

Lesson Plan: Mini-Volcanoes!

Area: Chemistry

Age Group: Kindergarten-1st Grade

Supplies Needed:

- Plastic cups (one for each student)
- Large plastic trays for volcano to overflow into
- Baking Soda
- Vinegar
- Soap Detergent
- Food coloring (optional)

Introduction:

- Fill in the blank: When a volcano erupts, _____.
- What is a volcano?
- Why does a volcano erupt?

Demonstration:

- Put some baking soda in the plastic cup
- Next add a squirt of liquid soap detergent (and food coloring if wanted)
- Finally, add the vinegar to the cup and watch what happens!

Directions:

- Provide each student with a cup that already has the baking soda, liquid soap detergent, and food coloring in it
- Also provide the students with a small cup of vinegar that they will add themselves
- Make sure that the plastic cups are in the trays (easy clean-up!)
- Ask students to follow along with you as you add the vinegar to the cup

Follow-up:

- Class discussion about what happened
- Identify the volcano, magma, and lava in our demonstration (volcano=cup, magma=foam while it is inside the cup, lava=foam after it comes outside of cup)
- Brain-pop video!: <http://www.brainpop.com/science/theearthsystem/volcanoes/>
- What did the students learn?
- Coloring sheet of a volcano?

Lesson Plan: Radical Raisins!

Area: Physical Science

Age Group: Kindergarten-1st Grade

Supplies Needed:

- Plastic clear cups
- Raisins cut in half
- Club Soda (cannot be flat)
- Other types of small food like grapes, nuts, etc.

Introduction:

- Ask students if they have ever noticed the bubbles in soda
- Fill in the blank: The bubbles in my soda _____.

Demonstration:

- Pour the club soda in the glass
- Drop in half a raisin
- Watch what happens

Directions:

- Provide each student with a cup filled with club soda
- Give them each a couple of raisins
- Ask students to drop the raisins into the cup at the same time as you do
- Ask the students to watch the raisin to see what happens!
- The raisin will “dance”
- See if the same thing will happen with the other objects like grapes, nuts

Follow-up:

- Have a class discussion of what happened
- Ask students what happened to the raisin and why they think that happened
- Explain that the bubbles stuck to the sides of the raisin causing it to float: buoyancy
- Talk about other examples of buoyancy: A lifejacket causes a person to float and be buoyant
- Brain-pop movie!:
<http://www.brainpop.com/science/motionsandforces/buoyancy/>

Source: <http://pbskids.org/zoom/activities/sci/dancingraisins.html>

Lesson Plan: Plastic Milk

Area: Chemistry

Age Group: Kindergarten-1st Grade

Supplies Needed:

- Skim Milk
- White Vinegar
- Microwavable Bowl
- Strainer
- Copy of “Little Miss Muffet”
- Food coloring (optional)

Introduction:

- Read “Little Miss Muffet” to students
- Ask them about “curds and whey” when you get to that part
- What are curds and whey? Has anyone eaten curds and whey before?

Demonstration:

- Add 4 teaspoons of white vinegar for every 1.5 cups of skim milk (For fun, food coloring can be added to the mixture)
- Microwave mixture for a minute
- Strain the mixture and make the curds into a blob
- WARNING: this experiment may smell bad

Directions:

- Give each student a blob of curds
- Allow students to make the blob into shapes or designs
- Once dry, the shape or design will harden and the students can take it home with them!

Follow-up:

- Tell students that they just witnessed a chemical reaction
- Explain to them what a chemical reaction is and that the vinegar caused the milk to separate into a liquid and a solid
- Ask them what they learned
- Brain-pop movie: <http://www.brainpop.com/science/matter/statesofmatter/>

Source: <http://pbskids.org/zoom/activities/sci/plasticmilk.html>

Lesson Plan: The Colors behind the Black

Area: Physical Science

Age Group: Kindergarten-1st Grade

Supplies Needed:

- Paper towels
- Black Washable Markers
- Pans of water
- Tape

Introduction:

- Ask students about all their favorite colors
- Introduce primary and secondary colors
- Talk about mixing colors
- What about the color black? How do you make black?

Demonstration:

- Cut the paper towels into strip
- In the center of the strip (about $\frac{3}{4}$ of the way down), use the black marker to draw a medium sized dot
- Place a pan of water against a wall
- Tape the strip to the wall so that just the tip of the strip is submerged in the water

Directions:

- Provide each student with a paper towel strip and a marker (have them write their initials at the top of each strip)
- Ask them to draw a black dot
- Tape their strips to the wall so that they are in the water as well
- Let the students watch what happen to the strip of paper towel

Follow-Up:

- Brain-pop movie!: <http://www.brainpop.com/science/energy/color/>
- Ask students what they learned

Lesson Plan: Let's Be Molecules!

Area: Physical Science

Age Group: Kindergarten-1st Grade

Supplies Needed:

- Large Space
- Overhead Projector
- Glass beaker
- Water
- Food Coloring

Introduction:

- What are molecules? Describe that molecules are everywhere and that they are very small, too small to see with your eye

Demonstration:

- Turn on overhead projector and place a beaker with water on top of the projector
- Ask students if they think the molecules are moving
- Add a couple drops of food coloring and watch what happens!
- Students should be able to see drops of food coloring moving around and swirling
- Connect this to what molecules are and tell students that the molecules are moving even though the water is not moving

Directions:

- Have the whole class stand up and explain that they are now going to "become" molecules. Explain that warm molecules move around a lot and they like to spread out away from each other. Ask students to do this by walking, bouncing, or dancing. The hotter the molecules are, the faster they move. Ask students to act like hot molecules.
- Next they are going to become cold molecules. Cold molecules like to huddle together and bounce slowly. The colder the molecules are slower they bounce, and when they freeze they bounce really slowly, but they don't stop moving. Ask students to act like frozen molecules.
- Now give students cues as to how they should act like. Yell out hot molecules, cold molecules, and warm molecules, and students should act accordingly. Start off changing cues slowly but then get faster, see if the class can respond right away.

Follow-Up:

- Brain pop movie!
- Ask them what they learned

Source: <http://www.canteach.ca/elementary/physical15.html>

Lesson Plan: The Wind and Its Origins

Area: Physical Science

Age Group: 2nd-3rd Grade

Supplies Needed:

- lamp (without lampshade)
- talcum powder
- pencil
- piece of paper
- scissors

Introduction:

- Ask students what they think the wind is
- Ask students to brainstorm what the wind could be, what it means to them:
 - Every time I feel the wind, _____.

Demonstration:

Part 1:

- Turn on the lamp, and let it heat up a bit.
- Sprinkle some talcum powder just above the bulb.

Part 2:

- Cut a spiral out of the piece of paper
- Carefully balance the spiral on the point of a pencil. Don't make a hole in the spiral.
- Hold the pencil with the spiral just above heated lamp.

Directions:

- Ask students to closely watch what happens to the talcum powder and what happens to the spiral
- Have students discuss what they saw and why it happened
- The powder rises into the air because it is heated from the lamp
- The spiral will slowly spin because of the heated air from the lamp
- Discuss what wind actually is and what causes wind: movement of hot and cold air
- Discuss how hot air rises and cold air sinks

Follow-up:

- Talk about hurricanes and tornadoes and how they come about: extreme cases of wind
- Show animations of how hurricanes and tornadoes form:
<http://www.brainpop.com/science/weatherandclimate/wind/>

Source: <http://www.canteach.ca/elementary/earthspace11.html>

Lesson Plan: Invisible Ink!

Area: Forensics

Age Group: 2nd-3rd Grade

Supplies Needed:

- Vinegar/Lemon juice
- Toothpicks/Paintbrushes
- Paper
- Heat source

Introduction:

- Ask students what chemicals are, where they are found in daily life
- Ask students what a chemical reaction is and examples of them
- Explain how chemical reactions are occurring everywhere at any time and any place

Demonstration:

- Using the toothpick/paintbrush, write a message on a piece of paper with invisible ink
- Wave piece of paper over heat source and the secret message should appear!

Directions:

- Each student will have a toothpick/paintbrush and some of the invisible ink
- Have students use toothpick and paintbrush to write a secret message or draw a special picture on a piece of paper
- Let it dry
- Have each student wave their piece of paper over the heat source
- The secret message should slowly appear and they can take it home with them!

Follow-up:

- Ask students what caused the message to appear
- Any other normal chemical reactions like this?
- Are there any other methods for making the message appear?

Source: <http://www.canteach.ca/elementary/physical11.html>

Lesson Plan: How Powerful is Static Electricity?

Area: Physical Science

Age Group: 2nd-3rd Grade

Supplies Needed:

- Plastic comb (one for each student)
- Tiny pieces of paper (from hole puncher?)
- Ping pong balls
- Running tap water
- Balloon

Introduction:

- Do small demonstration: rub balloon in hair to make hair stand up
- Ask students what causes this to happen
- It's Static Electricity!!

Demonstration:

- Set up three stations
 - Paper Station: paper is spread out on the table
 - Ping Pong station: ping pong tables laid out on table
 - Water station: have a thin stream of water coming from tap
- Ask students to write down predictions of what they think might happen if they run a comb through their hair and they hold the comb next to each of the objects provided

Directions:

- Split class up into three groups, have each group visit each station for about ten minutes.
- When student arrives at a new station, have them run the comb through their hair a few times and quickly hold the comb close to the object provided at the center
- What happens? Ask students to record what they see.
- When everyone is done, have discussion about what happened at each station and why
- Opposites attract and likes repel

Follow-Up:

- Brain-pop movie: <http://www.brainpop.com/science/energy/staticelectricity/>
- Where else have students seen static electricity at work?

Source: <http://www.canteach.ca/elementary/physical1.html>

Lesson Plan: Electric Gelatin

Area: Physical Science

Age Group: 2nd-3rd Grade

Supplies Needed:

- Balloon
- Unflavored gelatin powder
- Paper plate
- Wool scarf or sweater
- Plate

Introduction:

- Ask students what they know about static electricity
- Examples of static electricity?
- Fill in the blank: Static electricity can _____.

Demonstration:

- Pour the unflavored gelatin powder on a paper plate
- Rub the balloon on wool for 10 seconds
- Hold the rubbed part of the balloon above the gelatin powder, **DO NOT LET THE BALLOON TOUCH THE GELATIN**
- Slowly raise the balloon

Directions:

- Provide each student with a small plate with the gelatin and a small balloon
- Ask students to follow your directions
- When the balloon is above the gelatin, what happens?
- After the balloon is slowly raised above the gelatin, what happens?

Follow-up:

- Have a class discussion on what the students saw and why they think it happened
- Explain that the balloon was charged after rubbing it with the wool; it had static electricity
- The balloon then attracted the gelatin
- What other examples of static electricity?
- Brain-pop video!: <http://www.brainpop.com/science/energy/staticelectricity/>

Source: <http://pbskids.org/zoom/activities/sci/electricgelatin.html>

Lesson Plan: Friction Fun!

Area: Physics

Age Group: 2nd-3rd Grade

Supplies Needed:

- Pennies (enough for each student)
- 5-8 identical inclines each with a different type of surface (wood, metal, carpet, paper, fabric, etc.)

Introduction:

- Introduce the concept of friction
- Fill in the blank: Because of friction, I can _____.
- Examples of friction: rubbing our hands together, walking
- How to reduce friction: ice, oil, wheels

Demonstration:

- Rubbing hand demonstration
- Put on roller skates and roll around: reduction of friction

Directions:

- Give each student a penny
- Have the students go to each station consisting of an incline with a different type of surface to test the friction of it
- At each student, place the penny face down at the top of the incline
- Each student will write down what happens to their penny

Follow-up:

- Class discussion: what happened to the pennies at each surface?
- Which surface caused the penny to slide the fastest? The slowest? Not at all?
- Why do the surfaces act differently?
- Show cartoons of each surface, depicting friction

Lesson Plan: Different Levels of Density!

Area: Physical Science

Age Group: 4th-5th Grade

Supplies Needed:

- 7 small clear plastic cups
- Light corn syrup
- Vegetable Oil
- Milk
- Water with food coloring
- Other objects of the same size

Introduction:

- Ask students what they think density is and any examples of it
- Fill in the blank: Density is important because it lets me _____.

Demonstration:

Part 1:

- Pour liquids in each glass in the order shown below. Pour out a glass of each liquid combination, so you will have 3 filled glasses in total.
- Corn syrup, milk, oil
- Milk, oil, corn syrup
- Oil, corn syrup, milk
- What happened? Draw your observations. Why did this happen? Organize the liquids from most to least dense.

Part 2:

- Pour out a little of each liquid in separate glasses. Include a glass with a little water in it. So, you will have 4 glasses of liquids in total.
- Try dropping each of the different objects in the liquids. In which liquids did it sink? In which liquids did it float? Record.
- Which objects floated the most? Which objects sank the most? Organize the objects for most to least dense.

Directions:

- Separate students into groups of four and have them perform the demonstrations on their own
- Ask them to write down their observations
- Have a class discussion and answer the questions posed above

Follow-Up:

- Other examples of where density is important?
- Swimming? Floating?
- Brain pop video!

Source: <http://www.canteach.ca/elementary/physical8.html>

Lesson Plan: So You Think Air is Nothing?

Area: Physical Science

Age Group: 4th-5th Grade

Supplies Needed:

- A Glass
- Piece of Paper towel
- Sink full of water

Introduction:

- Ask students to fill in the blank: Air takes up as much space as a _____.

Demonstration:

- Stuff the piece of paper towel in the bottom of the glass so that it will not fall out when you flip it upside down.
- Hold the glass upside down and plunge it into the sink.
- Hold the glass under water for about 10 second and then slowly and steadily lift the glass up, making sure not to tilt it at all.
- Pull out the dry piece of paper towel and show it to the students.

Directions:

- Ask students whether or not they think you can plunge the glass all they way into the sink of water without getting the paper towel wet?
- Have a class discussion of why the paper towel stayed dry.

Follow-Up:

- Brain-pop video!
- Other examples of air taking up space?

Source: <http://www.canteach.ca/elementary/physical19.html>

Lesson Plan: Magical Goo

Area: Chemistry

Age Group: 4th-5th Grade

Supplies Needed:

- ½ cup of Corn starch per student
- Medium Zip-loc bag for each student
- Plastic container
- Measuring cup
- ¼ Cup of water for each student
- Food coloring (optional)

Introduction:

- What are the three types of matter? Solid, liquid, gas
- Ask students of examples of each of these
- Ask students if they know examples of objects that are two types of matter (i.e. melting ice: solid/liquid)

Demonstration:

- In a clear container, mix in 1 cup of corn starch with ½ cup of water (Optional: add a couple drops of food coloring)
- Ask students to follow along

Directions:

- Provide each student with ½ cup of corn starch and ¼ cup of water (Option: food coloring)
- Ask students to mix the corn starch and water in the plastic zip-loc bag that they have
- Students may also add a couple drops of food coloring if they wish
- Once mixed well, ask students to hold the goo in their hand
- What happens?
- Now ask students to squeeze the goo, what happens?

Follow-up:

- Have a class discussion on what they think the goo is: a solid or a liquid?
- Brain-pop video on solids, liquids, and gases!
- Ask students what they learned

Lesson Plan: Mini-Geysers!

Area: Geology and Chemistry

Age Group: 4th-5th Grade

Supplies Needed:

- One 2-liter bottle of diet soda
- Pack of Mentos
- Level Surface (Outside)
- Test tube
- Index Card
- Small plastic cups

Introduction:

- What is a chemical reaction? Examples of them in our daily life?
- What is a geyser? What causes geysers to occur? Where are geysers found?

Demonstration:

- Open the soda and place it on a flat surface
- Place as many mentos as possible in the test tube (make sure that the mentos can easily slide out)
- Use the index card as a cover for the test tube so that it is the only thing keeping the mentos from falling into the soda
- Pull the index card away and drop the mentos into the bottle
- Watch what happens!

Directions:

- Have students go outside with you and write down what happens when the mentos is dropped into the bottle
- After the demonstration, provide each student with a small cup of soda and a mentos
- Ask students to drop the mentos into the cup of soda so they can simulate their own geyser

Follow-up:

- Back in the classroom, have a class discussion of what happened
- CO₂ in the soda sticks to the surface of the mentos
- The small bubbles form so quickly that it forces a fountain to come out of the bottle
- Watch a video of this experiment on a very large scale:
<http://eepybird.com/dcm1.html>
- Have a competition to see how many students can keep their mouth shut with a mentos and a mouthful of soda in their mouth

Source: <http://www.wetheteachers.com/plan.php?id=73>

Lesson Plan: Creative Cells

Area: Physics

Age Group: 4th-5th Grade

Supplies Needed:

- Pretzel sticks
- Gummy worms
- Nerds Gumballs
- Twizzler
- Nerds
- Jelly Beans
- Marshmallow Cream
- Knives
- Paper plates

Introduction:

- What is the cell? Where can you find the cell?
- Show a large model of the cell to the students
- Tell students that we will make a food model of the cell!

Demonstration:

- Have students follow along with you as you build the cell
- Using 4 pretzel sticks and the marshmallow cream, make a rectangle on the paper plate: this is the cell wall of the plant cell
- Place a Nerds Gumball in the center: the nucleus
- Place some pieces of twizzler around the gumball: the endoplasmic reticulum
- Next, add some gummy worms: golgi bodies
- Finally, add some jelly beans: mitochondria
- The candy cell is complete!
- As you add each type of candy, explain what it represents and what it does in the cell

Directions:

- Provide each student with a plate and some of each type of candy
- Ask the students to follow along with you
- In the end, students can take their candy cell home, or eat it!

Follow-up:

- Summarize everything
- Interactive Quiz: ask students what each type of candy represented and what it does? For correct answers, award with leftover candy

Lesson Plan: Who says I can't be Sherlock Holmes?

Area: Observation and Memory

Age Group: 4th-5th

Supplies Needed:

- A classroom with various materials
- One standard deck of cards
- Sherlock Holmes outfit?

Introduction:

- Detectives are good observers.
- We're going to create a "crime scene" in our classroom! We want you to tell us what's out of place. So let's all be Sherlock Holmes and find clues 😊

Demonstration:

- Show a brief example of what the students are going to do.
- Mentor A (the "detective") leaves the room.
- Mentor B (the "thief") messes things up in the room like putting the pencil sharpener in a different place, erasing or writing something on the white/board, changing the time on the clock, "stealing" a book, etc. Act it out in a funny way to make the kids laugh and etc.
- Mentor A re-enters the room with a magnifying glass. Write all the objects that are missing or out of place on the board. Ask help from the kids.

Directions:

- Put all of the cards face down in the middle of the classroom.
- Tell the students to sit around the cards in a circle. Explain the game of concentration – one player turns over a card and chooses to turn over another card sequentially. The player picks up both cards if they are a matched pair. The objective of the game is to pick up as many cards as possible until all cards have been collected
- Taking turns, let each student turn over 2 cards. They can all observe what the other students are turning over.
- At the end of the game, see who has how many cards.

Follow-up:

- How good is our memory?
- Short term memory vs. long term memory
- Repetition and practices enhances long term memory – "practice makes perfect."
- Motor skills such as running and jumping are learned by repetition.
- A person's memory degrades with age.
- Give everyone a peppermint: supposed to help students concentrate.