May 1 - Swimming in Salt Water

If you've ever had difficulties swimming, has someone told you that swimming in salt water is easier because you're "extra" buoyant? This means it's easier to float. Do you know why that is? Let's first discover if it's actually true that things float better in salty water.

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

Materials

Raw egg
1 cup salt
Water
Measuring cup
1 large drinking glass
Spoon

Procedure

Fill the large glass ¾ full with tap water.
Carefully place the egg in the water. What happens?
Remove the egg from the water. Make sure the glass is still ¾ full of water.
Slowly add ½ cup of salt to the water in the glass.
Stir until the salt dissolves.
Add another ½ cup of salt to the water. Don't worry! You can't add too much salt!
Continue stirring until the salt dissolves.
Carefully place the egg in the water. What happens this time?

Results

When the egg was placed in the tap water, it sank to the bottom of the glass.
But when the egg was placed in the salt water, it floated.
If you put enough salt in the water, the egg should have floated right on the top of the water.

Explanation

We just saw buoyancy in action! Buoyancy (the ability to float) occurs when a fluid (our salt water) exerts upward pressure on something (the egg) and causes it to rise.
When we dissolved the salt in the water it made the water denser. The water is dense because it contains lots of salt particles. So while the egg sunk in ordinary tap water, the salt water exerted a greater upward force on the same egg and caused it to float.

Additional Questions and Experiments

Do you think a sugar-and-water solution would have the same results as our salt solution?
Would it take more or less sugar in the water compared to salt to make the egg float?
What other substances that can be dissolved in water might cause the same effects?
Would a boiled egg float the same as a raw egg?
There should be no end to the questions you can ask about buoyancy! Happy experimenting!

Alannah Maurer, PhD

Science Smarts Column – May 2010

Regional Executive Director
Praxis – The Science & Technology Hotline

May 8 - Fat in Foods

You may remember that I have a special interest in nutrition, so I thought this week we would try a simple experiment to determine if a particular food has fat in it.
Fat is a component of food. Some foods contain little or no fat, while others are quite high in their fat content. We all need some fat in our diet every day to stay healthy.
Let's see if we can tell which foods that we commonly eat have more fat.

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

Materials

A sheet of paper
Pencil
Whole milk
Butter or margarine
Peanut butter (do not use this if you have nut allergies!)
Lemon or orange
Liquid honey
Potato chip

Procedure

Draw 6 small circles on the piece of paper. Label each circle with one of the foods that you will be testing. Rub a small bit of each food on the paper in its own circle. After 10-15 minutes, examine both sides of the paper.

Results

Some of the circles will be dry. Other circles will appear greasy and the spot will be spreading.

Explanation

All the foods produce a spot on the paper by filling the spaces between the fibres of the paper. Spots that are made by water in the food evaporate in the air and dry. But the globules of fat remain. They would have to be broken down by something like dish soap.

Additional Experiments/Questions

Keep the piece of paper for the rest of the day. Observe the different circles throughout the day. How far have some of the spots spread?
Try this experiment with a variety of foods found in your fridge and kitchen. Again, ask an adult before using different types of food.
Many food products today are called "low-fat". Can you see the difference between regular and low-fat using our simple experiment?
There are also various types of fats, including unsaturated, saturated, and trans fats. Why not do a little bit of research on your own to see what the difference is between the types of fats. Then

check the nutrition labels on different food products you find around the house. Which foods are high in each different type of fat?
Happy experimenting!

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

May 15 - Green Pennies

Today we'll try another experiment using things we easily find around the house – vinegar and pennies!
I know this might sound like a strange combination but we're going to see a chemical reaction take place overnight. We'll also learn some words related to chemistry that you may or may not already know.

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

Materials

Saucer or small plate
Paper towel
Vinegar
4 or 5 pennies

Procedure

Fold the paper towel and place it on the plate.
Pour vinegar over the paper towel – use enough to cover the paper towel.
Place the pennies on top of the paper towel.
Leave them for at least 24 hours.

Results

There should be a green coating on the top of the pennies. The bottom of the pennies should have retained their copper appearance.

Explanation

Vinegar is acidic. It contains acetic acid. An acid has a pH less than 7. pH is a measure of whether a chemical is an acid or a base (distilled water has a pH of 7 which is considered neutral).
When oxygen is present, a chemical reaction occurs between the copper in the pennies and the vinegar producing the green coating we saw on the top of the pennies. This green coating is called copper acetate.
When no oxygen is present (on the bottom of the pennies), this reaction does not take place and the pennies look normal. Oxygen is required for many chemical reactions to occur.

Additional Experiments/Questions

How long does it take for the pennies to look normal again after you take them off the plate?

Try this experiment again, but this time leave the pennies on the plate long enough for the paper towel to dry out. What colour do you see spreading from the pennies? Can you find out what causes this colour?

Happy experimenting!

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

May 22 - Ice Cube Party Trick

Here's a fun trick to try at a party. And of course it uses science!

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

Materials

A glass of water
Salt shaker with salt
Approximately 15 cm of string or thick thread
An ice cube

Challenge

Ask people to rescue an ice cube from a glass of water using a piece of string without getting their hands wet.
Tell them they may use anything on the party table except the dishes or utensils.
If no one succeeds, you can show them how it's done!

Procedure

Place the ice cube in a glass of water.
Hang the end of the string over the edge of the glass.
Place the other end of the string on the ice cube.
Sprinkle some salt on the ice cube where the string is sitting on it and let it stand for 5-10 minutes.
Try to lift the ice cube with the string.

Results

The string will freeze onto the ice cube. Then when you pull the string up, the ice cube will lift out of the water. If this doesn't work right away, just try to vary the amount of time the salt sits on the ice cube.

Explanation

When you sprinkle the salt on the ice, it lowers the freezing point of water and causes the surface of the ice cube to melt just a little bit. Then, as the ice refreezes, it traps the string and attaches it to the ice cube.

Volunteers Needed!
Wanted! Adults with an interest in science!
Do you work in a science-related field or have a hobby that involves science? Would you be interested in sharing your love of science with kids in our community?
Please call me at 403-527-5365 or email me at praxis@praxismh.ca.

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

May 29 - Crystals

This week we're going to learn about crystals and we'll grow both salt and sugar crystals.
This experiment will take a few days, but you should have some amazing crystals at the end!

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

Materials
Warm water
2 large glasses or jars
Salt
Sugar
String
2 pencils
2 nails or 2 large paperclips

Procedure
Fill a jar ¾ full with really warm water.
Stir in 1 tablespoon of salt at a time. Keep adding salt until the salt no longer dissolves.
Attach the nail or paperclip to one end of the string.
Wrap the other end of the string around a pencil.
Rest the pencil over the edge of the jar and suspend the nail or paperclip in the jar so that it hangs down into the water but doesn't touch the bottom of the jar.
Cover the jar with a piece of paper towel or a coffee filter and place in a warm place.
Repeat these steps using sugar instead of salt.

Results
After a few days, the water slowly evaporates and crystals form on the string and on the nails or paperclips.

Explanation

Crystals are formed from a regular, repeated pattern of connected molecules – in our experiment we grew crystals from table salt (sodium chloride) and sugar (sucrose) molecules.
As the water evaporates from the salt and sugar water, the molecules of salt or sugar draw closer together and form cube-shaped crystals.

Additional Questions/ Experiments

Can you think of a gemstone that is a crystal?
What other crystals exist in nature?
Does the size of the nail or paperclip change how the crystals look? What about using different types or thickness of string?
Try growing a crystal garden. Pour your saturated solution (salt or sugar) over something like a brick, sponge or rocks. Cover this with a coffee filter to keep out dust and allow the liquid to slowly evaporate.

Happy experimenting!

Alannah Maurer, PhD
Regional Executive Director
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