Consult 4 Kids Lesson Plans

Component:	Science
Grade Level:	K-5 Grades
Lesson Title:	How to Grow Borax Crystals
Focus:	Chemical Reactions

Materials
Buttons, blue food coloring, glass jars, pencils, white pipe cleaners, cotton string, thin wires, box of toothpicks, spoons for stirring, hot water

Opening

State the Objective

Today we are going to learn how to make snowflakes (borax crystals) by using borax and a few other household items.

Crystals are made up of molecules arranged in a repeated pattern that extends in all three dimensions. Borax is also known as sodium borate. It is usually found in the form of a white powder made up of colorless crystals that are easily dissolved in water. When the solution cools, the water molecules move closer together. Crystals begin to form.

Gain prior knowledge by asking students, "What do you know about _____?"

1. Ask, "Have you ever seen a snowflake? Describe the snowflake. (Snowflakes have 6 sides.)
2. Borax is a mineral that comes from the ground. What is the most common use for borax? (All purpose cleaner, deodorizes, disinfects, repels cockroaches and ants)

Content (the "Meat")

Instruction / Demonstration ("I do" – "We do")

1. Provide each student with 3 toothpicks. Have students arrange the toothpicks in the shape of a 6-sided snowflake. Are these snowflakes the same? (No. Every snowflake is different.)
2. Draw several 6-sided snowflakes on a piece of paper. Create each snowflake different from the rest.
3. Ahead of time, demonstrate the activity for the whole class. See direction steps under Students Practice.

Students Practice ("You do")

1. Review the directions for the activity.
2. Provide each small group with supplies.
3. First, bend a pipe cleaner into the shape of a snowflake. If you don't have a pipe cleaner, use a thin wire or a button on a string.
4. Tie the wire, pipe cleaner or button to one end of a piece of string.
5. Tie the wire, pipe cleaner, or button on a string around the middle of a pencil.
6. The leader will pour about one cup of hot water into a jar. Preheat the jar.

Activity → Teachable Moment(s) *throughout

Tip: Listen for questions that begin with "what" or "how."

Student: "Cool!" How would I make a lot of crystals to show my friends?"

Teacher: "Students, is there a faster way to make a lot of crystals?"

7. Add 3 tablespoons of borax slowly, one teaspoon at a time, stirring continuously. 8. Add blue food coloring. 9. Place the pencil over the top of the jar so that the string is hanging down into the jar and the wire, pipe cleaner or button is submerged about ¾ of the way into the solution. 10. Allow the jar to sit for about 24 hours. You will see crystals around the object at the end of the string.	

Closing

Review

Say, "Let's review what we did today. First, we added borax slowly to hot water. Then we hung a string on a pencil, connected to a wire, pipe cleaner or button. Next we submerged the wire, pipe cleaner or button about ¾ of the way into the solution. Finally we let the jar sit overnight and watched the crystals begin to form."

Debrief

Likes and Dislikes

Create a chart and list what students liked and what students didn't like about the activity. You might begin by asking, "What about this activity . . . "

Reflection (Confirm, Tweak, Aha!)

1. What did we do today that you already knew how to do?
2. What did we do today that you knew how to do, but you learned something new to add to what you already knew?
3. What did we do today that was totally new to you?

Modification of Lesson

Other substances can be used to grow crystals. Sugar crystals use a similar process. Goggle "sugar crystals" for specific directions.

Consult 4 Kids Lesson Plans

Component:	Science
Grade Level:	K - 5
Lesson Title:	How to Clean Pennies
Focus:	Chemical Reactions

Materials
Newspaper, paper towels, several spoons, white vinegar, table salt, assorted pennies, distilled water, timer

Opening

State the Objective

Today we are going to learn how to clean pennies with just a few simple steps.

Gain prior knowledge by asking students, "What do you know about _____?"

1. Ask, "Have you ever seen a very shiny penny, or a dull greenish penny?"
2. "How do you think we can clean pennies? Will it take a lot of scrubbing to do the job?"
3. "In your experience (prior knowledge), have you ever seen someone clean pennies?"

Content (the "Meat")

Instruction / Demonstration ("I do" – "We do")

Students are fascinated when they see chemical reactions right before their eyes. People don't often think of vinegar as a cleaning agent. However, it is one of the most effective cleaning agents you can use. Vinegar contains acetic acid. The greenish coating on a penny is not dirt or tarnish, but actually copper oxide, which appears when the copper reacts with the air around it and forms a chemical bond with the oxygen. The acetic acid also forms a chemical reaction removing the oxide from the penny.

WARNING: Before cleaning your penny with vinegar, check the date it was minted. Pennies made before 1982 are over 90% copper. However, newer pennies are mostly zinc with a thin coating of copper. Why is this important? Vinegar can dissolve zinc. Choose pennies that are not scratched or dented. If the pennies are minted in 1982 or later, you should not let them sit in the bowl for an extended period of time.

1. Ask students what they think will happen when we put pennies in a vinegar solution.
2. Ask, "Why will we add salt to the solution?" (Salt acts as a catalyst, speeding up the chemical reaction.
3. Make a prediction as to how long it will take the pennies to be clean with salt?

Students Practice ("You do")

1. The teacher gives step-by-step directions.
2. Pour about a half-cup vinegar into a bowl or jar.

Activity → Teachable Moment(s) *throughout

Tip: Teachers, listen for questions that begin with "what" or "how."

Student: "Awesome! Would the pennies get clean if we didn't use table salt?"

Teacher: "Students, what do you think about that? Shall we try the experiment again without the table salt?"

3. Add a teaspoon of table salt to the mixture. 4. Stir the salt into the vinegar until it completely dissolves or seal the jar and shake it. 5. Drop the penny into the solution and let it set for 10 minutes. 6. Fish the penny out of the jar with a spoon and rinse it with lukewarm distilled water. 7. Set the penny on a paper towel to dry. 8. The penny should look brand new, without you having to do any rubbing or scrubbing!	

Closing

Review

1. First we mixed vinegar and salt.
2. Next we dropped a penny into the solution and waited 10 minutes.
3. Then we fished the penny out of the jar and rinsed it with lukewarm water.
4. Finally we set the penny on a paper towel to dry.

Debrief

Three What's

1. What did you enjoy most about this activity?
2. What was the biggest challenge with this activity?
3. What did you learn from the group?

Reflection (Confirm, Tweak, Aha!)

Sample: We learned that salt is a catalyst and speeds up the process of cleaning pennies.

Your Reflection:

Modification

Try other liquids to clean pennies: lemon juice, pickle juice, hot sauce, taco sauce, or ketchup.

Consult 4 Kids Lesson Plans

Component:	Science
Grade Level:	K-5
Lesson Title:	How to Peel a Raw Egg
Focus:	Chemical Reactions

Materials
Plastic jars with lids, masking tape, black marker, clear vinegar, several hard-boiled eggs, several uncooked eggs, paper towels

Opening

State the Objective

Today we are going to observe what happens when a raw egg is placed in a jar of vinegar for 24 to 48 hours.

Eggshells are made of calcium carbonate. When vinegar (acetic acid) reacts with calcium carbonate, the eggshell will gradually dissolve. Carbon dioxide bubbles will form. After 24 to 48 hours, the shell should have been removed from the egg. You may need to gently wipe the shell off the egg with a paper towel or place it under running water for a few seconds.

Gain prior knowledge by asking students, "What do you know about _____?"

Ask, "What are some things made of calcium carbonate? Think of objects that have shells." (Egg shells, shells of marine animals, snails, classroom chalk, plaster, marble, limestone and The Great Pyramid of Egypt).

Content (the "Meat")

Instruction / Demonstration ("I do" – "We do")

1. Spin the hard-boiled egg. Notice that when you touch the egg, it should stop spinning quickly.
2. Spin a raw egg. It will take longer for the raw egg to stop spinning. Why? (The yolk and white keep banging against the shell, back and forth.)
3. Ask a student to demonstrate how to peel the shell off a hard-boiled egg.
4. If possible, separate the thin membrane from the shell. This thin membrane is what is keeping a raw egg together when the shell is removed.
5. Demonstrate the activity in front of the class. See directions under Student Practice.
6. Ask students to help in the demonstration.

Students Practice ("You do")

1. Place a strip of masking tape on the jar. Students write their names on the tape.
2. Fill the jar with some vinegar.
3. Gently place the uncooked egg into the vinegar without cracking the egg. The egg must be covered completely with vinegar.
4. Place the lid on the jar.
5. Do not shake or move the jar for 24 to 48 hours. Watch the carbon dioxide bubbles form on the egg.
6. After 24 to 48 hours, the shell should have been removed from the egg. You may

Activity → Teachable Moment(s) *throughout

Tip: Teachers, listen for questions that begin with "what" or "how."

Student: "This was gross! How will I ever use this experiment in real life?"

Teacher: "Class, who can think of a way to use raw eggs without a shell in real life?"

need to gently wipe the shell off the egg with a paper towel or place it under running water for a few seconds. 7. Students write their names on a paper towel. Gently place the egg on the towel.	

Closing

Review

Say, "Let's review what we did today. First we put vinegar into a jar. Then we gently placed a raw egg in the vinegar. Next we waited 24 to 48 hours. Finally we carefully removed the egg from the vinegar and rinsed off the remaining shell."

Debrief

WHI?

Ask the following three questions:

1. What were some of the questions that came up in your group?
2. How did you about including everyone?
3. If you were to try this again, what might you do differently?

Reflection (Confirm, Tweak, Aha!)

Sample: "I now see why there is a thin membrane between the raw egg and the shell."

Your Reflection:

Modification of Lesson

K – 2 Grades: Ask volunteers to help students retrieve the raw egg from the vinegar. A tablespoon might be helpful. Younger students may draw a Before and After Picture showing what happened to the egg.

3-5 Grades: For the brave of heart, give students a felt-tipped black marker. With a light touch, ask students to draw a simple face on the raw egg membrane – eyes, nose, and mouth.

Consult 4 Kids Lesson Plans

Component:	Science
Grade Level:	K-5
Lesson Title:	Magic Potion
Focus:	Chemical Reactions

Materials
Newspaper, bowl, 2 Tablespoons vinegar, 1 tablespoon baking soda, several balloons, rubber bands, small juice bottle or small vinegar bottle, siphon made out of a paper cone.

Opening

State the Objective

Today we are going to observe what happens when baking soda is added to vinegar.

There is a chemical reaction that forms between vinegar (an acid) and the baking soda (a base). The bubbles that form are carbon dioxide gar. This is what happens when bakers add baking soda to cookie batter to make it rise. Also, vinegar and baking soda are used as cleaning agents. Vinegar kills bacteria, mold and germs. It is used to wash windows, leaving them sparkling clean. Baking soda removes stubborn stains, absorbs odors, and puts out grease fires.

Gain prior knowledge by asking students, "What do you know about _____?"

1. Ask, "How many of you have seen a box of baking soda? A jar of vinegar? In which room of the house do you see these items?" (Kitchen for baking, kitchen, bathroom or garage for cleaning)
2. Name a few foods that contain vinegar. (Catsup, pickle juice, taco sauce, and hot sauce)
3. "Have you watched someone cooking pancakes? Did you notice that bubbles form on the top of the pancakes? What is inside the bubbles?" (carbon dioxide gas)

Content (the "Meat")

Instruction / Demonstration ("I do" – "We do")

Make a prediction about what will happen to the balloon when baking soda and vinegar are mixed.

1. Demonstrate the activity in front of the whole class.
2. Blow up a balloon several times so it is stretch out.
3. Pour 4 tablespoons of vinegar into a bottle with a small opening (juice bottle).
4. Make a siphon cone out of paper.
5. Pour 2 tablespoons of baking soda in a balloon.
6. Without tipping the baking soda in, put the balloon over the top of the container. Use your hand or a rubber band to hold the seal.
7. Jiggle the balloon so the baking soda is dumped in.
8. The balloon will blow itself up! This is carbon dioxide gas.

Students Practice ("You Do")

1. Students review each direction step.
2. Divide students into groups of 3 or 4.
3. Provide students with newspaper, balloon, vinegar, baking soda, tablespoon, and

Activity → Teachable Moment(s) *throughout

Tip: Teachers, listen for questions that begin with "what" or "how."

Student: "Wow! How did that work?"

Teacher: "Class, why do you think the balloon blew itself up?"

bottle. 4. Students conduct the experiment, following the Direction Steps.	

Closing
Review Say, "Let's review what we did today. First we put vinegar into a bottle. Then we poured baking soda into a balloon. After that, we fit the balloon around the bottle opening and jiggled the baking soda into the vinegar. Finally, the balloon blew itself up."
Debrief **Liked Best, Next Time (LBNT) -** Students express an opinion about the lesson. 1. Share what you enjoyed most. 2. Share what else you would have liked to have done. 3. Share what you would have like to have spent more time on.

Reflection (Confirm, Tweak, Aha!)

Sample: "Now I know that when I bake cookies, the space inside those bubbles on top of the cookies, is carbon dioxide gas. So that means that the bubbles that form on top of pancakes on the griddle, is carbon dioxide gas, too!"

Your Reflection:

Modification of Lesson

K-1 Grades: Ask for volunteers to help with the experiment. Younger students may need help blowing up the balloon ahead of time, and attaching the balloon to bottle opening.

Consult 4 Kids Lesson Plans

Component:	Science
Grade Level:	K-5
Lesson Title:	Make Orange Soda
Focus:	Chemical Reactions

Materials
Plastic cups, water, orange juice, baking soda, sugar, orange soda can or bottle, spoons for stirring

Opening

State the Objective

Today we are going to learn how to make orange soda from water, orange juice, baking soda and sugar.

Sodas are very popular in our culture. Pepsi and Coke are sold all over the world. They were invented over 100 years ago. The question is, "Do you like the homemade soda better than soda in a can or bottle?" After this activity, decide for yourself.

Gain prior knowledge by asking students, "What do you know about _____?"

1. Ask, "What ingredients are in orange soda? Let's read the container: carbonated water, high fructose corn syrup, citric acid, caffeine, preservatives, and food coloring. Where is the orange juice?"
2. Are sodas a healthy food choice?

Content (the "Meat")

Instruction / Demonstration ("I do" – "We do")

1. How would a soda taste without the carbonated water (carbon dioxide gas)? (Flat; no sparkle)
2. Which soda is more popular: Pepsi or Coke? Why?
3. Demonstrate the activity for the whole class. See directions below.

Students Practice ("You do")

1. Provide each small group with supplies. Allow each student to create their own orange soda.
2. First, fill the plastic cup half full with water.
3. Finish filling the cup with orange juice.
4. Add a half teaspoon of baking soda, and a half teaspoon of sugar.
5. Stir. What do you notice?
6. Taste the soda, if desired.

Activity → Teachable Moment(s) *throughout

Tip: Listen for questions that begin with "what" or "how."

Student: "How can they make orange soda without orange juice and still use the work *orange* on the label?"

Teacher: "Students, do you need orange juice in the soda to call it an orange drink?"

Consult 4 Kids Lesson Plans

Closing

Review

Say, "Let's review what we did today. First we filled a cup half full with water. Then we finished filling the cup with orange juice. Next we added baking soda and sugar. Now we have orange soda!"

Debrief

What's Important About That? Ask the students, "What was important about learning to make orange juice soda? When one student responds, it is important to listen for what the student says is important about the activity that was just completed. Building on that statement, the question again is, "What is important about that (whatever was stated second by the student.) Continue to ask the same question up to five times, each time taking the child's understanding of what is important to a deeper level. At the end, the teacher states, "Then what I heard you say is, 'The importance of Making Orange Soda is . . . '

Reflection (Confirm, Tweak, Aha!)

1. What did we do today that you already knew how to do?
2. What did we do today that you knew how to do, but you learned something new to add to what you already knew?
3. What did we do today that was totally new to you?

Modification of Lesson

Extend the lesson by making other flavors of soda. Add apple juice to make apple soda, or lemon juice to make lemon soda.