

RAFT IDEAS

Topics: Crystalline Solids, Solutions, Phases of Matter

Materials List

- ✓ Chenille stems
- ✓ Borax (available in grocery stores in the laundry products section)
- ✓ Hot water
- ✓ Heat resistant and water-tight container at least 15 cm (6") deep
- ✓ Large paper clips
- ✓ I.C. tubes, dowels, or chopsticks

This activity can be used to teach:

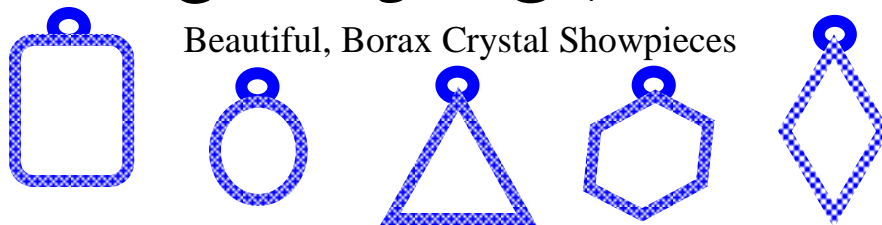
Next Generation Science Standards:

- Structure of matter (Grade 5, Physical Science 1-1)
- Properties of materials (Grade 5, Physical Science 1-3)
- Mixtures (Grade 5, Physical Science 1-4)
- Changes of state (Middle School, Physical Science 1-4)
- Chemical reactions (Middle School, Physical Science 1-2, High School, Physical Science 1-2)
- Cycling of Earth's material (Middle School, Earth and Space Science 2-1)



Overnight Crystals

Beautiful, Borax Crystal Showpieces



Grow crystals overnight in this fun activity that can be used to teach solutions, phases of matter, solids, and crystal systems.

To Do and Notice

1. Bend chenille stems into shapes about 10 cm (4") long. Make sure each shape has a loop on the top to aid in suspension into the solution.
2. Fill the container with hot water (hot spigots on water coolers work well) to about 5 cm (2") from the top.
3. Add about a cup of borax to the hot water and stir until it completely dissolves.
4. Repeat step 3 until a small amount of solute (borax) remains undissolved at the bottom of the solution. The borax solution is now saturated.
5. Suspend the chenille stem shapes from a dowel, chopstick, or I.C. tube using an opened paper clip and submerge the shapes into the solution.
6. Leave the container undisturbed over night. As the solution cools, it holds less solute, and excess dissolved ions crystallize into borax onto chenille stem fuzz.
7. The next morning, remove the chenille stems from the solution and notice the crystal growth on the shapes. Place the shapes onto a paper towel to dry.
8. Notice that all the borax crystals are the same shape, but some are larger in size. Crystal shape is one identifier of crystals.

Note: If the chenille stems are not covered in crystals, repeat the procedure, but use a bit hotter water and dissolve more borax into the solution.

The Science Behind the Activity

Crystals grow when the concentration of particles in solution exceeds the solvent's capacity. Warm water can dissolve more solute than cold water. As the warm borax solution cools, excess particles (ions) form crystals (regularly shaped solids). Molecular properties determine crystal shape; borax crystals ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, hydrated sodium borate) belong to the monoclinic crystal system.

In nature, borax forms in arid regions (e.g. – Trona, near the town of Mohave in Southern California) from the evaporation of water in intermittent lakes (playas). Borax and other borates are used by many industries to produce common, everyday products, including cosmetics, medicines, laundry additives, ceramics, and glass.

Taking it Further

Compare crystals grown from a solution that cooled quickly and from a solution that cooled more slowly. Which crystals are larger?

Web Resources (Visit www.raft.net/raft-idea?isid=257 for more resources!)

More detailed information about Borax - <http://www.galleries.com/Borax>

Check out Searles Lake mineral collecting information at:

<http://www1.iwvisp.com/tronagemclub/GEM-O-RAMA.htm>