HOME SCIENCE TOOLS®

inspired learning

26 HALLOWEEN SCIENCE EXPERIMENTS!

TABLE OF CONTENTS:

SIMPLE SLIME RECIPE

GAK SLIME

WHAT YOU NEED:

- ☐ School glue
- ☐ Borax (Sodium tetraborate)
- ☐ Food coloring (optional)
- ☐ Water
- ☐ Two bowls

WHAT YOU DO:

1. In one bowl mix 1 oz. glue (about ¼ of the glue bottle) and ¼ cup water. If you want colored slime, add food coloring to the glue and water mixture. Lift some of the solution out of the container with the stir stick and note what happens.

2. Add 1/4 cup of liquid Sodium Tetraborate (Borax) Solution (find recipe below) to the glue and water mixture and stir slowly.

3. The slime will begin to form immediately. Lift some of the solution with the stir stick and observe how the consistency has changed from Step 1.

4. Stir as much as you can, then dig in and knead it with your hands until it gets less sticky. This is a messy experience but is necessary because it allows the two compounds to bond completely. Don't worry about any leftover water in the bowl; just pour it out.

5. When not in use, store the slime in a plastic bag in the fridge to keep it from growing mold.

WHAT HAPPENED:

The glue has an ingredient called polyvinyl acetate, which is a liquid polymer. The borax links the polyvinyl acetate molecules to each other, creating one large, flexible polymer. This kind of slime will get stiffer and more like putty the more you play with it. Experiment with different glues to see if they create slime (e.g., carpenter glue, tacky glue, etc.).

SUPER SLIME

CLEAR SLIME

WHAT YOU NEED:

- ☐ Polyvinyl alcohol (PVA) solution
- ☐ Borax (Sodium tetraborate)
- ☐ Beaker or jar
- ☐ Food coloring (optional)

The type of slime is the same clear gooey kind that you see in the movies. This is the real gooey deal! (This slime is non-toxic, but still keep these chemicals away from unsupervised children and wash your hands after playing with the slime.)

WHAT YOU DO:

1. Pour ½ cup of the polyvinyl alcohol (PVA) solution into a beaker, jar, or bowl. If you want colored slime, add food coloring to the PVA solution and stir with a stir stick.

2. Add 2 teaspoons of the Sodium Tetraborate (Borax) Solution (see recipe below) into the PVA solution and stir slowly.

3. Try lifting some of the solution with the stir stick and note what happens.

4. Once the slime has formed, you can play with it. Just don't eat it!

5. Your slime will last longer if you seal it in a plastic bag and keep it in the fridge, otherwise it will dry out or mold.

WHAT HAPPENED:

Polyvinyl alcohol (PVA) is a liquid polymer and is therefore formed from long chains of connected molecules. The sodium tetraborate forms hydrogen bonds with oxygen present in the PVA chains. Hydrogen bonds occur when the positive charge of the hydrogen atoms attracts the negative charge of the oxygen atoms within the compound. The hydrogen bonds link the individual PVA strands to each other, creating a "blob" of slime. Since hydrogen bonds are weak, they will break and reform as you hold the slime or let it ooze onto a flat surface.

GLOW IN THE DARK SLIME

WHAT YOU NEED:

- ☐ Small bowl
- ☐ Glow in the dark powder
- ☐ Measuring cup
- ☐ Green food coloring
- ☐ Liquid laundry starch
- ☐ Elmer's clear glue

Learn how to make glow in the dark slime with this easy slime recipe. Perfect for Halloween (or any time or reason, really), Glow in the Dark Slime is not only fun, but also a great hands-on science learning opportunity! This slime recipe is super easy for beginners, yet packs a 'cool' element for the older kiddos. By using laundry starch and clear glue, your slime recipe is sure to 'wow'!

WHAT YOU DO:

1. Place a bowl on the table. Add one cup of glue and 1/2 a cup of water into the bowl.
2. Add green food coloring (just a drop) and your glow in the dark powder and stir.
3. Fill your measuring cup 3/4 of the way full of starch. Carefully pour the starch into the glue cream mixture while you stir.
4. It's easy to add too much starch to slime, so stop adding starch as soon as the slime "gels." But, if your slime is really sticky, you may need to add a bit more starch.
5. Place the slime outside in bright sunlight for an hour, then bring it back inside

TIP

Use plastic cups and sticks to mix so you can throw away all of the materials when your slime is made and ready for play!

PLAYING WITH YOUR SLIME:

The slime will be green in daylight, but when you bring it BACK into a dark room, suddenly, it will start to glow! The longer you leave the slime in the sun the brighter and longer it will glow in the dark.

SLIME BUBBLES

WHAT YOU NEED:

- ☐ Straw (hard plastic straws that come with reusable cups are easiest to use)
- ☐ 5 oz. bottle of Elmer's clear school glue
- ☐ Sta-Flo Liquid Starch (about ½ cup)
- ☐ Paper towels for cleaning up
- ☐ Bowl
- ☐ Spoon
- ☐ Food coloring

You can make ooey gooey slime using just a few ingredients, then experiment with this amazing polymer by blowing air through a straw to create slime bubbles!

WHAT YOU DO:

1. Pour the whole bottle of glue into a bowl and mix in a few drops of food coloring (we used 3 drops of green).
2. Pour a small amount of liquid starch into the colored glue and mix it thoroughly. It will begin to form a clump.
3. Add a little more starch and stir it in well. Continue adding starch and mixing with the spoon until you can't stir it anymore, then it's time for the fun part: use your hands!
4. Add more starch and knead it into the mixture. It will feel slimy and may still stick to your hands. Try to scrape as much of the mixture out of the bowl and off the spoon and your hands as you can, then mix it in. As you knead it, it will begin to dry off a little.
5. Stretch the slime with one hand and watch what happens. If it's really stretchy, it's a great slime that is a lot of fun to play with. Separate it into two parts and set one back in the bowl. Add a little more starch to the other part and continue kneading and mixing (it may separate into strands, but keep squishing and it will come back together). When you stretch it, does it break off? If not, keep adding a little starch at a time.
6. Once your slime is stiff enough, pull off a bouncy-ball sized piece, make it into a ball, and stick a straw into it. Press the slime around the straw and hold it firmly so no air can escape, then slowly blow through the open end of the straw. This may take some practice, but you should be able to get a decent bubble!
7. When you're finished, use paper towels to wipe the extra bits of slime off of your dishes before washing them in the sink. Store your slime in a ziploc bag when not in use (it should keep well for a week or two). Wash your hands after touching the slime.

WHAT HAPPENED:

Slime is a polymer, which is a long chain of molecules that gives it stretch and flexibility. Glue is also a polymer, so why doesn't it behave the same way as this slime? Well, when you added starch to the glue, it caused the glue molecules to link together in a way that made them flexible and more solid than liquid. This is called cross-linking. Cross-linked molecules are bigger and less liquid-like than regular polymers. The chains of polymers already in the glue were linked together by the starch molecules, making them less fluid and more stretchy! *For more information, check out the Polymers Science Lesson and learn what they are, how they're made, and about some common polymers you encounter every day!*

OOBLECK OR QUICKSAND

SLIME

WHAT YOU NEED:

- ☐ Cornstarch
- ☐ Water
- ☐ A big bowl

WHAT YOU DO:

1. In the plastic mixing bowl, combine small amounts of water and cornstarch together to form a mixture that looks like heavy whipping cream and has the consistency of honey. The approximate ratio of the cornstarch to water mixture is 2 cups of cornstarch to 1 cup of water. So if you use all of a regular-sized box of cornstarch (about 16 oz.), you will use about 1½ cups of water. It is best to start with less water and slowly add it until the desired consistency is reached.

2. After making your mixture, gently lay your hand on the surface of the cornstarch-water mixture. You should notice that your hand sinks in the mixture like you would expect it to do. Move your hand through the mixture, slowly first and then try to move it really fast. Was it easier to move your hand slowly or quickly through it?

3. If your mixture is deep enough to submerge your entire hand in it, try grabbing a handful of the mixture and pulling your hand out quickly. Then try again, this time relaxing your hand and pulling it out slowly. Did you notice a difference?

4. Try punching the cornstarch-water mixture. (Be careful not to hurt yourself on the bowl!) Make sure to hit the substance hard and pull your fist back quickly. Did the substance splatter everywhere or did it remain in the bowl? (If it splattered, add more cornstarch.)

5. Whenever you gently and slowly move your hand through the cornstarch-water mixture, it behaves like a liquid. But when you try to move your hand through it quickly or forcefully hit the substance, it behaves like a solid. This cornstarch-water mixture behaves similarly to quicksand.

WHAT HAPPENED:

The flow and movement of a fluid is affected by its viscosity, or how sticky and thick it is. Quicksand and the cornstarch-water mixture are both non-Newtonian fluids. Non-Newtonian viscosity changes with the type of force applied to it. The viscosity of Newtonian fluids (such as water and honey, which follow Sir Isaac Newton's law of viscosity) is dependent only on the temperature and pressure of the fluid, not the force applied to it. For instance, warm honey (less viscous) flows much more freely than cold honey (more viscous).

Since the ability of a non-Newtonian fluid to move depends on the force or stress applied to it, these fluids do not act like ones we are more familiar with (e.g., honey or water). A light pressure, such as pouring or gently pressing the cornstarch-water mixture, allows it to move like a liquid.

GLOOZE

SLIME

WHAT YOU NEED:

- ☐ Skim milk
- ☐ Vinegar
- ☐ Baking soda
- ☐ A coffee filter

WHAT YOU DO:

1. Add 7 tablespoons of skim milk to a cup and add 1 tablespoon of vinegar to the milk. Gently stir the mixture until solids have formed.

2. Let the solids sink to the bottom of the mixture and then drain off the liquid using a filter (a coffee filter works best). Let the solids drain for a few minutes.

3. Add ¼ teaspoon of baking soda to the solids and knead together to form a slimy mixture from milk.

WHAT HAPPENED:

When you added the vinegar to the milk, it caused the milk's protein, casein, which is also a polymer, to separate from the liquid part of the milk and clump together to form solids. Casein is used in adhesives, paints, and even plastics. The baking soda neutralizes the acid added, which allows the casein to go back to its liquid form.

GLOWING JACK O'LANTERNS

Experiment

WHAT YOU NEED:

- ☐ Clean glass jars
- ☐ Glow sticks
- ☐ Exacto knife
- ☐ Glass paint pen

This is a fun project and will not only delight the kids, but will 'wow' the adults on Halloween night, too! This project uses glow sticks, which are inexpensive (you can stock up on them at your local Dollar Store). Glow sticks do have a limited life span, however, so if you're going to use these on Halloween night, you may want to make these the evening you'll be using them. This project does require parental supervision or help (i.e., cutting the glow stick can be difficult and requires use of the exacto knife. This is NOT a project kids shoud be doing on thier own.

WHAT YOU DO:

1. Draw some fun faces onto the jars with your glass paint pen (i.e., markers and/or sharpies may not have the clearest, most visible faces) and color them in.
2. Activate the glow stick by bending it and letting it glow (NOTE: glow stics only typically glow between 2-3 hours)
3. Tilt the glow stick upright so there's a little air pocket on the top, then slice off the top and pour the glowing liquid into your jar(s) and seal the lid
4. Rotate the jar so the glowing liquid completely coats the inside of the jar. A fine layer of the glowing liquid will adhere to the glass; the remainder should drip down and pool in the bottom of the jar
5. If your finished glowing jars appear to be fading within several minutes, simply pick them up and repeat the rolling and coating process. You can do this throughout the evening to help keep them glowing.

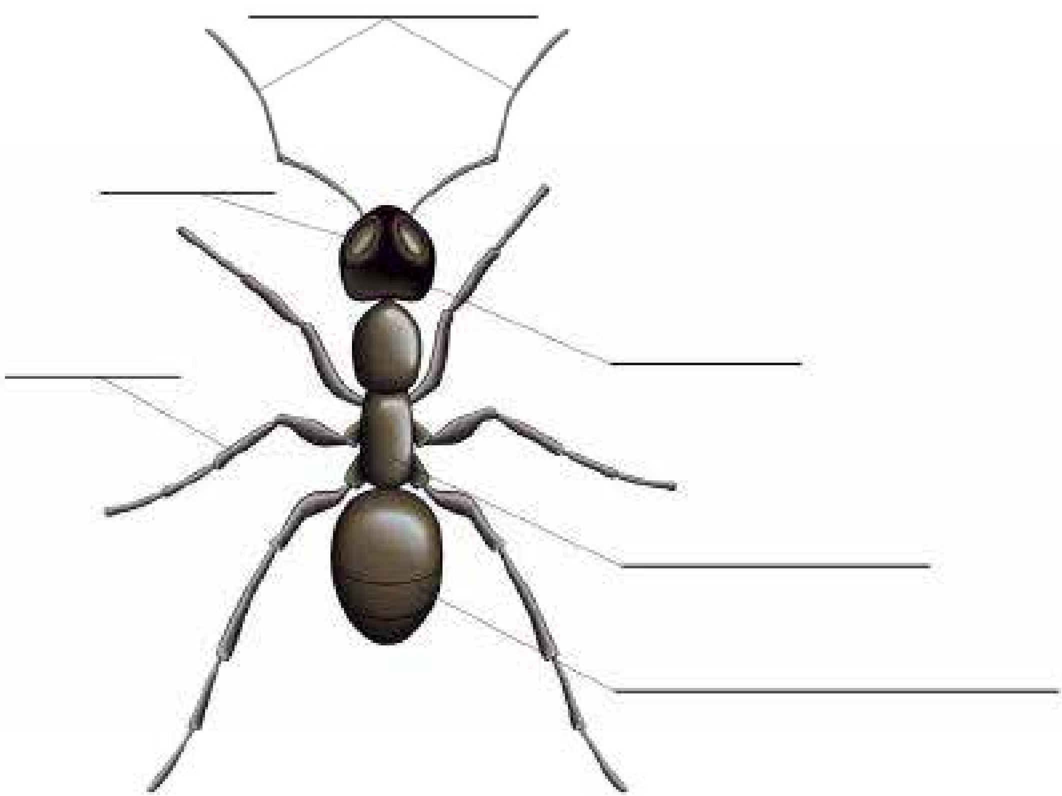
WHAT HAPPENED:

Glow sticks actually contain two separate compartments, with two different chemical solutions. One solution, in the case of most glow sticks, contains a diphenyl oxalate compound, along with a dye whose identity varies depending on the desired color. The other solution is one of hydrogen peroxide, a chemical, and is contained within an inner glass cylinder. This cylinder keeps the two solutions separate from each other, and prevents them from reacting. The action of snapping the glow stick breaks the glass cylinder, allowing the two solutions to mix and kicking off the reaction leading to the glow.

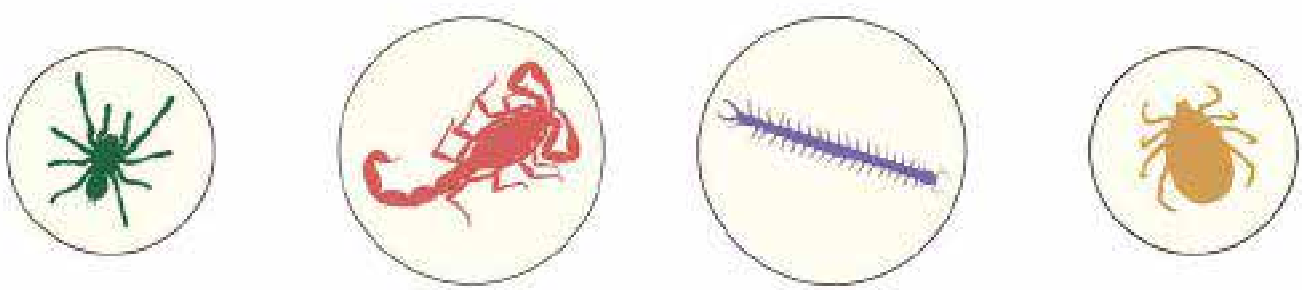
INSECTS VS. BUGS

Label the ant with the body parts listed below it.
These are the parts that make an ant an insect!
Some insects also have wings, but this ant does not.

head	eyes (2)	abdomen
thorax	legs (6)	antennae (2)



Circle the parts of the bugs below that show you they are not insects:



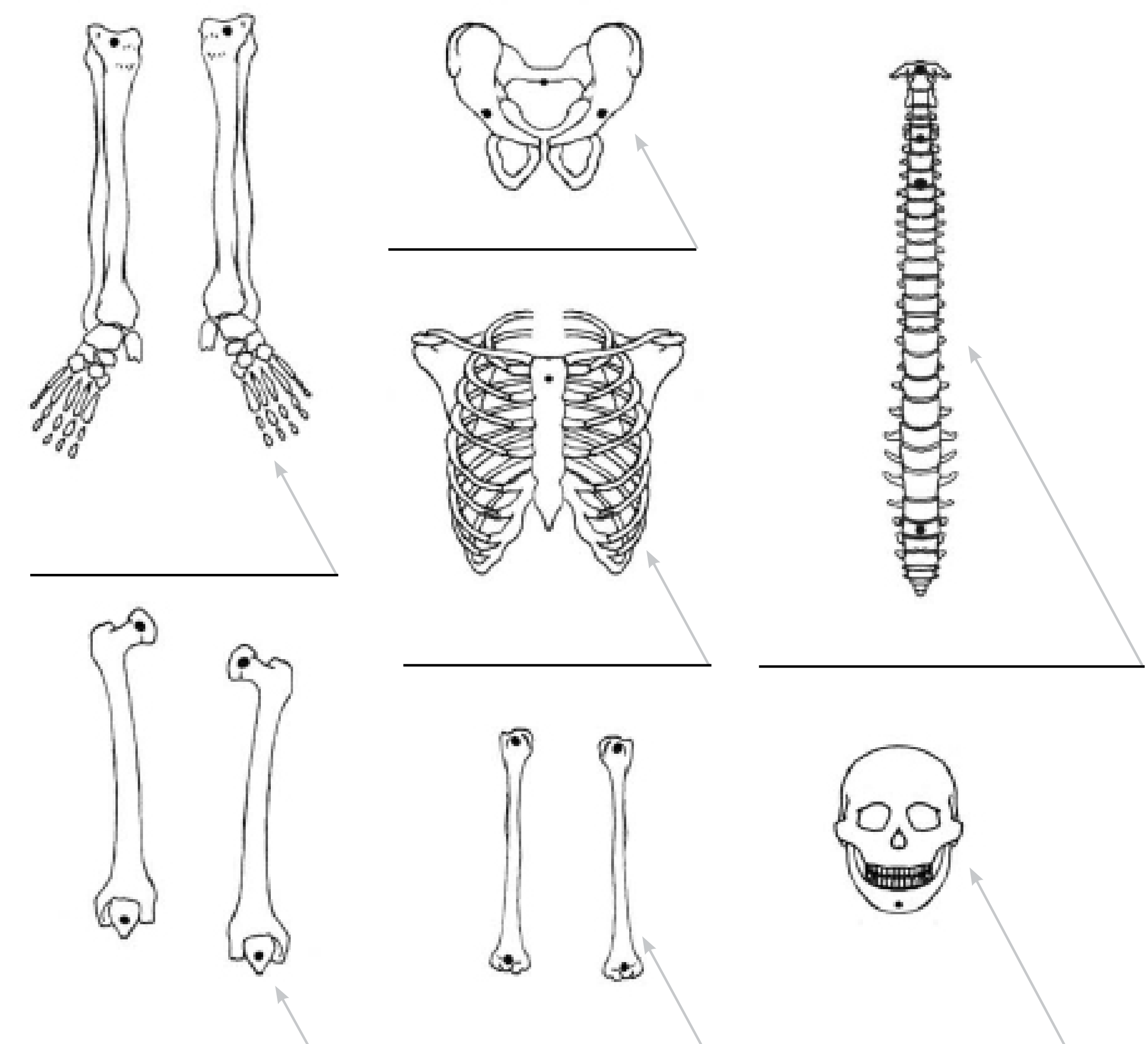
BONES IN YOUR BODY:

Label each bone in the picture with the parts listed below

Vertebrae (spine)
Pelvis (hip bone)
Skull

Femur (upper leg bone -2)
Humerus (upper arm bone -2)

Lower arm and hand (2)
Lower leg and foot (2)
Rib cage



TO MAKE A SKELETON:

Cut out each bone and fit them all together. Use the black dots as guides to connect the bones in the right spots.

HOME SCIENCE TOOLS
inspired learning

BLOOD TYPING

Experiment

WHAT YOU NEED:

- ☐ 16 cups filled with water (four for each blood type)
- ☐ Red food coloring
- ☐ Blue food coloring
- ☐ Pen or pencil and paper to record data

Use this project to illustrate blood type compatibility. If the color of the "blood" changes, it is incompatible. If the color of the "blood" stays the same, it is compatible.

WHAT YOU DO:

1. Fill 16 cups with water.
2. Put red food coloring in four cups. They'll represent Type A blood.
3. Put blue food coloring in four cups. These will represent Type B blood.
4. Put blue and red food coloring in four more cups to make a purplish color; this will represent Type AB blood.
5. Leave only water in the last four cups; this will represent blood Type O.
6. Pour one of the red "A" blood type cups into another one of the "A" blood type cups. Since the color did not change, blood Type A is compatible for blood transfusions with blood Type A. Once you've recorded that data, discard the cup.
7. Next, pour another red "A" into a blue type "B" cup. Since the color changed to purple, Type A blood and Type B blood are not compatible. Make a note of this as well.
8. Then pour a different "A" cup into the purple AB blood type.
9. Finally, red type A will pour the last cup into type O.
10. Repeat the steps with type B, AB, and O and record the results.

WHAT HAPPENED:

Blood Type A can only be given to Type A and AB patients. Blood Type B can only be given to Type B and AB patients. Blood Type AB individuals can receive blood from everyone, but can only donate to other AB blood type patients. Blood Type O individuals can only receive Type O blood, but they can donate blood to every other type.

PUMPKIN PETRI DISHES

WHAT YOU NEED:

☐ 1 pumpkin (or part of it)
☐ Ziplock bags
☐ Marker (to write on bags)
☐ Data sheet or paper
☐ Pencil/pen

WHAT YOU DO:

1. Cut a pumpkin into pieces that will fit inside the ziplock bags, placing one piece of pumpkin in a bag. The size of these pieces of pumpkin is not important; just make sure they fit in the bags and the pieces are fairly uniform in size.

2. Close the ziplock bags most of the way (the environment needs to be moist, yet fresh air needs to enter.)

3. Place the bags in various areas around the house such as the refrigerator, a sunny area, a shady area, a warm area, a dry area, a moist area, etc. (You may want to label each bag with its location)

4. After choosing the locations for your pumpkin petri dishes, predict which pumpkin will grow the most mold during the course of the experiment.

5. Each day, look at all your pumpkin samples and record how much mold has grown on each piece.

6. Print out and use the Pumpkin Petri Dish Chart to record your pumpkin petri dish data.

QUESTIONS:

When did the mold start to grow on pumpkin section 1?

Pumpkin section 2? etc…

How would you compare the growth of mold on pumpkin section 1 to that of pumpkin section 2?

How is temperature/time related to the growth of the mold?

What could be done to minimize the growth of mold?

What could be done to maximize the growth of mold?

How would you apply what you learned to where we should keep our food?

How would you adapt this experiment to create a different experiment?

PUMPKIN PETRI DISH CHART:

Directions: Under the location column, list the places each pumpkin petri dish is located. Under the first date column, record the date adn how much mold has grown on each piece for that date. Examples would be none, few spots, completely covered, etc.. Do this for each subsequent date you check the mold growth on each pumpkin.

START DATE:	DATE:	DATE:	DATE:	DATE:
LOCATION				

PHASES OF THE MOON

Astronomy Science Project

WHAT YOU NEED:

- ☐ An orange *(or a Styrofoam ball of a size similar to an orange)*
- ☐ A desk lamp *(or any lamp with a removable shade)*
- ☐ A room that can easily be made dark
- ☐ An adult's help
- ☐ A pencil

WHAT YOU DO:

1. Get an adult to help you push the sharp end of a pencil halfway through the orange; push it far enough to keep it stable when you hold the unsharpened end.

2. Find a room that you can make dark by turning off the lights and closing shades. If you can't make it dark enough, do the experiment when it is dark outside or use blankets to cover windows.

3. Set the lamp on a table or dresser so it is about the same level as your head when you're standing. Turn the lamp on and remove the shade or turn the lamp so that the bulb is facing toward you (if you're using a desk lamp).

4. Stand about 3 feet in front of the lamp and hold the pencil with the orange attached to it out at arm's length. The orange should be between you and the lamp. For this activity, you represent Earth, the lamp is the sun, and the orange is the moon.

5. To see the moon's phases, slowly turn your whole body to the left, keeping your arm straight out in front of you with the orange at eye level. This is how the moon orbits the Earth. Keep turning in the same direction until you have gone in a full circle and are facing the lamp again. Keep your eyes on the orange and watch the shadows on it very carefully to see the phases of the moon as we see them from Earth.

WHAT HAPPENED:

It takes around 29 days for the moon to orbit the Earth once and the same amount of time for the moon to spin around one complete time on its axis. That means that we always see the same side of the Moon! However, we do see the moon changing as it goes through its phases.

New Moon

While facing the lamp (sun), the surface of the orange (moon) facing you (Earth) was dark, even though the other half of the orange, facing toward the lamp was bright. This is the first phase of the moon, called the new moon. We can't see the moon at all during this phase!

Waxing Crescent

As you began to turn away from the lamp, a shadow still covered most of the orange, but you probably saw a small crescent shape of light on the right side of the orange. This phase is called waxing crescent.

First Quarter

The next phase is called the first quarter: the light (sun) shone on the half of the orange (moon) facing it. From Earth, we see half of the light side and half of the dark side during this phase so sometimes it is called a "half moon."

Waxing Gibbous

As you continued to turn to the left, the light shone on more of the side of the orange you could see, lighting up all of the orange except for a small crescent. This is the waxing gibbous phase.

Full Moon

Once you had turned halfway around so that the lamp was directly behind you, the light (sun) shone directly on the orange (moon) making the whole side facing you bright. This is a full moon. During a full moon, the side facing away from Earth is dark. This phase is the exact opposite of new moon.

(Note: if the orange isn't fully illuminated, try moving your head or shoulders so you aren't blocking the lamp. If you are blocking it, you've created a lunar eclipse – which happens when the Earth blocks the sun's light from hitting the moon. Normally, the moon is just above or just below Earth so an eclipse doesn't happen every time there is a full moon.)

Waning Gibbous

At this point, the amount of the light side of the moon that we can see begins to decrease, or wane. The next phase is called waning gibbous. Most of the moon is still light during this phase.

Last Quarter

Next is the last quarter (also called third quarter) where only half of the illuminated side of the moon is visible. This phase is opposite of the first quarter. Notice that your back is facing toward the direction you were facing when you saw the first quarter phase!

Waning Crescent

The last visible phase is the waning crescent, where only a sliver of light is visible. This phase is opposite the waxing crescent. After this, you will be facing toward the lamp (sun) again, and the orange (moon) will be back to the new moon phase!

SPINNING STRAW TRICK

Experiment

WHAT YOU NEED:

- ☐ Plastic bottle and cap
- ☐ Plastic straw
- ☐ Wool or fleece sweater or blanket

WHAT YOU DO:

1. Make sure the cap is screwed onto the bottle. Set the bottle on a table.

2. Wrap the bottom edge of a sweater or blanket around the straw. Holding onto one end, rub the straw back and forth between the fabric several times.

3. Still holding the same end of the straw, carefully balance it across the cap of the bottle. Touch the straw as little as possible.

4. Place one finger very close to one end of the straw (try not to actually touch the straw) and begin to move your finger slowly in a circle around the bottle. The straw should follow it! This step may take a little practice to make it move smoothly.

WHAT HAPPENED:

Rubbing the straw between the layers of cloth of your shirt created static electricity. The rubbing motion caused the straw to gain an electrical charge. When your finger came close enough, the negative charge on the straw was attracted to the positive charge of your skin. As you moved your finger, the straw moved right along with it because the charges were attracted to each other. Do you remember learning about magnets? Opposite charges attract while like charges repel (push away) and the same is true for electrical charges. Try showing your friends or family members this science "magic" trick and see if they can figure out how you made the straw move without touching it!

SCATTERED PEPPER TRICK

Experiment

WHAT YOU NEED:

- ☐ Shallow dish
- ☐ Water
- ☐ Pepper
- ☐ Dish soap

WHAT YOU DO:

1. Pour some water into the dish.

2. Sprinkle about a teaspoon of pepper over the surface of the water. Notice how it floats but doesn't move much? Stick your finger into the water and try to push some of the pepper towards the edges of the dish.

3. Now put a drop of dish soap onto your finger and dip it in the water in the center of the dish. What happens to the pepper this time?

WHAT HAPPENED:

Water in a dish has a tension across it called surface tension—it acts sort of like a very thin layer of film stretched across the water. This tension isn't broken by the pepper or by your finger. It is, however, broken by dish soap! The dish soap breaks through the "film" across the top of the water and creates a burst, pushing the pepper outward towards the edges of the dish! To perform this as a magic trick for your family or friends, you'll need to start over by rinsing all the soap out of the dish and refilling it with water and pepper. Once the surface tension has been broken by the soap, you can't get it back unless you start over.

INVISIBLE INK

Experiment

WHAT YOU NEED:

- ☐ Ink type 1 – lemon juice, grapefruit juice, vinegar, milk, onion juice
- ☐ Ink type 2 – cobalt chloride
- ☐ Ink type 3 – phenolphthalein, Windex
- ☐ Q-tips or paintbrush

Invisible inks are also called sympathetic inks, and can be made with many different substances. Sometimes they appear when you heat them up; other times another chemical can reveal them. Get creative and see how many kinds of invisible ink you can find.

WHAT YOU DO:

1. Choose a liquid like lemon juice to use as ink. Write a message on a piece of white paper using a paintbrush or q-tip, dipping in the ink frequently. Let the message dry.

2. Turn on the toaster and carefully hold your paper over it. The heat will make your secret writing appear!

3. Some sympathetic inks appear and disappear again based on humidity. To try one of these, make a solution of 1/8 teaspoon cobalt chloride and 1/2 cup water. After writing your message and letting it dry, heat the paper to see your message appear in blue.

4. Now hold the paper face down over a pan of steaming water. The steam will cause the writing to disappear. If you reheat it (evaporating all the water) the writing will appear again.

5. Other sympathetic inks work because of acid-base reactions. Use phenolphthalein solution to write a message on a piece of paper and let it dry. After it is dry, spray it with some Windex. Since Windex is a base, it will turn the phenolphthalein bright pink.

What other sympathetic inks can you find?

Which kind shows up best?

Which kind lasts longest?

DISAPPEARING CUP

Experiment

WHAT YOU NEED:

- ☐ Small aluminum pie tin
- ☐ Styrofoam cup
- ☐ Acetone
- ☐ Safety gloves
- ☐ Safety goggles

Watch a styrofoam cup disappear before your eyes! You can find acetone at a hardware store, or buy it in a small quantity from us. It is very flammable, so keep it away from all flames and use it in a well-ventilated area. This project requires adult supervision.

WHAT YOU DO:

1. Set the cup in the middle of the pie tin
2. Carefully pour about a tablespoon of acetone into the cup.
3. Watch the reaction!

WHAT HAPPENED:

Styrofoam is mostly air, trapped in place by the polymer polystyrene. A polymer is a very large molecule formed by repeated patterns of chemical units strung together in long chains. The acetone dissolves the long polymer strands in the styrofoam, allowing all the trapped air to escape. Without air, the cup is just a blob of polystyrene on the bottom of the dish! You can pour off the excess acetone and let the blob of polystyrene dry into a hard lump of plastic.

Note: This project makes a great lab safety demonstration: A teacher can pour water into a styrofoam cup and drink it, then pour acetone (which looks like water!) into the cup. Hold the second cup over a bowl or beaker to contain the mess. Use this to reinforce that one should never eat and drink in a lab. What looks like water may be something quite different!

FOAMY FLASK/ELEPHANT TOOTHPASTE

Science Project

WHAT YOU NEED:

- ☐ PPE (personal protective equipment): gloves, apron, and goggles
- ☐ Hydrogen peroxide, 6% or higher (available at beauty supply stores)
- ☐ Baking dish or pie tin
- ☐ 250 ml flask
- ☐ Funnel
- ☐ Graduated cylinder
- ☐ Yeast
- ☐ Food coloring

Make a dramatic demonstration of a chemical reaction with this spin-off of the classic "elephant toothpaste" experiment. This version catalyzes a chemical decomposition using only common household items, making it safer for home labs and younger scientists. While the chemicals used may be ordinary, the results are exceptional!

WHAT YOU DO:

1. Safety first! Before beginning the experiment, put on your PPE.
2. Use the graduated cylinder to measure 50 ml hydrogen peroxide, and pour it into the flask.
3. Add a few drops of food coloring if you like.
4. Place the flask in the middle of a pie tin or baking dish.
5. Measure 10 ml dishwashing soap, and add it to the flask.
6. Open the packet of yeast, and pour its contents through the funnel into the flask. Quickly remove the funnel.
7. Feel the outside of the flask, and note its temperature. Wait a few minutes to see foam come streaming out of the flask.
8. Dispose of the remaining mixture by pouring it down the sink and rinsing with hot water.

WHAT HAPPENED:

Hydrogen peroxide's chemical formula is H2O2. H2O is liquid water, and O2 is oxygen gas. In this experiment, we observed the chemical decomposition of hydrogen peroxide. Chemical decomposition is the separation of a chemical compound into elements or simpler compounds. In this case, hydrogen peroxide decomposed into water and oxygen. The chemical expression for what happened is: $2\ H_2O_2 \rightarrow 2\ H_2O + O_2$.

Adding the yeast sped up the process. Enzymes in the yeast called catalase acted as a catalyst—a substance added to a chemical mixture that speeds up the chemical reaction time. The yeast wasn't necessary to make foam — only water, soap, and a whole lot of oxygen gas was necessary. But adding the yeast made the hydrogen peroxide decompose (break down) much more quickly than it would normally, releasing oxygen and water faster. The dish soap made the production of oxygen more noticeable because of the foam. This reaction also created heat, so it's what's known as an exothermic reaction, a reaction that releases heat energy.

Another interesting fact about hydrogen peroxide: it is sometimes used as rocket fuel. When hydrogen peroxide breaks down rapidly, it produces a lot of oxygen gas, which propels the rocket into the air. The hydrogen peroxide HST sells is a solution of water and hydrogen peroxide, as is the kind most of us keep in our medicine cabinets—30% and 3% respectively. Hydrogen peroxide that powers rockets is at least 90% concentration.

WHAT COLOR ARE LEAVES?

Project

WHAT YOU NEED:

- ☐ A few green leaves from 3 different kinds of trees
- ☐ 3 small drinking glasses
- ☐ Rubbing alcohol
- ☐ Plastic wrap
- ☐ A pan of hot tap water
- ☐ Coffee filters or filter paper
- ☐ Scissors
- ☐ Tape
- ☐ 3 pencils

WHAT YOU DO:

1. Tear the leaves into small pieces. Put the pieces from each tree into different glasses (make sure each glass only has pieces from one type of tree!).
2. Get an adult to pour rubbing alcohol into each glass so that all the leaf pieces are covered. Put a piece of plastic wrap over the top of each glass to keep the alcohol from evaporating (getting soaked up by the air).
3. Let an adult set the glasses in the pan of hot water and leave them for about 30 minutes. Check to make sure the alcohol in each glass has turned green before you take them out. If it hasn't, refill the pan with hot water and put the glasses back in until the alcohol turns green.
4. While you wait, cut 3 strips out of the middle of the coffee filters. Make each strip about 1 inch wide. Tape one end of each strip to the middle of a pencil. Cut the other end of the strip into a point.
5. Once the alcohol in each glass has turned green, take the glasses out of the hot water. Set a pencil with the paper strip taped to it over each glass so that the paper strip hangs down and the point touches the alcohol in the glass. If the paper is too long, roll some of it around the pencil to shorten it.
6. Let the glasses and papers sit for about 30 more minutes and then check to see if anything is happening. You should see the green color start to soak up on the paper. Wait even longer to see if any other colors come out!

WHAT HAPPENED:

The alcohol and the heat from the hot water made the color in the leaves dissolve so you could see it in the alcohol. It is similar to what happens when you make tea. When you put a tea bag (filled with tea leaves) in a cup of hot water for a few minutes, the water becomes colored and flavored by the tea leaves. When you put the paper strips into the green-colored alcohol, the colors started to get soaked up by the paper and you should have seen a couple different shades of green. If you waited long enough, you might have been able to see other colors from the leaves appear on the paper – such as orange or yellow. If you saw colors besides green, those are colors that the leaves will change to in the fall! Did you see any difference in the colors from the different kinds of leaves you tested? The reason you couldn't see all those colors in the green leaves or in the alcohol solution is because the chemical that causes the green color is much stronger than the chemical that causes orange and yellow. When you put the paper into the alcohol solution, the colors had a chance to separate, and the orange and yellow area were no longer covered up by the green. The same thing happens when leaves start to change colors – the chemical that makes them green starts to go out of the leaves, leaving the chemicals that make other colors behind, turning the leaves all the pretty colors of fall!

LEAF CHROMATOGRAPHY

Experiment

WHAT YOU NEED:

- ☐ Green leaves from several different trees *(Trees with a dramatic color change, like maples, work best)*
- ☐ Chromatography or filter paper *(you can use coffee filters)*
- ☐ Beaker or drinking glass
- ☐ Isopropyl (rubbing) alcohol
- ☐ Plastic wrap
- ☐ Pencil

Leaves contain different pigments, which give them their color. Green chlorophyll is the most common type of pigment, but there are also carotenoids (yellow, orange) and anthocyanins (red). Chlorophyll, which is essential for photosynthesis, usually hides the other pigments, except when autumn comes along and it begins to break down. This is why leaves turn different colors in the fall. Do this project to see the hidden colors in a green leaf and predict what color it will be in the fall! (Adult supervision recommended.)

WHAT YOU DO:

Hint: Keep leaves from different trees separate and follow the steps below for each set of leaves, so you can compare results.

1. Tear the leaves into several pieces and place them in a beaker or glass, then add just enough rubbing alcohol to cover them. Cover the beaker with plastic wrap to keep the alcohol from evaporating.

2. Put the beaker in a dish of hot tap water for about 30 minutes, until the alcohol turns green as the pigments from the leaves are absorbed into it.

3. Cut a strip of filter paper about a half inch wide and tape it to a pencil. Suspend the pencil across the beaker and let the strip just barely touch the alcohol and pigment mixture.

WHAT HAPPENED:

A bit of the mixture will travel slowly up the paper. After about 30-90 minutes you should be able to see the “green” color break up into several different colors as the different pigments begin to separate. You’ll see different shades of green, and perhaps other colors as well. Which leaves had the most colorful pigments? Based on your experiment, which trees’ leaves do you think will turn the brightest and least brightest colors this fall?

PRESERVE AUTUMN LEAVES

Glycerin Method

WHAT YOU NEED:

- ☐ Glycerin
- ☐ Water
- ☐ Flat pan or disposable plates
- ☐ Leaves
- ☐ A weight or something to keep leaves submerged

There are many methods to preserve leaves. One method is to put them into a glycerin/water solution. This will preserve your leaves yet leave them relatively flexible. This preserving method works because the natural moisture present in the leaves is replaced by the glycerin solution, maintaining the leaf's texture and form.

WHAT YOU DO:

1. Mix the glycerin and water so that it is one part glycerin and two parts water. You only need enough to submerge the leaves — about one cup.

2. Pour the solution into a flat pan, place the leaves in the solution, and then put the weight on the leaves to keep them submerged.

3. Keep the leaves submerged in the solution for 2-6 days.

4. Dry the leaves gently with a paper towel. They should feel soft and pliable.

TIP

Try using two Styrofoam or other disposable plates. Put leaves and enough glycerin solution to just lightly cover the leaves in the bottom of one plate. Then put the other plate on top of the leaves and solution. Now you can put a weight on the top plate without getting the weight in the solution.

PRESERVE AUTUMN LEAVES

Wax Paper Method

WHAT YOU NEED:

- ☐ Leaves
- ☐ Wax paper
- ☐ Thin towel or paper
- ☐ Iron
- ☐ Ironing board

There are multiple methods to preserve leaves. One of the most common ways to preserve leaves is by pressing them between wax paper.

WHAT YOU DO:

1. Place a leaf between two pieces of wax paper.
2. Put a towel or a piece of thick paper over the wax paper.
3. Press on the towel or paper with a warm iron to seal the wax sheets together. This takes about 2-5 minutes on each side, depending on how moist the leaf is. Once you have finished one side, flip the leaf over and do the other side.
4. Cut around the leaf, leaving a small margin of wax paper to ensure that it will stay sealed.
5. Rather than cutting out the leaves, you may want to try to peel the wax paper off the leaves, leaving a coat of wax behind to protect the leaves. Try this on one leaf first to see if this method works for you.

PRESERVE AUTUMN LEAVES

Microwave Method

WHAT YOU NEED:

- ☐ Fresh leaves that have not dried out
- ☐ Paper towels
- ☐ Microwave
- ☐ Acrylic spray from a craft store

There are multiple methods to preserve leaves. Thanks to everyday technology, you can preserve autumn leaves using your microwave.

WHAT YOU DO:

1. Arrange the leaves on top of two paper towels. Lay another towel over the leaves to cover them.

2. Microwave the leaves for 30-180 seconds. Be very attentive and careful. Leaves that are cooked in the microwave too long can catch fire. The drier the leaves, the less time they will need. Leaves that curl after removal from the microwave have not been in long enough. Leaves that are scorched have been in there too long. Only dry them for a few seconds at a time.

3. Let the leaves sit for a day or two and then finish by spraying an acrylic sealant on both sides of the leaves.

4. Compare the texture and color of the leaves after using the different preserving methods. Did one method work well for a particular tree species, but another method work better for a different tree species? What do you conclude about what happens to the leaves during the different preserving processes? If you'd like, use a tree identification guide to help identify the leaves of different species.

GUMMY FRANKENWORMS

Experiment

WHAT YOU NEED:

- ☐ Gummy worms
- ☐ Baking soda (sodium bicarbonate)
- ☐ Water
- ☐ Vinegar (dilute acetic acid)
- ☐ 2 glasses
- ☐ Scissors or kitchen shears

Kids can have a blast by turning ordinary gummy worms into 'Frankenworms' with this easy science experiment.

WHAT YOU DO:

1. Using scissors, cut the gummy worms in half or into quarters lengthwise. You want long, thin strips of worms.

2. Drop the worm strips in one glass. Add a couple of spoonfuls of baking soda and enough water to dissolve some of the baking soda. If all of the baking soda dissolves, add more until some undissolved powder remains.

3. Let the worms soak in the baking soda solution for 15 minutes to half an hour.

4. Pour vinegar into the other glass. Drop a baking-soda-soaked worm into the vinegar.

WHAT HAPPENED:

At first, nothing appears to happen. Then, bubbles start to form on the surface of the worm. The worm starts to move. After some time, the reaction stops and the worm stills.

The gummy worms wriggle because a chemical reaction between baking soda (sodium bicarbonate) and vinegar (weak acetic acid) produces carbon dioxide gas. The tiny gas bubbles released by the reaction stick to the body of the gummy worms, eventually merging into bubbles big enough to float part of the worm. If the gas bubble detaches, it floats to the surface while that part of the gummy worm sinks back down.

TIPS FOR SUCCESS:

If your worms appear dead in the water, you may be able to revive them:

• See if you can cut the worms thinner. You may wish to ask an adult for help. A thinner gummy worm is a lighter gummy worm and thus much easier to make move. Thin worms absorb baking soda better, too.

• Try adding more baking soda to the soaking solution or soaking the worms longer. The baking soda needs to get into the gelatin that makes up the worms so that it can react with the vinegar to make bubbles.

GRADES: 2+

CANDY CHROMATOGRAPHY

Science Experiment

WHAT YOU NEED:

- ☐ M&Ms and Skittles, or other candy with colored coating
- ☐ Petri dish or a clean plate
- ☐ Pipet or dropper
- ☐ Filter paper (or coffee filters cut into strips)
- ☐ Toothpick
- ☐ Water
- ☐ Salt
- ☐ Ruler or pencil
- ☐ Clips or tape
- ☐ Beaker

WHAT YOU DO:

1. **PREPARE A SALT WATER SOLUTION** by mixing 1/8 teaspoon of salt into 3 cups of water, shaking or stirring until completely dissolved. This will be your chromatography solvent. Pour about 100 ml of salt water into the beaker.

2. **GET TWO PIECES OF CHROMATOGRAPHY PAPER,** or cut out two 4×8 cm rectangles from the coffee filter. Mark a line in pencil 1 cm from the bottom of each. Use the pencil to label one for Skittles and one for M&Ms.

3. **SORT THE CANDIES** to find several matching colors: both packs should contain some red, orange, green, etc.

4. **USE THE PIPET TO PUT A SINGLE DROP OF WATER FOR EACH M&M COLOR** in the bottom of the petri dish. (Make sure the drops are evenly spaced.) Place an M&M on each water drop and set aside. The water will dissolve the candy coloring. Remove the candy after 1-2 minutes.

5. **REPEAT STEP 3 FOR THE SKITTLES,** this time using the lid of the petri dish.

6. **DAB THE END OF A TOOTHPICK IN ONE OF THE COLORED WATER DROPLETS** and apply the pigment to the filter paper. Apply 2-3 coats, letting the spots dry in between. Use a clean toothpick and repeat for each color.

7. **TAPE OR CLIP THE PAPERS SIDE-BY-SIDE** (but not touching) to your pencil or ruler. Place the pencil or ruler over the mouth of the beaker. You want your papers barely touching the water. The paper will soak up the water and move up the paper. When the water nears the top, take the papers out, transfer them to a clean, dry, flat surface, and let them dry.

EXAMINE YOUR RESULTS:

What colors do you see on your chromatogram? Are the two chromatograms similar? Where do you see differences? Look at the ingredient list on the packaging and see if some of the same dyes are listed. If the dyes overlap, what do you think might be the reason for different chromatograms?

WHAT HAPPENED:

The water travels up the paper strip by capillary action. Capillary action occurs because the water is attracted to the surface of the paper, and as the first water molecules stick to the paper, they pull others along with them. (Capillary action is one way water moves up through the roots of plants.) As the candy coating dissolves in the water, it is pulled up the paper too.

You probably found that the candy coating is actually a mixture of several pigments. Certain pigments dissolve in water more easily and are pulled with the water farther up the paper. Others are more attracted to the paper and move more slowly. Usually smaller molecules move farther than larger ones.

For further study, repeat the experiment with colored markers, flavored gelatin, powdered drink mix, or food coloring. Try to predict your results.

CHROMATOGRAPHY CONCEPTS:

The word chromatography comes from the two Greek words for color and writing, and this project will teach you why. Chromatography is a simple technique for separating a mixture's individual components.

In chemistry, a mixture is a combination of substances that can be separated because they are not chemically bonded. Conversely, a compound cannot be separated since its elements are chemically bonded.

In this paper chromatography project, a mixture is dissolved and pulled across a piece of paper. The mixture separates and its components travel across the paper at different rates. The result is what's known as a chromatogram, or the pattern of separated substances revealed through chromatography.

NOTES:

TESTING CANDY FOR GLUCOSE

Benedict's test for sugars Science Experiment

WHAT YOU NEED:

**Equal to the number of candies being tested*

- ☐ 3-4 different types of Halloween candy
  (Hint: We think non-chocolate types will work best: Smarties, lollipops, etc.)
- ☐ Disposable plastic cups*
- ☐ Disposable pipettes*
- ☐ Small glass test tubes*
- ☐ Benedict's solution
- ☐ Cutting board, knife, and fork
- ☐ Metal spatula
- ☐ 400 ml beaker
- ☐ Wax pencil
- ☐ Lab burner and stand
- ☐ Test tube rack
- ☐ Test tube clamp
- ☐ Safety goggles
- ☐ Gloves
- ☐ Adult helper

WHAT YOU DO:

1. Before beginning, put on your goggles and gloves. Safety first! You'll need to prepare a solution for each candy you're testing. Have an adult help you use a knife to finely chop them, or break them into small pieces and grind them up using the back of a fork. Take care to clean the knife/fork in between each candy so as to not cross-contaminate.Chop solid candy to mix with water.
2. In a clean cup, measure 1 level spatula scoop of ground candy. Repeat with additional candy types crushed candy.
3. Use the pipette to add 3 droppers full of hot water to each cup. Stir, dissolving the candy as much as you can to make liquid solutions. Use the same amount of ground candy and water in each solution and to clean the spatula in between.
4. Label each solution, and observe and record the color. Predict (make a hypothesis) which candy you think contains the most glucose.
5. Using a different pipette for each solution, add 25 drops of one candy solution to the first test tube. Repeat with remaining candies in clean test tubes.
6. Label each test tube with the wax pencil.
7. Add 5 drops of Benedict's solution to each test tube. Gently swirl to mix.
8. Place the stand over the lab burner. According to the manufacturer's directions, use the lab burner to heat 300 ml of water in the beaker.
9. When the water boils (large bubbles appear at the surface), turn the heat to low and add the test tubes, placing them carefully inside the beaker. After 5 minutes, turn the burner off.
10. Use the test tube clamp to remove the test tubes from the beaker and place them in the test tube rack.
11. Allow the solutions to cool for several minutes. Swirl the contents of each test tube and observe and record the color of the liquid.

WHAT HAPPENED:

Glucose is a simple sugar that plants produce by the process of photosynthesis. Like all carbohydrates, it is made of hydrogen, carbon, and oxygen. Glucose is essential to life, as it is the primary source of energy for our body's cells, and it is able to enter our bloodstream quickly to provide energy right away. Without it, our bodies would not function. Plus, glucose is the primary energy source used by brain cells! Without enough glucose, brain function may be diminished.

Benedict's solution (also called Fehling's solution) is bright blue liquid. It's made of copper sulfate, sodium citrate, and sodium carbonate. While it's usually bright blue, when it's mixed with a solution that contains glucose, it turns green, yellow, deep-red or brown, depending on the sugar concentration.

Other types of sugar include fructose, which comes from honey, fruit and vegetables, and sucrose, which is what most table sugar is made of. Since this test only detects the presence of glucose, you can't tell how much other types of sugar these candies contain.

FOR FURTHER STUDY:

For further testing, compare different foods that aren't typically thought of as sweet, like milk or bread, as well as other types of sweet foods besides candy, like fruit and soda pop. Also consider using glucose test strips instead of Benedict's solution and see how that affects your results. Think about and discuss why knowing which foods contain a lot of glucose might be beneficial.

EXAMINE YOUR RESULTS:

Any color change (green, yellow, orange, red) indicates the presence of glucose. A dark red-brown solution indicates more glucose than any other color. Using the chart above as a guide, which candy contains the most glucose? Which candy has the least glucose? Was your hypothesis correct?

NOTES:

HALLOWEEN APPS AND SITES FOR KIDS

1. **SCRATCH** is an amazing platform for learning coding. They have yearly Halloween challenges where users can submit Halloween inspired creations.

2. Have your kids discovered **JIB JAB**? This site allows kids to make goofy video clips to send to friends and family.

3. **SPOOKY HANGMAN** is a spooky winner! Available on Android / IOS

4. **PUMPKIN CARVER** is a fun app that lets you carve a virtual pumpkin. You can even light up your creation. Available on Android / IOS

5. **PLANTS VS. ZOMBIES** is a silly but fun game for tweens. Android / IOS

6. **ORIGAMI HALLOWEEN** is something different and fun to try. Android / IOS

7. Halloween inspired **WORD SEARCHES** are also a lot of fun, there are many to choose from.