

INSTRUCTIONS:

SPACE AGE CRYSTALS[®]

CRYSTAL GROWING KIT ITEM # 6127

Ages 12 +

WARNING:

This kit contains chemicals which may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision. Do not swallow crystals, chemicals or solutions. Avoid contact with eyes, mouth, and skin. Read instructions before use. Keep crystals, chemicals, and solutions out of reach of small children. If chemicals or solutions come in contact with skin, rinse immediately with warm water. If chemicals or solutions get in the eyes, flush immediately with warm water. If chemicals, crystals, or solutions are swallowed, call a physician immediately.

CONTENTS OF KIT:

- 1 bag of "citrine" crystal growing chemical*,
- 1 bag of "emerald" crystal growing chemical*,
- 1 bag of "aquamarine" crystal growing chemical*,
- 1 bag of "ruby" crystal growing chemical*,
- 2 bags of "gypsum" (aka "plaster of Paris")**,
- 1 plastic tray with 1 geode mold, 1 geode stand,
- 6 crystal growing vessels (marked A, B, C, D, E, and F), and
- 4 lids (marked G, H, K, and L),
- 2 spatulas,
- 1 booklet about Space Age Crystals[®] (48 pages),
- 1 set of instructions.

* 7.1 oz (200 grams) each of Ammonium Phosphate Monobasic ($[(NH_4)H_2PO_4]$, CAS # 7722-76-1).

** 6.3 oz (180 grams) each of Calcium Sulfate Hemi-Hydrate ($(CaSO_4 \cdot \frac{1}{2}H_2O)$, CAS # 26499-65-0).

WHAT ELSE YOU NEED:

- An old stainless steel (or glass) saucepan with lid, which is no longer used for cooking (do not use any aluminum or Teflon coated pans),
- plastic (or glass) storage container with lid (capacity 500 ml or 16.9 oz),
- rubber gloves,
- plastic wrap,
- newspaper (or paper towels),
- pen,
- paper,
- ruler,
- scissors (helpful, but not required),
- scotch tape (electrical tape would be even better).

BEFORE YOU START YOUR EXPERIMENTS:

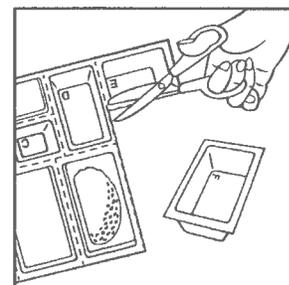
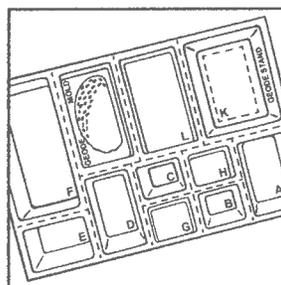
Make sure to **read the complete set of instructions prior to starting any experiments!** Select a room for your experiments, where the temperature remains relatively constant, and where the crystals can grow undisturbed. Avoid moving your crystal growing vessels during the experiment. **Protect your work area well with plastic wrap and newspaper.** The crystal growing chemical and solutions are dyed with food colors (see warnings on each individual chemical bag). Accidental spills may stain your table, carpet or floor. As an additional safeguard, you might want to place the crystal growing vessels inside a large plastic container.

Please make sure that young children do not have any access to the crystal growing chemicals, crystals and solutions during, and after the experiments! For additional safety, wear rubber gloves when handling solutions, chemicals, or crystals.

It is important to carefully measure the amount of water in each experiment. This is crucial to the success of your crystal growing experiments!

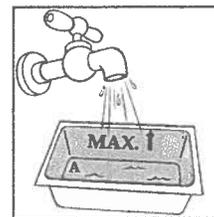
The crystals you will grow with this kit look quite similar to their natural counterparts. Their chemical composition, however, is quite different: Your **SPACE AGE CRYSTALS[®] "CITRINE", "EMERALD", "AQUAMARINE",** and **"RUBY"** consist of ammonium phosphate monobasic ($[(NH_4)H_2PO_4]$, water (H_2O), and a small amount of food dye.

Separate the plastic tray into its components by bending the tray several times along the perforated lines until the various parts come apart, or use a pair of scissors to cut out the parts. Make sure to eliminate any sharp edges.

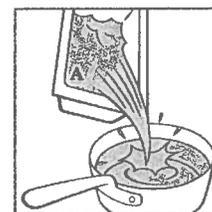


EXPERIMENT # 1: GROWING "CITRINE" CRYSTAL SEEDS™

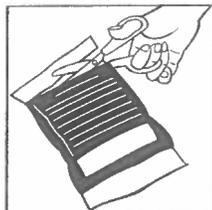
1.1 Fill vessel "A" with water up to the rim (approx. 350 grams, or 11.83 oz, or 1.5 cups of water).



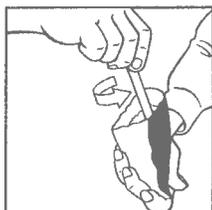
1.2 Pour all of the water from vessel "A" into the saucepan.



1.3 Open chemical bag marked: "CITRINE".

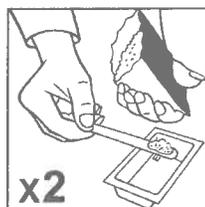


1.4 Stir contents of bag with spatula.

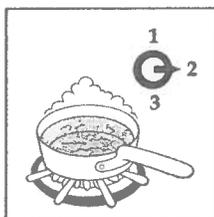


1.5 Remove two tips of chemical with spatula, and place into vessel "E".

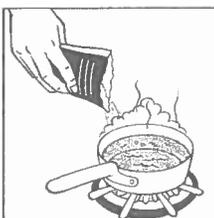
Note: have a closer look at the chemical on the spatula, and you will notice that the chemical actually consists of many tiny crystals.



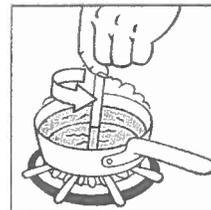
1.6 Place saucepan (filled with water in step 1.2) onto a heating element, and set heat to medium.



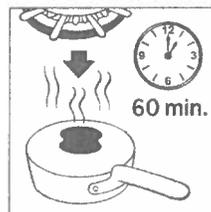
1.7 Pour remaining contents of chemical bag marked "CITRINE" into saucepan.



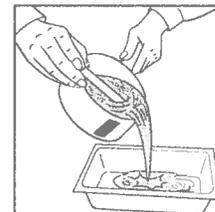
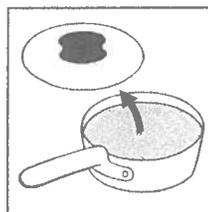
1.8 While heating the solution, stir solution **constantly** with spatula until the chemical is **completely** dissolved, and the solution becomes "clear" (cloudless). **Note:** We have formulated this to happen at approx. 55 °C (131 °F). In case you accidentally overheat the solution (even up to the boiling point), the solution will still grow crystals afterwards, but you would then need to be very careful, because above 60 °C (140 °F) the solution becomes burning hot!).



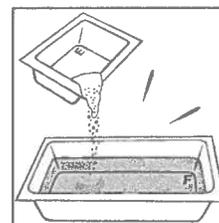
1.9 Remove saucepan from heat, cover with lid, and let solution cool down for 60 minutes.



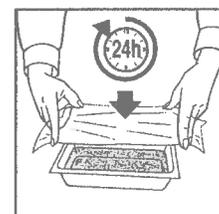
1.10 Remove cover from saucepan, and pour all of the solution carefully into vessel "F".



1.11 Pour all of the contents of vessel "E" (see step 1.5) into vessel "F". **Note:** The chemical particles will now act like "seeds", and help jump-start the crystal growing process inside the supersaturated solution.



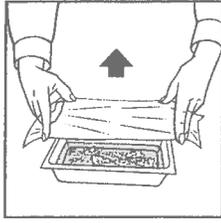
1.12 Cover vessel "F" with plastic wrap, and let stand for 24 hours. **Note:** You should be able to see the first small crystals appear within 12 hours.



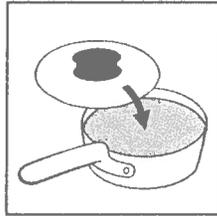
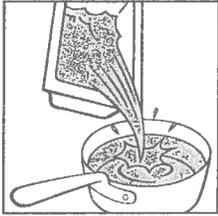
IMPORTANT SAFETY NOTE:

Use extreme caution when heating solutions in the experiments! Overheated solutions may cause instant severe burns. In case of any accidental burns, immediately rinse affected areas for at least 5 minutes with cold water, seek medical attention, or call a doctor right away!

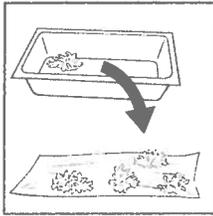
1.13 Remove plastic wrap from vessel "F". **Note:** Look at all of the sparkling Space Age Crystals®, which grew inside the solution. If no crystals grew then it's probably because you used too much water. In this case, let vessel "F" stand uncovered for at least one week at a time. Eventually enough water will evaporate from the solution, and the solution will become supersaturated again (which is the state required for crystals to grow).



1.14 Carefully pour solution from container "F" into saucepan, and cover saucepan with lid. **Note:** Avoid dropping any crystals into the saucepan (if you accidentally do, don't worry, because the seeds will be dissolved again in Experiment 3).



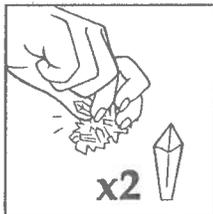
1.15 Now you can remove all of the grown crystal seeds from vessel "F". Place them on absorbent paper (or newspaper). Allow to dry for 1 hour.



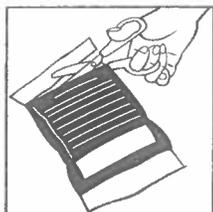
1.16 Clean vessel "F" with warm water for re-use in other Experiments.

EXPERIMENT # 2 :
PREPARING FOR THE GROWTH OF A "CITRINE" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND CRYSTAL CAVE™ GEODE.

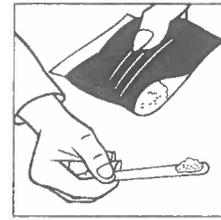
2.1 Select two nice looking single crystal seeds from step 1.15. **Note:** If you don't have any single crystal seeds, you can easily break them off any crystal cluster.



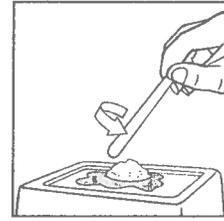
2.2 Cut open one of the bags marked "GYPSUM".



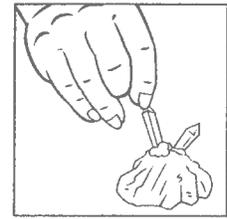
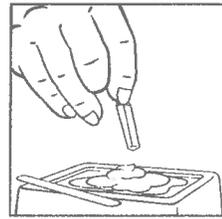
2.3 Use tip of spatula to remove a small amount of "GYPSUM" from the bag, and place onto lid "L".



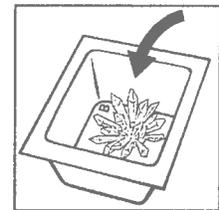
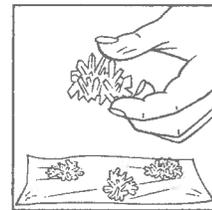
2.4 Add two drops of water to the "GYPSUM" (on lid "L"), and mix well with spatula. **Note:** "GYPSUM MIX" needs to be rather thick in order to work as glue.



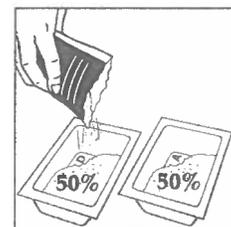
2.5 Select a "BASE ROCK" from "CONTENTS OF KIT", and use the "GYPSUM MIX" from step 2.4 to adhere the two single crystal seeds from step 3.1 onto the "BASE ROCK". Allow to dry for 1 hour. **Note:** While the "GYPSUM MIX" hardens, you will have to hold the single crystal seeds without moving. This should take about 3 to 5 minutes.



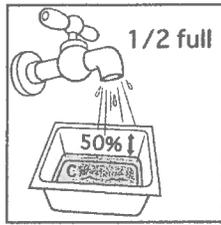
2.6 Select a nice looking "CRYSTAL CLUSTER" from step 1.15, and place it into vessel "B". **Note:** You can break off any unwanted parts, and place them back onto the absorbent paper. Be sure to leave a large enough crystal cluster seed (about 4 cm or 1.5" in diameter).



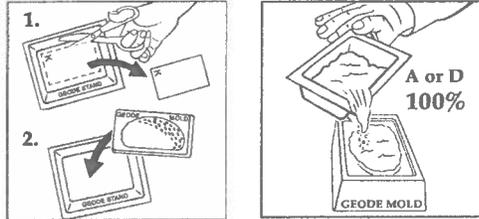
2.7 Take the opened "GYPSUM" bag, and pour all of its contents equally into vessels "A" and "D". **Note:** Skip this step for Experiment 5 and 11, because you should still have one of these vessels filled with "GYPSUM" (from the previous Experiment).



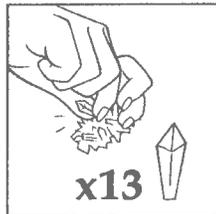
2.8 Fill half of vessel "C" with cold water (about 60 grams, or 2 oz, or ¼ cup of water).



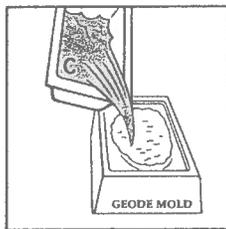
2.9 Select "GEODE MOLD", and remove lid "K" (if you haven't already done so - you can also use scissors to cut out lid). Then place "GEODE MOLD" into "GEODE STAND", and pour "GYPSUM" from vessel "A" (or vessel "D", but not both) into vessel "GEODE MOLD".



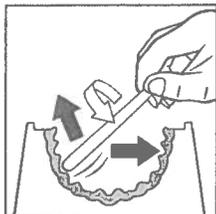
2.10 Select 13 single crystal seeds from step 1.15, and set aside for use in step 2.13. **Note:** The crystal seeds can be either single crystals or small crystal clusters, but they should not be larger than 3 cm in size (approx. 1 1/8"). Don't worry, if you don't have exactly 13.



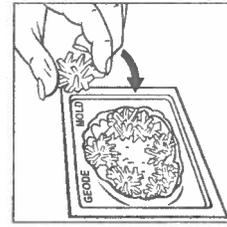
2.11 Pour water from vessel "C" into vessel "GEODE MOLD" (which was filled with "GYPSUM" – see step 3.9), and mix well with spatula. Stir every 20 seconds until the "GYPSUM MIX" becomes thick enough to spread it along the inside walls of the "GEODE MOLD" (after about 5 to 7 minutes).



2.12 Spread the "GYPSUM MIX" evenly with spatula along the inside of the "GEODE MOLD" walls. **Note:** While the "GYPSUM MIX" hardens, you will have to work very fast (about 90 seconds to finalize step 2.12 and 2.13). Make sure to also spread enough "GYPSUM MIX" up to the lower rim of the mold (do not spread above the lower rim!).



2.13 While the "GYSPUM MIX" is still soft, push the bottom part of the 13 crystal seeds set aside in step 2.10 into the "GYPSUM SHELL" (from step 2.12). Allow to dry for 1 hour.

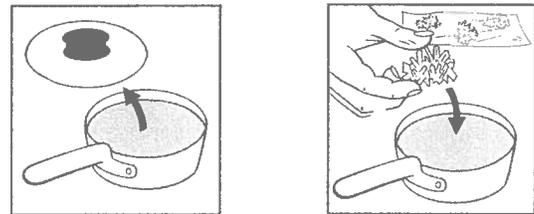


2.14 Now you should have all of the following items **before** continuing with your next Experiment:

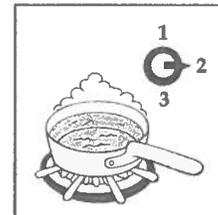
- 1 base rock with 2 single crystal seeds attached,
- 1 crystal cluster in vessel "B",
- 1 geode shell covered with crystal seeds,
- 1 saucepan covered with lid (holding crystal growing solution),
- 1 absorbent paper with many extra crystal seeds.

EXPERIMENT # 3: GROW A "CITRINE" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND CRYSTAL CAVE™ GEODE.

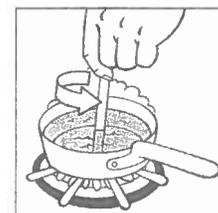
3.1 Remove cover from saucepan, and add all of the remaining seeds from step 1.15 to the solution in the saucepan.



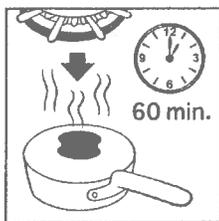
3.2 Place saucepan onto heating element, and set heat to medium.



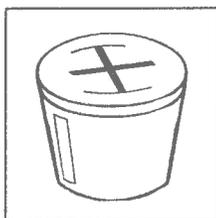
3.3 While heating solution, stir solution **constantly** with spatula until the crystal seeds are **completely** dissolved. **Note:** We have formulated this to happen at approx. 55 °C (131 °F). In case you accidentally overheat the solution (even up to the boiling point), the solution will still grow crystals afterwards, but you would then need to be very careful, because above 60 °C (140 °F) the solution becomes burning hot!).



3.4 Remove saucepan from heat, cover with lid, and let solution cool down for 60 minutes.



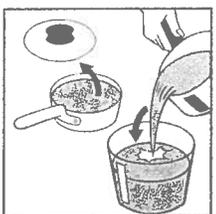
3.5 Select a **clean** plastic storage container (or glass container) with lid, which can hold at least 500 ml (16.9 oz) of liquid. **Note:** You can use, for example, an old margarine plastic container from your recycling bin, or an old glass jar. Make sure it is sanitized first, and completely clean prior to use!



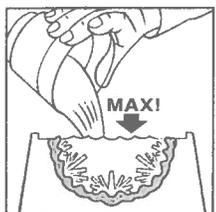
3.6 Label the "SOLUTION STORAGE CONTAINER" from step 3.5 with a permanent marker.



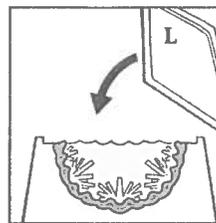
3.7 Remove lid from saucepan, and pour entire solution from step 3.4 into the "SOLUTION STORAGE CONTAINER" from step 3.6.



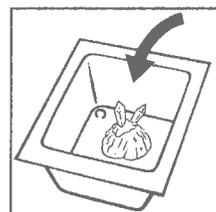
3.8 Pour solution from "SOLUTION STORAGE CONTAINER" into "GEODE SHELL" (from step 2.13) until "GEODE SHELL" is filled up to its lower rim. **Note:** Do not let solution inside the "SOLUTION STORAGE CONTAINER" cool down too much, and be sure to complete steps 3.8 to 3.16 within about 3 minutes. Avoid spills and do not overfill the vessels.



3.9 Cover "GEODE MOLD" with lid "L".



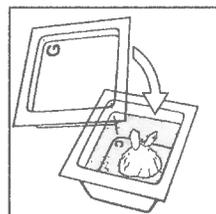
3.10 Place "BASE ROCK WITH SINGLE CRYSTAL SEEDS" from step 2.5 into center of vessel "C".



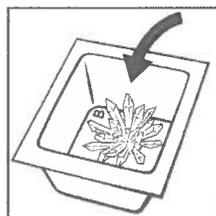
3.11 Fill vessel "C" with solution from "SOLUTION STORAGE CONTAINER" up to 1 cm (0.4") below the rim.



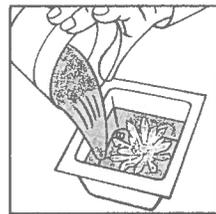
3.12 Cover vessel "C" with lid "G".



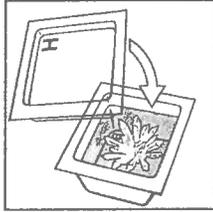
3.13 Use vessel "B" from step 2.6, and center crystal cluster.



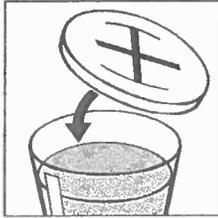
3.14 Fill vessel "B" with solution from "SOLUTION STORAGE CONTAINER" up to 1 cm (0.4") below the rim.



3.15 Cover vessel "B" with lid "H".



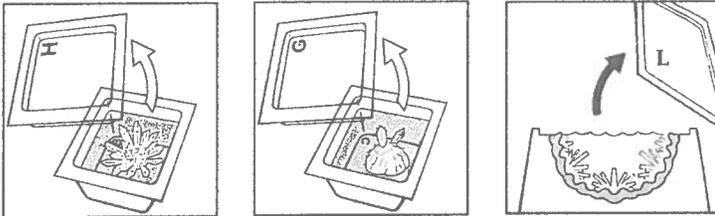
3.16 Cover "SOLUTION STORAGE CONTAINER" with lid.



3.17 Write down the **current step number, time, and date** on a piece of paper, place it beside the vessels, and leave vessels "B", "C", and "GEODE MOLD" **undisturbed for 24 hours**. **Note:** Write this down, it will help you remember when you started the crystal growth experiment.



3.18 After **24 hours** of crystal growth, remove lids from vessel "B", "C", and "GEODE MOLD".



3.19 On the piece of paper (from **step 3.17**), strike out previous notes, and write down current step number, time, and date. Place paper with notes beside the vessels.

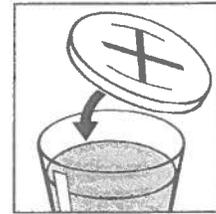
3.20 Allow crystals to grow in uncovered vessel "B", "C", and "GEODE MOLD" for another **72 hours** (3 days).



3.21 After 72 hours of crystal growth, use solution from "SOLUTION STORAGE CONTAINER" to refill vessels "B", "C" and "GEODE MOLD" up to 1 cm (0.4") below the rim.



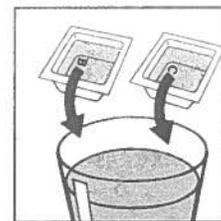
3.22 Cover "SOLUTION STORAGE CONTAINER" again with lid.



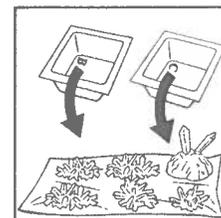
3.23 Repeat **steps 3.19 to 3.23** until all of the solution in the "SOLUTION STORAGE CONTAINER" is used up, or until the tip of a crystal reaches the surface of the solution (after refill). **Note:** This can take up to 3 more cycles (approx. 10 to 15 days), depending on the relative humidity of your room. If a crystal outgrows its container, choose a larger container, and continue.

Important Note: Remove any growth on and/or near the rim of your vessels every day, if any, by gently scraping it off with a ruler. Dispose any "rim crystal growth" into the "SOLUTION STORAGE CONTAINER".

3.24 Empty remaining solution in vessel "B", "C" and "GEODE MOLD" into "SOLUTION STORAGE CONTAINER".

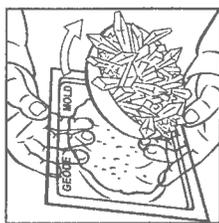


3.25 Now you can remove all of your **SPACE AGE CRYSTALS**® from vessel "B" and "C", and place them onto absorbent paper.



3.26 To remove your "CRYSTAL CAVE™ GEODE" from the "GEODE MOLD", gently press on the outside plastic wall of the "GEODE MOLD", until the "CRYSTAL CAVE™ GEODE" begins to detach itself completely.

Note: Be sure not to break the plastic "GEODE MOLD" in this step, because you will need it in other experiments.



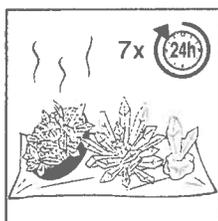
3.27 Place your "CRYSTAL CAVE™ GEODE" onto absorbent paper.

3.28 Clean all your vessels and lids with warm water.

Note: When you repeat this step in **Experiment 12**, do not empty and clean the "SOLUTION STORAGE CONTAINER" right away. Instead, let the solution in the "SOLUTION STORAGE CONTAINER" evaporate completely. You may remove your 13th crystal cluster when a crystal reaches the top of the solution. This will take a couple of weeks (length XX depends on the relative humidity of your room).



3.29 Allow all crystals to dry for at least one week. **Note:** Replace absorbent paper after 24, 48, and 72 hours.



3.30 Now your **SPACE AGE CRYSTALS®** are ready for display. Protect your crystals from excessive heat, as well as direct sunlight, and water. If possible, keep them behind glass and on top of a non-corrosive, plastic surface. Dust should be blown off with a hair-dryer (cold air setting), or with a small, soft brush. Do not wash the crystals, because they are still water-soluble! Keep away from small children.



EXPERIMENT # 4:

GROW "EMERALD" CRYSTAL SEEDS™.

Same as **EXPERIMENT # 1**, but use the "EMERALD" chemical bag instead.

EXPERIMENT # 5:

PREPARING FOR THE GROWTH OF AN "EMERALD" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND CRYSTAL CAVE™ GEODE.

Same as **EXPERIMENT # 2**, but use the "EMERALD" seeds from **Experiment # 4** instead.

EXPERIMENT # 6:

GROW AN "EMERALD" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND CRYSTAL CAVE™ GEODE.

Same as **EXPERIMENT # 3**, but use "EMERALD" solution and seeds from **Experiment # 5** instead.

EXPERIMENT # 7:

GROW "AQUAMARINE" CRYSTAL SEEDS™.

Same as **EXPERIMENT # 1**, but use "AQUAMARINE" chemical bag instead.

EXPERIMENT # 8:

PREPARING FOR THE GROWTH OF AN "AQUAMARINE" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND CRYSTAL CAVE™ GEODE.

Same as **EXPERIMENT # 2**, but use "AQUAMARINE" seeds from **Experiment # 7** instead.

EXPERIMENT # 9:

GROW AN "AQUAMARINE" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND "CRYSTAL CAVE™ GEODE.

Same as **EXPERIMENT # 3**, but use "AQUAMARINE" solution and seeds from **Experiment # 8** instead.

EXPERIMENT # 10:

GROW "RUBY" CRYSTAL SEEDS.

Same as **EXPERIMENT # 1**, but use "RUBY" chemical bag instead.

EXPERIMENT #11:

PREPARING FOR THE GROWTH OF A "RUBY" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND CRYSTALCAVE™ GEODE.

Same as **EXPERIMENT # 2**, but use "RUBY" seeds from **Experiment 10** instead.

EXPERIMENT # 12:

GROW "RUBY" SINGLE CRYSTAL, CRYSTAL CLUSTER, AND CRYSTAL CAVE™ GEODE.

Same as **EXPERIMENT # 3**, but use the "RUBY" solution and seeds from **Experiment 11** instead.

DISPOSAL OF MATERIALS:

You may dispose crystals, or any remaining chemicals into the regular household garbage (the chemicals and colorants are FDA grade materials, and are not known to be harmful to the environment). They are 100% biodegradable. Recycle all other materials as permitted by local regulations.

A fascinating hobby for ages 12 and up!