praxis

Science Exposed

SHAW Series

Alberta Science

Curriculum Fits

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Science Exposed

Episode 1

Science of Sound

Link: http://praxismedhat.com/science-exposed

Curriculum Fit:

Grade 3

Topic D: Hearing and Sound

Overview Students explore the nature of sound, its sources, its qualities and what it is. They learn that sound is vibration and that changes in vibration can affect the loudness, pitch and quality of sound. They learn about sound travel by studying what things carry sound, what things make it louder or softer, and what happens to sound when it reaches their ears. The sensitivity of human ears and those of other animals is examined, as students learn about the safe use of this valuable sense.

Screeching Balloons

Materials

balloon

1/4" hex nut

Optional: various coins (pennies, nickels, etc.)

Procedure

1. Squeeze the hex nut through the mouth of the balloon. Make sure that the hex nut goes all the way into the balloon so that there is no danger of being sucked out while blowing up the balloon.
2. Blow up the balloon, but be careful not to over inflate it, as it will burst very easily.
3. Tie off the balloon and you're ready to go.
4. Grip the balloon at the stem end as you would a bowling ball. The neck of the balloon will be in the palm of your hand.
5. While holding the balloon palm down swirl it in a circular motion. The nut may bounce at first, but eventually it will begin to roll around the sides of the balloon.
6. Hear that sound?

7. Once the nut begins to spin, use your other hand to stabilize the balloon. The sounds should continue for almost 10 seconds after the balloon has stopped moving.
8. Repeat this time using different kinds of coins.
9. What do you notice?

What is Going On?

Today we've learned about two things: centripetal force and producing sounds.

Centripetal force is the inward force that acts on an object moving in a circular path. So as the balloon spins and the hex nut travels in a circle around the balloon, there is a "centre-seeking" force acting on the nut.

In this experiment the nut vibrates the balloon and produces sound. A hex nut has flat sides. These flat sides slide, bounce and vibrate along the inside of the balloon. These movements cause the balloon to vibrate and produce sound. If you were to complete the activity and put a dime in the balloon instead of the hex nut, the dime would demonstrate centripetal force, but would not produce sound because a dime is round. The round dime would glide much easier over the balloon surface and not produce any sounds.

Science Exposed

Episode 2

Science of Dry Ice

Link: http://praxismedhat.com/science-exposed

NOTE: This episode is for viewing only as DRY ICE should only be handled by experienced science professionals under appropriate conditions for safety reasons.

Curriculum Fit:

Grade 5

Topic C: Classroom Chemistry

Students learn about the properties and interactions of some safe to handle household liquids and solids. They test a variety of materials to see what happens when things are mixed together: what dissolves, what reacts and what remains unaffected. They discover that when a solid material dissolves, it can be recovered as a crystal by evaporating the liquid. They also learn that when two materials react to form a new material, the original materials cannot be recovered. As an example of a chemical reaction, students learn to produce carbon dioxide gas and show that this gas differs from ordinary air.

Dry Ice Facts

- Dry ice is solid **carbon dioxide**. This is a normal gas in our atmosphere. Carbon dioxide is the gas we give off when we breathe and the gas plants use for **photosynthesis.**

- Dry ice has a temperature of about -79 °C.

- Dry ice **sublimates** from a solid to a gas.

- Dry ice can cause frostbite due to it being so cold.

Science Exposed

Episode 3

Science of Sound Continued…

Link: http://praxismedhat.com/science-exposed

Curriculum Fit:

Grade 3

Topic D: Hearing and Sound

Overview Students explore the nature of sound, its sources, its qualities and what it is. They learn that sound is vibration and that changes in vibration can affect the loudness, pitch and quality of sound. They learn about sound travel by studying what things carry sound, what things make it louder or softer, and what happens to sound when it reaches their ears. The sensitivity of human ears and those of other animals is examined, as students learn about the safe use of this valuable sense.

Clucking Chickens

Materials

cup (large plastic)
string
button
small piece of sponge
water
ruler
scissors
nail

Procedure

1. Find the centre of the cup. Using the ruler, measure one centimetre from the left of centre and place a mark here. Measure one centimetre to the right of centre this time, and place a mark there.
2. **To make the hole, BE CAREFUL, have an adult help you.** You can do this by pushing a nail slowly into the cup until it punctures the cup all of the way through. Do this for the two holes you marked AWAY from centre.
3. Using the ruler, measure 50 cm of string and cut with the scissors.
4. Insert the end of the string into one of the holes in the top of the cup and pull it through the other hole.
5. Tie a knot in the string at the top of the cup. Hold the cup upside down, and the string should be dangling down.
6. Using the scissors carefully cut a small piece of sponge. About 2cmx2cm will be large enough.

7. Carefully poke a hole in the middle of the piece of sponge. Again, be careful you do not cut yourself.
8. Pull the string through this hole in the sponge.
9. Hold onto the string and sponge carefully and tie a button onto the end of this piece of string to keep it from pulling through the sponge. Make sure you have a good knot in the end to keep the sponge and button on the string.
10. Dip the sponge in a bit of water, and wring it out entirely. You just want it to be damp.
11. Pull the piece of sponge to the top of the string just below the mouth of the cup.
12. Wrap the wet sponge around the top of the string.
13. Squeeze the sponge against the string as you move the sponge down the string using jerky movements.
14. If you have time, you can decorate your "chicken" with the materials provided to make it look more life-like.

What is going on?

A sound should have been produced that made it sound like a clucking chicken. The water allows the sponge to move down the string, but there is enough friction to cause the string to vibrate, because the sponge skips and pulls at the string. The irregular touching on the string produces tiny taps that force the string's molecules to move back and forth. The vibrating string strikes the molecules in the cup, and the cup's molecules strike the air molecules causing them to move back and forth in rhythm with the cup and string. The sound is made louder because the inside of the cup acts like a megaphone that concentrates the sound waves and sends them out in one direction.

Science Exposed

Episode 4

Static Electricity

Link: http://praxismedhat.com/science-exposed

Curriculum Fit:

Grade 5

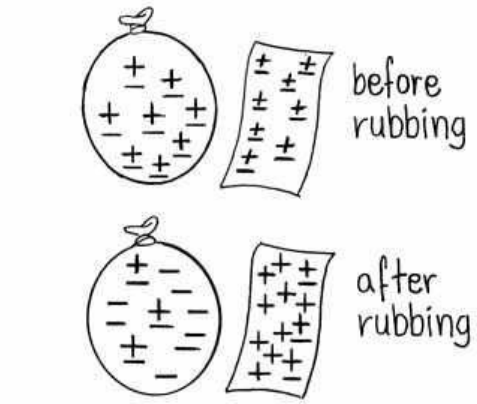
Topic D: Electricity and Magnetism

Overview
Students learn about electricity by building and testing circuits. Using batteries, bulbs and wires, students construct simple circuits and test the effects of various modifications. Through such tests, they discover that a circuit requires a closed pathway for electricity and that some materials conduct electricity and others do not. They learn that an electric current can affect a nearby magnet and that this property of electricity is used in making electromagnets and motors. Potential dangers are examined, as students learn about the safe use of electricity.

What is Static Electricity?

Static electricity is the buildup of electric charges on a surface. The charges can "jump" from one surface to another.

How Does Static Electricity Work?



Source: Unknown

Opposites Attract

*** Remember to ask an adult before you do this experiment.**

Materials

balloon

clean, dry head of hair, or a wool sweater, cloth

sheet of black paper

salt

pepper

sturdy surface

tablespoon

two empty soda cans

long piece of PVC pipe

scissors

tissue paper

Procedure

1. Place the sheet of black coloured paper on a sturdy surface.
2. Place six tablespoons (90mL) of salt on the paper. You want to have a nice mound of salt.
3. Add three tablespoons (45 mL) of pepper.
4. Make sure the mixture is mixed up well.
5. Blow up the balloon and tie it.
6. Rub the balloon in your hair (or a volunteer's hair). Rub really well.
7. Slowly place the balloon over the salt and pepper mixture.
8. What do you see
9. Did you hear anything?
10. Repeat.

Caution: You do not want to touch your eyes while doing this experiment as the pepper powder on your fingers will really sting your eyes. Once you are done, be sure to dispose of the balloon and wash your hands very well.

Extension

1. Place the two empty soda cans close together lying flat on the table.
2. Take the cloth and "charge" the piece of PVC pipe.
3. Hold the pipe close to the empty soda cans.

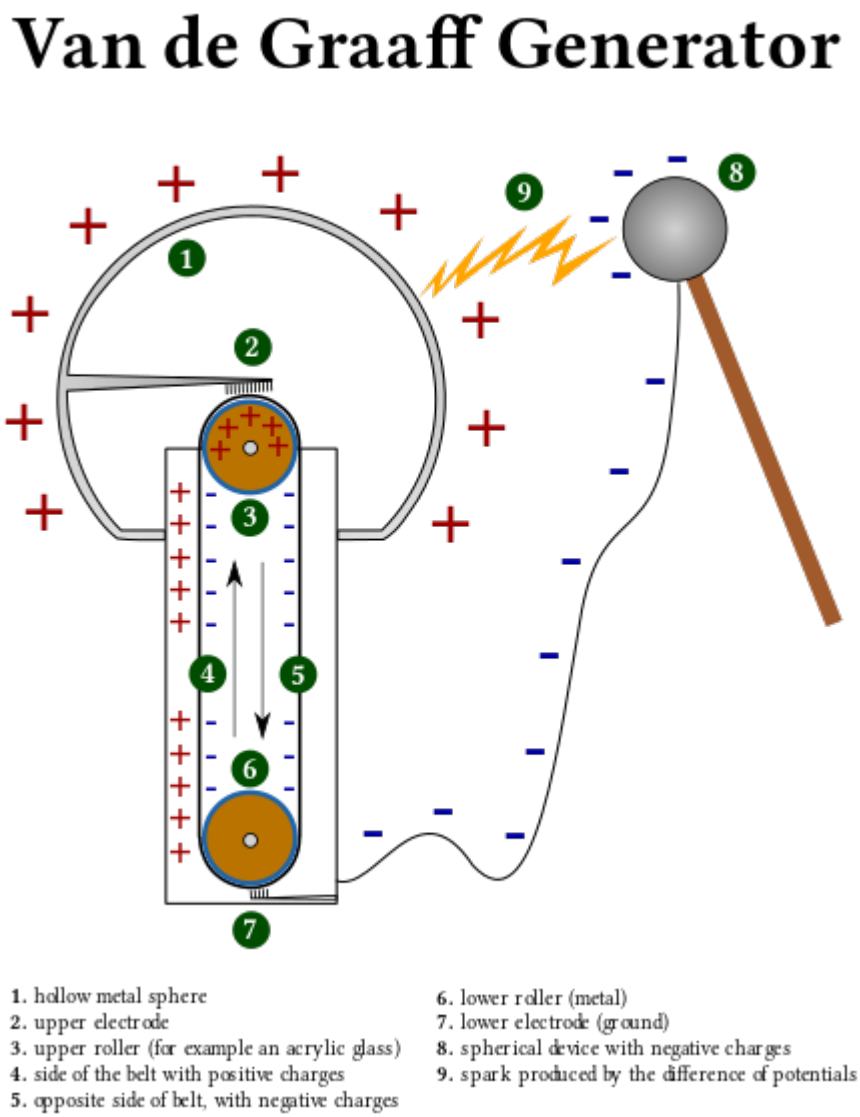
4. What happens?
5. Cut out an interesting shape from the tissue paper.
6. “Charge” the PVC pipe once again.
7. Hold the pipe close to the tissue paper.
8. What happens?

Explanation

Ah ha! I have finally found the answer and whew it is not my fault that my hair is standing on end. Of course it has to do with science!! I should have known…static electricity is at play, as it is in this experiment.

In this experiment, you created static electricity by the friction as you are rubbing the balloon on your volunteer’s hair. Try not to laugh at their crazy hairdo now!! You gave the balloon electrons and it became charged. The pepper in this experiment was uncharged. When you held a charged object (balloon) over the pepper that was uncharged, it quickly became attracted to it. If you carefully look at the bottom of the balloon, you will be able to see all of the pepper stuck to it. You should have also been able to hear the pepper attracting to the balloon!

How Does a Van de Graaff Generator Work



Source: https://en.wikipedia.org/wiki/File:Van_de_Graaff_Generator.svg

Science Exposed

Episode 5

Electricity

Link: http://praxismedhat.com/science-exposed

Curriculum Fit:

Grade 5

Topic C: Mechanisms Using Electricity

Overview
Students build electrical devices for a variety of purposes, using knowledge gained in the previous topic. Tasks that students are assigned may include such things as making a switch from scrap materials, making a device to control the speed of a motor, making a burglar alarm and lighting three bulbs from one source. Through work on these tasks, students learn the role of various components and control devices that are part of an electrical system. At the same time, they develop skills of problem solving and teamwork.

Topic D: Electricity and Magnetism

Overview
Students learn about electricity by building and testing circuits. Using batteries, bulbs and wires, students construct simple circuits and test the effects of various modifications. Through such tests, they discover that a circuit requires a closed pathway for electricity and that some materials conduct electricity and others do not. They learn that an electric current can affect a nearby magnet and that this property of electricity is used in making electromagnets and motors. Potential dangers are examined, as students learn about the safe use of electricity.

Fruit Batteries

***Remember to ask an adult before you do any science experiment.**

Materials

galvanized (zinc) nail

sandpaper

apple

18 gauge copper wire (it comes on a small roll)

wire strippers (optional)

scissors

voltmeter

ruler

Procedure

1. Using the sandpaper, gently rub the end of the galvanized nail. Clean the surface well.
2. Measure and cut a 10cm strip of wire.
3. Strip the insulation off of each end (about 1cm). Use the wire strippers, but if you do not have them, carefully snip a little piece being careful not to go all of the way through the wire and then peel back the plastic with your fingernails.
4. Gently sand the ends of the copper wire just to clean them off.
5. Carefully push the nail into the apple. It does not have to be all of the way through about 2cm deep should be fine.
6. Push one end of the copper wire into the apple. It should be very close to the nail, but DO NOT touch the nail.
7. You now have two terminals in the apple battery!
8. Turn the voltmeter on.
9. Take the red lead from the voltmeter and touch it to either the nail or the wire. Use the black lead and touch it to the other terminal.
10. Read what the voltmeter says. Note: if it does not display anything, simply switch the leads, you have them backwards!

What is going on?

The voltage you read on the voltmeter is the amount of electricity the apple battery is producing. The juice of the apple acts as an electrolyte through which ions can flow. Although this type of fruit does not have enough power to light a bulb for instance, it is clearly producing electricity!

Note: You should be able to purchase all materials listed in this experiment relatively inexpensively at a local hardware store.

Conductive Dough

***Remember to ask an adult before you do this experiment.**

Materials

measuring cups

measuring spoons

mixing bowl

missing spoon

flour

cream of tartar (found in the spice section at the grocery store)

food colouring (optional)

led lights

9V battery

wires with alligator clips

vegetable oil

salt

sugar

stove top or hot plate

pot to cook the mixture in

sink (to clean up)

plastic containers or zipper bags (to store dough in)

Procedure

1. Into the pot, mix the following: one cup (250 mL) of flour, one cup (250 mL) of water, ¼ cup (60mL) of salt, three tablespoons (45 mL) of cream of tartar and one tablespoon (15mL) of vegetable oil. You can also add some food colouring at this point. I would advise colouring one of the dough mixtures so you can tell them apart. Stir well and place over medium heat.
2. Allow this mixture to cook until the dough pulls away from the sides of the pot.
3. Remove the dough from the heat and allow it to cool until you can handle it.
4. At this point you may have to knead a bit more flour into it the dough so it can be molded into various balls or shapes. This is your conductive dough.
5. Place the dough in a sealable container until you are ready to use it and then it will not dry out.
6. You need to make the insulating dough.

7. In a clean pot, mix the following: one cup (250 mL) of flour, ½ cup of (125 mL) of sugar), three tablespoons (45 mL) of vegetable oil and ½ cup (125 mL) of water.
8. Repeat steps 2 -5.
9. Build your circuit now!
10. Take one piece of conductive dough and roll it into a nice ball. Repeat so you have two balls of conductive dough.
11. Repeat, making one ball of insulating dough.
12. Place the dough balls together with the insulating dough in the middle.
13. Take the led light and gently separate the prongs on the bottom. Place one prong in one ball of conductive dough and the other prong into the other ball of conductive dough. You are doing this to ensure the electricity will flow into the led light.
14. Take the alligator clips and attach one to each post of the 9v battery.
15. Place a penny on one end of one alligator clip and a paper clip into the other alligator clip.
16. Gently insert the penny into one of the conducting balls and the paper clip into the other conduction dough ball.
17. Watch what happens.

What is going on?

In this experiment you made conductive dough first and insulating dough in the second part of the experiment. When I first tried this, I thought it was pretty amazing myself – but that is likely the inner science geek talking! It is amazing though if you really think about it. What looks like plain old dough can transfer electricity…HOW does this happen??

In the conductive dough the salt and water allow electricity to flow and light up the bulb. Conductors allow the electricity to pass through them.

On the other hand, insulators do not allow electricity to easily pass through them. Resistance is a measurement of how insulating something is. This dough is resistive which means little electricity can flow through it.

Once you have mastered creating these simple circuits try to make parallel and series circuits. You can also try to make buzzers work, or fans move. Check out what they may have at the electronics store as the possibilities are endless!

Science Exposed

Episode 6

Science or Magic?

Link: http://praxismedhat.com/science-exposed

Curriculum Fit(s):

Grade 1:

Topic A: Creating Colour

Overview
Students explore coloured materials, learning about different colours, how they are created, what happens when they are mixed and how they can be transferred from one material to another. Students learn to distinguish and describe colours and work with a variety of materials to create, modify and apply colours. In the process, students learn that different materials have particular properties and that the properties and interactions of materials have to be taken into account when they are used for a specific purpose.

Grade 2:

Topic A: Exploring Liquids

Overview
Students learn about the nature of liquids and the interactions of liquids with other materials. They
explore liquids by examining droplets, by watching liquids trickle down slopes, by investigating flow rates and by observing liquid interactions with a variety of materials. They learn that some materials are impervious to liquids, while others are absorbent, and that some liquids mix readily while others do not. They observe that liquid water can be changed to ice or to steam, and back again, if heated and cooled,
and that wet materials dry out when left open to the air. Through this topic, students learn that water is our most important liquid, that we use water in many ways, and that water is essential to life.

Grade 5

Topic C: Classroom Chemistry

Overview
Students learn about the properties and interactions of some safe to handle household liquids and solids. They test a variety of materials to see what happens when things are mixed together: what dissolves, what reacts and what remains unaffected. They discover that when a solid material dissolves, it can be recovered as a crystal by evaporating the liquid. They also learn that when two materials react to form a new material, the original materials cannot be recovered. As an example of a chemical reaction, students learn to produce carbon dioxide gas and how that this gas differs from ordinary air.

Grade 5

Topic D: Weather Watch

Overview
Students learn about weather phenomena and the methods used for weather study. They learn to measure temperatures, wind speed and direction, the amounts of rain and snow, and the amount of cloud cover. In studying causes and patterns of air movements, students learn about the effects of uneven heating and cooling and discover the same patterns of air movement in indoor environments as are found outdoors. They also learn about human actions that can affect weather and climate and study the design and testing of clothing used as protection against the weather.

Magic Powder

Materials

water gel powder (OR a couple of diapers)

bottle of water

2 cups (the kind you cannot see into)

Procedure

1. Before the audience gets there, prepare your cups. If you do not have water gel powder, cut several diapers open and shake out the powder in there. You want about 154 mL (one tablespoon).
2. Fill one cup with 250 mL of water and the other cup with one blue scoop of Water Gel.
3. Walk up to a coworker, a teacher, a student, or a parent and pour the water from one cup into the cup with the scoop of Water Gel.
4. Say something like, "This is for taking the last donut," or "This is for the 'B' I got on that physics test," and tip the cup over their head.
5. Nothing will come out!
6. Say, "Just kidding OR April Fools," and RUN FAST!

What is going on?

The secret to this "magic Trick" is the powder put in the cup. It is a superabsorbent polymer called sodium polyacrylate. When this powder comes into contact with water, the molecules of the polymer draw the water in and then hold onto it. In the case of Water Gel, it's able to absorb 100x its own weight in water! This is how diapers are so absorbent and do not leak!

Carbon Dioxide Fire Extinguisher

***Remember to ask an adult to help you with this experiment.**

Materials

vinegar

baking soda

beaker or measuring coup (something you can pour out of)

tea light candles

measuring spoons

measuring cup

lighter or matches

baking pan (to work on)

safety goggles

Procedure

1. Put your safety goggles on.
2. Place the beaker and a tea light candle on the baking pan.
3. Measure 30 mL (two tablespoons) of baking soda and put it in the beaker.
4. Using the measuring cup, measure 125 mL (1/2 cup) of vinegar).
5. Pour this into the baking soda.
6. Observe.
7. Have an adult help you light the tea light candle.
8. Pick up your beaker and tip it a little bit (not enough for the liquid to come out), but just hold it there.
9. Observe.
10. What happens?

What is going on?

You should have put the candle out once you held the beaker near the flame for a couple of seconds. Why is this? Well, when you mixed the vinegar (acetic acid) and baking soda (sodium bicarbonate), you created a chemical reaction. This chemical reaction is unstable though. It quickly decomposed into carbon dioxide and water. The bubbles released this carbon dioxide gas, and it filled the beaker. You did not see this gas because it is colourless and odourless. special gas called **carbon dioxide** (CO_2).

Carbon dioxide is all around us. We breathe it out each time we exhale. It is useful for plants as they use it in photosynthesis. In this experiment it was also useful because it was able to put out a flame. Carbon dioxide gas is heavier than air, so as a result, it is able to put out the flame as it is poured out of your beaker and onto the flame of the candle.

Keep The Paper Towel Dry Trick

Materials

large clear plastic container
clear glass
water
a couple of paper towels
science helper

Procedure

1. Fill the clear container about three quarters full of water.
2. Set on a sturdy surface to work.
3. Crumple up the paper towel and place it in the empty glass.
4. Holding the glass in one hand, flip it upside down.
5. Holding the glass firmly, straight and steady, plunge it to the bottom of the container and pull up quickly.
6. Flip the glass over and observe the paper towel.

What is going on?

It may take a bit of practice, but you should have been able to put the paper towel and glass into the container of water and pulled it out completely dry! This is possible because there is something else in the glass as you submerge it into the water – air. The air is literally trapped in there, as you push the glass to the bottom of the water. This air in turn "pushes" the water out of the way as you lower the glass into the water, keeping the paper towel dry!

Clouds

***Remember to ask an adult before doing this experiment.**

Materials

bicycle tire foot pump

cork

empty 2L pop bottle

70% rubbing alcohol

safety glasses

metal inflation needle (from the bicycle pump)

science helper

Procedure

1. Put on your safety goggles.
2. Make sure your cork fits in the pop bottle. It should be quite snug. You can purchase different sizes, so be careful that you measure correctly.
3. Have an adult assist you in pushing the metal inflation needle through the cork. It should be through just enough so you can pump air out of the end.
4. Attach the pump to the inflation needle/cork.
5. Pour enough rubbing alcohol in the pop bottle to cover the bottom. Swirl it around all the sides ensuring it is all coated.
6. Put the cork in the bottle.
7. Holding the cork firmly in place, pump the bottle up – it may take ten or fifteen pumps…the bottle will be really firm to the touch.
8. Remove the cork.
9. Observe.

What is going on?

Did you know that there are water molecules in the air around you – even if it is not raining? These invisible drops of water are actually called water vapour. The air you are pumping into the bottle is actually forcing the water vapour present in the bottle to squeeze together really tightly. They are just kind of hanging out there and then all of a sudden – WOW! When you pop the cork out of the bottle, you are releasing all of that pressure rather quickly allowing the air to expand. As this happens the temperature of the air cools down or condenses and you are able to see the cloud.

Clouds are quite complex to understand, but I will try to simplify it here for you. Basically, clouds forms when air which is warm and moist rises, cools and then expands high up in the atmosphere. This water vapor condenses to form tiny water droplets which in turn start the entire process of forming a cloud.

Scared Pepper

Materials

container of pepper

shallow pan or petri dish

bar of soap

Procedure

1. Fill the pan approximately 1 centimetre deep.
2. Set the pan on the counter and let it rest until the water is no longer moving.
3. Gently sprinkle the top of the water with the pepper. Be sure that there is a visible layer of pepper.
4. Touch the bar of soap into the middle of the pepper.
5. Watch what happens.

What is going on?

When you touch the bar of soap to the pepper, the pepper should have scattered to the sides of the pan. This is because the soap breaks the surface tension of the water. As you touch the soap to the water, some of it dissolves and mixes with the water. The soap molecules get between the water molecules and decrease the attraction they have for one another. The soap breaks the surface tension of the water in the area where you touch it. The tension on the rest of the surface of the water pulls the floating pepper to the sides of the pan way from the soap.

Magic Milk

***Remember to ask an adult before doing this experiment.**

It's an explosion of color! Some very unusual things happen when you mix a little milk, food coloring, and a drop of liquid soap. Use this experiment to amaze your friends and uncover the scientific secrets of soap.

Materials

milk (whole or 2%)

dinner plate or Pie Plate

food coloring (red, yellow, green, blue – primary colours)

dish-washing soap (Dawn™ brand works well)

cotton swabs

Procedure

1. Pour enough milk in the dinner plate to completely cover the bottom. Allow the milk to sit for a couple of minutes and settle.
2. Add one drop of each of the four colors of food coloring - red, yellow, blue, and green - to the milk. Keep the drops close together in the center of the plate of milk.
3. Find a clean cotton swab for the next part of the experiment. Predict what will happen when you touch the tip of the cotton swab to the center of the milk. It's important not to stir the mix. Just touch it with the tip of the cotton swab. Go ahead and try it.
4. Now place a drop of liquid dish soap on the other end of the cotton swab. Place the soapy end of the cotton swab back in the middle of the milk and hold it there for 10 to 15 seconds. Look at that burst of color!
5. Add another drop of soap to the tip of the cotton swab and try it again. Experiment with placing the cotton swab at different places in the milk. Notice that the colors in the milk continue to move even when the cotton swab is removed. What makes the food coloring in the milk move?

Repeat the experiment using water in place of milk. Will you get the same eruption of color? Why or why not? What kind of milk produces the best swirling of color: skim, 1%, 2%, or whole milk? Why?

What is going on?

It's an explosion of color! Some very unusual things happen when you mix a little milk, food coloring, and a drop of liquid soap. Use this experiment to amaze your friends and uncover the scientific secrets of soap.

Milk is mostly water but it also contains vitamins, minerals, proteins, and tiny droplets of fat suspended in solution. Fats and proteins are sensitive to changes in the surrounding solution (the milk).

When you add soap, the weak chemical bonds that hold the proteins in solution are altered. It becomes a free-for-all! The molecules of protein and fat bend, roll, twist, and contort in all directions. The food coloring molecules are bumped and shoved everywhere, providing an easy way to observe all the invisible activity.

At the same time, soap molecules combine to form a *micelle*, or cluster of soap molecules. These micelles distribute the fat in the milk. This rapidly mixing fat and soap causes swirling and churning where a micelle meets a fat droplet. When the micelles and fat droplets have dispersed throughout the milk the motion stops, but not until after you've enjoyed the show!

There's another reason the colors explode the way they do. Since milk is mostly water, it has surface tension like water. The drops of food coloring floating on the surface tend to stay put. Liquid soap wrecks the surface tension by breaking the cohesive bonds between water molecules and allowing the colors to zing throughout the milk.

Soap Soufflé

***An adult must help you with this experiment.**

Materials

one bar of Ivory™ soap

one bar of another brand of soap

adult supervision

paper towels

bowl

water

cutting board

knife

microwave oven

Procedure

1. Fill the bowl about ¾ full of room temperature water.
2. Carefully slide the bar of soap into the water
3. Observe what happens.
4. Slowly slide the bar of Ivory™ soap into the water.
5. Observe what happens.
6. Have an adult help you cut the bar of Ivory™ soap in half.
7. Look at the inside of the soap.
8. Take the other bar of soap and cut it in half also.
9. Observe.
10. Place the bar of Ivory™ soap on a paper towel.
11. Have your adult helper place it in the microwave.
12. Set the microwave on high for one minute.
13. Watch through the window what happens.
14. Remove the bar of soap from the microwave. Allow it to cool for a few minutes before touching it.
15. Make some observations.

What is going on?

First of all, the Ivory™ soap should have been able to float in the water. Did you know that Ivory™ soap is one of the few brands of soap that will actually float in the water? This is because Ivory soap is manufactured in a special way; air is mixed into the soap making it light and fluffy.

When you placed the soap in the microwave, you should have seen the bar of Ivory™ soap expands into a large fluffy soufflé! The secret behind the science here is that the soap contains water (I know it is hard to believe as you cannot see it, but trust me it is in the soap). This water is in the form of water vapour trapped inside the soap. When you heat the soap up, the water vaporized, forming bubbles and also causing the soap to expand into a fluffy soufflé

Science Exposed

Episode 7

Let's Get Messy!

Link: http://praxismedhat.com/science-exposed

Curriculum Fit(s):

Grade 5

Topic C: Classroom Chemistry

Overview
Students learn about the properties and interactions of some safe to handle household liquids and solids. They test a variety of materials to see what happens when things are mixed together: what dissolves, what reacts and what remains unaffected. They discover that when a solid material dissolves, it can be recovered as a crystal by evaporating the liquid. They also learn that when two materials react to form a new material, the original materials cannot be recovered. As an example of a chemical reaction, students learn to produce carbon dioxide gas and how that this gas differs from ordinary air.

Charcoal Snake

***This experiment should only be done OUTSIDE and by an ADULT.**

Materials

safety goggles

outdoor location

tin pie plate

sand

lighter

powdered sugar

baking soda

ethanol

mixing bowl

measuring spoons

measuring cups

Procedure

1. Find a safe location OUTSIDE away from EVERYTHING to do this – NOTE: it involves fire.
2. Put on your safety goggles.
3. Fill the pie tin with sand.
4. Make an indentation in the middle of the sand with your hand. You want it to be a bit of a "bowl" shape as it is going to hold a mixture.
5. Pour 50 mL (1/4 cup) of ethanol all over the sand in the pie tin. Allow it to soak in.
6. In a small mixing bowl, combine 40 mL (eight teaspoons) of powdered sugar with 5 mL (one teaspoon) of baking soda.
7. Pour this mixture into the indentation you made in the sand.
8. Have an adult light the sand using a lighter.
9. Stand back and observe.
10. BE PATIENT!
11. Ensure this is extinguished BEFORE leaving it. NEVER leave it unattended.

What is going on?

As the mixture begins to burn, you will see a long charcoal snake beginning to emerge out of the sand! It does take quite a while for this to happen.

You are lucky in this experiment – you are getting a "three for one deal"! There are three chemical reactions all dependent on heat. The first reaction occurs when the sugar begins to combust in the presence of oxygen. As a result, the gas carbon dioxide and water vapour are produced which push the sugar/baking soda mixture up through the sand. As the unburned sugar continues to heat up, it does not have any oxygen, and as a result a **thermal decomposition** occurs and the black carbon snake begins to emerge (as well as water vapour). The final reaction in this experiment occurs as the baking soda begins to decompose. This produces a solid sodium carbonate, carbon dioxide and water vapour which continue to push the carbon snake upwards making it grow and grow and grow!

Mentos Geyser

Materials

2 L diet cola

Mentos

Procedure

1. Select an outdoor location, which has a flat area.
2. Open the bottle of diet cola and position the bottle on the ground so that it will not tip over.
3. Place 7 Mentos candies in your hand.
4. Place your hand next to the mouth of the soda.
5. Count down . . . 1 2 3 . . .drop the Mentos in the bottle.
6. Most important step - - - RUN AWAY!

What is going on?

Each Mentos candy has thousands of tiny pits all over the surface. These tiny pits are called nucleation sites - perfect places for carbon dioxide bubbles in the cola to form. As soon as the Mentos hit the cola, bubbles form all over the surface of the candy and then quickly rise to the surface of the liquid. Couple this with the fact that the Mentos candies are heavy and sink to the bottom of the bottle and you've got a double-whammy. When all this gas is released, it literally pushes all of the liquid up and out of the bottle in an incredible cola blast.

Rising Water

***An adult should do this experiment as it involves fire. Find a safe location to do this.**

Materials

tin pie plate

small glass jar

tea light candle

water

lighter

food colouring (optional)

Procedure

1. Find a safe location to do this experiment as it involves fire.
2. Set the pie tin on a safe, sturdy surface.
3. Place the tea light candle in the middle of the pie tin.
4. Carefully pour enough water in the pie tin until it is about half way up the sides of the candle.
5. Add food colouring if you wish.
6. Light the tea light candle.
7. Place the small glass jar over top of the candle carefully. Resting it at the bottom of the pie tin.
8. Observe.

What is going on?

In this experiment, obviously, the candle heats the air that is trapped under the glass jar. This in turn allows the hot air to expand initially – you may even see some escaping out below the jar in the form of bubbles. Stay with me though, as the candle burns up the oxygen in this closed environment, it eventually burns itself out and allowing the air in the jar to cool. As the cooler air contracts, it takes up less space. This contraction creates a weak vacuum of lower pressure in the glass jar. As a result you have the outside air pushing water into the container until the pressure becomes equal both inside and outside the glass jar. You should have observed that the water will stop rising once this pressure is finally equalized.

Elephant Toothpaste

***An adult needs to do this experiment with you.**

Materials

food colouring

package of yeast

warm water

measuring spoons

measuring cups

empty cup

stir stick or spoon to stir with

large plastic flask or empty large soda bottle

peroxide

dish soap

safety goggles

baking pan

flat empty counter or table to work on

Procedure

1. Find a good place to work as this experiment could potentially make a mess…! Outside would be perfect or a good sturdy counter will work too.
2. Put on your safety glasses.
3. Place the flask on the cookie sheet and set aside for now.
4. Measure three tablespoons (45 mL) of warm water into the empty cup.
5. Measure one tablespoon (15 mL) of dry yeast to the warm water. Stir it well and set aside for a minute or so.
6. Measure ½ cup (125 mL) of hydrogen peroxide and carefully pour it into the flask.
7. Add a few drops of food colouring of your choice. Swirl it around.
8. Squeeze three large squirts (I know such an exact measurement, but it does not need to be precise) of dish soap into the peroxide mixture.
9. Have everyone stand back and slowly add the yeast mixture to the peroxide mixture.
10. Watch what happens.

11. Clean up your mess!!

What is going on?

I call this experiment elephant toothpaste because it looks like toothpaste being squeezed out of a tube and big enough for an elephant to use – it should foam up and squirt right out into the air!

There is a bit of a complicated chemical reaction occurring in this pretty cool experiment! Let us look at this simply…basically you start with peroxide and a bit of soap. You add a catalyst to this mixture. As a result of this you start breaking down the peroxide into two of its components; oxygen and water. What you end up with is water and soap and a TON of tiny bubbles as a result of the oxygen being released.

Did you know that you should read the percentage of peroxide you use as there are varying strengths – 3%, 12%, and even higher? Look around at different stores to see what you can find. The stronger the peroxide, the larger your reaction! Be careful though and follow all safety rules to keep your science fun and safe.

If you want to know the exact Chemistry:

Elephant Toothpaste Chemistry

The overall equation for this reaction is:

$2\ H_2O_2(aq) \rightarrow 2\ H_2O(l) + O_2(g)$

However, the decomposition of the hydrogen peroxide into water and oxygen is catalyzed by the iodide ion.

$H_2O_2(aq) + I^-(aq) \rightarrow OI^-(aq) + H_2O(l)$

$H_2O_2(aq) + OI^-(aq) \rightarrow I^-(aq) + H_2O(l) + O_2(g)$

Film Canister Rockets

***Remember to ask an adult before doing this experiment.**

Materials

empty film canister/ empty pill container

vinegar

baking soda

safety goggles

- Construction paper,
- Glue,
- Tape.

Procedure

1. Put on your safety goggles.
2. Fill a film canister half full with vinegar, then using the lid as a bowl; add a small amount of baking soda.
3. QUICKLY close the lid (which adds the baking soda) and turn the canister lid side down (on a flat surface and outside). The reaction occurs in less than two seconds so practice makes perfect!
4. Experiment with different amounts of vinegar and baking soda for the best launch.
5. If you want, decorate your film canister into an actual rocket and see which design is the most effective for a great launch!

What is going on?

The vinegar (acetic acid) reacts with the baking soda (sodium bicarbonate) producing carbonic acid. Carbonic acid is not stable and falls apart to produce carbon dioxide and water. The release of carbon dioxide (a gas) causes the pressure to increase and once the pressure is high enough it blows the lid and canister apart. The force of this is what propels the rocket into the air! Have fun and be sure to get messy!

Exploding Baggies

***Remember to ask an adult before doing this experiment.**

Materials

sandwich size zipper baggies

water

vinegar

baking soda

tissue

measuring spoons

measuring cups

outdoor location

Procedure

1. Take a tissue and separate it into layers. You will only need one layer for this experiment.
2. Place the tissue on a flat surface and place 30 mL (two tablespoons) of baking soda in the middle of the tissue. Fold it up so it looks like a neat little package. Set aside for now.
3. Measure 125 mL (1/4 cup) of vinegar and pour it into the zipper baggies. Close the baggie up.
4. Go outside OR to a location you can get messy!
5. Unzip the baggie and put the baking soda packet inside.
6. QUICKLY zip up the baggie.
7. I suggest throw it and run away.
8. Cover your ears!!
9. Observe.

What is going on?

The baggie should have begun to fill up…fill up…fill up…and explode. Why?? Well, the mixture of vinegar (acetic acid) and baking soda (sodium bicarbonate) combine and create a chemical reaction. This reaction in turn releases carbon dioxide. You have the carbon dioxide trapped inside of the bag and it has nowhere to go until…the bag explodes!