SCIENCE IS MAGIC

OVERVIEW: To stimulate the students' imaginations and seek scientific explanations for what appears to be magic through several different science experiments.

OBJECTIVE: To demonstrate heat can travel through air and cause an object to burn

To observe the chemical reaction which occurs when baking soda, liquid detergent, and vinegar are mixed.

Introduce the students to the concept of organic and inorganic items; then demonstrate the difference with combustion/oxidation.

To demonstrate the elasticity of polymer chains.

To demonstrate how to make a toy from two common everyday "chemicals"

GRADE LEVEL: K-4

OHIO STANDARDS: PS1, PS3, PS4

Grade 1 Physical Science Motions and Materials: Properties of objects and materials can change

Grade 2 Physical Science Matter and Forms of Energy: All objects and substances in the natural world are composed of matter and Matter exists in different states, each of which has different properties

Grade 4 Physical Science Electricity, Heat, and Matter: The total amount of matter is conserved when it undergoes a change

TIME: 30-45 minutes

VOCABULARY: Particles, combustion, chemical reaction, carbon dioxide, organic, carbon, hydrogen, inorganic, polymer, viscous

Materials

ACTIVITY 1: The jumping candle flame

*Candle in holder

*Candle Snuffer

*Lighter or matches

IMPORTANT:

Read all instructions before proceeding

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ACTIVITY 2: Acid Base, Chemical Reaction with Goldenrod paper

*Goldenrod paper

*Q-Tips

*Cup with water and cup with ammonia

ACTIVITY 3: Organic versus Inorganic

*Matches

*Candles

*Salt

*Safety Goggles

*Tongs

*Magnesium Ribbon

*Tray

ACTIVITY 4: Bubble foam generator

*Pop Bottles

*Vinegar

*Baking Soda

*Soap

ACTIVITY 5: Disappearing Water

*3 Cups

*Sodium Polyacrylate

*Diaper

ACTIVITY 6: Slime

*2 small cups

*Borax and water mixture

*Glue and water mixture

*Food coloring

*Stir sticks

ACTIVITY 7: Poking holes through baggie

*Freezer bag (quart size)

*3 Pencils

ACTIVITY 8: Out with a bang

*Balloon

*Knitting needles

*Vaseline

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ACTIVITY 1: THE JUMPING CANDLE FLAME

PROCEDURE:

1. Light a candle and make sure that everyone can see it.
2. Snuff out the candle and then hold a lighted match three inches above the candle so that the match is in the column of smoke. (The candle will light again because the flame is able to travel on the smoke particles and relight the wick.)

QUESTIONS:

1. Why did the flame jump from the match to the candle? (because the flame is able to travel on the smoke particles and relight the wick).
2. What will happen if you move the match out of the column of smoke? (the match will burn out; the candle will not relight).
3. How far can I move the match up and still light the candle? (this depends on the height of the column of smoke).

ACTIVITY 2: Acid/Base Reaction

PROCEDURE:

1. Have 2 cups prepared...one with water and one with ammonia
2. Ask a student to come up and write their name on goldenrod paper with a Q-tip dipped in the water and show the class
3. Next, have them use the cup with ammonia. The writing will be red

QUESTIONS:

1. Why did it turn red? Was it magic? (There was an acid/base reaction. The turmeric in the paper reacts with the ammonia and the writing becomes red)

ACTIVITY 3: ORGANIC VS. INORGANIC

PROCEDURE:

1. Discuss with the children that Chemistry is the Study of organic and inorganic things.
2. One way to tell the difference between organic and inorganic things is through COMBUSTION. Combustion is the ability to BURN something. Organic things will burn easily. Inorganic things will generally not burn. Certain inorganic things will burn if they get hot enough
3. Demonstrate Combustion (burning):

A. ORGANIC BURNING (Have a tray of water available to put out matches, etc.) Light a match, explain it is made from a mixture of chemicals to get it to light and catch the wood/paper on fire. Also, light the candle. Ask for examples of organic material...gasoline, wax, etc.

B. INORGANIC BURNING While the candle is burning, tell the children that Inorganic chemicals do not burn because of their chemistry. If you sprinkle salt on the candle, it goes out because salt smothers the fire due to lack of air and doesn't burn.

C. SPECIAL CASES Soil is a special case. Soil is a mixture of both organic and inorganic things. The organic things in soil may burn, but will eventually burn itself out because the rest of it is inorganic.

Certain metals, if heated hot enough, will burn.

PUT ON YOUR SAFETY GOGGLES. Using sand paper, remove the oxidation from a 1.5 inch long piece of Magnesium ribbon. Hold the ribbon into the candle fire. It will ignite with bright white light!

QUESTIONS:

1. Where have you seen this bright of light before? (4th of July. Magnesium is in fireworks and creates the bright white. Sulfur creates the red light)

ACTIVITY 4: BUBBLE FOAM GENERATOR

PRCEDURE:

1. Place the two pop bottles inside the cake pan. Fill one with baking soda and a few drops of soap prior to the experiment. Also, have one cup with water, and one with vinegar.
2. Call up two volunteers.
3. Have one put the water in the empty bottle. Explain we forgot to say the magic words.
4. Have the other volunteer pour the vinegar in the bottle. Watch the foam rise.

QUESTIONS:

1. Ask the students to hypothesize why the reaction occurred. Would the same reaction occur if the ingredients were changed? This might lead to experimenting with other ingredients. (A chemical reaction produces tiny soap bubbles filled with carbon dioxide)
2. Stress how chemists experiment similar to this, that the reaction one gets depends on what is put in.

ACTIVITY 5: DISSAPPEARING WATER

PROCEDURE:

1. Before this demonstration, have three cups and one with about a Tablespoon of powdered Sodium Polyacrylate
2. Pour some water in a cup that doesn't contain the chemical. Ask the students to carefully watch as you switch the cups around. Go slow and tell them this is for practice. When they identify the cup, pour the water into the cup with the sodium polyacrylate in it.
3. Switch the cups around faster. The water is "magically" gone. Prove it, by placing all three cups upside down.

QUESTIONS:

1. What happened to the water? (Show the students the contents of the cup. Sodium polyacrylate absorbs water. Explain the same chemical is in baby diapers. Pour water into a diaper above someone's head.)

ACTIVITY 6: SLIME

PROCEDURE:

1. Using the plastic cup, add the glue solution and a few drops of food coloring.
2. Next, add about half as much of the borax solution to it, while stirring constantly.

3. Show the class the “slime” you created.

QUESTIONS:

1. Was this magic? What do you think happened to the glue mixture? Both were runny liquids, so why did they turn into slime?

(White glue is an example of a polymer. Poly means many and mer means unit. Polymers are made by combining many repeating units called monomers. Mono means one. White glue is composed of a chemical called “polyvinyl acetate”. The glue is thick because the polyvinyl acetate is like chains. The chains have a hard time moving against each other so the glue is thick. When you add the starch solution to the polyvinyl acetate, the polyvinyl acetate chains link together like the steps on a ladder. The borax forms bridges with the polymer chains binding them together (cross-linking) and producing the more viscous solution.

ACTIVITY 7: POKE DON’T SOAK

PROCEDURE:

1. Fill a plastic bag about 3/4 full of water and seal it.
2. Pick a student to come to the front of a room and experiment over their head.
3. Take the bag over their head. Ask them if they mind if you poke the pencils into the bag with the bag over the top of their head.
4. While holding the bag over their head, poke the pencils in one at a time.

QUESTIONS:

1. Why do you think very little or no water spills? (Look closely at the plastic bag surrounding the pencil. Notice how it is attached to the pencils)
2. How is this like the slime? (Plastic is made of long thin polymers)

ACTIVITY 8: OUT WITH A BANG

PROCEDURE:

1. Using the Vaseline, rub a little on the knitting needles before the students arrive.
2. Inflate the balloon and tie it off. Show the children the knitting needle. Take the needle and jab the side of the balloon to make it pop. Ask the children if it is possible to put the needle through the balloon without popping it.
3. Inflate another balloon and tie it off.
4. Using a gentle twisting motion, insert the needle into the knot end of the balloon where the rubber is thicker.
5. Continue pushing the needle until it touches the other inside and twist through.
6. Gently pull the needle back out. While the balloon is still inflated, pop it from the side to prove it is a real balloon.

QUESTIONS:

1. Why didn’t the balloon pop? (Balloons are made of a thin sheet of rubber that contain many strands of polymer chains. The elasticity of these polymer chains causes rubber to be stretchy. Blowing up the balloon stretches these strands of polymer chains. The strands in the balloon stretch more in the middle than the ends.