Explore Agriculture through Science- small activities

Dancing Popcorn in a Jar

Why does popcorn pop? Well popcorn pops due to the water stored in a small circle of soft starch in each kernel. As the kernel is heated, the water heats and expands. At around 212 degrees, the water turns into steam and changes the starch inside the kernels into a gooey mixture. The kernel will continue to heat to around 347 degrees until it pops. When the kernel pops, the steam is released and the gooey starch mixture comes out, cooling immediately and creates the odd shapes we know as popcorn. When this happens, the popcorn really turns itself inside out. Each kernel increases 40-50 times its original size when it pops!

Amazingly, Americans eat more than 16 billion quarts of popped popcorn a year. That means that each American eats approximately 51 quarts, or 204 cups of popcorn a year! This activity doesn't actually make edible popcorn, but is a fun experiment for students to watch how gasses capture popcorn to make them dance.

Materials

- Clear glass container
- Popcorn kernels
- 2 ½ - 3 cups of water
- 2 Tbsp. baking soda
- 6 Tbsp. white vinegar
- Food coloring optional

Directions

1. Fill your jar with water and add food coloring.
2. Add 2 Tbsp. of baking soda and stir until it is dissolved.
3. Add a small handful of popcorn kernels.
4. Add the vinegar and watch the corn jump up and down.

Explanation: When the baking soda and vinegar combine, they react, producing carbon dioxide gas. These gas bubbles form around the kernels, lifting the kernels up to the surface where the gas bubbles pop and the corn is released to be surrounded by a new gas bubble.

Activity idea from www.onetimethrough.com

Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608

Rev. Jun-17

TEXAS FARM BUREAU®

Let's Make Salt Fireworks

Texas grows an abundance of corn each year. Most of the corn in Texas will be used not as food corn but as corn byproducts and to feed animals. These byproducts are added to many different everyday items such as toothpaste, gum, sweetener, ethanol and fireworks.

Fireworks use the byproduct corn starch. The starch is broken down even further into dextrin, which is a key ingredient in fireworks. Dextrin acts as a binder and as a fuel for the fireworks explosion. Without corn to create corn starch, fireworks wouldn't be the same.

Corn is a great addition to our diet, in other ways than just corn on the cob. Oil from the germ of the kernel is low in saturated fat. This low fat product is ideal for health conscious Americans. Starch from our little friend provides carbohydrates to our diet. This provides needed energy for growth and activities. Fructose, from cornstarch, is a sweetener that is 1 ½ times sweeter than refined sugar. Less fructose is needed to sweeten so the foods contain fewer calories. Fructose also helps the body utilize protein.

Fewer calories, higher fiber, reduced amounts of sugar and less fat are all parts of a desirable diet. Corn in the human food chain helps provide all of these.

It takes a skilled person, called a pyrotechnic, to create fireworks. You students can use their new knowledge about the importance of corn in fireworks to create their own special show with simple, nonexplosive ingredients.

Materials

- Black construction paper
- Table salt
- Red and blue food coloring mixed with water
- Straws for droppers
- Glue

Directions

1. Have kids draw out fireworks with glue on their construction paper. This can be strait lines going out in an exploding motion or something more creative.

2. Sprinkle salt on the construction paper and shake off the excess.

3. Have students decorate the fireworks with the food coloring, using the straw as a dropper.

4. Let the water dry and you will have your own creative fireworks show!

Activity idea from www.craftymorning.com

Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608

Rev. Jun-17

How to make Cornstarch Goo

Supplies

- 1 cup cornstarch
- ¼ cup water
- Food coloring (optional)
- Container for goo

Directions

Mix all of the ingredients together in your container. If you are using food coloring, it is easier to put the coloring in the water first and mix. You can mix the goo with a fork or use your hands. The goo should be a solid when pressure is applied and a liquid when held in your hand. If the goo is too watery, add a small amount of cornstarch and mix. If it is too dry, add a small amount of water and mix. When adding extra amounts, a little goes a long way!

When you have the right consistency, start to play! See what you can make with the goo and what you can make it do. Use toys to enhance the fun. Bounce items into the goo and see what happens. Roll the goo into a ball and see how big you can make it. If you make enough, you can even walk on it!

Explanation:

The mixture of cornstarch and water is known as a non-Newtonian mixture. It acts differently than the majority of substances we know, causing a great mystery as to why it functions so oddly. The viscosity, or flow, of a non-Newtonian mixture depends on the pressure or stress applied. When more pressure is applied to our mixture, the atoms become more stressed, causing them to clump together and form a solid. When less stress is applied, they flow freely. Other non-Newtonian mixtures are honey, whipping cream and ketchup.

Corn Facts

- Corn is the most grown crop in Texas.
- The majority of corn grown in Texas is fed to animals.
- One bushel (56 pounds) will sweeten 400 cans of soda!
- The average ear of corn has 16 rows. Ears will always have even number of rows.
- Most ears of corn will have about 800 kernels.
- One acre is about the size of a football field.

Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608

Rev. Jun-17

Milk- More than a Healthy Drink

A dairy farm raises cows for milk. The dairy farmer used to milk the cows by hand. He would sit on a stool beside the cow, place a bucket under her udder and squeeze each of the four teats so that milk would go into the bucket. Now farmers use milking machines to speed up milking. These machines are a part of a parlor or stalls, which many cows step into at a time. Before the milk machines are attached, the udders are cleaned to ensure milk safety. The machines gently pull the milk out of the udders, going into a large tank where it is cooled very quickly. Dairy cows are milked two or three times a day, evenly spaced out to make the cows comfortable.

Every day a tanker truck takes the milk from the farm to a processing plant. Here, the milk is pasteurized. That means it is heated to 160 degrees for 15 seconds to kill any bacteria such as E.coli or salmonella that the milk might have contain naturally. The milk is also homogenized to keep the fat in the milk from rising to the top. After the milk has been pasteurized and homogenized, it is put into cartons or plastic jugs and taken to the grocery store. Butter, cheese, yogurt, ice cream, and sour cream are all dairy products that are made from milk.

Dairy is an important part of any age person's diet, adding many key nutrients our bodies need to best perform. The following three activities involve dairy products and turning them into a tasty treat!

Shake and Make Butter

Materials

- Pint size jar or cup with lid
- heavy whipping cream, room temperature
- salt
- crackers

Directions

1. Fill the jar 2/3 full of heavy whipping cream. Add salt if desired. Secure lid.
2. Shake container for 5-10 minutes.
3. When a solid lump forms in jar, open the container and pour out buttermilk.
4. Spread on crackers or bread and enjoy.

Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608

Ice Cream in a Bag

Materials

The recipe is for one student so everyone can have their own bag

- Measuring cups and spoons
- ½ cup milk
- ½ teaspoon vanilla
- 1 tablespoon sugar
- 4 cups crushed ice, regular will work as well
- 4 tablespoons salt, rock salt is best
- 2 quart Ziploc bags
- 1 gallon Ziploc freezer bag

Directions

1. Place the milk, vanilla and sugar into one of the quart size bags. Seal the bag, trying to get the most air out as possible.

2. Place this bag inside the other quart size bag and seal again.

3. Put the bag of liquid inside the gallon size bag and fill with ice. Sprinkle salt on the ice.

4. Squeeze the air out of the bag and close.

5. Shake and massage the bag, letting your liquid get surrounded by ice. In about five minutes, the liquid should turn to ice cream.

6. Take out the quart bag, whipping it off. Cut off a bottom corner and squeeze into a bowl or eat out of the bag.

Explanation:
Ice cream freezes at 21 degrees Fahrenheit. Ice cream can be made in the classroom with the understanding that the freezing point of water is actually lowered by adding salt to the ice between the bag walls. Heat energy is transferred easily from the milk through the plastic bag to the salty ice water, causing the ice to melt. As it does so, the water in the milk freezes, resulting in ice cream.

Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608

Milk Color Explosion

Materials

- Milk (whole or 2%)
- Bowl
- Food coloring
- Dish soap
- Cotton swabs

Directions

1. Pour milk into bowl.

2. Add one drop of different colored food coloring to the milk. Place the drops near each other in the center of the bowl.

3. Touch a clean cotton swab in the middle of the colors, careful not to mix anything. Did anything happen?

4. Next place a small amount of dish soap on the cotton swab and repeat. Did anything this time? Hold the swab in place and watch the color keep moving.

5. Experiment with different types of milk to see if the same reaction occurs. Do different soap types have different effects on the milk? What if the milk was cooler or hotter?

6. What if you place the food coloring farther apart? Does the same reaction occur?

Explanation:
Simple- When the soap touches the milk, it weakens the surface tension at that spot, causing a ripple to explode outward and spread out the food coloring.

In depth-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). The secret of the bursting colors is the chemistry of that tiny drop of soap. Dish soap, because of its bipolar characteristics (nonpolar on one end and polar on the other), weakens the chemical bonds that hold the proteins and fats in solution. The soap's polar, or *hydrophilic* (water-loving), end dissolves in water, and its *hydrophobic* (water-fearing) end attaches to a fat globule in the milk. This is when the fun begins.

The molecules of fat bend, roll, twist, and contort in all directions as the soap molecules race around to join up with the fat molecules. During all of this fat molecule gymnastics, the food coloring molecules are bumped and shoved everywhere, providing an easy way to observe all the invisible activity. As the soap becomes evenly mixed with the milk, the action slows down and eventually stops.

Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608

Let's Brush Those… Eggs?

Materials

- Four boiled white eggs and one raw white egg
- Small clear cups
- Dark sodas, coffee and tea
- Vinegar
- Tooth brush
- Tooth paste

Directions

1. Place the four boiled eggs into the clear cups. Cover each egg with a different dark liquid.

2. Place the raw egg into a cup and cover with vinegar.

3. Discuss with your students what they think will happen to the eggs in the different liquids.

4. Let the eggs sit in the liquids overnight, checking on them during the day to monitor progress.

5. The next day, take the eggs out of the liquids and keep track of which liquid they were submersed into.

6. The vinegar egg shell will have dissolved overnight, resembling what plaque does to our teeth, creating cavities.

7. Discuss with your students what happened to the eggs. Why did they turn colors? Why did the shell disappear?

8. Brush each egg like you would your teeth. What happens once they are brushed? Did the tooth paste remove the stains? Did different liquids react differently on the eggs?

9. Ask your students what they learned from the experiment. What will they do differently now?

*Activity from www.luvprek.blogspot.com

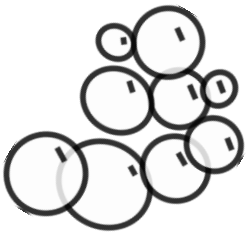
How to make Homemade Bubbles

Recipe one

- 4 ½ cups water
- ½ cup dishwashing detergent
- 4 Tbsp. glycerin- available at pharmacies

Recipe two

- 12 cups water
- 3 cups dishwashing detergent
- ¾ cup corn syrup



Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608

Density Tower

Materials

- Tall, narrow, clear container
- Food coloring optional for liquids
- 1.5-3 ounces of the following liquids
- Items across from the liquids

Lamp oil	Ping pong ball
Rubbing alcohol	Soda bottle cap
Vegetable oil	Plastic bead
Tap water	
Dish soap	Cherry tomato
Milk	Board game die
Maple syrup	
Corn syrup	Popcorn kernel
Honey	Metal nut or bolt

Directions

1. Pour your honey into your container. All liquids from now on will be poured *slowly*!

2. Pour the liquids slowly in the following order- corn syrup, maple syrup, milk, dish soap, tap water, vegetable oil, rubbing alcohol and lamp oil. When pouring the liquids pour the liquid into the middle of the container. You can color each liquid with different colors to make an easier observation for your students.

3. Let the liquids settle and you will observe layers that appear. These layers will be in the order you poured them in.

4. Have the students make a chart of the layers.

5. Drop the items into the container in the following order-metal nut or bolt, popcorn kernel, die, cherry tomato, plastic bead, soda bottle cap, ping pong ball.

6. Observe where the objects stop and have students add to their chart. Are there any objects that are in the middle of layers?

7. Students can also drop various items into liquids and guess which liquid they will be suspended in.

8. Have a discussion with your students on density. This will explain why the objects and liquids separate out.

   Activity idea from www.stevespanglerscience.com/

Agriculture in the Classroom
P. O. Box 2689
Waco, TX 76703
www.texasfarmbureau.org

P. (254)751-2569
P. (254)751-2608