank filled with fresh water. Add additional water to compensate for evaporation.



Contents and colors may vary.
Conforms to ASTM D-4236.

Contains sodium silicate. Avoid contact with skin, eyes and mucous membranes. In case of contact, flush well with water. For skin, wash area with soap and water. For eyes, get immediate medical attention. If swallowed, give large quantities of water or milk. Call physician immediately. Parents, please read all cautionary statements on enclosed instructions.



24hrs Emergency
Australian Poison
Control Centre
Tel: 131 126

Dear Customer,
NSI International, Inc. is the manufacturer of this kit. We hope you enjoy your Magic Rocks kit. If you find that we have made an error or if something is missing or damaged, let us know so that we can correct the problem for you. Please include the following:

- Name of item
- Date of purchase
- Purchase price (please include sales slip)
- Model number
- Place of purchase
- Brief description of the problem

Please do not contact Smithsonian or return the kit to the store where you purchased it. They will not have the replacement!

Send all correspondence to:

Distributed by
HUNTER LEISURE PTY LTD
94 Keilor Park Drive Tullamarine VIC 3043
Australia
Tel: 03 9287 9888

