

Aug 7 - Amazing Milk

Today we'll see an explosion of colour when we mix three common ingredients found in our kitchen: milk, food colouring and dish soap.

***Remember to ask an adult before doing these experiments.**

Materials

Milk (preferably whole)

Plate

Food colouring (different colours)

Liquid dish soap

Cotton swabs

Procedure

1. Pour some milk into the plate, enough to cover the bottom, and let the milk settle.
2. Add one drop of each colour of food colouring to the milk, close to the middle of the plate.
3. Take the cotton swab and touch the tip of it into the middle of the milk. Make sure that you just touch the milk. Be careful not to stir the milk.
4. Now place a drop of the liquid dish soap on the cotton swab. Touch this end of the cotton swab to the center of the milk. If nothing happens right away hold the swab there for a few seconds.
5. Now add another drop of dish soap to the cotton swab and try touching the milk with it again, try placing the cotton swab in different spots on the plate.

Explanation

Milk is made up of many things. It's actually mostly water but also contains vitamins, minerals, protein and fat. The important things for this experiment are the protein and fat.

The fat and the protein in the milk are very sensitive to changes in the milk, so when you add the soap to the milk you actually change the milk. The chemical bonds holding the fat and protein in place are altered by the addition of dish soap. Now the fat and protein molecules move around in all directions. This movement bumps the food coloring molecules.

The food colouring lets us see the invisible activity that is going on in the milk.

Since milk contains mostly water it has surface tension similar to water. This is why food colouring floating on the surface of the water usually stays where you placed it. When you added the dish soap, it broke the surface tension and allowed the food colouring to move throughout the milk.

Additional Experiments/Questions

Repeat this experiment again using milk with lower fat content. Did the same thing occur? What if you water instead of milk? What happens?

This will be my last science experiment for Praxis. Look for a great experiment next week from our new Executive Director Karly Burr.

Alannah Maurer, PhD
Regional Executive Director
Praxis – The Science & Technology Hotline

August 14

Hello, my name is Karly Burr and I am the new Regional Executive Director at Praxis. Today I have an experiment that will help you predict when stormy weather is on its way. Meteorologists use special equipment to measure changes in everything from UV intensity to precipitation. They compile this information to predict the weather every day. In this experiment we will build a barometer, which will measure changes in the atmospheric pressure.

Remember to ask an adult before doing these experiments

Materials

- A balloon
- A clean jar
- Drinking straw
- Rubber cement or other strong glue
- Ruler
- Tape
- Scissors
- Rubber band
- Piece of wood or thick cardboard

Procedure

1. Paint or squeeze the glue onto the rim of the jar.
2. Cut the neck off the balloon and stretch it over the mouth of the jar, holding it flat and in place with the elastic.
3. Cut the end of the straw so it makes a sharp point and tape it to the balloon so the pointed end sticks out. Make sure the blunt end of the straw is near the middle of the balloon.
4. Seal the jar so no air can get in or out with more glue and the rubber band.
5. Tape the jar to the wood so the straw points over the piece of wood.
6. Tape the ruler to the piece of wood at the end of the straw, making sure the straw doesn't touch the ruler.
7. Make sure to put your barometer somewhere in your house that stays around the same temperature, so keep it away from heaters and windows.
8. Check the barometer every couple of days and take note of where the straw is pointing.

Explanation

The tip of the straw will move up and down corresponding to changes in atmospheric pressure. When storms move through, the atmospheric pressure outside of the jar drops, and the balloon will swell because the air pressure in the jar is higher than it is outside. This swelling in the balloon causes the point of the straw to move down the ruler. If the atmospheric pressure increases, which it does during nice weather, the balloon will return to the initial pressure marking. Check your barometer every couple of days and you may be able to predict when a storm is on its way.

Karly Burr
Regional Executive Director
Praxis – The Science & Technology Hotline

August 21 – Homeostasis

The human body does a lot of amazing things. Many of the things our bodies do every day occur without us even thinking about them, like breathing. One important set of automatic functions is homeostasis. Homeostasis is a set of processes that help a living organism maintain its internal conditions (like blood pressure and temperature) when outside conditions change. It is partially responsible for everything from feeling thirsty to being tired at the end of the day. Today we will explore one of the homeostatic mechanisms of the body.

Remember to ask an adult before doing these experiments

Materials

- A pair of socks
- Some water
- A nice warm day

Procedure

1. Soak one sock in water and wring it out, so it's still wet but not dripping.
2. Go outside and put the dry sock on one foot and the wet sock on the other foot.
3. Wait a few minutes with your feet in the sun and notice any differences in temperature of your feet.

Explanation

The foot with the wet sock should feel cooler than the foot with the dry sock. This is due to evaporation which is the phase change from liquid to gas. Every time liquids evaporate from a surface, heat from that surface is used up and the surface becomes cooler. When the sun and your body warm up the water on the sock, the water absorbs heat from your body to turn into a gas. This causes the wet foot to be cooler than the dry foot.

Can you think of a way this applies to the human body? If you guessed sweat, then you are right. When your body heats up above 37°C, either through exercising or the temperature outside, your skin is signaled to sweat. After that signal your sweat glands release water out of your skin which can then evaporate and cool you down. Air movement, such as wind can

increase evaporation, which is why you might not feel as sweaty on a windy day compared to a calm day.

Extension

Try this experiment in a house with very good air-conditioning. When the air-conditioning is on, put on the socks from above and put your feet in front of a fan. See what happens to the leg that has the wet sock on it. Look up what causes goose-bumps in an encyclopedia or on the internet.

Karly Burr
Regional Executive Director
Praxis – The Science and Technology Hotline

August 28 - You scream, I scream

Some of the best science experiments combine food and fun! This week we will be expanding our knowledge of freezing points while making a yummy treat.

Always remember to ask an adult before doing any science experiment

Materials:

- ½ cup cream or milk
- 1 tablespoon sugar
- ½ teaspoon vanilla or other flavoring
- 2 small re-sealable freezer bag
- 1 large re-sealable freezer bag
- 3-4 cups ice
- 4-6 tablespoons salt
- Mittens or gloves
- A friend

Procedure:

1. Mix the first 3 materials together and place in 1 small re-sealable bag. Squeeze out as much air as possible and seal shut.
2. Put this filled bag into the other small bag and squeeze out all of the air before sealing shut. Double bagging prevents salt water from contaminating the cream mixture.
3. Fill the Large freezer bag ½ to ¾ full of ice and add the salt.
4. Place the double bagged cream mixture into the large freezer bag and seal shut. To prevent ice from escaping you may want to tape the top shut.
5. Both you and a friend should put on mittens and go outside. Toss the freezer bag back and forth.
6. After 10-15 minutes of throwing the bag around, open up the bags and check out your icy treat.
7. Grab a spoon and enjoy your ice cream! Each recipe makes 1 serving.

Explanation:

As we have discovered in other experiments this summer (Anti-freezing) mixing water with salt decreases the freezing temperature of the water. Plain water freezes at 0 C, so adding salt makes the water freeze at temperatures as low as -20°C . Combing the salt with the ice lowers the

freezing temperature of the mixture.

As the ice melts, the water combines with the ice to form a brine solution (salt water), which has a freezing temperature much lower than 0 C. The heat produced from the salt dissolving in the water, as well as the heat produced from the melting ice cubes is adsorbed from the ice. This means that adding salt to the ice cubes has made the ice and salt water mixture colder than 0°C. Lowering the temperature of the ice is dependent on the concentration of the salt.

So, why can't we make ice cream with just plain ice? We learned in another experiment (Amazing milk) that milk (and cream) is made up mostly of proteins, fat and water. To make ice cream, we also added sugar. Just like adding salt to water decreases the freezing point of the water, the fat, protein and sugar in the milk decreases the freezing temperature of the ice cream mixture. Therefore, plain ice is not cold enough to freeze the ice cream.

Extension:

The difference between milk and cream is the fat content. Try making 2 kinds of ice cream; one with cream and one with milk. See if the difference in fat content changes the time it takes to make the ice cream. Check and see if the fat content changes the taste. Enjoy!

Karly Burr
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