exp!ore

LAB SCIENCE

About Our Program!

The Michigan Department of Community Health (MDCH) Bureau of Laboratories is the State Public Health Laboratory. We are proud to announce our Explore Lab Science Program.

The goal of the Explore Lab Science Program is to introduce children to lab science at an early age.

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Visit Our Website!

www.michigan.gov/explorelabscience

- Take a tour of our laboratory online.
  - We have short video clips that highlight testing areas within our laboratory!
- Learn about science by participating in games and activities online.
  - Watch the ***Why Am I Sick*** video and learn about good germs and bad germs!
- Find additional experiments to complete at home.
  - Learn about cell structures by making your own pizza. Check out ***Life Inside a Cell!*** for more information.

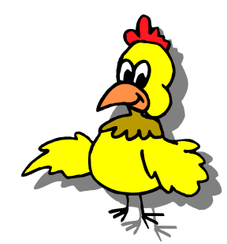
All of these activities and more are available at:
www.michigan.gov/explorelabscience

Try Our Experiments!

This activity packet contains experiments that can be completed at home (with adult supervision). Enjoy learning about science and don't forget that science is all around us! Continue to learn about science this summer!

Featured Experiments:

Candy Chromatography



Rubber Chicken Bone

Three Layer Float

Rubber Chicken Bone

This activity is recommended for 9th-12th grade students. Younger children may participate with adult supervision.

What will I need?

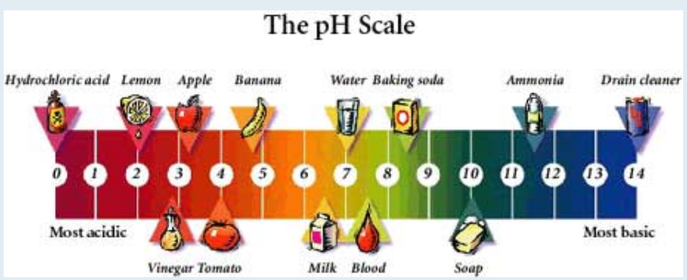
- Chicken bone
- A bowl or a jar with a lid, that is large enough to hold the chicken bone
- Household distilled vinegar

What do I do?

1. Begin by saving a chicken bone. Chicken drumstick bones work best, but any chicken bone will do.
2. Rinse off and dry the chicken bone. Make sure there is no meat left on the bone.
3. Before you place the bone in the jar or bowl, make notice of how hard the bone is. Is it bendable?
4. Place the bone in the bowl or jar
5. Pour vinegar in the bowl or jar until it completely covers the bone.
6. Place the lid on the bowl or jar, and let it sit for 3 to 4 days.
7. After 3 or 4 days, gently remove the bone from the bowl or jar
8. Rinse the bone off with water, and try to gently bend it. Take notice of the differences before the bone is placed in the vinegar and after it is removed.

How did that happen?! What's so special about vinegar?

Vinegar is considered a strong acid because it is low on the pH scale. Acids low on the pH scale are strong enough to breakdown and dissolve away the calcium in the bone. The body needs Calcium to maintain the level of bone mass that is needed to support the bones and the structure of the body. Once calcium in bones is dissolved, there is nothing to keep the bones hard. The only thing left is the bone tissue. This bone tissue is soft and bendable.



Many of the liquids you have in your home are either acids or bases. If a liquid is an acid, we classify them as **Acidic**. If a liquid is a base, we classify them as **Basic**. Acidic liquids have more of the hydrogen or H+ ions and come from the Latin word *acidus* which means *sharp* or *sour*. Basic liquids have more of the hydroxide ions or OH- ions. Another word scientist use for base is alkali.

Three Layer Float

This activity is recommended for 5th-12th grade students. Younger children may participate with adult supervision.

What will I need?

- Tall clear bottle (or a tall clear glass will work as well)
- Vegetable Oil
- Water
- Honey
- 1 coin
- 1 cork(try using a plastic bottle top if a cork is not available)
- 1 grape

What do I do?

1. Fill the bottle at least 1/3 of the way with honey
2. Allow the honey to settle, and fill the bottle with oil another 1/3 of the way.
3. Fill the last 1/3 of the bottle with water
4. Allow the three liquids to settle. You will know that all of the liquids have settled once you see the three layers stacked evenly on top of one another.
6. Now that the layers have been settled, take the coin and drop it into the bottle. Take note of where the coin settles
7. Take the grape and drop it into the clear bottle. Take not of where it settles.
8. Take the cork and drop it into the bottle. Take not of where the cork settles.

What just happened here?

The coin, grape and cork settle in each of the three different fluid layers. Each item, just like each of the liquids, have difference densities. **Density** is a property of matter that is unique to each substance-meaning each substance has their own density; some more than others. Density is calculated by mass divided by volume. So, the same volume of two different liquids will have different weights because they have different masses. The liquids that weigh more (have a higher density) will sink below the liquids that weigh less (have a lower density). For example, 10 ounces of honey will weigh more than 10 ounces of water. Therefore, honey is denser than water.

As you poured each liquid into the bottle, you may have noticed that none of the liquids mixed. Each liquid has its own density, and each liquid formed a layer based on their density. The most dense liquid stays at the bottom, and the least dense liquid is at the top. The same thing goes for each of the items. The item which was most dense fell to the bottom, while to item with the least density floated on the surface of the liquid at the top.

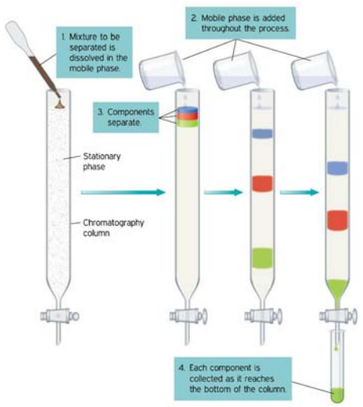
"Explore Science Every Day"

Visit www.michigan.gov/explorelabscience for more activities!

Chromatography: Real Laboratory Application

The Michigan Department of Environmental Quality and the Michigan Department of Community Health work together to determine which fish are safe to eat.

Laboratory scientists and technicians test fish for possible chemical contamination using column chromatography. Fish are processed and then added to columns to check for the presence of chemicals.



Results are reported in the ***Michigan Fish Advisory.*** This advisory is available so that you can see which fish have been tested for chemicals and are safer for you and your family to eat.

For more information visit www.michigan.gov/eatsafefish

Candy Chromatography

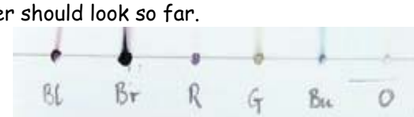
This activity is recommended for 5th-12th grade students. Younger children may participate with adult supervision.

What will I need?

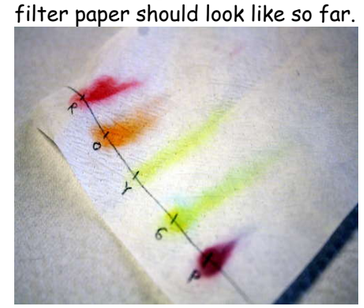
- M&Ms or skittles; 1 of each color
- Water
- Table salt
- Coffee filter paper
- Tall drinking glass
- Scissors
- Ruler
- Pencil
- Aluminum
- 6-8 toothpicks
- Large dish

What do I do?

1. Cut the coffee filter into a square, 3 inches by 3 inches. Ask an adult to help you
2. Using your pencil, draw a line at least 2 cm (or 1 inch) from the edge of the filter paper.
3. Count the number of candies you plan to use and place pencil marks along the line for each piece of candy you have. Make sure the marks are at least $\frac{1}{4}$ of an inch apart.
4. Underneath each marking, label the color of the candy you will test on each spot. Below is a picture of how your filter paper should look so far.



5. On your aluminum foil, place one drop of water for each piece of candy you have. Make sure the drops are spaced apart so that the water does not run.
6. Place one piece of candy on each drop. Let the candy sit for 1 minute or until the color has ran off. After the color has run off, carefully pick the candy up and throw it away (or eat it).
7. Dip a toothpick into a color and dab the color onto the pencil marking on the filter paper for that color. Make sure to use a clean toothpick for each color.
8. Allow the filter paper to dry, then go back and add more color to each marking, a total of three times, so that you have enough color in each sample.
9. When the paper is dry, fold it in half with the color sample markings on the bottom.
10. Prepare a 1% solution by mixing 1/8 teaspoon of salt and three cups of water in a tall glass. Stir the solution until the salt is completely dissolved.
11. Pour $\frac{1}{4}$ of the salt solution into the dish. Make sure the level of solution in the dish is below the markings. When the solution begins to rise up the paper, take it out of the dish, and place it on a dry, clean surface.
12. As the solution passes though the marking, the dyes from the candies will begin to separate. Below is a picture of what your filter paper should look like so far.



13. Take note of what you see

What just happened here?!

As the filter paper was placed in the solution, the solution was able to travel up the paper through capillary action. As the solution passes through each of the dyes, it begins to separate the dyes. Did you notice that some of the candy colors contained more than 1 dye? The dyes separate because some dyes are more likely to stick to the filter paper, while other dyes have a higher affinity for the salt water-which means some dyes are more willing to stick to the salt water, as opposed to other dyes.

What you just did is what scientist call **chromatography.** Chromatography, from the Greek word *chroma* meaning color and *graphein* meaning to write, is a laboratory method used to separate mixtures. Chromatography separates mixtures into two phases: a **stationary phase** and a **mobile phase.** The mobile phase is the solution that the mixture is dissolved in. The mobile phase carries the mixture through a structure holding another material to the stationary phase.

3 Ways to Keep Science FUN!

1 Ask Questions!

Not sure about something. Always ask How and Why?

2 Pay Attention!

Science is all about details. Pay attention, you may learn something.

3 Explore!

Perform experiments and try to predict what will happen.

Visit www.michigan.gov/explorelabscience for more activities!