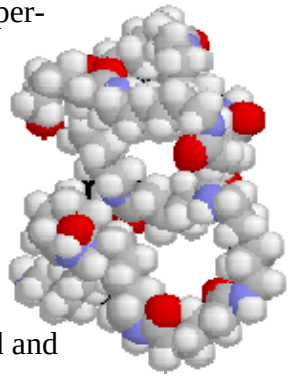
Color Excitement!

Topic: Properties of Matter / Color	**Overview:** Students will create crystals of many colors.
Standards: K.1 a, b; K.4 a l.1 a, f. g; 1.2 a, c 2.1 a, b, d 3.1 a, c 4.1 a, b; 4.2 a, b, c, d 5.1 g, h	**Objective:** The students will: • Identify and name basic colors • Transfer basic inquiry skills (predicting, observing, explaining) to literacy (reading, writing) tasks
Materials: 3 clear plastic cups, ¼ cup warm tap water per cup, colored water jelly crystals,	**Cooperative Learning:** Timed Round Robin Team Discussion Class Discussion All Write Round Robin

Content Information:

Water Jelly Crystals hold water in the soil so it can be released to plants as they need it. These amazing pebble-sized polymer crystals mysteriously grow into huge pieces of gel-like material when you add water. In fact, these crystals absorb 150-300 times their weight in water! Because of their incredible thirst, they're used to reduce by up to 80% the amount of water needed to water crops and gardens during years of drought! These polymers perform very important functions in everyday life. They're used in everything from baby diapers to environmental cleanup materials! Aside from their environmental and industrial uses, super-absorbent crystals are a great way to teach kids about color and light!



These Water Jelly Crystals are actually classified by scientists as a super-absorbent polymer. Polymers are made up of many, many molecules all strung together to form super long chains. The *properties* of substances made out of polymers reflect what's going on at the molecular level. Materials that are made of polymers look, feel, and act depending on how their atoms and molecules are connected. Some are rubbery, like a bouncy ball, some are sticky and gooey, and some are hard and tough, like a skateboard.

When the tiny pebble-like chunks soak in water, they grab onto water molecules and explode into lots of fat, globby, water-filled crystals! The longer you leave them to soak, the more water will be absorbed and the more likely you are to have little or no water remaining. Allow student to touch those squishy, gooey, slimy, shimmery, lumps! They look like ice cubes. Stick your hand into the zip lock bag full of Water Jelly Crystals. It's a most interesting sensation. You may think it's cold and slimy but leave your hand in the bag for a moment and do some "research."

Water Jelly Crystals are non-toxic, safe for use around pets and young children, and are considered to be environmentally beneficial. However, do not taste or eat any of the materials described in this activity. Since these crystals are designed to be used with plants, they can be buried in a planter box or garden when you're finished using them. They are biodegradable after about 8 years.

Instructional Sequence:
Introduction:

1. Play a game of "I Spy." Tell the children they are looking for something in the room. Slowly give them clues about the object. Share its color, shape, and size. Wait between clues so that children can process ideas and share guesses.
2. **TIMED ROUND ROBIN**: In teams of 4, students choose an "I spy" object and share clues with teammates. Each student has one minute to give clues about the object and have teammates guess the object. After one minute, the next student begins giving clues. Continue until each student has had a turn.
3. Talk about what kinds of clues (colors, shapes, sizes, locations, others) were given.
4. Make lists of words that fit under each category:
   - Colors — *red, yellow, orange, green, blue, purple, black, brown, white*
   - Shapes — *circle, square, triangle, square, rhombus, sphere, cylinder*
   - Sizes — *big, little, small, short, tall*
   - Location — *above, below, on top, behind, near*
5. Discuss what part of our body lets us know about all these colors, shapes, sizes, and locations — our EYES!
6. Tell students that today they will use with their eyes to observe color.

   OR

   1. Read "Planting a Rainbow" to students. Use TIMED ROUND ROBIN to have students share what they liked or learned from the book.

Procedure:

1. Place a glass of water in the center of each team. Drop yellow and blue food coloring into the glass and ask students to observe carefully. They will quickly notice the colors mixing as the water begins to turn green.
2. **TEAM DISCUSSION**: Ask: "What are others ways that we can mix color?" Students discuss with teammates. Teacher circulates and monitors discussion.
3. Tell students that today they will explore another way to mix color.
4. Assign lab roles: Principal Investigator who directs others to follow procedures; Materials Manager who does experiment; Reporter who records data; Timekeeper/Clean up Captain who keeps time and helps clean up.
5. Distribute lab materials. Fill three cups with ¼ cup of warm water. Students should add 1 teaspoon of Water Jelly Crystals to each cup (a different color for each cup –red, yellow, and blue).
6. **ALL WRITE ROUND ROBIN**: Tell students to observe and record what happens to the crystals after 10 minutes, 20, and 30 minutes. They may feel the crystals. Ask: "How have the crystals changed?" Students take turns stating an observation. Each student has paper and pencil to record answers. Ask students to predict if the crystals will get any bigger if you add more water or if you wait longer?
7. Have students remove 3 or 4 crystals and put them on the table. Use a ruler to measure their size. What differences do you see? Compare one of the hydrated crystals (soaked in water) to a crystal that did not soak in water. How do the sizes of the water-filled crystals compare to each other? What about the dry crystals?
8. To mix colors, students should take crystals and jam them by color layer into the Baby Soda Bottles or test tube. Tell students to make observations. Colors will begin to blend almost immediately at they different colored crystals come into contact with each other. Have students continue to make observations throughout the day. Keep test tubes for 24 hours.

Observations and Conclusions:

1. **TEAM / CLASS DISCUSSION: Sample questions:** What did you see when the different colored crystals touched each other? Why do you think this happened? How many different colors to you see? Can you name the colors? How did the crystals feel? What color appears when colors are mixed: Red and yellow? Blue and yellow? Red and blue? How could you make purple, orange, or green?

Sample Assessment:

- Have students write or draw what they learned showing what colors mix to form other colors.

Extension:

- Color Mixing – Fill a test tube with water and add a few drops of red food coloring to the water. Place cap on tube. Do the same with 2 other tubes using yellow and blue food coloring. Hold each tube up to your eyes near light to observe the colors. Hold two tubes over your eyes and observe the color.
- Repeat the previous experiment with distilled water in place of regular tap water. Distilled water is similar to rainwater, so the experiment will show how much rainwater the crystals will absorb in the ground if used around plants.
- Will the polymer crystals absorb anything other than water? Try any of these liquids in place of water: • Tomato juice • Orange juice • Vegetable oil • Milk • Soda pop • Rainwater or melted snow • Hot water • Salt water. What did you find?
- **Cold Crystals** - Place a zipper-lock bag of the jelly-like polymer crystals in the freezer. Examine the bag of polymer after 12 hours. Compare the length of time that the crystals stay cold with a similar amount of ice in a zipper-lock bag. Research shows that the polymer crystals hold the cold 2.5 times longer than ordinary ice. Could you use polymer crystals in place of crushed ice the next time you need an ice bag?
- **Polymer Plants** - Grow grass seed, radish, beans, or other fast-starting plants in a mixture of polymer and soil. The soil/polymer mixture should be half soil and half hydrated polymer crystals (have already absorbed water). Try growing the same seeds that you planted in the soil/polymer mixture in just plain soil and compare the growth at two day intervals for one or two weeks. Growing a polymer plant makes a great science fair project! Will radish seeds grow in a cup of polymer crystals without soil? Try it -- you might be surprised!
- Students often want to demonstrate what they learn to their parents. This should be encouraged. Tell students to show their parents how colors mix by using food coloring and water.
- Use baby soda bottles to create lava lamps. Fill the test tube (or 16 oz. plastic bottle) ¾ full with vegetable oil. Fill the rest of the bottle with water and add a few drops of food coloring. Seal with the cap. Shake the bottle and observe. The water will not mix with the oil nor will the dye. The dye only colors the water.