Nurturing Young Chemists

Chemistry explorations in early childhood classrooms often involve baking, mixing, or dissolving, during which students predict outcomes and try to replicate the results. The objective is to help students come to understand that even though we cannot see what is happening to cause a change, we can see that the change happens every time we follow a certain procedure.

One such activity is making "slime." More than just "fun," making slime is a great opportunity to introduce young children to safe laboratory practices and teach them how to follow a procedure. Another reason this is a good activity for early childhood students is because there is some "wiggle room" in the measurements of the substances. Students will produce a thought-provoking and fun product even if they do not measure exactly. There are many recipes for "slime," each slightly different but all producing a stretchy polymer that is more or less dry depending on the proportions used (somewhere between the result of a forceful sneeze and a "super ball").

Using nonstandard units to measure is appropriate for young children whose knowledge of number symbols and fine-motor skills are not developed well enough to make exact measurements. It is also convenient for this activity because most of the measurements are for the same amount. A small plastic container such as an empty prescription bottle or a pill cup work well. First and second graders can usually use graduated measuring cups.

This exploratory kind of chemistry allows students to experience the adventure of science and to become a "real" scientist by making the decisions. It will also help them realize that to get the same cool mixture or surprising reaction that a classmate achieved, they must duplicate the procedure that was used.


Do you teach "chemistry" in grades preK to 2?

I teach children there are many different changes; one change may cause a change in temperature, create bubbles, create a gas, or change colors. I have several very simple and safe experiments for them to do. Of course, the most popular is the vinegar and baking soda experiment. I tell students, "Let's put these two together to see if we can make a change." I have the children put one heaping teaspoon of soda in a sandwich baggie. Carefully place the bottle of vinegar into the baggie. Seal the baggie and then tip over the bottle. Observe for changes to occur. I ask the children to tell me what they see. This activity is perfect for them to observe bubbles and gas. We record what we observe, bringing in writing skills.

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Prime Slime

Objective:
To learn about following procedures by mixing three substances together and examining the properties of the resulting substance.

All students must wear safety goggles. Remind students not to eat or smell substances during this activity.

A MSDS for Borax is available by clicking on this article at www.nsta.org/elementaryschooljournal#.

Materials:
- Water
- Liquid white school glue
- Borax (a laundry booster that can be found on the detergent aisle)
- Small containers (pill bottles work well) for measuring "units" of materials
- A cup (wax-coated paper or plastic) and spoon for each child
- A clear, unbreakable container with a lid (such as a plastic drink bottle)

Procedure:
1. Ahead of time, write up activity steps using picture symbols instead of words for the materials and display them for children to see.
2. When you are ready to begin, read the steps, introducing each of the substances in order of appearance in the written procedure. Discuss what the substances are, how they are used, and all safety rules for the procedure. Have students put on their safety goggles.
3. Discuss the properties of each material—how does it feel? Ask, "What do you think would happen if we mixed these substances together?"
4. Now give each student a cup and a spoon and have them measure out one unit of water and pour it into their cup. Ask, "What is in your cup?" "How does it feel to stir it?" "What does it look like?" "Is it wet or dry?"
5. Before adding another material, ask, "What do you think will happen when you put the next substance into your cup?" Next, have each student measure out one unit of white school glue, pour it into their cup, and stir well. Some of the glue will stick to the sides of the measuring unit but does not have to be scraped out.
6. This step is to be done by the teacher only. Keep the box of Borax out of the reach of children. Mix 250 ml (1 cup) of water with 15 ml (1 tablespoon) of Borax in a plastic container. Shake the container until most of the Borax has dissolved. Label the container with words or a symbol. Introduce the word solution—the Borax has mixed into the water in tiny pieces so it looks like it has almost disappeared but it is still there.
7. Pour one unit of the Borax-and-water solution into each student's cup and instruct them to stir well. Ask, "Is there a change? What did you make? What does it feel like? Is the slime dry or wet?"

Be sure to include time for play (try drawing on the slime with washable markers) and follow-up discussion. Students will undoubtedly be thrilled with their "cool" mixture. As students handle the "slime," they'll observe it change from a slimy goop to a kneadable dough that can drip slowly. Although the children cannot see the strands of the polymer that has been created linking together, they'll feel (and see) a firming in the texture as more bonds are formed as they work with their own "prime slime."

Peggy Ashbrook (scienceissimple@yahoo.com) is a preschool science teacher and author of Science Is Simple: Over 250 Activities for Preschoolers.
How do you use toys in teaching science?
Here's an idea I learned from a fellow PreK teacher: Freeze water in several large resealable plastic bags to make irregularly shaped ice. Food coloring will tint the ice to make it easier to see, and small toys can be frozen inside. It may take several days for the water to freeze in the center. Float them as "icebergs" in tubs of water (or baby pools, or in the water table). I love to see the children's faces as they rub the ice to discover what it is. Children can weigh the "icebergs" at the beginning and after a period of time, or see how long it takes for the toy to come to the surface of the ice.

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Teacher’s Picks
Look for fiction as well as nonfiction resources to extend students’ thinking about scientific concepts.

Books
Pancakes for Breakfast. Tomie de Paola. 1978. Harcourt. Children enjoy providing the words for this pictures-only story of a grandmotherly woman's work to assemble the ingredients for pancakes. Good example of how scientists keep trying over and over.


Teaching Chemistry with Toys: Activities for Grades K–9. Jerry L. Sarquis, Mickey Sarquis, and John P. Williams. 1995. Learning Triangle Press. This teacher's resource book provides complete instructions for teaching chemistry principles through simple activities that use popular children's toys like Silly Putty and common materials such as food coloring.

Internet
The American Chemical Society
www.chemistry.org/portal/a/c/s/1/acsdisplay.html?DOC=kids\kids_parent_teacher.html
Scroll down to “Guidelines for Teaching Safely” and click on "Milli’s Safety Tips" for a one-page poster on safety rules for doing chemistry.

Borax website
www.borax.com
What is Borax, and where does it come from?

Rader’s CHEM4KIDS.COM, an often recommended website with good sections on matter and solutions.
www.chem4kids.com

The Science and Technology Center for Environmentally Responsible Solvents and Processes (CERSP)
www.science-house.org/CO2/activities/polymer/sillyputty.html
A similar slime activity with good explanations for elementary and middle school students.